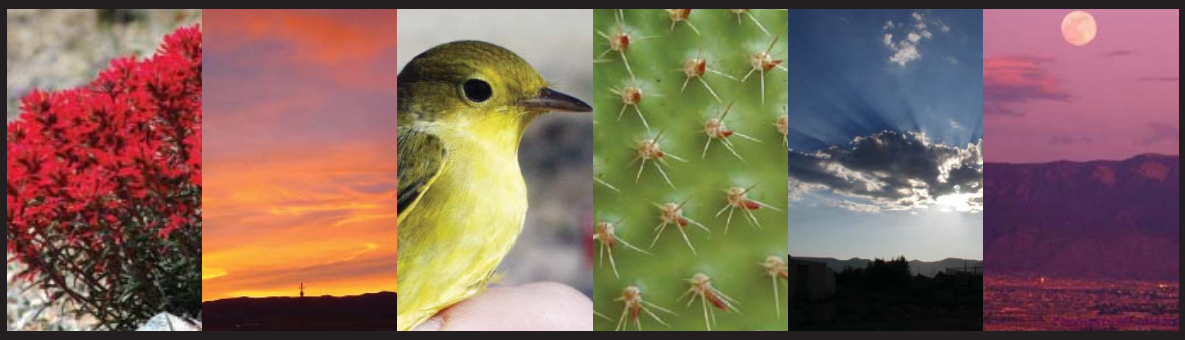
Sandia Report
SAND2014-15817R
Unlimited Release
Printed September 2014

2013 ANNUAL SITE ENVIRONMENTAL REPORT FOR SANDIA NATIONAL LABORATORIES NEW MEXICO



Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Approved for public release; further dissemination unlimited.

Sandia National Laboratories

U.S. DEPARTMENT OF ENERGY

National Nuclear Security Administration

SAND2014-15817R
Unlimited Release
Printed September 2014

Calendar Year 2013
Annual Site Environmental Report for
Sandia National Laboratories,
Albuquerque, New Mexico

PRODUCED BY:
Sandia National Laboratories P.O. Box 5800
Albuquerque, New Mexico 87185-0730

ABSTRACT

Sandia National Laboratories, New Mexico is a government-owned/contractor-operated facility. Sandia Corporation, 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 Field Office administers the contract and oversees contractor operations at the site. This annual report summarizes data and the compliance status of Sandia Corporation's sustainability, environmental protection, and monitoring programs through December 31, 2013. Major environmental programs include air quality, water quality, groundwater protection, terrestrial surveillance, waste management, pollution prevention, environmental restoration, oil and chemical spill prevention, and implementation of the National Environmental Policy Act. Environmental monitoring and surveillance programs are required by DOE Order 231.1B, *Environment, Safety, and Health Reporting* (DOE 2012).

Calendar Year 2013 Annual Site Environmental Report
Sandia National Laboratories, Albuquerque, New Mexico
Final Approval date: August 2014

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

Prepared for:
U.S. Department of Energy, National Nuclear Security Administration,
Sandia Field 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 provided their time and expertise assisting in the production of the SNL/NM annual report:

PROJECT COORDINATOR/TECHNICAL REVIEWER
Stacy Griffith (Sandia)

DOE PROJECT LEAD/TECHNICAL REVIEWER
Karen Agogino (DOE/NNSA/SFO)

STATISTICS/DATA SUPPORT
Jun Li (Sandia)

WORD PROCESSING/PRODUCTION SUPPORT
Nancy White (Sandia)
Alexandra Minitrez (Sandia)

CONTRIBUTING AUTHORS

Avery, Penny
Bailey-White, Brenda
Bange, Marilyn
Barthel, Michael
Bonaguidi, Joseph
Brown, Mendy
Byrd, Caroline
Carpenter, Meaghan
Carter, Natalie
Castillo, David
Catechis, Christopher
Cox, Steve
Daniel, Carolyn
Deola, Regina
Duran, Leroy
Eckstein, Joanna
Evelo, Stacie
Herrera, Lorraine
Herring III, Allen
Jackson, Tim
Mauser, Joseph
McCord, Samuel
Miller, Amy
Miller, Mark
Mitchell, Michael
Moore, Michael
Nagy, Michael
Payne, Jennifer
Peek, Dennis
Reiser, Anita
Ricketson, Sherry
Rogers, Jessica
Roma, Charles
Salinas, Stephanie
Skelly, Michael
Ullrich, Rebecca
Vetter, Doug
Wagner, Katrina
Wood, Craig
Wrons, Ralph
Ziock, Robert

NOTE TO THE READER

The goal of the Sandia National Laboratories, New Mexico Annual Site Environmental Report is 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, questions, or requests for copies of this report and/or appendices to:

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

The SNL/NM Annual Site Environmental Report can be found at the following website:
http://www.sandia.gov/news/publications/environmental/index.html

This page intentionally left blank.

Acronyms and Abbreviations vii
Executive Summary S-1

1.0 Introduction 1-1
1.1 History 1-1
1.2 Mission 1-1
1.2.1 Operating Contract 1-2
1.3 Location Description 1-2
1.4 Laboratory Activities and Facilities 1-5
1.4.1 The Technical Areas 1-5
1.4.2 Other Facilities and Areas 1-6
1.5 Environmental Setting 1-6
1.5.1 Geology and Hydrology 1-6
1.5.2 Ecology 1-9
1.5.3 Climate 1-10

2.0 Compliance Summary 2-1
2.1 Compliance Status with Federal Regulations 2-1
2.1.1 Comprehensive Environmental Response, Compensation, and Liability Act 2-1
2.1.2 Emergency Planning and Community Right-to-Know Act 2-1
2.1.3 Resource Conservation and Recovery Act 2-4
2.1.4 Federal Facility Compliance Act 2-5
2.1.5 Atomic Energy Act 2-6
2.1.6 Clean Air Act 2-6
2.1.7 Clean Water Act 2-7
2.1.8 Safe Drinking Water Act 2-8
2.1.9 Toxic Substances Control Act 2-9
2.1.10 Federal Insecticide, Fungicide, and Rodenticide Act 2-9
2.1.11 National Environmental Policy Act 2-9
2.1.12 Endangered Species Act 2-10
2.1.13 Migratory Bird Treaty Act 2-11
2.1.14 Cultural Resources Acts 2-11
2.1.15 Environmental Compliance Executive Orders 2-12
2.1.16 DOE Directives 2-13
2.2 Occurrence and Release Reporting in 2013 2-13
2.2.1 DOE Order 232.2 Reportable Occurrences 2-13
2.2.2 Environmental Releases 2-13
2.3 2013 Audits and Appraisals 2-13
2.4 Summary of Reporting Requirements 2-19
2.5 Summary of Environmental Permits 2-19
2.6 Environmental Performance Measures 2-19

3.0 Environmental Programs Information 3-1
3.1 Environmental Management System Program 3-2
3.2 Environmental Life-Cycle Management Program 3-5
3.3 Environmental Restoration Operations 3-5
3.3.1 Waste Cleanup and Site Closures 3-5
3.3.2 Mixed Waste Landfill Activities 3-7
3.4 Long-Term Stewardship Program 3-8
3.4.1 Compliance Oversight 3-8
3.4.2 SWMU 502/Building 9938 Surface Discharge Site 3-11

3.4.3 Institutional Controls 3-12
3.4.4 Community Liaison and Planning, and Stakeholder Involvement 3-12
3.5 Ecology Program 3-12
3.6 National Environmental Policy Act Program 3-13
3.6.1 SNL/NM Site-Wide Environmental Impact Statement (SWEIS) 3-13
3.6.2 2013 NEPA Activities 3-14
3.7 Environmental Education Outreach Program 3-14
3.7.1 Annual Youth Conference on the Environment 3-14
3.7.2 EMS Excellence Awards Program 3-15
3.7.3 SNL/NM Phone Book Recycling 3-15
3.8 Chemical Information System and Chemical Exchange Program 3-15
3.9 Waste Management, and Material Sustainability and Pollution Prevention 3-16
3.9.1 Waste Management Facilities and 2013 Activities 3-17
3.9.2 Radioactive Waste and Mixed Waste 3-17
3.9.3 Hazardous Waste and Other Regulated Waste 3-20
3.9.4 Solid Waste Collection and Recycling Center 3-21
3.9.5 Materials Sustainability and Pollution Prevention (MSP2) Program 3-22

4.0 Terrestrial Surveillance Program 4-1
4.1 Program Objectives 4-1
4.2 Sample Media 4-3
4.3 Sampling Locations 4-3
4.4 Radiological Parameters and Results 4-9
4.5 Non-Radiological Parameters and Results 4-12

5.0 Air Quality Compliance and Meteorological Monitoring 5-1
5.1 Meteorological Monitoring Program 5-1
5.1.1 Meteorological Monitoring Results 5-3
5.1.2 Wind Analysis 5-5
5.2 Ambient Air Surveillance Program 5-5
5.2.1 Monitoring Stations 5-5
5.2.2 Ambient Air Monitoring Results 5-8
5.3 Radiological Air Emissions 5-11
5.3.1 Compliance Reporting 5-13
5.3.2 SNL/NM NESHAP Facilities 5-13
5.4 Assessment of Potential Dose to the Public 5-16
5.4.1 NESHAP Dose Assessment 5-16
5.4.2 Dose Assessment Results 5-19
5.5 Air Compliance Requirements and Compliance Strategies 5-21
5.5.1 SNL/NM Air Emission Sources 5-21
5.5.2 Title V 5-24
5.5.3 Compliance Strategies 5-25

6.0 Water Quality 6-1
6.1 Wastewater Discharge Program 6-1
6.1.1 SNL/NM and the ABCWUA 6-1
6.1.2 Permitting and Reporting 6-4
6.1.3 Wastewater Monitoring Stations 6-4
6.1.4 TA-V Wastewater Radiological Screening 6-5
6.1.5 Summary of Wastewater Monitoring Results 6-6

6.1.6 Sanitary Sewer System Releases in 2013 6-6
6.2 Surface Discharge Program 6-6
6.2.1 Surface Discharge Approvals 6-7
6.2.2 Activities at Evaporation Lagoons 6-7
6.2.3 Surface Discharge Releases in 2013 6-8
6.3 Stormwater Program 6-9
6.3.1 Storm Drain System 6-9
6.3.2 Permitting 6-10
6.3.3 Stormwater Monitoring Points 6-13
6.3.4 Routine Inspections and Monitoring 6-13
6.3.5 Activities in 2013 6-15
6.4 Oil Storage and Spill Control 6-15

7.0 Quality Assurance 7-1
7.1 Environmental Monitoring QA 7-1
7.1.1 Sample Management Office (SMO) 7-1
7.1.2 Selection of a Contract Laboratory 7-2
7.1.3 Quality Control for Samples 7-2
7.1.4 Data Validation and Records Management 7-3
7.2 2013 Sample Management Office Activities 7-3
7.2.1 Sample Handling and Analyses 7-3
7.2.2 Laboratory QA Assessments and Validation 7-4
7.2.3 QA Audits 7-4

8.0 References, Permits, Regulations and Standards for Environmental Programs 8-1

9.0 Glossary 9-1

Distribution Dist-1

NOTE: See Appendix C for Groundwater Levels. All appendices are located on attached CD on the back inside cover of this report.

APPENDIX A 2013 Wastewater Monitoring Results ..... (See Attached CD)
APPENDIX B Fiscal Year 2013 Site Sustainability Plan ..... (See Attached CD)
APPENDIX C Calendar Year 2013 Annual Groundwater Monitoring Report ..... (See Attached CD)
APPENDIX D 2013 Terrestrial Surveillance Results ..... (See Attached CD)
APPENDIX E 2013 Stormwater Sampling Results ..... (See Attached CD)

FIGURES

1-1 Map of Sandia National Laboratories, Technical Areas, and Permitted Areas 1-3
1-2 State of New Mexico Map 1-4
1-3 Faults and Hydrogeologically Distinct Areas 1-7
4-1 Terrestrial Surveillance Program On-Site and Perimeter Sampling Locations 4-8
4-2 Terrestrial Surveillance Program Off-Site Sampling Locations 4-10
4-3 TLD Exposure Rates by Year and Location Class 4-13

5-1 The Clean Air Network (CAN) of Meteorological Towers and Ambient Air Monitoring Stations 5-2
5-2 2013 Annual Wind Roses for Towers CL1, A36, and SC1 5-6
5-3 2013 Annual Wind Roses for Daytime and Nighttime Wind Frequency at the A36 Tower 5-7
5-4 Locations of the Facilities at SNL/NM that Provided Radionuclide Inventories in 2013 5-14
5-5 Summary of Atmospheric Releases of Argon-41 and Tritium from SNL/NM Facilities from 2000 to 2013 5-17
6-1 Wastewater Monitoring Station Locations 6-2
6-2 Stormwater Monitoring Point Locations at SNL/NM 6-11

TABLES

1-1 Common Plants and Animals Identified at KAFB 1-9
2-1 Major Environmental Regulations and Statutes Applicable to SNL/NM 2-2
2-2 2013 SARA Title III (or EPCRA) Reporting Requirements Applicable to SNL/NM 2-3
2-3 Threatened and Endangered Species Potentially Occurring in Bernalillo County, New Mexico 2-10
2-4 DOE Order 232.2 Occurrence Reports in 2013 2-14
2-5 Environmental Program Audits and Appraisals Conducted in 2013 2-18
2-6 Summary of Sandia Reporting Requirements to Outside Agencies (Other than DOE) for Releases of Pollutants or Hazardous Substances 2-20
3-1 Summary Data for SNL/NM NEPA Reviews Submitted to DOE/NNSA/SFO During Calendar Year 2013 3-13
3-2 Waste Shipped by SNL/NM Waste Management Facilities During Calendar Year 2013 3-18
3-3 Waste Recycled by SNL/NM During Calendar Year 2013 3-19
4-1 Decision Matrix for Determining Priority Action Levels 4-2
4-2 On-Site Terrestrial Surveillance Locations and Sample Types 4-4
4-3 Perimeter Terrestrial Surveillance Locations and Sample Types 4-6
4-4 Off-Site Terrestrial Surveillance Locations and Sample Types 4-7
4-5 Radiological Summary Statistics for Sample Locations Noted as Priority-2 During Calendar Year 2013 4-11
4-6 Radiological Summary Statistics for Sample Locations Noted as Priority-3 During Calendar Year 2013 4-11
4-7 Summary Statistics for TLD Exposure Rates, Calendar Years 2000 – 2013 4-12
4-8 Various Reference Values for Metals in Soil (all units in mg/kg) 4-14
4-9 Summary Statistics for All Locations Identified as Priority-2 for Metals in Soil During Calendar Year 2013 (all units in mg/kg) 4-15
4-10 Summary Statistics for All Locations Identified as Priority-3 for Metals in Soil and Sediment During Calendar Year 2013 (all units in mg/kg) 4-15
5-1 Annual Climatic Summary from Tower A36 During Calendar Year 2013 5-3
5-2 Variations and Extremes in Meteorological Measurements across the Meteorological Tower Network During Calendar Year 2013 5-4
5-3 Criteria Pollutant 5-Year Results as Compared to City of Albuquerque Maximum Monitored Data 5-8
5-4 Particulate Matter and Lead Monitoring Results as Compared to City of Albuquerque Maximum Monitored Data 5-9
5-5 Monthly and Annual Averages for PM_{10} (Air) During Calendar Year 2013 (all units in μg/m3) 5-9
5-6 Averaged Results of PM_{10} Analysis (Air) During Calendar Year 2013 5-10
5-7 Monthly and Annual Averages for $PM_{2.5}$ (Air) During Calendar Year 2013 (all units in μg/m3) 5-11

5-8 VOC Average Concentrations Compiled from Monthly Results at Four Stations (Air) During Calendar Year 2013 (*Average was computed using only detected results*) 5-12
5-9 SNL/NM Radiological Dose Reporting for Calendar Year 2013 5-12
5-10 Summary of Radionuclide Releases from NESHAP Sources During Calendar Year 2013 5-15
5-11 Annual Source-Specific Effective Dose Equivalent (EDE) from Primary Sources to Off-Site Receptors During Calendar Year 2013 5-18
5-12 Annual Source-Specific EDE to On-Site Receptors During Calendar Year 2013 5-19
5-13 Calculated Dose Assessment Results for On-Site and Off-Site Receptors and for Collective Populations During Calendar Year 2013 5-20
5-14 Boiler Fuel Usage and Emission Data During Calendar Year 2013 5-22
5-15 Generator Hours and Emission Data During Calendar Year 2013 5-23
6-1 SNL/NM Wastewater Discharge Permits and Station Characteristics 6-5
6-2 NMWQCC Monitoring and Reporting Requirements 6-7
6-3 SNL/NM Facilities Subject to Stormwater Permitting (These facilities are in areas where stormwater can potentially drain to Tijeras Arroyo) 6-12
6-4 MSGP Stormwater Monitoring Requirements During Calendar Year 2013 6-14
8-1 Summary of Environmental Permits and Registrations in Effect During Calendar Year 2013 8-13
8-2 Federal and State Air Regulations That Are Applicable or Potentially Applicable to SNL/NM Operations 8-19
8-3 Summary of Compliance History with Regard to Mixed Waste (MW) at SNL/NM 8-20
8-4 Quantity of Mixed Waste Subject to the Federal Facility Compliance Order (End of FY 2013) 8-23
8-5 Derived Concentration Standards (DCS) for Selected Radionuclides 8-25
8-6 General Dose Limits to the Public from DOE Facilities 8-25
8-7 Groundwater Monitoring Parameters Required by 40 CFR 265, Subpart F 8-26
8-8 EPA Primary Drinking Water Supply Standards 8-27
8-9 EPA Secondary Drinking Water Supply Standards 8-29
8-10 New Mexico Water Quality Control Commission (NMWQCC) Standards for Groundwater of 10,000 mg/L total dissolved solid (TDS) Concentration or Less 8-30
8-11 Boilers Associated with Permits and Registrations During Calendar Year 2013 8-32
8-12 Emergency Generators Associated with the Permits and Registrations During Calendar Year 2013 8-33

This page intentionally left blank.

Acronyms and Abbreviations

A	ABCWUA	Albuquerque Bernalillo County Water Utility Authority
	ACGIH	American Conference of Governmental Industrial Hygienists
	AEA	Atomic Energy Act
	ACRR	Annular Core Research Reactor
	AHCF	Auxiliary Hot Cell Facility
	AMPL	Advanced Manufacturing Process Laboratory
	ANOVA	Analysis of Variance
	AOC	Area of Concern
	AQC	Air Quality Compliance
	ARG	Ancestral Rio Grande
	ARCOC	Analysis Request and Chain-of-Custody
	ASER	Annual Site Environmental Report
	AST	aboveground storage tank
	AWN	Acid Waste Neutralization
B	BGS	below ground surface
	bldg	building
	BMP	best management practice
	BSG	Burn Site Groundwater
C	C&D	Construction and Demolition
	CAA	Clean Air Act
	CAAA	CAA Amendments
	CAC	Corrective Action Complete
	CAMU	Corrective Action Management Unit
	CAN	Clean Air Network
	CAP88	CAA Assessment Package-1988
	CEP	Chemical Exchange Program
	CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
	CFR	Code of Federal Regulations
	CINT	Center for Integrated Nanotechnologies
	CIS	Chemical Information System
	CME	Corrective Measures Evaluation
	CMI	Corrective Measures Implementation
	CMS	Corrective Measures Study
	CO	carbon monoxide
	COA	City of Albuquerque
	COC	contaminant of concern
	COOC	Compliance Order on Consent
	CPG	Comprehensive Procurement Guidelines
	CPMS	Criteria Pollutant Monitoring Station
	CSS	CWL/sanitary sewer line
	CWA	Clean Water Act
	CWL	Chemical Waste Landfill
	CY	Calendar Year

D	D&D	decontamination and demolition
	DETS	Dynamic Explosive Test Sites
	DOE	U.S. Department of Energy
	DOECAP	DOE Consolidated Audit Program
	DP-530	Discharge Permit-530
	DQO	data quality objective
	DWB	Drinking Water Bureau
E	ECF	Explosive Components Facility
	EDE	effective dose equivalent
	EEANM	Environmental Education Association of New Mexico
	ELM	Environmental Life-Cycle Management
	EMS	Environmental Management System
	EO	Executive Order
	EPA	U.S. Environmental Protection Agency
	EPCRA	Emergency Planning and Community Right-to-Know Act
	EPEAT	Electronic Product Environmental Assessment Tool
	ER	Environmental Restoration
	ESA	Endangered Species Act
	ES&H	Environment, Safety, and Health
	ET	evapotranspirative
F	FFCA	Federal Facilities Compliance Act
	FFCO	Federal Facilities Compliance Order
	FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
	Final Order	NMED Final Order for MWL
	FOP	field operating procedure
	FY	Fiscal Year
G	GCP	General Construction Permit
	GHG	greenhouse gas
	GP	Guiding Principle
	GSA	General Services Administration
	GWPP	Groundwater Protection Program
H	HAP	hazardous air pollutant
	HBWSF	High Bay Waste Storage Facility
	HE	high explosives
	HERMES-III	High Energy Radiation Megavolt Electron Source-III
	HLW	high-level radioactive waste
	HPML	High Power Microwave Laboratory
	HSWA	Hazardous and Solid Waste Amendment
	HVAC	Heating, Ventilation, and Air Conditioning
	HWHF	Hazardous Waste Handling Facility
I	I-40	Interstate 40
	IBL	Ion Beam Laboratory
	IC	institutional control
	ICM	Interim Corrective Measure
	ILMS	Integrated Laboratory Management System

	ISMS	Integrated Safety Management System
	ISO	International Organization for Standardization
	IT	Information Technology
K	KAFB	Kirtland Air Force Base
	KTF	Kauai Test Facility
	KTF/HI	Kauai Test Facility, Hawaii
L	LECS	Liquid Effluent Control System
	LED	Light-emitting Diode
	LEED	Leadership in Energy and Environmental Design
	LLW	low-level radioactive waste
	LMC	Lockheed Martin Corporation
	LMF	Large Melt Facility
	LTMMP	Long-Term Monitoring and Maintenance Plan
	LTTD	Low Temperature Thermal Desorption
	LTS	Long-Term Stewardship
M	M&O	Management and Operating
	MAC	maximum allowable concentration
	MAPEP	Mixed Analyte Performance Evaluation Program
	MBTA	Migratory Bird Treaty Act
	MCL	maximum contaminant level
	MDL	Microelectronics Development Laboratory
	MEI	maximally exposed individual
	MESA	Microsystems and Engineering Sciences Applications
	MLLW	mixed low-level waste
	Module 4	HSWA Module
	MS4	Municipal Separate Storm Sewer System
	MSB	Manzano Storage Bunker
	MSDS	Material Safety Data Sheet
	MSGP	Multi-Sector General Permit
	MSP2	Material Sustainability and Pollution Prevention
	MTRU	mixed transuranic waste
	MW	mixed waste
	MWL	Mixed Waste Landfill
N	NAAQS	National Ambient Air Quality Standards
	NCRP	National Council on Radiation Protection
	NELAC	National Environmental Laboratory Accreditation Conference
	NESHAP	National Emission Standards for Hazardous Air Pollutants
	NEPA	National Environmental Policy Act
	NGF	Neutron Generator Facility
	NHPA	National Historic Preservation Act
	NM	New Mexico
	NMAAQS	New Mexico Ambient Air Quality Standards
	NMAC	New Mexico Administrative Code
	NMDOA	New Mexico Department of Agriculture
	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
	NOI	Notice of Intent
	NO_x	nitrogen oxide
	NPDES	National Pollutant Discharge Elimination System
	NPL	National Priorities List
	NPN	nitrate plus nitrite
	NRC	U.S. Nuclear Regulatory Commission
	NSPS	New Source Performance Standard
	NSR	New Source Review
O		
	ODS	ozone depleting substance
	(the) Order	Compliance Order on Consent
	ORPS	Occurrence Reporting and Processing System
	OSHA	Occupational Safety and Health Act
P		
	P2	pollution prevention
	PCB	polychlorinated biphenyl
	PCCP	Post-Closure Care Plan
	PEP	Performance Evaluation Plan
	(the) Permit	Permit NM5890110518-1
	PGWS	perched groundwater system
	pH	potential of hydrogen
	PM	particulate matter
	$PM_{2.5}$	respirable particulate matter (diameter equal to or less than 2.5 microns)
	PM_{10}	respirable particulate matter (diameter equal to or less than 10 microns)
	POTW	Publicly-Owned Treatment Works
	PPE	personal protective equipment
	PRD	Process Research Development
	PSL	primary subliner
	PWS	Public Water System
Q		
	QA	quality assurance
	QAPP	Quality Assurance Project Plan
	QC	quality control
R		
	RAP	Remedial Action Plan
	RCRA	Resource Conservation and Recovery Act
	RICE	Reciprocating Internal Combustion Engine
	RMWMF	Radioactive and Mixed Waste Management Facility
	RPDP	Radiation Protection Dosimetry Program
	RPICL	Radiation Protection Instrument Calibration Laboratory
	RPSD	Radiation Protection Sample Diagnostics
	RQ	reportable quantity

S

SA	sustainable acquisition
SAF	Soil Amendment Facility
Sandia	Sandia Corporation
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SDS	Safety Data Sheet
SDWA	Safe Drinking Water Act
SF6	sulfur hexafluoride
SFO	Sandia Field Office
SHPO	State Historic Preservation Office
SIC	Standard Industrial Classification
SMO	Sample Management Office
SNL	Sandia National Laboratories
SNL/CA	Sandia National Laboratories, California
SNL/NM	Sandia National Laboratories, New Mexico
SO_2	sulfur dioxide
SOW	Statement of Work
SPCC	Spill Prevention Control and Countermeasures
SSL	soil screening level
SSP	Site Sustainability Plan
SSPP	Strategic Sustainability Performance Plan
ST	stabilization treatment
START	Sandia Tomography and Radionuclide Transport
STP	Site Treatment Plan
SUWCO	Sewer Use and Wastewater Control Ordinance
SWCRC	Solid Waste Collection and Recycling Center
SWEIS	Site-Wide Environmental Impact Statement
SWMP	stormwater monitoring point
SWMU	Solid Waste Management Unit
SWPPP	Stormwater Pollution Prevention Plan

T

TA	technical area
TAG	Tijeras Arroyo Groundwater
TAL	target analyte list
TCC	Thermal Test Complex
TCE	trichloroethene
TCR	test capabilities revitalization
TDS	total dissolved solids
TLD	thermoluminescent dosimeter
TLV	threshold limit value
TRI	Toxic Release Inventory
TRU	transuranic
TSCA	Toxic Substances Control Act
TSD	treatment, storage and disposal
TSS	total suspended solids
TTF	Thermal Treatment Facility
TTR	Tonopah Test Range
TTR/NV	Tonopah Test Range, Nevada

U	USAF	U.S. Air Force
	USFS	U.S. Forest Service
	USGS	U.S. Geological Survey
	UST	underground storage tank
V	VA	Veterans Administration
	VCA	Voluntary Corrective Action
	VCM	Voluntary Corrective Measure
	VOC	volatile organic compound
	VSA	vertical sensor array
	VZMS	Vadose Zone Monitoring System

Units of Measure

°C	degrees Celsius
°F	degrees Fahrenheit
%	percent
Ci	curies
Ci/yr	curies per year
cm	centimeter
cu yd	cubic yards
ft	feet
g	grams
gal	gallons
hr	hour
kg	kilogram
km	kilometer
km^2	square kilometers
lbs	pounds
m^2	square meters
m/sec	meters per second
Max	maximum
mb	millibar
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mi	miles
mph	miles per hour
mrem	millirem
mrem/yr	millirems per year
mSv	millisievert
mSv/yr	millisievert per year
ND	not detected

pCi/g	picocuries per gram
pCi/m3	picocuries per cubic meter
person-mSv/yr	person-millisievert per year
person-rem/year	person-roentgen equivalent, man per year
person-Sv/yr	person-sievert per year
ppb	parts per billion
ppm	parts per million
ppm bv	parts per million by volume
scf	standard cubic feet
sq ft	square feet
sq mi	square miles
Sv	sievert
$t_{1/2}$	half life
tpy	tons per year
U	uranium
µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter

This page intentionally left blank.



Executive Summary

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 Field Office (SFO) 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 231.1B, *Environment, Safety, and Health Reporting*. This ASER summarizes the environmental protection, restoration, and monitoring programs in place at SNL/NM during Calendar Year (CY) 2013. It also discusses Sandia's compliance with environmental statutes, regulations, and DOE directives 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

The environmental programs and waste management activities at Sandia meet or exceed the requirements of federal, state, and local environmental regulations, as well as DOE directives in the Prime Contract between Sandia and DOE.

Environmental Management System (EMS) is the primary management approach for addressing environmental aspects of operations and activities, including environmental programs, energy, and transportation functions. Sandia continues to improve environmental management and work processes and received International Organization for Standardization 14001 Certification in 2009, certification in 2012, and retained certification in the 2013 Surveillance Audit.

While all 2013 program activities are performed continuously, they are reported in this ASER on a CY basis, unless otherwise noted (programs based on the Fiscal Year operate from October 1st through September 30th, annually). A description of the environmental programs and 2013 activities at SNL/NM are summarized below.

Environmental Life-Cycle Management (ELM)

The ELM Program provides environmental stewardship for past, present, and future activities. The purpose of the ELM Program is to promote the long-term stewardship of a site's natural and cultural resources throughout its operational, closure, and post-closure life cycle. See Section 3.2 for more information.

Environmental Restoration (ER) Operations

Sandia's ER Operations were created under the DOE Office of Environmental Management 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 (HSWAs) of 1984. HSWA requirements apply to ER Operations sites, which include Solid Waste Management Units (SWMUs) or Areas of Concern (AOCs). 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." See Section 3.3 for more information.

The 2013 status of the ER Operations site closure is as follows:

- There are 278 SNL/NM SWMUs/AOCs not currently requiring corrective action.
- There are 36 SWMUs/AOCs requiring corrective action.
- As stated in letters from the New Mexico Environment Department (NMED) in 2010 and 2012, 6 of the 36 SWMUs/AOCs require additional investigation or groundwater monitoring as part of the corrective action. SWMUs 8/58, 68, 149, and 154 require groundwater monitoring. SWMU 52 required backfilling of the tanks and associated piping.
- In 2013, SWMU 52 activities were completed, reported, and approved by the NMED.

Included in the 36 SWMUs/AOCs requiring corrective action are three groundwater AOCs (Technical Area V [TA-V], Tijeras Arroyo Groundwater [TAG], and Burn Site Groundwater [BSG]) that have final remedies pending. Also included in the 36 SWMUs/AOCs requiring corrective action are three sites at active test facilities (SWMUs 83, 84, and 240) with potential solid contamination that will be evaluated at the end of their test operations. For additional information about ER Operations refer to Chapter 3 of this report. Detailed information about Environmental Management cleanup efforts throughout DOE can be found at DOE's website, and at Sandia's Environmental Responsibility website:

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

http://www.sandia.gov/about/environment/index.html

Long-Term Stewardship (LTS) Program

The mission of the LTS Program is the long-term protection of human health and the environment from hazards associated with residual contamination at legacy sites, and minimization of Sandia's environmental liability by ensuring compliance with the environmental requirements provided in multiple NMED permits. Stewardship of legacy sites (former ER Sites) is 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 legacy sites. Sandia's LTS activities are increasing as remedial activities at ER sites are completed. The LTS Program conducts Compliance Oversight, Institutional Control, and Community Liaison and Stakeholder Involvement activities. LTS Compliance Oversight activities include groundwater monitoring, various types of monitoring at the Corrective Action Management Unit (CAMU), and Chemical Waste Landfill (CWL) to meet NMED regulatory requirements, and investigation of any new releases. See Section 3.4 for more information.

Groundwater monitoring at SNL/NM consists of monitoring a network of approximately 79 wells for presence of constituents of concern (COCs) at various intervals during the year. Sixty seven groundwater monitoring wells associated with legacy sites (former ER sites) are monitored to meet NMED requirements. An additional 12 wells and a spring are sampled to assess SNL/NM operations impacts on groundwater. Water level measurements are obtained from 96 SNL/NM wells and 29 wells owned by other agencies. Monitoring wells are maintained or replaced as necessary. All 2013 groundwater monitoring activities, analytical results, hydrographs, and contour maps are provided in *SNL/NM's Calendar Year 2013 Annual Groundwater Monitoring Report* (SNL/NM June 2014a). A summary of this report is provided in Section 3.4.

Under LTS, 67 groundwater monitoring wells associated with former ER sites are monitored to meet NMED requirements. Sandia personnel collect groundwater samples at six project areas: CWL, Mixed Waste Landfill, TA-V, TAG, BSG, and miscellaneous SWMUs. The 2013 water quality results for these six areas were consistent with results from past years.

The LTS Program conducts the long-term monitoring of the CAMU containment cell as required by the NMED. Leachate is pumped weekly, and is sampled and disposed of as hazardous waste. Monitoring, inspections, maintenance/repairs, and annual reporting are being performed at the CWL by the LTS Program in accordance with the CWL Post-Closure Care Permit (PCCP). In 2013, CWL groundwater samples were collected in January and July (two sampling events). No analytes were detected at concentrations exceeding the U.S. Environmental Protection Agency (EPA) maximum contaminant levels.

Administrative and physical institutional controls (ICs) are in place at SNL/NM to appropriately limit access to and use of legacy sites. Legacy sites are periodically inspected and maintained when necessary. A total of 27 IC site inspections were completed in 2013. No large scale maintenance requirements or other concerns with physical ICs were identified on legacy sites during the 2013 annual inspections.

It is important that the public be made aware of the work being conducted at SNL/NM 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 legacy sites. In addition to making technical documents available to the public, stakeholders participated in semi-annual DOE, U.S. Department of Defense meetings on environmental activities.

Additional 2013 LTS activities included the Voluntary Corrective Action (VCA) that was conducted at SWMU 502/Building 9938 Surface Discharge Site. As reported in the CY 2012 ASER, a surface discharge of wastewater occurred in December 2012 at Coyote Test Field Building 9938 (also referred to as LTS SWMU 502). SNL personnel periodically conducted research and development activities involving the production, isolation, and purification of materials used in the synthesis of explosives at Buildings 9938 and 9939. The wastewater generated from each synthesis activity was containerized in polyethylene plastic containers and discharged to the ground surface in an area south of Building 9938. The volume of wastewater discharged from each synthesis activity was conservatively estimated at ten gallons. A total of 25 synthesis activities were held from July 2010 through September 2012, thus a total of approximately 250 gallons of wastewater was discharged to the ground surface.

The 2013 VCA at SWMU 502 included completion of a site assessment and surface and subsurface soil sampling. Based upon field investigation results, a determination of Corrective Action Complete without controls is recommended for SWMU 502 for the following explanations:

- No COCs are present in the soil at levels considered hazardous to human health for either an industrial or residential land-use scenario.
- No COCs warrant ecological concern because ecological risks were acceptable per NMED guidance.

Details can be found in the *Investigation Report for Voluntary Corrective Action at Solid Waste Management Unit 502 Building 9938 Surface Discharge Site* (SNL/NM October 2013) submitted to the NMED in October 2013. Final determination by the NMED is pending.

Ecology Program

The Ecology Program provides for biota monitoring as an additional element of environmental monitoring. Ecology Program personnel collect ecological resource data, plant and animal data, biota contaminant data (as needed), assist in complying with regulations and laws, and provide biological surveys in support of site activities. These data are used to support documentation, land use decisions, and wildlife communication campaigns to ensure safe work environments and sustainable decision making strategies. See Section 3.5 for more information. Since no significantly elevated levels of radionuclides or metals were observed in soil or vegetation samples during sampling under the Terrestrial Surveillance Program (see below and Chapter 4), no contaminant analysis of radionuclides and metals on wildlife were performed in 2013.

National Environmental Policy Act (NEPA) Program

The NEPA Program provides the DOE/NNSA/SFO with technical assistance in support of compliance with NEPA and the National Historic Preservation Act at all of Sandia's locations: NEPA Program personnel reviewed a total of 980 proposed projects in various corporate systems. To support mission activities at SNL/NM, 81 DOE NEPA checklists were transmitted to the DOE/NNSA/SFO for review and determination in 2013. See Section 3.6 for more information.

Also in 2013, Sandia personnel assisted the DOE in the continued development of a new Site-Wide Environmental Impact Statement (SWEIS). Environmental Programs personnel reviewed the Preliminary Draft SWEIS completed by the DOE contractor. During the review cycle, Environmental Programs personnel conferred with experts from various SNL/NM programmatic missions to review and clarify data on their current and anticipated future operations.

Environmental Outreach Program

The Environmental Outreach Program reaches out to the community through various events and provides environmental information. Sandia recognizes that in addition to complying with requirements, it is important to communicate with Sandia's workforce and the local community to help reduce environmental impacts at work and at home. Using an integrated approach, Sandia communicates environmental awareness to its workforce via various newsletters, awareness campaigns, and outreach events. In 2013, Outreach Program personnel coordinated the semi-annual DOE Public Meetings, hosted the Annual Youth Conference on the Environment, and participated in several outreach and awareness events. At these events, the outreach team distributed fact sheets and newsletters. See Section 3.7 for more information.

Chemical Information System and Chemical Exchange Program

The Chemical Information System (CIS) Program maintains a comprehensive chemical information management system that provides work place chemical container tracking as well as information about the chemical hazards found in the associated Safety Data Sheets (SDS) (previously known as Material Safety Data Sheets [MSDS]). The SDS library in CIS currently contains over 80,000 SDSs. The Chemical Exchange Program (CEP) was developed to reduce the amount of usable chemicals disposed as waste, resulting in cost avoidance for both new acquisitions and disposal. See Section 3.8 for more information.

Waste Management

Waste at SNL/NM is managed at 10 facilities: the Hazardous Waste Handling Facility, the Thermal Treatment Facility, the Radioactive and Mixed Waste Management Facility, the Auxiliary Hot Cell Facility, 5 Manzano Storage Bunkers, and the Solid Waste Collection and Recycling Center. In addition, the Reapplication Yard recycles surplus material and equipment that cannot be reapplied, sent for auction, or donated to K-12 schools. See Section 3.9 more information.

Materials Sustainability and Pollution Prevention (MSP2)

The MSP2 Program provides assessment, guidance, and assistance to the laboratories' workforce to implement measures that reduce resource use, generated waste, and to enhance the overall efficiency of processes and organizations within SNL/NM. Additionally, the MSP2 Program works with several facilities to investigate or initiate new recycling avenues for certain waste streams. See Section 3.9 for more information.

Terrestrial Surveillance Program

The Terrestrial Surveillance Program conducts sampling activities to detect any potential releases or migration of radiological or non-radiological contaminated material to off-site locations (community locations outside Kirtland Air Force Base [KAFB] boundaries). Soil, sediment, and vegetation are collected from on-site, perimeter, and off-site locations. In 2013, there were no sample results that

indicated concerns, or that required further investigation or corrective action. See Chapter 4 for more information.

Air Quality Compliance Program

The Air Quality Compliance (AQC) Program ensures compliance with regulations, monitor ambient air quality and radionuclide air emissions. See Chapter 5 for more information.

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 of 1990. The Albuquerque Bernalillo County/Air Quality Control Board, the State of New Mexico, and the EPA determine applicable air quality standards for non-radiological pollutants. The AQC Program personnel currently maintain 13 issued authority-to-construct New Source Review (NSR) permits; and 28 issued NSR registrations from the City of Albuquerque (COA). Currently, there are no new NSR applications pending issuance with the COA.

Ambient Air Monitoring – Sandia measures ambient air quality (a non-compliance activity) at 6 locations throughout SNL/NM, and compares results with National Ambient Air Quality Standards and local ambient air regulations. The network monitors particulate matter (PM_{10} and $PM_{2.5}$) and volatile organic compounds (VOCs). Results of monitoring in 2013 indicate the following: PM_{10} concentrations are comparable to results from previous years, the high $PM_{2.5}$ concentration measured in June was likely the result of wildland fire and smoke, and a statistical analysis of VOC concentration at one station indicated a slightly higher value than other stations and may be due to a high traffic pattern in the vicinity.

Radiological National Emission Standards for Hazardous Air Pollutants (NESHAP) Compliance – Subpart H of NESHAP regulates radionuclide air emissions from DOE/NNSA facilities, with the exception of naturally occurring radon. Facilities that have the potential to release emissions to the environment are evaluated annually. In 2013, the primary radionuclides released from SNL/NM facilities were tritium and argon-41. The on-site maximally exposed individual (MEI) was located on KAFB. The on-site MEI dose of 1.11E-03 millirems per year (mrem/yr) at the Chestnut Site resulted primarily from tritium releases at the Neutron Generator Facility (NGF). The off-site MEI was located at the Eubank Gate Area. The off-site MEI dose of 1.42E-03 mrem/yr at the Eubank Gate Area resulted also primarily from tritium releases at the NGF. Both doses are well below the 10 mrem/yr EPA standard.

Water Quality Program

The Water Quality Program conducts effluent monitoring through wastewater, surface discharge, and stormwater monitoring and surveillance activities. See Chapter 6 for more information.

Wastewater – Wastewater from SNL/NM is discharged from 6 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. In 2013, there was one reportable event resulting in a Notice of Violation (NOV) issued by ABCWUA. The event was discovered when a one-gallon glass bottle containing a mixture of waste solvents fractured and spilt on a table and some of the liquid released into the laboratory sink, which went into the sanitary sewer (approximately 3/4 gallon) in Permitted Flow Basin 2069A. See Chapter 6 for more information. All discharge parameters at the other permitted locations were met resulting in SNL/NM receiving five "Gold Pre-Treatment Awards" and one "Silver Pre-Treatment Award" from the ABCWUA for the 2012-2013 treatment year.

Surface Discharge – All water that will be released to the ground surface, either directly or to lined containments is defined as a surface discharge. These discharges must meet State of New Mexico surface discharge standards. All internal discharges approved by Sandia in 2013 met NMED New Mexico Water Quality Control Commission standards. Routine surface discharges are made to two evaporation

lagoons that service the pulsed power facilities under an existing discharge permit. During 2013, all permit requirements were met for both NMED-permitted lagoons. There were four surface releases reported to NMED.

Stormwater Runoff – Stormwater Program personnel perform quarterly observations and analytical sampling at the SNL/NM stormwater monitoring points, in addition to maintaining permits and ensuring compliance with applicable regulations. In 2013, all monitoring data collected was submitted to EPA. Observations of stormwater and sampling were performed when there was adequate runoff to collect a sample. The observations and sampling of the stormwater were performed from July through October. There were exceedances of benchmark levels at six monitoring points in July and at three monitoring points in September. The exceedences included chemical oxygen demand, lead, silver, cadmium, cyanide, magnesium, and zinc. Soil concentrations for certain constituents indicated exceedences due to natural background at SNL/NM, other exceedences are being reviewed as part of the selection, design, installation, and implementation of stormwater control measures and improvements.

Oil Storage and Spill Control – The Spill Prevention Control and Countermeasures Plan (required under the Clean Water Act) describes the oil storage facilities at SNL/NM and the mitigation controls in place to prevent inadvertent discharges of oil. Oil storage facilities subject to regulations include oil storage tanks (aboveground storage tanks [ASTs] and underground storage tanks [USTs]), bulk storage areas (multiple containers), and temporary or portable tanks. Sandia currently operates 47 ASTs and three USTs at SNL/NM.

Quality Assurance

All environmental monitoring (includes sampling) is conducted in accordance with program-specific sampling and analysis plans or work plans, which contain applicable quality assurance elements. These documents meet appropriate federal, state, and local regulatory guidelines for conducting sampling and analysis activities. 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 are carried out in accordance with DOE Directives. See Chapter 7 for more information.



Chapter 1
Introduction

This Annual Site Environmental Report (ASER) was prepared in accordance with and as required by U.S. Department of Energy (DOE) Order 231.1B, *Environment, Safety, and Health Reporting* (DOE 2012). This ASER describes the environmental protection programs currently in place at Sandia National Laboratories, New Mexico (SNL/NM). This report is made available to the general public in printed and electronic form.

Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation (LMC), manages and operates the laboratory for the DOE, National Nuclear Security Administration (NNSA). The DOE/NNSA, Sandia Field Office (SFO) administers the contract and oversees contractor operations at the site. Building on its original nuclear weapons mission, Sandia maintains research and development programs to support a wide variety of national security missions, resulting in technologies for non-proliferation, homeland security, energy and infrastructure, and defense systems and assessments.

While all 2013 program activities are performed continuously, they are reported in this ASER on a calendar year (CY) basis, unless otherwise noted (programs based on the Fiscal Year operate from October 1st through September 30th, annually).

1.1 History

Operations at SNL/NM began in 1945 as Z Division, the ordnance design, testing, and assembly arm of Los Alamos Scientific Laboratory (now Los Alamos National Laboratory). The division moved to Sandia Base (now merged into Kirtland Air Force Base [KAFB]) on the perimeter of the City of Albuquerque (COA), to be near an airfield and to work closely with the military. Z Division became a separate branch of Los Alamos in 1948, and was renamed Sandia Laboratory. On November 1, 1949, Sandia, a wholly owned subsidiary of Western Electric, began managing Sandia Laboratory. In 1979, Congress recognized the facility as a national laboratory. In 1993, Sandia became a wholly owned subsidiary of Martin Marietta, now LMC.

1.2 Mission

Sandia's enduring core mission is to provide science and engineering support for the nation's nuclear weapons stockpile. Today, the mission encompasses additional critical aspects of national security, including developing technologies and strategies for responding to emerging threats, protecting and preventing the disruption of critical infrastructures, and the non-proliferation of weapons of mass destruction. Sandia also collaborates with representatives from other government agencies, the industrial sector, and universities to develop and commercialize new technologies. Information about recent technologies developed at SNL/NM can be found at:

http://www.sandia.gov/news/index.html

1.2.1 Operating Contract

Sandia complies with specific environmental regulations established by local, state, and federal agencies. The Prime Contract, DE-AC04-94AL85000, between Sandia and the DOE defines the primary contractual obligations for operating SNL/NM. This contract also drives Sandia Environment, Safety, and Health (ES&H) standards and requirements.

The Prime Contract states that Sandia must comply with DOE directives that establish specific requirements for environmental programs. The four primary DOE directives currently on the contract that pertain to environmental protection and management are listed below:

- DOE Order 231.1B, Change 1, *Environment, Safety, and Health Reporting* (DOE 2012),
- DOE Order 435.1, Change 1, *Radioactive Waste Management* (DOE 2001),
- DOE Order 458.1, Change 3, *Radiation Protection of the Public and the Environment* (DOE 2013), and
- DOE Order 232.2, *Occurrence Reporting and Processing of Operations Information* (DOE 2011a).

1.3 Location Description

The majority of the lands used by the DOE or the NNSA for SNL/NM activities are located within the boundaries of KAFB (Figure 1-1). The following sections describe the location, characteristics, and the physical setting of SNL/NM on a regional basis.

New Mexico (NM) is the fifth largest state in the U.S., comprising approximately 121,000 square miles (sq mi). Based on recent projections, the estimated 2013 population of NM was 2,085,287 (Census December 2013) and is projected to be approximately 2.1 million by 2030 (Census March 2004). The City of Albuquerque is the largest in the state with approximately 555,400 residents (Census May 2013).

The estimated population within a 50-mile radius of the zip code for SNL/NM is approximately 962,000 residents (Melissa Data 2014). Nine counties are contained or partially included in that radius (Figure 1-2).

KAFB is a military installation that is 51,559 acres, which includes 20,486 acres withdrawn from the Cibola National Forest through an agreement with the U.S. Forest Service (USFS) (DOE 1999). Located at the foot of the Manzanita Mountains, it has a mean elevation of 5,384 feet (ft) and a maximum elevation of 7,986 ft. KAFB is host to more than 450 federal government and private sector tenants and associate units (KAFB November 2012). KAFB and SNL/NM are adjacent to the COA, which borders KAFB on its north, northeast, west, and southwest boundaries. The Albuquerque International Sunport (airport) and Mesa del Sol, a 12,800-acre mixed-use urban area under development, are west of KAFB. The Isleta Pueblo is located south of KAFB boundary.

SNL operations are conducted on DOE-owned property assigned for operational use, non-DOE-owned property contracted from other Federal agencies, and privately-owned leased property. SNL sites located on DOE-owned property comprise 2,938 acres and include five technical area(s) (TAs) (DOE 1999). For non-DOE-owned property, Sandia conducted operations on 5,637 acres of land permitted from the U.S. Air Force, a portion of which are on land withdrawn from the USFS (SNL/NM October 2006). DOE leases approximately 2750 acres from the New Mexico State Land Office (La Semilla Buffer Zone) west of the KAFB boundary. This area serves as a margin of safety and a sound buffer for testing operations (DOE 1999). In addition, Sandia conducts operations at off-site leased facilities.

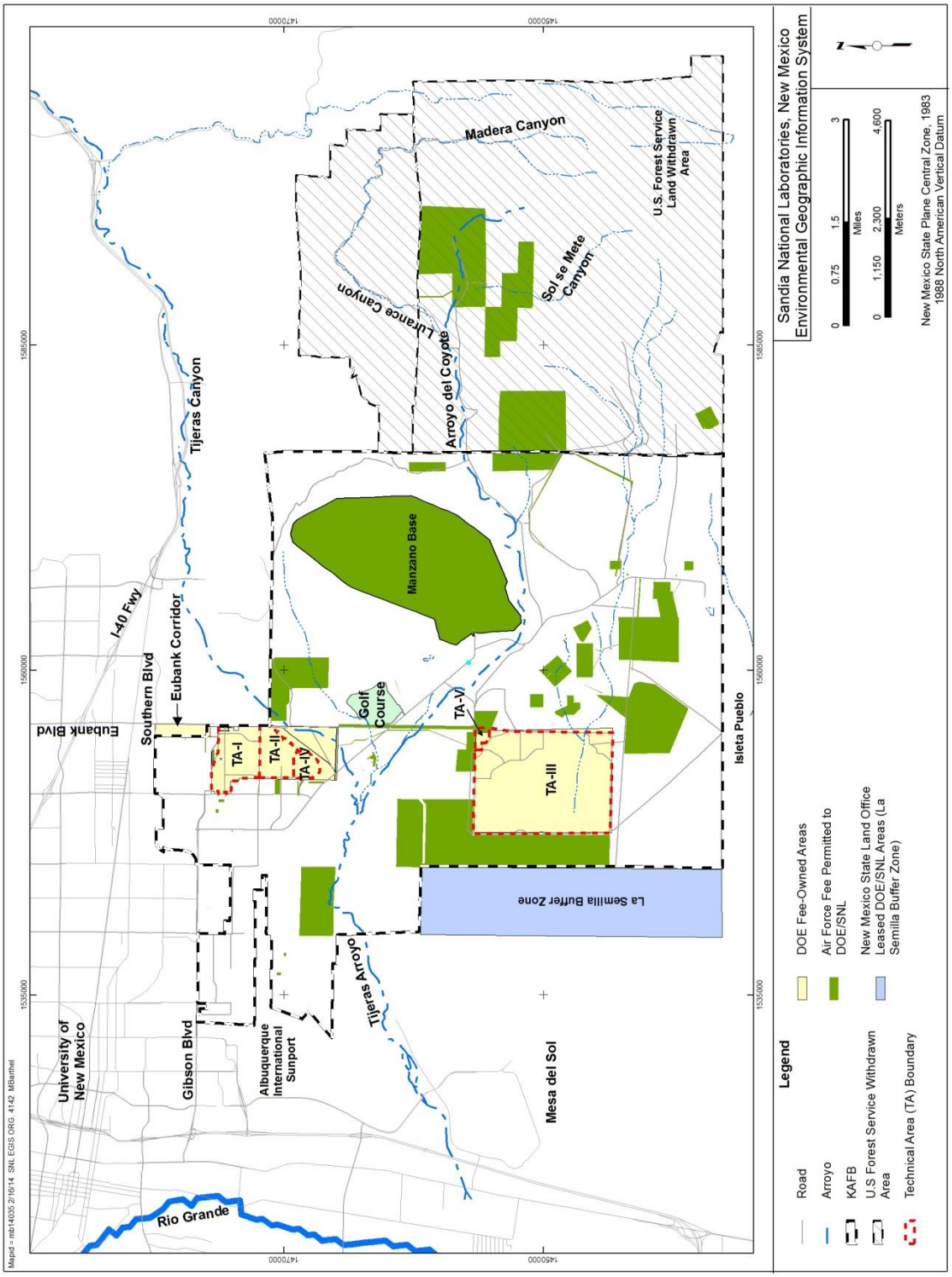


FIGURE 1-1. Map of Sandia National Laboratories, Technical Areas, and Permitted Areas

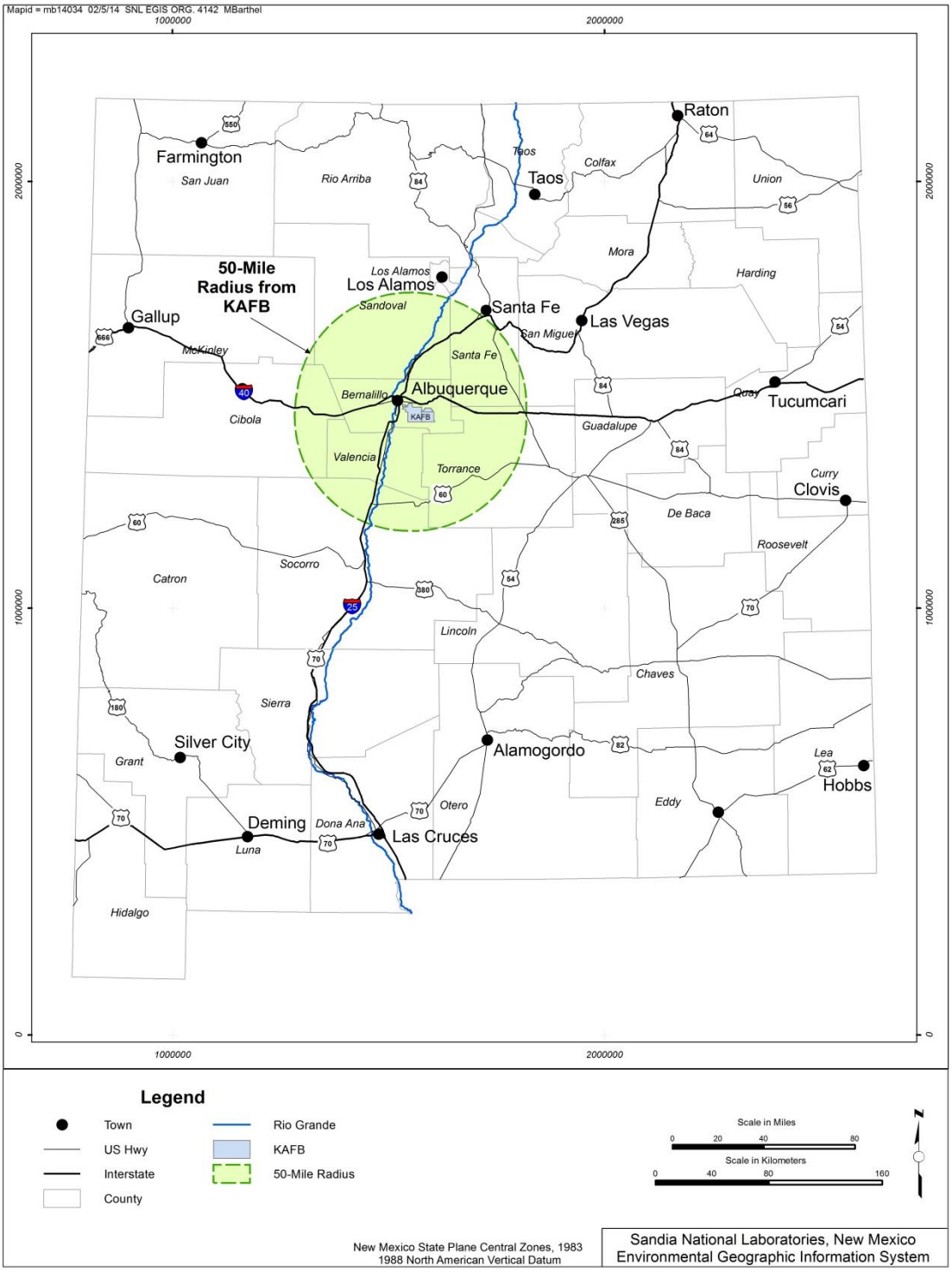


FIGURE 1-2. State of New Mexico Map

1.4 Laboratory Activities and Facilities

SNL/NM consists of five DOE fee-owned secured TAs, buildings, and structures in non-secured leased areas, and several remote testing areas, also on leased land. These remote test areas are collectively known as the Coyote Test Field and are located in the canyons on the west side of the Manzano Mountains. In 2013, the total workforce at SNL/NM was approximately 10,610 and the NM location has approximately 6.17 million gross square feet of existing facilities (SNL/NM December 2013).

1.4.1 The Technical Areas

TA-I is located in the northern portion of KAFB and operations include the main administrative center and numerous laboratories and offices. A majority of activities performed in TA-I are dedicated to weapon design, research and development on weapon systems, limited production of weapon systems components, technology transfer, high-performance computing, and energy research programs. Facilities in TA-I include the new Ion Beam Laboratory, the main technical library, several assembly/manufacturing areas, environmental test facilities, and various laboratories, such as the Advanced Manufacturing Processes Laboratory, the Neutron Generator Facility, the Processing and Environmental Technology Laboratory, the Joint Computational Engineering Laboratory, Sandia Tomography and Radionuclide Transport Laboratory, and the Microsystems and Engineering Sciences Applications (MESA) Complex.

TA-II, located south of TA-I, includes both technical facilities and infrastructure support. The Explosive Components Facility, the Hazardous Waste Handling Facility (HWHF), the Solid Waste Collection and Recycling Center, the Construction and Demolition Recycle Center, and the National Infrastructure Simulation and Analysis Center.

TA-III, located in the south-central part of KAFB, is the largest and most remote of the TAs. There are large outdoor test areas, as well as facilities that can accommodate indoor testing. The area is used to accommodate large-scale engineering test activities requiring large safety and/or security buffers, such as collision testing sled tracks, centrifuges, vibration test facilities, and impact test complexes. A few of the outdoor test areas include the Rocket Sled Test Facility, the Drop/Water Facility, and the Terminal Ballistics Facility. A few of the indoor test facilities include the Centrifuge Facility, the Mechanical Shock Facility, and the Thermal Test Complex. The Radioactive and Mixed Waste Management Facility (RMWMF) is located in the southern portion of TA-III. The Mixed Waste Landfill (MWL), the Chemical Waste Landfill (CWL), and the Corrective Action Management Unit (CAMU) are also located in TA-III.

TA-IV, located south of TA-II, includes facilities used to conduct research and development 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 Research Module, the Radiographic Integrated Test Stand, the High Energy Radiation Megavolt Electron Source-III, the Saturn Accelerator, the Repetitive High Energy Pulsed Power I Accelerator, the High Power Microwave Laboratory, and the Short-Pulse High Intensity Nanosecond X Radiator.

TA-V, located adjacent to the northeast section of TA-III, includes facilities that routinely handle radioactive materials used in experimental research and development programs. Capabilities include reactor technology, radiation transport techniques, radiation damage on materials, and radiation vulnerability assessments. Some of the facilities in TA-V include the Gamma Irradiation Facility, the Annular Core Research Reactor, the Hot Cell Facility, and the Auxiliary Hot Cell Facility.

1.4.2 Other Facilities and Areas

Several remote test areas are located east and southeast of TA-III and within the canyons and foothills of the USFS withdrawn area (Arroyo del Coyote, Lurance, Madera, and Sol se Mete Canyons). These areas are used for environmental and developmental testing, including explosive ordnance testing, impact testing, rocket firing experiments, and open burn thermal testing.

Sandia operates several facilities outside the boundaries of KAFB. These are a mixture of properties leased or owned by DOE. The Center for Integrated Nanotechnologies, the MESA Technology and Operations Prototype, the International Programs Building, the Innovation Parkway Office Center, and the National Museum of Nuclear Science and History are all located on Eubank Boulevard Southeast within one mile of KAFB. There are many other small-scale, off-site Sandia projects, including the Advanced Materials Laboratory at the University of New Mexico.

1.5 Environmental Setting

SNL/NM is set in the high desert region in central New Mexico. The mountains on the east and plains on the west create a diverse range of geological, hydrological, ecological, and climatic settings discussed in the sections below. A maximum elevation of 7,986 ft occurs on the eastern edges of KAFB; the mean elevation is 5,384 ft.

The most prominent topographic feature in the Albuquerque region is the Sandia Mountains, which form an impressive backdrop to the east of the COA and KAFB. The Sandia Mountains form a 13-mile long escarpment distinguished by steep cliffs, pinnacles, and narrow canyons; the tallest point is Sandia Crest at 10,678 ft. At sunset, the Sandia Mountains are often bathed briefly in a pinkish glow, which is how they got their name (sandia is Spanish for "watermelon"). The Sandia Mountains are divided from the Manzanita and Manzano Mountains (to the south) by Tijeras Canyon (Figure 1-3).

At approximately ¾ of a mile wide, Tijeras Arroyo is a significant topographic feature that is situated diagonally northeast to southwest on 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; it discharges to the Rio Grande approximately ten miles from the west boundary of KAFB.

1.5.1 Geology and Hydrology

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 filled with sediment deposits. The Rio Grande Rift extends for about 450 miles from Leadville, Colorado into New Mexico; Albuquerque and the KAFB are within a rift valley.

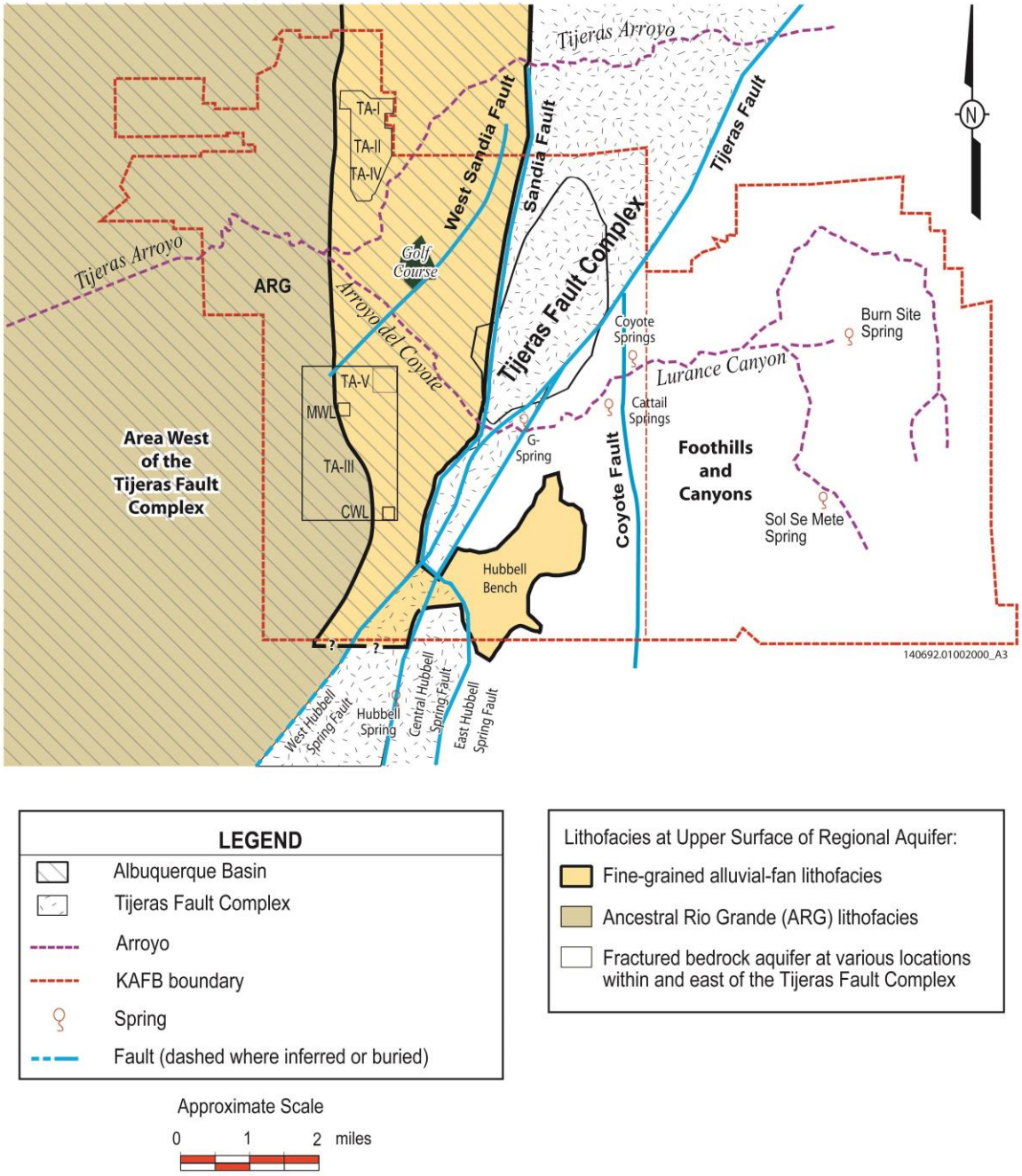


FIGURE 1-3. Faults and Hydrogeologically Distinct Areas

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 sq mi 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 the northern end. There is relatively little topographic relief along the Rio Puerco Fault Belt on the northwestern side of the basin. The Albuquerque Basin is drained to the south through the Rio Puerco and the Rio Grande.

Several faults run through KAFB (Figure 1-3). Tijeras Fault, which has been traced as far north as Madrid, New Mexico, trends southwesterly through Tijeras Canyon and across KAFB. The Tijeras Fault is a strike-slip fault on which movement is horizontal parallel to the strike of the fault. Early movement along the Tijeras Fault can be traced to the late Precambrian Period, 570 million years ago, and the fault has been active as recently as the late Pleistocene epoch, 12,000 years ago. The system of minor faults associated with the Tijeras Fault on KAFB is collectively referred to as the Tijeras Fault Complex. The Tijeras Fault Complex marks a distinct boundary between the bedrock geology 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.

The Sandia Fault establishes the eastern boundary of the Albuquerque Basin on KAFB. The up-thrown side of the fault is manifested as the Sandia Mountains. The stratigraphic section exposed at the top of the mountain is buried under the sediments of the basin. The total vertical offset is on the order of 7 kilometers (4.3 miles). The eastern boundary of the basin, south of KAFB, is the Hubbell Spring Fault. Both the Sandia and Hubbell Spring Faults are north-trending, down-to-the-west, en echelon normal faults, which are Tertiary in age (63 million to 1.8 million years ago) (Lozinsky et al. 1991; Woodward 1982; Kelley 1977). The Sandia Fault converges with the Tijeras Fault and the Hubbell Spring Fault in the region of KAFB, identified as the Tijeras Fault Complex.

The hydrogeological system is divided into two areas separated by the Tijeras Fault Complex, which marks a distinct geological boundary (Figure 1-3). To the east of the Tijeras Fault Complex, the hydrogeology is characterized by fractured and faulted bedrock covered by a thin layer of alluvium with depths to groundwater ranging from 45 to 325 ft below ground surface (bgs) within the basin. On the west side of the Tijeras Fault Complex, groundwater is contained in alluvial sediments and depths to groundwater ranging from 295 ft to 570 ft bgs.

A perched groundwater system (PGWS) overlies the regional aquifer in the north portion of KAFB. The PGWS extends from TA-I to the KAFB Golf Course. The western extent of the PGWS lies between Wyoming Boulevard and the Albuquerque International Sunport's (airport) 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 groundwater approximately 270 ft bgs in the west and 420 ft bgs in the east.

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.

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 Aquifer System. Most Albuquerque Bernalillo County Water Utility Authority (ABCWUA) 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 ft (Thorn et al. 1993). Groundwater withdrawal from KAFB and ABCWUA 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.

1.5.2 Ecology

Two major physiographic provinces influence the flora and fauna of the region: mesa and plains, and mountains. The topography of the KAFB and SNL/NM area ranges from lowland grasslands to high-elevations coniferous forests. 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.

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*	Spotted towhee	*Pipilo maculatus*
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*	New Mexico spadefoot toad	*Spea multiplicata*
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*	Piñon pine	*Pinus edulis*
New Mexico feathergrass	*Hesperostipa neomexicana*	Ring muhly	*Muhlenbergia torreyi*
Purple three-awn	*Aristida purpurea*	Bush muhly	*Muhlenbergia porteri*
Shrub live oak	*Quercus turbinella*	Soapweed yucca	*Yucca glauca*
Galleta	*Pleruaphis jamesii*	Black grama	*Bouteloua eriopoda*

NOTES: KAFB = Kirtland Air Force Base

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

The Sandia, Manzanita, and Manzano Mountains comprise the mountain physiographic province. 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. Forests tend to be patchy due to topography, weather, fire, insect outbreaks, and disease. The landscape is a complex mosaic of open meadows and forest stands of varying ages and species.

The regional life zones of the KAFB and SNL/NM area are represented by specific plants and animals. The three life zones occurring in the area are the Ponderosa Pine Forest or Transition Life Zone, the Piñon-Juniper Woodland Zone, and the Upper Sonoran Life Zone. These life zones are described below.

Ponderosa Pine Forest or Transition Life Zone (7,000 to 8,000 ft) – 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 ft.

Piñon-Juniper Woodland Zone (6,000 to 7,000 ft) – 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.

Upper Sonoran Life Zone (below 6,000 ft) – this short grass prairie zone occurs on alluvial fans, mesas, and gently rolling or sloping plains. Pioneer plants include tumbleweed, goat head, 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 western portion of KAFB is within this zone.

1.5.3 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 around 90 degrees Fahrenheit (°F) and winter high temperatures around 50°F. Daily low temperatures range from around 60°F in the summer to around 20°F in the winter. The dry continental climate also produces low average humidity in the late spring and summer prior to the onset of the monsoon season. Daytime relative humidity 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 annual rainfall twice that of locations in the Albuquerque Basin. 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. Most precipitation falls between July and October, mainly in the form of brief, heavy rain showers. Average annual precipitation is approximately 8.5 inches for the Albuquerque area. In 2013, Albuquerque received approximately 9.32 inches of precipitation (NWS 2013). Severe drought conditions existed in the Albuquerque area in 2013 and nearly two-thirds of the state was in severe to exceptional drought conditions (NWS 2013).

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 (mph). Wind gusts commonly reach 50 mph.

This page intentionally left blank.



Chapter 2
Compliance Summary

Sandia Corporation (Sandia) conducts operations at Sandia National Laboratories, New Mexico (SNL/NM) in compliance with federal, state, and local environmental regulations. This includes U.S. Department of Energy (DOE) directives, orders, and guidance, and Presidential Executive Orders (EO). As a part of this compliance, Sandia adheres to strict reporting and permitting requirements.

This chapter summarizes Sandia compliance status with major environmental regulations, statutes, and DOE directives that are applicable to operations conducted at SNL/NM (Table 2-1). Compliance issues, corrective actions, environmental occurrences, and environmental audits and appraisals are also discussed in this section.

Current permits held for SNL/NM, are listed in Chapter 8.

2.1 Compliance Status with Federal Regulations

Most environmental regulations and statutes applicable to SNL/NM are shown in Table 2-1. The following subsections detail the regulations.

2.1.1 Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (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, 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. The Superfund Amendments and Reauthorization Act (SARA) requires reporting of a reportable quantity release. Sandia was in full compliance with CERCLA/SARA in 2013, as illustrated in this chapter.

2.1.2 Emergency Planning and Community Right-to-Know Act

The Emergency Planning and Community Right-to-Know Act (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 2-2.

TABLE 2-1. Major Environmental Regulations and Statutes Applicable to SNL/NM[a]

Regulation/Statute	Description
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
Clean Air Act (CAA) and CAA Amendments (CAAA)	Provides standards to protect the Nation's air quality
Clean Water Act (CWA)	Provides general water quality standards to protect the Nation's water sources and byways
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
Cultural Resources Acts	Includes various acts that protect archeological, historical, religious sites, and resources
Endangered Species Act (ESA)	Provides special protection status for federally listed endangered or threatened species
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 environmental management
Federal Facility Compliance Act (FFCA)	Directs federal agencies regarding environmental compliance
Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)	Controls the distribution and use of various pesticides
Migratory Bird Treaty Act (MBTA) of 1918	Prevents the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests
National Emission Standards for Hazardous Air Pollutants (NESHAP)	Specifies standards for radionuclide air emissions and other hazardous air releases under the CAA
National Environmental Policy Act (NEPA)	Requires federal agencies to review all proposed activities so as to include environmental aspects in agency decision-making
Resource Conservation and Recovery Act (RCRA)	Mandates the management of solid and hazardous waste and certain materials stored in underground storage tanks
Safe Drinking Water Act (SDWA)	Enacts specific health standards for drinking water sources
Superfund Amendments and Reauthorization Act (SARA)	SARA, Title III, also known as the Emergency Planning and Community-Right-to-Know Act (EPCRA), mandates communication standards for hazardous materials over a threshold amount that are stored or used in a community
Toxic Substance Control Act (TSCA)	Specifies rules for the manufacture, distribution, and disposal of specific toxic materials such as asbestos and polychlorinated biphenyls

NOTES: [a] This is a partial listing of all the applicable environmental regulations and statues.
SNL/NM = Sandia National Laboratories, New Mexico
U.S. = United States

TABLE 2-2. 2013 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	Yes		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/SFO, which distributes it to the required entities.
304	Emergency Notification		No	There was no RQ release in 2013.
311-312	Hazardous Chemical Storage Reporting Requirements	Yes		There are two "Community Right-to-Know" reporting requirements: (a) Sandia 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 lbs and for all extremely hazardous substances present at the facility in an amount greater than or equal to 500 lbs or the Threshold Planning Quantity, whichever is lower; (b) Sandia provides Safety Data Sheets (formerly called MSDSs) electronically 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	Yes		Sandia exceeded the reporting threshold for lead and lead compounds for 2013.

NOTES: CFR = Code of Federal Regulations
DOE = U.S. Department of Energy
EPA = U.S. Environmental Protection Agency
EPCRA = Emergency Planning and Community Right-to-Know Act
lbs = pounds
MSDS = Material Safety Data Sheet (gives relevant chemical information)
NNSA = National Nuclear Security Administration
RQ = reportable quantity
Sandia = Sandia Corporation
SARA = Superfund Amendments and Reauthorization Act
SFO = Sandia Field Office
SNL/NM = Sandia National Laboratories, New Mexico
TRI = Toxic Release Inventory

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 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, unless otherwise specified.

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 proposed were to 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.

In 2013, chemical use at SNL/NM exceeded the reporting threshold for submitting a TRI report for lead and lead compounds. Sandia continues to document its toxic chemical use in the *Chemical Inventory Report Calendar Year (CY) 2013* (SNL/NM 2014a), which documents all purchases of chemicals at SNL/NM, Tonopah Test Range (TTR), and Kauai Test Facility (KTF) for 2013. This chemical inventory supports compliance with SARA Title III. Summary TRI Reporting information for TTR and KTF is provided in the CY 2013 Annual Site Environmental Report for TTR/KTF.

2.1.3 Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) regulates the generation, transportation, treatment, storage, and disposal (TSD) of hazardous chemical waste and non-hazardous solid waste, and the storage of hazardous or petroleum products in underground storage tanks. Under the authority of the New Mexico Hazardous Waste Act (NMHWA), and with delegated authority from the EPA under RCRA, the New Mexico Environment Department (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. Applicable regulations are listed in Chapter 8.

The hazardous component of hazardous/radioactive mixed waste (MW) is regulated as hazardous waste and is 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) Operations, 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. For a summary of Sandia's hazardous waste management activities during 2013 refer to Chapter 3.

New Mexico Hazardous Waste Act

On April 29, 2004, the NMED, DOE, and Sandia entered into the Compliance Order on Consent (the Order; NMED April 2004). The Order provides requirements and establishes schedules and deliverables for corrective action pursuant to the New Mexico Hazardous Waste Act, as well as requirements concerning perchlorate and nitrate pursuant to the New Mexico Solid Waste Act.

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

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

On February 6, 2002, Sandia and DOE/NNSA/SFO submitted a comprehensive RCRA Part B request to renew the operating permits for these units. The request also included updated permit applications for nine MW management units: the Radioactive and Mixed Waste Management Facility, the High Bay

Waste Storage Facility (HBWSF), seven Manzano Storage Bunkers (MSBs); and a new application for operation of the Auxiliary Hot Cell Facility. Sandia continues to operate under the existing permits and under interim status during the permit application and renewal process. The HBWSF and two of the seven MSBs were withdrawn from the permit application in 2003, and RCRA 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/NNSA/SFO and Sandia currently conduct post-closure care and maintenance, as detailed in Section 3.4.1. DOE/NNSA/SFO and Sandia submitted an updated Part B permit request to NMED on May 4, 2012 (SNL/NM May 2012).

On August 20, 2007, NMED issued a draft operating permit to DOE/NNSA/SFO and Sandia and invited public comments. DOE/NNSA/SFO, Sandia, and several citizens submitted comments to NMED. During 2010, NMED met with interested commenters to discuss their comments and propose modifications to the draft permit. On September 17, 2012, NMED issued a revised draft operating permit to DOE/NNSA/SFO and Sandia, and proposed granting corrective action complete (CAC) status for 24 solid waste management units and areas of concern. NMED invited public comments on the draft permit and proposed CAC status. The comment period ended February 14, 2013. DOE/NNSA/SFO, Sandia, and several citizens submitted comments to NMED.

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 surface storage of hazardous wastes in drums. Waste management operations ceased and closure activities began in 1989. Closure included two voluntary corrective measures: extraction of solvent vapors (primarily trichloroethylene) and excavation of the entire landfill. Sandia and DOE/NNSA/SFO submitted a Post-Closure Care Plan in 2005 as a permit application (SNL/NM September 2005).

On October 15, 2009, NMED issued a final post-closure care permit and a notice of approval for the final remedy and closure plan amendment (NMED October 2009). The permit became effective on June 2, 2011, when NMED issued written approval of DOE/NNSA/SFO and Sandia's certification of the closure of the CWL. Details about closure and post-closure care activities are detailed in Section 3.4.1.

TA-III Classified Waste Landfill – The TA-III Classified Waste Landfill was used to store non-hazardous classified media (e.g. floppy disks) and components. Sandia and DOE/NNSA/SFO, instead of seeking permit coverage, plan to excavate the contents of the landfill and revegetate the area. An excavation plan was approved by NMED on April 6, 2010.

2.1.4 Federal Facility Compliance Act

The Federal Facilities Compliance Act (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 issued a Federal Facilities Compliance Order (FFCO) to DOE and Sandia (NMED October 1995). The FFCO was developed pursuant to the FFCA, and provides requirements for achieving compliance with the requirements of Title 40 of the Code of Federal Regulations (CFR), Part 268.50 for mixed hazardous/radioactive waste at SNL/NM. A *Site Treatment Plan (STP)* (SNL/NM March 2013) and a schedule for processing the waste were developed. The STP does not include any 2013 deadlines. In 2013, Sandia continued to characterize and treat MW and to package wastes for shipment to permitted off-site TSD facilities.

2.1.5 Atomic Energy Act

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/NNSA/SFO, the U.S. Nuclear Regulatory Commission, and the EPA. Federal regulations control radioactive emissions and the transportation of nuclear materials. The authority for controlling radioactive waste is retained by DOE/NNSA/SFO and governed by DOE directives.

2.1.6 Clean Air Act

The objectives of the Clean Air Act (CAA), as amended, 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 City of Albuquerque (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 8, Table 8-1.

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 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 to the maximally exposed individual (MEI). The dose is compared to the EPA standard of 10 millirems per year (mrem/yr) allowed from radioactive air emissions from a DOE facility. For perspective, the annual radiation dose from natural background radiation is approximately 311 mrem/yr (NCRP 2009). Sandia met all NESHAP compliance requirements in 2013 as detailed in Section 5.4.2.

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

As required by the Consolidated Emissions Reporting Rule (EPA 2002), the emission inventory requests annual emissions of volatile organic compounds, nitrogen oxide, carbon monoxide, sulfur dioxide, lead,

ammonia, particulate matter with a diameter equal to or less than 10 microns (PM_{10}), particulate matter with a diameter equal to or less than 2.5 microns ($PM_{2.5}$), and HAP from Facilities that hold Federal permits. The COA has still not issued the Title V Operating Permit for SNL/NM, and have indicated that the National Emissions Inventory does not need to be completed until this permit is issued.

New Source Review (NSR) Requirements

The NSR permitting program was established as part of the 1977 Amendments to the CAA.

NSR requirements provide assurance to the public that any large, new, or modified industrial source in their neighborhood will be protective of human health and the environment, 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.

Reciprocating Internal Combustion Engine (RICE) NESHAP Requirements

As part of an effort to control pollution in the U.S., the EPA provides NESHAP requirements that dictate the level of pollution that stationary sources may produce within an area source for hazardous air pollutants. These standards are authorized by Section 111 of the CAA, and the regulations are published in 40 CFR Part 63. The RICE NESHAP has been established to address stationary generators and the potential ambient air impact within an area source for HAP.

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 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 CAA Amendments 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,
- 100,000 carbon dioxide equivalent greenhouse gas emissions,
- 10 tpy of any HAP, or
- 25 tpy of any combination of HAPs.

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

2.1.7 Clean Water Act

The Clean Water Act (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, stormwater 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 Utility 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 EPA has authority over National Pollutant Discharge Elimination System (NPDES) permits.

New Mexico Stream Standards

EPA Region VI is the permitting agency for discharges under the NPDES. NMED Surface Water Quality Bureau assists EPA in regulation of stormwater discharges by performing inspections on behalf of EPA and by serving as a local point of contact for providing information to permit holders. New Mexico has enacted "Standards for Interstate and Intrastate Surface Waters" (20.6.4 NMAC) to protect the quality of surface waters in the state.

ABCWUA Sewer Discharge Regulations

There are six wastewater monitoring stations, or outfalls, operating under the ABCWUA permits at SNL/NM. During 2013, there was one reported event that exceeded permitted limits established by the ABCWUA. For additional information refer to Section 6.1.1.

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 standards for the protection of groundwater and surface water prior to discharge. Sandia reviewed and approved 30 one-time internal surface discharge permits in 2013. Sandia also investigated four reportable environmental releases that met NMED reporting standards. Detailed information regarding these releases can be found in Section 2.2.2 and Section 6.2.3 of this report.

Sandia maintains two evaporation lagoons in Technical Area (TA)-IV, which are permitted by NMED Discharge Permit-530 (DP-530). The TA-IV lagoons are used to contain and evaporate accumulated stormwater pumped from the secondary containment areas around seven oil tanks that support the pulsed power accelerators and 2013 activities are discussed in Section 6.2.2. All permit conditions for the TA-IV permitted lagoons were met in 2013. The current permit for DP-530 was re-issued on September 12, 2007 and was to expire on September 12, 2012. Permit renewal for DP-530 was submitted within the required 180-days prior to its expiration date. On September 11, 2012, NMED informed Sandia that because the permit renewal application had been submitted in time, the lagoons are still permitted.

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" 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 and visual assessments are conducted, sufficient runoff permitting. For additional information refer to Section 6.3.

2.1.8 Safe Drinking Water Act

The Safe Drinking Water Act (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. Under the authority of the SDWA, and with delegated authority from the EPA, the NMED administers the safe drinking water regulatory program in New Mexico. Safe drinking water protection activities at SNL/NM are conducted under NMED regulations (20.7.10 NMAC). These state drinking water rules have requirements not covered by the SDWA. Applicable regulations are listed in Chapter 8.

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 Public Water System (PWS). The system derives its water from deep groundwater wells (Appendix C). KAFB routinely samples its water and conducts analyses to establish that its water quality conforms to EPA's MCL standards. In support of KAFB compliance with NMED Drinking Water Standards, Sandia operates the water distribution system on DOE/NNSA/SFO property in conformance with the SDWA regulations. Sandia provides DOE/NNSA/SFO with an annual certification for KAFB that all backflow preventers installed in the potable water distribution system have been properly tested and maintained.

Information on the KAFB PWS 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 at the following website:

http://www.kirtland.af.mil/shared/media/document/AFD-110623-041.pdf

2.1.9 Toxic Substances Control Act

The Toxic Substances Control Act (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. Details related to TSCA are in Section 3.9.

2.1.10 Federal Insecticide, Fungicide, and Rodenticide Act

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) regulates pesticide use and is enforced under the New Mexico Pesticide Control Act. 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. Sandia was in full compliance with FIFRA in 2013.

2.1.11 National Environmental Policy Act

The National Environmental Policy Act (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. Proposed actions that would not significantly impact the human environment are categorically excludable from additional NEPA documentation (as

identified in DOE NEPA Implementing Procedures, 10 CFR Part 1021). Other proposed actions may fit within a class of actions that have environmentally significant impacts associated with them. For this class of proposed actions, the agency must prepare an environmental assessment or an environmental impact statement 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. Additional information is provided in Chapter 3.

2.1.12 Endangered Species Act

The Endangered Species Act (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 through NEPA reviews and the Ecology Program. Table 2-3 lists the threatened and endangered species potentially occurring in Bernalillo County.

TABLE 2-3. Threatened and Endangered Species Potentially Occurring in Bernalillo County, New Mexico

Common Name	Scientific Name	Federal Status	State Status	Observed at KAFB
Animals				
Spotted bat	*Euderma maculatum*	---	Threatened	
Pale Townsend's big-eared bat	*Plecotus townsendii pallescens*	SOC	---	
New Mexican jumping mouse	*Zapus hudsonius luteus*	Proposed Endangered	Endangered	
Fish				
Rio Grande silvery minnow	*Hybognathus amarus*	Endangered	Endangered	
Birds				
Northern goshawk	*Accipiter gentilis*	SOC		
Baird's sparrow	*Ammodramus bairdii*	SOC	Threatened	
Sprague's pipit	*Anthus spragueii*	Candidate	---	
Western burrowing owl	*Athene cunicularia hypugea*	SOC	---	
Common black-hawk	*Buteogallus anthracinus anthracinus*	SOC	Threatened	
Black tern	*Childonias niger*	SOC	---	
Yellow-billed cuckoo	*Coccyzus americanus*	Proposed Threatened	---	
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*	SOC	Threatened	✓
Arctic peregrine falcon	*Falco peregrinus tundrius*	SOC	Threatened	
Bald eagle	*Haliaeetus leucocephalus*	---	Threatened	
White-eared hummingbird	*Hylocharis leucotis borealis*	---	Threatened	
Brown pelican	*Pelecanus occidentalis carolinensis*	---	Endangered	
Neotropic cormorant	*Phalacrocorax brasilianus*	---	Threatened	

See notes at end of table.

TABLE 2-3. Threatened and Endangered Species Potentially Occurring in Bernalillo County, New Mexico (Concluded)

Common Name	Scientific Name	Federal Status	State Status	Observed at KAFB
Birds (Continued)				
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 for Calendar Year 2013.
KAFB = Kirtland Air Force Base
SOC = species of concern
--- = no designation

2.1.13 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (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 through NEPA reviews and the Ecology Program.

2.1.14 Cultural Resources Acts

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

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

At SNL/NM, cultural resources compliance is coordinated through the NEPA Program. Actions that could adversely affect cultural resources are initially analyzed in a NEPA checklist. Historic properties, as defined by NHPA and other implementing regulations, include both 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 the DOE/NNSA. Planning through the NEPA process identifies potential impacts to these sites, and appropriate historic documentation is undertaken to mitigate adverse effects when necessary.

There are no known archaeological sites located on DOE/NNSA-owned property. However, archaeological 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 activities are planned to avoid potential impacts to these cultural resource sites. DOE/NNSA has a responsibility to ensure that impacts to cultural resources are assessed and appropriate actions are taken to mitigate any impact.

Historic Building Assessment

In 2013, DOE/NNSA/SFO undertook consultation with the New Mexico State Historic Preservation Office (SHPO) on actions at seven individual buildings, with two actions on one of the seven buildings. None of the actions were found to have an adverse effect on cultural resources.

In 2010, Sandia undertook a site-wide survey and historic building assessment of the SNL/NM site. The final recommendation to DOE/NNSA/SFO included eight historic districts and three individually eligible buildings. DOE/NNSA/SFO has not yet completed consultation with SHPO on the recommendation. As properties face renovation, DOE/NNSA/SFO conducts consultation with SHPO; for 2013, those consultations were on the seven properties mentioned above. As the cumulative effect of actions taken since the 2010 survey resulted in changes to the built environment, Sandia revisited and revised the survey in 2013. The current recommendation to DOE/NNSA/SFO is that there are seven historic districts and two individually eligible buildings at SNL/NM. Sandia is treating the properties recommended as eligible as historic. Documentation continues on buildings previously determined to be eligible for the National Register of Historic Places.

2.1.15 Environmental Compliance Executive Orders

Floodplain Management (EO 11988), as amended, has 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 (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. 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, 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/SFO and Sandia 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 Sandia operations.

Strengthening Federal Environmental, Energy, and Transportation Management (EO 13423), was issued in January 2007. EO 13423 sets goals in the areas of energy efficiency, acquisition, renewable energy, toxin 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.

Federal Leadership in Environmental, Energy, and Economic Performance (EO 13514), was issued in October 2009. EO 13514 establishes an integrated strategy towards sustainability to safeguard the health of our environment and make greenhouse gas emissions a priority for all federal agencies. EO 13514 sets goals in the areas of promoting electronics stewardship, pollution prevention, increased renewable energy, waste reduction, recycling, and fossil fuel usage reduction.

2.1.16 DOE Directives

DOE directives on the contract baseline that pertain to environmental protection and management are discussed in Section 1.2.1, "Operating Contract." In 2013, Sandia met all requirements stated in these DOE directives.

2.2 Occurrence and Release Reporting in 2013

Under DOE Order 232.2 (DOE 2011a), the current order for occurrence reporting, 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 Order 232.2, or determined to be recurring through performance analysis, are considered occurrences. There are environmental releases that may not meet DOE Order 232.2 reporting thresholds; however, they are still reportable to outside agencies.

2.2.1 DOE Order 232.2 Reportable Occurrences

All 2013 occurrences at SNL/NM that meet DOE Order 232.2 criteria defined above are entered into DOE's Occurrence Reporting and Processing System (ORPS) database. Corrective actions and closure of occurrence reports are also tracked in ORPS. For this report, the ORPS database is queried for SNL/NM occurrences in following groups (as defined by DOE Order 232.2):

- Group 5 Environmental,
- Group 9 Noncompliance Notifications,
- Group 10 Management Concerns, and
- Any occurrence that involves any of the environmental programs at SNL/NM.

During 2013, there were 41 occurrences for all categories at SNL/NM; 8 of these met the query criteria above (Table 2-4). Two were categorized as Significance Category 3 and six were categorized as Significance Category 4 (the lowest level occurrence).

2.2.2 Environmental Releases

In 2013, there were four surface discharge releases that were reportable to NMED and one release to the sanitary sewer system reported to ABCWUA. The sewer release is summarized in Section 6.1.1. The surface discharges are summarized in Section 6.2.3.

2.3 2013 Audits and Appraisals

Operations at SNL/NM 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 2013 are listed in Table 2-5.

TABLE 2-4. DOE Order 232.2 Occurrence Reports in 2013

Month in 2013	Significance Category	Reporting Criteria	Report Number, Title, and Summary of Event
February	SC3	**Group 10 Management Concerns** 10(3) A near miss to an otherwise ORPS reportable event, where something physically happened that was unexpected or unintended, or where no, or only one, barrier prevented an event from having a reportable consequence.	NA--SS-SNL-2000-2013-0001 Building 870 Hazardous Waste Storage Area Chemical Reaction On February 19, 2013, a 2.5-gallon hazardous waste container located in the Center 2700 less-than-90-day hazardous waste storage area failed. The container held approximately 2 quarts of an acid solution at the time of failure, approximately 1 quart was released upon container failure. The chemical solution released was completely contained inside the waste storage building, which is equipped with secondary containment and exhaust ventilation. There were no injuries or releases to the environment, and no workers were present in the waste storage area when the reaction occurred. Prior to waste container failure, hydrochloric acid was added to the waste container; it is suspected that the addition of acid caused a chemical reaction in the waste container and subsequent container failure.
March	SC3	**Group 10 Management Concerns** 10(3) See above for criteria description.	NA--SS-SNL-1000-2013-0003 Management Peroxide-forming Chemical Removed from Building 701/3224 March 8, 2013, as part of a Division 1000/Center 1800 chemical clean-up operation, a laboratory owner had located a bottle of methyl magnesium chloride in THF in Building 701/3224. The THF solvent had evaporated and the bottle contained the remaining salt as solid material appearing as dry powder. THF, while not the primary ingredient is known as a potentially peroxide-forming chemical and the peroxide crystals are potentially shock-sensitive. It was not possible to do routine peroxide testing due to the evaporation. The chemical bottle was secured in a plastic container inside a locked flammable chemical refrigerator, in addition the lab was secured, and signage was placed to assure no contact would be made until disposal could be arranged.

See notes at end of table.

TABLE 2-4. DOE Order 232.2 Occurrence Reports in 2013 (Continued)

Month in 2013	Significance Category	Reporting Criteria	Report Number, Title, and Summary of Event
April	SC4	**Group 9 Noncompliance Notifications** 9(1) Any written notification from an outside regulatory agency that a site/facility is considered to be in noncompliance with a schedule or requirement (e.g., Notice of Violation, Notice of Intent to Sue, Notice of Noncompliance, Warning Letter, Finding of Violation, Finding of Alleged Violation, Administrative Order, or equivalent notification or enforcement action).	NA--SS-SNL-4000-2013-0001 RCRA Hazardous Waste Notice of Violation from New Mexico Environment Department On April 1, 2013, the NMED conducted a Hazardous Waste Compliance Evaluation Inspection at CINT. Subsequent to the inspection, a NOV was sent and received on August 22, 2013. The NMED observed 6 violations. 1. Failure to have an accumulation start date identified on containers of hazardous waste at the less than 90-day area. 2. Failure to label hazardous waste containers with their contents. 3. Failure to label hazardous waste containers with the words "Hazardous Waste." 4. Failure to properly record inspections in an inspection log or summary. 5. Failure to have spill control equipment at the less than 90-day hazardous waste accumulation area. 6. Failure to keep hazardous waste containers closed during storage. The NMED stated in the NOV that the Sandia responses to the inspection have been reviewed and it was determined that the violations cited in the NOV have already been adequately addressed and no further action is required.
June	SC4	**Group 5 Environmental** 5A(4) Any discrete release of SF6 due to an event or DOE operation equal to or exceeding 115 pounds or 115 pounds more than the normal release quantity if the SF6 release is a common byproduct of the operation.	NA--SS-SNL-1000-2013-0008 Unplanned Release of SF6 From Bulk Tube Tank On June 27, 2013, a worker heard a loud "rushing noise" coming from the SF6 storage tank area. The noise was attributed to one of the Building 983 bulk SF6 storage tube tanks venting to atmosphere. The unplanned SF6 release resulted from a ruptured burst disk that provides over-pressure protection for the tank. The tank is co-located with eight other identical tanks in an open-air, access-controlled installation 100 feet west of Building 983. All nine tube tanks are individually valved and over-pressure-protected so that the failure of one tank does not affect the others. Initial indications suggest that failure of the burst disk was temperature related. Temperature on the day of the occurrence was a record setting 105°F. Based on currently available information, it appears 1,940 pounds were lost (i.e. the entire contents of the particular tube tank). The worker immediately reported it to a person with primary environmental, safety, and health duties related to the facility.

See notes at end of table.

TABLE 2-4. DOE Order 232.2 Occurrence Reports in 2013 (Continued)

Month in 2013	Significance Category	Reporting Criteria	Report Number, Title, and Summary of Event
July	SC4	**Group 5 Environmental** 5A(4) See above for criteria description.	SS-SNL-1000-2013-0009 Release of SF6 More Than 115 pounds Above Normal Release Quantities On July 15, 2013, a Z-Operations employee reported that the normal release quantity for SF6 was exceeded by greater than 115 pounds on six separate occasions. The exceedance was discovered while updating the SF6 tracking database. The "normal release quantity" is a calculated value used to establish an "occurrence trigger level" that is determined at the beginning of each fiscal year in accordance with the Z Machine DOE Order 232.2 Implementation Plan. The 2013 trigger level was established at 222 pounds per week. A critique/fact finding was held.
August	SC4	**Group 9 Noncompliance Notifications** 9(1) See above for criteria description.	NA--SS-SNL-NMFAC-2013-0005 Contract Operations in the Coyote Test Field Fails to Acquire Proper Permits, Causing Notification to an Outside Agency On August 26, 2013, it was discovered that project changes were sufficient in scope and magnitude to require a SWPPP, a stormwater CGP, and a Fugitive Dust Permit, which were not in place. The error is a noncompliance to an outside agency and thus meets the criteria for occurrence reporting. The National Environmental Policy Act document for this scope of work was written before the design was completed. After the design was complete, changes in the scope of the project increased such that a SWPPP and Fugitive Dust Permit were required. The originally planned area for disturbed land included a trench and an area for the spoils pile of about half an acre; however, the final total disturbed area may end up being closer to 2.1 acres. Work on the project was suspended until a fugitive dust permit, a CGP, and a SWPPP could be put in place. It should be noted that the contractor has used a watering truck for dust control throughout the project.

See notes at end of table.

TABLE 2-4. DOE Order 232.2 Occurrence Reports in 2013 (Concluded)

Month in 2013	Significance Category	Reporting Criteria	Report Number, Title, and Summary of Event
September	SC4	**Group 9 Noncompliance Notifications** 9(1) See above for criteria description.	NA--SS-SNL-4000-2013-0003 Air-Quality Testing Emergency Generators at the Building 858 Complex Did Not Meet Required Annual Schedule On September 5, 2013, a NOV was issued from the COA AEHD for non-compliance of annual testing of two emergency generators. In 2011, compliance testing was waived by the COA under a testing waiver granted by the COA AEHD. Sandia operated to the criteria in the current waiver, which was interpreted to require that testing would take place by December 31, 2012. The COA reviewed the permit and interpreted the permit to require that the test date should have been July 8, 2012. Due to this observation by COA AEHD, a post-inspection notification was issued on January 29, 2013, indicating non-compliance based on late testing with no corrective action needed. A critique was conducted. Although not required, a causal analysis was initiated and identified the need for internal improvements, which were implemented.
November	SC4	**Group 5 Environmental** 5A(2) - Any release (onsite or offsite) of a pollutant from a DOE facility that is above levels or limits specified by outside agencies in a permit, license, or equivalent authorization, when reporting is required in a format other than routine periodic reports.	NA--SS-SNL-1000-2013-0012 Building 897/Room 3005 Fractured Glass Bottle of Used Solvent Waste On November 21, 2013, a 1-gallon glass bottle containing used solvent waste spontaneously fractured and spilled on the table, in the sink, and on the surrounding area. The spill was approximately 1 gallon and some liquid was released to the laboratory sink drain that is connected to the sanitary sewer. The Water Quality Program was notified of the spill, since some fluid went down the sink drain that is connected to the sanitary sewer. Authorized personnel cleaned up the spill. The Albuquerque Bernalillo County Water Utility Authority was then notified of the release, and a NOV was issued. See Chapter 6 for further information on this occurrence.

NOTES: °F = degree Fahrenheit
AEHD = Albuquerque Environmental Health Department
CGP = Construction General Permit
CINT = Center for Integrated Nanotechnologies
COA = City of Albuquerque
DOE = U.S. Department of Energy
NMED = New Mexico Environment Department
NOV = Notice of Violation
ORPS = Occurrence Reporting and Processing System
RCRA = Resource Conservation and Recovery Act
SC = Significance Category
SF6 = sulfur hexafluoride
SWPPP = Stormwater Pollution Prevention Plan
THF = tetrahydrofuran

TABLE 2-5. Environmental Program Audits and Appraisals Conducted in 2013

Appraising Agency	Title	Date	Summary
ABCWUA	ABCWUA inspected facilities within Flow Basins 2069A, 2069F, 2069G, 2069I, 2069K and 2238A.	Inspected facilities during February, June, and November of 2013.	No findings or observations resulted from these inspections.
NMED (Hazardous Waste Bureau)	Compliance Evaluation Inspection (annual)	April 1, 2013	On August 16, 2013 received a "Notice of Violation and Resolution" identifying 6 violations that had been adequately addressed with no further action required. No fines or penalties were assessed.
NQA	ISO 14001 Surveillance Audit	May 13, 2013	3 Minor Findings (non-conformity) 4 Observations
Internal/Independent Audits and Appraisals			
00857 Internal Audit: ES&H, S&S, and IT Operations Department	Chronic Beryllium Disease Program	February 12, 2013	No findings or observations.
00857 Internal Audit: ES&H, S&S, and IT Operations Department	Fire Protection, 2012-ES-0021	April 1, 2013	1 Finding 2 Observations 2 Remarks 3 Noteworthy Practices
00857 Internal Audit: ES&H, S&S, and IT Operations Department	Radiation Protection Program 2013-ES-0027	May 21, 2013	1 Finding 2 Observations 2 Noteworthy Practices
00857 Internal Audit: ES&H, S&S, and IT Operations Department	Sandia National Laboratories/New Mexico Stormwater Management, 2013-ES-0016	July 17, 2013	2 Findings 2 Observations 3 Remarks 2 Noteworthy Practices
00857 Internal Audit: ES&H, S&S, and IT Operations Department	Safe Drinking Water Act, 2013-ES-0026	September 30, 2013	2 Findings 1 Remark 1 Noteworthy Practice
00857 Internal Audit: ES&H, S&S, and IT Operations Department	CIS & Biological Agents Inventory, 2013-ES-0011	Final report yet to be issued in 2014.	

NOTES: ABCWUA = Albuquerque Bernalillo County Water Utility Authority
CIS = Chemical Information System
ES&H = Environment, Safety, and Health
ISO = International Organization for Standardization
IT = Information Technology
NMED = New Mexico Environment Department
NQA = National Quality Assurance
S&S = Safeguards and Security

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 2-6 summarizes the primary reporting requirements for releases applicable to SNL/NM.

2.5 Summary of Environmental Permits

Table 8-1 in Chapter 8 lists all environmental permits and registrations that were in effect in 2013. It also 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. The results are reported through the Environment, Safety and Health (ES&H) Assurance Dashboard, the management review process, management reports and annual summaries (such as this report).

Environmental performance and Sandia's performance measures are also assessed as part of the Performance Evaluation Plan (PEP) agreement between DOE/NNSA/SFO and Sandia. On the basis of the PEP, DOE/NNSA/SFO prepares an annual Performance Evaluation Report that assesses Sandia's performance for the Fiscal Year (FY). For FY 2013, the overall score for Sandia was listed as "Excellent."

TABLE 2-6. 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 EDE to the 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
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 2013.	NRC 40 CFR 302
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. Operations at Sandia during 2013 exceeded the reporting requirement for lead and lead compounds. A TRI report was submitted. See Section 2.1.2.	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 an 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 2013. Details of these events are summarized in Section 6.2.3.	NMED 20.6.2.1203 NMAC
Accidental Slug Discharge Notification	The ABCWUA 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 2013 there was one reportable event that exceeded permitted limits and a notification was sent to the ABCWUA. See Section 6.1.1.	ABCWUA Sewer Use and Wastewater Control Ordinance

NOTES: ABCWUA = Albuquerque Bernalillo County Water Utility Authority
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CFR = Code of Federal Regulations
DOE = U.S. Department of Energy
EDE = Effective Dose Equivalent
EPA = U.S. Environmental Protection Agency
EPCRA = Emergency Planning and Community Right- to-Know Act
MEI = Maximally Exposed Individual
NESHAP = National Emission Standards for Hazardous Air Pollutants
NMAC = New Mexico Administrative Code
NMED = New Mexico Environment Department
NRC = U.S. Nuclear Regulatory Commission
POTW = Publicly-Owned Treatment Works
RQ = Reportable Quantity
Sandia = Sandia Corporation
SARA = Superfund Amendments and Reauthorization Act
TRI = Toxic Release Inventory



Chapter 3
Environmental Programs Information

Sandia Corporation (Sandia) collects environmental data to determine and report the impact of existing Sandia operations on the environment. Sandia's environmental programs include monitoring and surveillance of air, water, soil, and biota. The environmental programs activities at Sandia meet or exceed the requirements of federal, state, and local environmental regulations, as well as U.S. Department of Energy (DOE) directives in the Prime Contract between Sandia and DOE. Presidential Executive Orders (EO) and DOE guidance documents are also used to establish program criteria.

Environmental Management System (EMS) is the primary management approach for addressing environmental aspects of operations and activities, including environmental programs, energy, and transportation functions. Environmental monitoring began at Sandia National Laboratories, New Mexico (SNL/NM) in 1959 when the principal objective was to monitor radioactive effluents and determine any associated environmental impacts. Since then, environmental programs and waste management, along with other Environment, Safety, and Health (ES&H) activities, have greatly expanded at SNL/NM. The environmental programs and focus areas include:

- EMS Program
- Environmental Life-Cycle Management (ELM) Program
- Environmental Restoration (ER) Operations
- Long-Term Stewardship (LTS) Program
- Ecology Program
- National Environmental Policy Act (NEPA) Program
- Environmental Education Outreach Program
- Chemical Information System (CIS) and Chemical Exchange Program (CEP)
- Waste Management and Material Sustainability and Pollution Prevention (MSP2)

The following environmental programs are in separate chapters:

- Terrestrial Surveillance Program (Chapter 4)
- Air Quality Compliance and Meteorological Monitoring Programs (Chapter 5)
- Water Quality Program (Chapter 6)

All operations and activities at SNL/NM, including those in the environmental programs, are performed under the ES&H Corporate Policy. The policy states:

> "It is the policy of Sandia to protect Members of the Workforce and the public, prevent incidents, protect the environment through integration of environmental stewardship and sustainability throughout the life-cycle of its activities, and ensure regulatory compliance. Sandia conserves natural resources and protects the environment."

DOE's Integrated Safety Management System (ISMS) is a key element of Sandia's Integrated Laboratory Management System (ILMS). ISMS provides the framework for managing ES&H activities and functions while integrating them into all Sandia operations.

Sandia's methodology for managing and implementing its ES&H policies and procedures is derived from and builds upon the DOE contractual requirements for ISMS. ISMS is a framework defined by five "core functions" that provide processes to guide management in identifying and controlling hazards. These include:

1. Define the scope of work,
2. Analyze the hazards,
3. Develop and implement controls for hazards,
4. Prepare and perform work within controls, and
5. Provide feedback and continuously improve performance.

3.1 Environmental Management System Program

DOE Order 436.1, Departmental Sustainability (DOE 2011b) was established to ensure the EMS and site sustainability are at the forefront of environmental excellence. Although this order is not within Sandia's Prime Contract, the intent of DOE Order 436.1 is implemented through the Prime Contract requirement for an International Organization for Standardization (ISO) 14001 certified EMS. Sandia has implemented an EMS as part of the ISMS. The ILMS is how Sandia conducts its operations and manages the laboratories. ISMS is one of Sandia's constituent elements of ILMS and provides the context for implementing the Sandia EMS.

Sandia personnel implemented its EMS Program in December 2005 and received third-party ISO 14001 Certification in 2009, with a certification in 2012. An ISO Surveillance Audit was completed in 2013 and the ISO 14001 Certification was retained. Since that time, Sandia has worked to fully implement and establish the EMS Program, in conjunction with the ISMS, in all site operations. EMS is the framework by which Sandia manages and continually improves its environmental compliance and sustainability practices. The EMS identifies the environmental consequences of Sandia's activities, products, and services and develops objectives and measurable targets to mitigate potential impacts to the environment.

DOE defines its key clean energy and sustainability strategies and goals in its Site Sustainability Plan (SSP) (Appendix B). Each DOE site is required to prepare an annual SSP that articulates the site's performance status and planned actions for meeting DOE's SSP goals and broader sustainability program. Sandia uses its EMS as a platform for SSP implementation, as well as for other programs with objectives and measurable targets that contribute to meeting sustainability goals.

Sandia continues to achieve significant environmental accomplishments through the EMS. The following paragraphs describe a number of these important programs and achievements.

In 2013, Sandia successfully retained certification under the ISO 14001, Environmental Management Systems, through auditing by a third party registrar. The certification demonstrates Sandia's EMS satisfies specific requirements detailing a systemic approach to handling environmental issues based on the Plan-Do-Check-Act process approach to continual improvement.

In 2013, Sandia won a DOE/National Nuclear Security Administration (NNSA) Sustainability Best in Class Award for Greenhouse Gas Management. The award was for reducing the use of sulfur hexafluoride (SF6), which is identified by the EPA as having the highest global warming potential of any gas, at 23,900 carbon dioxide equivalents. NNSA named Sandia in the Greenhouse Gas Scope 1 and 2 categories. Sandia's Saturn-Hermes III pulsed-power facilities use SF6 as an electrical insulator for high-voltage switching devices, such as spark gaps and cascade switches. The Saturn-HERMES III team has reduced Sandia's SF6 emissions by upgrading the gas handling systems, and identifying and replacing probable leaks and failure modes in the systems.

Sandia has and continues to encourage members of its workforce to use alternatives to single-passenger commuting through incentive and assistance programs, including preferred parking to incentivize carpooling/vanpooling and bus-pass discounts. Commuting alternatives reduce traffic on Albuquerque streets, save money on fuel costs, help the environment, ease the parking situation at SNL/NM, and can even provide exercise. Sandia's web-based Commuter Assistance Program (link below) provides information to connect carpool and vanpool riders; assist bicycle commuters on routes, safety, locker and shower locations; and information on Albuquerque's bus (and train) routes and schedules. Approximately ten percent of Sandia's workforce participates in alternative commuting opportunities.

https://info.sandia.gov/commuter_assistance/index.html

Sandia strives to implement sustainability in the construction of new buildings and operation and maintenance of existing buildings on the SNL/NM campus. As such, Sandia implements the Federal High Performance Sustainable Building Guiding Principles (GPs). As part of the GPs, all new-building construction projects over 5,000 square feet (sq ft) are required to be certified under the U.S. Green Building Councils Leadership in Energy and Environmental Design (LEED) Green Building Rating System. Sandia currently has seven LEED-certified buildings and another under construction in 2013. Sandia is also implementing the GPs on all its existing buildings greater than 5,000 sq ft, through measures that improve energy performance, conserve water, enhance indoor environmental quality, and reduce environmental impacts of materials.

Beyond the GP, Sandia emphasizes energy use reduction in building operations and computing equipment. Energy conservation at Sandia is an ongoing process involving numerous projects and operational strategies. Energy reduction measures and projects implemented in 2013 include:

- Conversion of building controls from pneumatic to direct digital controls zone control, enabling more efficient operation of building heating, ventilation, and air conditioning (HVAC) systems.
- Installation of occupancy sensors in buildings that allows both lighting and HVAC to be turned off when spaces are unoccupied.
- Replacement of aging chillers with new energy efficient chiller systems.
- Operation of most buildings within a strict temperature band of 70 to 76 degrees Fahrenheit (°F).
- Implementation of computer power management programing on many non-mission critical desktop computers.
- Installation of plate-and-frame heat exchangers in several buildings that utilize large scale evaporative cooling using outside air (referred to as free cooling systems). These systems use outside air as the source of cooling when conditions permit.
- Utilization of the Building Automation System to shut off or set back systems during nonstandard working hours in buildings that do not require 24/7 operation.

Similar to energy use reduction, Sandia recognizes the importance of water resources and implements measures to minimize water use. Sandia uses a Central Irrigation Control System that applies the correct amount of water to landscaping based on the time of year, historic evapotranspiration rates, and irrigation system audit calculations. A High-Efficiency Reverse Osmosis system is operated at the highest deionized water use facility that maximizes water recovery and minimizes waste water. A spent rinse water recycling process is also operated that enables the reuse of process water at this facility. Sandia is also installing and retro-fitting high-efficiency restroom fixtures in new buildings and renovation projects.

Sandia's Fleet Services provides vehicles for Sandia business use and was recognized within the top 100 Best Fleets in North America in 2013 for the second straight year. Fleet Services implements a number of environmental practices, including replacement of retired light-duty vehicles with alternative fuel vehicles. This not only reduces the consumption of petroleum fuel, it increases use of alternative fuels (including compressed natural gas, biodiesel, and E-85 gasoline). Other efficiency measures employed by Sandia's Fleet Services include "right-size" vehicle use to maximize fuel-use efficiency, use of low-rolling resistant tires, and synthetic oil use.

Sandia continues installation of "Cool Roofs" at buildings requiring roof replacements. Sandia has approximately 3,338,971 gross sq ft total roof area and 128 roofs, or approximately 75 percent (2,490,548 gross sq ft) that comply with the "cool roof" definition. They are either bright white installed membrane roofs or existing roof membranes that have been coated with a bright white roof coating.

Sandia continually strives to reduce the generation and landfill disposal of nonhazardous solid waste. The SSP goal for nonhazardous solid waste, excluding construction and demolition (C&D) debris, is to divert 50 percent from landfill disposal by 2015. Sandia achieved an approximate 64 percent diversion rate for the nonhazardous solid waste, excluding the C&D debris category of solid waste in 2013. Similarly, the SSP goal for C&D debris is to divert 50 percent from landfill disposal by 2015. C&D debris differs significantly from the typical office-generated solid waste stream. Concrete, asphalt, wood, metal, insulation, and other C&D debris are required to be managed and disposed separately from the typical office solid waste stream. Sandia achieved an approximate 94 percent diversion rate for C&D solid waste in 2013. This high diversion rate is primarily due to concrete recycling, which is typically conducted on a 2- to 3-year interval. Sandia routinely diverts scrap metal, wood, ceiling tiles, carpet, concrete and asphalt from the C&D debris stream for recycling.

Sandia is committed to reducing its greenhouse gas (GHG) emissions and the two major sources associated with Sandia operations are fugitive emissions associated with SF6 and grid-based electricity use. Energy reduction efforts at Sandia, including electricity use, were described above. SF6 used in pulsed power and high-voltage research and development applications account for the majority of use at Sandia. In 2013, Sandia made several improvements to minimize SF6 emissions, including:

- Upgrading SF6 gas supply and return manifolds with new fittings and piping to eliminate leaks at one of the pulsed power facilities.
- Upgraded SF6 gas supply and return tubing at one of the pulsed power facilities that is more durable and has less permeability than the tubing previously used.
- Procured three new high efficiency SF6 gas reclaimer units for use at several of the pulsed power facilities. This includes installation of the infrastructure for use of the reclaimer units, as well as training of the personnel in operation of the reclaimer units.
- Continued to improve tracking SF6 gas cylinder use during maintenance and operation modes.

Additional information can be found on the external EMS website:

www.sandia.gov/about/environment/index.html

3.2 Environmental Life-Cycle Management Program

The Sandia ELM Program involves stewardship for past, present, and future activities at SNL/NM. The ELM 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/SNL September 2006). The environmental programs described in this document support that stewardship.

The ELM Program mission ensures long-term protection of human health and the environment, and proactive management toward sustainable use and protection of natural and cultural resources affected by Sandia's operations and operational legacies. This mission will be accomplished by proactively identifying potential environmental impacts and applying environmental processes and guidance.

The objectives of the ELM Program are to:

- Protect human health and the environment from past, present, and future operations,
- Preserve and protect natural and cultural resources, and
- Apply life-cycle cost principles to environmental impacts of SNL operations.

The ELM Program reviews all proposed projects and activities that have the potential to impact the environment through the NEPA process.

3.3 Environmental Restoration Operations

Sandia's ER Operations was created under the DOE Office of Environmental Management 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. HSWA requirements apply to ER Operations sites that include Solid Waste Management Units (SWMUs) or Areas of Concern (AOCs). 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 AOCs at SNL/NM that are not regulated as SWMUs (primarily closed-out septic systems) that have also been investigated as a part of ER Operations. 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 (Bleakly July 1996).

Sandia, DOE, and NMED negotiated a Compliance Order on Consent (the Order) that was signed in 2004 (NMED April 2004). The Order governs corrective action for releases of hazardous waste or hazardous constituents at SNL/NM. The Order will terminate upon the completion of its requirements and the RCRA Part B Operating Permit will remain as the enforceable document.

3.3.1 Waste Cleanup and Site Closures

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

identified as potential SWMUs in a RCRA Facility Assessment in 1987 (EPA April 1987). Additional sites were identified in subsequent years and were incorporated into the list of sites subject to the RCRA corrective action requirements in Module IV of the RCRA Part B Operating Permit (EPA September 1997).

Since then, approximately 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 contaminants of concern (COCs). In 1992, ER Project (now Operations) 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 Operations were Sandia National Laboratories, California (SNL/CA), the Kauai Test Facility, Hawaii (KTF/HI), and the Tonopah Test Range, Nevada (TTR/NV). There were also a number of miscellaneous sites located in other areas nationwide and internationally.

DOE and Sandia propose ER sites to NMED for Corrective Action Complete (CAC) status when they meet NMED criteria, either before or after remediation; the criteria includes acceptable levels of risk to human health and the environment presented by the contaminants at the site.

After NMED grants CAC status, DOE and Sandia submit a request for a Class III modification to the HSWA Module (Module IV) of Permit NM5890110518-1 (the Permit) requesting that the site be deleted from Table A.1 "*List of Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) Requiring Corrective Action*" of the permit and added to Table A.2 "*List of Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) not currently requiring Corrective Action*" of the permit. The majority of ER sites are granted CAC status under a risk-based scenario. Risks to human health and the environment 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 together with the available information and conceptual model for each site to determine the risk to human health and the environment.

All CAC proposals and Class III Permit modifications are available for review at the University of New Mexico Zimmerman Library.

The 2013 status of the ER Operations site closure is as follows:

- There are 278 SNL/NM SWMUs/AOCs not currently requiring corrective action (Davis July 2012).
- There are 36 SWMUs/AOCs requiring corrective action (Davis July 2012).
- As stated in letters from the NMED in 2010 and 2012, 6 of the 36 SWMUs/AOCs require additional investigation or groundwater monitoring as part of the corrective action (Bearzi April 2010). SWMUs 8, 58, 68, 149, and 154 require groundwater monitoring. SWMU 52 requires backfilling of the tanks and associated piping (Kieling October 2012).
- In 2013, SWMU 52 activities were completed, reported (SNL/NM September 2013a), and approved by the NMED (Kieling November 2013a).

Included in the 36 SWMUs/AOCs requiring corrective action are three groundwater AOCs (Technical Area [TA]-V, Tijeras Arroyo Groundwater [TAG], and Burn Site Groundwater [BSG]) that have final remedies pending. Also included in the 36 SWMUs/AOCs requiring corrective action (Davis July 2012) are three sites at active test facilities (SWMUs 83, 84, and 240) with potential soil contamination that will be evaluated at the end of their test operations.

3.3.2 Mixed Waste Landfill Activities

The Mixed Waste Landfill (MWL) is a 2.6 acre SWMU located in the north-central part of TA-III undergoing corrective action in accordance with the HSWA module of the SNL/NM RCRA Permit and the Order (NMED April 2004). From March 1959 through December 1988 the MWL received approximately 100,000 cubic feet of low-level radioactive waste and minor amounts of mixed waste generated at SNL/NM research facilities. Groundwater, which is approximately 500 feet (ft) below ground surface at the MWL, has been monitored since 1990. More than twenty years of data indicate that groundwater has not been contaminated by the MWL (SNL/NM December 2002, SNL/NM June 2012, and SNL/NM June 2013).

The Phase 2 RCRA Facility Investigation was conducted from 1992 to 1995 and confirmed tritium as the primary contaminant of concern at the MWL (SNL/NM September 2002). As directed by the NMED, the MWL Corrective Measures Study (CMS) Report (SNL/NM May 2003) was submitted to the NMED in May 2003. The NMED held a public comment period on the MWL CMS from August 11 to December 9, 2004, and a public hearing was held from December 2 to December 3 and December 8 to December 9, 2004. On May 26, 2005, the Secretary of the NMED issued a Final Order on the MWL (NMED May 2005) that included a vegetative cover with a biointrusion barrier (i.e., an evapotranspirative [ET] cover) as the final remedy and required a Corrective Measures Implementation (CMI) Plan within 180 days. The MWL CMI Plan (SNL/NM November 2005) was submitted to NMED in November 2005 and conditionally approved by the NMED in December 2008 (Bearzi December 2008). The MWL ET Cover construction was completed from May through September 2009. The MWL CMI Report documenting cover construction in accordance with the CMI Plan was submitted to NMED in 2010 (SNL/NM January 2010a) and was approved by NMED on October 14, 2011 (Bearzi October 2011) after a 90-day NMED public comment period (November 29, 2010 through February 28, 2011) that included a public meeting on December 14, 2010.

The MWL Long-Term Monitoring and Maintenance Plan (LTMMP) previously submitted in September 2007 was revised and submitted to the NMED in March 2012 (SNL March 2012) within 180 days of CMI Report approval, as required by the NMED Final Order on the MWL. The revised MWL LTMMP is pending NMED approval; a 150-day public comment period was completed from September 14, 2012 through February 11, 2013 that included a public meeting on October 16, 2012. Upon NMED approval, implementation of the monitoring, inspection, maintenance/repair, and annual reporting requirements of the LTMMP will begin immediately, including the process to install three multiport soil-vapor monitoring wells proposed in the LTMMP. The first five-year reevaluation report, specified in the Final Order on the MWL, will be submitted five years after the date of LTMMP approval (Bearzi October 2011).

The groundwater monitoring network at the MWL consists of seven wells. Four of these wells were installed in 2008 (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) and comprise the MWL groundwater monitoring network for the uppermost part of the regional aquifer. Monitoring well MWL-MW4 was installed in 1993 at an angle of 6 degrees from vertical with two discrete screen intervals 20 ft apart to evaluate vertical potentiometric gradients and changes in aquifer parameters with depth. Monitoring wells MWL-MW5 and MWL-MW6 were installed in 2000 at a distance of approximately 200 and 500 ft west of the MWL, respectively, with the screened intervals placed below the top of the regional water table in the coarse-grained Ancestral Rio Grande (ARG) deposits.

In 2013, annual groundwater monitoring was performed at the MWL in January and February in accordance with the Order (NMED April 2004). All groundwater samples were analyzed for volatile organic compounds (VOCs), Target Analyte List (TAL) metals plus uranium (both filtered and unfiltered samples), anions (as bromide, chloride, fluoride, and sulfate), alkalinity, nitrate plus nitrite (NPN), gamma spectroscopy, gross alpha/beta activity, and tritium. No analytes were detected at concentrations exceeding the EPA Maximum Contaminant Levels (MCLs), except for chromium in the unfiltered sample fraction from monitoring well MWL-MW4. This exceedance appears to be related to the corrosion of stainless steel components of the dedicated sampling system in this well (no other wells at MWL have a dedicated sampling system). Analytical results for MWL groundwater monitoring are summarized in 2013 *Annual Groundwater Monitoring Report* (SNL/NM June 2014a) (Appendix C), along with additional site background information.

In addition to annual groundwater monitoring, ET Cover maintenance activities (i.e., weed removal, seeding, application of gravel mulch, erosion repair, and supplemental watering) were performed in August and November 2013. Supplemental watering of the ET Cover vegetation was performed from late-May through mid-August 2013 due to very dry conditions leading into the 2013 growing season. To address the final remaining condition associated with NMED approval of the CMI Plan (Bearzi December 2008), the nine-acre MWL Borrow Pit area (source of clean soil fill material used to construct the MWL ET Cover) was reclaimed from May through August 2013. Reclamation included grading to achieve the design topography and slope, application of soil amendments to buffer the high-alkalinity soils, surface ripping to mix the amendments with the surface soil and create windrows, and seeding with native plant species tolerant of low moisture and high-alkalinity soil conditions. After NMED approval, routine monitoring, inspections, maintenance/repairs, and annual reporting will be performed as stipulated in the MWL LTMMP (SNL/NM March 2012).

3.4 Long-Term Stewardship Program

The mission of the LTS Program is the long-term protection of human health and the environment from hazards associated with residual contamination at legacy sites, and minimization of Sandia's environmental liability by ensuring compliance with the environmental requirements provided in multiple NMED permits. Stewardship of legacy sites is necessary to maintain long-term protection of human health, the environment, and natural and cultural resources from hazards associated with residual radioactivity and hazardous contamination. Sandia's LTS activities are increasing as remedial activities are completed. The LTS Program conducts compliance oversight, institutional control (IC), and community-liaison and stakeholder-involvement activities.

3.4.1 Compliance Oversight

LTS compliance oversight activities include groundwater monitoring and various types of monitoring at the Corrective Action Management Unit (CAMU) and Chemical Waste Landfill (CWL) to meet NMED regulatory requirements. Monitoring well maintenance is also performed as necessary. An internal sample management database stores monitoring information. The database provides legally defensible monitoring data for current and past activities to ensure protection of human health and the environment.

Groundwater Monitoring

Groundwater monitoring at SNL/NM consists of monitoring a network of approximately 79 wells for presence of COCs at various intervals during the year. Sixty seven groundwater monitoring wells associated with legacy sites (former ER sites) are monitored to meet NMED requirements. An additional 12 wells and a spring are sampled to assess SNL/NM operations impacts on groundwater.

Water level measurements are obtained from 96 Sandia wells and 29 wells owned by other agencies. Monitoring wells are maintained or replaced as necessary.

Sandia personnel collect groundwater samples at the following project areas: CWL, MWL, TA-V, TAG, BSG, and SWMUs 8/58, 49, 68, 116, 149, and 154 (67 wells). The 2013 water quality results for these study areas were consistent with results from past years, and the groundwater analytical results are provided in the 2013 *Annual Groundwater Monitoring Report* (SNL/NM June 2014a) (Appendix C). The report also provides information on the overall objectives of the groundwater monitoring program, the regulatory drivers, the DOE directives that govern the program, and the program-related activities that occurred during 2013.

All analytical results were below applicable MCLs at the CWL and MWL. At TA-V, several analytical results exceeded the MCL for trichloroethene (TCE) and NPN. TCE exceeded the MCL of 5 micrograms per liter (μg/L) in five wells with a maximum concentration of 18.4 μg/L, and NPN exceeded the MCL of 10 milligrams per liter (mg/L) in three wells with a maximum concentration of 13.0 mg/L. At TAG, several analytical results exceeded the MCL for TCE and NPN. TCE exceeded the MCL in one well with a maximum concentration of 9.23 μg/L, and NPN exceeded the MCL in five wells with a maximum concentration of 38.5 mg/L. At BSG, NPN exceeded the MCL in four wells with a maximum concentration of 41.9 mg/L. At SWMUs 8/58, fluoride exceeded the MCL of 4.0 mg/L in one well. All other analytical results for groundwater samples from TA-V, TAG, BSG, and the groundwater AOCs were below established MCLs.

Activities also include general surveillance of water quality from a network of wells not directly associated with legacy sites. Annual samples were collected from 12 wells and one spring. Analyses were conducted for TAL metals (plus mercury), inorganics (including NPN, major anions, and total cyanide), total phenols, total alkalinity, VOCs, total halogenated organics, gross alpha, gross beta, and selected radionuclides (e.g., uranium-234, uranium-235, and uranium-238). Groundwater samples from four wells were analyzed for high explosives (HE). These four designated wells are used to establish background concentrations of HE at the Dynamic Explosives Test Site east and south of TA-III, and to monitor potential groundwater impacts from explosives testing. No VOCs or HEs were detected at concentrations above EPA MCLs or New Mexico Water Quality Commission Maximum Allowable Concentrations (MACs). Fluoride was detected above the MAC in Coyote Springs and three groundwater wells. Beryllium concentrations in Coyote Springs exceeded the EPA MCL. The exceedance for each of these elements is attributable to the elevated natural concentrations associated with bedrock groundwater systems at the sampling locations. Refer to Appendix C of this report for detailed information and results of the analysis of collected groundwater samples.

Groundwater levels are measured in wells on a quarterly or monthly basis. Wells that have stable trends are measured quarterly; wells that have fluctuating water levels due to seasonal pumping at nearby extractive wells are measured monthly. Water level data are used to generate a regional water table elevation contour map from which groundwater flow directions can be obtained. Groundwater elevation tables, hydrographs, and contour maps derived from the data are provided in Appendix C.

Chemical Waste Landfill

The CWL is now a remediated, closed, interim status landfill undergoing post-closure care in accordance with the CWL Post-Closure Care Permit (PCCP) (NMED October 2009). The site is approximately 2 acres and is located in the southeast corner of TA-III. From 1962 through 1985, the CWL was used for disposal of hazardous wastes, chemicals, solid wastes, and minor amounts of radioactive wastes generated by SNL/NM research activities. Liquid waste disposal ended in 1982. The CWL was also used as a hazardous waste drum storage facility from 1981 to 1989. All final closure activities are documented in the *CWL Final RCRA Closure Report* (SNL/NM September 2010) that was submitted to NMED on September 27, 2010 and approved on June 2, 2011 (Kieling June 2011). The CWL PCCP

became effective in June 2011 (Kieling June 2011), and all monitoring, inspections, maintenance/repairs, and annual reporting have been performed by the LTS Program in accordance with its requirements.

The groundwater monitoring network at the CWL consists of four wells. In 2013, CWL groundwater monitoring was performed in January and July (two semi-annual sampling events) in accordance with CWL PCCP requirements. All monitoring activities and results are detailed in the 2013 *Annual Groundwater Monitoring Report* (SNL/NM June 2014a) (Appendix C), along with additional site background information. Groundwater samples were analyzed for TCE, nickel, and chromium. The July samples were also analyzed for additional VOCs, including 1,1 dichloroethene, 1,1,2-trichloro-1,2,2-trifluoroethane, chloroform, tetrachloroethene, and trichlorofluoromethane. TCE was the only detected VOC (samples from monitoring well CWL-MW10). No analytes were detected at concentrations exceeding the EPA MCLs.

The CWL PCCP requires other monitoring (i.e., soil-gas monitoring), inspections, and maintenance/repair activities that are documented and reported for each CY in annual post-closure care reports. The 2013 soil-gas monitoring results continue to indicate the residual VOC soil-gas plume beneath the CWL is slowly dissipating in the vadose zone. ET Cover maintenance activities (i.e., weed removal, seeding, discrete application of herbicides, and supplemental watering) were performed from February through October 2013. The CWL ET Cover continues to meet PCCP-defined criteria for successful revegetation. No repairs were required based upon inspections of the ET Cover, stormwater diversion structures, compliance monitoring system (groundwater and soil-gas monitoring wells and sampling equipment), and security fence. All PCCP-required monitoring, inspection, and maintenance/repair requirements were met for 2013 and are documented in the *CWL Annual Post-Closure Care Report*, *Calendar Year 2013* (SNL/NM March 2014b).

Regulatory activities in 2013 included a submittal to the NMED of updated reference documents (Beausoleil January 2013) cited in the CWL PCCP, approval of the February 2013 Class 1 Permit modification request (Kieling November 2013b), and technical correspondence with NMED related to ET Cover maintenance activities.

Corrective Action Management Unit

The CAMU is a containment cell located in TA-III and is permitted under the RCRA. It was engineered to hold treated soil wastes generated from the excavation of the CWL. The LTS Program conducts the long-term monitoring of the CAMU as required by the NMED in the RCRA Closure Report (SNL/NM December 2003).

The CAMU containment cell consists of engineered barriers and a final cover system, and incorporates a bottom liner system with a leachate collection 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 monitoring subsystems that include the primary subliner (PSL), a vertical sensor array (VSA), and the CWL/sanitary sewer line (CSS). The PSL, VSA, and CSS monitoring subsystems are monitored quarterly for the composition of soil vapors and soil moisture content.

In 2013, 398 gallons (gal) of leachate (a listed hazardous waste) were removed from the collection system. This is a slight reduction from the 413 gal of leachate removed in 2012. Leachate is pumped from the containment cell leachate collection system on a weekly basis and containerized in 55-gal poly drums and stored in a RCRA 90-Day Storage Area. Waste is characterized by drawing a composite sample that is sent to an off-site laboratory for analysis. Waste is transported to the SNL/NM Hazardous Waste Handling Facility (HWHF) and subsequently shipped to an off-site hazardous waste facility for treatment.

Baseline data for soil moisture and soil vapor were established between October 2003 and September 2004.

The 2013 soil vapor monitoring results indicate an influence from the residual soil vapor plume emanating from the location of the former CWL. This is consistent with the conceptual model of the CWL residual soil vapor plume (SNL/NM December 2004). VOC concentrations at the CSS and VSA monitoring subsystem locations continue to correlate with soil temperature variations, increasing when the soil temperature is warmer and decreasing when soil temperature is cooler. The VOC concentrations are not attributed to the material in the CAMU containment cell.

The 2013 soil moisture monitoring results have remained consistent with the baseline data for the PSL and VSA monitoring subsystems. Slight increases at two of the CSS monitoring locations (September 2005 and March 2007) were attributed to a leak in the sanitary sewer system that parallels the CSS monitoring subsystem. A liner was inserted to the sanitary sewer system sewer (September 2010) to seal any leaks. Soil moisture values have since stabilized at the two CSS monitoring locations.

VZMS monitoring results are compiled and reported on an annual basis; additional information on activities conducted, including sampling results, can be found in the *CAMU VZMS Annual Monitoring Results Report* (SNL/NM September 2013b).

3.4.2 SWMU 502/Building 9938 Surface Discharge Site

As reported in the CY 2012 ASER, a surface discharge of wastewater occurred in December 2012 at the Coyote Test Field Building 9938 (also referred to as LTS SWMU 502). Sandia personnel periodically conducted research and development activities involving the production, isolation, and purification of materials used in the synthesis of explosives at Buildings 9938 and 9939. The wastewater generated from each synthesis activity was containerized in polyethylene plastic containers and discharged to the ground surface in an area south of Building 9938. The volume of wastewater discharged from each synthesis activity was conservatively estimated at 10 gal. A total of 25 synthesis activities were held from July 2010 through September 2012, thus a total of approximately 250 gal of wastewater was discharged to the ground surface.

The DOE and Sandia formally notified the NMED of this newly identified or suspected SWMU by letter in December 2012. A January 2013 inspection of the discharge area performed, with assistance from personnel associated with the processes that generated the wastewater. The inspection identified several small zones of discolored soil within a total area approximately 10 ft wide by 25 ft long. No odors were present and there was no evidence of staining on surfaces surrounding the discharge area.

A Voluntary Corrective Action (VCA) was planned and conducted at SWMU 502 in 2013 to address the remediation initiative. The VCA included completion of a site assessment and surface and subsurface soil sampling. Soil samples were analyzed for HE compounds, perchlorate, TAL metals, VOCs, semivolatile organic compounds, perchlorate, and NPN.

Based upon field investigation results, a determination of CAC without controls is recommended for SWMU 502 for the following explanations:

- No COCs are present in the soil at levels considered hazardous to human health for either an industrial or residential land-use scenario.
- No COCs warrant ecological concern because ecological risks were acceptable per NMED guidance.

Details can be found in the *Investigation Report for Voluntary Corrective Action at Solid Waste Management Unit 502 Building 9938 Surface Discharge Site* (SNL/NM October 2013) submitted to the NMED in October 2013. Final determination by the NMED is pending.

3.4.3 Institutional Controls

Administrative and physical ICs are in place at SNL/NM to appropriately limit access to, and use of, legacy sites, which have been approved with controls. These sites are periodically inspected and maintained when necessary. A total of 27 IC inspections were completed in 2013. No large-scale maintenance requirements, or other concerns with physical ICs, were identified on legacy sites during the 2013 annual inspections. Maintenance did take place on one site not normally inspected under the LTS IC program because the site was closed and received NMED approval of CAC without controls. Subsidence had occurred over a previously backfilled underground cistern feature at Site 275. LTS coordinated corrective actions that were completed in the spring of 2013.

3.4.4 Community Liaison and Planning, and Stakeholder Involvement

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 legacy sites. Stakeholders participate in semi-annual DOE/U.S. Department of Defense joint meetings on environmental activities. Regulatory decision documents for legacy sites are available to the public in the local federal repository (University of New Mexico's Zimmerman Library), and in its electronic documents Lobo Vault collection:

http://repository.unm.edu/handle/1928/10963

3.5 Ecology Program

Biota monitoring began in 1996 as an additional element of environmental monitoring. The objectives of the Ecology Program are to:

- Collect ecological resource inventory data to support site activities while preserving ecological resources and to maintain regulatory compliance.
- Collect plant and animal species data to advance the understanding of on-site ecological resources.
- Collect biota contaminant data on an as-needed basis in support of site projects and regulatory compliance.
- Assist in complying with regulations and laws.
- Educate the SNL/NM community regarding ecological resource conservation.
- Provide biological surveys in support of site activities.
- Provide support when biological issues arise, i.e., injured or nesting bird situations, snake relocation, and other wildlife encounters or issues.

Data are collected on plant, mammal, reptile, amphibian, bird, and insect species that currently inhabit SNL/NM. Data collected include information on presence, abundance, species diversity, and land-use patterns. These data are primarily utilized to support NEPA documentation, land use decisions, and wildlife communication campaigns to ensure safe work environments and sustainable decision-making strategies. 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 2013. Table 1-1 in Chapter 1 represents common species identified at Kirtland Air Force Base (KAFB).

3.6 National Environmental Policy Act Program

The NEPA Program provides the DOE/NNSA/SFO with technical assistance in support of compliance with NEPA and the National Historic Preservation Act at all of Sandia's locations: SNL/NM, SNL/CA, TTR/NV, KTF/HI, and other remote locations as needed. The SNL/NM NEPA Team reviews projects for conformance to existing DOE NEPA documents and determinations. The use of the NEPA software facilitates Sandia NEPA reviews, citing existing NEPA documentation as appropriate. The software also supports quality assurance activities by providing a consistent framework that makes NEPA documentation and information readily available to DOE/NNSA/SFO and Sandia users. A DOE NEPA checklist, or an Air Force Form 813, is prepared for the DOE review and determination, if the proposed action meets any of the following concerns:

- Proposes a new action,
- Does not fall within the analysis of an existing Sandia NEPA document, and
- Occurs on KAFB property (permitted or requested for permit for Sandia use).

NEPA program documents and regulations are listed in Chapter 8. Table 3-1 summarizes the NEPA reviews that were completed in 2013.

TABLE 3-1. Summary Data for SNL/NM NEPA Reviews Submitted to DOE/NNSA/SFO During Calendar Year 2013

NEPA Reviews	Review Breakouts		Quantity
Corporate NEPA Software System	Reviewed by SNL/NM NEPA Team		217
	Reviews Completed by DOE/NNSA/SFO		75*
Other Corporate NEPA Reviews	Completed by SNL/NM NEPA Team		682
DOE/USAF NEPA Documents	New Land-Use Permit Reviews	0	
	Land-Use Permit Renewal Reviews	0	
	Land-Use Permit Termination Reviews	0	
	Project-Specific Reviews	6	
	Environmental Assessments Under USAF Activities	0	
	Subtotal for USAF Reviews Completed		6*
Grand Total of all NEPA Reviews			**980**
Percentage of Total Reviews Requiring Submittal to DOE **Total DOE Reviews* (75 + 6 = 81) *divided by Total NEPA Reviews* (980) =			8 %

NOTES: DOE = U.S. Department of Energy
NEPA = National Environmental Policy Act
NNSA = National Nuclear Security Administration
SFO = Sandia Field Office
SNL/NM = Sandia National Laboratories/New Mexico
USAF = U.S. Air Force
% = percent

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

During 2013, Sandia personnel assisted the DOE in the continued development of a new SWEIS. Environmental Programs Department personnel reviewed the Preliminary Draft SWEIS completed by the DOE contractor. During the review cycle, Environmental Programs personnel conferred with subject matter experts from various Sandia programmatic missions to review and clarify data on their current and anticipated future operations.

3.6.2 2013 NEPA Activities

The Sandia NEPA Team participated in or completed the following environmental activities:

- Completed the redevelopment of the ISMS NEPA software for a new, state-of-the-art, secure and more reliable NEPA system;
- Supported the development of the SNL Solar Regional Test Center in Cocoa Beach, FL;
- Supported the continued development of the SNL Wind Energy Laboratory in Lubbock, TX;
- Supported data calls and the preparation of the Draft Environmental Assessment for the Resumption of Transient Testing of Nuclear Fuels and Materials (DOE/EA-1954); and
- Initiated additional software redevelopment, for Tracking Environmental Actions Management System, which documents internal department coordination and review in support of project-related environmental aspects compliance and NEPA checklists completion.

In addition to the activities above, the Sandia NEPA Team reviewed a total of 980 proposed projects in various corporate systems. To support mission activities, 81 DOE NEPA checklists were transmitted to the DOE/NNSA/SFO for review and determination.

3.7 Environmental Education Outreach Program

Sandia's Environmental Outreach Program reaches out to the community through various events and provides environmental information to members of Sandia's workforce. Sandia recognizes that in addition to complying with requirements, it is important to communicate with Sandia's workforce and the local community to help reduce environmental impacts at work and at home. Sandia has an integrated approach to communicate environmental awareness to its workforce via various newsletters, awareness campaigns, and outreach events. Sandia collaborates with numerous internal and external organizations such as the City of Albuquerque (COA), and the Environmental Education Association of New Mexico (EEANM).

Currently, Sandia participates in, or holds, several internal and external outreach and awareness events. Events conducted in 2013 include Youth Conference on the Environment and the annual EMS Excellence Awards Ceremony. Sandia also coordinates the semi-annual DOE Public Meeting. At these events, the outreach team distributes fact sheets and newsletters; when working with children, the team often demonstrates environmental education models on topics including local air quality, landfills, groundwater, and watershed education. The Outreach team also encourages the members of the workforce and the community to provide feedback and ask questions about Sandia's environmental programs.

3.7.1 Annual Youth Conference on the Environment

The Annual Youth Conference on the Environment is a free, one-day conference offered to high school students as a means to educate them on various environmental issues. In 2013, approximately 100 students attended and learned about urban farming. The event was co-sponsored by Sandia, the EEANM, and the COA.

3.7.2 EMS Excellence Awards Program

The annual EMS Excellence Awards Program recognizes members of the workforce who demonstrate environmental excellence in areas such as energy and water conservation, environmental protection, waste minimization, and recycling. Since its inception in 2006, the EMS Team has received over 190 nominations from individuals and teams who are contributing to Sandia's vision of EMS.

3.7.3 SNL/NM Phone Book Recycling

For years, SNL/NM has received over 800 Yellow Page phone books that were distributed to employees across the laboratory. This process occupied time and resources for very little gain, as most people use internet search tools to find phone numbers for local businesses. Additionally, each year, hundreds of phone books were disposed of as new phone books were received. In Fiscal Year (FY) 2013, SNL/NM's Shipping and Mail department committed to eliminating the receipt and delivery of paper phone books for the laboratory. With an estimated weight of 4 pounds (lbs) each, elimination of phone book delivery will remove 3,200 lbs of mixed paper from our waste stream, and save the labor cost of unpackaging, sorting, loading and delivering phone books to 800 mail stops, as well as the use of fuel and vehicle emissions that accompany those deliveries. By reducing consumption and eliminating the laboratory's annual order of 800 phone books, thousands of pounds of paper will be saved and will remain in the supply chain for other printing opportunities; therefore, decreasing Sandia's environmental footprint.

3.8 Chemical Information System and Chemical Exchange Program

The Chemical Information System (CIS) is a comprehensive chemical information management system that provides work place chemical container tracking, as well as information about the chemical hazards found in the associated Safety Data Sheets (SDS) (previously known as Material Safety Data Sheets [MSDS]). The chemical information consists of the chemical or product name, location, quantity, and information about who is responsible for the chemical. The SDS library in CIS currently contains over 80,000 SDSs.

The primary driver for CIS is derived from state and federal regulations, among them the Emergency Planning and Community Right-to-Know Act (EPCRA). The intent of CIS is to address the issue of classifying the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures.

Beyond regulatory compliance, CIS provides an inventory control and safety management system. This electronic inventory helps chemical users and their managers to assess and manage workplace hazards. Easy access to this inventory facilitates quick availability searches, sharing of chemicals, source reduction, as well as minimizing chemical purchases and waste disposal expenses. The goal of CIS is to be the comprehensive corporate chemical information system that facilitates proper chemical information management.

The CEP was developed in 1989 as a Hazardous Waste Management Waste Minimization program. The goal of the CEP is to reduce the amount of usable chemicals disposed as waste, resulting in cost avoidance for both new acquisitions and disposal. The program has been through multiple transformations since its inception.

The CIS/CEP team continues to develop a more user-friendly, web-based interactive tool for using the CEP. In 2008, the CEP was introduced as a module within CIS available to members of the workforce. This tool allows members of the workforce to submit, browse, and request chemicals. Once a chemical has been accepted, it goes onto a searchable list of available chemicals and continues to be properly managed by the current owner for up to six months. After six months, the owner is notified automatically via email. If another member of the workforce requests the chemical, transportation to the new owner is arranged by the CEP. In 2013, CEP delivered 163 lbs of excess chemical to new users.

3.9 Waste Management, and Material Sustainability and Pollution Prevention

Sandia follows the waste management hierarchy dictated in the Pollution Prevention Act of 1990 and reinforced in amendments to the RCRA. The objective of the waste management and MSP2 focus areas is to make every attempt to reduce, reuse, or recycle waste, as appropriate, before any treatment or disposal. Waste management activities at SNL/NM are conducted in accordance with applicable permits and regulations as discussed in Chapter 2.

Wastes are generated throughout SNL/NM during daily activities that include research and testing; production; maintenance and support operations; construction, renovation, decommissioning and demolition; environmental protection; and waste management. The wastes include the following:

- Radioactive waste (including low-level radioactive waste [LLW] and transuranic [TRU] waste),
- Mixed waste (including mixed low-level waste [MLLW] and mixed transuranic [MTRU] waste),
- RCRA-regulated hazardous waste,
- Toxic Substance and Control Act (TSCA)-regulated waste,
- Other regulated wastes, including special waste and industrial solid waste,
- Construction and demolition waste, and
- Commercial solid waste.

Processes at SNL/NM waste management facilities vary according to the specific waste type, but generally incorporate one or more of the following tasks in preparation for shipment to off-site facilities for recycling, storage, treatment, or disposal:

- Screening,
- Sorting,
- Baling,
- Repackaging,
- Treatment, and
- Storage.

Types of waste handled and shipped in 2013 are summarized in Table 3-2. Wastes recycled in 2013 are summarized in Table 3-3.

3.9.1 Waste Management Facilities and 2013 Activities

Wastes are managed at several SNL/NM facilities, as follows: the Radioactive and Mixed Waste Management Facility (RMWMF); five Manzano Storage Bunkers (MSBs); the Auxiliary Hot Cell Facility (AHCF); the HWHF; the Thermal Treatment Facility (TTF); and the Solid Waste Collection and Recycling Center (SWCRC).

At each facility, wastes are tracked, inspected, and managed at all times to maintain protection of human health and the environment. Wastes are not disposed at SNL/NM. Waste management activities at individual facilities during 2013 are summarized as follows:

- Activities at the RMWMF included screening, sorting, repackaging, storage, and treatment. Wastes were treated by one or more of the following methods: solidification and stabilization; chemical deactivation and neutralization; macroencapsulation, and physical treatment (volume reduction).
- Activities at the MSBs consisted of storage.
- Wastes were generated at the AHCF during material management activities.
- Activities at the HWHF included screening, sorting, repackaging, and storage.
- During 2013, Sandia operated the TTF, a RCRA-permitted open-burn unit in TA-III, for the on-site treatment of small quantities of unique explosive waste generated by research and test activities at an adjacent facility.
- Operations at the SWCRC.

3.9.2 Radioactive Waste and Mixed Waste

LLW and MW managed at SNL/NM are generated through a variety of processes, including production, research, and waste management activities. TRU and MTRU wastes managed at SNL/NM are generated through research and waste management activities. During 2013, legacy wastes (wastes originally generated between 1990 and 1998), were also managed at SNL/NM.

SNL/NM's LLW generally consists of laboratory waste, debris from decontamination and demolition (D&D) activities, and personal protective equipment (PPE). LLW is primarily contaminated with one or more isotopes of strontium, plutonium, cobalt, americium, thorium, cesium, tritium, and/or uranium (plutonium and americium in LLW are below the activity level designated for TRU waste).

TRU waste may derive from sealed instrument sources, D&D waste, PPE, and/or laboratory waste. The radioactive component in TRU is generally americium, plutonium, neptunium, and curium.

MW and MTRU generally consist of inorganic debris and radioactive metallic objects with hazardous waste constituents, and include wastes that have been treated to meet hazardous waste treatment standards. The radioactive components of MW and MTRU are similar to LLW or TRU waste at SNL/NM.

TABLE 3-2. Waste Shipped by SNL/NM Waste Management Facilities During Calendar Year 2013

Waste Categories	2013 Waste Shipped	
	(kg)	**(lb)**
Radioactive Waste		
Low-Level Waste	25,507	56,233
Transuranic Waste	0	0
Subtotal Shipped	**25,507**	**56,233**
Mixed Radioactive/Hazardous Waste		
Mixed Low-Level Waste	22,561	49,738
Mixed Transuranic Waste	0	0
Subtotal Shipped	**22,561**	**49,738**
Resource Conservation and Recovery Act (RCRA)		
Hazardous Waste	53,435	117,803
Subtotal Shipped	**53,435**	**117,803**
Toxic Substances Control Act (TSCA)		
Polychlorinated Biphenyls (PCBs)	8,237[a]	18,159
PCBs and hazardous waste mixture	0	0
Subtotal Shipped	**8,237**	**18,159**
Other Regulated Wastes		
Infectious Waste	731	1,612
Asbestos	54,447	120,034
Chemical Waste (includes Special Waste and Industrial Solid Waste)	299,962	661,296
Used Oil (not recycled)	0	0
Subtotal Shipped	**355,140**	**782,942**
Commercial Solid Waste		
Solid Waste Collection and Recycling Center Dry Waste	732,920	1,615,795
Offsite Office Waste (Sandia Science and Technology Park)	51,880	114,375
Cafeteria Wet Waste	21,920	48,325
Construction and Demolition Waste	1,158,980	2,555,087
Subtotal Shipped	**1,965,700**	**4,333,582**
2013 Total Waste Shipped	**2,430,580**	**5,358,457**

NOTES: All wastes shipped off-site for treatment and/or disposal unless noted otherwise. Wastes that are treated on-site and shipped off-site are included in the quantities of wastes shipped off-site. Waste treatment may increase waste quantity (e.g., adding inert material to treat the waste through macroencapsulation within an outer container).
Construction and demolition waste is now included in this table.
[a] = The weight shown includes the weight of the PCB-containing equipment: two transformers and a regulator.
kg = kilogram
lb = pound
SNL/NM = Sandia National Laboratories, New Mexico

TABLE 3-3. Waste Recycled by SNL/NM During Calendar Year 2013

Recycle Categories	Waste Recycled	
	(kg)	**(lb)**
Regulated or Chemical Waste Recycled		
Batteries	32,553	71,767
Capacitors	750	1,655
Chemical Exchange Program (CEP)	73	163
Computer Electronics	292,781	645,467
Coolant	753	1,661
Lead	42,765	94,280
Light Ballasts (non-PCB)	3,925	8,655
Light Bulbs	10,851	23,924
Mercury containing items	160	354
Oil / Grease / Fuel	108,606	239,434
Soil	1,148	2,532
Toner / Ink Cartridges	14,694	32,396
Transformers	8,749	19,290
Subtotal	**517,808**	**1,141,578**
Commercial, Construction, and Demolition Solid Waste Recycled		
Asphalt	773,262	1,704,734
Batteries	1,351	2,979
Binder Exchange Program	371	819
Brake Chambers	181	400
Cardboard	167,338	368,915
Carpet Tiles	*None Shipped*	
Ceiling Tiles	*None Shipped*	
Chairs	30,472	67,180
Compost (Food, Green, Paper, Plywood and Gypsum)	163,265	359,934
Concrete	10,838,103	23,893,681
Fencing	90	200
Food Grease	9,044	19,940
Glass	743	1,640
Metals	980,709	2,162,073
Paper (Mixed and White)	112,025	246,971
Plastics	20,344	44,852
Shock Absorbers	136	300
Tires	6,599	14,550
Wood	53,291	117,486
Subtotal	**13,157,324**	**29,006,654**
Total Waste Recycled	**13,675,132**	**30,148,232**

NOTES: kg = kilogram
lb = pound
PCB = polychlorinated biphenyl
SNL/NM = Sandia National Laboratories, New Mexico

No high-level radioactive waste (HLW) is generated at SNL/NM. Although Sandia operates several nuclear reactors, these are not used for power production; therefore, spent fuel that would be removed from the research reactors would not be classified as HLW.

All LLW, MW, TRU, and MTRU generators are instructed to contact the Radioactive Waste Program to obtain prior approval before generating waste; this promotes waste minimization and allows development of a pathway for waste treatment and disposal before the waste is generated. Radioactive wastes are typically shipped to off-site facilities within one year, but may remain on-site longer than one year if necessary to complete the process for acceptance at an off-site facility and/or to achieve full utilization of transport vehicles.

Regulatory Status of Mixed Waste

As discussed in Section 2.1.4, Sandia manages MW that is subject to the Federal Facilities Compliance Order (FFCO) (NMED October 1995), however, no compliance dates are active. The requirements include: deadlines for processing and/or disposing of various types of waste as specified in the annual *Site Treatment Plan* (STP); and providing an annual update of activities and the current inventory of stored waste still on-site. During 2013, DOE/NNSA/SFO and Sandia met all regulatory deadlines; the compliance history regarding MW and the FFCO is shown in Chapter 8, Table 8-3. DOE/NNSA/SFO and Sandia provided an annual update of MW activities (SNL/NM March 2013). Chapter 8, Table 8-4 lists the quantities of MW subject to the FFCO at the end of FY 2013. In July 2013, DOE/NNSA/SFO and Sandia requested Revision 14 to the STP to establish new compliance deadlines and ensure continuity of the STP requirements.

3.9.3 Hazardous Waste and Other Regulated Waste

Hazardous waste generated at SNL/NM includes a wide variety of wastes from research and testing, together with larger quantities of wastes from D&D, production, maintenance, and support operations, including waste management activities. Hazardous wastes that cannot be recycled or treated on-site are sent to off-site facilities for treatment, as needed, before disposal at permitted off-site facilities. Applicable regulations for hazardous waste handled at SNL/NM are listed in Chapter 8. During 2013, waste management activities at the HWHF, RMWMF, and TTF included management of hazardous wastes.

Certain types of explosive wastes generated at SNL/NM are treated at the RMWMF or TTF. Explosive waste at SNL/NM is generally managed at the point of generation until it is shipped to an off-site facility for treatment in accordance with regulatory requirements.

In accordance with the requirements of Module IV, Section B.1 of Hazardous Waste Facility Permit NM5890110518, 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.

Sandia recycles many types of hazardous waste, where feasible. Recycled hazardous waste includes various batteries, silver compounds, mercury compounds, lamps, capacitors, and toxic metals such as lead. Waste minimization efforts promoted throughout SNL/NM are investigated and implemented by line organizations with the support and technical assistance from MSP2, as discussed in Section 3.9.5.

Industrial Solid and Special Wastes

Special waste and industrial solid waste generated at SNL/NM includes a wide variety of wastes from research and testing, production, maintenance and support operations, D&D, and waste management activities. Wastes that cannot be recycled or treated on site are sent to off-site facilities for treatment as

needed before disposal at permitted off-site facilities. Applicable regulations for special waste and industrial solid waste handled at SNL/NM are listed in Chapter 8.

Sandia recycles many categories of non-hazardous waste, including alkaline batteries, fluorescent lamps, oils, and non-polychlorinated biphenyl (PCB) containing ballasts. Waste minimization efforts promoted throughout SNL/NM are not limited to hazardous waste, but also include non-hazardous waste, as discussed in Section 3.9.5.

Polychlorinated Biphenyl and Asbestos Wastes

PCBs are a class of organic chemicals that were widely used in industrial applications due to their practical, physical and chemical properties. Uses 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 fluorescent lighting fixture retrofit program instituted in 1998. Six additional units of PCB-regulated equipment remain in use at SNL/NM. There are also six discrete areas of existing PCB spill contamination on concrete floors (from old transformers that have since been removed from service) which are being actively managed in compliance with an EPA/TSCA use authorization. PCB waste generated and shipped in 2013 is summarized in Table 3-2.

Asbestos-containing materials are present in older buildings at SNL/NM, and abatement 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 present in floors, ceilings, roofing tile, certain types of insulation, and other fire-retardant construction materials. Typical asbestos waste generated from equipment abatement consists of fume hoods, ovens, and cable insulation. In instances where laboratory equipment has asbestos-containing material in good condition and in a non-friable form (which poses no inhalation risk), these items are allowed to remain in service, or are redistributed through the property reapplication program. Table 3-2 summarizes the quantities of asbestos waste generated and shipped in 2013.

3.9.4 Solid Waste Collection and Recycling Center

The Solid Waste Transfer Facility was renamed the SWCRC in January 2012. This change was made in recognition that the increased emphasis on waste reduction and diversion had resulted in the facility falling below the State of New Mexico threshold of commercial solid waste picked up on an average daily basis. The function of the SWCRC is now shared equally between collection and processing of recyclable and non-recyclable solid waste generated by SNL/NM operations, in compliance with all applicable regulations. It does not accept hazardous, radioactive, residential, or food service wastes. Solid waste is disposed of locally at the COA Cerro Colorado landfill, and recyclables are either picked up by or delivered to local vendors.

SWCRC Operations

Processing commercial solid waste at the SWCRC includes screening 100 percent of the waste for prohibited materials, which are removed when identified. While screening 100 percent of the solid waste before it enters the conveyor is not a regulatory requirement, it is a best practice implemented to prevent prohibited materials from inadvertently ending up in the landfill. The conveyor then feeds the waste into a baler where it is compressed and wire-tied into desk-sized bales. The bales are weighed on a scale

calibrated twice annually, individually tracked, and loaded into a trailer for transport to a local landfill. Solid waste generated in 2013 by SNL/NM is summarized in Table 3-2.

Recyclables

Another important function of the SWCRC 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, and numerous categories of plastics. Recyclables constitute over 50 percent of SNL/NM commercial solid waste and diverting the recyclables significantly reduces the number of trips to the landfill. Proceeds from the sale of recyclable materials are reinvested in the recycling program. The SWCRC also provides some recycling support for KAFB on a cost-reimbursable basis, and for the DOE/NNSA Albuquerque Complex and the DOE/NNSA/SFO.

In support of small SNL/NM construction and demolition projects, the Construction and Demolition (C&D) Recycle Center at the SWCRC accepts small quantities of C&D waste (managed separately from the solid waste). Sandia construction contractors that bring recyclables to the SWCRC are assisted by SWCRC personnel in loading the roll-offs and hoppers with cardboard, wood, various scrap metals, and lastly C&D debris. Materials recycled in 2013 are summarized in Table 3-3.

SWCRC personnel also support the collection of C&D debris and C&D recyclables by delivering roll-offs (20-, 30-, and 40-cubic yard) upon request to numerous locations on the site. When requested, the SWCRC personnel pick-up the full roll-offs and take them either to the KAFB landfill (C&D debris only) or to local recycling vendors.

Another service is delivery and pickup of green waste roll-offs to the Albuquerque Bernalillo County Water Utility Authority's Soil Amendment Facility (SAF) where it is processed into compost and, as needed, bringing back compost in the roll-offs for use on the site. In 2013, green waste collected in roll-offs from various grounds keeping operations on the site were transported to the SAF, and for a total of 10 round trips, the roll-offs brought back 200 cubic yards of compost as soil amendment for a specific re-vegetation project at SNL/NM.

3.9.5 Materials Sustainability and Pollution Prevention (MSP2) Program

Program Scope

The MSP2 Program provides guidance and technical support to reduce waste generation and increase green purchasing by organizations within SNL/NM. The program strives for continuous improvement by setting targets and associated activities for reuse and recycling, waste reduction, sustainable acquisition (SA), and electronics stewardship. The MSP2 Program is directed and guided by multiple federal requirements, and in particular, the DOE Strategic Sustainability Performance Plan.

The MSP2 Program partners with numerous organizations at SNL/NM, including research departments, Facilities Maintenance and Operations, Procurement and other Environmental Protection programs. Activities include researching waste reduction technologies and strategies applicable to Sandia work processes, seeking avenues to reuse and recycle waste streams currently landfilled or incinerated, and leading or assisting with cost-effective implementation of new waste reduction or recycling initiatives.

Awareness and Outreach

The MSP2 staff conducts awareness programs and outreach activities that promote and teach MSP2 strategies and technologies to waste generators. MSP2 staff submits nominations for Federal recognition (i.e., DOE and EPA) and other award programs. Internal articles and notices are regularly

created that showcase MSP2 activities and awards to Sandia for MSP2 accomplishments. MSP2 information and successes can be found at the following website:

http://p2.sandia.gov

The MSP2 Program supports awareness events each year. Sandia's Earth Day event was held in April 2013 and combined with the Take Our Sons and Daughters to Work Event. A booth was hosted to promote composting and recycling opportunities at work and at home and was well received by the youth and their parents. Seven "Zero Waste Events" were hosted by MSP2 with cooperation and support from catering contractors, to teach participants that it is possible to eliminate waste. These Zero Waste Events were in conjunction with other non-environmentally oriented activities such as Health Fitness Day, the Hispanic Heritage and Diversity Awareness Event, and department potlucks. MSP2 also hosts an annual booth at the main cafeteria for November's America Recycle Day and New Mexico's Recycling Awareness Month.

MSP2 staff give presentations at conferences, professional society meetings, and other organized events to disseminate and share Sandia-specific MSP2 knowledge and experience. In 2013, MSP2 staff presentations included:

- Internal customized training presentations to specific departments such as Fleet Services, Information Technology teams, Procurement, and new hire classes.
- "Reduce, Reuse, Recycle, Reinvest, Compost, & Buy Green - SNL/NM on the Path to Zero Waste to Landfill." to:
    - the New Mexico chapter of the Air and Waste Management Association (May), and
    - the Albuquerque and Rio Rancho Green Chamber of Commerce.
- Solid Waste Diversion Processes as they relate to the OS1 Custodial Service Program - Audit (May), and
- Pollution Prevention and Waste Minimization to the New Mexico Society of Hazardous Materials Managers continuing education seminar (October).

3.9.5.1 Sustainable Acquisition (SA) Program

Through the SA Program, MSP2 works to integrate products with reduced environmental impact into purchase agreements and ongoing operations and maintenance across SNL/NM. Products with high recycled content percentages, renewable biobased source materials, and those that have been labeled by widely recognized environmental certification systems are all part of the Sandia approach to sustainable acquisition. These products reduce demand for virgin materials, while increasing demand on recycled markets; reduce material sent to landfills; use less energy for harvesting, transport, and conversion of raw materials; rely less on petroleum ingredients; and require less energy and water resource use in manufacturing. By seeking out suppliers who share these goals and communicating with Sandia procurement, purchasers, and end users, Sandia is helping to pull many markets toward products that are better for human health and the environment.

MSP2 works with Procurement staff to write green purchasing requirements into all applicable contracts with Sandia. Construction specifications are another means of calling out green products and MSP2 works with Facilities groups to put in item specific language. The ultimate goal is to provide products

with sustainable alternatives as a first choice to Sandia by contractual obligation. Increasingly, sustainable acquisition is being addressed as early as the Request for Quotation so that a company's environmental stance becomes a component in the contract award process.

3.9.5.2 Waste Reduction

MSP2 has continued its contract with a local composting company to divert food waste from onsite cafeterias serving up to 1,200 customers per day and from catered events. During 2013, 40,700 lbs of food waste, approximately 46 percent of the total food service waste, was diverted from the landfill.

In other waste reduction efforts, the CEP delivered containers of excess chemicals to new users, weighing 163 lbs, avoiding both new purchase costs and waste disposal expenses. The Lead Bank reduces the need for purchase of new lead, and provides a location for departments to send excess elemental lead other than for hazardous disposal. In 2013, 64,386 lbs of lead were recycled, and 29,760 lbs were distributed for reuse on-site. The glass bottle and jar recycling pilot continued in 2013 with two campus drop-off locations. The objective is to reduce glass waste from new product containers, and to make diversion available to beverage consumers. In 2013, 1,640 lbs of glass was diverted for recycle through the COA. Three additional collection locations are under consideration.

3.9.5.3 Electronics Stewardship

Electronics Stewardship covers the life cycle impacts of information technology equipment, and is now routinely addressed in the DOE and Federal government as a whole. The impacts of electronics use are many, but include a significant portion of an organization's energy use, toxics contributed to the waste stream, and the opportunity for "e-cycling" or capture of the high value materials for use in new equipment. Electronics life cycle management is divided into three stages: purchase, operations, and end of life management. The SNL/NM MSP2 group is tasked with monitoring and facilitating improvements to Sandia's performance at all three of these stages.

Sandia is a continuing partner in the Federal Electronics Challenge Program, which promotes a comprehensive approach to reducing the environmental impacts of electronics assets ownership. One part of that approach is use of the Electronic Product Environmental Assessment Tool (EPEAT) in the purchase of electronic equipment that is recyclable, uses fewer toxins in production, and is more energy efficient. EPEAT requirements were integrated into computer equipment purchasing contracts at Sandia beginning in FY 2008, and the results have been continuously improving since then. In 2013, 97 percent of SNL/NM purchases of computer towers, laptops, and monitors were EPEAT Gold registered, which is the highest level of environmental attributes. These numbers indicate computing equipment that is recyclable, uses zero or negligible toxic metals in production, and are more energy efficient. Imaging equipment (printers, multifunction devices, etc.) and televisions were introduced as a new category of EPEAT-registered equipment in 2013, after several years of analysis by the EPEAT community. MSP2 staff worked with Procurement and the vendor to get the EPEAT requirements added to the contract immediately and Sandia was able to show 93 percent compliance on 573 imaging equipment purchases and 23 percent compliance on 30 television purchases.

Operations are currently an aspect of electronics stewardship that has a lot to do with people. All EPEAT-certified equipment is Energy Star-compliant, but it is up to each user to take advantage of energy saving features. Still, calculations show energy savings in the hundreds of thousands of dollars.

Regarding the end of life for computer equipment, if a unit is not immediately reassigned to another individual for reuse, it enters the Property Reapplication system. Property Reapplication offers a select

quality of computers for reuse. Computer systems not designated for reuse are palletized and then stored in the MSP2 Tent until sufficient quantity for a recycling shipment is reached. MSP2 then coordinates a shipment to a certified domestic electronics recycler that dismantles and segregates the material for distribution back to the manufacturing industry or raw materials market. The recycling rate for excess IT equipment (e-scrap) continues to be 100 percent. Considering the number of computing systems purchased annually by Sandia, this practice represents a dramatic reduction of what would otherwise be hazardous waste if not recycled. Almost 350,000 lbs of e-scrap was recycled by Sandia personnel in 2013. To reduce future quantities of e-scrap from ever being produced, two ongoing computer equipment reduction initiatives are making a big impact. The first, using server virtualization to reduce the number of actual servers on-site as well as to host individuals' virtual desktops, has cut down on the physical hardware required and the associated energy use and disposal/recycling. The second is the use of networked copy machines as multifunction devices that can produce both duplex copies and duplex print jobs, in addition to being a full color scanner and fax machine. This avoids the use, and can eliminate future purchases of many printers, scanners, and fax machines.

3.9.5.4 Recycling

Sandia accounts for its recycling in two separate categories: routine, which is waste from recurring and/or typical office operations, and non-routine, from intermittent clean-up and construction activities. In 2013, 67 percent of Sandia's routine waste and 91 percent of non-routine waste was recycled. See Table 3-3 for the breakdown of recycling by waste stream.

While the majority of recycling operations are conducted at the SWCRC and HWHF, the MSP2 group manages several other recycling functions. This year, the major initiatives included completing a major mixed paper expansion in which the Custodial Services team took over management of the recycle stream from volunteers, refinement of electronics recycling to more specific material streams, and teaming with Facilities to sponsor a concrete and asphalt crushing event for material reuse onsite.

In summary, the MSP2 Program made further progress in 2013 in its major focus areas of Waste Reduction, Electronics Stewardship, Reuse/Recycling, and Awareness. The intent continues to be institutionalizing materials sustainability considerations into daily work activities.

This page intentionally left blank.



Chapter 4
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. Gamma radiation levels are measured using thermoluminescent dosimeters (TLDs) to determine the impact, if any, of SNL/NM's operations on ambient radiation levels.

Various locations have been used for sample collection for up to 20 years. When some of the older sampling locations are no longer relevant to current operations, these sampling locations may be relocated and placed in areas with greater potential environmental impact. However, the number of samples collected annually should remain approximately the same as in the past.

4.1 Program Objectives

The Terrestrial Surveillance Program is designed and conducted to address the requirements of U.S. Department of Energy (DOE) Order 458.1, *Radiation Protection of the Public and the Environment* (DOE 2013) and to satisfy Sandia's Environmental Management System Program standards, which adopt the requirements of International Organization for Standardization (ISO) 14001. Reporting is done in accordance with DOE Order 231.1B, *Environment, Safety and Health Reporting* (DOE 2012) and addresses these objectives:

- 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 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 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. SNL/NM personnel conduct 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 458.1, *Radiation Protection of the Public and the Environment* (DOE 2013).

Sample results for metals in surface soils are compared to U.S. surface soil average concentrations (Kabata-Pendias 2000), local and regional surface soil average concentrations (Dragun and Chekiri 2005), or site-specific surface soil concentrations (Dinwiddie September 1997). *Chemical Analyses of Soil Samples Collected from the Sandia National Laboratories, New Mexico Environs, 1993-2005* (SNL/NM March 2006) is 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

In summary for 2013, the mean value of each non-radiological constituent in soils is less than the correlative residential level set by the State of New Mexico soil screening levels (SSLs), with the exception of arsenic. However, the mean value for arsenic is less than the industrial level set by the State of New Mexico SSLs.

For an added measure of sample verification, the DOE Oversight Bureau of the New Mexico Environment Department (NMED) splits samples with SNL/NM personnel 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 event 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 SNL/NM personnel 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.

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.

In 2000, SNL/NM changed to analytical laboratories with lower detection capabilities for many of the metals. The analyses in 2013 utilized data from the same analytical laboratory since 2000.

In some instances, this qualitative inspection of the data is augmented by the graphical evaluation methodology described and documented in the *Chemical Analyses of Soil Samples Collected from the Sandia National Laboratories, New Mexico Environs, 1993-2005* (SNL/NM March 2006).

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 step is performed to ensure that anomalous data that would otherwise pass statistical scrutiny is flagged for further investigation. This is particularly useful where insufficient data exists for trending, but comparison of new data to "expected values" is desired.

4.2 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 2013, soil samples were collected from locations indicated in Tables 4-2, 4-3, and 4-4.

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 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 KAFB. 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 2013, no vegetation was collected due to the on-going drought.

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.

4.3 Sampling Locations

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. The 2013 sampling locations are illustrated in Figure 4-1. Locations sampled are shown in Tables 4-2, 4-3, and 4-4.

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

Location Number	Sampling Location	Soil	Sediment	Vegetation*	TLD
1	†Pennsylvania Ave.	X			X
2NE**	† MWL (northeast)	X		X	
2NW	†MWL (northwest)	X		X	X
2SE	†MWL (southeast)	X			
2SW	†MWL (southwest)	X			
3	†Coyote Canyon Control	X			X
6	†TA-III (east of water tower)	X		X	X
7	†Unnamed Arroyo (north of TA-V)	X			X
20	TA-IV (southwest) (KAFB Skeet Range)				X
31	TA-II Guard Gate				X
33*	†Coyote Springs	X		X	
34	†Lurance Canyon Burn Site	X		X	
35	CWL	X		X	
41	†TA-V (northeast fence)	X			X
42	†TA-V (east fence)	X		X	X
43	†TA-V (southeast fence)	X		X	X
45	†RMWMF, TA-III (northwest corner)	X		X	X
46	†TA-II (south corner)	X		X	X
47	Tijeras Arroyo (east of TA-IV)				X
48	Tijeras Arroyo (east of TA-II)				X
49	†Near the ECF	X		X	
51	†TA-V (north of culvert)	X		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	† LMF, Bldg. 9939	X		X	

See notes at end of table.

TABLE 4-2. On-Site Terrestrial Surveillance Locations and Sample Types (Concluded)

Location Number	Sampling Location	Soil	Sediment	Vegetation*	TLD
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		
83	†Tijeras Arroyo Groundwater Well		X		
84	†Stormwater Monitoring Point (S-10)		X		
85	†Arroyo del Coyote Cable Site		X		
86	†Corner of Wyoming and S Street	X			
90	†TA-III Land Mine Test Site	X			
91	†Background Arroyo Near ER-87	X			
92	†New Classified Waste Landfill	X			
93	††Thunder Range Explosive Test Area	X			
94	††Thunder Range, Southeast of R5	X			

NOTES: * = No vegetation samples collected due to ongoing drought.
** = 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.
† These locations may be analyzed periodically for target analyte list (TAL) metals.
†† High Explosives (HE) assay in soil
Bldg. = Building
CWL = Chemical Waste Landfill
ECF = Explosive Components Facility
ER = Environmental Restoration
KAFB = Kirtland Air Force Base
LMF = Large Melt Facility
MWL = Mixed Waste Landfill
N = North
NE = Northeast
NW = Northwest
RMWMF = Radioactive and Mixed Waste Management Facility
SE = Southeast
SW = Southwest
TA = Technical Area
TLD = thermoluminescent dosimeter

TABLE 4-3. Perimeter Terrestrial 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			
65	†Tijeras Arroyo (up-gradient)		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: * = No vegetation samples were collected due to the ongoing drought.
** = 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.
† These locations may be analyzed periodically for target analyte list (TAL) metals.
Bldg. = Building
DOE = U.S. Department of Energy
KAFB = Kirtland Air Force Base
TLD = thermoluminescent dosimeter
USGS = U.S. Geological Survey

TABLE 4-4. Off-Site Terrestrial Surveillance Locations and Sample Types

Location Number	Sampling Location	Soil	Sediment	Vegetation*	TLD
8	†Rio Grande, Corrales Bridge (up-gradient)		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
21	Bernalillo Fire Station 10, Tijeras				X
22	Los Lunas Fire Station				X
23	Rio Rancho Fire Station, 19th Avenue				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
30	Albuquerque Fire Station 6, Griegos NW				X
62*	†East Resident	X			
68	†Las Huertas Creek		X		

NOTES: * = No vegetation samples were collected due to the ongoing drought.
** = 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.
†These locations may be analyzed periodically for target analyte list (TAL) metals.
I-40 = Interstate 40
NE = Northeast
NW = Northwest
SE = Southeast
TLD = thermoluminescent dosimeter

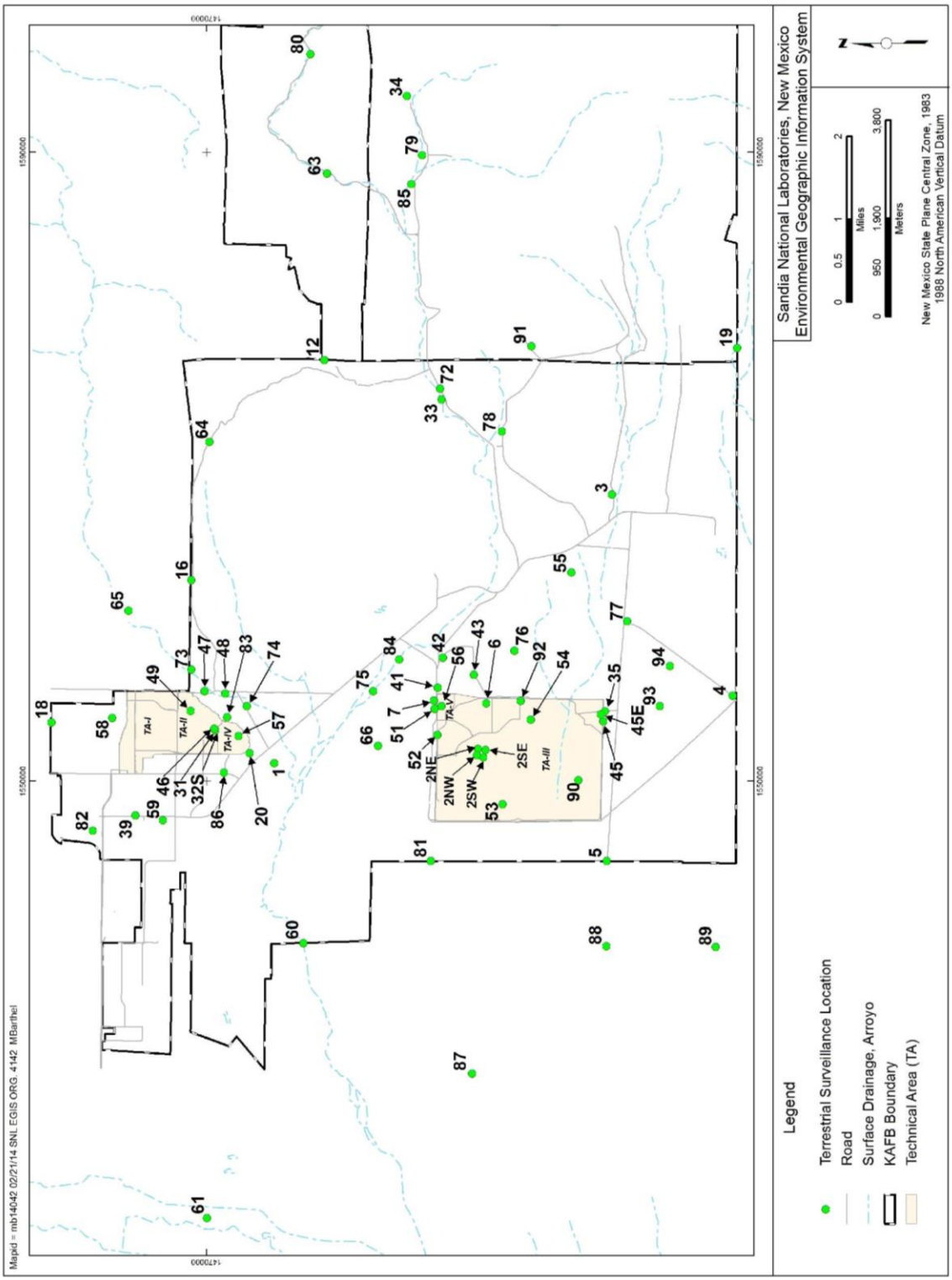


FIGURE 4-1. Terrestrial Surveillance Program On-Site and Perimeter Sampling Locations

In some instances, special radiological or non-radiological "sampling campaigns" near operations of interest, may be conducted in addition to, or in partial substitution for fixed locations. There were no special sampling campaigns conducted in 2013.

On-site

On-site locations are selected within or near areas of past or current SNL/NM operations (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. In 2008, three sampling points along the western KAFB buffer area were established (87, 88, and 89). These points were to augment the existing points then being sampled, with the intent to provide additional information regarding potential SNL/NM impacts to Mesa del Sol (a new sub-development) residents. These locations were sampled for radionuclides and target analyte list (TAL) metals in soil. Location P-88 was not sampled in 2013 and will be discontinued in the future. The primary reason for discontinuing this location is the remoteness of the location and the fire risk of driving to it in its trackless location during the high fire risk that persists due to the ongoing drought. In addition, the results that have been obtained from this location since sampling began are consistent with results from nearby P-5, P-81, P-87, and P-89. Therefore, continued sampling at this location is not warranted. Table 4-3 and Figure 4-1 will remain unchanged in this year's report, for reference. However, P-88 will not appear in future reports. 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 (Figure 4-2 and Table 4-4). Sample locations have been selected within a 25-mile radius of KAFB.

4.4 Radiological Parameters and Results

Radiological analyses are performed on all soil, sediment, and vegetation samples and are summarized in this section. The 2013 radiological parameters and analytical results can be found in Appendix D of this report. A detailed statistical analyses was performed on the 2013 data.

Radiological Results

The results of the statistical analysis showed no on-site or perimeter soil or sediment locations that were Priority-1 (both higher than off-site and with an increasing trend). One location was identified as Priority-2 (higher than off-site) for cesium-137. The Priority-2 location and parameters are listed in Table 4-5. There was one Priority-3 (increasing trend) location identified (Table 4-6).

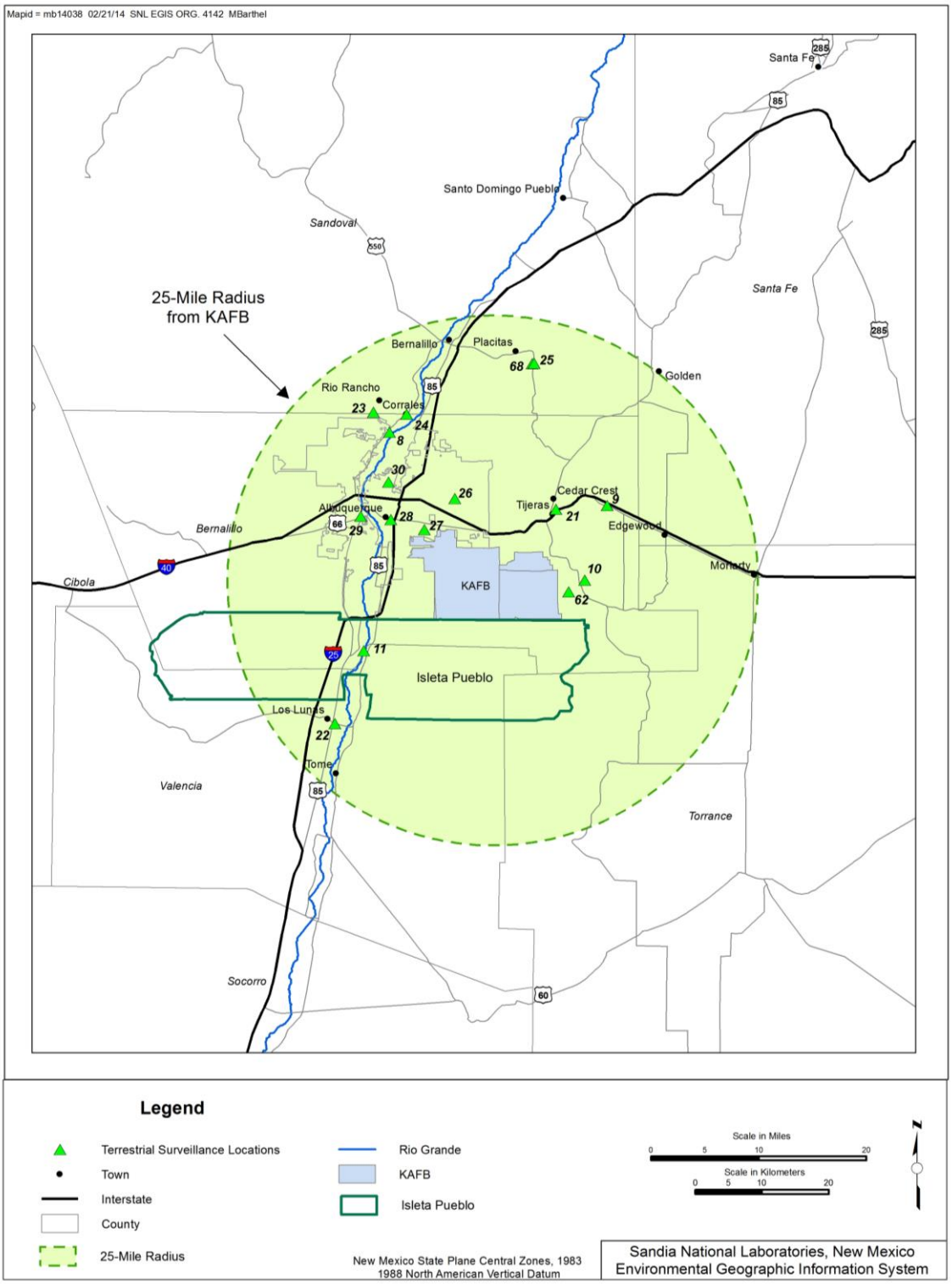


FIGURE 4-2. Terrestrial Surveillance Program Off-Site Sampling Locations

TABLE 4-5. Radiological Summary Statistics for Sample Locations Noted as Priority-2 During Calendar Year 2013

Sample Media	Analyte	Units	Location	Number of Samples	Average	Std Dev	Minimum	Maximum	2013 Result
Soil	Cesium-137	pCi/g	12	14	1.01	0.49	0.07	1.82	0.95

NOTES: Data presented is for fourteen years (2000-2013).
pCi/g = picocurie per gram
Std Dev = Standard Deviation

TABLE 4-6. Radiological Summary Statistics for Sample Locations Noted as Priority-3 During Calendar Year 2013

Sample Media	Analyte	Units	Location	Number of Samples	Average	Std Dev	Minimum	Maximum	2013 Result
Soil	Cesium-137	pCi/g	85	10	0.15	0.17	0.015	0.51	0.38

NOTES: Data presented is for fourteen years (2000-2013).
pCi/g = picocurie per gram
Std Dev = Standard Deviation

Cesium-137

One perimeter location (12) continues to be identified as Priority-2 (higher than off-site) for cesium-137 in surface soils. Location 12 is located on the U.S. Forest Service land withdrawn area. This location is 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 worldwide as a result of historical nuclear weapons testing. Over the past 13 years, the values for cesium-137 at this perimeter location ranged from 0.07 to 1.82 picocuries per gram (pCi/g). However, these levels are not cause for concern.

One sediment location (85) was identified as Priority-3 (increasing trend) for cesium-137 in surface soils (Table 4-6). All other sediment sample locations were identified as Priority-4 (consistent with off-site results and no increasing trend) 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 or sediment samples collected.

Total Uranium

No soil or sediment locations were identified as Priority-1, Priority-2, or Priority-3 for total uranium.

TLD

TLD exposure rates by quarter, and the exposure rate for each location class (on-site, perimeter, or off-site) for 2013, can be found in Appendix D of this report. The exposure rate summary statistics for each location class can also be found in Appendix D. Albuquerque Fire Stations Number 2 and Number 7 (off-site locations 28 and 29, respectively) were decommissioned; therefore, TLD results from these locations were not collected in 2013 and will no longer be collected in the future.

Data for 2000 through 2013 were analyzed to determine if any statistical differences were observed for either location class or year. Operational locations are excluded from the statistical analysis. In 2013, there was no statistical difference between on-site, perimeter, and off-site locations. Table 4-7 shows the overall exposure rate summary statistics for 2000 through 2013. Figure 4-3 shows the TLD exposure rates by year and location class.

TABLE 4-7. Summary Statistics for TLD Exposure Rates, Calendar Years 2000 – 2013

Location Class	Number of Obs	Units	Mean	Median	Std Dev	Minimum	Maximum
Off-site	159	mR/yr	98.6	97.2	14.5	73.2	147.6
Perimeter	109	mR/yr	100.2	101.5	11.5	78.5	132.2
On-Site	191	mR/yr	99.2	99.2	9.3	80.9	119.7

NOTES: mR/yr = milliroentgen per year (10^{-3} roentgen per year)
Obs = observations
Std Dev = Standard Deviation
TLD = Thermoluminescent Dosimeter

4.5 Non-Radiological Parameters and Results

In May 2013, routine samples were collected for trending analysis. Baseline environmental monitoring data, collected from soil samples within the study areas, indicate that currently there is no unusual contamination of soils with TAL metals or high explosive (HE) compounds. With the exception of arsenic, none of the analyte concentrations detected in the site soils exceed NMED SSLs for residential land use (see Table 4-8 and Table 4-9). Most samples did not exceed NMED residential SSLs of 4 mg/kg. Based on process knowledge of site activities, these arsenic concentrations are most likely naturally occurring.

Site-wide Non-Radiological Results

No sampling locations were noted to be Priority-1 (both higher than off-site and with an increasing trend). Eight parameters at four locations were identified as Priority-2 (higher than off-site). Twelve parameters at six sampling locations were noted to be Priority-3 (increasing trend). The Priority-2 locations and parameters are listed in Table 4-9. The Priority-3 locations and parameters are listed in Table 4-10. All trending analyses include data from 2000 forward rather than only the five most recent years. This change makes the trending analyses more meaningful by including all comparable data since 2000. All results, with the exception of arsenic, are less than NMED SSLs, levels that would trigger further investigation. Refer to Figure 4-1 for an illustration of the locations listed in the following descriptions.

Aluminum

One on-site location (1) and one off-site location (62) were identified as Priority-3 (increasing trend) for aluminum in surface soils. However, all concentrations are within the range of background identified for aluminum in New Mexico surface soils, and are expected to be naturally occurring. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for aluminum.

Arsenic

One on-site location (33) was identified as Priority-2 (higher than off-site) for arsenic in surface soils and was slightly higher than the NMED SSLs for residential use. However, all concentrations are within the range of background identified for arsenic in New Mexico surface soils, and are expected to be naturally occurring. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for arsenic.

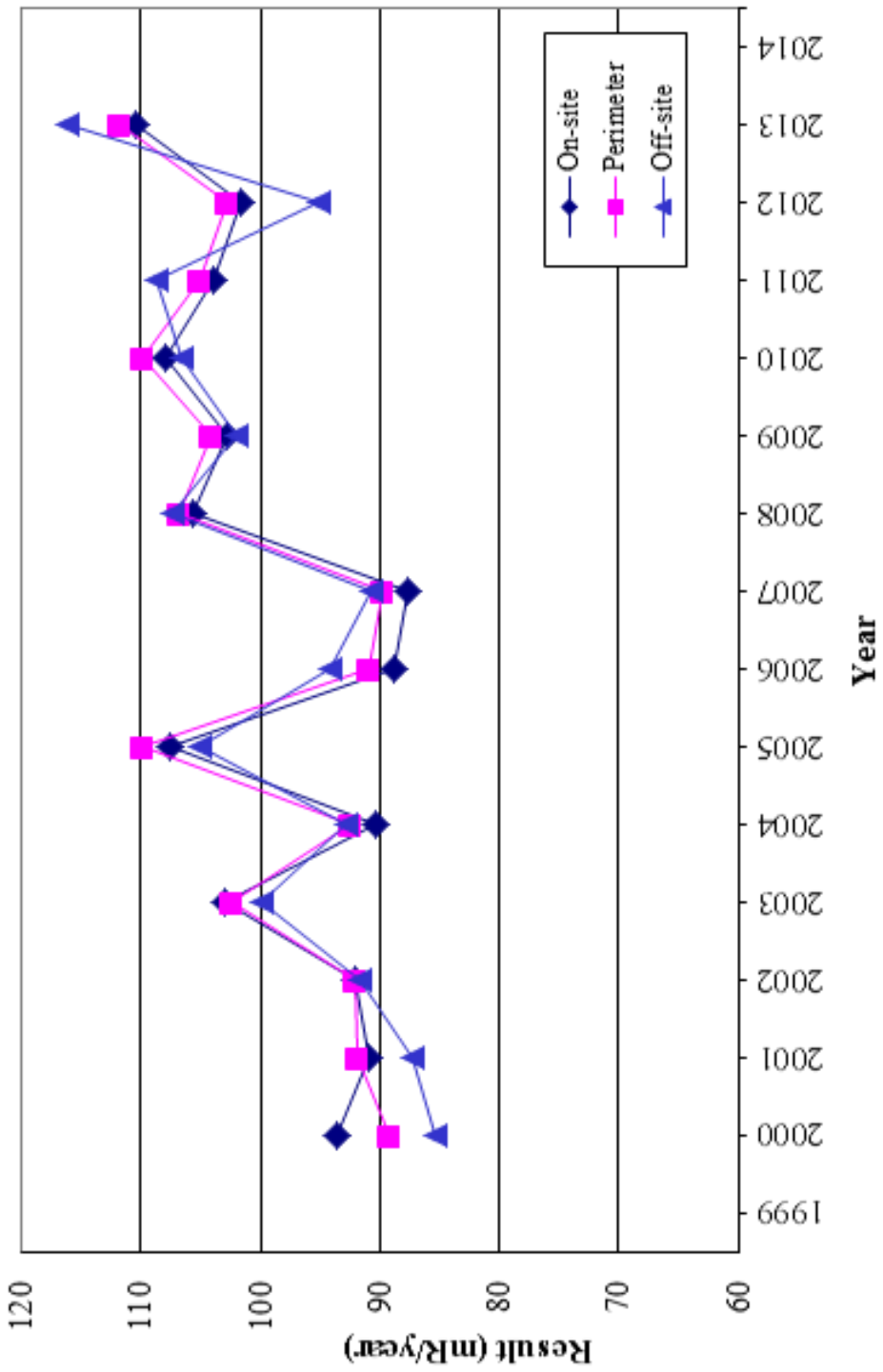


FIGURE 4-3. TLD Exposure Rates by Year and Location Class

TABLE 4-8. Various Reference Values for Metals in Soil (all units in mg/kg)

	NM Background Soil Concentrations[a]		NMED Soil Screening Levels[b]		U.S. Background Soil Concentrations[c]	
Analyte	**Lower Limit**	**Upper Limit**	**Residential**	**Industrial**	**Lower Limit**	**Upper Limit**
Aluminum	5,000	100,000	78,000	1,130,000	4,500	100,000
Antimony	0.2	1.3	31.3	454	0.25	0.6
Arsenic	2.5	19	3.9	17.7	1	93
Barium	230	1,800	15,600	223,000	20	1,500
Beryllium	1	2.3	156	2,260	0.04	2.54
Cadmium	ND	11	70.3	897	0.41	0.57
Calcium	600	320,000	N/A	N/A	N/A	N/A
Chromium III	7.6	42	117,000	1,7000,000	7	1,500
Cobalt	2.1	11	N/A	N/A	3	50
Copper	2.1	30	3,130	45,400	3	300
Iron	1,000	100,000	54,800	795,000	5,000	50,000
Lead	7.8	21	400	800	10	70
Magnesium	300	100,000	N/A	N/A	N/A	N/A
Manganese	30	5,000	1,860	26,700	20	3,000
Nickel	2.8	19	1,560	22,500	5	150
Potassium	1,900	63,000	N/A	N/A	N/A	N/A
Selenium	0.2	0.8	391	5,680	0.1	4
Silica (Silicon)	150,000	440,000	N/A	N/A	24,000	368,000
Silver	0.5	5	391	5,680	0.2	3.2
Sodium	500	100,000	N/A	N/A	N/A	N/A
Thallium	N/A	N/A	0.782	11.4	0.02	2.8
Titanium	910	4,000	N/A	N/A	20	1,000
Vanadium	15	94	391	5,680	0.7	98
Zinc	18	84	23,500	341,000	13	300

NOTES: [a] Dragun and Chekiri, *Elements in North American Soils*, 2005, Hazardous Materials Control Resources Institute, (Used *San Juan Basin, A Horizon* to determine values).
[b] New Mexico Environment Department (NMED), February 2012. *Risk Assessment Guidance for Site Investigations and Remediation*, Hazardous Waste Bureau and the Ground Water Quality Bureau Voluntary Remediation Program, Table A-1 updated June 2012.
[c] U.S. Soil Surface Concentrations, Kabata-Pendias, A., CRC, *Trace Elements in Soils and Plants*, 3rd Edition, 2000.
mg/kg = milligram per kilogram
N/A = not applicable
ND = not detected
NM = New Mexico
NMED = New Mexico Environment Department
U.S. = United States

TABLE 4-9. Summary Statistics for All Locations Identified as Priority-2 for Metals in Soil During Calendar Year 2013 (all units in mg/kg)

Analyte	Location Type	Location	Avg	Std Dev	Min	Max	NMED Soil Screening Level [a]		2013 Result
							Residential	Industrial	
Arsenic	On-Site	33	11.25	8.6	4.02	32.7	3.9	17.7	4.02
Beryllium	On-Site	33	1.1	0.30	0.79	1.59	156	2,260	0.80
Cobalt	Perimeter	64	8.5	0.72	7.3	9.4	N/A	N/A	7.72
Copper	On-Site	6	34.9	15.5	11.0	55.8	3,130	45,400	16.00
Iron	Perimeter	64	22,150	2,331	18,100	25,500	54,800	795,000	21,200
Magnesium	Perimeter	64	7,567	366	7,030	8,180	N/A	N/A	7,260
Manganese	Perimeter	64	658	102	558	905	1,860	26,700	723
Potassium	On-Site	1	4,441	1,320	1,020	6,050	N/A	N/A	5,390

NOTES: Data presented is for fourteen years (2000-2013).
[a] New Mexico Environment Department (NMED), February 2012. *Risk Assessment Guidance for Site Investigations and Remediation*, Hazardous Waste Bureau and the Ground Water Quality Bureau Voluntary Remediation Program, Table A-1 updated June 2012.
Avg = Average
Max = Maximum
mg/kg = milligram per kilogram
Min = Minimum
N/A = not applicable
NMED = New Mexico Environment Department
Std Dev = Standard Deviation

TABLE 4-10. Summary Statistics for All Locations Identified as Priority-3 for Metals in Soil and Sediment During Calendar Year 2013 (all units in mg/kg)

Analyte	Location Type	Location	Avg	Std Dev	Min	Max	NMED Soil Screening Level[a]		2013 Result
							Residential	Industrial	
Aluminum	On-Site	1	12,971	3,385	4,380	17,100	78,000	1,130,000	15,000
	Off-Site	62	17,133	4,955	10,800	25,100			25,100
Beryllium	On-Site	85	0.45	0.10	0.24	0.54	156	2,260	0.54
Cadmium	Off-Site	62	0.33	0.11	0.12	0.44	70.3	897	0.44
Cobalt	On-Site	85	4.34	0.96	2.33	5.24	N/A	N/A	5.24
Copper	On-Site	85	7.72	2.77	3.17	11.4	3,130	45,400	11.4
Lead	On-Site	85	10.9	1.85	8.01	12.8	400	800	12.8
Manganese	On-Site	1	397	87.6	193	507	1,860	26,700	480
Nickel	On-Site	2NW	5.72	1.22	3.72	7.33	1,560	22,500	6.14
Vanadium	On-Site	86	25.34	13.25	0.40	42.5	391	5,680	42.5
Zinc	On-Site	6	46.1	11.8	32.1	64.0	23,500	341,000	47.2
	On-Site	85	32.75	6.8	24.9	41.7			39.6

NOTES: Data presented is for fourteen years (2000-2013).
[a] New Mexico Environment Department (NMED), February 2012. *Risk Assessment Guidance for Site Investigations and Remediation*, Hazardous Waste Bureau and the Ground Water Quality Bureau Voluntary Remediation Program, Table A-1 updated June 2012.
Avg = Average
Max = Maximum
mg/kg = milligram per kilogram
Min = Minimum
NMED = New Mexico Environment Department
NW = Northwest
Std Dev = Standard Deviation

Beryllium
One on-site location (33) was identified as Priority-2 (higher than off-site) for beryllium in surface soils. One on-site sediment location (85) was identified as Priority-3 (increasing trend) for beryllium in surface soils. The concentration of beryllium at this location (85) was within the range of background identified for beryllium in New Mexico surface soils, and is expected to be naturally occurring. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for beryllium.

Cadmium
One on-site sediment location (62) was identified as Priority-3 (increasing trend) for cadmium in surface soils. The concentration is consistent with the range of background for cadmium in New Mexico surface soils, and is expected to be naturally occurring. All other soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for cadmium.

Cobalt
One perimeter location (64) was identified as Priority-2 (higher than off-site) for cobalt in surface soils. One on-site sediment location (85) was identified as Priority-3 (increasing trend) for cobalt in surface soils. The concentrations at all locations are within the range of background for cobalt in New Mexico surface soils, and are expected to be naturally occurring. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for cobalt.

Copper
One perimeter location (6) was identified as Priority-2 (higher than off-site) for copper in surface soils. One on-site sediment location (85) was identified as Priority-3 (increasing trend) for cooper in surface soils. The concentrations at all locations are within the range of background for cobalt in New Mexico surface soils, and are expected to be naturally occurring. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for copper.

Iron
One perimeter location (64) was identified as Priority-2 (higher than off-site) for iron in surface soils. The concentrations at all locations are within the range of background for iron in New Mexico surface soils, and are expected to be naturally occurring. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for iron.

Lead
One on-site sediment location (85) was identified as Priority-3 (increasing trend) for lead in surface soils. This soil concentration is within soil concentrations identified for lead in New Mexico surface soils, and is expected to be naturally occurring. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for lead.

Magnesium
One perimeter location (64) was identified as Priority-2 (higher than off-site) for magnesium in surface soils. The concentrations at all locations are within the range of background for magnesium in New Mexico surface soils, and are expected to be naturally occurring. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for magnesium.

Manganese
One perimeter location (64) was identified as Priority-2 (higher than off-site) for manganese in surface soils. One on-site location (1) was identified as Priority-3 (increasing trend) for manganese in surface soils. The concentrations at all locations are within the range of background for manganese in New

Mexico surface soils, and are expected to be naturally occurring. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for manganese.

Nickel

One on-site location (2NW) was identified as Priority-3 (increasing trend) for nickel in surface soils. This soil concentration is within soil concentrations identified for nickel in New Mexico surface soils, and is expected to be naturally occurring. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for nickel.

Potassium

One on-site location (1) was identified as Priority-2 (higher than off-site) for potassium in surface soils. This soil concentration is within soil concentrations identified for potassium in New Mexico surface soils, and is expected to be naturally occurring. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for potassium.

Vanadium

One on-site location (86) was identified as Priority-3 (increasing trend) for vanadium in surface soils. This soil concentration is within soil concentrations identified for vanadium in New Mexico surface soils, and is expected to be naturally occurring. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for vanadium.

Zinc

One on-site location (6) was identified as Priority-3 (increasing trend) for zinc in surface soils. One on-site sediment location (85) was identified as Priority-3 (increasing trend) for zinc in surface soils. These soil concentrations are within soil concentrations identified for zinc in New Mexico surface soils, and are expected to be naturally occurring. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for zinc.

This page intentionally left blank.



Chapter 5
Air Quality Compliance and Meteorological Monitoring

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

- Clean Air Network (CAN) Program conducts meteorological monitoring (Section 5.1) and ambient air surveillance (Section 5.2).
- National Emission Standards for Hazardous Air Pollutants (NESHAP) Program coordinates with facility owners to meet radiological air emission regulations (Sections 5.3 and 5.4).
- 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 (Section 5.5).

5.1 Meteorological Monitoring Program

The Meteorological Monitoring Program is part of the CAN program. The main objective of the Meteorological Monitoring Program is to provide site-specific representative data for SNL/NM. 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 projects.

The U.S. Department of Energy (DOE) directives and regulations applicable to the Meteorological Monitoring Program are listed in Chapter 8.

Tower and Network Instrumentation

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

- Six 10-meter towers,
- One 30-meter tower, and
- One 60-meter tower.

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

Meteorological Monitoring Towers

All meteorological towers are instrumented to measure temperature and wind velocity, including the standard deviation of horizontal wind direction (sigma theta), 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).

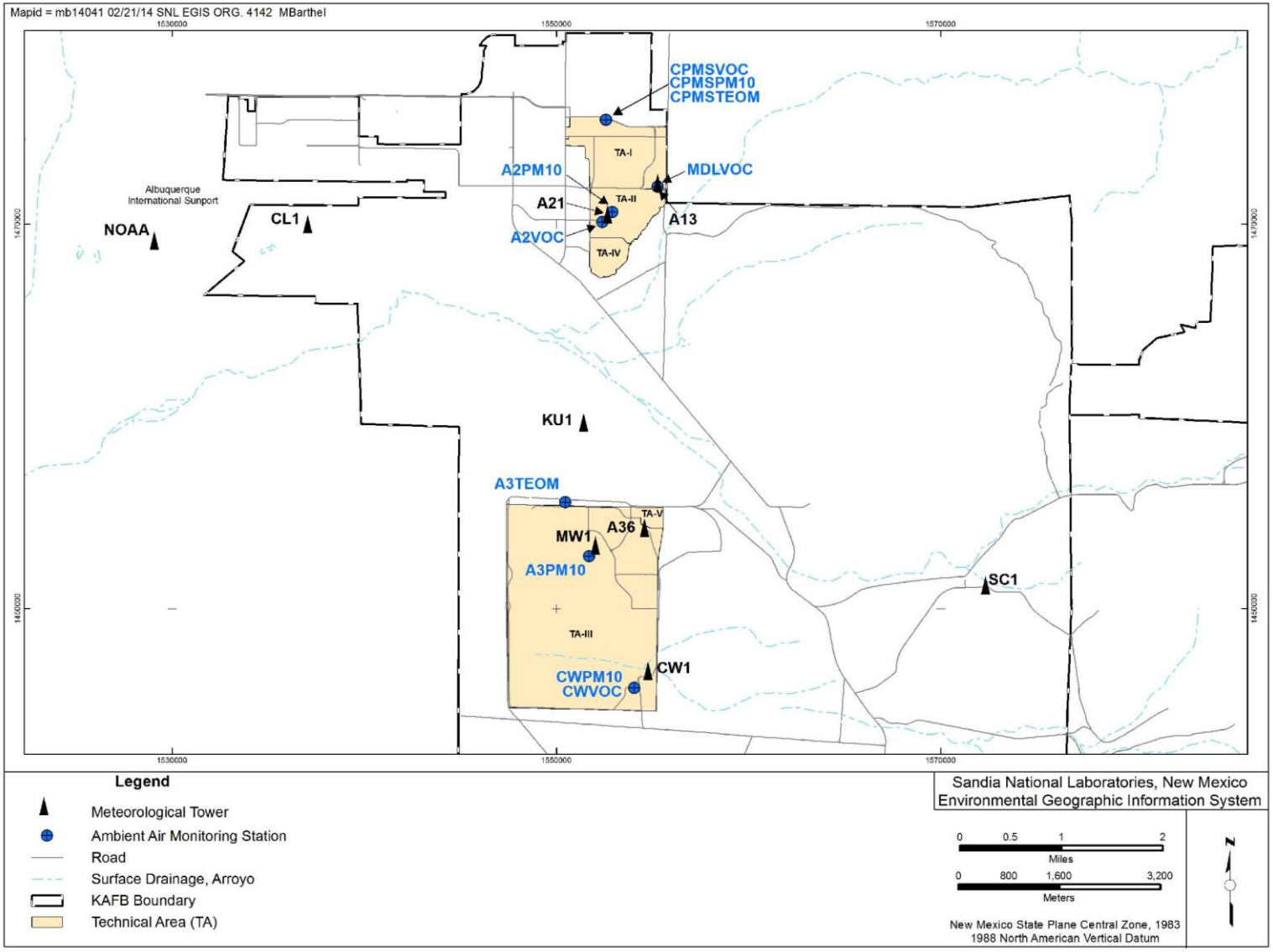


FIGURE 5-1. The Clean Air Network (CAN) of Meteorological Towers and Ambient Air Monitoring Stations

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.

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 2013 annual climatic summary for tower A36 is shown in Table 5-1.

TABLE 5-1. Annual Climatic Summary from Tower A36 During Calendar Year 2013

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
Temperature (°C)													
Average Daily High	6.35	9.82	17.19	20.96	25.80	34.02	30.80	30.66	26.70	19.22	12.04	6.70	20.02
Average Daily Low	-6.13	-3.24	3.27	6.11	11.33	18.20	17.09	17.82	14.63	6.07	0.74	-4.29	6.80
Monthly Mean	0.38	3.42	10.60	13.87	18.81	26.46	23.77	24.16	20.73	12.96	6.84	1.58	13.63
Extremes (°C)													
High	15.39	15.49	24.31	28.98	32.83	40.03	34.94	34.34	33.00	27.16	18.85	16.73	40.03
Low	-14.67	-7.78	-5.41	-3.64	-0.45	12.65	11.56	14.83	6.13	-1.82	-6.51	-14.29	-14.67
Relative Humidity (%)	46.95	40.72	27.13	23.40	20.86	19.26	49.40	44.18	49.74	37.20	56.94	57.36	39.43
Precipitation (cm)													
Monthly	0.41	0.36	0.41	0.20	0.15	1.14	12.06	1.27	10.46	0.41	2.08	1.80	30.76
24 Hour Max	0.25	0.23	0.38	0.15	0.10	1.07	3.00	0.64	3.45	0.18	0.61	1.09	3.45
Wind (m/sec)													
Monthly	2.99	3.93	3.86	4.51	4.55	4.59	3.69	3.28	3.37	3.76	3.33	2.73	3.72
24 Hour Max	6.21	7.82	7.47	7.65	8.16	7.81	5.96	4.61	5.94	7.35	10.98	7.59	10.98
Maximum Gust	19.70	22.26	24.54	22.22	23.42	26.34	23.74	16.46	23.98	28.78	25.50	20.78	28.78
Barometric Pressure (mb)	835.9	832.1	833.5	830.2	833.0	833.7	836.5	837.6	835.2	834.7	837.0	835.3	834.56

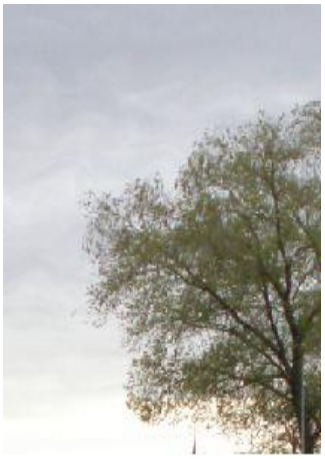
NOTES: °C = degree Celsius
cm = centimeter
m/sec = meters per second
Max = maximum
mb = millibar
% = percent

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. Table 5-2 shows some of the variations and extremes found in meteorological measurements across SNL/NM.

Current weather information from the SNL/NM CAN meteorological network can be found at the following website:

http://132.175.200.42/

TABLE 5-2. Variations and Extremes in Meteorological Measurements across the Meteorological Tower Network During Calendar Year 2013



Wind Speed	Minimum (m/sec)	Maximum (m/sec)	Spread (m/sec)
Average Annual Wind Speed	3.63 Tower KU1	3.88 Tower CW1	0.25
Greatest Difference in Average Wind Speed over 24 hours	9.71 Tower SC1	15.07 Tower A13	5.36
Greatest Difference in Daily Maximum Wind Speed	19.91 Tower CW1	43.23* Tower CL1 *record	23.32 Summer Microburst
Average Difference in Daily Wind Speed Variations	0.97 All towers		



Temperature	Minimum (ºC)	Maximum (ºC)	Spread (ºC)
Average Annual Temperature	13.22 Tower SC1	13.86 Tower A13	0.64
Network Annual Extremes	-19.91 Tower CW1	40.35 Tower MW1	60.26
Greatest Difference in Daily Minimum Temperature	-5.43 Tower CW1	2.07 Tower SC1	7.50
Greatest Difference in Average Daily Temperature	2.55 Tower KU1	5.10 Tower SC1	2.55
Greatest Difference in Daily Maximum Temperature	17.14 Tower SC1	20.64 Tower CL1	3.50



Precipitation	Minimum (cm)	Maximum (cm)	Spread (cm)
Annual Precipitation (Extremes)	27.94 Tower SC1	30.76 Tower A36	2.82
24 hour Rainfall Variation	0.22 Tower SC1	4.90 Tower A36	4.68
Greatest Monthly Precipitation Difference	7.98 Tower SC1	12.06 Tower A36	4.08
Greatest in Monthly Rainfall		12.06 Tower A36	

NOTES: Winter precipitation that falls as snow is underestimated (mostly at the SC1 tower)
ºC = degrees Celsius
cm = centimeter
m/sec = meters per second

5.1.2 Wind Analysis

Annual wind roses for three locations across SNL/NM are illustrated in Figures 5-2 and 5-3. A wind rose is a graphical representation of wind speed and direction frequency distribution. Wind direction is reported by the direction by which it originates. As shown in Figure 5-2 and 5-3, wind directions and speeds can vary significantly across SNL/NM. The annual wind frequency distribution for Technical Area (TA)-I, not shown, indicates 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.

5.2 Ambient Air Surveillance Program

Ambient air surveillance is conducted under the Ambient Air Surveillance Program through a network of six air monitoring stations located on or near SNL/NM property (Figure 5-1). The six stations include monitors for volatile organic compounds (VOCs), particulate matter (diameter equal to or less than 10 microns [PM_{10}]), and particulate matter (diameter equal to or less than 2.5 microns [$PM_{2.5}$]). The primary objective of the Ambient Air Surveillance Program is to provide an indication of what the ambient air is measured at around the SNL/NM operations in comparison to the monitors managed by the City of Albuquerque (COA).

It is a U.S. Environmental Protection Agency (EPA) requirement that the COA monitor the ambient air in Bernalillo County to determine compliance with the National and New Mexico Ambient Air Quality Standards. This monitoring is essential to the COA Environmental Health Department in the planning and issuance of the various air permits. Air permit applicants must include the potential emissions from proposed sources, as well as the actual emissions that are expected due to the operational hours and/or usage of fuel proposed within the permit application. The applications are reviewed, along with the data received from the COA monitors, to determine if the permit can be issued and the permitted source can be installed.

5.2.1 Monitoring Stations

The Ambient Air Surveillance Program began at SNL/NM as a means to determine what, if any, impact the operations at SNL/NM were having in comparison to the National and New Mexico Ambient Air Quality Standards. At the time, the monitoring program at the COA was in its infancy state, and data did not exist for comparison purposes. The lack of data was of particular concern because of the Steam Plant Facility, which drove SNL/NM to install the Criteria Pollutant Monitoring Station (CPMS) in 1996. The Steam Plant was decommissioned and demolished in 2009.

The CPMS was in operation for 16 years, with 2012 being the final year of data collection. Throughout the 16 years of sampling, SNL/NM created a solid baseline of the effect that operations have on the background criteria pollutant levels at the CPMS location. A statistical report is in the process of being completed including the entirety of the data collected. There have been a number of changes in operations that have occurred over the past decade, and the resulting criteria pollutant sampling data has remained consistent from year to year, and consistent with the data collected by the COA. Table 5-3 displays a comparison of the 5 years of SNL/NM criteria pollutant data to COA criteria pollutant data.

All of the criteria pollutant ambient air data that is collected by the COA is available at:

http://www.cabq.gov/airquality/download-air-data

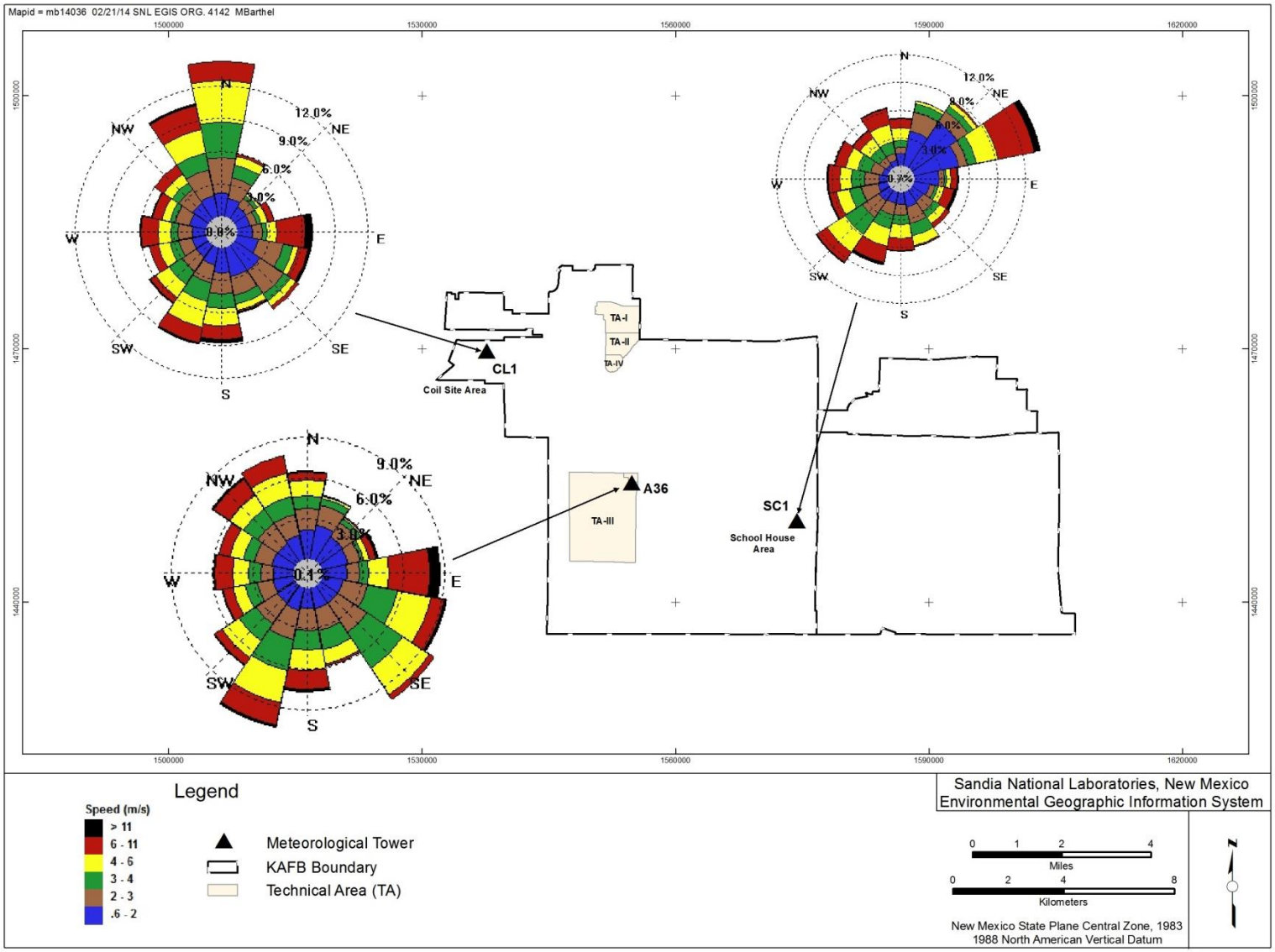


FIGURE 5-2. 2013 Annual Wind Roses for Towers CL1, A36, and SC1

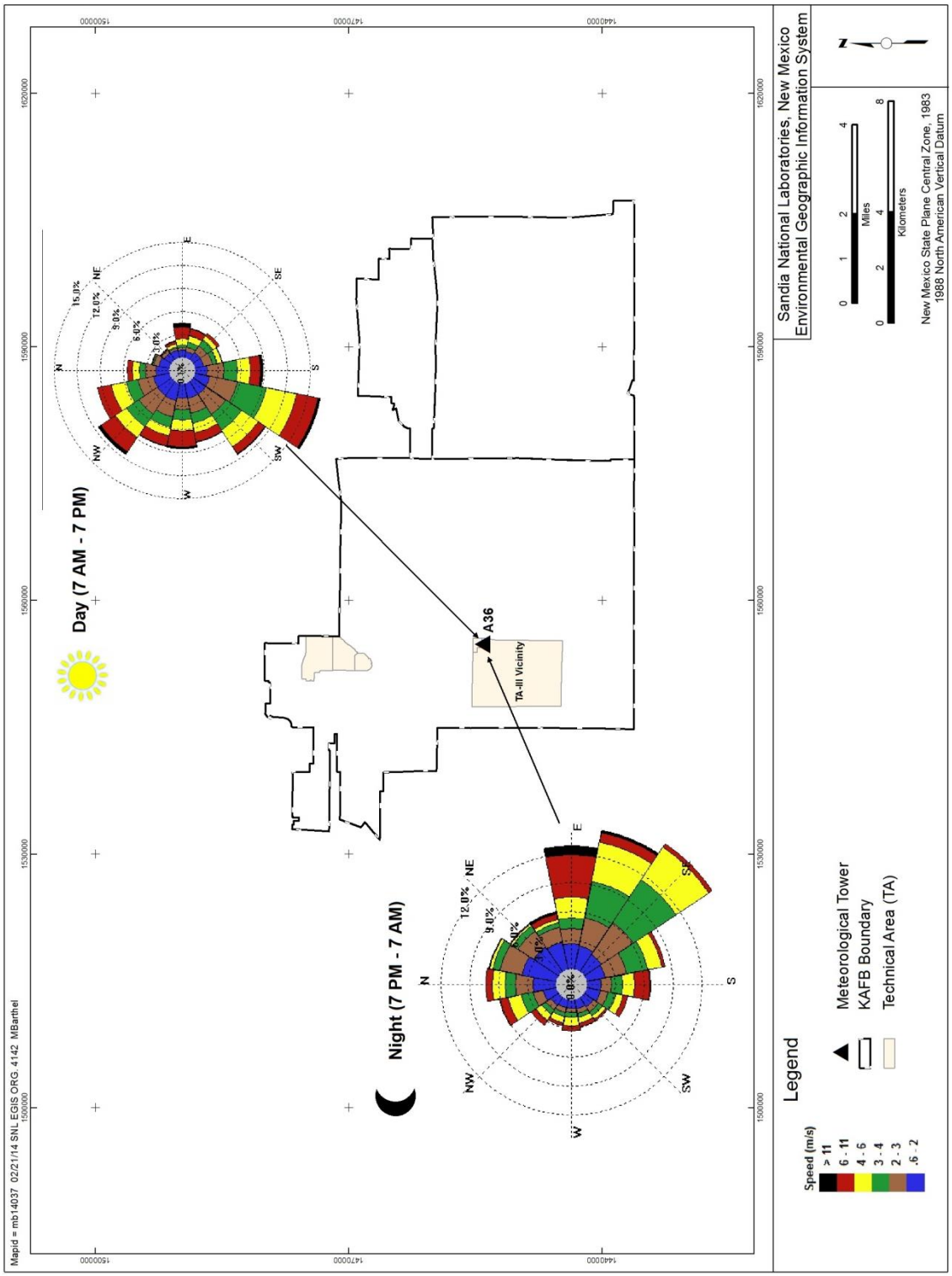


FIGURE 5-3. 2013 Annual Wind Roses for Daytime and Nighttime Wind Frequency at the A36 Tower

TABLE 5-3. Criteria Pollutant 5-Year Results as Compared to City of Albuquerque Maximum Monitored Data

Criteria Pollutant	Averaging Time	Units	2008		2009		2010		2011		2012		2013
			SNL/NM Data	COA Data	SNL/NM Data	COA Data	SNL/NM Data	COA Data	SNL/NM Data	COA Data	SNL/NM Data	COA Data	COA Data
Carbon Monoxide	1 hour	ppm	4.07	6.50	2.07	3.70	5.22	3.50	1.42	3.10	1.76	3.60	2.90
	8 hours	ppm	3.31	4.10	1.32	2.50	2.38	3.10	1.90	2.20	0.82	2.70	1.10
Nitrogen Dioxide	1 hour	ppb	58.90	97.00	140.30	55.00	119.50	81.00	80.20	61.00	49.30	53.00	52.00
Sulfur Dioxide	1 hour	ppb	8.85	N/A	9.15	N/A	5.75	N/A	8.78	5	9.50	6	5
	24 hours	ppb	7.45	N/A	7.35	N/A	5.10	N/A	6.35	8	5.39	2	2
Ozone	1 hour	ppm	0.084	0.089	0.085	0.086	0.080	0.094	0.088	0.089	0.085	0.088	0.082
	8 hour	ppm	0.069	0.072	0.068	0.073	0.073	0.078	0.076	0.08	0.079	0.08	0.074

NOTES: COA = City of Albuquerque
N/A = Not Applicable
ppb = parts per billion
ppm = parts per million
SNL/NM = Sandia National Laboratories/New Mexico

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

PM_{10} Stations – PM_{10} are measured at four monitoring locations (CPMSPM10, A2PM10, A3PM10, and CWPM10). 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 22 metals and are radiologically screened for gross alpha, gross beta, and gamma spectroscopy.

$PM_{2.5}$ Stations – $PM_{2.5}$ is measured at two newly established locations (CPMSTEOM and A3TEOM) at SNL/NM. $PM_{2.5}$ is measured continuously and recorded in hourly concentrations 24 hours a day, 365 days per 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.

5.2.2 Ambient Air Monitoring Results

PM_{10}

Data recovery for PM_{10} was 100 percent complete based on a sampling schedule occurring every sixth day. The highest daily particulate loading occurred at the CWPM10 site. A PM_{10} concentration of 45 micrograms per cubic meter ($\mu g/m^3$) occurred at CWPM10 in January 2013. The 24-hour average PM_{10} and lead data are displayed in Table 5-4, and is compared to data collected by the COA monitors. The monthly and annual averages for PM_{10} are listed in Table 5-5. The annual PM concentrations for 2013 are comparable to the results for 2012.

TABLE 5-4. Particulate Matter and Lead Monitoring Results as Compared to City of Albuquerque Maximum Monitored Data

Criteria Pollutant	Averaging Time	Units	2013	
			SNL/NM Data	COA Data
PM_{10}	24 hours	$\mu g/m^3$	45.0	114.0
$PM_{2.5}$	24 hours	$\mu g/m^3$	25.6	53.2
Lead	24 hours	$\mu g/m^3$	0.005	0.006

NOTES: COA = City of Albuquerque
$\mu g/m^3$ = micrograms per cubic meter
$PM_{2.5}$ = particulate matter (diameter equal to or less than 2.5 microns)
PM_{10} = particulate matter (diameter equal to or less than 10 microns)
SNL/NM = Sandia National Laboratories/New Mexico

TABLE 5-5. Monthly and Annual Averages for PM_{10} (Air) Particular Matter During Calendar Year 2013 (all units in $\mu g/m^3$)

Sample Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
A2PM10	7.00	6.50	7.20	6.75	4.00	10.20	4.80	11.40	8.80	8.67	6.80	9.60	7.64
CPMSPM10	6.40	6.00	5.80	6.20	6.20	9.50	4.40	9.20	6.80	6.33	5.20	6.00	6.50
CWPM10	15.50	8.00	8.40	6.80	7.20	7.60	5.20	11.20	8.00	7.83	8.60	10.60	8.74
A3PM10	5.20	4.00	5.00	5.00	5.20	13.00	7.40	10.60	8.40	8.00	5.75	4.80	6.86

NOTES: $\mu g/m^3$ = micrograms per cubic meter
PM_{10} = Particulate Matter (diameter equal to or less than 10 microns)

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 2013, monthly composites varied from three to six filters per month, depending on the sampling schedule and sampler power interruptions. 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 5-6 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 5-6 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 concentration of radium-226 at the A3PM10 station was statistically different and slightly higher than at the CWPM10 and A2PM10 stations. The area surrounding the CWPM10 and A2PM10 stations are fairly remote, with the A3PM10 having a higher traffic pattern due to maintenance at an additional monitor and meteorological tower adjacently located. Radium-226 is the most common radium isotope. It is a product of uranium-238 decay. Uranium-238 is a naturally occurring isotope that is found in soil. With the wind conditions that exist, having a slightly higher reading at A3PM10 does not seem unreasonable. The ANOVA results also indicated that barium at CPMSPM10 was statistically different and slightly higher than at all other stations. With the incidental use of barium in laboratory operations in TA-I, it seems reasonable that the results at the CPMSPM10 monitor would be slightly higher than the more remote monitors.

TABLE 5-6. Averaged Results of PM_{10} Analysis (Air) During Calendar Year 2013

Analyte	Units	A2PM10	CPMSPM10	CWPM10	A3PM10	TLV
Aluminum	µg/m^3	7.63E-02	7.72E-02	9.45E-02	6.01E-02	2,000
Antimony	µg/m^3	9.81E-05	2.60E-04	1.13E-04	1.48E-04	500
Arsenic	µg/m^3	4.38E-04	1.45E-04	2.18E-04	6.65E-05	10
Barium	µg/m^3	2.65E-03	4.40E-03	2.38E-03	1.55E-03	50
Cadmium	µg/m^3	ND	8.61E-06	ND	ND	10
Calcium	µg/m^3	4.00E-01	3.41E-01	4.35E-01	2.15E-01	2,000
Chromium	µg/m^3	1.19E-03	2.37E-03	6.32E-04	1.03E-03	10
Cobalt	µg/m^3	1.23E-04	5.33E-04	2.55E-04	1.01E-04	20
Copper	µg/m^3	1.77E-02	1.19E-02	7.94E-03	1.15E-02	1,000
Iron	µg/m^3	1.12E-01	1.26E-01	1.20E-01	7.98E-02	5,000
Lead	µg/m^3	6.41E-04	7.72E-04	6.77E-04	6.23E-04	150
Magnesium	µg/m^3	6.33E-02	5.57E-02	5.76E-02	3.81E-02	10,000
Manganese	µg/m^3	3.08E-03	3.20E-03	3.54E-03	2.23E-03	200
Nickel	µg/m^3	1.89E-04	2.38E-04	2.21E-04	1.38E-04	50
Potassium	µg/m^3	4.03E-02	4.69E-02	4.52E-02	2.98E-02	2,000
Selenium	µg/m^3	ND	7.86E-05	3.99E-04	1.33E-04	200
Silver	µg/m^3	1.17E-04	1.12E-04	7.35E-05	6.13E-05	10
Sodium	µg/m^3	7.50E-02	1.31E-01	5.18E-02	6.87E-02	5,000
Thallium	µg/m^3	8.27E-05	3.07E-05	ND	ND	100
Vanadium	µg/m^3	2.76E-04	2.29E-04	2.50E-04	1.65E-04	50
Zinc	µg/m^3	4.27E-03	6.02E-03	6.10E-03	3.36E-03	10
Uranium	µg/m^3	1.03E-05	1.41E-05	2.84E-05	1.67E-05	200
Actinium-228	pCi/m^3	2.17E-03	ND	6.92E-03	3.67E-03	100
Alpha, gross	pCi/m^3	6.24E-03	6.16E-03	5.50E-03	4.93E-03	N/A
Americium-241	pCi/m^3	2.60E-03	ND	ND	ND	N/A
Beryllium-7	pCi/m^3	1.69E-01	1.71E-01	1.50E-01	1.32E-01	40,000
Beta, gross	pCi/m^3	2.26E-02	2.50E-02	2.25E-02	2.02E-02	N/A
Bismuth-212	pCi/m^3	2.76E-05	9.43E-03	9.72E-03	1.25E-04	700
Bismuth-214	pCi/m^3	1.67E-03	1.56E-03	8.71E-04	ND	2,000
Cesium-137	pCi/m^3	ND	ND	ND	4.59E-04	400
Cobalt-60	pCi/m^3	1.32E-04	8.47E-04	ND	ND	80
Lead-212	pCi/m^3	1.43E-03	ND	4.62E-04	1.35E-03	80
Lead-214	pCi/m^3	1.62E-04	9.51E-04	ND	8.41E-05	2,000
Potassium-40	pCi/m^3	ND	1.03E-02	2.04E-02	ND	900
Radium-224	pCi/m^3	1.76E-02	4.53E-02	ND	3.00E-02	4
Radium-226	pCi/m^3	1.64E-02	ND	1.92E-02	4.62E-02	1
Radium-228	pCi/m^3	2.17E-03	ND	6.92E-03	3.67E-03	3
Thorium-231	pCi/m^3	ND	1.17E-02	5.72E-03	ND	N/A
Thorium-234	pCi/m^3	2.72E-02	2.36E-03	1.74E-03	9.86E-02	400
Uranium-235	pCi/m^3	2.31E-03	3.53E-03	2.53E-03	6.19E-03	0.1
Uranium-238	pCi/m^3	2.72E-02	2.36E-03	1.74E-03	9.86E-02	0.1

NOTES: ACGIH = American Conference of Governmental Industrial Hygienists
DOE = U.S. Department of Energy
µg/m^3 = micrograms per cubic meter
mrem = millirem
N/A = not applicable
ND = not detected
pCi/m^3 = picocuries per cubic meter
PM_{10} = Particulate Matter (diameter equal to or less than 10 microns)
TLV = threshold limit value (TLVs are guidelines and not legal standards. TLV guidelines assist in the control of health hazards) (ACGIH January 2011). The TLVs listed for radionuclides are derived from DOE Order 458.1 (DOE 2013) derived concentration guide values defined for 100 mrem.

$PM_{2.5}$

$PM_{2.5}$ is also known as "fine particulate." Fine particulates may 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 for 2013 was approximately 86 percent. Unfortunately, both monitors began malfunctioning and are in the process of being replaced. The monthly and annual averages for $PM_{2.5}$ are listed in Table 5-7, with values for several months replaced by 5-year averages to account for missing data due to the malfunctions. In 2013, the highest concentrations were found in June and were most likely the result of wildland fire smoke transported from areas outside of SNL/NM.

TABLE 5-7. Monthly and Annual Averages for $PM_{2.5}$ (Air) During Calendar Year 2013 (all units in $\mu g/m^3$)

Location	Jan	Feb	Mar	Apr[1]	May[1]	Jun	Jul	Aug	Sep	Oct[1]	Nov[1]	Dec[1]	Annual
CPMSTEOM	6.42	5.07	5.63	8.55	9.80	14.91	9.64	8.95	6.27	7.27	6.80	6.63	**8.00**
TA3TEOM	5.91	4.84	7.35	7.90	8.39	13.22	10.20	7.44	6.91	6.44	6.10	5.66	**7.53**

NOTES: [1] = There were data recovery issues during these months at both monitors. The data for these months are 5 year averages from 2008 through 2012. New replacement monitors are currently in the process of being ordered and installed.
$\mu g/m^3$ = microgram per cubic meter
$PM_{2.5}$ = Particulate Matter (diameter equal to or less than 2.5 microns)

VOCs

The VOCs generally observed at SNL/NM are products or by-products of fossil fuels or from laboratory operations. In 2013, the data recovery for VOC monitoring was greater than 99 percent. Monthly VOC samples were analyzed for 32 VOC species plus total non-methane hydrocarbon. Table 5-8 shows the compiled results for compounds detected at four stations.

An ANOVA was performed to determine if statistical differences existed between stations. The results of the ANOVA indicated that the concentrations of n-hexane at the MDLVOC station were statistically different and slightly higher than the other sites. There is steady traffic flow surrounding this monitor, as well as a large amount of laboratory operations in the vicinity. That can explain the slightly higher concentrations found at the MDLVOC station.

5.3 Radiological Air Emissions

The EPA regulates radionuclide air emissions in accordance with 40 Code of Federal Regulations (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.

A summary of radiological releases and public doses resulting from SNL/NM operations is provided in Table 5-9.

TABLE 5-8. VOC Average Concentrations Compiled from Monthly Results at Four Stations (Air) During Calendar Year 2013 (*Average was computed using only detected results*)

Compound	All units in ppm bv				
	CPMSVOC	CWVOC	MDLVOC	TA-II VOC	TLV
1-Butene/Isobutene	0.39	ND	0.26	0.17	ND
Acetone	5.07	4.16	3.49	2.72	500,000
Benzene	0.35	0.35	0.29	0.23	500
Butane, n-	0.96	1.21	0.92	1.01	N/A
Butanone, 2-	0.59	0.44	0.49	0.33	N/A
Chloromethane	0.63	0.68	0.59	0.58	50,000
Dichlorodifluoromethane	0.50	0.61	0.51	0.51	1,000,000
Hexane, n-	0.33	0.37	0.45	0.29	N/A
Hydrocarbons, Total Non-Methane	12.31	13.10	11.65	9.97	N/A
Isohexane	0.25	0.42	0.30	0.31	100,000
Methylbutane, 2-	0.71	2.66	1.47	0.79	N/A
Methylene chloride	0.65	26.56	9.45	0.56	50,000
Pentane, n-	0.56	0.97	0.71	0.61	N/A
Tetrachloroethane	ND	7.48	3.48	ND	25,000
Toluene	0.50	0.61	0.60	0.51	50,000
Trichlorofluoromethane	0.27	0.33	0.28	0.27	1,000,000

NOTES: N/A = not available
ND = not detected
ppm bv = parts per million by volume
TLV= threshold limit value. TLVs are guidelines and not legal standards. TLV guidelines assist in the control of occupational health hazards (ACGIH January 2011).
VOC = volatile organic compounds. VOCs may be shown as separate species as well as in combination with another analyte.

TABLE 5-9. *S*NL/NM Radiological Dose Reporting for Calendar Year 2013

Pathway	Dose to Off-Site MEI		Dose to On-Site MEI		Percent of DOE 100 mrem/yr Limit	Estimated Population Dose (80-km radius)		Estimated Background Radiation Population Dose	
	mrem	mSv	mrem	mSv		Person-rem	Person-Sv	Person-rem	Person-Sv
Air	1.11E-03	1.11E-05	1.42E-03	1.42E-05	0.003	7.40E-02	7.40E-04	-	-
Water	0	0	0	0	0	0	0	-	-
Other Pathways	0	0	0	0	0	0	0	-	-
All Pathways	1.11E-03	1.11E-05	1.42E-03	1.42E-05	0.003	7.40E-02	7.40E-04	2.74E+05	2.74E+03

Radiological Atmospheric Releases for 2013 (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 Uranium	Other Actinides	Other
1.50E+01	1.72E+00	5.39E-04	1.01E-05	2.18E-04	0	3.10E-05	0

NOTES: DOE = U.S. Department of Energy
hr = hour
km = kilometer
MEI = maximally exposed individual
mrem = millirem
mrem/yr = millirem per year
mSv = millisievert
rem = roentgen equivalent man
SNL/NM = Sandia National Laboratories, New Mexico
Sv = Sievert
$t_{1/2=}$ half life

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 Field Office (SFO) submits the annual report to EPA and the COA Environmental Health Department. The NESHAP report for 2013 is prepared in 2014 and is entitled, *NESHAP Annual Report for Calendar Year (CY) 2013*, *SNL/NM* (SNL/NM June 2014b).

5.3.2 SNL/NM NESHAP Facilities

Currently, there are 12 potential NESHAP facilities that may be defined as point emission sources at SNL/NM are illustrated in Figure 5-4 and are described below. Of these facilities, nine had emissions in 2013 (Table 5-10). Point sources are produced from an exhaust stack or vent. Table 5-10 lists the radionuclides and the total reported emissions (in curies [Ci]) from each of the SNL/NM NESHAP sources in 2013.

TA-I Sources

Ion Beam Laboratory (IBL) Accelerator – This is an ion solid interaction and defect physics accelerator facility. Operations at IBL could result in release of trace amounts of tritium.

Neutron Generator Facility (NGF) – The NGF is the nation's principal production facility for neutron generators. This facility currently could emit only tritium. The facility has two stacks, but only utilizes the main stack in the Tritium Envelope North Wing. 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).

Process Research Development (PRD) Laboratory – This laboratory is capable of handling and conducting research on tritium materials which could be released in trace amounts. It is currently in standby mode and has yet to become operational.

Radiation Protection Instrument Calibration Laboratory (RPICL) – Calibration on radiation detection equipment could result in small releases of tritium.

Sandia Tomography and Radionuclide Transport (START) Laboratory – The START laboratory is used to perform small-scale experiments. Only trace amounts of radionuclides could be occasionally released.

TA-II Sources

Explosive Components Facility (ECF) – The ECF conducts destructive testing on neutron generators that could result in the release of trace amounts of tritium.

Radiation Protection Sample Diagnostics Laboratory – Small-scale radiometric sample analyses on an as-needed basis. Only trace amounts of radionuclides could occasionally be released.

TA-III Sources

Radioactive and Mixed Waste Management Facility (RMWMF) – The RMWMF primarily handles low-level waste, mixed waste, and some transuranic (TRU) waste that could be released in trace amounts. Although anticipated releases do not exceed the regulatory threshold requiring continuous monitoring, it is performed voluntarily at the RMWMF as a BMP.

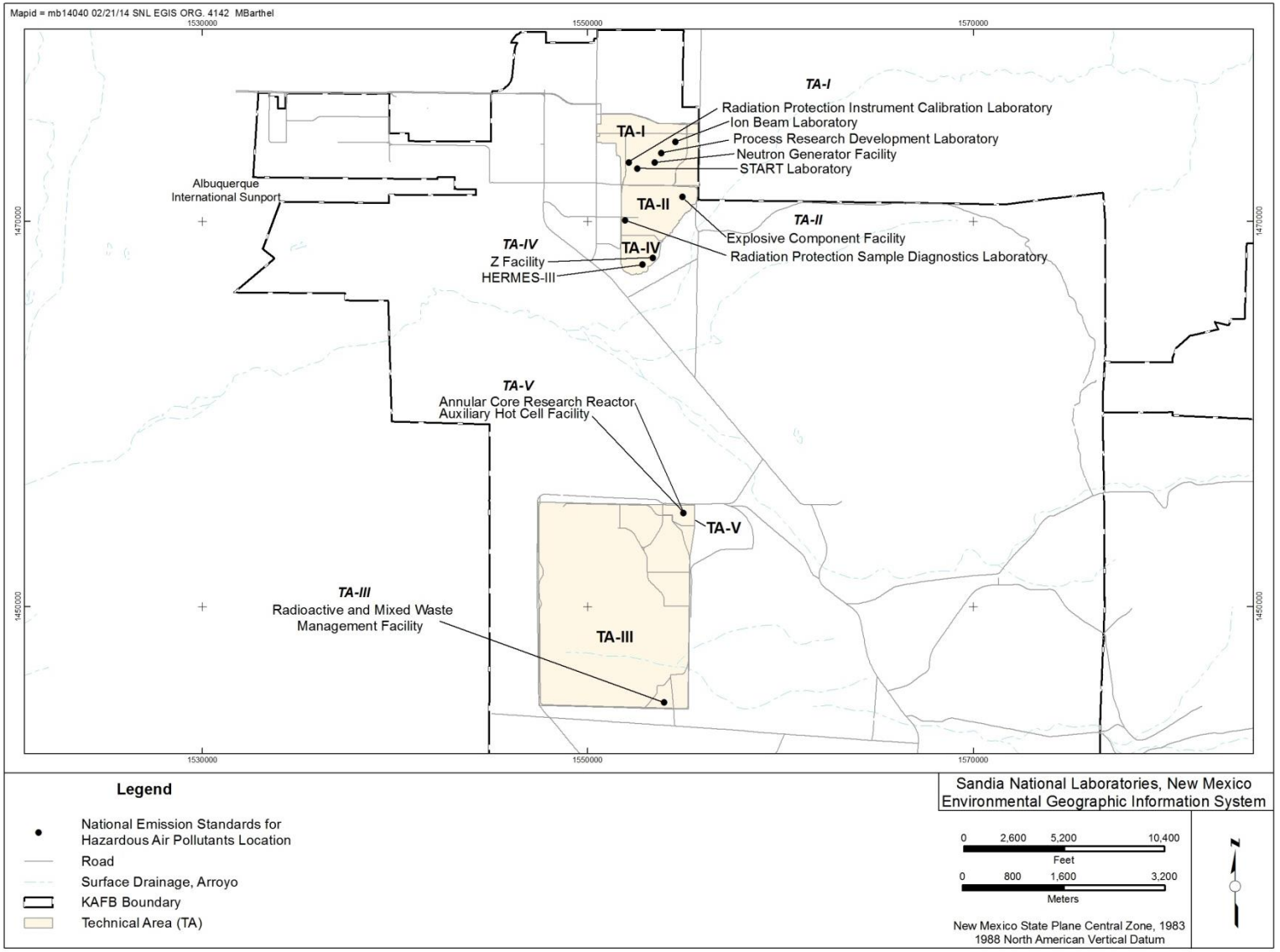


FIGURE 5-4. Locations of the Facilities at SNL/NM that Provided Radionuclide Inventories in 2013

TABLE 5-10. Summary of Radionuclide Releases from NESHAP Sources During Calendar Year 2013

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	Argon-41	1.72
AHCF, TA-V	The AHCF is used to identify, sort, characterize, and repackage legacy nuclear materials and transuranic (TRU) waste packages for permanent removal from the SNL/NM site. Legacy material may include accountable nuclear material, TRU waste, spent nuclear fuel, and radiological material.	Point	Periodic	Krypton-85 Strontium-90 Cesium-137 Tritium Plutonium-241	2.57E-08 1.34E-08 1.02E-08 1.72E-09 5.94E-10
ECF, TA-II	Facility used for testing neutron generator design and manufacturing.	Point	Calculation	Tritium	1.06E-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	Nitrogen-13 Oxygen-15	4.90E-04 4.90E-05
NGF, TA-I	Principal production facility for neutron generators – Tritium Envelope North Wing.	Point	Continuous	Tritium	13.7
RMWMF, TA-III	Facility that handles radioactive and mixed waste.	Point	Continuous	Tritium (oxide) Tritium (elemental) Americium-241 Strontium-90 Cesium-137	1.11 2.18E-01 3.10E-05 2.76E-07 5.09E-08
RPICL, TA-I	Laboratory that performs radiation detection equipment calibration.	Point	Calculation	Tritium	4.11E-05
START, TA-I	Small-scale laboratory operation.	Point	Calculation	Strontium-90 Technetium-99	2.00E-07 1.00E-05
Z Facility, TA-IV	Experimental facility for research on light-ion inertial confinement fusion.	Point	Calculation	Tritium	1.10E-03

NOTES: Monitoring Method: Periodic = Based on periodic measurements
Calculation = Calculated from known parameters
Continuous = Based on continuous air monitoring results
ACRR =Annular Core Research Reactor
AHCF = Auxiliary Hot Cell Facility
Ci/yr = curies per year
ECF = Explosive Components Facility
HERMES-III = High Energy Radiation Megavolt Electron Source-III
NESHAP = National Emission Standards for Hazardous Air Pollutants
NGF = Neutron Generator Facility
RMWMF = Radioactive and Mixed Waste Management Facility
RPICL = Radiation Protection Instrument Calibration Laboratory
SNL/NM = Sandia National Laboratories, New Mexico
START = Sandia Tomography and Radionuclide Transport Laboratory
TA = Technical Area
TRU = Transuranic

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.

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 and then released as an intense concentrated burst (shot) at a target. Some experiments could result in the release of trace amounts of radionuclides.

TA-V Sources

Annular Core Research Reactor (ACRR) – This reactor is used primarily to support defense program projects. Trace amounts of radionuclides could occasionally be released.

Auxiliary Hot Cell Facility (AHCF) – The AHCF is used to identify, sort, characterize, and repackage legacy nuclear materials and TRU packages for permanent removal from the SNL/NM site. Legacy material may include accountable nuclear material, TRU material, spent nuclear fuel, and radiological material. Trace amounts of radionuclides could occasionally be released.

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 provided in Chapter 8.

5.4.1 NESHAP Dose Assessment

Emission Sources

To assess compliance, all NESHAP facilities at SNL/NM must submit annual facility emission data to the NESHAP Team Leader. The emissions from four "primary" sources (ACRR, Z Facility, NGF, and the RMWMF) are modeled using EPA's Clean Air Act (CAA) Assessment Package-1988 (CAP88) (EPA February 2013) to estimate the annual dose to each of the identified public receptors. Primary sources are those that determine their emissions by direct measurements or by calculations based on measured operational parameters.

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 2013, the highest emissions were from tritium. Historically, tritium and argon-41 have been the most significant contributor to the effective dose equivalent (EDE) of the MEI. Figure 5-5 shows the historical annual reported release (in Ci) of tritium and argon-41. The atmosphere contains 72 percent nitrogen, 21 percent oxygen, 0.93 percent argon, 0.03 percent carbon dioxide, and minor concentrations of neon, methane, hydrogen, helium, and krypton. Some of these constituents are susceptible to isotope transformations during high energy processes, which result in air activation products such as argon-41.

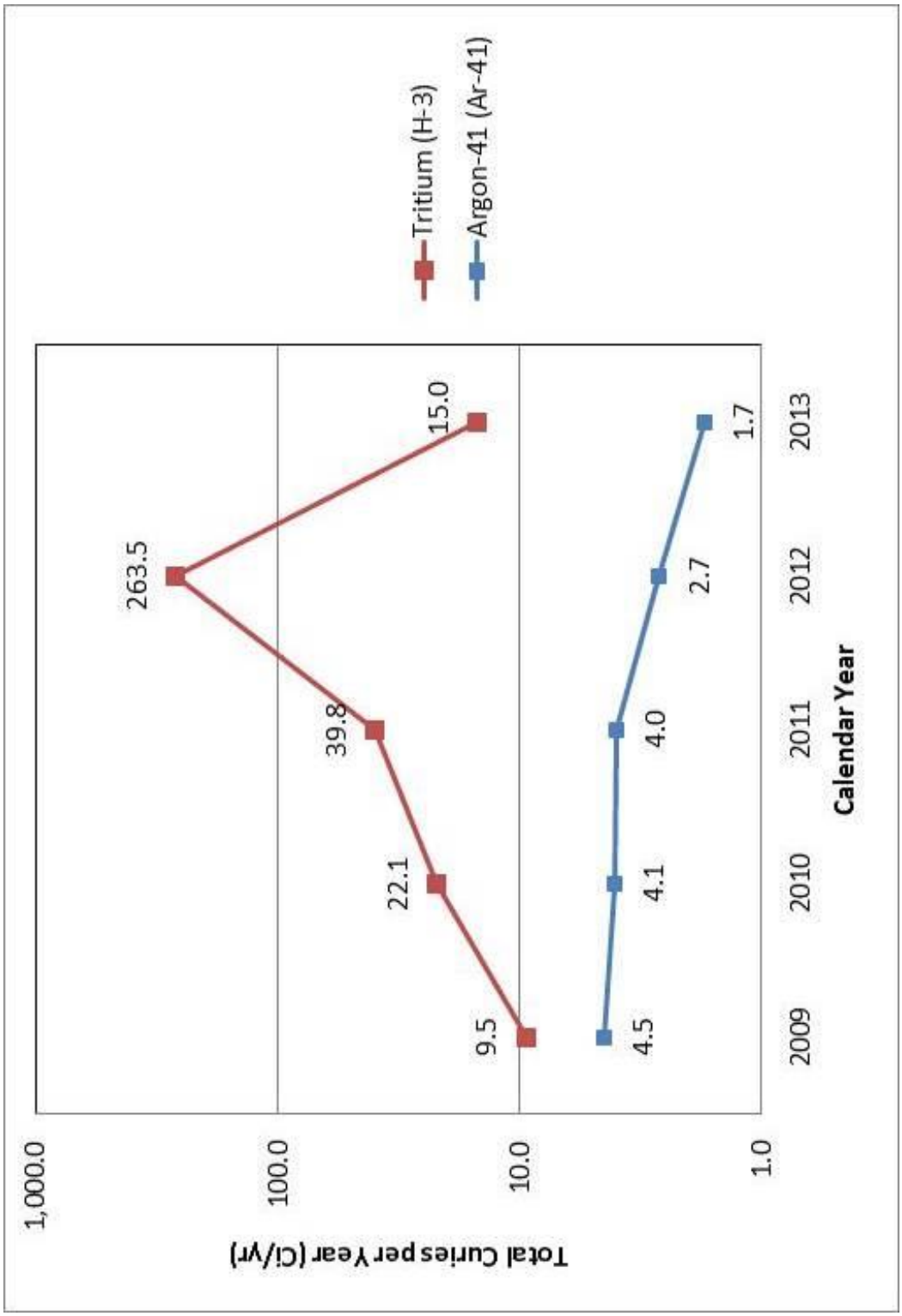


FIGURE 5-5. Summary of Atmospheric Releases of Argon-41 and Tritium from SNL/NM Facilities from 2000 to 2013

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 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). The NESHAP calculation for resident population was based on estimated urban and county population data and U.S. Census Bureau data (Census May 2013). The beef and dairy cattle numbers and food crop area fraction were calculated using 2007 agricultural statistics. The statistics were supplied by the New Mexico Department of Agriculture (NMDOA) (NMDOA 2013). The following values were used in the 2013 CAP88 calculation:

- 0.93 Dairy cattle/square kilometers ($km^{2)}$
- 0.58 Beef cattle/km^2
- 0.00062 Acres of food crops/square meters ($m^{2)}$
- 882,187 Population (within 50-mile radius)

On-site and Off-site Public Receptors

Receptor locations in the vicinity of SNL/NM, shown in Table 5-11 and Table 5-12, have been identified as potential locations of maximum exposure to a member of the public. Off-site receptor locations extend to the Isleta Resort Casino, 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 facilities, offices, and housing areas, as well as other non-DOE and non-U.S. Department of Defense facilities on KAFB.

TABLE 5-11. Annual Source-Specific Effective Dose Equivalent (EDE) from Primary Sources to Off-Site Receptors During Calendar Year 2013

FACILITY	ACRR	NGF	RMWMF	Z Facility	TOTAL (mrem/yr)
	Emission (mrem/yr)	Emission (mrem/yr)	Emission (mrem/yr)	Emission (mrem/yr)	
City of Albuquerque EHD Bio-Disease	5.40E-05	8.90E-04	1.60E-04	5.50E-08	**1.10E-03**
Dog Off Leash Parking Area	4.90E-05	8.80E-04	1.50E-04	5.40E-08	**1.08E-03**
East Resident	6.20E-06	8.20E-04	3.10E-05	4.70E-08	**8.57E-04**
Eubank Gate Area (Bldg. 8895)	3.90E-05	1.30E-03	8.00E-05	6.40E-08	**1.42E-03**
Four Hills Resident	4.40E-05	8.70E-04	8.60E-05	5.20E-08	**1.00E-03**
Isleta Resort and Casino	1.50E-05	8.30E-04	6.30E-05	4.80E-08	**9.08E-04**
La Luz Childcare	3.50E-05	1.00E-03	7.40E-05	5.90E-08	**1.11E-03**
Manzano Mesa Apartments	3.10E-05	9.80E-04	7.00E-05	5.60E-08	**1.08E-03**
Manzano Multicultural Generational Community Center	2.90E-05	9.30E-04	6.70E-05	5.40E-08	**1.03E-03**
The National Museum of Nuclear Science and History	2.90E-05	9.60E-04	6.70E-05	5.50E-08	**1.06E-03**
NM School for the Blind and Visually Impaired	3.20E-05	9.90E-04	7.10E-05	5.70E-08	**1.09E-03**
Sunflower Meadows Park	5.90E-06	8.20E-04	3.00E-05	4.70E-08	**8.56E-04**
USGS	1.70E-05	8.20E-04	6.40E-05	4.70E-08	**9.01E-04**
VA Hospital	3.20E-05	9.10E-04	7.60E-05	5.70E-08	**1.02E-03**
Willow Wood	3.30E-05	9.90E-04	7.30E-05	5.70E-08	**1.10E-03**
TOTAL	**4.51E-04**	**1.40E-02**	**1.16E-03**	**8.09E-07**	**1.56E-02**

NOTES: ACRR = Annular Core Research Reactor
Bldg. = Building
EHD = Environmental Health Department
mrem/yr = millirem per year
NGF = Neutron Generator Facility
NM = New Mexico
RMWMF = Radioactive and Mixed Waste Management Facility
USGS = U.S. Geological Survey
VA = Veterans Administration

TABLE 5-12. Annual Source-Specific EDE to On-Site Receptors During Calendar Year 2013

FACILITY	ACRR	NGF	RMWMF	Z Facility	TOTAL (mrem/yr)
	Emission (mrem/yr)	Emission (mrem/yr)	Emission (mrem/yr)	Emission (mrem/yr)	
Air National Guard Communications Flight	3.70E-05	1.00E-04	6.50E-05	1.10E-08	**2.02E-04**
Armed Forces Reserve Center	6.60E-05	1.30E-04	8.80E-05	7.80E-08	**2.84E-04**
Chestnut Site	9.40E-05	2.00E-05	1.00E-03	2.50E-09	**1.11E-03**
Child Development Center at Maxwell Housing Center	3.70E-05	4.60E-05	5.00E-05	5.00E-09	**1.33E-04**
Golf Course Club House	1.80E-04	5.20E-05	1.50E-04	9.90E-09	**3.82E-04**
Golf Course Maintenance Area	1.10E-04	7.20E-05	1.20E-04	1.10E-08	**3.02E-04**
Homeland Security Bldg. (1008)	4.80E-05	7.50E-04	7.30E-05	3.00E-08	**8.71E-04**
Honeywell Systems/Support Site	4.70E-05	5.20E-04	6.90E-05	2.70E-08	**6.36E-04**
Lovelace Respiratory Research Institute	3.50E-05	1.10E-05	1.30E-04	1.20E-09	**1.76E-04**
KAFB Fire Station	3.90E-05	2.20E-04	5.90E-05	1.50E-08	**3.18E-04**
KAFB Landfill	6.60E-05	1.60E-04	9.00E-05	2.60E-08	**3.16E-04**
Kirtland Elementary	3.60E-05	4.40E-05	5.00E-05	4.70E-09	**1.30E-04**
Kirtland Family Housing	3.20E-05	2.10E-04	5.30E-05	8.90E-09	**2.95E-04**
Kirtland Storage Facility	2.40E-04	5.80E-05	1.80E-04	1.20E-08	**4.78E-04**
Manzano Offices (Fire Station)	7.40E-04	2.80E-05	1.30E-04	2.20E-09	**8.98E-04**
Maxwell Housing (SE Corner)	3.90E-05	4.90E-05	5.10E-05	5.50E-09	**1.39E-04**
Pershing Park Housing	3.00E-05	1.70E-04	5.20E-05	1.00E-08	**2.52E-04**
Richard W. Davis Advanced Laser Facility (formally Airport Bldg.)	7.00E-05	1.50E-04	8.00E-05	1.50E-08	**3.00E-04**
Sandia Area Federal Credit Union	4.30E-05	3.20E-04	6.40E-05	2.10E-08	**4.27E-04**
Sandia Elementary School	3.00E-05	1.80E-04	5.20E-05	1.00E-08	**2.62E-04**
TA-IV Cafeteria	6.40E-05	1.40E-04	8.90E-05	1.20E-07	**2.93E-04**
Tijeras Learning Center	6.90E-05	4.80E-05	1.10E-04	2.40E-09	**2.27E-04**
Vehicle Maintenance Flight	3.80E-05	1.10E-04	6.80E-05	1.20E-08	**2.16E-04**
Wherry Elementary	3.40E-05	1.20E-04	6.00E-05	9.60E-09	**2.14E-04**
TOTAL	**2.22E-03**	**3.71E-03**	**2.93E-03**	**4.50E-07**	**8.87E-03**

NOTES: ACRR = Annular Core Research Reactor
Bldg. = building
EDE = Effective Dose Equivalent
KAFB = Kirtland Air Force Base
mrem/yr = millirem per year
NGF = Neutron Generator Facility
RMWMF = Radioactive and Mixed Waste Management Facility
SE = southeast
TA = Technical Area

Meteorology

Data from two meteorological towers (A36 and A21) in the proximity of NESHAP emission sources were used in 2013. 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 (EPA 2013). Individual EDEs to off-site and on-site receptors are presented in Tables 5-11 and 5-12, respectively. Dose assessment results are summarized in Table 5-13.

TABLE 5-13. Calculated Dose Assessment Results for On-Site and Off-Site Receptors and for Collective Populations During Calendar Year 2013

Dose to Receptor	Location	2013 Calculated Dose	NESHAP Standard
Individual Dose			
On-site Receptor EDE to the MEI	Chestnut Site	1.11E-03 mrem/yr (1.11E-05 mSv/yr)	10 mrem/yr (0.1 mSv/yr)
Off-site Receptor EDE to the MEI	Eubank Gate Area	1.42E-03 mrem/yr (1.42E-05 mSv/yr)	10 mrem/yr (0.1 mSv/yr)
Collective Dose			
Collective Regional Population	Residents within an 80-km (50-mile) radius	7.40E-02 person-rem/yr (7.40E-04 person-mSv/yr)	No Standard Available
Collective KAFB Population	KAFB Housing	9.11E-04 person-rem/yr (9.11E-06 person-mSv/yr)	No Standard Available

NOTES: EDE = effective dose equivalent
KAFB = Kirtland Air Force Base
km = kilometer
MEI = maximally exposed individual
mrem/yr = millirem per year
mSv/yr = millisievert per year
NESHAP = National Emissions Standards for Hazardous Air Pollutants
person-mSv/yr = person-millisievert per year
person-rem/yr = person-rem per year
rem = roentgen equivalent man

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.

Radiological NESHAP Compliance Subpart H of NESHAP regulates radionuclide air emissions from DOE/NNSA facilities, with the exception of naturally occurring radon. The Radiological NESHAP Program evaluates facilities that have the potential to release emissions to the environment yearly. In 2013, the primary radionuclides released from SNL/NM facilities were tritium and argon-41. In 2013, the on-site MEI was located on KAFB. The on-site MEI dose of 1.11E-03 mrem/yr at the Chestnut Site resulted primarily from tritium releases at the NGF. The off-site MEI was located at the Eubank Gate Area. The off-site MEI dose of 1.42E-03 mrem/yr at the Eubank Gate Area resulted also primarily from tritium releases at the NGF. Both doses are well below the 10 mrem/yr EPA standard. By comparison, the average person in the Albuquerque area receives 311 mrem/yr from natural background radiation (NCRP 2009).

Collective Dose

The collective population dose resulting from all SNL/NM radiological emissions was calculated for both KAFB and the regional area (Table 5-13). 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 a 50-mile radius.

Regional

The Albuquerque regional collective population dose in 2013 was 7.410E-02 person-roentgen equivalent, man per year (person-rem/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 882,187 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 Kirtland Family). The total population dose for KAFB was obtained by summing the three areas based upon a total residential population of 3,548. The 2013 calculation resulted in an estimated population dose of 9.11E-04 person-rem/yr.

5.5 Air Compliance Requirements and Compliance Strategies

Air quality standards are implemented by regulations promulgated by local and federal governments in accordance with the CAA. The Albuquerque Bernalillo County Air Quality Control Board, 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 8.

5.5.1 SNL/NM Air Emission Sources

As discussed in Section 5.2.1, criteria pollutants include sulfur dioxide, nitrogen oxide, carbon monoxide, ozone, PM, and lead. 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 Standard (NAAQS) and implemented in (20.11.8 New Mexico Administrative Code [NMAC]). NMAAQS 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. As discussed previously, ambient air measurements taken in the vicinity of SNL/NM facilities historically have been well below maximum threshold limit values and standards for criteria pollutants, and comparable to the COA monitors.

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 held for SNL/NM are multi-source (including a combination of criteria pollutant emission sources). The DOE/NNSA/SFO and the AQC program has started to work with the COA to assure that we have only one permit or registration for combustion sources per building. This is to better align with the current regulations and requirements. The alignment has been completed and redundant multi-source permits and registrations have been corrected. Significant sources at SNL/NM are listed, below.

Boilers

During 2013, Sandia personnel maintained 34 permits and registrations for applicable boilers site wide. Table 5-14 illustrates the annual boiler fuel usage and associated emissions for 2013. The boilers associated with the permits and registrations are shown in Table 8-11.

Emergency Generators

During 2013, Sandia personnel maintained 11 permits and registrations for applicable generators site wide. Table 5-15 illustrates the annual hours of operation and associated emissions for 2013. The emergency generators associated with the permits and registrations are shown in Table 8-12.

TABLE 5-14. Boiler Fuel Usage and Emission Data During Calendar Year 2013

Permit Number	Fuel Usage (scf)	Emissions (tpy)				
		NO_x	CO	PM_{10}	SO_2	VOC
#374-M2	7,735,462	0.1934	0.3249	0.0294	0.0070	0.0213
R#547-RV1	6,935,162	0.3468	0.2913	0.0264	0.0021	0.0191
#925-M2	10,805,896	0.5403	0.4538	0.0411	0.0097	0.0297
R#1406-M1	2,633,408	0.0658	0.1106	0.0100	0.0008	0.0072
#1725-M1	8,709,775	0.4355	0.3658	0.0331	0.0026	0.0240
#1820-M1	58,030,800	1.4508	2.4373	0.2205	0.0522	0.1596
R#1823	8,496,740	0.4248	0.3569	0.0323	0.0025	0.0234
R#1888-RV1	20,270,992	1.0135	0.8514	0.0770	0.0061	0.0557
R#1902-RV1	2,454,642	0.1227	0.1031	0.0093	0.0007	0.0068
R#2109	4,380,747	0.1095	0.1840	0.0166	0.0039	0.0120
R#2110	5,288,962	0.1322	0.2221	0.0201	0.0048	0.0145
R#2111	2,845,500	0.0711	0.1195	0.0108	0.0026	0.0078
R#2112	4,194,258	0.1049	0.1762	0.0159	0.0038	0.0115
R#2113	2,481,699	0.0620	0.1042	0.0094	0.0022	0.0068
R#2114	2,284,118	0.0571	0.0959	0.0087	0.0021	0.0063
R#2115	2,006,349	0.0502	0.0843	0.0076	0.0018	0.0055
R#2116	7,952,243	0.1988	0.3340	0.0302	0.0072	0.0219
R#2117	3,217,073	0.0804	0.1351	0.0122	0.0029	0.0088
R#2118	2,572,440	0.0643	0.1080	0.0098	0.0023	0.0071
R#2119	1,974,291	0.0494	0.0829	0.0075	0.0018	0.0054
R#2120	9,073,267	0.2268	0.3811	0.0345	0.0082	0.0250
R#2121	8,409,983	0.2102	0.3532	0.0320	0.0076	0.0231
R#2122	6,158,733	0.1540	0.2587	0.0234	0.0055	0.0169
R#2169	852,635	0.0426	0.0358	0.0032	0.0003	0.0023
R#2170	1,758,174	0.0879	0.0738	0.0067	0.0005	0.0048
R#2171	1,856,155	0.0928	0.0780	0.0071	0.0006	0.0051
R#2172-RV1	1,710,280	0.0855	0.0718	0.0065	0.0005	0.0047
R#2173	N/D[1]	1.0606	0.8909	0.0806	0.0064	0.0583
R#2174-RV1	5,144,016	0.2572	0.2160	0.0195	0.0015	0.0141
R#2175	2,654,378	0.1327	0.1115	0.0101	0.0008	0.0073
R#3111	566,762	0.0142	0.0238	0.0022	0.0002	0.0016

NOTES: [1] = There is currently not an individual fuel meter on this building, it is a total for several buildings. The emissions associated are the allowable emissions within the registration.
CO = carbon monoxide
NO_x = nitrogen oxide
PM_{10} = Particulate Matter (diameter equal to or less than 10 microns)
N/D = non detect
scf = standard cubic feet
SO_2 = sulfur dioxide
tpy = tons per year
VOC = Volatile Organic Compound

TABLE 5-15. Generator Hours and Emission Data During Calendar Year 2013

Permit Number	Hours	Emissions (tpy)				
		NO_x	CO	PM_{10}	SO_2	VOC
#374-M2	8	0.0711	0.0153	0.0050	0.0047	0.0056
#402[a]	18.4	0.1658	0.0440	0.0030	0.0209	0.0047
	16					
	16					
	16.9					
#415-M2	2.6	0.0077	0.0017	0.0005	0.0005	0.0006
#924-RV1	8	0.0860	0.0197	0.0025	0.0290	0.0025
#925-M2	7	0.0753	0.0172	0.0022	0.0254	0.0022
#1725	11	0.0898	0.0206	0.0026	0.0303	0.0026
#1820-M1	17	0.2818	0.0749	0.0273	0.0255	0.0317
	17	0.3574	0.0949	0.0346	0.0324	0.0402
#1828	9.8	0.0882	0.0202	0.0026	0.0297	0.0026
#1900[b]	6.9	0.0087	0.0075	0.0004	0.0028	N/A
#1930[b]	1.8	0.0010	0.0007	0.0001	0.0001	N/A
#2097[b]	9	0.0086	0.0010	0.0000	0.0031	N/A

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.
[b] City of Albuquerque has started issuing generator permits with combined NO_x and VOC emissions. Permit #1900 is the first permit to have this combination for Sandia.
CO = carbon monoxide
N/A = not applicable
NO_x = nitrogen oxide
PM_{10} = Particulate Matter (diameter equal to or less than 10 microns)
SO_2 = sulfur dioxide
tpy = tons per year
VOC = Volatile Organic Compound

Chemical Usage

Registration #1901-RV1 was issued on October 24, 2011 by the COA, which includes all HAP chemical usage for general laboratory usage for research and development purposes. With the issuance of Registration #1901-RV1, all other permits and registrations that contained HAP chemical requirements have been modified to no longer have these requirements associated with them. During 2013, SNL/NM purchased a total of 20 tons of HAP chemicals, with the potential airborne release amounting to 5.3 tons. This number is below the Registration #1901-RV1 and major HAP chemical source status of 25 tons per year (tpy).

Miscellaneous New Source Review (NSR) Permits

The document disintegrator is an industrial-size, classified document shredder. There is one pollutant of concern with this permit, which is particulate emissions. The document disintegrator operated 334 hours in 2013 which calculated an estimated 0.8 tons of total suspended particulate. The process input rate of material was 62.5 percent below the permitted limit.

The Thermal Test Complex is an enclosed research and development 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. The facility burned some jet propulsion fuel grade 8 fuel during 2013 and conducted some methanol fuel testing resulting in the following potential emissions in tpy:

Pollutant	Emissions (tpy)
Carbon Monoxide	3.09E-02
Nitrogen Dioxide	8.11E-04
Sulfur Dioxide	1.46E-03
PM_{10}	2.81E-02
Hazardous Air Pollutant	1.02E-02
Volatile Organic Compound	3.47E-02

All emissions are well below permitted limits for the facility.

Open Burn Permits

Open burn permits are required for:

- Treatment of Explosive Waste by Open Burning (hazardous waste treatment),
- Research and Development Activities (no limit)
- Aboveground Detonation of Explosives (over 20 pounds [lbs]),
- Disposal of Explosives by Burning, to Avoid Hazards of Transport or Handling (no limit)
- Igniting Rocket Motors (with greater than 4,000 lbs of fuel).

A list of 2013 permits can be found in Chapter 8, Table 8-1.

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. For a list of 2013 permits refer to Chapter 8, Table 8-1 of this report.

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 vehicles.

5.5.2 Title V

The CAA Amendment 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 tpy or greater of any criteria pollutant, 100,000 tpy carbon dioxide equivalent greenhouse gas (GHG) emissions,
- 10 tpy of any single HAP, and
- 25 tpy of any combination of HAPs.

Background

The DOE/NNSA/SFO 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 is currently being negotiated with the COA.

Greenhouse Gas Emissions

On May 13, 2010, the EPA issued a final rule that addresses greenhouse gas emissions from stationary sources under the CAA permitting programs. This final rule sets thresholds for GHG emissions that define when permits under the NSR Prevention of Significant Deterioration and Title V Operating Permit programs are required for new and existing industrial facilities.

The CAA permitting program emissions thresholds for criteria pollutants such as lead, sulfur dioxide, and nitrogen oxide are 100 and 250 tpy. While these thresholds are appropriate for criteria pollutants, they are not feasible for GHGs because GHGs are emitted in much higher volumes. EPA phased in the CAA permitting requirements for GHGs in two initial steps. Operations at SNL/NM became applicable in the second step, with deadline dates between July 1, 2011 and June 30, 2013. Operating permit requirements will, for the first time, apply to sources based on their GHG emissions even if they would not apply based on emissions of any other pollutant. Facilities that emit at least 100,000 tpy carbon dioxide equivalent will be subject to Title V permitting requirements.

During 2013, there was a calculated total of 225,117 tpy carbon dioxide equivalent (including fugitive GHG emissions) that would apply to the Title V permit. A meeting was held with the COA in 2013 to discuss the path forward with the update to the Title V Permit application. The application is in the process of being updated appropriately.

Permit Fee Structure

The COA regulations require source owners to pay air emission fees, which are implemented under 20.11.2 NMAC, *Fees*. The sources included in the fee determination for SNL/NM include the COA NSR permitted and registered sources, as summarized in Chapter 8, Table 8-1. 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 2013, a fee of $14,498 was paid to the COA based on the current permitted emissions fees.

Stratospheric Ozone Protection

Title VI of the CAA Amendments of 1990 required EPA to establish regulations to phase out the production and consumption of ozone depleting substances (ODSs). ODSs are defined as chlorofluorocarbons, hydrochlorofluorocarbons, 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 ODSs 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 lbs of refrigerant; and establishment of safe disposal standards.

At SNL/NM, ODSs 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.

5.5.3 Compliance Strategies

DOE/NNSA/SFO and Sandia have met the conditions of its permits and registrations.

This page intentionally left blank.



Chapter 6
Water Quality

Sandia Corporation (Sandia) personnel conduct effluent monitoring through wastewater, surface water, and stormwater monitoring and surveillance programs. 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 stormwater regulations under the National Pollutant Discharge Elimination System (NPDES). Sandia also adheres to the water quality guidelines contained in U.S. Department of Energy (DOE) Order 458.1, *Radiation Protection of the Public and the Environment* (DOE 2013).

6.1 Wastewater Discharge Program

Wastewater that is discharged to the public sewer system from Sandia National Laboratories, New Mexico (SNL/NM) facilities is divided into two categories: sanitary discharges and industrial discharges. Sanitary discharges 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 personnel monitor liquid effluent discharges to meet regulatory compliance. Toxic discharges are further reduced by implementation of Toxic Organic Management Plans, general good housekeeping, and engineering practices. Pollution prevention (P2) measures are implemented to reduce, substitute, or eliminate toxic chemicals, where feasible, as discussed in Section 3.9.5 of this report.

6.1.1 SNL/NM and the ABCWUA

The ABCWUA operates a Publicly-Owned Treatment Works (POTW) that discharges to the Rio Grande. The SNL/NM sewer system connects to the ABCWUA's sanitary sewer system and eventually to the POTW through six permitted outfalls (Figure 6-1). It should be noted that SNL/NM Station WW007 (Permit 2069G) for activities conducted at the Microsystems and Engineering Sciences Applications (MESA) is upstream of the final discharge location, Station WW001 (Permit 2069A). Wastewater effluent discharged from any of the six outfalls must meet the ABCWUA's Sewer Use and Wastewater Control Ordinance (SUWCO) requirements. Information on the ABCWUA SUWCO requirements can be found at the American Legal Publishing Corporation's website:

www.amlegal.com/albuquerque_nm/

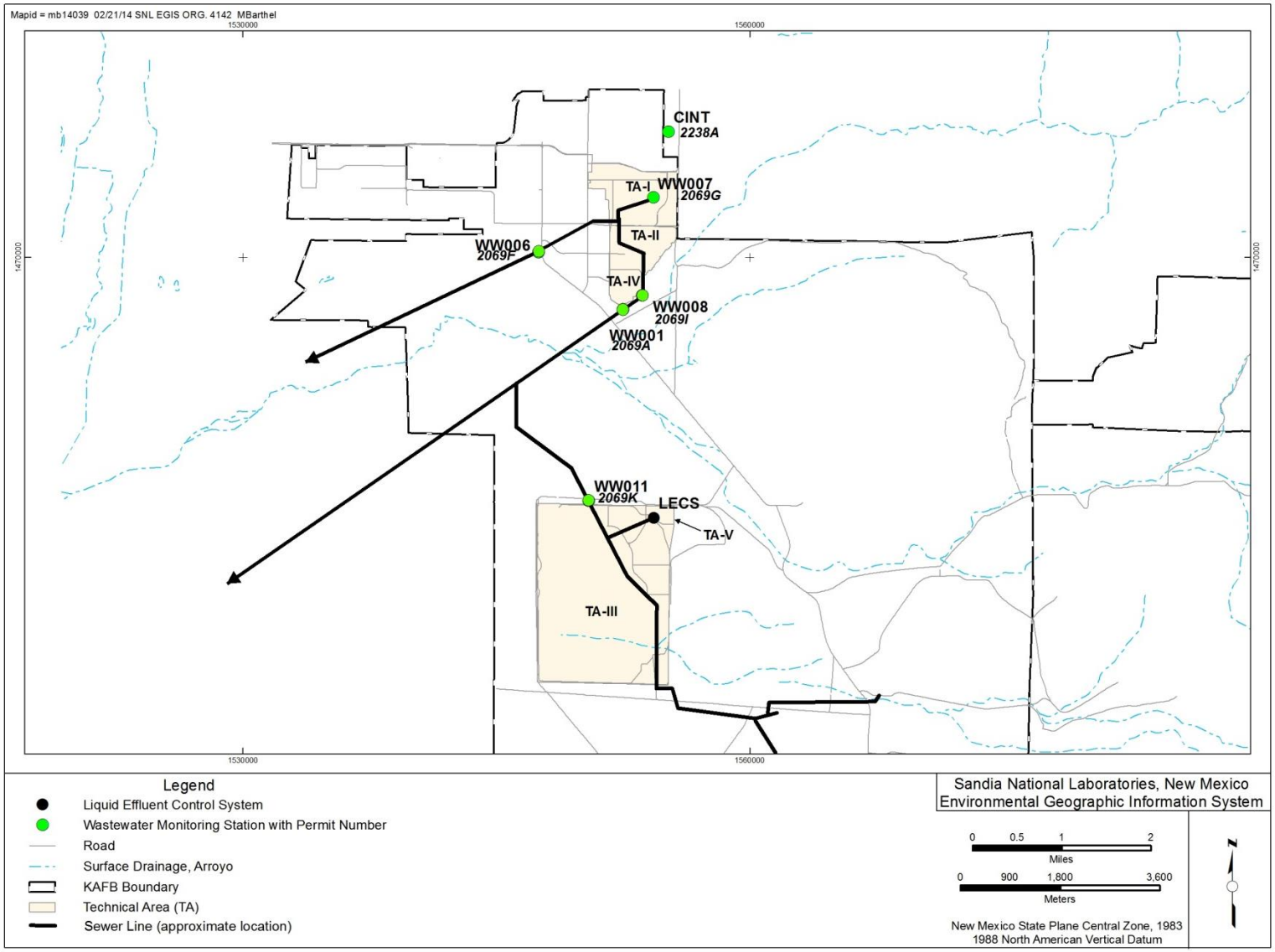


FIGURE 6-1. Wastewater Monitoring Station Locations

During 2013, there was one reportable event that was caused by a spill into a laboratory sink. A Notice of Violation was issued by the ABCWUA on November 25, 2013 for discharge to the sanitary sewer of mixed solvents from this spill event. The ABCWUA permit for 2069A specifically prohibits disposal of hazardous substances into the sanitary sewer. The event was discovered and self-reported by Sandia personnel to the ABCWUA. The reportable event is summarized below:

On Thursday, November 21, 2013 at Building 897, Laboratory 3005, at approximately 3:30 p.m., a gallon glass bottle containing waste solvent (acetone, isopropyl alcohol, trichloroethene [TCE], Novec fluid, and deionized water) fractured and spilt on the table, in the sink, and surrounding area in the laboratory. The spill was approximately one gallon and some was released into the laboratory sink that went into the sanitary sewer (approximately 3/4 gallons [gal]). A spill kit was used to absorb the remaining material.

An independent causal analysis team was formed to evaluate and determine the corrective actions for this event. The corrective actions are listed below:

Corrective Actions:

- Develop and share lessons learned about the potential hazards associated with over filling containers and the importance of using secondary containment to prevent environmental releases.
- Obtain an additional flammable cabinet to ensure solvent waste is stored inside the cabinet, and not the fume hood, and that it has adequate secondary containment. This will eliminate the need to store solvent waste in the fume hood and to subject bottles to additional handling.
- Update the chemical handling procedures to ensure workers are aware of the hazards of overfilling chemical containers.
- Ensure laboratory personnel are working more closely with the Hazardous Waste Management Facility to arrange for more prompt hazardous waste pickup to minimize accumulation.
- Request that management send email to Waste Management requesting that they improve the time delays in picking up hazardous waste.
- Develop a consistent process to handle hazardous materials inventory.
- Employ practices of waste segregation to try and practice recycling of used solvents. Waste had not been picked up and accumulated in part due to the mixtures of solvents that cause waste processing issues.

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. The ABCWUA also presents Wastewater Compliance Awards and Sandia received five "Gold Pre-Treatment Awards" and one "Silver Pre-Treatment Award" for the 2012 to 2013 reporting year (November 2012 through November 2013). A "Gold Pre-Treatment Award" is given based on a facility's 100 percent (90 percent for Silver) 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 Water Utility Department, Water Reclamation 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 8.

Sandia personnel 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 Sandia 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. One-time releases are approved on a case-by-case basis. Buildings that only produce domestic sewage, such as from lavatories (restrooms and showers), sinks, and fountains are not required to obtain a wastewater discharge approval.

6.1.3 Wastewater Monitoring Stations

SNL/NM has six on-site monitoring stations permitted by the ABCWUA (Figure 6-1). Wastewater permits are listed in Chapter 8, Table 8-1 of this report. All of the wastewater from the six permitted monitoring stations, with the exception of Station WW007 (Permit 2069G) and the Center for Integrated Nanotechnologies (CINT) (Permit 2238A), contain a mixture of sanitary and industrial wastewater, which discharges into the ABCWUA sanitary sewer system through the Tijeras Arroyo Intercept.

The EPA has established categorical pre-treatment standards for specified classes of industrial discharges. Station WW007 (Permit 2069G) monitors the wastewater discharged from the Acid Waste Neutralization (AWN) system within the MDL in Technical Area (TA)-I. Laboratory discharges from the MESA complex may also be configured to discharge to this AWN system. The CINT facility also utilizes an AWN system for pre-treatment of its process wastewater. Sandia personnel discharge approximately 800,000 to 1,000,000 gal of wastewater per day to the public sewer system.

All outfall monitoring stations are equipped with flow meters that control automatic sampling units and pH sensors that continuously monitor wastewater 24 hours a day, 365 days a year. An auto-dialer notifies Sandia personnel when pH regulatory limits have been exceeded. Sandia personnel are required to notify DOE/National Nuclear Security Administration (NNSA)/Sandia Field Office (SFO) personnel of the exceeded limit. In addition, DOE/NNSA/SFO personnel are required to report the exceeded limit to 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 Station WW007 (Permit 2069G) and the CINT (Permit 2238A) are located within buildings, and are also equipped with installed continuous flow measuring and pH recording instrumentation.

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 and radiological screening of TA-V process water at the LECS
Categorical	
2069G (WW007)	Laboratory industrial processes acid wastewater from MDL activities
2238A (CINT)	Laboratory industrial processes acid wastewater from CINT activities

NOTES: "All waste streams" include both domestic and industrial discharges.
CINT = Center for Integrated Nano-Technologies
LECS = Liquid Effluent Control System
MDL = Microelectronics Development Laboratory
SNL/NM = Sandia National Laboratories, New Mexico
TA-V = Technical Area V

Sandia personnel split wastewater samples taken from SNL/NM permitted 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 personnel send all collected 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. Wastewater monitoring parameters are listed below:

- Metals – aluminum, arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, silver, and zinc.
- Radiological – gamma spectroscopy, gross alpha, gross beta, and tritium.
- General Chemistry – chemical oxygen demand, cyanide, formaldehyde, oil and grease, phenolic compounds, semi-volatile organic compounds, soluble fluoride, and volatile organic compounds.

Sandia personnel maintain three active septic tank systems and one holding tank 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. All septic holding tank records are sent to the NMED.

6.1.4 TA-V Wastewater Radiological Screening

Sandia personnel maintain 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, laboratory 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: reactor and non-reactor wastewater. Non-reactor wastewater is water from restrooms and non-radioactive laboratory activities. Reactor process wastewater is water from areas that use, process, or store radioactive materials and is channeled to holding tanks where it can be screened for radiological contaminants within the Liquid Effluent Control System (LECS) (Figure 6-1). The LECS was developed as a control system to maintain the integrity of the ABCWUA's

sanitary sewer system by collecting, analyzing, and handling reactor process wastewater from TA-V reactor activities. 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.

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. Discharges to the sanitary sewer from the LECS and other SNL/NM activities did not exceed standards for radionuclides at any of SNL/NM's wastewater monitoring stations in 2013.

6.1.5 Summary of Wastewater Monitoring Results

During 2013, Sandia personnel split wastewater samples with both the ABCWUA and the NMED. Laboratory analytical results for these split wastewater samples, based on the parameters shown in Section 6.1.3, confirmed that Sandia was in compliance with all NMED and ABCWUA regulations for Permits 2069A, 2069F, 2069G, 2069I, 2069K and 2238A. As previously stated in Section 6.1.1, one exceedance occurred in 2013. The event was discovered and reported by Sandia when a gallon bottle containing waste solvent (acetone, IPA, TCE, Novec fluid, and deionized water) fractured and spilt on the table, in the sink, and surrounding area in the laboratory, and some was released into the laboratory sink that went into the sanitary sewer (at most 3/4 gal) in Permitted Flow Basin 2069A. The ABCWUA Industrial Waste Engineer also conducted day long inspections of individual laboratory operations within the permitted flow basins during the months of February, June (two separate days), and November. All water discharged from the LECS in 2013 also met federal regulatory standards and DOE orders for radiological levels in wastewater. All analytical results from sampling conducted in 2013 met ABCWUA discharge requirements and can be found in Appendix A of this report.

6.1.6 Sanitary Sewer System Releases in 2013

Reportable occurrences and environmental releases in 2013 are discussed in Section 6.1.1 of this report. There was one reportable release (ABCWUA Permit 2069A) in 2013.

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 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 8.

6.2.1 Surface Discharge Approvals

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 Sandia 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.

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 discharges are requested as a result of fire training activities, the need to flush eyewash stations, and the cleaning of building exteriors. In 2013, 30 individual surface discharge requests were made; Sandia met all NMED standards.

6.2.2 Activities at Evaporation Lagoons

Sandia personnel with 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 Permit-530 (DP-530). 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 content of the tanks 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 for discharges from the pulsed power facilities located in TA-IV to Lagoons #1 and #2 on March 8, 1988. The DP-530 was submitted pursuant to New Mexico Administrative Code (NMAC) 20.6.2.3106 of NMWQCC regulations, and was approved pursuant to 20.6.2.3109 NMAC. A permit renewal application for DP-530 was submitted to NMED, was approved on September 12, 2007, and was to expire on September 12, 2012. Permit renewal for DP-530 was submitted within the required 180 days prior to its expiration date of September 12, 2012. The monitoring and reporting requirements are listed in Table 6-2.

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: EPA = U.S. Environmental Protection Agency
NMWQCC = New Mexico Water Quality Control Commission
TDS = total dissolved solids

Samples were collected from Lagoon #1 and Lagoon #2 on September 11, 2013. Sample fractions were collected for the parameters specified in, DP-530, under specific conditions identified in the September 12, 2007, DP-530 discharge permit renewal issued by NMED. All samples were transported with sample custody documentation to the analytical laboratory. Although there were no discharges to Lagoon #2 in 2013, sampling occurred to ensure no residual or outside contamination had occurred. Laboratory analysis results indicated that all detected constitutes met ABCWUA discharge requirements. During 2013, monthly inspections were performed on both lagoons and were documented in checklists filed in Sandia's Customer Funded Records Center and with DOE/NNSA/SFO.

Also, during 2013, Lagoon #1 was drained to the sanitary sewer system after sampling and analysis results indicated the water met discharge standards of the ABCWUA. After draining and cleaning, the condition of the Lagoon #1 liner was inspected. The inspection of the Lagoon #1 liner did not identify any signs of cracking or damage.

6.2.3 Surface Discharge Releases in 2013

The Surface Discharge Program must be contacted in the event of an accidental release or spill to the ground surface. In 2013, four releases met the reporting requirements established by NMED. These releases are discussed in Section 2.2.2, and are summarized below.

1. On Thursday June 20, 2013 Sandia maintenance personnel responded to a report of water overflowing from a cooling tower in TA-I at SNL/NM. The cause of the overflow was debris blocking the distributor nozzles in the cooling tower. Maintenance personnel turned off the pumping system upon arrival and stopped the release. It is estimated that 16,000 gal of water overflowed from the cooling tower. Approximately 1,000 gal was captured in the concrete containment structure. Maintenance personnel were able to shut down the system upon arrival and repairs were completed on June 21, 2013.

2. On Tuesday, October 22, 2013 a 14-inch potable water main leak occurred in TA-III at SNL/NM and the water valves were located and shut off the water after approximately 45 minutes. Before the construction crew was able to isolate and close the potable water line, an estimated volume of 175,000 gal was discharged on to the road. The water then traveled north into the existing earthen storm channels for approximately 5,100 feet. The broken water line was repaired and put back in service on November 5, 2013.

3. On Thursday, October 31, 2013 a possible sewer line leak was reported in TA-III. However, it was due to the 14-inch water line break as described in item number 2 above. The area was dry, as observed during a site visit two weeks after the surface water break occurred.

4. Solid Waste Management Unit (SWMU) 68 Release/Discharge Notification 7/15 Day Spill Report was submitted to the NMED on October 2, 2013. On September 25, 2013, an artillery shell was found on the ground surface at SWMU 68 during a routine inspection of the site. The shell was believed to have been exposed during recent heavy rains in the area. The KAFB Fire and Explosive Ordnance Disposal team was notified of the potential unexploded ordnance. It was determined that the item be exploded in place. This was completed the same day as the discovery of the item.

6.3 Stormwater Program

The Stormwater Program maintains stormwater permits and assists line organizations in complying with all permit conditions and regulatory requirements. The SNL/NM NPDES permits are in place to reduce the impact of Sandia's industrial and construction activities on the environment.

6.3.1 Storm Drain System

Stormwater runoff flowing over the ground surface has the potential to pick up and transport contaminants. The Stormwater Program works in coordination with the Materials Sustainability and Pollution Prevention (MSP2) Program, the Surface Discharge Program, Facilities Engineering, and ER Operations to implement measures and best management practices (BMPs) to prevent or reduce potential contaminants from being transported in stormwater 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 SWMUs,
- Building material contaminants from construction activities, and
- Pesticides and fertilizers from landscaped areas.

Sandia controls the potential contaminants that may be picked up by stormwater runoff by routing all industrial waste water to the sanitary sewer and storing most chemicals indoors. Sandia also limits stormwater 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 stormwater runoff. Some facilities, such as the Hazardous Waste Handling Facility and the Radioactive and Mixed Waste Management Facility 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 the storm drain system. Per the Resource Conservation and Recovery Act Part B permit, discharge of the water is allowed if there have been no spills or releases or no visible sheen or excessive debris. If discharged to the sanitary sewer, approval must be obtained from the ABCWUA through DOE/NNSA/SFO.

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 mean all surface waters situated wholly or partly within or bordering upon the State, including lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, reservoirs, or natural ponds. Surface waters of the state also means all tributaries of such waters, including adjacent wetlands, any manmade bodies of water that were originally created in surface waters of the state or resulted in the impoundment of surface waters of the state, and any "Waters of the United States" as defined under the CWA that are not included in the preceding description. 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." under the CWA.

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.

Sandia facilities in TA-I, TA-II, and TA-IV have storm drains, culverts, and channels that divert stormwater 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 SNL/NM defined watershed areas are evaluated for possible NPDES permitting (Figure 6-2).

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, activities are evaluated for possible NPDES permits for facilities in these areas. TA-III, TA-V, and several remote sites are located in this area.

6.3.2 Permitting

The EPA provides regulatory oversight for the NPDES permits. There are three types of NPDES, as listed below.

Multi-Sector General Permit (MSGP) – Operators must submit a Notice of Intent (NOI), implement control measures, sample stormwater runoff for comparison to national benchmark values, and develop site-specific Stormwater Pollution Prevention Plans (SWPPP). An NOI was submitted to the EPA for coverage under the 2008 MSGP and in 2009 the EPA issued a new permit.

Following approval in 2009, the existing SWPPP was updated to comply with the 2008 MSGP requirements (SNL/NM February 2012). Key facilities affected by NPDES regulations are listed in Table 6-3. Chapter 8 lists all applicable regulations and program documents.

General Construction Permit (GCP) – A general construction permit requires protection of stormwater runoff during and after construction. All areas of the site that are susceptible to erosion must be stabilized upon completion of the project. A new GCP was issued in February 2012 for a five-year term. During 2013, 12 stormwater construction permits were active. Construction permits are listed in Chapter 8, Table 8-1.

Municipal Separate Storm Sewer System (MS4) – Under the CWA revisions of 1987, the U.S. Congress established a permitting program under the NPDES for stormwater discharges to "waters of the United States." An MS4 owned by municipalities, tribes, and state and federal agencies, primarily in urbanized areas as defined by the latest U.S. Census, is subject to the permitting requirement.

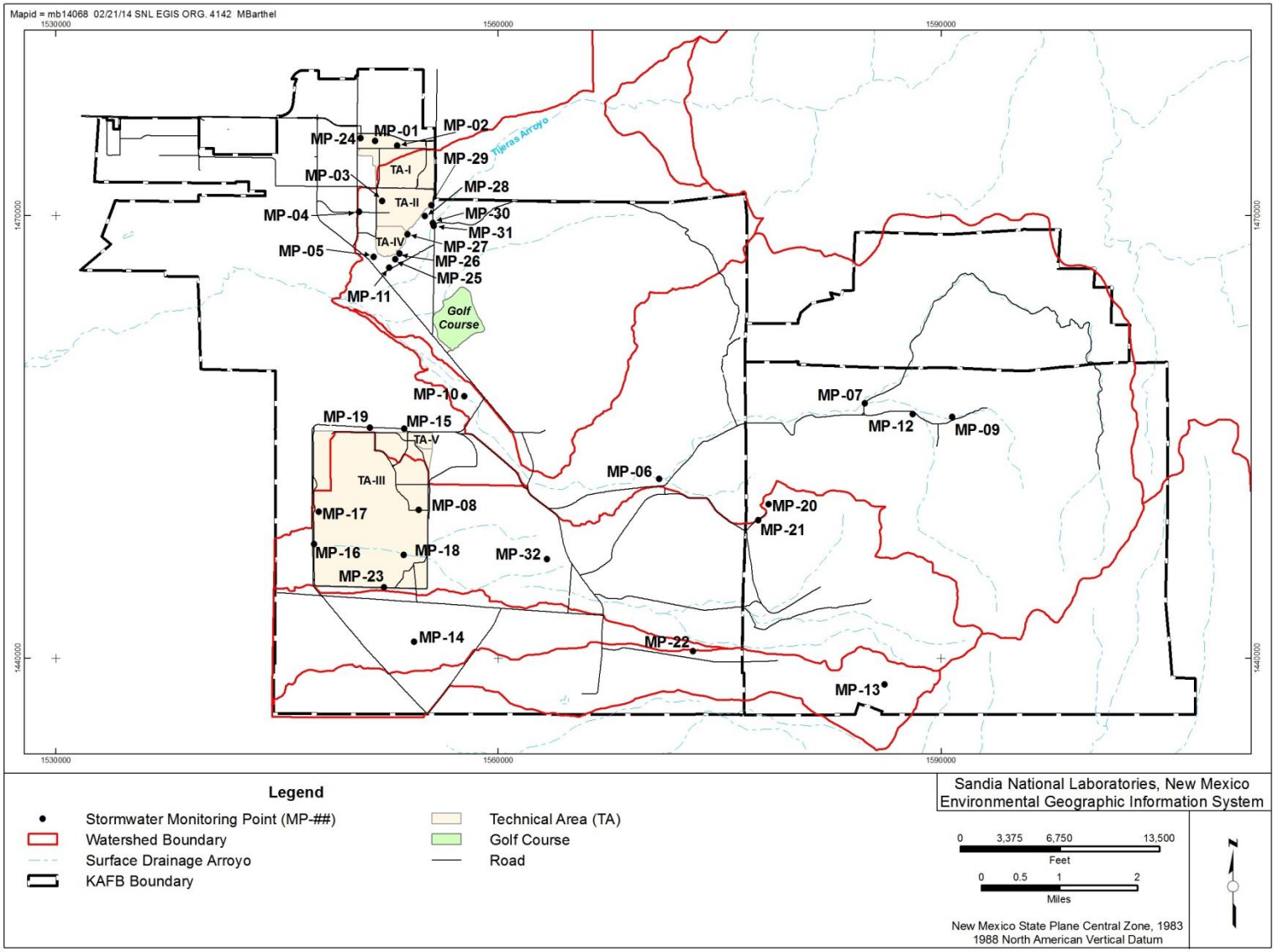


FIGURE 6-2. Stormwater Monitoring Point Locations at SNL/NM

TABLE 6-3. SNL/NM Facilities Subject to Stormwater Permitting
(These facilities are in areas where stormwater can potentially drain to Tijeras Arroyo)

Description of SIC Code*	Potential Pollutants and Impacts	Applicable SNL/NM Facilities**	MSGP Sector
NPDES Multi-Sector Stormwater Permit			
Scrap and Waste Recycling	- Various solid objects with potential residual surface contamination	- Reapplication and Storage Yard - Solid Waste Transfer Station	N
Hazardous Waste Treatment, Storage, or Disposal Facilities	- Regulated hazardous chemical and radioactive waste	- HWHF - Manzano Storage Complex - RMWMF - CWL - TTF - AHCF - CAMU - SWMUs (including those in Lurance and Madera Canyons)	K
Electronic and Electrical Equipment Manufacturing	- Raw chemical storage such as acid and sodium hydroxide - Electroplating processes	- 858 Complex - AMPL - CINT - NGF	AC
Sand and Gravel Mining	- Crushed concrete and asphalt	- TA-III Borrow Pit	N, J-1
Landfills	- Non- Hazardous Waste	- Classified Waste Landfill	L
Short-Term Construction Permits			
Construction Permits – 2013	- Building material pollutants - Disturbed soil	- Mixed Waste Landfill Cover - 4160 Volt Feeder - DETS North - Building 704 - DETS Thunder Range - TA-II Escarpment - National Solar Thermal Test - TCR Phase II - TA-II Corporate Storage Building - P Avenue Improvements - Telecommunications Cable Installation to Building 9972	

NOTES: *The EPA requires a NPDES Stormwater Permit for all industrial facilities that have processes defined in the SIC codes listed in Appendix A of 40 CFR 122.
**Applicable facilities are monitored under the expanded Stormwater Program, which was in effect in October 2001. The expanded program is documented in the SWPPP (SNL/NM February 2012).
AHCF = Auxiliary Hot Cell Facility
AMPL = Advanced Manufacturing Process Laboratory
CAMU = Corrective Action Management Unit
CFR = Code of Federal Regulations
CINT = Center for Integrated Nano Technology
CWL = Chemical Waste Landfill
DETS = Dynamic Explosive Test Sites
EPA = U.S. Environmental Protection Agency
HWHF = Hazardous Waste Handling Facility
MSGP = Multi-Sector General Permit
NGF = Neutron Generation Facility
NPDES = National Pollutant Discharge Elimination System
RMWMF = Radioactive and Mixed Waste Management Facility
SIC = Standard Industrial Classification
SNL/NM = Sandia National Laboratories, New Mexico
SWMU = Solid Waste Management Unit
SWPPP = Stormwater Pollution Prevention Plan
TA = Technical Area
TCR = Test Capabilities Revitalization
TTF = Thermal Treatment Facility

In 2011, Sandia, which operates an MS4, was notified by the EPA that SNL/NM would be included in the urbanized area and would participate in a watershed pilot stormwater permit for the middle Rio Grande Valley. The new permit is expected to be issued by the EPA in 2014.

6.3.3 Stormwater Monitoring Points

Figure 6-2 illustrates the stormwater monitoring point (SWMP) locations. Using the locations of the MSGP sites, along with the watershed boundaries and flow patterns, the stormwater monitoring points were located at points that would best be suited to collect a representative sample of stormwater runoff. The locations identified were then checked in the field where slight adjustments were made. This understanding between the hydrologic connection between the watershed outfalls, drainage patterns and locations of MSGP sites allowed for the selection of the monitoring points where representative samples could be collected.

6.3.4 Routine Inspections and Monitoring

All routine MSGP inspection results are attached to the SWPPP. Routine inspections include the following:

- Monitoring station inspections are conducted monthly during the monitoring season to ensure that samplers and other equipment are functioning properly. The current monitoring season runs from July through October each calendar year. The monitoring season was selected based on historical meteorological data that show that these months have the most precipitation. Precipitation is limited in the vicinity of SNL/NM, approximately 60 percent of the annual rainfall occurs in 4 months of the year during the July/August monsoon season and into the early fall. It is during these 4 months from July to October that there is a better chance of having a precipitation event that produces one quarter inch of rain or greater in a 24-hour period.

- 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 stormwater P2.

- Wet weather inspections (visual monitoring) are conducted quarterly during a storm event, if possible, but generally during the rainy season from July through October. Samples are collected and visually inspected for foaminess, clarity, and the presence of oil. 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 stormwater 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 stormwater system are conducted. After the inspections have been completed, a report is generated indicating the extent of the inspections within the NPDES permit. Any inconsistency between the SWPPP and conditions at the facilities is noted in the report. If changes to the SWPPP 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.

Laboratory results received since September 28, 2010 from rainfall runoff collected at SWMP-11 (SWMU 46) have exceeded benchmark values for cadmium, silver, and cyanide. After a field investigation, it was determined that controls were needed to minimize on-site erosion and sediment transport in the drainage area to SWMP-11. Erosion and sediment controls were installed at SWMP-11 in 2010. The controls were evaluated by continued sampling of stormwater runoff and comparing these results to benchmark values. Heavy rainfall in 2013 impacted controls and resulted in increased runoff. Current BMPs are being reevaluated and a National Environmental Policy Act (NEPA) checklist is in development to address the increase in amount and intensity of rainfall and target source areas, in addition to sample collection locations.

Quarterly monitoring is the only analytical monitoring required at SNL/NM under the 2008 MSGP. Annual effluent limitation monitoring; State monitoring; and impaired monitoring are not currently required.

An alternative to quarterly monitoring is allowed under the MSGP due to irregular stormwater runoff associated with the semi-arid climate in New Mexico and is shown below:

- Period 1: July
- Period 2: August
- Period 3: September
- Period 4: October

Table 6-4 shows the parameters to be sampled for each industry sector except Sector AC, which does not have monitoring under the 2008 MSGP.

TABLE 6-4. MSGP Stormwater Monitoring Requirements During Calendar Year 2013

Pollutant	MSGP Sector/Section	Benchmark Value (mg/L)
Total Recoverable Arsenic	K	0.15
Total Recoverable Cadmium	K	0.0029
Total Cyanide	K	0.022
Total Recoverable Lead	N, K, AA	0.122
Total Recoverable Mercury	K	0.0014
Total Recoverable Magnesium	K	0.064
Total Recoverable Selenium	K	0.005
Total Recoverable Silver	K	0.0065
Total Recoverable Aluminum	AA, N	0.75
Total Recoverable Copper	N	0.0189
Total Recoverable Iron	AA, N	1.0
Total Recoverable Zinc	AA, N	0.16
Chemical Oxygen Demand	K, N	120
Ammonia	K	2.14
Nitrate plus Nitrite (as Nitrogen)	AA, J	0.68
Total Suspended Solids	L, N, J	100

NOTES: mg/L = milligram per liter
MSGP = Multi-Sector General Permit

After collection of four samples, if the average of the four monitoring values for any parameter does not exceed the benchmark, then the sampling requirements for that parameter have been fulfilled for the permit term. If the average of the four values exceeds the benchmark, then selection, installation, and implementation of the control measures must be reviewed to determine if modification(s) are necessary.

If it is determined that the average concentration exceeds benchmark value(s) is due solely to the presence of that pollutant in the natural background, corrective action or additional monitoring is not required provided that:

- The average concentration of the benchmark monitoring results is less than or equal to the concentration of the pollutant in the natural background,
- The supporting rational and any data, literature studies that describe the levels of natural background pollutants in the stormwater discharge is documented and maintained with the SWPPP, and
- EPA is notified on the final quarterly benchmark monitoring report that the benchmark exceedances are attributable solely to natural background pollutant levels.

After a rainfall of sufficient intensity and duration (as defined in the regulation), stormwater 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.

6.3.5 Activities in 2013

Quarterly visual observations and analytical sampling was conducted in 2013. All MSGP monitoring data collected must be submitted to the EPA no later than 30 days after receiving the complete laboratory results for all monitored outfalls for the reporting period (Section 6.3.3). The monitoring data as submitted to the EPA, along with the environmental surveillance sampling results, can be found in Appendix E of this report.

In July, there were exceedances at six monitoring points above benchmark levels. In September, there were exceedances at three monitoring points above benchmark levels. The exceedences included chemical oxygen demand, lead, silver, cadmium, cyanide, magnesium, and zinc. Soil concentrations for certain constituents indicated exceedences due to natural background at SNL/NM, other exceedences are being reviewed as part of the selection, design, installation, and implementation of stormwater control measures and improvements.

Visual observations of stormwater were performed when there was adequate runoff to collect a sample. The majority of the visual observations of stormwater quality were done in the summer months and these assessments did not produce any indications of stormwater pollution except for sediment in samples taken in arroyos and road-side ditches.

6.4 Oil Storage and Spill Control

The oil storage capacity at SNL/NM is 1.8 million gal in 47 aboveground storage tanks (ASTs) and three underground storage tanks (USTs). 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. Three USTs are currently operating at SNL/NM. Two 20,000-gal fiberglass USTs at SNL/NM and one 10,000-gal UST are registered with NMED. Forty-seven 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. Eight ASTs at SNL/NM are registered with NMED.

A Spill Prevention Control and Countermeasures (SPCC) Plan is required under the CWA. SNL/NM's SPCC Plan was revised in 2011 to incorporate changes to 40 Code of Federal Regulations (CFR) 112 and 20.5 NMAC. The focus of these 40 CFR 112 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. 20.5 NMAC regulations are to reduce, mitigate, and eliminate the threats to the environment posed by petroleum products released from storage tanks.

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 those facilities with the following types of oil-containing equipment:

- ASTs (e.g. tanks, transformers),
- USTs,
- Transfer facilities,
- Container storage areas,
- Portable equipment

Table 8-1 lists the permit numbers for those tanks that are registered with NMED. SNL/NM's State of New Mexico Owner identification number is 14109.



Chapter 7
Quality Assurance

Sandia Corporation (Sandia) deploys responsibility and accountability for implementing quality assurance (QA) for all its operations. Compliance with the Contractor Requirements Document of U.S. Department of Energy (DOE) Order 414.1D, Quality Assurance (DOE 2011c), is ensured via policy statements, processes, and procedures; and executing the actions specified in those processes and procedures. Sandia management is responsible for ensuring the quality of its products and for assessing its operations, programs, projects, and business systems; and identifying deficiencies and effecting continuous improvements.

7.1 Environmental Monitoring QA

Environmental monitoring (includes sampling) is conducted in accordance with program-specific sampling and analysis plans (SAP) or work plans, which contain applicable QA elements. These documents meet appropriate federal, state, and local regulatory guidelines for conducting sampling and analysis activities. 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 are carried out in accordance with DOE Directives.

Project SAPs include critical elements, such as procedures for sample collection, sample preservation and handling, sample control, references to analytical methods and analyte lists, laboratory quality control (QC) and procedures, required limits of detection, known potential matrix interferences, field QC, health and safety, schedules and frequency of sampling, data review, data acceptability, and reporting.

7.1.1 Sample Management Office (SMO)

Environmental samples are packaged, shipped, and tracked to off-site (contracted) laboratories by the Sample Management Office (SMO). Some samples are processed and analyzed for radiological constituents by the Sandia National Laboratories, New Mexico (SNL/NM) Radiation Protection Sample Diagnostics (RPSD) laboratory in accordance with RPSD procedures. SMO personnel are responsible for QA and QC once the samples are relinquished to the SMO by field team members.

SMO personnel provide 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.

7.1.2 Selection of a Contract Laboratory

All off-site contract laboratories are selected based on performance objectives, licenses and accreditations, and appraisals (pre-award assessments) as described in the *Quality Assurance Project Plan (QAPP) for the SMO* (SNL/NM April 2010). 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; SNL/NM May 2011a). All calibrations and detection limits must be verified before sample analysis and data reporting. Once a laboratory has passed 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.

SMO contract laboratories perform work in compliance with the Sandia SOW for Analytical Laboratories (SNL/NM January 2013). 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. 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.

7.1.3 Quality Control for Samples

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, some of which are unavoidable, that can be introduced into the sampling process include potential sample contamination in the field or during the transportation of samples. Additionally, sample results can be affected by the variability present at each sample location.

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.

Thermoluminescent dosimeters used to measure gamma radiation are owned, issued, and processed by the Radiation Protection Dosimetry Program (RPDP) at SNL/NM. The technical basis for the environmental dosimeter monitoring program is provided in *Description and Procedures of the Environmental Radiation Dosimetry Program* (SNL/NM 1987). Dosimeters are issued and processed quarterly following established protocols and QA/QC requirements specified in the RPDP operating procedures and the RPDP Quality Plan (SNL January 2010b). Automated dosimeter processing equipment is used to

process environmental dosimeters. Data reduction and dose calculations are performed by the RPDP external dosimetry technical staff.

7.1.4 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, 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, who is responsible for program objectives, regulatory compliance, and project-specific data quality requirements. The project leader makes the final decision regarding the usability and reporting of the data.

Additionally, all groundwater monitoring data, site wide confirmatory data, radioactive mixed waste characterization data and a specified percentage of other program data are validated to detailed method-specified requirements.

7.2 2013 Sample Management Office Activities

SMO activities in 2013 included sample packaging, shipping, and tracking to off-site (contracted) laboratories, and reviewing all data deliverables for compliance with contract and data quality requirements.

7.2.1 Sample Handling and Analyses

In 2013, the SMO processed a total of 4,123 samples in support of Sandia programs and projects, including:

- Air Quality Compliance,
- Water Quality,
- Terrestrial Surveillance,
- Long-Term Stewardship,
- Environmental Restoration Operations,
- Waste management, and
- Decontamination and Demolition.

Of these, 3,838 were for the first five programs and projects listed above. A total of 1,112 samples were submitted as field and analytical QC samples to assist with data validation and decision making.

During 2013, Sandia employed the following contract laboratories to perform analysis of SNL/NM samples:

- General Engineering Laboratories (GEL) in Charleston, South Carolina;
- Test America Inc. in St. Louis, Missouri; Costa Mesa, California; Austin, Texas; West Sacramento, California;
- Southwest Research Institute (SWRI) in San Antonio, Texas;
- Hall Environmental Analysis Laboratory in Albuquerque, New Mexico;
- State of New Mexico Department of Health in Albuquerque, New Mexico; and
- Cape Fear Analytical in Wilmington, North Carolina.

7.2.2 Laboratory QA Assessments and Validation

In 2013, the SMO personnel continued independent, on-site assessments and validation at the NELAC approved laboratories used by Sandia. Specific checks for documentation completeness, proper equipment calibration, proper laboratory practices, and batch QC data are made. These assessments focus on data defensibility and regulatory compliance requirements specific to SNL/NM work.

7.2.3 QA Audits

The DOE Consolidated Audit Program (DOECAP) conducted audits in 2013 at the primary SMO contract laboratories using DOECAP Quality Systems Analytical Services 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.

No findings for SNL/NM samples were issued in 2013 in either the DOECAP audit or the MAPEP audit.



Chapter 8
References, Permits, Regulations and Standards for Environmental Programs

ACGIH, see American Conference of Governmental Industrial Hygienist.

American Conference of Governmental Industrial Hygienist (ACGIH), January 2011. "2011 TLVs and BEIs Substance and Agents Listing," accessed through *https://www.acgih.org/resources/press/TLV2011list.htm*.

Bearzi, J.P. (New Mexico Environment Department), December 2008. Letter to K. Davis (U.S. Department of Energy) and F. Nimick (Sandia Corporation), "Conditional Approval, Mixed Waste Landfill Corrective Measures Implementation Plan, November 2005, Sandia National Laboratories, EPA ID No. NM5890110518, SNL-05-025," December 22, 2008.

Bearzi, J.P. (New Mexico Environment Department), July 2009. Letter to K. Davis (U.S. Department of Energy) and F. Nimick (Sandia Corporation), "Approval: Chemical Waste Landfill Evapotranspirative [ET] Cover Plan, June 2009, Sandia National Laboratories, EPA ID No. NM5890110518, HWB-SNL-09-010," July 31, 2009.

Bearzi, J.P. (New Mexico Environment Department), April 2010. Letter to K. (U.S. Department of Energy, National Nuclear Security Administration [NNSA]) and M. Walck (Sandia Corporation), "Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and Five Other SWMUs/AOCs (Request of January 7, 2008), Sandia National Laboratories, EPA ID No. NM5890110518 HWB-SNL-06-007 and HWM-SNL-08-001," April 8, 2010.

Bearzi, J.P. (New Mexico Environment Department), May 2011. Letter to P. Wagner (U.S. Department of Energy NNSA/Sandia Site Office) and S.A. Orrell (Sandia National Laboratories/New Mexico), "Notice of Disapproval, Mixed Waste Landfill Corrective Measures Implementation Report, January 2010, Sandia National Laboratories, EPA ID No. NM5890110518, SNL-10-005," May 20, 2011.

Bearzi, J.P. (New Mexico Environment Department), October 2011. Letter to P. Wagner (U.S. Department of Energy NNSA/Sandia Site Office) and S.A. Orrell (Sandia National Laboratories/New Mexico), "Notice of Approval, Mixed Waste Landfill Corrective Measures Implementation Report, January 2010, Sandia National Laboratories, EPA ID No. NM5890110518, SNL-10-005," October 14, 2011.

Beausoleil, G.L. (U.S. Department of Energy National Security Administration [NNSA]/Sandia Field Office), January 2013. Letter to J. Keiling (New Mexico Environment Department), "Submittal of Updated Reference Document Cited in the Chemical Waste Landfill Post Closure Care Permit for the Department of Energy National Nuclear Security Administration/Sandia Site Office and Sandia National Laboratories/New Mexico, EPA ID No. NM5890110518," January 24, 2013.

Bleakly, D. (Sandia National Laboratories/New Mexico), July 1996. Memorandum, "List of Non-ER Septic/Drain Systems for the Sites Identified Through the Septic System Inventory Program," July 8, 1996.

Census, see U.S. Census Bureau.

Davis, K. (U.S. Department of Energy), November 2008. Letter to J. Bearzi (New Mexico Environment Department), "Submitting responses to the New Mexico Environment Department Notice of Disapproval on the Mixed Waste Landfill Corrective Measures Implementation Plan dated October 10, 2008," November 26, 2008.

Davis, K. (U.S. Department of Energy), February 2009. Letter to J. Bearzi (New Mexico Environment Department), "Submitting requested changes in the form of replacement pages in response to the Mixed Waste Landfill Conditional Approval letter from the New Mexico Environment Department dated December 22, 2008," February 12, 2009.

Davis, J.H. (New Mexico Environment Department), July 2012. Letter to G. Beausoleil (U.S. Department of Energy NNSA) and S.A. Orrell (Sandia National Laboratories), "March 2006 Petition for Corrective Action Complete, SWMUs 233 and 234 and AOC 1115, Sandia National Laboratories, EPA ID No. NM5890110518 HWB-SNL-06-007," July 27, 2012.

DOE, see U.S. Department of Energy.

DOE/AL, see U.S. Department of Energy/Albuquerque Operations Office.

DOE/SNL, see U.S. Department of Energy/Sandia National Laboratories.

Dinwiddie, R.S. (State of New Mexico Environment Department), September 1997. Letter to M.J. Zamorski (U.S. Department of Energy, Kirtland Area Office), "Request for Supplemental Information: Background Concentrations Report, SNL/KAFB," September 24, 1997.

Dragun, J. and K. Chekiri, 2005. *Elements in North American Soils*. The Association for Environmental Health and Sciences, Amherst, MA, 2005.

EPA, see U.S. Environmental Protection Agency.

Grant, P.R., Jr., 1982. "Geothermal Potential in the Albuquerque Area, New Mexico," in *Guidebook-New Mexico Geological Society*, Volume 33, pp. 325-331, New Mexico Geological Society, Albuquerque, New Mexico, 1982.

ISO, see International Organization for Standardization.

International Organization for Standardization (ISO), 2004. "Environmental Management Systems - Requirements with Guidance (ISO 14001)," International Organization for Standardization, Geneva, Switzerland, 2004.

International Organization for Standardization (ISO), 2008. "Quality Management Systems - Requirements (ISO 9001)," International Organization for Standardization, Geneva, Switzerland, 2008.

Kabata-Pendias, A., 2000. *Trace Elements in Soils and Plants*, 3rd. Ed. CRC Press, Inc., Boca Raton, FL, 2000.

KAFB, see Kirtland Air Force Base.

Kelley, V. C., 1977. *Geology of Albuquerque Basin, New Mexico*, Memoir 33. New Mexico Bureau of Mines and Mineral Resources, Socorro, New Mexico, 1977.

Kieling, J.E. (New Mexico Environment Department), June 2011. Letter to P. Wagner (U.S. Department of Energy NNSA/Sandia Site Office) and S.A. Orrell (Sandia National Laboratories/New Mexico), "Notice of Approval, Closure of Chemical Waste Landfill and Post-Closure Care Permit in Effect, Sandia National Laboratories, EPA ID No. NM5890110518, HWB-SNL-10-013," June 2, 2011.

Kieling, J.E. (New Mexico Environment Department), December 2011. Letter to P. Wagner (U.S. Department of Energy NNSA/Sandia Site Office) and S.A. Orrell (Sandia National Laboratories/New Mexico), "Withdrawal of Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan, Sandia National Laboratories, EPA ID No. NM5890110518, HWB-SNL-07-017," December 21, 2011.

Kieling, J.E. (New Mexico Environment Department), October 2012. Letter to G. Beausoleil (U.S. Department of Energy) and P. Davies (Sandia National Laboratories/New Mexico), RE: Solid Waste Management Unit 52, Sandia National Laboratories, EPA ID No. NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001, October 2012.

Kieling, J.E. (New Mexico Environment Department), November 2013a. Letter to G. Beausoleil (U.S. Department of Energy) and P. Davies (Sandia National Laboratories/New Mexico), "Submitting the Notice of Approval: Solid Waste Management Unit (SWMU) 52: Filling Tanks 2 and 4 with a Permanent Insoluble Material, September 2013, Sandia National Laboratories, EPA ID No. NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001," November 12, 2013.

Kieling, J.E. (New Mexico Environment Department), November 2013b. Letter to G. Beausoleil (U.S. Department of Energy) and P. Davies (Sandia National Laboratories/New Mexico), "Approval, Request for Modification to Hazardous Waste Post-Closure Care Permit for the Chemical Waste Landfill at Sandia National Laboratories, February 2013, Sandia National Laboratories, EPA ID No. NM5890110518, HWB-SNL-12-015," November 7, 2013.

Kirtland Air Force Base (KAFB), November 2012. *Integrated Natural Resources Management Plan, Kirtland, Air Force Base, New Mexico,* Prepared October 2012 by the 377th CES/CEANQ for the 377th Air Base Wing, Albuquerque, New Mexico, signed November 2012.

Lozinsky, R., and R.H. Tedford, 1991. *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, New Mexico, 1991.

Melissa Data, 2014. *50.0 mile radius around ZIP Code 87123*, accessed through *http://www.melissadata.com/Lookups/zipradius.asp?zipcode=87123&radius=50&submit=Submit.*

Moats, W.P. (New Mexico Environment Department), December 2003. 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 No. NM5890110518, HWB SNL-03-012," December 16, 2003.

NCRP, see National Council on Radiation Protection and Measurements.

National Council on Radiation Protection and Measurements (NCRP), 2009. *Ionizing Radiation Exposure of the Population of the United States*, NCRP Report 160. National Council on Radiation Protection and Measurements, Bethesda, MD, 2009.

New Mexico Department of Agriculture (NMDOA), 2013. website at *http://nmdaweb.nmsu.edu/2013*.

New Mexico Environment Department (NMED), October 1995. "Federal Facilities Compliance Order," New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico, amended on December 22, 2010 by the NMED (Amendment No. 5).

New Mexico Environment Department (NMED), April 2004. "Compliance Order on Consent, Pursuant to the New Mexico Hazardous Waste Act § 74 4 10," New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico, April 29, 2004.

New Mexico Environment Department (NMED), May 2005. "Final Order, State of New Mexico Before the Secretary of the Environment in the Matter of Request for a Class 3 Permit Modification for Corrective Measures for the Mixed Waste Landfill, Sandia National Laboratories, Bernalillo County, New Mexico, EPA ID No. 5890110518." New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico, May 26, 2005.

New Mexico Environment Department (NMED), October 2009. "Resource Conservation and Recovery Act, Post Closure Care Permit (as amended), EPA ID No. NM5890110518, to the U.S. Department of Energy/Sandia Corporation, for the Sandia National Laboratories Chemical Waste Landfill," New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico, October 15, 2009.

New Mexico Environment Department (NMED), February 2012. *Risk Assessment Guidance for Site Investigations and Remediation*. New Mexico Environment Department, Hazardous Waste Bureau and the Ground Water Quality Bureau Voluntary Remediation Program, Santa Fe, New Mexico, Table A-1 Updated June 2012.

NMDOA, New Mexico Department of Agriculture

NMED, see New Mexico Environment Department.

NWS, see U.S. National Weather Service.

Sandia National Laboratories, New Mexico (SNL/NM), 1987. *Description and Procedures of the Environmental Radiation Dosimetry Program*, SAND Report SAND87-1916, Sandia National Laboratories, Albuquerque, New Mexico

Sandia National Laboratories, New Mexico (SNL/NM), 1995. "Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report," Sandia National Laboratories, Albuquerque, New Mexico, 1995.

Sandia National Laboratories, New Mexico (SNL/NM),, September 2002. *Report of the Mixed Waste Landfill Phase 2 RCRA Facility Investigation, Sandia National Laboratories, Albuquerque, New Mexico*, SAND Report SAND2002-2997, Sandia National Laboratories, Albuquerque, New Mexico, September 2002.

Sandia National Laboratories, New Mexico (SNL/NM), October 2002. "Closure Plan for the Corrective Action Management Unit, Technical Area III," Sandia National Laboratories, Albuquerque, New Mexico, October 2002.

Sandia National Laboratories, New Mexico (SNL/NM), December 2002. *Mixed Waste Landfill Groundwater Report, 1990 through 2001, Sandia National Laboratories, Albuquerque, New Mexico*, SAND Report SAND2002-4098, Sandia National Laboratories, Albuquerque, New Mexico, December 2002.

Sandia National Laboratories, New Mexico (SNL/NM), April 2003. "Final Chemical Waste Landfill – Landfill Excavation Voluntary Corrective Measure Report," Sandia National Laboratories, Albuquerque, New Mexico, April 2003.

Sandia National Laboratories, New Mexico (SNL/NM), May 2003. "Mixed Waste Landfill Corrective Measures Study," Sandia National Laboratories, Albuquerque, New Mexico, May 21, 2003.

Sandia National Laboratories, New Mexico (SNL/NM), December 2003. "Resource Conservation and Recovery Act Closure Report for the Corrective Action Management Unit, Technical Area III," Sandia National Laboratories, Albuquerque, New Mexico, December 2003.

Sandia National Laboratories, New Mexico (SNL/NM), December 2004. "Chemical Waste Landfill Corrective Measures Study Report," Sandia National Laboratories, Albuquerque, New Mexico, December 2004.

Sandia National Laboratories, New Mexico (SNL/NM), August 2005. "Chemical Waste Landfill Site Operational Boundary Closure Addendum to the Landfill Excavation Voluntary Corrective Measure Final Report (approved by NMED in October 2005)," Sandia National Laboratories, Albuquerque, New Mexico, August 2005.

Sandia National Laboratories, New Mexico (SNL/NM), September 2005. "Post-Closure Plan for the Chemical Waste Landfill, Technical Area III," Sandia National Laboratories, Albuquerque, New Mexico, September 2005.

Sandia National Laboratories, New Mexico (SNL/NM), November 2005. "Mixed Waste Landfill Corrective Measures Implementation Plan," Sandia National Laboratories, Albuquerque, New Mexico, November 2005.

Sandia National Laboratories, New Mexico (SNL/NM), March 2006. *Chemical Analyses of Soil Samples Collected from the Sandia National Laboratories, New Mexico Environs, 1993-2005*. SAND Report SAND2006-1468, Sandia National Laboratories, Albuquerque, New Mexico, March 2006.

Sandia National Laboratories, New Mexico (SNL/NM), October 2006. "Long-Range Development Plan." Sandia National Laboratories, Albuquerque, New Mexico, October 2006.

Sandia National Laboratories, New Mexico (SNL/NM), 2007. "Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan," Sandia National Laboratories, Albuquerque, New Mexico. 2007.

Sandia National Laboratories, New Mexico (SNL/NM), August 2008. "Investigation Report on the Soil-Vapor Volatile Organic Compounds, Tritium, and Radon Sampling at the Mixed Waste Landfill," Sandia National Laboratories, New Mexico. August 2008.

Sandia National Laboratories, New Mexico (SNL/NM), June 2009. "Chemical Waste Landfill Evapotranspirative Cover Plan," Sandia National Laboratories, Albuquerque, New Mexico, June 2009.

Sandia National Laboratories, New Mexico (SNL/NM), April 2010. "Quality Assurance Project Plan for the Sample Management Office, Revision 2," Sandia National Laboratories, Albuquerque, New Mexico, April 2010.

Sandia National Laboratories, New Mexico (SNL/NM), January 2010a. "Mixed Waste Landfill Corrective Measures Implementation Report, Revision 1," Sandia National Laboratories, Albuquerque, New Mexico, January 2010.

Sandia National Laboratories, New Mexico (SNL/NM), January 2010b. "Radiation Protection Dosimetry Program (RPDP) Quality Plan (RPDP-104), Revision 6," Sandia National Laboratories, Albuquerque, New Mexico, January 2010.

Sandia National Laboratories, New Mexico (SNL/NM), September 2010. "Chemical Waste Landfill Final Resource Conservation and Recovery Act (RCRA) Closure Report," Sandia National Laboratories, Albuquerque, New Mexico, September 2010.

Sandia National Laboratories, New Mexico (SNL/NM), May 2011a. "Statement of Work for Analytical Laboratories, Revision 5," Sandia National Laboratories/New Mexico (SNL/NM). Sandia National Laboratories, Albuquerque, New Mexico, May 2011.

Sandia National Laboratories, New Mexico (SNL/NM), May 2011b. "Data Validation Procedure for Chemical and Radiochemical Data," Administrative Operating Procedure (AOP) 00-03, Revision 3. Sample Management Office, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories, New Mexico (SNL/NM), February 2012. *Storm Water Pollution Prevention Plan (SWPPP)*, PLA97-06, Revision 6, Sandia National Laboratories, Albuquerque, New Mexico, February 2012.

Sandia National Laboratories, New Mexico (SNL/NM), March 2012. "Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan," Sandia National Laboratories, Albuquerque, New Mexico, March 2012.

Sandia National Laboratories, New Mexico (SNL/NM), May 2012. "Submittal of a Long-Term Monitoring and Maintenance Plan for Solid Waste Management Units and Technical and Administrative Corrections and Updates to Comprehensive Part B Permit Request for Sandia National Laboratories/New Mexico, EPA ID No. NM5890110518," Albuquerque, New Mexico, May 2012.

Sandia National Laboratories, New Mexico (SNL/NM), June 2012. *Annual Groundwater Monitoring Report, Calendar Year 2011*, SAND Report SAND2012-4311P, Sandia National Laboratories, Albuquerque, New Mexico, June 2012.

Sandia National Laboratories, New Mexico (SNL/NM), January 2013. "Sandia National Laboratories/New Mexico Statement of Work for Analytical Laboratories, Revision 6," Sandia National Laboratories, Albuquerque, New Mexico, January 2013.

Sandia National Laboratories, New Mexico (SNL/NM), March 2013. "Site Treatment Plan for Mixed Waste, Fiscal Year 2012 Update," Sandia National Laboratories, Albuquerque, New Mexico, March 2013.

Sandia National Laboratories, New Mexico (SNL/NM), June 2013. *Annual Groundwater Monitoring Report, Calendar Year 2012*, SAND Report SAND2013-4700P, Sandia National Laboratories, Albuquerque, New Mexico, June 2013.

Sandia National Laboratories, New Mexico (SNL/NM), September 2013a. "Solid Waste Management Unit (SWMU) 52: Filling Tanks 2 and 4 with a Permanent Insoluble Material Report," Sandia National Laboratories, Albuquerque, New Mexico, September 2013.

Sandia National Laboratories, New Mexico (SNL/NM), September 2013b. "Corrective Action Management Unit Vadose Zone Monitoring System Annual Monitoring Results Report," Sandia National Laboratories, Albuquerque, New Mexico, September 2013.

Sandia National Laboratories, New Mexico (SNL/NM), October 2013. "Investigation Report for Voluntary Corrective Action at Solid Waste Management Unit 502 Building 9938 Surface Discharge Site," Sandia National Laboratories, Albuquerque, New Mexico, October 2013.

Sandia National Laboratories, New Mexico (SNL/NM), December 2013. *Fiscal Year 2014 Site Sustainability Plan,* Sandia National Laboratories, Albuquerque, New Mexico, December 2013.

Sandia National Laboratories, New Mexico (SNL/NM), January 2014. "Work Plan for the Installation of Three Soil-Vapor Monitoring Wells (MWL-SV03, MWL-SV04, and MWL-SV05) at the Mixed Waste Landfill," Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories, New Mexico (SNL/NM), March 2014a. *Chemical Inventory Report, Calendar Year 2013*. Sandia National Laboratories, Albuquerque, New Mexico, March 2014.

Sandia National Laboratories, New Mexico (SNL/NM), March 2014b. "Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2013," Sandia National Laboratories, Albuquerque, New Mexico, March 2014.

Sandia National Laboratories, New Mexico (SNL/NM), June 2014a. *Calendar Year 2013 Annual Groundwater Monitoring Report*, SAND Report SAND2014-15438R, Sandia National Laboratories, Albuquerque, New Mexico, July 2014.

Sandia National Laboratories, New Mexico (SNL/NM), June 2014b. "NESHAP Annual Report for Calendar Year 2013," Sandia National Laboratories, New Mexico, Sandia National Laboratories, Albuquerque, New Mexico, June 2014.

Shyr, L., H. Herrera, R. Haaker, March 1998. *The Role of Data Analysis in Sampling Design of Environmental Monitoring*, SAND Report SAND98-0612. Sandia National Laboratories, Albuquerque, New Mexico, March 1998.

SNL/NM, see Sandia National Laboratories, New Mexico.

Thorn, C.R., D. P. McAda, and J.M. Kernodle, 1993. *Geohydrologic Framework and Hydrologic Conditions in the Albuquerque Basin, Central New Mexico*, Water Resources Investigation Report 93-4149. U.S. Geological Survey, Albuquerque, New Mexico, 1993.

USACE, see U.S. Army Corps of Engineers.

U.S. Army Corps of Engineers (USACE), 1979. *Special Flood Hazard Information, Tijeras Arroyo and Arroyo del Coyote, Kirtland AFB, New Mexico,* U.S. Army Corps of Engineers Albuquerque District, Albuquerque, New Mexico, 1979.

U.S. Census Bureau (Census), March 2004. *2005 Interim State Population Projections, Table 1: Interim Projections: Ranking of Census 2000 and Projected 2030 State Population and Change: 2000 to 2030*, accessed through *http://www.census.gov/population/projections/data/state/projectionsagesex.html.* March 2004.

U.S. Census Bureau (Census), May 2013. *Annual Estimates of the Resident Population for Incorporated Places Over 50,000, Ranked by July 1, 2012 Population: April 1, 2010 to July 1, 2012 - United States -- Places Over 50,000 Population*, accessed through *http://www.census.gov/popest/data/cities/totals/2012/index.html.*

U.S. Census Bureau (Census), December 2013. *National, State, and Puerto Rico Commonwealth Totals Datasets: Population change: April 1, 2010 to July 1, 2013*, accessed through *http://www.census.gov/popest/data/national/totals/2013/NST-EST2013-popchg2010-2013.html.*

U.S. Department of Energy (DOE), October 1999. *Final Site-Wide Environmental Impact Statement for Sandia National Laboratories/New Mexico,* DOE/EIS-0281. U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico, Record of Decision (ROD) on December 6, 1999.

U.S. Department of Energy (DOE), 2001. DOE Order 435.1, Change 1 (See DOE Orders Section).

U.S. Department of Energy (DOE), 2002. *Title V Operating Permit Application No. 515* (2002 update; Volume 1 for Sandia National Laboratories). DOE/Sandia Site Office, Albuquerque, New Mexico (2002).

U.S. Department of Energy (DOE), 2003. DOE Manual 231.1-2 (See DOE Orders Section).

U.S. Department of Energy (DOE), 2011a. DOE Order 232.2 (See DOE Orders section).

U.S. Department of Energy (DOE), 2011b. DOE Order 436.1 (See DOE Orders section).

U.S. Department of Energy (DOE), 2011c. DOE Order 414.1D (See DOE Orders section).

U.S. Department of Energy (DOE), 2011d. DOE Standard Derived Concentration Technical Standard, DOE-STD-1196-2011, U.S. Department of Energy, Washington, D.C., April 2011.

U.S. Department of Energy (DOE), 2012. DOE Order 231.1B (See DOE Orders section).

U.S. Department of Energy (DOE), 2013. DOE Order 458.1 (See DOE Orders section).

U.S. Department of Energy/Albuquerque Operations Office (DOE/AL), September 1987. *Comprehensive Environmental Assessment and Response Program (CEARP) Phase 1: Installation Assessment*, draft. DOE/Albuquerque Area Office, Environment, Safety and Health Division, Albuquerque, New Mexico, September 1987.

U.S. Department of Energy/Sandia National Laboratories (DOE/SNL), September 2006. *Environmental Restoration Long-Term Stewardship (LTS) Implementation Plan*. U.S. Department of Energy /Sandia Site Office and Sandia National Laboratories, Albuquerque, New Mexico, September 2006.

U.S. Environmental Protection Agency (EPA), 1985. *Hazardous Waste Management System; Final Codification Rule*. Federal Register, 50 FR 28702 (p. 28712), July 15, 1985.

U.S. Environmental Protection Agency (EPA), 1987. "Final RCRA Facility Assessment Report of Solid Waste Management Units at Sandia National Laboratories," prepared by A.T. Kearney, Inc. and Harding Lawson Associates under Contract No. 68-01-7038, Albuquerque, New Mexico, (April 1987).

U.S. Environmental Protection Agency (EPA), 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 No. NM5890110518," issued by U.S. Environmental Protection Agency Region VI on September 25, 1997.

U.S. Environmental Protection Agency (EPA), 2002. *Consolidated Emissions Reporting*, Federal Register, 67 FR 39602, June 10, 2002.

U.S. Environmental Protection Agency (EPA), February 2013. *Radiation Risk Assessment Software (CAP88-PC)*, Version 3.0. software accessed through *http://www.epa.gov/radiation/assessment/CAP88/index.html*.

U.S. National Weather Service (NWS), 2013. "Weather Highlights, Temperature and Precipitation: Albuquerque," Weather Forecast Office, Albuquerque, New Mexico, data accessed through *http://www.srh.noaa.gov/abq/?n=climonhigh2013annual-hydrodrought*, 2013.

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).

EO 13514 *Federal Leadership in Environmental, Energy, and Economic Performance* (October 2009).

DOE DIRECTIVES

DOE 2001 U.S. Department of Energy, *Radioactive Waste Management*, DOE Order 435.1, Change 1. U.S. Department of Energy, Washington, DC (August 2001).

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 2011a U.S. Department of Energy, *Occurrence Reporting and Processing of Operations Information*, DOE O 232.2. U.S. Department of Energy, Washington, DC (August 2011).

DOE 2011b U.S. Department of Energy, *Departmental Sustainability,* DOE Order 436.1, U.S. Department of Energy, Washington, DC (May 2011).

DOE 2011c U.S. Department of Energy, *Quality Assurance*, DOE Order 414.1D, U.S. Department of Energy, Washington, DC (April 2011).

DOE 2012 U.S. Department of Energy, *Environment, Safety and Health Reporting*, DOE Order 231.1B, Change 1. U.S. Department of Energy, Washington, DC (November 2012).

DOE 2013 U.S. Department of Energy, *Radiation Protection of the Public and the Environment*, DOE Order 458.1, Change 3. U.S. Department of Energy, Washington, DC (January 2013).

CODE OF FEDERAL REGULATIONS

10 CFR 830 *Nuclear Safety Management*

10 CFR 851 *Worker Safety and Health Program*

40 CFR 50 *National Primary and Secondary Ambient Air Quality Standards*

40 CFR 60 *Standards of Performance for New Stationary Sources*

40 CFR 61 N*ational 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 63 N*ational Emission Standards for Hazardous Air Pollutants for Source Categories*

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 265 *Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities*

40 CFR 268 *Land Disposal Restrictions*

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 370 *Hazardous Chemical Reporting: Community Right-To-Know*

40 CFR 372 *Toxic Chemical Release Reporting: Community Right-to-Know (EPCRA Implementing Regulation)*

FEDERAL 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.) (Amended by the Price-Anderson Act)
- Clean Air Act (CAA) 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.)
- Price-Anderson Amendments Act (PAAA) (42 U.S.C. §2282 et seq.) (see Atomic Energy Act)
- 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

20.11.2 NMAC, *Fees*
20.11.8 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
New Mexico Hazardous Waste Act (NMSA 1978, §74-4-1 et seq.)
20.4.1 NMAC, *Hazardous Waste Management*

Solid Waste Program
New Mexico Solid Waste Act (NMSA 1978, §74-9-1 et seq.)
20.9 NMAC, *Solid Waste Management*

This page intentionally left blank.

TABLE 8-1. Summary of Environmental Permits and Registrations in Effect During Calendar Year 2013

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	2/28/2013	2/28/2018	ABCWUA
General	WW006 Station Manhole, at Pennsylvania Avenue	2069 F	6/17/2010	3/31/2014	ABCWUA
Microelectronics Development Laboratory (MDL)	WW007 Station Manhole, TA-I	2069 G	5/5/2010	2/28/2015	ABCWUA
General	WW008 Station Manhole, south of TA-II at Tijeras Arroyo	2069 I	6/15/2010	8/31/2014	ABCWUA
General	WW011 Station Manhole, north of TA-III (includes TAs-III and V, and Coyote Test Field sewer lines)	2069 K	5/25/2010	10/31/2014	ABCWUA
Center for Integrated Nanotechnologies (CINT)	CINT	2238A	5/25/2011	4/30/2016	ABCWUA
SURFACE DISCHARGE					
Pulsed Power Development Facilities (Discharge Plan)	TA-IV, Lagoons I and II	DP-530	9/21/2007	9/21/2012 Renewal application submitted and deemed complete. Current permit remains in effect until permit is renewed by NMED.	NMED
UNDERGROUND STORAGE TANKS (UST)					
UST (10,000 gallons)	TA-I	2418	6/1/2013	6/1/2014	NMED
UST (20,000 gallons)	TA-I	2416	6/1/2013	6/1/2014	NMED
UST (20,000 gallons)	TA-I	2417	6/1/2013	6/1/2014	NMED
ABOVE GROUND STORAGE TANKS (AST)					
AST / 2,000	TA-I	1998	6/1/2013	6/1/2014	NMED
AST / 4,500	TA-IV	2001	6/1/2013	6/1/2014	NMED
AST / 5,000	TA-III	1999	6/1/2013	6/1/2014	NMED
AST / 5,500	CTF	2000	6/1/2013	6/1/2014	NMED
STORMWATER					
NPDES INDUSTRIAL PERMITS					
National Pollution Discharge Elimination System (NPDES) "Multi-sector General" Permit	Stormwater discharges from Industrial Activities at SNL/NM on KAFB	SNL/NM – NMR05GQ63 DOE/SFO – NMR05GP29	10/2009 11/2009	Active until new permit issued	EPA
National Pollution Discharge Elimination System (NPDES) "Multi-sector General" Permit	Stormwater discharges from Industrial Activities at the FAA/AANC/NDI Validation Center	SNL/NM – NMR05GL17 DOE/SFO – NMR05GH54	6/2009 6/2009	Active until new permit issued	EPA

See notes at end of table.

TABLE 8-1. Summary of Environmental Permits and Registrations in Effect During Calendar Year 2013 (Continued)

Permit Type and/or Facility Name	Location	Permit Number	Issue Date	Expiration Date	Regulatory Agency
NPDES CONSTRUCTION PERM					
4169 Volt Feeder	Coyote Test Field	SNL/NM - NMR12AQ28	12/24/2013	Active until terminated	EPA
Bldg. 704	TA-I	SNL/NM - NMR12A806	7/11/2012	Active until terminated	EPA
Bldg. 730	TA-I	SNL/NM - NMR12AG75	4/3/2013	Active until terminated	EPA
Dynamic Explosive Test Sites (DETS) Thunder Range	Thunder Range	SNL/NM - NMR12A228 DOE/SFO - NMR12A230	6/13/2012	Active until terminated	EPA
DETS North	Thunder Range	SNL/NM - NMR12A222 DOE/SFO - NMR12A224	6/13/2012	Active until terminated	EPA
Mixed Waste Landfill Cover	TA-III	SNL/NM - NMR12A183 DOE/SFO - NMR12A190	6/13/2012	Active until terminated	EPA
National Solar Thermal Test	Coyote Test Field	SNL/NM - NMR12AB09	10/16/2012	Active until terminated	EPA
P Avenue Improvements	TA-II	SNL/NM – NMR12A152 DOE/SFO – NMR12A827	6/28/2012	Terminated 6/21/2013	EPA
TA-II Corporate Storage Building	TA-II	SNL/NM - NMR12N91	10/23/2013	Active until terminated	EPA
TA-II Escarpment	TA-II	SNL/NM - NMR12A317	6/13/2012	Terminated 1-10-2013	EPA
Telecommunications Cable Installation to Building 9972	Coyote Test Field	SNL/NM - NM12AH77	4/30/2013	Active until terminated	EPA
Test Capabilities Revitalization (TCR) Phase II	TA-III	SNL/NM - NMR12A044	4/1/2010	Active until terminated	EPA
ECOLOGICAL					
NM Department of Game and Fish Authorization for Taking Protected Wildlife for Scientific/Educational Purposes	Site-Wide Ecological Monitoring	2931	3/12/2014	12/31/2016	NM Department of Game and Fish
NM Department of Game and Fish Nuisance Permit	Site-Wide Ecological Monitoring Activity	Nuisance Permit #119	3/29/2013	3/31/2014	NM Department of Game and Fish
Federal Fish and Wildlife Permit – Special Purpose, Relocate	Site-Wide Ecological Monitoring Activity	MB02872A-1	1/04/2013	3/31/2016	U.S. Fish and Wildlife Service
Federal Fish and Wildlife Permit – Special Purpose, Salvage	Site-Wide Ecological Monitoring Activity	MB02907A-0	4/01/2013	3/31/2016	U.S. Fish and Wildlife Service

See notes at end of table.

TABLE 8-1. Summary of Environmental Permits and Registrations in Effect During Calendar Year 2013 (Continued)

Permit Type and/or Facility Name	Location	Permit Number	Issue Date	Expiration Date	Regulatory Agency
RCRA					
Hazardous Waste Facility Permit Modules I – III	Hazardous Waste Management Facility	NM5890110518-1	8/6/1992	08/06/2002, remains in effect until permit is renewed	NMED
Module IV. Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA	Solid Waste Management Units and Areas of Concern	NM5890110518	8/26/1993	9/20/2002, remains in effect until permit is renewed	NMED
Hazardous Waste Treatment Facility Permit Modules I - III	Thermal Treatment Facility (TTF)	NM5890110518-2	12/4/1994	12/4/2004, remains in effect until permit is renewed	NMED
Class III Permit Modification for the Management of Hazardous Remediation Waste in the Corrective Action Management Unit (CAMU), Tech Area III	CAMU	NM5890110518	9/25/1997	9/20/2002, remains in effect until permit is renewed	NMED
RCRA Part A Permit Application for Hazardous Waste Management Units	Radioactive and Mixed Waste Management Facility (RMWMF); 5 Manzano Bunkers; Auxiliary Hot Cell Facility	NM5890110518	First submitted 8/1990; Rev. 5/4/2012	No expiration date	NMED
RCRA Post-Closure Care Permit for the Chemical Waste Landfill	CWL	NM5890110518	6/2/2011	6/2/2021	NMED
OPEN BURN PERMITS*					
Propellant Applications – Terminal Ballistics Facility	Bldg. 6750	13-0004	1/3/13	12/31/13	COA
Explosive Applications – Terminal Ballistics Facility	Bldg. 6750	13-0007	1/3/13	12/31/13	COA
Explosive Applications – Terminal Ballistics Facility	Bldg. 6750	13-0008	1/3/13	12/31/13	COA
Thermite Applications – Terminal Ballistics Facility	Bldg. 6750	13-0013	1/3/13	12/31/13	COA
Explosives Testing	Thunder Range	13-0009	1/3/13	12/31/13	COA
Thermal Treatment Facility	TTF*	13-0012	1/3/13	12/31/13	COA
Wood Crib	Burn Site	13-0011	1/3/13	12/31/13	COA
Air Transport Shipping Container Test	Burn Site	10-0056	2/1/13	2/28/13	COA
Air Transport Shipping Container Pre-Test	Burn Site	13-0017	1/10/13	1/31/13	COA
Explosives Testing	9920, 9930, and 9939 Test Sites	13-0014	1/3/13	12/31/13	COA
Explosives Testing	Bldg. 9920 Test Site	13-0003	1/3/13	12/31/13	COA
Carbon Fiber Epoxy Burn Tests	Burn Site / TTC	13-0016	1/3/13	12/31/13	COA
Explosives Testing	DETS	13-0005	1/3/13	12/31/13	COA
Igloo	Burn Site	13-0014	1/3/13	12/31/13	COA
IED and HME Explosives Testing and Training	Bldg. 9930 Test Site	13-0006	1/3/13	12/31/13	COA
Explosives Testing	Thunder Range	13-0015	1/3/13	12/31/13	COA

See notes at end of table.

TABLE 8-1. Summary of Environmental Permits and Registrations in Effect During Calendar Year 2013 (Continued)

Permit Type and/or Facility Name	Location	Permit Number	Issue Date	Expiration Date	Regulatory Agency
AIR (Permits and Registrations)					
Document Disintegrator	TA-III	Permit #144-M1	9/28/2006	N/A	COA
Neutron Generator Facility (NGF)	TA-I	Permit #374-M2	12/6/2010	N/A	COA
Standby diesel generators at Bldg 862	TA-I	Permit #402	5/07/1996	N/A	COA
RMWMF	TA-III	Permit #415-M2-RV1	9/23/2011	N/A	COA
Title V Operating Permit	Site-Wide	515 (pending)	Submitted 3/1/1996	N/A	COA
Explosives Components Facility	TA-II	Registration #547-RV1	9/27/2011	N/A	COA
Emergency Generator at Building 702	TA-I	Permit #924-RV1	2/8/2012	N/A	COA
Processing and Environmental Technology Laboratory (PETL) Emergency Generator	TA-I	Permit #925-M2	4/11/2012	N/A	COA
Advanced Manufacturing Prototype Facility (AMPF)	TA-I	Registration #1406-M1-RV1	10/4/2011	N/A	COA
Thermal Test Complex	TA-III	Permit #1712-RV1	10/6/2011	N/A	COA
Center for Integrated Nanotechnology (CINT)	Sandia Science and Technology Park	Permit #1725-M1	10/11/2004	N/A	COA
MESA Facility Boilers and Generators	TA-I	Permit #1820-M1	3/8/2011	N/A	COA
Building 899A Boiler Registration	TA-I	Registration #1823-RV1	9/30/2011	N/A	COA
South East Tech Area I Generator	TA-I	Permit #1828	9/28/2006	N/A	COA
Building 878 Boiler Registration	TA-I	Registration #1888-RV1	5/11/2011	N/A	COA
Strategic Defense Facility, Building 963	TA-IV	Permit#1900	1/11/2008	N/A	COA
Sitewide HAP Chemical Registration	Site Wide Permit	Registration #1901-RV1	10/24/2011	N/A	COA
Building 865 Boiler Registration	TA-I	Registration #1902-RV1	11/30/2010	N/A	COA
Building 962 Generator	TA-IV	Permit #1930-RV1	2/3/2012	N/A	COA
Building 833 Generator	TA-I	Permit #2097	9/1/2010	N/A	COA
Building 802 Boiler Registration	TA-I	Registration #2109	10/28/2010	N/A	COA
Building 804 Boiler Registration	TA-I	Registration #2110	11/8/2010	N/A	COA
Building 810 Boiler Registration	TA-I	Registration #2111	11/8/2010	N/A	COA
Building 823 Boiler Registration	TA-I	Registration #2112	11/8/2010	N/A	COA
Building 840 Boiler Registration	TA-I	Registration #2113	11/8/2010	N/A	COA
Building 857 Boiler Registration	TA-I	Registration #2114	11/8/2010	N/A	COA
Building 860 Boiler Registration	TA-I	Registration #2115	11/8/2010	N/A	COA
Building 880 Boiler Registration	TA-I	Registration #2116	11/30/2010	N/A	COA
Building 890 Boiler Registration	TA-I	Registration #2117	11/29/2010	N/A	COA
Building 887 Boiler Registration	TA-I	Registration #2118	11/29/2010	N/A	COA
Building 891 Boiler Registration	TA-I	Registration #2119	11/29/2010	N/A	COA
Building 892 Boiler Registration	TA-I	Registration #2120	11/30/2010	N/A	COA

See notes at end of table.

TABLE 8-1. Summary of Environmental Permits and Registrations in Effect During Calendar Year 2013 (Continued)

Permit Type and/or Facility Name	Location	Permit Number	Issue Date	Expiration Date	Regulatory Agency
AIR (Permits and Registrations) (Continued)					
Building 894 Boiler Registration	TA-I	Registration #2121	11/30/2010	N/A	COA
Building 897 Boiler Registration	TA-I	Registration #2122	11/30/2010	N/A	COA
Building 960 Boiler Registration	TA-IV	Registration #2169	9/27/2011	N/A	COA
Building 895 Boiler Registration	TA-I	Registration #2170	9/27/2011	N/A	COA
Building 800 Boiler Registration	TA-I	Registration #2171	9/27/2011	N/A	COA
Building 6585 Boiler Registration	TA-V	Registration #2172-RV1	1/26/2012	N/A	COA
Building 6587 Boiler Registration	TA-V	Registration #2173	2/10/2012	N/A	COA
Building 6580 Boiler Registration	TA-V	Registration #2174-RV1	2/26/2012	N/A	COA
Building 981 Boiler Registration	TA-IV	Registration #2175	9/22/2011	N/A	COA
Building 983 Boiler Registration	TA-IV	Registration #3111	9/13/2013	N/A	COA
FUGITIVE DUST CONTROL AND DEMOLITION PERMIT FILE (Permits)**					
Borrow Site – Cell 1 Programmatic	TA-III	P08-0005	6/19/2013	6/19/2018	COA
Moving Vehicle Test Track Programmatic	TA-III	P08-0004	6/19/2013	6/19/2018	COA
Thunder Range – Range 6 programmatic	Remote	P08-0061	6/19/2013	6/19/2018	COA
Thunder Range – Range 1 Programmatic	Remote	P08-0062	6/18/2013	6/18/2018	COA
Thunder Range – Range 5 Programmatic	Remote	P08-0063	6/19/2013	6/19/2018	COA
Thunder Range – Range 7 Programmatic	Remote	P09-0021	12/22/2009	12/22/2014	COA
Thunder Range – Range 4 Programmatic	Remote	P09-0022	12/22/2009	12/22/2014	COA
DETS Complex/Building 9940 (Modification/Expansion) Programmatic	Remote	P09-0014	7/8/2009	7/8/2014	COA
DETS – East Programmatic	Remote	P09-0016	7/9/2009	7/9/2014	COA
DETS – West Programmatic	Remote	P09-0015	7/9/2009	7/9/2014	COA
DETS – South Programmatic	Remote	P10-0018	12/2/2010	12/2/2015	COA
Parking Lot – Steam Plant Site	TA-1	6101-P	6/19/2013	6/19/2018	COA
Mixed Waste Landfill Cover	TA-III	10-683-4161	4/28/2009	4/28/2014	COA
Borrow Pit Cell 3	TA-III	10-683-4160	4/28/2009	4/28/2014	COA
ARRA Projects at the National Solar Thermal Test Facility	Remote	10-564-4405	10/20/2010	10/20/2015	COA
TCR Phase 2	TA-III	5356-C	3/20/2012	8/31/2013	COA
MO312 Parking Lot Construction	TA-II	5684-C	11/13/2012	11/13/2014	COA
Reconstruct 6585 Parking Lot	TA-III	5789-C	1/11/2012	1/11/2014	COA
Building 704 Construction	TA-1	5445-C	5/30/2012	5/30/2014	COA
P2 Laydown Yard and Sprung Structure Construction	TA-II	5596-C	9/14/2012	9/14/2014	COA
Building 730 Construction	TA-I	6096-C	6/7/2013	6/7/2015	COA
Telecommunications Cable Installation – 9972	Remote	5983-C	4/29/2013	4/29/2014	COA

See notes at end of table.

TABLE 8-1. Summary of Environmental Permits and Registrations in Effect During Calendar Year 2013 (Concluded)

Permit Type and/or Facility Name	Location	Permit Number	Issue Date	Expiration Date	Regulatory Agency
FUGITIVE DUST CONTROL AND DEMOLITION PERMIT FILE (Permits) (Continued)**					
Corporate and IT Storage Building Construction	TA-II	6263-C	9/24/2013	9/24/2014	COA
Assembly Building at Thunder Range	Remote	6303-C	10/9/2013	10/9/2014	COA
Underground Duct Bank Installation at 9956-9940	Remote	6262-C	9/24/2014	9/24/2014	COA
6642 Pavement Reconstruction	TA-III	6353-C	11/18/2013	11/18/2015	COA

NOTES: *Open Burn Permits are issued by the City of Albuquerque for no more than a year at any one time.
**Permits are obtained by general contractors directly from City of Albuquerque.
AANC = Airworthiness Assurance NDI Validation Center
ABCWUA = Albuquerque Bernalillo County Water Utility Authority
ARRA = American Recovery and Reinvestment Act
COA = City of Albuquerque
CTF = Coyote Test Field
CWL = Chemical Waste Landfill
DETS = Dynamic Explosives Test Site
DOE = U.S. Department of Energy
EPA = U.S. Environmental Protection Agency
FAA = Federal Aviation Administration
HAP = hazardous air pollutant
HME = Homemade Explosive
IED = Improvised Explosive Device
KAFB = Kirtland Air Force Base
MESA = Microsystems and Engineering Sciences Applications
N/A = not applicable
NDI = non-destructive Inspection
NM = New Mexico
NMED = New Mexico Environment Department
P2 = Pollution Prevention
RCRA = Resource Conservation and Recovery Act
SFO = Sandia Field Office
SNL/NM = Sandia National Laboratories, New Mexico
TA= technical area
TTC= Thermal Test Complex
TTF = Thermal Treatment Facility

TABLE 8-2. Federal and State Air Regulations That Are Applicable or Potentially Applicable to SNL/NM Operations

CAA Title	CAA Section	Federal Regulation	Local Regulation	Subject
I	176(c)	40 CFR 51	20.11.04 NMAC	General Conformity
	109	40 CFR 50	20.11.08 NMAC	National Primary and Secondary Ambient Air Quality Standards (NAAQS)
	114	40 CFR 98		Mandatory Greenhouse Gas Reporting
	165-166	40 CFR 52	20.11.02 NMAC	Permit Fees
		40 CFR 52	20.11.05 NMAC	Visible Air Contaminants
		40 CFR 52	20.11.06 NMAC	Emergency Action Plan
		40 CFR 52	20.11.07 NMAC	Variance Procedure
		40 CFR 52	20.11.20 NMAC	Fugitive Dust Control
		40 CFR 52	20.11.21 NMAC	Open Burning
		40 CFR 51-52	20.11.40 NMAC	Source Registration
		40 CFR 51-52	20.11.41 NMAC	Authority-to-Construct
		40 CFR 51.100	20.11.43 NMAC	Stack Height Requirements
		40 CFR 51	20.11.47 NMAC	Emissions Inventory Requirements
		40 CFR 51	20.11.49 NMAC	Excess Emissions
	160-169	40 CFR 52	20.11.61 NMAC	Prevention of Significant Deterioration
	165-166	40 CFR 60 40 CFR 63	20.11.65 NMAC	Volatile Organic Compounds (VOC)
		40 CFR 60	20.11.66 NMAC	Process Equipment
		40 CFR 60	20.11.22 NMAC	Wood Burning
		40 CFR 60	20.11.63 NMAC	New Source Performance Standards (NSPS)
		40 CFR 60	20.11.67 NMAC	Equipment, Emissions and Limitations (stationary combustion sources)
		40 CFR 60	20.11.68 NMAC	Incinerators
		40 CFR 60	20.11.69 NMAC	Pathological Waste Destructors
		40 CFR 61 40 CFR 63	20.11.64 NMAC	National Emission Standards for Hazardous Air Pollutants (NESHAP)
II	202-211	40 CFR 80	20.11.101 NMAC	Motor Vehicle Inspection: Centralized
			20.11.102 NMAC	Oxygenated Fuels
			20.11.103 NMAC	Motor Vehicle Visible Emissions
	213-219	40 CFR 85-86	20.11.100 NMAC	Motor Vehicle Inspection: Decentralized
IV	401-416	40 CFR 72-78	20.11.62 NMAC	Acid Rain
V	501-507	40 CFR 70-71	20.11.42 NMAC	Operating Permits
VI	601-618	40 CFR 82	20.11.23 NMAC	Stratospheric Ozone Protection
VII	113-114	40 CFR 64	20.11.90 NMAC	Administration, Enforcement, Inspection

NOTES: CAA = Clean Air Act
CFR = Code of Federal Regulations
NMAC = New Mexico Administrative Code
SNL/NM = Sandia National Laboratories, New Mexico

TABLE 8-3. Summary of Compliance History with Regard to Mixed Waste (MW) at SNL/NM

Date	Milestone	Comment
Nov 1984	1984 Hazardous and Solid Waste) Amendments (HSWA) to Resource Conservation and Recovery Act (RCRA)	Extended storage became an issue after HSWA established land disposal restrictions (LDR) and a 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 to New Mexico Environment Department (NMED) for MW storage. Later revisions to the interim status application added proposed MW treatment processes.
Oct 1992	Federal Facilities Compliance Act (FFCA) Passed	The FFCA allows storage of MW that does not meet the applicable treatment standard beyond the 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 (STP) Submitted	DOE submitted *Conceptual Site Treatment Plan for Mixed Waste* to NMED; other drafts followed.
Mar 1995	Final STP 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 NMED, DOE, and Sandia Corporation (Sandia), details specific actions required with regard to MW management, including the requirement to develop a STP, to be updated annually.
Mar 1996	STP Milestones Met	Updated STP to reflect Fiscal Year (FY) 1995 activities.
Sep 1996	First MW Shipment FFCO Amendment No. 1	First MW shipment made, MW sent to Perma-Fix/Diversified Scientific Services, Inc. for treatment. 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 SNL/NM Radioactive and Mixed Waste Management Facility in compliance with regulatory requirements.
1997-2001	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities in compliance with regulatory requirements, meeting all treatment and disposal milestones. Updated STP annually to reflect activities and changes to proposed treatment technologies. NMED approved Revisions 1 through 5 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
May 2001	FFCO Amendment No. 3	FFCO amended.
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.

See notes at end of table.

TABLE 8-3. Summary of Compliance History with Regard to Mixed Waste (MW) at SNL/NM (Continued)

Date	Milestone	Comment
2002-2003	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities in compliance with regulatory requirements, meeting all treatment and disposal milestones. Updated STP annually to reflect activities and changes to proposed treatment technologies. NMED approved Revisions 6 and 7 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
Apr 2003; Nov 2003	Revisions to Permit Application	DOE and Sandia revised Part A and Part B permit application in response to NMED comments.
Apr 2004	FFCO Amendment No. 4	FFCO amended.
Nov 2004	Revisions to Permit Application	DOE and Sandia revised Part A and Part B permit application in response to NMED comments.
2004-2005	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities in compliance with regulatory requirements, meeting all treatment and disposal milestones. Updated STP annually to reflect activities and changes to proposed treatment technologies. NMED approved Revisions 8 and 9 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
Jun 2005; Oct 2005; May 2006	Revisions to Permit Application	DOE and Sandia revised Part A and Part B permit application to reflect changes in waste management operations.
2006-2007	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities in compliance with regulatory requirements, meeting all treatment and disposal milestones. Updated STP annually to reflect activities and changes to proposed treatment technologies. NMED approved Revisions 10 and 11 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
Mar 2007	Revisions to Permit Application	DOE and Sandia revised Part A and Part B permit application to reflect changes in waste management operations.
Aug 2007	Draft Permit Issued	NMED issued draft permit to DOE and Sandia, and made it available for public comment.
Jan 2008	Comments on Draft Permit Submitted	DOE and Sandia submitted extensive comments on draft permit to NMED and requested resolution of comments.
2008-2010	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities in compliance with regulatory requirements, meeting all treatment and disposal milestones. Updated STP annually to reflect activities and changes to proposed treatment technologies. NMED approved Revision 12 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
Oct 2009; Nov 2010	Revisions to Permit Application	DOE and Sandia revised Part B permit application to reflect changes in waste management operations.
Dec 2010	FFCO Amendment No. 5	FFCO amended to extend certain compliance deadlines.
2011	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities in compliance with regulatory requirements, meeting all treatment and disposal milestones. Completed disposition of all mixed wastes subject to the STP, in compliance with applicable deadlines. Updated STP to reflect FY 2010 activities.

See notes at end of table.

TABLE 8-3. Summary of Compliance History with Regard to Mixed Waste (MW) at SNL/NM (Concluded)

Date	Milestone	Comment
Oct 2011; May 2012	Revisions to Permit Application	DOE and Sandia revised Part A and Part B permit application to reflect changes in waste management operations.
Sep 2012	Draft Permit Issued	NMED issued draft permit to DOE and Sandia, and made it available for public comment.
Nov 2012	Comments on Draft Permit Submitted	DOE and Sandia submitted comments on draft permit to NMED and requested resolution of comments.
2012-2013	No STP milestones	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities in compliance with regulatory requirements. Requested Revision 14 to STP to establish new deadlines and provide continuity.

NOTES: SNL/NM = Sandia National Laboratories/New Mexico

TABLE 8-4. Quantity of Mixed Waste Subject to the Federal Facility Compliance Order (End of FY 2013)

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.
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	Inorganic Debris with TCLP Metals	No waste currently in inventory
TG 10	0	Heterogeneous Debris	No waste currently in inventory
TG 11	0	Organic Liquids II	No waste currently in inventory.
TG 12	0	Organic Debris with TCLP Metals	No waste currently in inventory.
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	Soils <50 percent Debris and Particulates with TCLP Metals	No waste currently in inventory.
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	Spark Gap Tubes with TCLP Metals	No waste currently in inventory.
TG 25	0	Classified Items with TCLP Metals	No waste currently in inventory
TG 26	0	Debris Items with Reactive Compounds and TCLP Metals	No waste currently in inventory.
TG 27	0	High Mercury Solids and Liquids	No waste currently in inventory.
TRU/MW	0.000011	TRU/MW	

NOTES: FY = Fiscal Year
m^3 = cubic meters
TCLP = toxicity characteristic leaching procedure
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 [Sandia] employees and contractors), such as Kirtland Air Force Base (KAFB) personnel and the surrounding community. Radiation protection standards are provided in DOE Order 458.1, Radiation Protection of the Public and the Environment (DOE 2013). Environmental monitoring requirements for DOE operations are given in DOE Order 436.1, Departmental Sustainability (DOE 2011b). 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 458.1, *Radiation Protection of the Public and the Environment* (DOE 2013), 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 Standards (DCS) 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 8-5 lists the DCSs pertinent to activities at SNL/NM and to this report.

- *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 four percent of ingested water using DCS 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 8-6 summarizes the public radiation protection standards that are applicable to DOE facilities.

GROUNDWATER QUALITY MONITORING PARAMETERS

Resource Conservation and Recovery Act (RCRA)

Table 8-7 lists the 40 Code of Federal Regulations (CFR) 265, Subpart F, parameters required for groundwater monitoring analysis, implemented under RCRA. Table 8-8 gives the EPA interim primary drinking water standards (40 CFR 265, Appendix III) for the groundwater monitoring parameters. Table 8-9 gives EPA secondary drinking water standards. Table 8-10 gives New Mexico Water Quality Control Commission (NMWQCC) Standards for groundwater.

TABLE 8-5. Derived Concentration Standards (DCS) for Selected Radionuclides*

Radionuclide	Ingested Water		Inhaled Air	
	DCG (µCi/ml)	f_1 Value**	DCG (µCi/ml)	Solubility Class
Tritium (water)	1.9×10^{-3}	1	2.1×10^{-7}	S
Cesium-137	3×10^{-6}	1	8.8×10^{-10}	F
Uranium, total (U_{tot})	7.5×10^{-7}	4×10^{-2}	1.3×10^{-12}	M

NOTES: *From Table 5, Derived Concentration Technical Standards, DOE-STD-1196-2011 (DOE 2011d).
**f_1 value is the gastrointestinal absorption factor. Listed DCS's for U_{tot} are based on U_{238} listing in DOE-STD-1196-2011 (DOE 2011d).
μCi/ml = microcuries per milliliter
DCG = Derived Concentration Guides
DOE = U.S. Department of Energy
F = Fast
M = Medium
S = Slow

TABLE 8-6. General Dose Limits to the Public from DOE Facilities

Pathway	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 458.1, *Radiation Protection of the Public and the Environment* (DOE 2013).
**40 CFR 61, Subpart H for radionuclides, National Emission Standards for Hazardous Air Pollutants (NESHAP).
CFR = Code of Federal Regulations
DOE = U.S. Department of Energy
EDE = effective dose equivalent
mrem/yr = millirem per year
mSv/yr = millisievert per year

TABLE 8-7. Groundwater Monitoring Parameters Required by 40 CFR 265, Subpart F*

Parameters used as Indicators of Groundwater Contamination	Parameters Establishing Groundwater Quality	Parameters Characterizing the Suitability of the Groundwater as a Drinking Water Supply, as specified in Appendix III†
pH Specific Conductance Total Organic Carbon (TOC) Total Organic Halogen (TOX)	Chloride Iron Manganese Phenols Sodium Sulfate	Arsenic Barium Cadmium Chromium Fluoride Lead Mercury Nitrate (as N) Selenium Silver Endrin Lindane Methoxychlor Toxaphene 2,4-D 2,4,5-TP Silvex Radium Gross Alpha Gross Beta Turbidity Coliform Bacteria

NOTES: *Resource Conservation and Recovery Act (RCRA)
†40 CFR 265, Appendix III.
CFR = Code of Federal Regulations
pH = potential hydrogen (acidity)

TABLE 8-8. EPA Primary Drinking Water Supply 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 (total)	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
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**
Acrylamide	1.0	mg/L
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
Epichlorohydrin	20	mg/L
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

See notes at end of table.

TABLE 8-8. EPA Primary Drinking Water Supply Standards (Concluded)

Organic Chemicals (Continued)	MCL	Units
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
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: *Action level concentrations which trigger systems into taking treatment steps if 10 percent of tap water samples exceed the value.
EPA = U.S. Environmental Protection Agency
MCL = Maximum Contaminant Level
MFL = million fibers per liter
mg/L = milligram per liter
mrem/yr = millirem per year
pCi/L = picocurie per liter

TABLE 8-9. 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 = U.S. Environmental Protection Agency
mg/L = milligram per liter
pH = potential hydrogen (acidity)

TABLE 8-10. 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 (NO_3 as N)	10.0	mg/L
Selenium	0.05	mg/L
Silver	0.05	mg/L
Uranium	0.03	mg/L
Radioactivity: Combined Radium-226 and 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 Xylenes	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 plus 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 Dissolved Solids	1,000.0	mg/L
Zinc	10.0	mg/L
pH	Between 6 and 9	

See notes at end of table.

TABLE 8-10. 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 Subsections A, B, and C unless otherwise 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
pCi/L = picocurie per liter
pH = potential hydrogen (acidity)

TABLE 8-11. Boilers Associated with Permits and Registrations During Calendar Year 2013

Permit Number	Description	Size	Fuel Type
#374-M2	Neutron Generator Production Facility (NGPF) Boilers used to heat the facility.	Six (6) 2 MMBtu/hr	Natural Gas
R#547-RV1	Explosives Components Facility (ECF) Boilers used to heat the facility.	Two (2) 4.3437 MMBtu/hr	Natural Gas
#925-M2	Processing and Environmental Technology Laboratory (PETL) Boilers used to heat the facility.	Ten (10) 1.4 MMBtu/hr	Natural Gas
R#1406-M1	Advanced Manufacturing Prototype Facility (AMPF) Boilers used to heat the facility.	Two (2) 1.8 MMBtu/hr	Natural Gas
#1725-M1	Center for Integrated Nanotechnologies (CINT) Boilers used to heat the facility.	Two (2) 6 MMBtu/hr	Natural Gas
#1820-M1	Microsystems and Engineering Sciences Applications (MESA) Complex Boilers used to heat the facility.	Two (2) 20.412 MMBtu/hr	Natural Gas
		One (1) 10.206 MMBtu/hr	
		Eight (8) 2.0 MMBtu/hr	
R#1823	Weapons Integration Facility (WIF) Boilers used to heat the facility.	Two (2) 8.17 MMBtu/hr	Natural Gas
		One (1) 3.68 MMBtu/hr	
R#1888-RV1	Building 878 boilers used to heat the facility.	Thirteen (13) 2 MMBtu/hr	Natural Gas
R#1902-RV1	Building 865 boilers used to heat the facility.	Two (2) 0.28 MMBtu/hr	Natural Gas
		Two (2) 1.3 MMBtu/hr	
R#2109	Building 802 boilers used to heat the facility.	Three (3) 2 MMBtu/hr	Natural Gas
R#2110	Building 804 boilers used to heat the facility.	Four (4) 2 MMBtu/hr	Natural Gas
R#2111	Building 810 boilers used to heat the facility.	Three (3) 2 MMBtu/hr	Natural Gas
R#2112	Building 823 boilers used to heat the facility.	Three (3) 2 MMBtu/hr	Natural Gas
R#2113	Building 840 boilers used to heat the facility.	Four (4) 2 MMBtu/hr	Natural Gas
R#2114	Building 857 boilers used to heat the facility.	Two (2) 1.3 MMBtu/hr	Natural Gas
		Two (2) 1.1001 MMBtu/hr	
R#2115	Building 860 boilers used to heat the facility.	Two (2) 1.3 MMBtu/hr	Natural Gas
R#2116	Building 880 boilers used to heat the facility.	Four (4) 2 MMBtu/hr	Natural Gas
		Two (2) 0.28 MMBtu/hr	
R#2117	Building 890 boilers used to heat the facility.	Three (3) 2 MMBtu/hr	Natural Gas
R#2118	Building 887 boilers used to heat the facility.	Three (3) 2 MMBtu/hr	Natural Gas
R#2119	Building 891 boilers used to heat the facility.	Three (3) 2 MMBtu/hr	Natural Gas
R#2120	Building 892 boilers used to heat the facility.	Three (3) 2 MMBtu/hr	Natural Gas
R#2121	Building 894 boilers used to heat the facility.	Three (3) 2 MMBtu/hr	Natural Gas
		Two (2) 1.001 MMBtu/hr	
		Two (2) 1.3 MMBtu/hr	
R#2122	Building 897 boilers used to heat the facility.	Three (3) 2 MMBtu/hr	Natural Gas
R#2169	Building 960 boilers used to heat the facility.	Two (2) 1.5 MMBtu/hr	Natural Gas
R#2170	Building 895 boilers used to heat the facility.	Three (3) 2.0 MMBtu/hr	Natural Gas
R#2171	Building 800 boilers used to heat the facility.	Two (2) 1.44 MMBtu/hr	Natural Gas
R#2172-RV1	Building 6585 boilers used to heat the facility.	Two (2) 5.0 MMBtu/hr	Natural Gas
R#2173	Building 6597 boilers used to heat the facility.	One (1) 2.47 MMBtu/hr	Natural Gas
R#2174-RV1	Building 6580 boilers used to heat the facility.	Four (4) 2.0 MMBtu/hr	Natural Gas
R#2175	Building 981 boilers used to heat the facility.	Two (2) 1.8 MMBtu/hr	Natural Gas
R#3111	Building 983 boilers used to heat the facility.	Two (2) 1.3 MMBtu/hr	Natural Gas

NOTES: MMBtu/hr = Million British Thermal Units per hour

TABLE 8-12. Emergency Generators Associated with the Permits and Registrations During Calendar Year 2013

Permit	Description	Size	Fuel Type
#374-M2	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 TA-I of SNL/NM.	Four (4) 805 hp	Diesel
#415-M2	RMWMF Emergency Generator provides emergency power during unplanned power outage.	One (1) 192 hp	Diesel
#924-RV1	TA-I East L Avenue Emergency Generator provides emergency power during unplanned power outages	One (1) 896 hp	Diesel
#925-M2	PETL Emergency Generator provides emergency power during unplanned power outages.	One (1) 896 hp	Diesel
#1725-M1	CINT Emergency Generator provides emergency power during unplanned power outages.	One (1) 680 hp	Diesel
#1820-M1[a]	MESA Complex Emergency Generators provide emergency power during unplanned power outages.	One (1) 999 hp One (1) 1609 hp	Diesel
#1828	Southeast TA-I Back-up Generator provides backup power during unplanned power outages.	One (1) 750 hp	Diesel
#1900	SDF backup generator provides backup power during unplanned power outages.	One (1) 380 hp	Diesel
#1930	Building 962 backup generator provides backup power to the operations housed in Building 962.	One (1) 99 hp	Diesel
#2097	Building 833 generator will provide power for research and development missions.	One (1) 335 hp	Diesel

NOTES: CINT = Center for Integrated Nanotechnologies
hp = horsepower
MESA = Microsystems and Engineering Sciences Application
NGF = Neutron Generator Facility
PETL = Processing Environmental Technologies Laboratory
RMWMF = Radioactive Mixed Waste Management Facility
SDF = Strategic Defense Facility
SNL/NM = Sandia National Laboratories, New Mexico
TA = Technical Area

This page intentionally left blank.



Chapter 9
Glossary

A

Abatement – Reducing the degree or intensity of, or eliminating, pollution.

Aboveground storage tank (AST) – A closed container with all the container volume above grade. An AST system is one or more commonly connected *aboveground storage tanks* including all connected *piping,* both aboveground and underground, pumps, dispensing, and product transfer apparatus, *overfill protection devices*, and associated spill containment and collection apparatus.

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.

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.

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.

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.

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.

E

Ecology – The relationship of living things to one another and their environment, or the study of such relationships.

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.

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.

Electroplating – To coat or cover with a thin layer of metal by electrodeposition.

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.

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.

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.

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.

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.

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 groundwater 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 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.

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.

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 for 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, groundwater, or soil.

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.

Low-Level 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

Materials Sustainability and Pollution Prevention (MSP2) – The use and reuse of materials in the most productive and sustainable manner across their entire life cycle. Sustainable materials management purchases sustainable products, emphasizes using less, reduces waste and toxicity, recovers more of the materials that are used, slows climate change and assures sufficient resources to meet society's needs today and in the future.

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. The dose estimates are based on realistic, yet conservative input parameters.

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 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.

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.

Nitrate – 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.

Nitrite – 1. An intermediate in the process of nitrification. 2. Nitrous oxide salts used in food preservation.

Nitrogen Dioxide – A poisonous brown gas, NO_2, often found in smog and automobile exhaust fumes and synthesized for use as a nitrating agent, a catalyst, and an oxidizing agent.

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.

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

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).

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)

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.

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 biphenyl – "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.

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

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 stormwater. The liquid discharges from rest rooms and food preparation activities.

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-volatile organic compounds (SVOC) – Organic compounds that volatilize slowly at standard temperature (20 degrees C and 1 atm pressure).

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.

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.

Statement Of Work (SOW) – A comprehensive description of the goods, services, or combination of goods and services for which SNL contracts.

Stormwater – Water runoff from rainfall or snowmelt, including that discharged to the sanitary sewer system.

Sulfur Dioxide (SO_2) – A colorless, extremely irritating gas or liquid, SO_2, 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.

T

Thermoluminescent Dosimeter (TLD) – 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.

Total Non-Methane Hydrocarbon (TNMHC) – The sum of all hydrocarbon air pollutants except methane; significant precursors to ozone formation.

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."

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.

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.

U

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.

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.

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 table – The level of groundwater.

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.

Wetland – An area that is saturated by surface or groundwater with vegetation adapted for life under those soil conditions, as swamps, bogs, fens, marshes, and estuaries.

Wind rose – A graphical presentation of wind speed and direction frequency distribution.

This page intentionally left blank.

UNLIMITED RELEASE DISTRIBUTION

U.S. Department of Energy

U.S. Department of Energy
National Nuclear Security Administration
Sandia Field Office/ENG (SFO/ENG)
Attn: Karen Agogino (5*/12**/1***)
P.O. Box 5400, MS 0184
Albuquerque, NM 87185-5400

U.S. Department of Energy
Acting Associate Under Secretary for Environment, Health, Safety and Security
HQ/FORS, AU-1
Attn: Matthew Moury (1*/1**)
1000 Independence Ave., SW
Washington, DC 20585

U.S. Department of Energy
Director, Office of Environmental Protection, Sustainability Support & Corporate Safety Analysis
HQ/FORS, AU-20
Attn: Andrew C. Lawrence (1**)
1000 Independence Ave., SW
Washington, DC 20585

U.S. Department of Energy
National Nuclear Security Administration
Albuquerque Complex
NNSA/AC, NA-00-60
Attn: Steven R. Black (1*/1**)
P.O. Box 5400
Albuquerque, NM 87185-5400

U.S. Department of Energy
Office of Analysis
HQ/FORS, AU-23
Attn: Ross Natoli (1*/1**)
1000 Independence Ave. SW
Washington, DC 20585

U.S. Department of Energy
National Nuclear Security Administration
Acting Associate Principal Deputy Administrator
HQ/FORS, NA-3
Attn: William White (1*/1**)
1000 Independence Ave., SW
Washington, DC 20585

U.S. Department of Energy
Office of Soil and Groundwater Remediation
Attn: Justin Marble (1*/1***)
19901 Germantown Rd
Germantown, MD 20878

UNLIMITED RELEASE DISTRIBUTION (continued)

New Mexico Environment Department

New Mexico Environment Department
Hazardous Waste Bureau Chief
Attn: John Kieling (1**)
2905 Rodeo Park Drive East, Bldg. 1
Santa Fe, New Mexico 87505-6030

New Mexico Environment Department
Hazardous Waste Bureau
Permits Management Program
Program Manager
Attn: Dave Cobrain (1*)
2905 Rodeo Park Drive East, Bldg. 1
Santa Fe, New Mexico 87505-6030

New Mexico Environment Department
Hazardous Waste Bureau
Albuquerque Group Manager
Attn: William Moats (1*)
5500 San Antonio NE
Albuquerque, NM 87109

New Mexico Environment Department
DOE Oversight Bureau Chief
Attn: Thomas Skibitski (1*/1**/1***)
P.O. Box 5400, Mail Stop 1396
Albuquerque, NM 87185-5400

United States Air Force - Kirtland

United States Air Force
Environment Management Division Director
Attn: John Pike (1**/1***)
377 MSG/CEI, Suite 116
2050 Wyoming Blvd. SE
Kirtland AFB, NM 87117-5270

United States Air Force
Environmental Management Division
Attn: Andria Cuevas (1*)
377 MSG/CEIE, Suite A119
2050 Wyoming Blvd. SE
Kirtland AFB, NM 87117-5270

Environmental Restoration Program
Attn: Victoria R. Branson (1*)
Kirtland IST/AFCEC CZO, Suite A124
2050 Wyoming Blvd. SE
Kirtland AFB, NM 87117-5270

Universities and Colleges

University of New Mexico
Government Information Department
Zimmerman Library-UNM
Dan Barkley (1*)
1 University of New Mexico
MSC05 3020
Albuquerque, NM 87131-0001

University of New Mexico
Valencia Campus (1**)
280 La Entrada
Los Lunas, NM 87031

University of New Mexico
Los Alamos Branch 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

UNLIMITED RELEASE DISTRIBUTION (continued)

Universities and Colleges (continued)

Central New Mexico Community College
Main Campus (1**)
525 Buena Vista SE
Albuquerque, NM 87106-4096

Central New Mexico Community College
Montoya Campus (1**)
4700 Morris NE
Albuquerque, NM 87111

Central New Mexico Community College
South Valley Campus (1**)
5816 Isleta Boulevard SW
Albuquerque, NM 87105

Federal, State, and Other Agencies

U.S. Environmental Protection Agency
Region VI Office
Attn: Laurie King (1***)
Mail Code: 6PD
1445 Ross Ave., Suite 1200
Dallas, TX 75202-2733

U.S. Geological Society
Water Resources Division
New Mexico District
Attn: Linda Weiss (1*)
5338 Montgomery NE
Suite 400/300
Albuquerque, NM 87109-1311

U.S. Department of the Interior
Bureau of Indian Affairs, Southwest Region
Albuquerque Area Office
Attn: William Walker (1*)
1001 Indian School Road, NW
Albuquerque, NM 87104-2303

Lockheed-Martin Corporation
Corporate Energy, Environment,
Safety & Health
Attn: Jeff Thomas (2**)
6801 Rockledge Drive
Bethesda, MD 20817
Office: Bldg Code: MD/1CC
MailDrop: CCT-246
Room: 246-26

Argonne National Laboratory
Attn: Theresa Davis (1*)
9700 South Cass Avenue
Building 200, Room B-11
Argonne, Illinois 60439

New Mexico Bureau of Mines and Mineral Resources
Attn: Peggy Johnson (1*)
801 Leroy Place
Socorro, NM 87801

Pueblo of Isleta
Governor
Attn: Hon. Eddie Paul Torres Sr. (1**)
P.O. Box 1290
Isleta, NM 87022

Pueblo of Isleta
Public Works
Environmental Division Manager
Attn: Ramona Montoya (1**)
P.O. Box 1270
Isleta, NM 87022

UNLIMITED RELEASE DISTRIBUTION (continued)

Federal, State, and Other Agencies (continued)

Albuquerque Bernalillo County
Water Utility Authority
Water Resources Section
Water Quality Hydrologist
Attn: Rick Shean (1*)
P.O. Box 568
Albuquerque, NM 87103

Albuquerque Bernalillo County
Water Utility Authority
Environmental Compliance Division
Industrial Pretreatment
Industrial Waste Engineer
Attn: Mark Kelly, P.E. (1**)
4201 Second Street, SW
Albuquerque, NM 87105

City of Albuquerque Air Quality Division
Environmental Health Division
Attn: Mary Lou Leonard (1*)
1 Civic Plaza
Albuquerque, NM 87102

Bernalillo County Public Works Department
Natural Resources Services
Review & Permitting (Wells & Wastewater)
Attn: Christopher Gonzales (1*)
111 Union Square SE
Suite 100
Albuquerque, NM 8 7102

Bernalillo County Natural Resource Services
Water Resources Specialist
Attn: Sara Chudnoff (1*)
2400 Broadway Blvd., SE
Albuquerque, NM 87102

Lovelace Respiratory Research Institute
Director, ES&H
Attn: Penny H. Holeman (1*)
2425 Ridgecrest Dr. SE
Albuquerque, NM 87108

UNLIMITED RELEASE DISTRIBUTION (concluded)

Sandia National Laboratories Distribution

2	(MS 0101)	P. Hommert, 00001 (1**)
1	(MS 0143)	M. Hazen, 4000 (1**)
0	(MS 0725)	S. Gutierrez, 4100 (1*)
1	(MS 0729)	F. Nimick, 4140 (1**)
0	(MS 0141)	A. Blumberg, 11100 (1*)
0	(MS 0899)	Technical Library, 9536
2	(MS 1043)	ES&H Library, 4135 (2**)
5	(MS 0729)	A. Reiser, 4144 (5*/5**)
0	(MS 0718)	M. Skelly, 6234 (1***)
1	(MS 0730)	N. White, 3654 (1**)
1	(MS 0729)	A. Minitrez, 4143 (1**)
15	(MS 0730)	S. Griffith, 4143 (15**)

NOTE: *Requires a CD copy of this report.
**Requires a hardcopy of this report.
***Requires a CD copy of this report and a hardcopy of the Annual Groundwater Monitoring Report (Appendix C).

This page intentionally left blank.

APPENDIX A

2013 WASTEWATER MONITORING RESULTS

TABLE A-1. Permitted Sanitary Outfalls of Inorganic Analyses, February 2013 through April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units	Regulatory Limit (ABCWUA)
CINT	2238A	25-Feb-2013	093624-009	Cyanide, total	ND	0.00167	U	mg/L	0.45
CINT	2238A	25-Feb-2013	093624-010	Cyanide, total	ND	0.00167	U	mg/L	0.45
CINT	2238A	25-Feb-2013	093624-011	Cyanide, total	0.00366	0.00167	J	mg/L	0.45
CINT	2238A	25-Feb-2013	093624-012	Cyanide, total	ND	0.00167	U	mg/L	0.45
CINT	2238A	26-Feb-2013	093625-001	Aluminum	ND	0.068	U	mg/L	900
CINT	2238A	26-Feb-2013	093625-001	Arsenic	0.00697	0.005	J	mg/L	0.051
CINT	2238A	26-Feb-2013	093625-001	Boron	0.0382	0.015	J	mg/L	
CINT	2238A	26-Feb-2013	093625-001	Cadmium	ND	0.001	U	mg/L	0.05
CINT	2238A	26-Feb-2013	093625-001	Chromium	0.00417	0.001	J	mg/L	4.1
CINT	2238A	26-Feb-2013	093625-001	Copper	0.00855	0.003	J	mg/L	5.3
CINT	2238A	26-Feb-2013	093625-002	Fluoride	1.33	0.033		mg/L	36
CINT	2238A	26-Feb-2013	093625-001	Lead	0.00495	0.0033	J	mg/L	1
CINT	2238A	26-Feb-2013	093625-001	Molybdenum	0.0472	0.002		mg/L	2
CINT	2238A	26-Feb-2013	093625-001	Nickel	ND	0.0015	U	mg/L	2
CINT	2238A	26-Feb-2013	093625-001	Selenium	ND	0.006	U	mg/L	0.46
CINT	2238A	26-Feb-2013	093625-001	Silver	ND	0.001	U	mg/L	5
CINT	2238A	26-Feb-2013	093625-001	Zinc	0.00681	0.0033	J	mg/L	2.2
CINT	2238A	27-Feb-2013	093626-001	Aluminum	ND	0.068	U	mg/L	900
CINT	2238A	27-Feb-2013	093626-001	Arsenic	ND	0.005	U	mg/L	0.051
CINT	2238A	27-Feb-2013	093626-001	Boron	0.0593	0.015		mg/L	
CINT	2238A	27-Feb-2013	093626-001	Cadmium	ND	0.001	U	mg/L	0.05
CINT	2238A	27-Feb-2013	093626-001	Chromium	0.0043	0.001	J	mg/L	4.1
CINT	2238A	27-Feb-2013	093626-001	Copper	ND	0.003	U	mg/L	5.3
CINT	2238A	27-Feb-2013	093626-002	Fluoride	1	0.033		mg/L	36
CINT	2238A	27-Feb-2013	093626-001	Lead	0.0047	0.0033	J	mg/L	1
CINT	2238A	27-Feb-2013	093626-001	Molybdenum	0.0471	0.002		mg/L	2
CINT	2238A	27-Feb-2013	093626-001	Nickel	ND	0.0015	U	mg/L	2
CINT	2238A	27-Feb-2013	093626-001	Selenium	0.00737	0.006	J	mg/L	0.46
CINT	2238A	27-Feb-2013	093626-001	Silver	ND	0.001	U	mg/L	5
CINT	2238A	27-Feb-2013	093626-001	Zinc	ND	0.0033	U	mg/L	2.2
CINT	2238A	23-Apr-2013	093632-007	Ammonia	2.31	0.085		mg/L	
CINT	2238A	24-Apr-2013	093639-007	Ammonia	0.0587	0.017		mg/L	
WW001	2069A	23-Apr-2013	093627-001	Aluminum	ND	0.068	U	mg/L	900
WW001	2069A	23-Apr-2013	093627-007	Ammonia	15.4	0.425		mg/L	

TABLE A-1. Permitted Sanitary Outfalls of Inorganic Analyses, February 2013 through April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units	Regulatory Limit (ABCWUA)
WW001	2069A	23-Apr-2013	093627-001	Arsenic	ND	0.005	U	mg/L	0.051
WW001	2069A	23-Apr-2013	093627-001	Boron	0.111	0.015		mg/L	
WW001	2069A	23-Apr-2013	093627-001	Cadmium	ND	0.001	U	mg/L	0.05
WW001	2069A	23-Apr-2013	093627-001	Chromium	0.00402	0.001	J	mg/L	4.1
WW001	2069A	23-Apr-2013	093627-001	Copper	0.0423	0.003		mg/L	5.3
WW001	2069A	23-Apr-2013	093627-002	Fluoride	4.58	0.033		mg/L	36
WW001	2069A	23-Apr-2013	093627-001	Lead	0.0127	0.0033		mg/L	1
WW001	2069A	23-Apr-2013	093627-001	Molybdenum	0.178	0.002		mg/L	2
WW001	2069A	23-Apr-2013	093627-001	Nickel	0.00193	0.0015	J	mg/L	2
WW001	2069A	23-Apr-2013	093627-001	Selenium	0.0108	0.006	JB	mg/L	0.46
WW001	2069A	23-Apr-2013	093627-001	Silver	0.0013	0.001	J	mg/L	5
WW001	2069A	23-Apr-2013	093627-001	Zinc	0.423	0.0033		mg/L	2.2
WW001	2069A	24-Apr-2013	093634-001	Aluminum	0.095	0.068	J	mg/L	900
WW001	2069A	24-Apr-2013	093634-007	Ammonia	20.2	0.425		mg/L	
WW001	2069A	24-Apr-2013	093634-001	Arsenic	ND	0.005	U	mg/L	0.051
WW001	2069A	24-Apr-2013	093634-001	Boron	0.0766	0.015		mg/L	
WW001	2069A	24-Apr-2013	093634-001	Cadmium	ND	0.001	U	mg/L	0.05
WW001	2069A	24-Apr-2013	093634-001	Chromium	0.00385	0.001	J	mg/L	4.1
WW001	2069A	24-Apr-2013	093634-001	Copper	0.0295	0.003		mg/L	5.3
WW001	2069A	24-Apr-2013	093634-002	Fluoride	1.68	0.033		mg/L	36
WW001	2069A	24-Apr-2013	093634-001	Lead	0.0124	0.0033		mg/L	1
WW001	2069A	24-Apr-2013	093634-001	Molybdenum	0.111	0.002		mg/L	2
WW001	2069A	24-Apr-2013	093634-001	Nickel	0.00154	0.0015	J	mg/L	2
WW001	2069A	24-Apr-2013	093634-001	Selenium	0.0137	0.006	JB	mg/L	0.46
WW001	2069A	24-Apr-2013	093634-001	Silver	ND	0.001	U	mg/L	5
WW001	2069A	24-Apr-2013	093634-001	Zinc	0.119	0.0033		mg/L	2.2
WW006	2069F	22-Apr-2013	093640-009	Cyanide, total	ND	0.00167	U	mg/L	0.45
WW006	2069F	22-Apr-2013	093640-010	Cyanide, total	ND	0.00167	U	mg/L	0.45
WW006	2069F	22-Apr-2013	093640-011	Cyanide, total	ND	0.00167	U	mg/L	0.45
WW006	2069F	22-Apr-2013	093640-012	Cyanide, total	0.00308	0.00167	J	mg/L	0.45
WW006	2069F	23-Apr-2013	093628-001	Aluminum	0.142	0.068	J	mg/L	900
WW006	2069F	23-Apr-2013	093628-007	Ammonia	46.4	0.85		mg/L	
WW006	2069F	23-Apr-2013	093628-001	Arsenic	ND	0.005	U	mg/L	0.051
WW006	2069F	23-Apr-2013	093628-001	Boron	0.125	0.015		mg/L	

TABLE A-1. Permitted Sanitary Outfalls of Inorganic Analyses, February 2013 through April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units	Regulatory Limit (ABCWUA)
WW006	2069F	23-Apr-2013	093628-001	Cadmium	ND	0.001	U	mg/L	0.05
WW006	2069F	23-Apr-2013	093628-001	Chromium	0.00189	0.001	J	mg/L	4.1
WW006	2069F	23-Apr-2013	093628-001	Copper	0.0162	0.003		mg/L	5.3
WW006	2069F	23-Apr-2013	093628-002	Fluoride	1.39	0.033		mg/L	36
WW006	2069F	23-Apr-2013	093628-001	Lead	0.00544	0.0033	J	mg/L	1
WW006	2069F	23-Apr-2013	093628-001	Molybdenum	0.166	0.002		mg/L	2
WW006	2069F	23-Apr-2013	093628-001	Nickel	0.00157	0.0015	J	mg/L	2
WW006	2069F	23-Apr-2013	093628-001	Selenium	0.0183	0.006	JB	mg/L	0.46
WW006	2069F	23-Apr-2013	093628-001	Silver	ND	0.001	U	mg/L	5
WW006	2069F	23-Apr-2013	093628-001	Zinc	0.0895	0.0033		mg/L	2.2
WW006	2069F	24-Apr-2013	093635-001	Aluminum	0.147	0.068	J	mg/L	900
WW006	2069F	24-Apr-2013	093635-007	Ammonia	37	0.425		mg/L	
WW006	2069F	24-Apr-2013	093635-001	Arsenic	ND	0.005	U	mg/L	0.051
WW006	2069F	24-Apr-2013	093635-001	Boron	0.146	0.015		mg/L	
WW006	2069F	24-Apr-2013	093635-001	Cadmium	ND	0.001	U	mg/L	0.05
WW006	2069F	24-Apr-2013	093635-001	Chromium	0.00263	0.001	J	mg/L	4.1
WW006	2069F	24-Apr-2013	093635-001	Copper	0.0367	0.003		mg/L	5.3
WW006	2069F	24-Apr-2013	093635-002	Fluoride	0.763	0.033		mg/L	36
WW006	2069F	24-Apr-2013	093635-001	Lead	0.00572	0.0033	J	mg/L	1
WW006	2069F	24-Apr-2013	093635-001	Molybdenum	0.115	0.002		mg/L	2
WW006	2069F	24-Apr-2013	093635-001	Nickel	ND	0.0015	U	mg/L	2
WW006	2069F	24-Apr-2013	093635-001	Selenium	0.0143	0.006	JB	mg/L	0.46
WW006	2069F	24-Apr-2013	093635-001	Silver	ND	0.001	U	mg/L	5
WW006	2069F	24-Apr-2013	093635-001	Zinc	0.0797	0.0033		mg/L	2.2
WW006 #2	2069F	23-Apr-2013	093643-009	Cyanide, total	ND	0.00167	U	mg/L	0.45
WW006 #2	2069F	23-Apr-2013	093643-010	Cyanide, total	ND	0.00167	U	mg/L	0.45
WW006 #2	2069F	23-Apr-2013	093643-011	Cyanide, total	ND	0.00167	U	mg/L	0.45
WW006 #2	2069F	23-Apr-2013	093643-012	Cyanide, total	ND	0.00167	U	mg/L	0.45
WW007	2069G	22-Apr-2013	093641-009	Cyanide, total	ND	0.00167	U	mg/L	0.45
WW007	2069G	22-Apr-2013	093641-010	Cyanide, total	ND	0.00167	U	mg/L	0.45
WW007	2069G	22-Apr-2013	093641-011	Cyanide, total	ND	0.00167	U	mg/L	0.45
WW007	2069G	22-Apr-2013	093641-012	Cyanide, total	ND	0.00167	U	mg/L	0.45
WW007	2069G	23-Apr-2013	093629-001	Aluminum	ND	0.068	U	mg/L	900
WW007	2069G	23-Apr-2013	093629-007	Ammonia	1.21	0.017		mg/L	

TABLE A-1. Permitted Sanitary Outfalls of Inorganic Analyses, February 2013 through April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units	Regulatory Limit (ABCWUA)
WW007	2069G	23-Apr-2013	093629-001	Arsenic	ND	0.005	U	mg/L	0.051
WW007	2069G	23-Apr-2013	093629-001	Boron	0.0324	0.015	J	mg/L	
WW007	2069G	23-Apr-2013	093629-001	Cadmium	ND	0.001	U	mg/L	0.05
WW007	2069G	23-Apr-2013	093629-001	Chromium	0.00156	0.001	J	mg/L	4.1
WW007	2069G	23-Apr-2013	093629-001	Copper	ND	0.003	U	mg/L	5.3
WW007	2069G	23-Apr-2013	093629-002	Fluoride	3.18	0.033		mg/L	36
WW007	2069G	23-Apr-2013	093629-001	Lead	ND	0.0033	U	mg/L	1
WW007	2069G	23-Apr-2013	093629-001	Molybdenum	0.0216	0.002		mg/L	2
WW007	2069G	23-Apr-2013	093629-001	Nickel	ND	0.0015	U	mg/L	2
WW007	2069G	23-Apr-2013	093629-001	Selenium	0.00641	0.006	JB	mg/L	0.46
WW007	2069G	23-Apr-2013	093629-001	Silver	ND	0.001	U	mg/L	5
WW007	2069G	23-Apr-2013	093629-001	Zinc	ND	0.0033	U	mg/L	2.2
WW007	2069G	24-Apr-2013	093636-001	Aluminum	ND	0.068	U	mg/L	900
WW007	2069G	24-Apr-2013	093636-007	Ammonia	1.51	0.017		mg/L	
WW007	2069G	24-Apr-2013	093636-001	Arsenic	ND	0.005	U	mg/L	0.051
WW007	2069G	24-Apr-2013	093636-001	Boron	0.029	0.015	J	mg/L	
WW007	2069G	24-Apr-2013	093636-001	Cadmium	ND	0.001	U	mg/L	0.05
WW007	2069G	24-Apr-2013	093636-001	Chromium	0.00157	0.001	J	mg/L	4.1
WW007	2069G	24-Apr-2013	093636-001	Copper	ND	0.003	U	mg/L	5.3
WW007	2069G	24-Apr-2013	093636-002	Fluoride	1.73	0.033		mg/L	36
WW007	2069G	24-Apr-2013	093636-001	Lead	ND	0.0033	U	mg/L	1
WW007	2069G	24-Apr-2013	093636-001	Molybdenum	0.02	0.002		mg/L	2
WW007	2069G	24-Apr-2013	093636-001	Nickel	ND	0.0015	U	mg/L	2
WW007	2069G	24-Apr-2013	093636-001	Selenium	0.00987	0.006	JB	mg/L	0.46
WW007	2069G	24-Apr-2013	093636-001	Silver	ND	0.001	U	mg/L	5
WW007	2069G	24-Apr-2013	093636-001	Zinc	ND	0.0033	U	mg/L	2.2
WW008	2069I	22-Apr-2013	093642-009	Cyanide, total	ND	0.00167	U	mg/L	0.45
WW008	2069I	22-Apr-2013	093642-010	Cyanide, total	ND	0.00167	U	mg/L	0.45
WW008	2069I	22-Apr-2013	093642-011	Cyanide, total	0.0023	0.00167	J	mg/L	0.45
WW008	2069I	22-Apr-2013	093642-012	Cyanide, total	ND	0.00167	U	mg/L	0.45
WW008	2069I	23-Apr-2013	093630-001	Aluminum	0.122	0.068	J	mg/L	900
WW008	2069I	23-Apr-2013	093630-007	Ammonia	3.87	0.085		mg/L	
WW008	2069I	23-Apr-2013	093630-001	Arsenic	0.00639	0.005	J	mg/L	0.051
WW008	2069I	23-Apr-2013	093630-001	Boron	0.0852	0.015		mg/L	

TABLE A-1. Permitted Sanitary Outfalls of Inorganic Analyses, February 2013 through April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units	Regulatory Limit (ABCWUA)
WW008	2069I	23-Apr-2013	093630-001	Cadmium	ND	0.001	U	mg/L	0.05
WW008	2069I	23-Apr-2013	093630-001	Chromium	0.00286	0.001	J	mg/L	4.1
WW008	2069I	23-Apr-2013	093630-001	Copper	0.0672	0.003		mg/L	5.3
WW008	2069I	23-Apr-2013	093630-002	Fluoride	0.797	0.033		mg/L	36
WW008	2069I	23-Apr-2013	093630-001	Lead	0.00452	0.0033	J	mg/L	1
WW008	2069I	23-Apr-2013	093630-001	Molybdenum	0.093	0.002		mg/L	2
WW008	2069I	23-Apr-2013	093630-001	Nickel	0.00307	0.0015	J	mg/L	2
WW008	2069I	23-Apr-2013	093630-001	Selenium	0.00609	0.006	JB	mg/L	0.46
WW008	2069I	23-Apr-2013	093630-001	Silver	ND	0.001	U	mg/L	5
WW008	2069I	23-Apr-2013	093630-001	Zinc	0.0737	0.0033		mg/L	2.2
WW008	2069I	24-Apr-2013	093637-001	Aluminum	ND	0.068	U	mg/L	900
WW008	2069I	24-Apr-2013	093637-007	Ammonia	27.5	0.425		mg/L	
WW008	2069I	24-Apr-2013	093637-001	Arsenic	ND	0.005	U	mg/L	0.051
WW008	2069I	24-Apr-2013	093637-001	Boron	0.0759	0.015		mg/L	
WW008	2069I	24-Apr-2013	093637-001	Cadmium	ND	0.001	U	mg/L	0.05
WW008	2069I	24-Apr-2013	093637-001	Chromium	0.00202	0.001	J	mg/L	4.1
WW008	2069I	24-Apr-2013	093637-001	Copper	0.0351	0.003		mg/L	5.3
WW008	2069I	24-Apr-2013	093637-002	Fluoride	0.661	0.033		mg/L	36
WW008	2069I	24-Apr-2013	093637-001	Lead	ND	0.0033	U	mg/L	1
WW008	2069I	24-Apr-2013	093637-001	Molybdenum	0.00532	0.002	J	mg/L	2
WW008	2069I	24-Apr-2013	093637-001	Nickel	ND	0.0015	U	mg/L	2
WW008	2069I	24-Apr-2013	093637-001	Selenium	0.0105	0.006	JB	mg/L	0.46
WW008	2069I	24-Apr-2013	093637-001	Silver	ND	0.001	U	mg/L	5
WW008	2069I	24-Apr-2013	093637-001	Zinc	0.0431	0.0033		mg/L	2.2
WW011	2069K	23-Apr-2013	093631-001	Aluminum	ND	0.068	U	mg/L	900
WW011	2069K	23-Apr-2013	093631-007	Ammonia	21.5	0.425		mg/L	
WW011	2069K	23-Apr-2013	093631-001	Arsenic	ND	0.005	U	mg/L	0.051
WW011	2069K	23-Apr-2013	093631-001	Boron	0.0653	0.015		mg/L	
WW011	2069K	23-Apr-2013	093631-001	Cadmium	ND	0.001	U	mg/L	0.05
WW011	2069K	23-Apr-2013	093631-001	Chromium	0.00294	0.001	J	mg/L	4.1
WW011	2069K	23-Apr-2013	093631-001	Copper	0.0581	0.003		mg/L	5.3
WW011	2069K	23-Apr-2013	093631-002	Fluoride	0.726	0.033		mg/L	36
WW011	2069K	23-Apr-2013	093631-001	Lead	0.00499	0.0033	J	mg/L	1
WW011	2069K	23-Apr-2013	093631-001	Molybdenum	0.11	0.002		mg/L	2

TABLE A-1. Permitted Sanitary Outfalls of Inorganic Analyses, February 2013 through April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units	Regulatory Limit (ABCWUA)
WW011	2069K	23-Apr-2013	093631-001	Nickel	0.00309	0.0015	J	mg/L	2
WW011	2069K	23-Apr-2013	093631-001	Selenium	0.0168	0.006	JB	mg/L	0.46
WW011	2069K	23-Apr-2013	093631-001	Silver	0.00119	0.001	J	mg/L	5
WW011	2069K	23-Apr-2013	093631-001	Zinc	0.0894	0.0033		mg/L	2.2
WW011	2069K	24-Apr-2013	093638-001	Aluminum	0.127	0.068	J	mg/L	900
WW011	2069K	24-Apr-2013	093638-007	Ammonia	19.3	0.425		mg/L	
WW011	2069K	24-Apr-2013	093638-001	Arsenic	ND	0.005	U	mg/L	0.051
WW011	2069K	24-Apr-2013	093638-001	Boron	0.069	0.015		mg/L	
WW011	2069K	24-Apr-2013	093638-001	Cadmium	ND	0.001	U	mg/L	0.05
WW011	2069K	24-Apr-2013	093638-001	Chromium	0.00382	0.001	J	mg/L	4.1
WW011	2069K	24-Apr-2013	093638-001	Copper	0.0542	0.003		mg/L	5.3
WW011	2069K	24-Apr-2013	093638-002	Fluoride	0.774	0.033		mg/L	36
WW011	2069K	24-Apr-2013	093638-001	Lead	0.0042	0.0033	J	mg/L	1
WW011	2069K	24-Apr-2013	093638-001	Molybdenum	0.0953	0.002		mg/L	2
WW011	2069K	24-Apr-2013	093638-001	Nickel	0.00268	0.0015	J	mg/L	2
WW011	2069K	24-Apr-2013	093638-001	Selenium	0.0135	0.006	JB	mg/L	0.46
WW011	2069K	24-Apr-2013	093638-001	Silver	ND	0.001	U	mg/L	5
WW011	2069K	24-Apr-2013	093638-001	Zinc	0.0825	0.0033		mg/L	2.2

NOTES:

ABCWUA = Albuquerque Bernalillo County Water Utility Authority
B = The analyte is detected in the associated laboratory method blank.
ND = The analyte was not detected (at MDL).
MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
mg/L = milligrams per liter
J = The associated value is an estimated quantity.
U = The analyte was analyzed for but was not detected.

TABLE A-2. Summary of Sanitary Outfalls of Radiological Analyses, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Activity	Two Sigma Error	Laboratory Data Qualifier	MDA	Units
CINT	2238A	23-Apr-2013	093632-004	Actinium-228	0.747	13.6	U	12.6	pCi/L
CINT	2238A	23-Apr-2013	093632-003	Alpha, gross	0.392	0.984	U	1.76	pCi/L
CINT	2238A	23-Apr-2013	093632-004	Americium-241	1.3	6.82	U	9.97	pCi/L
CINT	2238A	23-Apr-2013	093632-004	Beryllium-7	8.11	15.4	U	26.2	pCi/L
CINT	2238A	23-Apr-2013	093632-003	Beta, gross	1.2	1.07	U	1.75	pCi/L
CINT	2238A	23-Apr-2013	093632-004	Bismuth-212	-12.4	40.2	U	43.5	pCi/L
CINT	2238A	23-Apr-2013	093632-004	Bismuth-214	4.33	8.8	U	7.33	pCi/L
CINT	2238A	23-Apr-2013	093632-004	Cesium-137	-1.41	1.83	U	2.94	pCi/L
CINT	2238A	23-Apr-2013	093632-004	Cobalt-60	2.09	2.08	U	3.48	pCi/L
CINT	2238A	23-Apr-2013	093632-004	Lead-212	0.553	6.25	U	5	pCi/L
CINT	2238A	23-Apr-2013	093632-004	Lead-214	0.181	7.05	U	6.69	pCi/L
CINT	2238A	23-Apr-2013	093632-004	Neptunium-237	0.388	3.29	U	5.78	pCi/L
CINT	2238A	23-Apr-2013	093632-004	Potassium-40	-7.72	37	U	43.3	pCi/L
CINT	2238A	23-Apr-2013	093632-004	Radium-223	23.7	53.4	U	55.5	pCi/L
CINT	2238A	23-Apr-2013	093632-004	Radium-224	66.8	47.8	U	66.8	pCi/L
CINT	2238A	23-Apr-2013	093632-004	Radium-226	-26.1	66.4	U	73.9	pCi/L
CINT	2238A	23-Apr-2013	093632-004	Radium-228	0.747	13.6	U	12.6	pCi/L
CINT	2238A	23-Apr-2013	093632-004	Sodium-22	-0.0588	1.77	U	3.16	pCi/L
CINT	2238A	23-Apr-2013	093632-004	Thorium-227	0.0505	13.5	U	22.6	pCi/L
CINT	2238A	23-Apr-2013	093632-004	Thorium-231	-22.6	34.3	U	35.1	pCi/L
CINT	2238A	23-Apr-2013	093632-004	Thorium-234	7.09	91.1	U	110	pCi/L
CINT	2238A	23-Apr-2013	093632-005	Tritium	10.4	68.1	U	123	pCi/L
CINT	2238A	23-Apr-2013	093632-004	Uranium-235	-9.89	16.4	U	17.9	pCi/L
CINT	2238A	23-Apr-2013	093632-004	Uranium-238	7.09	91.1	U	110	pCi/L
WW001	2069A	23-Apr-2013	093627-004	Actinium-228	15.4	20.7	U	20.1	pCi/L
WW001	2069A	23-Apr-2013	093627-003	Alpha, gross	0.597	1.49	U	2.59	pCi/L
WW001	2069A	23-Apr-2013	093627-004	Americium-241	2.06	3.5	U	5.46	pCi/L
WW001	2069A	23-Apr-2013	093627-004	Beryllium-7	-2.69	19.5	U	32.8	pCi/L
WW001	2069A	23-Apr-2013	093627-003	Beta, gross	16.3	3.49		3.08	pCi/L
WW001	2069A	23-Apr-2013	093627-004	Bismuth-212	21.3	33.7	U	58.3	pCi/L
WW001	2069A	23-Apr-2013	093627-004	Bismuth-214	1.74	8.53	U	9.5	pCi/L
WW001	2069A	23-Apr-2013	093627-004	Cesium-137	0.749	3.52	U	4.12	pCi/L
WW001	2069A	23-Apr-2013	093627-004	Cobalt-60	-0.228	2.38	U	4.19	pCi/L

TABLE A-2. Summary of Sanitary Outfalls of Radiological Analyses, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Activity	Two Sigma Error	Laboratory Data Qualifier	MDA	Units
WW001	2069A	23-Apr-2013	093627-004	Lead-212	0.944	6.91	U	7.63	pCi/L
WW001	2069A	23-Apr-2013	093627-004	Lead-214	0.431	7.25	U	8.84	pCi/L
WW001	2069A	23-Apr-2013	093627-004	Neptunium-237	0.718	4	U	6.97	pCi/L
WW001	2069A	23-Apr-2013	093627-004	Potassium-40	62.7	41.4		41.4	pCi/L
WW001	2069A	23-Apr-2013	093627-004	Radium-223	21.7	44.4	U	67.5	pCi/L
WW001	2069A	23-Apr-2013	093627-004	Radium-224	94.5	59.8	U	94.5	pCi/L
WW001	2069A	23-Apr-2013	093627-004	Radium-226	15.6	87.7	U	60.8	pCi/L
WW001	2069A	23-Apr-2013	093627-004	Radium-228	15.4	20.7	U	20.1	pCi/L
WW001	2069A	23-Apr-2013	093627-004	Sodium-22	0.405	2.53	U	4.52	pCi/L
WW001	2069A	23-Apr-2013	093627-004	Thorium-227	-6.62	14.7	U	24.9	pCi/L
WW001	2069A	23-Apr-2013	093627-004	Thorium-231	-21.8	26.2	U	29.6	pCi/L
WW001	2069A	23-Apr-2013	093627-004	Thorium-234	17	72.4	U	52.6	pCi/L
WW001	2069A	23-Apr-2013	093627-005	Tritium	0	68.4	U	125	pCi/L
WW001	2069A	23-Apr-2013	093627-004	Uranium-235	2.16	17.2	U	17.9	pCi/L
WW001	2069A	23-Apr-2013	093627-004	Uranium-238	17	72.4	U	52.6	pCi/L
WW006	2069F	23-Apr-2013	093628-004	Actinium-228	12.5	11.8	U	13.7	pCi/L
WW006	2069F	23-Apr-2013	093628-003	Alpha, gross	3.35	1.98		2.86	pCi/L
WW006	2069F	23-Apr-2013	093628-004	Americium-241	0.0431	10.4	U	15.4	pCi/L
WW006	2069F	23-Apr-2013	093628-004	Beryllium-7	-1.94	17.2	U	30.1	pCi/L
WW006	2069F	23-Apr-2013	093628-003	Beta, gross	26.6	5.23		3.98	pCi/L
WW006	2069F	23-Apr-2013	093628-004	Bismuth-212	19.7	34	U	50.9	pCi/L
WW006	2069F	23-Apr-2013	093628-004	Bismuth-214	9.7	6.81	U	9.7	pCi/L
WW006	2069F	23-Apr-2013	093628-004	Cesium-137	1.53	2.18	U	3.69	pCi/L
WW006	2069F	23-Apr-2013	093628-004	Cobalt-60	-1.88	1.98	U	2.93	pCi/L
WW006	2069F	23-Apr-2013	093628-004	Lead-212	0.788	6.74	U	6.25	pCi/L
WW006	2069F	23-Apr-2013	093628-004	Lead-214	0.517	8.71	U	7.87	pCi/L
WW006	2069F	23-Apr-2013	093628-004	Neptunium-237	-3.77	4.41	U	6.67	pCi/L
WW006	2069F	23-Apr-2013	093628-004	Potassium-40	-24.5	35.1	U	44.5	pCi/L
WW006	2069F	23-Apr-2013	093628-004	Radium-223	-24.3	40.7	U	64.9	pCi/L
WW006	2069F	23-Apr-2013	093628-004	Radium-224	47.9	46.3	U	63.3	pCi/L
WW006	2069F	23-Apr-2013	093628-004	Radium-226	-56.5	72.6	U	76	pCi/L
WW006	2069F	23-Apr-2013	093628-004	Radium-228	12.5	11.8	U	13.7	pCi/L
WW006	2069F	23-Apr-2013	093628-004	Sodium-22	-0.333	1.82	U	3.2	pCi/L

TABLE A-2. Summary of Sanitary Outfalls of Radiological Analyses, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Activity	Two Sigma Error	Laboratory Data Qualifier	MDA	Units
WW006	2069F	23-Apr-2013	093628-004	Thorium-227	-7.45	15.7	U	25.7	pCi/L
WW006	2069F	23-Apr-2013	093628-004	Thorium-231	-16.5	40.1	U	41	pCi/L
WW006	2069F	23-Apr-2013	093628-004	Thorium-234	102	156	U	136	pCi/L
WW006	2069F	23-Apr-2013	093628-005	Tritium	-10.6	67.2	U	125	pCi/L
WW006	2069F	23-Apr-2013	093628-004	Uranium-235	-7.9	17.6	U	19.8	pCi/L
WW006	2069F	23-Apr-2013	093628-004	Uranium-238	102	156	U	136	pCi/L
WW008	2069I	23-Apr-2013	093630-004	Actinium-228	5.8	11.3	U	11.1	pCi/L
WW008	2069I	23-Apr-2013	093630-003	Alpha, gross	2.4	0.924		1.01	pCi/L
WW008	2069I	23-Apr-2013	093630-004	Americium-241	3.67	6.82	U	9.99	pCi/L
WW008	2069I	23-Apr-2013	093630-004	Beryllium-7	-2.34	12.7	U	22.4	pCi/L
WW008	2069I	23-Apr-2013	093630-003	Beta, gross	15	2.76		1.4	pCi/L
WW008	2069I	23-Apr-2013	093630-004	Bismuth-212	20.2	25	U	36.3	pCi/L
WW008	2069I	23-Apr-2013	093630-004	Bismuth-214	1.34	6.42	U	5.42	pCi/L
WW008	2069I	23-Apr-2013	093630-004	Cesium-137	0.81	1.72	U	2.77	pCi/L
WW008	2069I	23-Apr-2013	093630-004	Cobalt-60	0.385	1.67	U	3.02	pCi/L
WW008	2069I	23-Apr-2013	093630-004	Lead-212	1.15	5.17	U	4.13	pCi/L
WW008	2069I	23-Apr-2013	093630-004	Lead-214	0.804	6.4	U	6.02	pCi/L
WW008	2069I	23-Apr-2013	093630-004	Neptunium-237	-0.132	2.85	U	4.86	pCi/L
WW008	2069I	23-Apr-2013	093630-004	Potassium-40	9.09	33.1	U	24.8	pCi/L
WW008	2069I	23-Apr-2013	093630-004	Radium-223	-10.4	28.8	U	47.7	pCi/L
WW008	2069I	23-Apr-2013	093630-004	Radium-224	42.9	35.7	U	47.6	pCi/L
WW008	2069I	23-Apr-2013	093630-004	Radium-226	23	62.5	U	45.7	pCi/L
WW008	2069I	23-Apr-2013	093630-004	Radium-228	5.8	11.3	U	11.1	pCi/L
WW008	2069I	23-Apr-2013	093630-004	Sodium-22	0.899	1.43	U	2.61	pCi/L
WW008	2069I	23-Apr-2013	093630-004	Thorium-227	-2.42	11.3	U	19.1	pCi/L
WW008	2069I	23-Apr-2013	093630-004	Thorium-231	21.8	34.5	U	29.6	pCi/L
WW008	2069I	23-Apr-2013	093630-004	Thorium-234	57.1	101	U	113	pCi/L
WW008	2069I	23-Apr-2013	093630-005	Tritium	31.5	71.2	U	124	pCi/L
WW008	2069I	23-Apr-2013	093630-004	Uranium-235	-12.2	14.9	U	15.7	pCi/L
WW008	2069I	23-Apr-2013	093630-004	Uranium-238	57.1	101	U	113	pCi/L
WW011	2069K	23-Apr-2013	093631-004	Actinium-228	7.22	12.3	U	9.58	pCi/L
WW011	2069K	23-Apr-2013	093631-003	Alpha, gross	4.32	2.34		3.06	pCi/L
WW011	2069K	23-Apr-2013	093631-004	Americium-241	-9.1	7.31	U	9.08	pCi/L

TABLE A-2. Summary of Sanitary Outfalls of Radiological Analyses, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Activity	Two Sigma Error	Laboratory Data Qualifier	MDA	Units
WW011	2069K	23-Apr-2013	093631-004	Beryllium-7	-8.85	20.5	U	23.9	pCi/L
WW011	2069K	23-Apr-2013	093631-003	Beta, gross	26.5	5.36		3.85	pCi/L
WW011	2069K	23-Apr-2013	093631-004	Bismuth-212	15.4	22.5	U	38.5	pCi/L
WW011	2069K	23-Apr-2013	093631-004	Bismuth-214	7.83	7.05		5.58	pCi/L
WW011	2069K	23-Apr-2013	093631-004	Cesium-137	-0.191	1.6	U	2.78	pCi/L
WW011	2069K	23-Apr-2013	093631-004	Cobalt-60	0.947	2.96	U	3.27	pCi/L
WW011	2069K	23-Apr-2013	093631-004	Lead-212	1.59	5.5	U	5.15	pCi/L
WW011	2069K	23-Apr-2013	093631-004	Lead-214	10.6	7.23	U	10.7	pCi/L
WW011	2069K	23-Apr-2013	093631-004	Neptunium-237	1.95	3.2	U	5.33	pCi/L
WW011	2069K	23-Apr-2013	093631-004	Potassium-40	10.8	32.2	U	42.6	pCi/L
WW011	2069K	23-Apr-2013	093631-004	Radium-223	10.5	31.5	U	53.3	pCi/L
WW011	2069K	23-Apr-2013	093631-004	Radium-224	27.6	34.6	U	49.8	pCi/L
WW011	2069K	23-Apr-2013	093631-004	Radium-226	-22.1	58.4	U	63.7	pCi/L
WW011	2069K	23-Apr-2013	093631-004	Radium-228	7.22	12.3	U	9.58	pCi/L
WW011	2069K	23-Apr-2013	093631-004	Sodium-22	-0.906	1.61	U	2.69	pCi/L
WW011	2069K	23-Apr-2013	093631-004	Thorium-227	-10.7	13.2	U	20.2	pCi/L
WW011	2069K	23-Apr-2013	093631-004	Thorium-231	-14.8	28.3	U	30.7	pCi/L
WW011	2069K	23-Apr-2013	093631-004	Thorium-234	-66.8	81.4	U	91.5	pCi/L
WW011	2069K	23-Apr-2013	093631-005	Tritium	-25.9	64.3	U	123	pCi/L
WW011	2069K	23-Apr-2013	093631-004	Uranium-235	-6.79	14.9	U	16	pCi/L
WW011	2069K	23-Apr-2013	093631-004	Uranium-238	-66.8	81.4	U	91.5	pCi/L

NOTES:

MDA = minimum detectable activity
pCi/L = picocuries per liter
U = The result is less than the MDA.

TABLE A-3. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
CINT	2238A	24-Apr-2013	093639-008	1,1'-Biphenyl	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Acenaphthene	ND	0.286	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Acenaphthylene	ND	0.286	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Acetophenone	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Anthracene	ND	0.286	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Atrazine	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Benzaldehyde	ND	4.76	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Benzo(a)anthracene	ND	0.286	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Benzo(a)pyrene	ND	0.419	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Benzo(b)fluoranthene	ND	0.286	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Benzo(ghi)perylene	ND	0.286	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Benzo(k)fluoranthene	ND	0.286	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Bromophenyl phenyl ether, 4-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Butylbenzyl phthalate	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Caprolactam	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Carbazole	ND	0.286	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Chloro-3-methylphenol, 4-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Chlorobenzenamine, 4-	ND	3.14	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Chloroethoxy)methane, bis(2-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Chloroethyl)ether, bis(2-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Chloronaphthalene, 2-	ND	0.286	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Chlorophenol, 2-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Chlorophenyl phenyl ether, 4-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Chrysene	ND	0.286	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Cresol, m,p-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Cresol, o-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Di-n-butyl phthalate	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Di-n-octyl phthalate	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Dibenz[a,h]anthracene	ND	0.286	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Dibenzofuran	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Dichlorobenzidine, 3,3'-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Dichlorodiisopropyl ether, 2,2'-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Dichlorophenol, 2,4-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Diethylphthalate	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Dimethylphenol, 2,4-	ND	2.86	U	µg/L

TABLE A-3. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
CINT	2238A	24-Apr-2013	093639-008	Dimethylphthalate	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Dinitro-o-cresol	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Dinitrophenol, 2,4-	ND	4.76	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Dinitrotoluene, 2,4-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Dinitrotoluene, 2,6-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Dioxane, 1,4-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Diphenyl amine	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Ethylhexyl)phthalate, bis(2-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Fluoranthene	ND	0.286	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Fluorene	ND	0.286	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Hexachlorobenzene	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Hexachlorobutadiene	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Hexachlorocyclopentadiene	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Hexachloroethane	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Indeno(1,2,3-c,d)pyrene	ND	0.286	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Isophorone	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Methylnaphthalene, 2-	ND	0.286	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Naphthalene	ND	0.286	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Nitro-benzene	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Nitroaniline, 2-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Nitroaniline, 3-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Nitroaniline, 4-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Nitrophenol, 2-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Nitrophenol, 4-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Nitrosodipropylamine, n-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Pentachlorophenol	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Phenanthrene	ND	0.286	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Phenol	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Pyrene	ND	0.286	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Trichlorobenzene, 1,2,4-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Trichlorophenol, 2,4,5-	ND	2.86	U	µg/L
CINT	2238A	24-Apr-2013	093639-008	Trichlorophenol, 2,4,6-	ND	2.86	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	1,1'-Biphenyl	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Acenaphthene	ND	0.3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Acenaphthylene	ND	0.3	U	µg/L

TABLE A-3. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW001	2069A	24-Apr-2013	093634-008	Acetophenone	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Anthracene	ND	0.3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Atrazine	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Benzaldehyde	ND	5	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Benzo(a)anthracene	ND	0.3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Benzo(a)pyrene	ND	0.44	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Benzo(b)fluoranthene	ND	0.3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Benzo(ghi)perylene	ND	0.3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Benzo(k)fluoranthene	ND	0.3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Bromophenyl phenyl ether, 4-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Butylbenzyl phthalate	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Caprolactam	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Carbazole	ND	0.3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Chloro-3-methylphenol, 4-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Chlorobenzenamine, 4-	ND	3.3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Chloroethoxy)methane, bis(2-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Chloroethyl)ether, bis(2-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Chloronaphthalene, 2-	ND	0.3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Chlorophenol, 2-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Chlorophenyl phenyl ether, 4-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Chrysene	ND	0.3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Cresol, m,p-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Cresol, o-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Di-n-butyl phthalate	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Di-n-octyl phthalate	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Dibenz[a,h]anthracene	ND	0.3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Dibenzofuran	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Dichlorobenzidine, 3,3'-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Dichlorodiisopropyl ether, 2,2'-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Dichlorophenol, 2,4-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Diethylphthalate	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Dimethylphenol, 2,4-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Dimethylphthalate	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Dinitro-o-cresol	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Dinitrophenol, 2,4-	ND	5	U	µg/L

TABLE A-3. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW001	2069A	24-Apr-2013	093634-008	Dinitrotoluene, 2,4-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Dinitrotoluene, 2,6-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Dioxane, 1,4-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Diphenyl amine	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Ethylhexyl)phthalate, bis(2-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Fluoranthene	ND	0.3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Fluorene	ND	0.3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Hexachlorobenzene	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Hexachlorobutadiene	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Hexachlorocyclopentadiene	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Hexachloroethane	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Indeno(1,2,3-c,d)pyrene	ND	0.3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Isophorone	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Methylnaphthalene, 2-	ND	0.3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Naphthalene	ND	0.3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Nitro-benzene	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Nitroaniline, 2-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Nitroaniline, 3-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Nitroaniline, 4-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Nitrophenol, 2-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Nitrophenol, 4-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Nitrosodipropylamine, n-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Pentachlorophenol	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Phenanthrene	ND	0.3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Phenol	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Pyrene	ND	0.3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Trichlorobenzene, 1,2,4-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Trichlorophenol, 2,4,5-	ND	3	U	µg/L
WW001	2069A	24-Apr-2013	093634-008	Trichlorophenol, 2,4,6-	ND	3	U	µg/L
WW006	2069F	24-Apr-2013	093635-008	1,1'-Biphenyl	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Acenaphthene	ND	0.286	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Acenaphthylene	ND	0.286	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Acetophenone	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Anthracene	ND	0.286	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Atrazine	ND	2.86	Uh	µg/L

TABLE A-3. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW006	2069F	24-Apr-2013	093635-008	Benzaldehyde	ND	4.76	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Benzo(a)anthracene	ND	0.286	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Benzo(a)pyrene	ND	0.419	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Benzo(b)fluoranthene	ND	0.286	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Benzo(ghi)perylene	ND	0.286	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Benzo(k)fluoranthene	ND	0.286	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Bromophenyl phenyl ether, 4-	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Butylbenzyl phthalate	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Caprolactam	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Carbazole	ND	0.286	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Chloro-3-methylphenol, 4-	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Chlorobenzenamine, 4-	ND	3.14	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Chloroethoxy)methane, bis(2-	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Chloroethyl)ether, bis(2-	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Chloronaphthalene, 2-	ND	0.286	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Chlorophenol, 2-	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Chlorophenyl phenyl ether, 4-	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Chrysene	ND	0.286	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Cresol, m,p-	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Cresol, o-	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Di-n-butyl phthalate	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Di-n-octyl phthalate	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Dibenz[a,h]anthracene	ND	0.286	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Dibenzofuran	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Dichlorobenzidine, 3,3'-	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Dichlorodiisopropyl ether, 2,2'-	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Dichlorophenol, 2,4-	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Diethylphthalate	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Dimethylphenol, 2,4-	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Dimethylphthalate	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Dinitro-o-cresol	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Dinitrophenol, 2,4-	ND	4.76	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Dinitrotoluene, 2,4-	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Dinitrotoluene, 2,6-	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Dioxane, 1,4-	ND	2.86	Uh	µg/L

TABLE A-3. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW006	2069F	24-Apr-2013	093635-008	Diphenyl amine	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Ethylhexyl)phthalate, bis(2-	4.22	2.86	Jh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Fluoranthene	ND	0.286	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Fluorene	ND	0.286	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Hexachlorobenzene	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Hexachlorobutadiene	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Hexachlorocyclopentadiene	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Hexachloroethane	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Indeno(1,2,3-c,d)pyrene	ND	0.286	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Isophorone	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Methylnaphthalene, 2-	ND	0.286	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Naphthalene	ND	0.286	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Nitro-benzene	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Nitroaniline, 2-	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Nitroaniline, 3-	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Nitroaniline, 4-	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Nitrophenol, 2-	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Nitrophenol, 4-	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Nitrosodipropylamine, n-	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Pentachlorophenol	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Phenanthrene	ND	0.286	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Phenol	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Pyrene	ND	0.286	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Trichlorobenzene, 1,2,4-	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Trichlorophenol, 2,4,5-	ND	2.86	Uh	µg/L
WW006	2069F	24-Apr-2013	093635-008	Trichlorophenol, 2,4,6-	ND	2.86	Uh	µg/L
WW007	2069G	24-Apr-2013	093636-008	1,1'-Biphenyl	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Acenaphthene	ND	0.288	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Acenaphthylene	ND	0.288	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Acetophenone	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Anthracene	ND	0.288	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Atrazine	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Benzaldehyde	ND	4.81	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Benzo(a)anthracene	ND	0.288	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Benzo(a)pyrene	ND	0.423	U	µg/L

TABLE A-3. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW007	2069G	24-Apr-2013	093636-008	Benzo(b)fluoranthene	ND	0.288	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Benzo(ghi)perylene	ND	0.288	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Benzo(k)fluoranthene	ND	0.288	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Bromophenyl phenyl ether, 4-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Butylbenzyl phthalate	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Caprolactam	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Carbazole	ND	0.288	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Chloro-3-methylphenol, 4-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Chlorobenzenamine, 4-	ND	3.17	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Chloroethoxy)methane, bis(2-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Chloroethyl)ether, bis(2-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Chloronaphthalene, 2-	ND	0.288	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Chlorophenol, 2-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Chlorophenyl phenyl ether, 4-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Chrysene	ND	0.288	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Cresol, m,p-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Cresol, o-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Di-n-butyl phthalate	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Di-n-octyl phthalate	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Dibenz[a,h]anthracene	ND	0.288	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Dibenzofuran	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Dichlorobenzidine, 3,3'-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Dichlorodiisopropyl ether, 2,2'-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Dichlorophenol, 2,4-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Diethylphthalate	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Dimethylphenol, 2,4-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Dimethylphthalate	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Dinitro-o-cresol	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Dinitrophenol, 2,4-	ND	4.81	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Dinitrotoluene, 2,4-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Dinitrotoluene, 2,6-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Dioxane, 1,4-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Diphenyl amine	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Ethylhexyl)phthalate, bis(2-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Fluoranthene	ND	0.288	U	µg/L

TABLE A-3. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW007	2069G	24-Apr-2013	093636-008	Fluorene	ND	0.288	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Hexachlorobenzene	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Hexachlorobutadiene	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Hexachlorocyclopentadiene	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Hexachloroethane	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Indeno(1,2,3-c,d)pyrene	ND	0.288	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Isophorone	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Methylnaphthalene, 2-	ND	0.288	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Naphthalene	ND	0.288	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Nitro-benzene	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Nitroaniline, 2-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Nitroaniline, 3-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Nitroaniline, 4-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Nitrophenol, 2-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Nitrophenol, 4-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Nitrosodipropylamine, n-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Pentachlorophenol	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Phenanthrene	ND	0.288	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Phenol	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Pyrene	ND	0.288	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Trichlorobenzene, 1,2,4-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Trichlorophenol, 2,4,5-	ND	2.88	U	µg/L
WW007	2069G	24-Apr-2013	093636-008	Trichlorophenol, 2,4,6-	ND	2.88	U	µg/L
WW008	2069I	24-Apr-2013	093637-008	1,1'-Biphenyl	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Acenaphthene	ND	0.288	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Acenaphthylene	ND	0.288	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Acetophenone	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Anthracene	ND	0.288	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Atrazine	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Benzaldehyde	ND	4.81	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Benzo(a)anthracene	ND	0.288	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Benzo(a)pyrene	ND	0.423	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Benzo(b)fluoranthene	ND	0.288	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Benzo(ghi)perylene	ND	0.288	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Benzo(k)fluoranthene	ND	0.288	Uh	µg/L

TABLE A-3. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW008	2069I	24-Apr-2013	093637-008	Bromophenyl phenyl ether, 4-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Butylbenzyl phthalate	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Caprolactam	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Carbazole	ND	0.288	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Chloro-3-methylphenol, 4-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Chlorobenzenamine, 4-	ND	3.17	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Chloroethoxy)methane, bis(2-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Chloroethyl)ether, bis(2-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Chloronaphthalene, 2-	ND	0.288	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Chlorophenol, 2-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Chlorophenyl phenyl ether, 4-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Chrysene	ND	0.288	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Cresol, m,p-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Cresol, o-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Di-n-butyl phthalate	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Di-n-octyl phthalate	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Dibenz[a,h]anthracene	ND	0.288	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Dibenzofuran	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Dichlorobenzidine, 3,3'-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Dichlorodiisopropyl ether, 2,2'-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Dichlorophenol, 2,4-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Diethylphthalate	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Dimethylphenol, 2,4-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Dimethylphthalate	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Dinitro-o-cresol	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Dinitrophenol, 2,4-	ND	4.81	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Dinitrotoluene, 2,4-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Dinitrotoluene, 2,6-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Dioxane, 1,4-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Diphenyl amine	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Ethylhexyl)phthalate, bis(2-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Fluoranthene	ND	0.288	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Fluorene	ND	0.288	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Hexachlorobenzene	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Hexachlorobutadiene	ND	2.88	Uh	µg/L

TABLE A-3. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW008	2069I	24-Apr-2013	093637-008	Hexachlorocyclopentadiene	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Hexachloroethane	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Indeno(1,2,3-c,d)pyrene	ND	0.288	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Isophorone	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Methylnaphthalene, 2-	ND	0.288	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Naphthalene	ND	0.288	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Nitro-benzene	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Nitroaniline, 2-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Nitroaniline, 3-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Nitroaniline, 4-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Nitrophenol, 2-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Nitrophenol, 4-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Nitrosodipropylamine, n-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Pentachlorophenol	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Phenanthrene	ND	0.288	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Phenol	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Pyrene	ND	0.288	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Trichlorobenzene, 1,2,4-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Trichlorophenol, 2,4,5-	ND	2.88	Uh	µg/L
WW008	2069I	24-Apr-2013	093637-008	Trichlorophenol, 2,4,6-	ND	2.88	Uh	µg/L
WW011	2069K	24-Apr-2013	093638-008	1,1'-Biphenyl	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Acenaphthene	ND	0.297	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Acenaphthylene	ND	0.297	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Acetophenone	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Anthracene	ND	0.297	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Atrazine	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Benzaldehyde	ND	4.95	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Benzo(a)anthracene	ND	0.297	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Benzo(a)pyrene	ND	0.436	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Benzo(b)fluoranthene	ND	0.297	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Benzo(ghi)perylene	ND	0.297	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Benzo(k)fluoranthene	ND	0.297	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Bromophenyl phenyl ether, 4-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Butylbenzyl phthalate	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Caprolactam	ND	2.97	U	µg/L

TABLE A-3. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW011	2069K	24-Apr-2013	093638-008	Carbazole	ND	0.297	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Chloro-3-methylphenol, 4-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Chlorobenzenamine, 4-	ND	3.27	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Chloroethoxy)methane, bis(2-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Chloroethyl)ether, bis(2-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Chloronaphthalene, 2-	ND	0.297	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Chlorophenol, 2-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Chlorophenyl phenyl ether, 4-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Chrysene	ND	0.297	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Cresol, m,p-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Cresol, o-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Di-n-butyl phthalate	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Di-n-octyl phthalate	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Dibenz[a,h]anthracene	ND	0.297	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Dibenzofuran	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Dichlorobenzidine, 3,3'-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Dichlorodiisopropyl ether, 2,2'-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Dichlorophenol, 2,4-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Diethylphthalate	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Dimethylphenol, 2,4-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Dimethylphthalate	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Dinitro-o-cresol	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Dinitrophenol, 2,4-	ND	4.95	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Dinitrotoluene, 2,4-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Dinitrotoluene, 2,6-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Dioxane, 1,4-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Diphenyl amine	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Ethylhexyl)phthalate, bis(2-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Fluoranthene	ND	0.297	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Fluorene	ND	0.297	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Hexachlorobenzene	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Hexachlorobutadiene	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Hexachlorocyclopentadiene	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Hexachloroethane	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Indeno(1,2,3-c,d)pyrene	ND	0.297	U	µg/L

TABLE A-3. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW011	2069K	24-Apr-2013	093638-008	Isophorone	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Methylnaphthalene, 2-	ND	0.297	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Naphthalene	ND	0.297	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Nitro-benzene	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Nitroaniline, 2-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Nitroaniline, 3-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Nitroaniline, 4-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Nitrophenol, 2-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Nitrophenol, 4-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Nitrosodipropylamine, n-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Pentachlorophenol	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Phenanthrene	ND	0.297	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Phenol	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Pyrene	ND	0.297	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Trichlorobenzene, 1,2,4-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Trichlorophenol, 2,4,5-	ND	2.97	U	µg/L
WW011	2069K	24-Apr-2013	093638-008	Trichlorophenol, 2,4,6-	ND	2.97	U	µg/L

NOTES:

h = Sample preparation holding time exceeded.

ND = The analyte was not detected (at MDL).

MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

J = The associated value is an estimated quantity.

µg/L = micrograms per liter

U = The analyte was analyzed for but not detected.

TABLE A-4. Summary of Sanitary Outfalls of Volatile Organic Compounds, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
CINT	2238A	23-Apr-2013	093632-006	Acetone	164	3		µg/L
CINT	2238A	23-Apr-2013	093632-006	Benzene	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Bromochloromethane	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Bromodichloromethane	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Bromoform	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Bromomethane	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Butanone, 2-	ND	2	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Carbon disulfide	ND	1.5	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Carbon tetrachloride	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Chlorobenzene	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Chloroethane	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Chloroform	0.3	0.3	J	µg/L
CINT	2238A	23-Apr-2013	093632-006	Chloromethane	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Cyclohexane	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Dibromo-3-chloropropane, 1,2-	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Dibromochloromethane	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Dibromoethane, 1,2-	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Dichlorobenzene, 1,2-	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Dichlorobenzene, 1,3-	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Dichlorobenzene, 1,4-	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Dichlorodifluoromethane	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Dichloroethane, 1,1-	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Dichloroethane, 1,2-	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Dichloroethene, 1,1-	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Dichloroethene, cis-1,2-	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Dichloroethene, trans-1,2-	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Dichloropropane, 1,2-	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Dichloropropene, cis-1,3-	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Dichloropropene, trans-1,3-	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Ethyl benzene	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Hexanone, 2-	ND	2.2	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Isopropylbenzene	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Methyl Acetate	ND	1.5	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Methylcyclohexane	ND	3	U	µg/L

TABLE A-4. Summary of Sanitary Outfalls of Volatile Organic Compounds, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
CINT	2238A	23-Apr-2013	093632-006	Methylene chloride	ND	3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Pentanone, 4-methyl-, 2-	ND	1.5	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Styrene	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Tert-butyl methyl ether	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Tetrachloroethane, 1,1,2,2-	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Tetrachloroethene	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Toluene	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-	ND	1.5	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Trichlorobenzene, 1,2,3-	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Trichlorobenzene, 1,2,4-	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Trichloroethane, 1,1,1-	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Trichloroethane, 1,1,2-	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Trichloroethene	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Trichlorofluoromethane	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Vinyl chloride	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Xylene	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Xylene, m- & p-	ND	0.3	U	µg/L
CINT	2238A	23-Apr-2013	093632-006	Xylene, o-	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Acetone	53.8	3		µg/L
WW001	2069A	23-Apr-2013	093627-006	Benzene	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Bromochloromethane	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Bromodichloromethane	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Bromoform	2.49	0.3		µg/L
WW001	2069A	23-Apr-2013	093627-006	Bromomethane	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Butanone, 2-	ND	2	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Carbon disulfide	ND	1.5	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Carbon tetrachloride	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Chlorobenzene	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Chloroethane	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Chloroform	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Chloromethane	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Cyclohexane	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Dibromo-3-chloropropane, 1,2-	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Dibromochloromethane	0.37	0.3	J	µg/L

TABLE A-4. Summary of Sanitary Outfalls of Volatile Organic Compounds, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW001	2069A	23-Apr-2013	093627-006	Dibromoethane, 1,2-	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Dichlorobenzene, 1,2-	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Dichlorobenzene, 1,3-	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Dichlorobenzene, 1,4-	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Dichlorodifluoromethane	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Dichloroethane, 1,1-	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Dichloroethane, 1,2-	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Dichloroethene, 1,1-	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Dichloroethene, cis-1,2-	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Dichloroethene, trans-1,2-	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Dichloropropane, 1,2-	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Dichloropropene, cis-1,3-	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Dichloropropene, trans-1,3-	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Ethyl benzene	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Hexanone, 2-	ND	2.2	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Isopropylbenzene	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Methyl Acetate	ND	1.5	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Methylcyclohexane	ND	3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Methylene chloride	ND	3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Pentanone, 4-methyl-, 2-	ND	1.5	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Styrene	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Tert-butyl methyl ether	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Tetrachloroethane, 1,1,2,2-	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Tetrachloroethene	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Toluene	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-	ND	1.5	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Trichlorobenzene, 1,2,3-	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Trichlorobenzene, 1,2,4-	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Trichloroethane, 1,1,1-	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Trichloroethane, 1,1,2-	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Trichloroethene	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Trichlorofluoromethane	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Vinyl chloride	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Xylene	ND	0.3	U	µg/L

TABLE A-4. Summary of Sanitary Outfalls of Volatile Organic Compounds, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW001	2069A	23-Apr-2013	093627-006	Xylene, m- & p-	ND	0.3	U	µg/L
WW001	2069A	23-Apr-2013	093627-006	Xylene, o-	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Acetone	34.9	3		µg/L
WW006	2069F	23-Apr-2013	093628-006	Benzene	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Bromochloromethane	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Bromodichloromethane	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Bromoform	0.83	0.3	J	µg/L
WW006	2069F	23-Apr-2013	093628-006	Bromomethane	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Butanone, 2-	2.29	2	J	µg/L
WW006	2069F	23-Apr-2013	093628-006	Carbon disulfide	ND	1.5	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Carbon tetrachloride	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Chlorobenzene	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Chloroethane	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Chloroform	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Chloromethane	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Cyclohexane	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Dibromo-3-chloropropane, 1,2-	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Dibromochloromethane	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Dibromoethane, 1,2-	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Dichlorobenzene, 1,2-	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Dichlorobenzene, 1,3-	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Dichlorobenzene, 1,4-	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Dichlorodifluoromethane	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Dichloroethane, 1,1-	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Dichloroethane, 1,2-	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Dichloroethene, 1,1-	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Dichloroethene, cis-1,2-	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Dichloroethene, trans-1,2-	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Dichloropropane, 1,2-	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Dichloropropene, cis-1,3-	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Dichloropropene, trans-1,3-	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Ethyl benzene	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Hexanone, 2-	ND	2.2	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Isopropylbenzene	ND	0.3	U	µg/L

TABLE A-4. Summary of Sanitary Outfalls of Volatile Organic Compounds, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW006	2069F	23-Apr-2013	093628-006	Methyl Acetate	ND	1.5	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Methylcyclohexane	ND	3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Methylene chloride	ND	3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Pentanone, 4-methyl-, 2-	ND	1.5	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Styrene	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Tert-butyl methyl ether	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Tetrachloroethane, 1,1,2,2-	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Tetrachloroethene	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Toluene	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-	ND	1.5	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Trichlorobenzene, 1,2,3-	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Trichlorobenzene, 1,2,4-	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Trichloroethane, 1,1,1-	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Trichloroethane, 1,1,2-	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Trichloroethene	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Trichlorofluoromethane	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Vinyl chloride	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Xylene	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Xylene, m- & p-	ND	0.3	U	µg/L
WW006	2069F	23-Apr-2013	093628-006	Xylene, o-	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Acetone	26.8	3		µg/L
WW007	2069G	23-Apr-2013	093629-006	Benzene	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Bromochloromethane	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Bromodichloromethane	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Bromoform	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Bromomethane	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Butanone, 2-	ND	2	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Carbon disulfide	ND	1.5	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Carbon tetrachloride	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Chlorobenzene	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Chloroethane	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Chloroform	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Chloromethane	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Cyclohexane	ND	0.3	U	µg/L

TABLE A-4. Summary of Sanitary Outfalls of Volatile Organic Compounds, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW007	2069G	23-Apr-2013	093629-006	Dibromo-3-chloropropane, 1,2-	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Dibromochloromethane	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Dibromoethane, 1,2-	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Dichlorobenzene, 1,2-	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Dichlorobenzene, 1,3-	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Dichlorobenzene, 1,4-	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Dichlorodifluoromethane	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Dichloroethane, 1,1-	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Dichloroethane, 1,2-	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Dichloroethene, 1,1-	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Dichloroethene, cis-1,2-	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Dichloroethene, trans-1,2-	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Dichloropropane, 1,2-	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Dichloropropene, cis-1,3-	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Dichloropropene, trans-1,3-	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Ethyl benzene	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Hexanone, 2-	ND	2.2	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Isopropylbenzene	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Methyl Acetate	ND	1.5	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Methylcyclohexane	ND	3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Methylene chloride	ND	3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Pentanone, 4-methyl-, 2-	ND	1.5	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Styrene	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Tert-butyl methyl ether	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Tetrachloroethane, 1,1,2,2-	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Tetrachloroethene	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Toluene	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-	ND	1.5	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Trichlorobenzene, 1,2,3-	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Trichlorobenzene, 1,2,4-	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Trichloroethane, 1,1,1-	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Trichloroethane, 1,1,2-	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Trichloroethene	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Trichlorofluoromethane	ND	0.3	U	µg/L

TABLE A-4. Summary of Sanitary Outfalls of Volatile Organic Compounds, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW007	2069G	23-Apr-2013	093629-006	Vinyl chloride	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Xylene	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Xylene, m- & p-	ND	0.3	U	µg/L
WW007	2069G	23-Apr-2013	093629-006	Xylene, o-	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Acetone	10.9	3		µg/L
WW008	2069I	23-Apr-2013	093630-006	Benzene	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Bromochloromethane	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Bromodichloromethane	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Bromoform	5.04	0.3		µg/L
WW008	2069I	23-Apr-2013	093630-006	Bromomethane	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Butanone, 2-	ND	2	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Carbon disulfide	ND	1.5	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Carbon tetrachloride	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Chlorobenzene	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Chloroethane	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Chloroform	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Chloromethane	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Cyclohexane	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Dibromo-3-chloropropane, 1,2-	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Dibromochloromethane	0.34	0.3	J	µg/L
WW008	2069I	23-Apr-2013	093630-006	Dibromoethane, 1,2-	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Dichlorobenzene, 1,2-	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Dichlorobenzene, 1,3-	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Dichlorobenzene, 1,4-	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Dichlorodifluoromethane	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Dichloroethane, 1,1-	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Dichloroethane, 1,2-	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Dichloroethene, 1,1-	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Dichloroethene, cis-1,2-	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Dichloroethene, trans-1,2-	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Dichloropropane, 1,2-	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Dichloropropene, cis-1,3-	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Dichloropropene, trans-1,3-	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Ethyl benzene	ND	0.3	U	µg/L

TABLE A-4. Summary of Sanitary Outfalls of Volatile Organic Compounds, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW008	2069I	23-Apr-2013	093630-006	Hexanone, 2-	ND	2.2	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Isopropylbenzene	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Methyl Acetate	ND	1.5	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Methylcyclohexane	ND	3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Methylene chloride	ND	3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Pentanone, 4-methyl-, 2-	ND	1.5	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Styrene	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Tert-butyl methyl ether	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Tetrachloroethane, 1,1,2,2-	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Tetrachloroethene	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Toluene	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-	ND	1.5	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Trichlorobenzene, 1,2,3-	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Trichlorobenzene, 1,2,4-	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Trichloroethane, 1,1,1-	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Trichloroethane, 1,1,2-	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Trichloroethene	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Trichlorofluoromethane	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Vinyl chloride	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Xylene	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Xylene, m- & p-	ND	0.3	U	µg/L
WW008	2069I	23-Apr-2013	093630-006	Xylene, o-	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Acetone	548	6		µg/L
WW011	2069K	23-Apr-2013	093631-006	Benzene	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Bromochloromethane	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Bromodichloromethane	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Bromoform	0.97	0.3	J	µg/L
WW011	2069K	23-Apr-2013	093631-006	Bromomethane	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Butanone, 2-	2.53	2	J	µg/L
WW011	2069K	23-Apr-2013	093631-006	Carbon disulfide	ND	1.5	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Carbon tetrachloride	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Chlorobenzene	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Chloroethane	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Chloroform	ND	0.3	U	µg/L

TABLE A-4. Summary of Sanitary Outfalls of Volatile Organic Compounds, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW011	2069K	23-Apr-2013	093631-006	Chloromethane	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Cyclohexane	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Dibromo-3-chloropropane, 1,2-	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Dibromochloromethane	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Dibromoethane, 1,2-	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Dichlorobenzene, 1,2-	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Dichlorobenzene, 1,3-	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Dichlorobenzene, 1,4-	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Dichlorodifluoromethane	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Dichloroethane, 1,1-	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Dichloroethane, 1,2-	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Dichloroethene, 1,1-	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Dichloroethene, cis-1,2-	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Dichloroethene, trans-1,2-	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Dichloropropane, 1,2-	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Dichloropropene, cis-1,3-	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Dichloropropene, trans-1,3-	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Ethyl benzene	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Hexanone, 2-	ND	2.2	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Isopropylbenzene	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Methyl Acetate	ND	1.5	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Methylcyclohexane	ND	3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Methylene chloride	ND	3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Pentanone, 4-methyl-, 2-	ND	1.5	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Styrene	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Tert-butyl methyl ether	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Tetrachloroethane, 1,1,2,2-	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Tetrachloroethene	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Toluene	0.78	0.3	J	µg/L
WW011	2069K	23-Apr-2013	093631-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-	ND	1.5	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Trichlorobenzene, 1,2,3-	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Trichlorobenzene, 1,2,4-	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Trichloroethane, 1,1,1-	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Trichloroethane, 1,1,2-	ND	0.3	U	µg/L

TABLE A-4. Summary of Sanitary Outfalls of Volatile Organic Compounds, April 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW011	2069K	23-Apr-2013	093631-006	Trichloroethene	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Trichlorofluoromethane	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Vinyl chloride	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Xylene	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Xylene, m- & p-	ND	0.3	U	µg/L
WW011	2069K	23-Apr-2013	093631-006	Xylene, o-	ND	0.3	U	µg/L

NOTES:

MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

ND = The analyte was not detected (at MDL).

J = The associated value is an estimated quantity.

µg/L = micrograms per liter

U = The analyte was analyzed for but not detected.

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2013

Permit Number	Station	Analyte	Result	Units	Regulatory Limit (ABCWUA)
2069A	WW001	Aluminum	0.068	mg/L	900
2069A	WW001	Aluminum	0.095	mg/L	900
2069A	WW001	Aluminum	0.175	mg/L	900
2069A	WW001	Aluminum	0.18	mg/L	900
		Aluminum Average	*0.130*		
		Aluminum StdDev	*0.057*		
		Aluminum Min	*0.068*		
		Aluminum Max	*0.18*		
2069A	WW001	Ammonia	15.4	mg/L	
2069A	WW001	Ammonia	20.2	mg/L	
2069A	WW001	Ammonia	21.2	mg/L	
2069A	WW001	Ammonia	23.2	mg/L	
		Ammonia Average	*20.000*		
		Ammonia StdDev	*3.311*		
		Ammonia Min	*15.400*		
		Ammonia Max	*23.2*		
2069A	WW001	Arsenic	0.005	mg/L	0.051
2069A	WW001	Arsenic	0.005	mg/L	0.051
2069A	WW001	Arsenic	0.00598	mg/L	0.051
2069A	WW001	Arsenic	0.00843	mg/L	0.051
		Arsenic Average	*0.006*		
		Arsenic StdDev	*0.002*		
		Arsenic Min	*0.005*		
		Arsenic Max	*0.00843*		
2069A	WW001	Boron	0.0766	mg/L	
2069A	WW001	Boron	0.111	mg/L	
2069A	WW001	Boron	0.129	mg/L	
2069A	WW001	Boron	0.142	mg/L	
		Boron Average	*0.115*		
		Boron StdDev	*0.028*		
		Boron Min	*0.077*		
		Boron Max	*0.142*		
2069A	WW001	Cadmium	0.001	mg/L	0.05
2069A	WW001	Cadmium	0.001	mg/L	0.05
2069A	WW001	Cadmium	0.001	mg/L	0.05
2069A	WW001	Cadmium	0.001	mg/L	0.05
		Cadmium Average	*0.001*		
		Cadmium StdDev	*0.000*		
		Cadmium Min	*0.001*		
		Cadmium Max	*0.001*		
2069A	WW001	Chromium	0.00385	mg/L	4.1
2069A	WW001	Chromium	0.00402	mg/L	4.1
2069A	WW001	Chromium	0.00411	mg/L	4.1
2069A	WW001	Chromium	0.00515	mg/L	4.1
		Chromium Average	*0.004*		
		Chromium StdDev	*0.001*		
		Chromium Min	*0.004*		
		Chromium Max	*0.00515*		
2069A	WW001	Copper	0.0295	mg/L	5.3

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2013

Permit Number	Station	Analyte	Result	Units	Regulatory Limit (ABCWUA)
2069A	WW001	Copper	0.0423	mg/L	5.3
2069A	WW001	Copper	0.0433	mg/L	5.3
2069A	WW001	Copper	0.0541	mg/L	5.3
		Copper Average	*0.042*		
		Copper StdDev	*0.010*		
		Copper Min	*0.030*		
		Copper Max	*0.0541*		
2069A	WW001	Fluoride	0.558	mg/L	36
2069A	WW001	Fluoride	1.68	mg/L	36
2069A	WW001	Fluoride	4.58	mg/L	36
2069A	WW001	Fluoride	8.41	mg/L	36
		Fluoride Average	*3.807*		
		Fluoride StdDev	*3.505*		
		Fluoride Min	*0.558*		
		Fluoride Max	*8.41*		
2069A	WW001	Lead	0.0124	mg/L	1
2069A	WW001	Lead	0.0127	mg/L	1
2069A	WW001	Lead	0.0185	mg/L	1
2069A	WW001	Lead	0.0324	mg/L	1
		Lead Average	*0.019*		
		Lead StdDev	*0.009*		
		Lead Min	*0.012*		
		Lead Max	*0.0324*		
2069A	WW001	Mercury	0.000067	mg/L	
2069A	WW001	Mercury	0.000067	mg/L	
		Mercury Average	*0.000*		
		Mercury StdDev	*0.000*		
		Mercury Min	*0.000*		
		Mercury Max	*0.000067*		
2069A	WW001	Molybdenum	0.036	mg/L	2
2069A	WW001	Molybdenum	0.0373	mg/L	2
2069A	WW001	Molybdenum	0.111	mg/L	2
2069A	WW001	Molybdenum	0.178	mg/L	2
		Molybdenum Average	*0.091*		
		Molybdenum StdDev	*0.068*		
		Molybdenum Min	*0.036*		
		Molybdenum Max	*0.178*		
2069A	WW001	Nickel	0.00154	mg/L	2
2069A	WW001	Nickel	0.00161	mg/L	2
2069A	WW001	Nickel	0.00193	mg/L	2
2069A	WW001	Nickel	0.00204	mg/L	2
		Nickel Average	*0.002*		
		Nickel StdDev	*0.000*		
		Nickel Min	*0.002*		
		Nickel Max	*0.00204*		
2069A	WW001	Selenium	0.006	mg/L	0.46
2069A	WW001	Selenium	0.0108	mg/L	0.46
2069A	WW001	Selenium	0.0129	mg/L	0.46
2069A	WW001	Selenium	0.0137	mg/L	0.46

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2013

Permit Number	Station	Analyte	Result	Units	Regulatory Limit (ABCWUA)
		Selenium Average	*0.011*		
		Selenium StdDev	*0.003*		
		Selenium Min	*0.006*		
		Selenium Max	*0.0137*		
2069A	WW001	Silver	0.001	mg/L	5
2069A	WW001	Silver	0.001	mg/L	5
2069A	WW001	Silver	0.001	mg/L	5
2069A	WW001	Silver	0.0013	mg/L	5
		Silver Average	*0.001*		
		Silver StdDev	*0.000*		
		Silver Min	*0.001*		
		Silver Max	*0.0013*		
2069A	WW001	Zinc	0.0859	mg/L	2.2
2069A	WW001	Zinc	0.087	mg/L	2.2
2069A	WW001	Zinc	0.119	mg/L	2.2
2069A	WW001	Zinc	0.423	mg/L	2.2
		Zinc Average	*0.179*		
		Zinc StdDev	*0.164*		
		Zinc Min	*0.086*		
		Zinc Max	*0.423*		
2069F	WW006	Aluminum	0.142	mg/L	900
2069F	WW006	Aluminum	0.147	mg/L	900
2069F	WW006	Aluminum	0.173	mg/L	900
2069F	WW006	Aluminum	0.217	mg/L	900
		Aluminum Average	*0.170*		
		Aluminum StdDev	*0.034*		
		Aluminum Min	*0.142*		
		Aluminum Max	*0.217*		
2069F	WW006	Ammonia	37	mg/L	
2069F	WW006	Ammonia	46.4	mg/L	
2069F	WW006	Ammonia	49.9	mg/L	
2069F	WW006	Ammonia	52.5	mg/L	
		Ammonia Average	*46.450*		
		Ammonia StdDev	*6.778*		
		Ammonia Min	*37.000*		
		Ammonia Max	*52.5*		
2069F	WW006	Arsenic	0.005	mg/L	0.051
2069F	WW006	Arsenic	0.005	mg/L	0.051
2069F	WW006	Arsenic	0.00524	mg/L	0.051
2069F	WW006	Arsenic	0.00572	mg/L	0.051
		Arsenic Average	*0.005*		
		Arsenic StdDev	*0.000*		
		Arsenic Min	*0.005*		
		Arsenic Max	*0.00572*		
2069F	WW006	Boron	0.1	mg/L	
2069F	WW006	Boron	0.116	mg/L	
2069F	WW006	Boron	0.125	mg/L	
2069F	WW006	Boron	0.146	mg/L	
		Boron Average	*0.122*		

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2013

Permit Number	Station	Analyte	Result	Units	Regulatory Limit (ABCWUA)
		Boron StdDev	*0.019*		
		Boron Min	*0.100*		
		Boron Max	*0.146*		
2069F	WW006	Cadmium	0.001	mg/L	0.05
2069F	WW006	Cadmium	0.001	mg/L	0.05
2069F	WW006	Cadmium	0.001	mg/L	0.05
2069F	WW006	Cadmium	0.001	mg/L	0.05
		Cadmium Average	*0.001*		
		Cadmium StdDev	*0.000*		
		Cadmium Min	*0.001*		
		Cadmium Max	*0.001*		
2069F	WW006	Chromium	0.00164	mg/L	4.1
2069F	WW006	Chromium	0.00189	mg/L	4.1
2069F	WW006	Chromium	0.00219	mg/L	4.1
2069F	WW006	Chromium	0.00263	mg/L	4.1
		Chromium Average	*0.002*		
		Chromium StdDev	*0.000*		
		Chromium Min	*0.002*		
		Chromium Max	*0.00263*		
2069F	WW006	Copper	0.0162	mg/L	5.3
2069F	WW006	Copper	0.0241	mg/L	5.3
2069F	WW006	Copper	0.0312	mg/L	5.3
2069F	WW006	Copper	0.0367	mg/L	5.3
		Copper Average	*0.027*		
		Copper StdDev	*0.009*		
		Copper Min	*0.016*		
		Copper Max	*0.0367*		
2069F	WW006	Cyanide, total	0.00167	mg/L	0.45
2069F	WW006	Cyanide, total	0.00167	mg/L	0.45
2069F	WW006	Cyanide, total	0.00167	mg/L	0.45
2069F	WW006	Cyanide, total	0.00167	mg/L	0.45
2069F	WW006	Cyanide, total	0.00191	mg/L	0.45
2069F	WW006	Cyanide, total	0.00219	mg/L	0.45
2069F	WW006	Cyanide, total	0.00308	mg/L	0.45
2069F	WW006	Cyanide, total	0.0031	mg/L	0.45
		Cyanide, total Average	*0.002*		
		Cyanide, total StdDev	*0.001*		
		Cyanide, total Min	*0.002*		
		Cyanide, total Max	*0.0031*		
2069F	WW006	Fluoride	0.629	mg/L	36
2069F	WW006	Fluoride	0.728	mg/L	36
2069F	WW006	Fluoride	0.763	mg/L	36
2069F	WW006	Fluoride	1.39	mg/L	36
		Fluoride Average	*0.878*		
		Fluoride StdDev	*0.346*		
		Fluoride Min	*0.629*		
		Fluoride Max	*1.39*		
2069F	WW006	Lead	0.0033	mg/L	1
2069F	WW006	Lead	0.0033	mg/L	1

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2013

Permit Number	Station	Analyte	Result	Units	Regulatory Limit (ABCWUA)
2069F	WW006	Lead	0.00544	mg/L	1
2069F	WW006	Lead	0.00572	mg/L	1
		Lead Average	*0.004*		
		Lead StdDev	*0.001*		
		Lead Min	*0.003*		
		Lead Max	*0.00572*		
2069F	WW006	Mercury	0.000067	mg/L	
2069F	WW006	Mercury	0.000067	mg/L	
		Mercury Average	*0.000*		
		Mercury StdDev	*0.000*		
		Mercury Min	*0.000*		
		Mercury Max	*0.000067*		
2069F	WW006	Molybdenum	0.0213	mg/L	2
2069F	WW006	Molybdenum	0.0218	mg/L	2
2069F	WW006	Molybdenum	0.115	mg/L	2
2069F	WW006	Molybdenum	0.166	mg/L	2
		Molybdenum Average	*0.081*		
		Molybdenum StdDev	*0.072*		
		Molybdenum Min	*0.021*		
		Molybdenum Max	*0.166*		
2069F	WW006	Nickel	0.0015	mg/L	2
2069F	WW006	Nickel	0.0015	mg/L	2
2069F	WW006	Nickel	0.0015	mg/L	2
2069F	WW006	Nickel	**0.002**	mg/L	2
		Nickel Average	*0.002*		
		Nickel StdDev	*0.000*		
		Nickel Min	*0.002*		
		Nickel Max	*0.002*		
2069F	WW006	Selenium	**0.006**	mg/L	0.46
2069F	WW006	Selenium	**0.006**	mg/L	0.46
2069F	WW006	Selenium	0.0143	mg/L	0.46
2069F	WW006	Selenium	0.0183	mg/L	0.46
		Selenium Average	*0.011*		
		Selenium StdDev	*0.006*		
		Selenium Min	*0.006*		
		Selenium Max	*0.0183*		
2069F	WW006	Silver	**0.001**	mg/L	5
2069F	WW006	Silver	0.001	mg/L	5
2069F	WW006	Silver	0.001	mg/L	5
2069F	WW006	Silver	0.001	mg/L	5
		Silver Average	*0.001*		
		Silver StdDev	*0.000*		
		Silver Min	*0.001*		
		Silver Max	*0.001*		
2069F	WW006	Zinc	0.0788	mg/L	2.2
2069F	WW006	Zinc	0.0797	mg/L	2.2
2069F	WW006	Zinc	0.0895	mg/L	2.2
2069F	WW006	Zinc	0.124	mg/L	2.2
		Zinc Average	*0.093*		

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2013

Permit Number	Station	Analyte	Result	Units	Regulatory Limit (ABCWUA)
		Zinc StdDev	*0.021*		
		Zinc Min	*0.079*		
		Zinc Max	*0.124*		
2069F	WW006 #2	Cyanide, total	0.00167	mg/L	0.45
2069F	WW006 #2	Cyanide, total	0.00167	mg/L	0.45
2069F	WW006 #2	Cyanide, total	0.00167	mg/L	0.45
2069F	WW006 #2	Cyanide, total	0.00167	mg/L	0.45
2069F	WW006 #2	Cyanide, total	0.00285	mg/L	0.45
2069F	WW006 #2	Cyanide, total	0.00367	mg/L	0.45
2069F	WW006 #2	Cyanide, total	0.00415	mg/L	0.45
2069F	WW006 #2	Cyanide, total	0.00921	mg/L	0.45
		Cyanide, total Average	*0.003*		
		Cyanide, total StdDev	*0.003*		
		Cyanide, total Min	*0.002*		
		Cyanide, total Max	*0.00921*		
2069G	WW007	Aluminum	0.068	mg/L	900
2069G	WW007	Aluminum	0.068	mg/L	900
2069G	WW007	Aluminum	0.068	mg/L	900
2069G	WW007	Aluminum	0.0723	mg/L	900
		Aluminum Average	*0.069*		
		Aluminum StdDev	*0.002*		
		Aluminum Min	*0.068*		
		Aluminum Max	*0.0723*		
2069G	WW007	Ammonia	1.21	mg/L	
2069G	WW007	Ammonia	1.51	mg/L	
2069G	WW007	Ammonia	6.95	mg/L	
2069G	WW007	Ammonia	18.9	mg/L	
		Ammonia Average	*7.143*		
		Ammonia StdDev	*8.270*		
		Ammonia Min	*1.210*		
		Ammonia Max	*18.9*		
2069G	WW007	Arsenic	0.005	mg/L	0.051
2069G	WW007	Arsenic	0.005	mg/L	0.051
2069G	WW007	Arsenic	0.005	mg/L	0.051
2069G	WW007	Arsenic	0.00616	mg/L	0.051
		Arsenic Average	*0.005*		
		Arsenic StdDev	*0.001*		
		Arsenic Min	*0.005*		
		Arsenic Max	*0.00616*		
2069G	WW007	Boron	0.029	mg/L	
2069G	WW007	Boron	0.0324	mg/L	
2069G	WW007	Boron	0.0715	mg/L	
2069G	WW007	Boron	0.0765	mg/L	
		Boron Average	*0.052*		
		Boron StdDev	*0.025*		
		Boron Min	*0.029*		
		Boron Max	*0.0765*		
2069G	WW007	Cadmium	0.001	mg/L	0.05
2069G	WW007	Cadmium	0.001	mg/L	0.05

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2013

Permit Number	Station	Analyte	Result	Units	Regulatory Limit (ABCWUA)
2069G	WW007	Cadmium	0.001	mg/L	0.05
2069G	WW007	Cadmium	0.001	mg/L	0.05
		Cadmium Average	*0.001*		
		Cadmium StdDev	*0.000*		
		Cadmium Min	*0.001*		
		Cadmium Max	*0.001*		
2069G	WW007	Chromium	0.00156	mg/L	4.1
2069G	WW007	Chromium	0.00157	mg/L	4.1
2069G	WW007	Chromium	0.00321	mg/L	4.1
2069G	WW007	Chromium	0.00426	mg/L	4.1
		Chromium Average	*0.003*		
		Chromium StdDev	*0.001*		
		Chromium Min	*0.002*		
		Chromium Max	*0.00426*		
2069G	WW007	Copper	0.003	mg/L	5.3
2069G	WW007	Copper	0.003	mg/L	5.3
2069G	WW007	Copper	0.00378	mg/L	5.3
2069G	WW007	Copper	0.00381	mg/L	5.3
		Copper Average	*0.003*		
		Copper StdDev	*0.000*		
		Copper Min	*0.003*		
		Copper Max	*0.00381*		
2069G	WW007	Cyanide, total	0.00167	mg/L	0.45
2069G	WW007	Cyanide, total	0.00167	mg/L	0.45
2069G	WW007	Cyanide, total	0.00167	mg/L	0.45
2069G	WW007	Cyanide, total	0.00167	mg/L	0.45
2069G	WW007	Cyanide, total	0.00167	mg/L	0.45
2069G	WW007	Cyanide, total	0.00167	mg/L	0.45
2069G	WW007	Cyanide, total	0.00167	mg/L	0.45
2069G	WW007	Cyanide, total	0.00167	mg/L	0.45
		Cyanide, total Average	*0.002*		
		Cyanide, total StdDev	*0.000*		
		Cyanide, total Min	*0.002*		
		Cyanide, total Max	*0.00167*		
2069G	WW007	Fluoride	1.73	mg/L	36
2069G	WW007	Fluoride	3.18	mg/L	36
2069G	WW007	Fluoride	12	mg/L	36
2069G	WW007	Fluoride	14.7	mg/L	36
		Fluoride Average	*7.903*		
		Fluoride StdDev	*6.413*		
		Fluoride Min	*1.730*		
		Fluoride Max	*14.7*		
2069G	WW007	Lead	0.0033	mg/L	1
2069G	WW007	Lead	0.0033	mg/L	1
2069G	WW007	Lead	0.0033	mg/L	1
2069G	WW007	Lead	0.0033	mg/L	1
		Lead Average	*0.003*		
		Lead StdDev	*0.000*		
		Lead Min	*0.003*		

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2013

Permit Number	Station	Analyte	Result	Units	Regulatory Limit (ABCWUA)
		Lead Max	*0.0033*		
2069G	WW007	Mercury	0.000067	mg/L	
2069G	WW007	Mercury	0.000067	mg/L	
		Mercury Average	*0.000*		
		Mercury StdDev	*0.000*		
		Mercury Min	*0.000*		
		Mercury Max	*0.000067*		
2069G	WW007	Molybdenum	0.02	mg/L	2
2069G	WW007	Molybdenum	0.0216	mg/L	2
2069G	WW007	Molybdenum	0.0222	mg/L	2
2069G	WW007	Molybdenum	0.0225	mg/L	2
		Molybdenum Average	*0.022*		
		Molybdenum StdDev	*0.001*		
		Molybdenum Min	*0.020*		
		Molybdenum Max	*0.0225*		
2069G	WW007	Nickel	0.0015	mg/L	2
2069G	WW007	Nickel	0.0015	mg/L	2
2069G	WW007	Nickel	0.0015	mg/L	2
2069G	WW007	Nickel	0.0015	mg/L	2
		Nickel Average	*0.002*		
		Nickel StdDev	*0.000*		
		Nickel Min	*0.002*		
		Nickel Max	*0.0015*		
2069G	WW007	Selenium	0.006	mg/L	0.46
2069G	WW007	Selenium	0.006	mg/L	0.46
2069G	WW007	Selenium	0.00641	mg/L	0.46
2069G	WW007	Selenium	0.00987	mg/L	0.46
		Selenium Average	*0.007*		
		Selenium StdDev	*0.002*		
		Selenium Min	*0.006*		
		Selenium Max	*0.00987*		
2069G	WW007	Silver	0.001	mg/L	5
2069G	WW007	Silver	0.001	mg/L	5
2069G	WW007	Silver	0.001	mg/L	5
2069G	WW007	Silver	0.001	mg/L	5
		Silver Average	*0.001*		
		Silver StdDev	*0.000*		
		Silver Min	*0.001*		
		Silver Max	*0.001*		
2069G	WW007	Zinc	0.0033	mg/L	2.2
2069G	WW007	Zinc	0.0033	mg/L	2.2
2069G	WW007	Zinc	0.0033	mg/L	2.2
2069G	WW007	Zinc	0.0033	mg/L	2.2
		Zinc Average	*0.003*		
		Zinc StdDev	*0.000*		
		Zinc Min	*0.003*		
		Zinc Max	*0.0033*		
2069I	WW008	Aluminum	0.068	mg/L	900
2069I	WW008	Aluminum	0.122	mg/L	900

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2013

Permit Number	Station	Analyte	Result	Units	Regulatory Limit (ABCWUA)
2069I	WW008	Aluminum	0.321	mg/L	900
2069I	WW008	Aluminum	0.389	mg/L	900
		Aluminum Average	*0.225*		
		Aluminum StdDev	*0.154*		
		Aluminum Min	*0.068*		
		Aluminum Max	*0.389*		
2069I	WW008	Ammonia	3.87	mg/L	
2069I	WW008	Ammonia	27.5	mg/L	
2069I	WW008	Ammonia	116	mg/L	
		Ammonia Average	*49.123*		
		Ammonia StdDev	*59.110*		
		Ammonia Min	*3.870*		
		Ammonia Max	*116*		
2069I	WW008	Arsenic	0.005	mg/L	0.051
2069I	WW008	Arsenic	0.00572	mg/L	0.051
2069I	WW008	Arsenic	0.00639	mg/L	0.051
2069I	WW008	Arsenic	0.0101	mg/L	0.051
		Arsenic Average	*0.007*		
		Arsenic StdDev	*0.002*		
		Arsenic Min	*0.005*		
		Arsenic Max	*0.0101*		
2069I	WW008	Boron	0.0759	mg/L	
2069I	WW008	Boron	0.0852	mg/L	
2069I	WW008	Boron	0.0901	mg/L	
2069I	WW008	Boron	0.0958	mg/L	
		Boron Average	*0.087*		
		Boron StdDev	*0.008*		
		Boron Min	*0.076*		
		Boron Max	*0.0958*		
2069I	WW008	Cadmium	0.001	mg/L	0.05
2069I	WW008	Cadmium	0.001	mg/L	0.05
2069I	WW008	Cadmium	0.001	mg/L	0.05
2069I	WW008	Cadmium	0.001	mg/L	0.05
		Cadmium Average	*0.001*		
		Cadmium StdDev	*0.000*		
		Cadmium Min	*0.001*		
		Cadmium Max	*0.001*		
2069I	WW008	Chromium	0.00202	mg/L	4.1
2069I	WW008	Chromium	0.00245	mg/L	4.1
2069I	WW008	Chromium	0.00273	mg/L	4.1
2069I	WW008	Chromium	0.00286	mg/L	4.1
		Chromium Average	*0.003*		
		Chromium StdDev	*0.000*		
		Chromium Min	*0.002*		
		Chromium Max	*0.00286*		
2069I	WW008	Copper	0.0351	mg/L	5.3
2069I	WW008	Copper	0.0672	mg/L	5.3
2069I	WW008	Copper	0.0935	mg/L	5.3
2069I	WW008	Copper	0.112	mg/L	5.3

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2013

Permit Number	Station	Analyte	Result	Units	Regulatory Limit (ABCWUA)
		Copper Average	*0.077*		
		Copper StdDev	*0.033*		
		Copper Min	*0.035*		
		Copper Max	*0.112*		
2069I	WW008	Cyanide, total	0.00167	mg/L	0.45
2069I	WW008	Cyanide, total	0.00167	mg/L	0.45
2069I	WW008	Cyanide, total	0.00167	mg/L	0.45
2069I	WW008	Cyanide, total	0.00167	mg/L	0.45
2069I	WW008	Cyanide, total	0.00167	mg/L	0.45
2069I	WW008	Cyanide, total	0.0023	mg/L	0.45
2069I	WW008	Cyanide, total	0.00289	mg/L	0.45
2069I	WW008	Cyanide, total	0.00522	mg/L	0.45
		Cyanide, total Average	*0.002*		
		Cyanide, total StdDev	*0.001*		
		Cyanide, total Min	*0.002*		
		Cyanide, total Max	*0.00522*		
2069I	WW008	Fluoride	0.526	mg/L	36
2069I	WW008	Fluoride	0.658	mg/L	36
2069I	WW008	Fluoride	0.661	mg/L	36
2069I	WW008	Fluoride	0.797	mg/L	36
		Fluoride Average	*0.661*		
		Fluoride StdDev	*0.111*		
		Fluoride Min	*0.526*		
		Fluoride Max	*0.797*		
2069I	WW008	Lead	0.0033	mg/L	1
2069I	WW008	Lead	0.0033	mg/L	1
2069I	WW008	Lead	0.0033	mg/L	1
2069I	WW008	Lead	0.00452	mg/L	1
		Lead Average	*0.004*		
		Lead StdDev	*0.001*		
		Lead Min	*0.003*		
		Lead Max	*0.00452*		
2069I	WW008	Mercury	0.000067	mg/L	
2069I	WW008	Mercury	0.000067	mg/L	
		Mercury Average	*0.000*		
		Mercury StdDev	*0.000*		
		Mercury Min	*0.000*		
		Mercury Max	*0.000067*		
2069I	WW008	Molybdenum	0.00458	mg/L	2
2069I	WW008	Molybdenum	0.00478	mg/L	2
2069I	WW008	Molybdenum	0.00532	mg/L	2
2069I	WW008	Molybdenum	0.093	mg/L	2
		Molybdenum Average	*0.027*		
		Molybdenum StdDev	*0.044*		
		Molybdenum Min	*0.005*		
		Molybdenum Max	*0.093*		
2069I	WW008	Nickel	0.0015	mg/L	2
2069I	WW008	Nickel	0.00307	mg/L	2
2069I	WW008	Nickel	0.0129	mg/L	2

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2013

Permit Number	Station	Analyte	Result	Units	Regulatory Limit (ABCWUA)
2069I	WW008	Nickel	0.016	mg/L	2
		Nickel Average	*0.008*		
		Nickel StdDev	*0.007*		
		Nickel Min	*0.002*		
		Nickel Max	*0.016*		
2069I	WW008	Selenium	0.006	mg/L	0.46
2069I	WW008	Selenium	0.00609	mg/L	0.46
2069I	WW008	Selenium	0.0105	mg/L	0.46
2069I	WW008	Selenium	0.0254	mg/L	0.46
		Selenium Average	*0.012*		
		Selenium StdDev	*0.009*		
		Selenium Min	*0.006*		
		Selenium Max	*0.0254*		
2069I	WW008	Silver	0.001	mg/L	5
2069I	WW008	Silver	0.001	mg/L	5
2069I	WW008	Silver	0.001	mg/L	5
2069I	WW008	Silver	0.001	mg/L	5
		Silver Average	*0.001*		
		Silver StdDev	*0.000*		
		Silver Min	*0.001*		
		Silver Max	*0.001*		
2069I	WW008	Zinc	0.0431	mg/L	2.2
2069I	WW008	Zinc	0.0737	mg/L	2.2
2069I	WW008	Zinc	2.46	mg/L	2.2
2069I	WW008	Zinc	2.6	mg/L	2.2
2069I	WW008	Zinc	7.44	mg/L	2.2
2069I	WW008	Zinc	8.01	mg/L	2.2
		Zinc Average	*3.438*		
		Zinc StdDev	*3.505*		
		Zinc Min	*0.043*		
		Zinc Max	*8.01*		
2069K	WW011	Aluminum	0.068	mg/L	900
2069K	WW011	Aluminum	0.127	mg/L	900
2069K	WW011	Aluminum	0.129	mg/L	900
2069K	WW011	Aluminum	0.174	mg/L	900
		Aluminum Average	*0.125*		
		Aluminum StdDev	*0.043*		
		Aluminum Min	*0.068*		
		Aluminum Max	*0.174*		
2069K	WW011	Ammonia	16.7	mg/L	
2069K	WW011	Ammonia	19.3	mg/L	
2069K	WW011	Ammonia	19.6	mg/L	
2069K	WW011	Ammonia	21.5	mg/L	
		Ammonia Average	*19.275*		
		Ammonia StdDev	*1.974*		
		Ammonia Min	*16.700*		
		Ammonia Max	*21.5*		
2069K	WW011	Arsenic	0.005	mg/L	0.051
2069K	WW011	Arsenic	0.005	mg/L	0.051

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2013

Permit Number	Station	Analyte	Result	Units	Regulatory Limit (ABCWUA)
2069K	WW011	Arsenic	0.00678	mg/L	0.051
2069K	WW011	Arsenic	0.00872	mg/L	0.051
		Arsenic Average	*0.006*		
		Arsenic StdDev	*0.002*		
		Arsenic Min	*0.005*		
		Arsenic Max	*0.00872*		
2069K	WW011	Boron	0.0653	mg/L	
2069K	WW011	Boron	0.0683	mg/L	
2069K	WW011	Boron	0.069	mg/L	
2069K	WW011	Boron	0.0726	mg/L	
		Boron Average	*0.069*		
		Boron StdDev	*0.003*		
		Boron Min	*0.065*		
		Boron Max	*0.0726*		
2069K	WW011	Cadmium	0.001	mg/L	0.05
2069K	WW011	Cadmium	0.001	mg/L	0.05
2069K	WW011	Cadmium	0.001	mg/L	0.05
2069K	WW011	Cadmium	0.001	mg/L	0.05
		Cadmium Average	*0.001*		
		Cadmium StdDev	*0.000*		
		Cadmium Min	*0.001*		
		Cadmium Max	*0.001*		
2069K	WW011	Chromium	0.00271	mg/L	4.1
2069K	WW011	Chromium	0.00294	mg/L	4.1
2069K	WW011	Chromium	0.00301	mg/L	4.1
2069K	WW011	Chromium	0.00382	mg/L	4.1
		Chromium Average	*0.003*		
		Chromium StdDev	*0.000*		
		Chromium Min	*0.003*		
		Chromium Max	*0.00382*		
2069K	WW011	Copper	0.0399	mg/L	5.3
2069K	WW011	Copper	0.0429	mg/L	5.3
2069K	WW011	Copper	0.0542	mg/L	5.3
2069K	WW011	Copper	0.0581	mg/L	5.3
		Copper Average	*0.049*		
		Copper StdDev	*0.009*		
		Copper Min	*0.040*		
		Copper Max	*0.0581*		
2069K	WW011	Fluoride	0.609	mg/L	36
2069K	WW011	Fluoride	0.726	mg/L	36
2069K	WW011	Fluoride	0.774	mg/L	36
2069K	WW011	Fluoride	8.59	mg/L	36
		Fluoride Average	*2.675*		
		Fluoride StdDev	*3.944*		
		Fluoride Min	*0.609*		
		Fluoride Max	*8.59*		
2069K	WW011	Lead	0.0033	mg/L	1
2069K	WW011	Lead	0.0033	mg/L	1
2069K	WW011	Lead	0.0042	mg/L	1

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2013

Permit Number	Station	Analyte	Result	Units	Regulatory Limit (ABCWUA)
2069K	WW011	Lead	0.00499	mg/L	1
		Lead Average	*0.004*		
		Lead StdDev	*0.001*		
		Lead Min	*0.003*		
		Lead Max	*0.00499*		
2069K	WW011	Mercury	0.000067	mg/L	
2069K	WW011	Mercury	0.000067	mg/L	
		Mercury Average	*0.000*		
		Mercury StdDev	*0.000*		
		Mercury Min	*0.000*		
		Mercury Max	*0.000067*		
2069K	WW011	Molybdenum	0.0908	mg/L	2
2069K	WW011	Molybdenum	0.0953	mg/L	2
2069K	WW011	Molybdenum	0.11	mg/L	2
2069K	WW011	Molybdenum	0.12	mg/L	2
		Molybdenum Average	*0.104*		
		Molybdenum StdDev	*0.013*		
		Molybdenum Min	*0.091*		
		Molybdenum Max	*0.12*		
2069K	WW011	Nickel	0.0015	mg/L	2
2069K	WW011	Nickel	0.0015	mg/L	2
2069K	WW011	Nickel	0.00268	mg/L	2
2069K	WW011	Nickel	0.00309	mg/L	2
		Nickel Average	*0.002*		
		Nickel StdDev	*0.001*		
		Nickel Min	*0.002*		
		Nickel Max	*0.00309*		
2069K	WW011	Selenium	0.006	mg/L	0.46
2069K	WW011	Selenium	0.006	mg/L	0.46
2069K	WW011	Selenium	0.0135	mg/L	0.46
2069K	WW011	Selenium	0.0168	mg/L	0.46
		Selenium Average	*0.011*		
		Selenium StdDev	*0.005*		
		Selenium Min	*0.006*		
		Selenium Max	*0.0168*		
2069K	WW011	Silver	0.001	mg/L	5
2069K	WW011	Silver	0.001	mg/L	5
2069K	WW011	Silver	0.00119	mg/L	5
2069K	WW011	Silver	0.0126	mg/L	5
		Silver Average	*0.004*		
		Silver StdDev	*0.006*		
		Silver Min	*0.001*		
		Silver Max	*0.0126*		
2069K	WW011	Zinc	0.0549	mg/L	2.2
2069K	WW011	Zinc	0.0825	mg/L	2.2
2069K	WW011	Zinc	0.0894	mg/L	2.2
2069K	WW011	Zinc	0.0931	mg/L	2.2
		Zinc Average	*0.080*		
		Zinc StdDev	*0.017*		

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2013

Permit Number	Station	Analyte	Result	Units	Regulatory Limit (ABCWUA)
		Zinc Min	*0.055*		
		Zinc Max	*0.0931*		
2238A	CINT	Aluminum	0.068	mg/L	900
2238A	CINT	Aluminum	0.068	mg/L	900
2238A	CINT	Aluminum	0.068	mg/L	900
2238A	CINT	Aluminum	0.0869	mg/L	900
		Aluminum Average	*0.073*		
		Aluminum StdDev	*0.009*		
		Aluminum Min	*0.068*		
		Aluminum Max	*0.0869*		
2238A	CINT	Ammonia	0.048	mg/L	
2238A	CINT	Ammonia	0.0587	mg/L	
2238A	CINT	Ammonia	0.526	mg/L	
2238A	CINT	Ammonia	2.31	mg/L	
		Ammonia Average	*0.736*		
		Ammonia StdDev	*1.073*		
		Ammonia Min	*0.048*		
		Ammonia Max	*2.31*		
2238A	CINT	Arsenic	0.005	mg/L	0.051
2238A	CINT	Arsenic	0.005	mg/L	0.051
2238A	CINT	Arsenic	0.005	mg/L	0.051
2238A	CINT	Arsenic	0.00697	mg/L	0.051
		Arsenic Average	*0.005*		
		Arsenic StdDev	*0.001*		
		Arsenic Min	*0.005*		
		Arsenic Max	*0.00697*		
2238A	CINT	Boron	0.0335	mg/L	
2238A	CINT	Boron	0.0369	mg/L	
2238A	CINT	Boron	0.0382	mg/L	
2238A	CINT	Boron	0.0593	mg/L	
		Boron Average	*0.042*		
		Boron StdDev	*0.012*		
		Boron Min	*0.034*		
		Boron Max	*0.0593*		
2238A	CINT	Cadmium	0.001	mg/L	0.05
2238A	CINT	Cadmium	0.001	mg/L	0.05
2238A	CINT	Cadmium	0.001	mg/L	0.05
2238A	CINT	Cadmium	0.001	mg/L	0.05
		Cadmium Average	*0.001*		
		Cadmium StdDev	*0.000*		
		Cadmium Min	*0.001*		
		Cadmium Max	*0.001*		
2238A	CINT	Chromium	0.00352	mg/L	4.1
2238A	CINT	Chromium	0.00402	mg/L	4.1
2238A	CINT	Chromium	0.00417	mg/L	4.1
2238A	CINT	Chromium	0.0043	mg/L	4.1
		Chromium Average	*0.004*		
		Chromium StdDev	*0.000*		
		Chromium Min	*0.004*		

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2013

Permit Number	Station	Analyte	Result	Units	Regulatory Limit (ABCWUA)
		Chromium Max	*0.0043*		
2238A	CINT	Copper	0.003	mg/L	5.3
2238A	CINT	Copper	0.003	mg/L	5.3
2238A	CINT	Copper	0.00855	mg/L	5.3
2238A	CINT	Copper	0.0136	mg/L	5.3
		Copper Average	*0.007*		
		Copper StdDev	*0.005*		
		Copper Min	*0.003*		
		Copper Max	*0.0136*		
2238A	CINT	Cyanide, total	0.00167	mg/L	0.45
2238A	CINT	Cyanide, total	0.00167	mg/L	0.45
2238A	CINT	Cyanide, total	0.00167	mg/L	0.45
2238A	CINT	Cyanide, total	0.00167	mg/L	0.45
2238A	CINT	Cyanide, total	0.00167	mg/L	0.45
2238A	CINT	Cyanide, total	0.00167	mg/L	0.45
2238A	CINT	Cyanide, total	0.00167	mg/L	0.45
2238A	CINT	Cyanide, total	0.00366	mg/L	0.45
		Cyanide, total Average	*0.002*		
		Cyanide, total StdDev	*0.001*		
		Cyanide, total Min	*0.002*		
		Cyanide, total Max	*0.00366*		
2238A	CINT	Fluoride	0.628	mg/L	36
2238A	CINT	Fluoride	1	mg/L	36
2238A	CINT	Fluoride	1.33	mg/L	36
2238A	CINT	Fluoride	1.67	mg/L	36
		Fluoride Average	*1.157*		
		Fluoride StdDev	*0.446*		
		Fluoride Min	*0.628*		
		Fluoride Max	*1.67*		
2238A	CINT	Lead	0.00423	mg/L	1
2238A	CINT	Lead	0.0047	mg/L	1
2238A	CINT	Lead	0.00495	mg/L	1
2238A	CINT	Lead	0.00549	mg/L	1
		Lead Average	*0.005*		
		Lead StdDev	*0.001*		
		Lead Min	*0.004*		
		Lead Max	*0.00549*		
2238A	CINT	Mercury	0.000067	mg/L	
2238A	CINT	Mercury	0.000067	mg/L	
		Mercury Average	*0.000*		
		Mercury StdDev	*0.000*		
		Mercury Min	*0.000*		
		Mercury Max	*0.000067*		
2238A	CINT	Molybdenum	0.0231	mg/L	2
2238A	CINT	Molybdenum	0.0296	mg/L	2
2238A	CINT	Molybdenum	0.0471	mg/L	2
2238A	CINT	Molybdenum	0.0472	mg/L	2
		Molybdenum Average	*0.037*		
		Molybdenum StdDev	*0.012*		

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2013

Permit Number	Station	Analyte	Result	Units	Regulatory Limit (ABCWUA)
		Molybdenum Min	*0.023*		
		Molybdenum Max	*0.0472*		
2238A	CINT	Nickel	0.0015	mg/L	2
2238A	CINT	Nickel	0.0015	mg/L	2
2238A	CINT	Nickel	0.0015	mg/L	2
2238A	CINT	Nickel	0.0015	mg/L	2
		Nickel Average	*0.002*		
		Nickel StdDev	*0.000*		
		Nickel Min	*0.002*		
		Nickel Max	*0.0015*		
2238A	CINT	Selenium	0.006	mg/L	0.46
2238A	CINT	Selenium	0.006	mg/L	0.46
2238A	CINT	Selenium	0.00737	mg/L	0.46
2238A	CINT	Selenium	0.00895	mg/L	0.46
		Selenium Average	*0.007*		
		Selenium StdDev	*0.001*		
		Selenium Min	*0.006*		
		Selenium Max	*0.00895*		
2238A	CINT	Silver	0.001	mg/L	5
2238A	CINT	Silver	0.001	mg/L	5
2238A	CINT	Silver	0.00359	mg/L	5
2238A	CINT	Silver	0.00649	mg/L	5
		Silver Average	*0.003*		
		Silver StdDev	*0.003*		
		Silver Min	*0.001*		
		Silver Max	*0.00649*		
2238A	CINT	Zinc	0.0033	mg/L	2.2
2238A	CINT	Zinc	0.0038	mg/L	2.2
2238A	CINT	Zinc	0.00681	mg/L	2.2
2238A	CINT	Zinc	0.00943	mg/L	2.2
		Zinc Average	*0.006*		
		Zinc StdDev	*0.003*		
		Zinc Min	*0.003*		
		Zinc Max	*0.00943*		

NOTES:

ABCWUA = Albuquerque Bernalillo County Water Utility Authority
mg/L = milligrams per liter
Min = Minimum
Max = Maximum
StdDev = Standard Deviation

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2013

Permit Number	Station	Analyte	Activity	Units	Regulatory Sewer Release Limits*
2069A	WW001	Actinium-228	1.69	pCi/L	300000
2069A	WW001	Actinium-228	15.4	pCi/L	300000
		Actinium-228 Average	*8.545*		
		Actinium-228 StdDev	*9.694*		
		Actinium-228 Min	*1.690*		
		Actinium-228 Max	*15.4*		
2069A	WW001	Alpha, gross	-0.3	pCi/L	
2069A	WW001	Alpha, gross	0.597	pCi/L	
		Alpha, gross Average	*0.149*		
		Alpha, gross StdDev	*0.634*		
		Alpha, gross Min	*-0.300*		
		Alpha, gross Max	*0.597*		
2069A	WW001	Americium-241	2.06	pCi/L	200
2069A	WW001	Americium-241	12.5	pCi/L	200
		Americium-241 Average	*7.280*		
		Americium-241 StdDev	*7.382*		
		Americium-241 Min	*2.060*		
		Americium-241 Max	*12.5*		
2069A	WW001	Beryllium-7	-2.69	pCi/L	
2069A	WW001	Beryllium-7	-0.287	pCi/L	
		Beryllium-7 Average	*-1.489*		
		Beryllium-7 StdDev	*1.699*		
		Beryllium-7 Min	*-2.690*		
		Beryllium-7 Max	*-0.287*		
2069A	WW001	Beta, gross	9.23	pCi/L	
2069A	WW001	Beta, gross	16.3	pCi/L	
		Beta, gross Average	*12.765*		
		Beta, gross StdDev	*4.999*		
		Beta, gross Min	*9.230*		
		Beta, gross Max	*16.3*		
2069A	WW001	Bismuth-212	21.3	pCi/L	
2069A	WW001	Bismuth-212	22.2	pCi/L	
		Bismuth-212 Average	*21.750*		
		Bismuth-212 StdDev	*0.636*		
		Bismuth-212 Min	*21.300*		
		Bismuth-212 Max	*22.2*		
2069A	WW001	Bismuth-214	1.74	pCi/L	
2069A	WW001	Bismuth-214	4.43	pCi/L	
		Bismuth-214 Average	*3.085*		
		Bismuth-214 StdDev	*1.902*		
		Bismuth-214 Min	*1.740*		
		Bismuth-214 Max	*4.43*		
2069A	WW001	Cesium-137	0.447	pCi/L	10000
2069A	WW001	Cesium-137	0.749	pCi/L	10000
		Cesium-137 Average	*0.598*		
		Cesium-137 StdDev	*0.214*		
		Cesium-137 Min	*0.447*		
		Cesium-137 Max	*0.749*		
2069A	WW001	Cobalt-60	-2.67	pCi/L	30000

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2013

Permit Number	Station	Analyte	Activity	Units	Regulatory Sewer Release Limits*
2069A	WW001	Cobalt-60	-0.228	pCi/L	30000
		Cobalt-60 Average	*-1.449*		
		Cobalt-60 StdDev	*1.727*		
		Cobalt-60 Min	*-2.670*		
		Cobalt-60 Max	*-0.228*		
2069A	WW001	Lead-212	0.94	pCi/L	20000
2069A	WW001	Lead-212	1.88	pCi/L	20000
		Lead-212 Average	*1.412*		
		Lead-212 StdDev	*0.662*		
		Lead-212 Min	*0.944*		
		Lead-212 Max	*1.88*		
2069A	WW001	Lead-214	-2.68	pCi/L	1000000
2069A	WW001	Lead-214	0.431	pCi/L	1000000
		Lead-214 Average	*-1.125*		
		Lead-214 StdDev	*2.200*		
		Lead-214 Min	*-2.680*		
		Lead-214 Max	*0.431*		
2069A	WW001	Neptunium-237	-1.47	pCi/L	
2069A	WW001	Neptunium-237	0.718	pCi/L	
		Neptunium-237 Average	*-0.376*		
		Neptunium-237 StdDev	*1.547*		
		Neptunium-237 Min	*-1.470*		
		Neptunium-237 Max	*0.718*		
2069A	WW001	Potassium-40	-5.85	pCi/L	40000
2069A	WW001	Potassium-40	62.7	pCi/L	40000
		Potassium-40 Average	*28.425*		
		Potassium-40 StdDev	*48.472*		
		Potassium-40 Min	*-5.850*		
		Potassium-40 Max	*62.7*		
2069A	WW001	Radium-223	-45.1	pCi/L	
2069A	WW001	Radium-223	21.7	pCi/L	
		Radium-223 Average	*-11.700*		
		Radium-223 StdDev	*47.235*		
		Radium-223 Min	*-45.100*		
		Radium-223 Max	*21.7*		
2069A	WW001	Radium-224	33.6	pCi/L	
2069A	WW001	Radium-224	94.5	pCi/L	
		Radium-224 Average	*64.050*		
		Radium-224 StdDev	*43.063*		
		Radium-224 Min	*33.600*		
		Radium-224 Max	*94.5*		
2069A	WW001	Radium-226	-40.3	pCi/L	600
2069A	WW001	Radium-226	15.6	pCi/L	600
		Radium-226 Average	*-12.350*		
		Radium-226 StdDev	*39.527*		
		Radium-226 Min	*-40.300*		
		Radium-226 Max	*15.6*		
2069A	WW001	Radium-228	1.69	pCi/L	600
2069A	WW001	Radium-228	15.4	pCi/L	600

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2013

Permit Number	Station	Analyte	Activity	Units	Regulatory Sewer Release Limits*
		Radium-228 Average	*8.545*		
		Radium-228 StdDev	*9.694*		
		Radium-228 Min	*1.690*		
		Radium-228 Max	*15.4*		
2069A	WW001	Sodium-22	-0.0512	pCi/L	
2069A	WW001	Sodium-22	0.405	pCi/L	
		Sodium-22 Average	*0.177*		
		Sodium-22 StdDev	*0.323*		
		Sodium-22 Min	*-0.051*		
		Sodium-22 Max	*0.405*		
2069A	WW001	Thorium-227	-6.62	pCi/L	
2069A	WW001	Thorium-227	0.43	pCi/L	
		Thorium-227 Average	*-3.095*		
		Thorium-227 StdDev	*4.985*		
		Thorium-227 Min	*-6.620*		
		Thorium-227 Max	*0.43*		
2069A	WW001	Thorium-231	-27.8	pCi/L	300
2069A	WW001	Thorium-231	-21.8	pCi/L	300
		Thorium-231 Average	*-24.800*		
		Thorium-231 StdDev	*4.243*		
		Thorium-231 Min	*-27.800*		
		Thorium-231 Max	*-21.8*		
2069A	WW001	Thorium-234	17	pCi/L	50000
2069A	WW001	Thorium-234	42.8	pCi/L	50000
		Thorium-234 Average	*29.900*		
		Thorium-234 StdDev	*18.243*		
		Thorium-234 Min	*17.000*		
		Thorium-234 Max	*42.8*		
2069A	WW001	Tritium	-44.6	pCi/L	10000000
2069A	WW001	Tritium	0	pCi/L	10000000
		Tritium Average	*-22.300*		
		Tritium StdDev	*31.537*		
		Tritium Min	*-44.600*		
		Tritium Max	*0*		
2069A	WW001	Uranium-235	-14.9	pCi/L	3000
2069A	WW001	Uranium-235	2.16	pCi/L	3000
		Uranium-235 Average	*-6.370*		
		Uranium-235 StdDev	*12.063*		
		Uranium-235 Min	*-14.900*		
		Uranium-235 Max	*2.16*		
2069A	WW001	Uranium-238	17	pCi/L	3000
2069A	WW001	Uranium-238	42.8	pCi/L	3000
		Uranium-238 Average	*29.900*		
		Uranium-238 StdDev	*18.243*		
		Uranium-238 Min	*17.000*		
		Uranium-238 Max	*42.8*		
2069F	WW006	Actinium-228	12.5	pCi/L	300000
2069F	WW006	Actinium-228	18.6	pCi/L	300000
		Actinium-228 Average	*15.550*		

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2013

Permit Number	Station	Analyte	Activity	Units	Regulatory Sewer Release Limits*
		Actinium-228 StdDev	*4.313*		
		Actinium-228 Min	*12.500*		
		Actinium-228 Max	*18.6*		
2069F	WW006	Alpha, gross	3.35	pCi/L	
2069F	WW006	Alpha, gross	6.95	pCi/L	
		Alpha, gross Average	*5.150*		
		Alpha, gross StdDev	*2.546*		
		Alpha, gross Min	*3.350*		
		Alpha, gross Max	*6.95*		
2069F	WW006	Americium-241	-10.9	pCi/L	200
2069F	WW006	Americium-241	0.0431	pCi/L	200
		Americium-241 Average	*-5.428*		
		Americium-241 StdDev	*7.738*		
		Americium-241 Min	*-10.900*		
		Americium-241 Max	*0.0431*		
2069F	WW006	Beryllium-7	-10	pCi/L	
2069F	WW006	Beryllium-7	-1.94	pCi/L	
		Beryllium-7 Average	*-5.970*		
		Beryllium-7 StdDev	*5.699*		
		Beryllium-7 Min	*-10.000*		
		Beryllium-7 Max	*-1.94*		
2069F	WW006	Beta, gross	16.1	pCi/L	
2069F	WW006	Beta, gross	26.6	pCi/L	
		Beta, gross Average	*21.350*		
		Beta, gross StdDev	*7.425*		
		Beta, gross Min	*16.100*		
		Beta, gross Max	*26.6*		
2069F	WW006	Bismuth-212	19.7	pCi/L	
2069F	WW006	Bismuth-212	63.2	pCi/L	
		Bismuth-212 Average	*41.450*		
		Bismuth-212 StdDev	*30.759*		
		Bismuth-212 Min	*19.700*		
		Bismuth-212 Max	*63.2*		
2069F	WW006	Bismuth-214	-2.49	pCi/L	
2069F	WW006	Bismuth-214	9.7	pCi/L	
		Bismuth-214 Average	*3.605*		
		Bismuth-214 StdDev	*8.620*		
		Bismuth-214 Min	*-2.490*		
		Bismuth-214 Max	*9.7*		
2069F	WW006	Cesium-137	-0.957	pCi/L	10000
2069F	WW006	Cesium-137	1.53	pCi/L	10000
		Cesium-137 Average	*0.287*		
		Cesium-137 StdDev	*1.759*		
		Cesium-137 Min	*-0.957*		
		Cesium-137 Max	*1.53*		
2069F	WW006	Cobalt-60	-1.88	pCi/L	30000
2069F	WW006	Cobalt-60	1.21	pCi/L	30000
		Cobalt-60 Average	*-0.335*		
		Cobalt-60 StdDev	*2.185*		

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2013

Permit Number	Station	Analyte	Activity	Units	Regulatory Sewer Release Limits*
		Cobalt-60 Min	*-1.880*		
		Cobalt-60 Max	*1.21*		
2069F	WW006	Lead-212	0.788	pCi/L	20000
2069F	WW006	Lead-212	5.48	pCi/L	20000
		Lead-212 Average	*3.134*		
		Lead-212 StdDev	*3.318*		
		Lead-212 Min	*0.788*		
		Lead-212 Max	*5.48*		
2069F	WW006	Lead-214	-6.98	pCi/L	1000000
2069F	WW006	Lead-214	0.517	pCi/L	1000000
		Lead-214 Average	*-3.232*		
		Lead-214 StdDev	*5.301*		
		Lead-214 Min	*-6.980*		
		Lead-214 Max	*0.517*		
2069F	WW006	Neptunium-237	-3.77	pCi/L	
2069F	WW006	Neptunium-237	-1	pCi/L	
		Neptunium-237 Average	*-2.385*		
		Neptunium-237 StdDev	*1.959*		
		Neptunium-237 Min	*-3.770*		
		Neptunium-237 Max	*-1*		
2069F	WW006	Potassium-40	-24.5	pCi/L	40000
2069F	WW006	Potassium-40	22.9	pCi/L	40000
		Potassium-40 Average	*-0.800*		
		Potassium-40 StdDev	*33.517*		
		Potassium-40 Min	*-24.500*		
		Potassium-40 Max	*22.9*		
2069F	WW006	Radium-223	-44.4	pCi/L	
2069F	WW006	Radium-223	-24.3	pCi/L	
		Radium-223 Average	*-34.350*		
		Radium-223 StdDev	*14.213*		
		Radium-223 Min	*-44.400*		
		Radium-223 Max	*-24.3*		
2069F	WW006	Radium-224	16.9	pCi/L	
2069F	WW006	Radium-224	47.9	pCi/L	
		Radium-224 Average	*32.400*		
		Radium-224 StdDev	*21.920*		
		Radium-224 Min	*16.900*		
		Radium-224 Max	*47.9*		
2069F	WW006	Radium-226	-56.5	pCi/L	600
2069F	WW006	Radium-226	9.94	pCi/L	600
		Radium-226 Average	*-23.280*		
		Radium-226 StdDev	*46.980*		
		Radium-226 Min	*-56.500*		
		Radium-226 Max	*9.94*		
2069F	WW006	Radium-228	12.5	pCi/L	600
2069F	WW006	Radium-228	18.6	pCi/L	600
		Radium-228 Average	*15.550*		
		Radium-228 StdDev	*4.313*		
		Radium-228 Min	*12.500*		

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2013

Permit Number	Station	Analyte	Activity	Units	Regulatory Sewer Release Limits*
		Radium-228 Max	*18.6*		
2069F	WW006	Sodium-22	-0.333	pCi/L	
2069F	WW006	Sodium-22	0.331	pCi/L	
		Sodium-22 Average	*-0.001*		
		Sodium-22 StdDev	*0.470*		
		Sodium-22 Min	*-0.333*		
		Sodium-22 Max	*0.331*		
2069F	WW006	Thorium-227	-7.45	pCi/L	
2069F	WW006	Thorium-227	0.317	pCi/L	
		Thorium-227 Average	*-3.567*		
		Thorium-227 StdDev	*5.492*		
		Thorium-227 Min	*-7.450*		
		Thorium-227 Max	*0.317*		
2069F	WW006	Thorium-231	-48.8	pCi/L	300
2069F	WW006	Thorium-231	-16.5	pCi/L	300
		Thorium-231 Average	*-32.650*		
		Thorium-231 StdDev	*22.840*		
		Thorium-231 Min	*-48.800*		
		Thorium-231 Max	*-16.5*		
2069F	WW006	Thorium-234	-40	pCi/L	50000
2069F	WW006	Thorium-234	102	pCi/L	50000
		Thorium-234 Average	*31.000*		
		Thorium-234 StdDev	*100.409*		
		Thorium-234 Min	*-40.000*		
		Thorium-234 Max	*102*		
2069F	WW006	Tritium	-65.4	pCi/L	10000000
2069F	WW006	Tritium	-10.6	pCi/L	10000000
		Tritium Average	*-38.000*		
		Tritium StdDev	*38.749*		
		Tritium Min	*-65.400*		
		Tritium Max	*-10.6*		
2069F	WW006	Uranium-235	-7.9	pCi/L	3000
2069F	WW006	Uranium-235	10.3	pCi/L	3000
		Uranium-235 Average	*1.200*		
		Uranium-235 StdDev	*12.869*		
		Uranium-235 Min	*-7.900*		
		Uranium-235 Max	*10.3*		
2069F	WW006	Uranium-238	-40	pCi/L	3000
2069F	WW006	Uranium-238	102	pCi/L	3000
		Uranium-238 Average	*31.000*		
		Uranium-238 StdDev	*100.409*		
		Uranium-238 Min	*-40.000*		
		Uranium-238 Max	*102*		
2069I	WW008	Actinium-228	1.91	pCi/L	300000
2069I	WW008	Actinium-228	5.8	pCi/L	300000
		Actinium-228 Average	*3.855*		
		Actinium-228 StdDev	*2.751*		
		Actinium-228 Min	*1.910*		
		Actinium-228 Max	*5.8*		

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2013

Permit Number	Station	Analyte	Activity	Units	Regulatory Sewer Release Limits*
2069I	WW008	Alpha, gross	1.75	pCi/L	
2069I	WW008	Alpha, gross	2.4	pCi/L	
		Alpha, gross Average	*2.075*		
		Alpha, gross StdDev	*0.460*		
		Alpha, gross Min	*1.750*		
		Alpha, gross Max	*2.4*		
2069I	WW008	Americium-241	-12.8	pCi/L	200
2069I	WW008	Americium-241	3.67	pCi/L	200
		Americium-241 Average	*-4.565*		
		Americium-241 StdDev	*11.646*		
		Americium-241 Min	*-12.800*		
		Americium-241 Max	*3.67*		
2069I	WW008	Beryllium-7	-2.34	pCi/L	
2069I	WW008	Beryllium-7	4.95	pCi/L	
		Beryllium-7 Average	*1.305*		
		Beryllium-7 StdDev	*5.155*		
		Beryllium-7 Min	*-2.340*		
		Beryllium-7 Max	*4.95*		
2069I	WW008	Beta, gross	15	pCi/L	
2069I	WW008	Beta, gross	33.5	pCi/L	
		Beta, gross Average	*24.250*		
		Beta, gross StdDev	*13.081*		
		Beta, gross Min	*15.000*		
		Beta, gross Max	*33.5*		
2069I	WW008	Bismuth-212	20.2	pCi/L	
2069I	WW008	Bismuth-212	25.6	pCi/L	
		Bismuth-212 Average	*22.900*		
		Bismuth-212 StdDev	*3.818*		
		Bismuth-212 Min	*20.200*		
		Bismuth-212 Max	*25.6*		
2069I	WW008	Bismuth-214	1.34	pCi/L	
2069I	WW008	Bismuth-214	15.1	pCi/L	
		Bismuth-214 Average	*8.220*		
		Bismuth-214 StdDev	*9.730*		
		Bismuth-214 Min	*1.340*		
		Bismuth-214 Max	*15.1*		
2069I	WW008	Cesium-137	-1.3	pCi/L	10000
2069I	WW008	Cesium-137	0.81	pCi/L	10000
		Cesium-137 Average	*-0.245*		
		Cesium-137 StdDev	*1.492*		
		Cesium-137 Min	*-1.300*		
		Cesium-137 Max	*0.81*		
2069I	WW008	Cobalt-60	0.385	pCi/L	30000
2069I	WW008	Cobalt-60	0.414	pCi/L	30000
		Cobalt-60 Average	*0.400*		
		Cobalt-60 StdDev	*0.021*		
		Cobalt-60 Min	*0.385*		
		Cobalt-60 Max	*0.414*		
2069I	WW008	Lead-212	-2.67	pCi/L	20000

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2013

Permit Number	Station	Analyte	Activity	Units	Regulatory Sewer Release Limits*
2069I	WW008	Lead-212	1.15	pCi/L	20000
		Lead-212 Average	*-0.760*		
		Lead-212 StdDev	*2.701*		
		Lead-212 Min	*-2.670*		
		Lead-212 Max	*1.15*		
2069I	WW008	Lead-214	0.804	pCi/L	1000000
2069I	WW008	Lead-214	18.2	pCi/L	1000000
		Lead-214 Average	*9.502*		
		Lead-214 StdDev	*12.301*		
		Lead-214 Min	*0.804*		
		Lead-214 Max	*18.2*		
2069I	WW008	Neptunium-237	-0.883	pCi/L	
2069I	WW008	Neptunium-237	-0.132	pCi/L	
		Neptunium-237 Average	*-0.508*		
		Neptunium-237 StdDev	*0.531*		
		Neptunium-237 Min	*-0.883*		
		Neptunium-237 Max	*-0.132*		
2069I	WW008	Potassium-40	9.09	pCi/L	40000
2069I	WW008	Potassium-40	53.5	pCi/L	40000
		Potassium-40 Average	*31.295*		
		Potassium-40 StdDev	*31.403*		
		Potassium-40 Min	*9.090*		
		Potassium-40 Max	*53.5*		
2069I	WW008	Radium-223	-17.2	pCi/L	
2069I	WW008	Radium-223	-10.4	pCi/L	
		Radium-223 Average	*-13.800*		
		Radium-223 StdDev	*4.808*		
		Radium-223 Min	*-17.200*		
		Radium-223 Max	*-10.4*		
2069I	WW008	Radium-224	33.8	pCi/L	
2069I	WW008	Radium-224	42.9	pCi/L	
		Radium-224 Average	*38.350*		
		Radium-224 StdDev	*6.435*		
		Radium-224 Min	*33.800*		
		Radium-224 Max	*42.9*		
2069I	WW008	Radium-226	23	pCi/L	600
2069I	WW008	Radium-226	32.4	pCi/L	600
		Radium-226 Average	*27.700*		
		Radium-226 StdDev	*6.647*		
		Radium-226 Min	*23.000*		
		Radium-226 Max	*32.4*		
2069I	WW008	Radium-228	1.91	pCi/L	600
2069I	WW008	Radium-228	5.8	pCi/L	600
		Radium-228 Average	*3.855*		
		Radium-228 StdDev	*2.751*		
		Radium-228 Min	*1.910*		
		Radium-228 Max	*5.8*		
2069I	WW008	Sodium-22	-1.56	pCi/L	
2069I	WW008	Sodium-22	0.899	pCi/L	

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2013

Permit Number	Station	Analyte	Activity	Units	Regulatory Sewer Release Limits*
		Sodium-22 Average	*-0.331*		
		Sodium-22 StdDev	*1.739*		
		Sodium-22 Min	*-1.560*		
		Sodium-22 Max	*0.899*		
2069I	WW008	Thorium-227	-8.47	pCi/L	
2069I	WW008	Thorium-227	-2.42	pCi/L	
		Thorium-227 Average	*-5.445*		
		Thorium-227 StdDev	*4.278*		
		Thorium-227 Min	*-8.470*		
		Thorium-227 Max	*-2.42*		
2069I	WW008	Thorium-231	-19.7	pCi/L	300
2069I	WW008	Thorium-231	21.8	pCi/L	300
		Thorium-231 Average	*1.050*		
		Thorium-231 StdDev	*29.345*		
		Thorium-231 Min	*-19.700*		
		Thorium-231 Max	*21.8*		
2069I	WW008	Thorium-234	-28.7	pCi/L	50000
2069I	WW008	Thorium-234	57.1	pCi/L	50000
		Thorium-234 Average	*14.200*		
		Thorium-234 StdDev	*60.670*		
		Thorium-234 Min	*-28.700*		
		Thorium-234 Max	*57.1*		
2069I	WW008	Tritium	31.5	pCi/L	10000000
2069I	WW008	Tritium	69.8	pCi/L	10000000
		Tritium Average	*50.650*		
		Tritium StdDev	*27.082*		
		Tritium Min	*31.500*		
		Tritium Max	*69.8*		
2069I	WW008	Uranium-235	-12.2	pCi/L	3000
2069I	WW008	Uranium-235	4.13	pCi/L	3000
		Uranium-235 Average	*-4.035*		
		Uranium-235 StdDev	*11.547*		
		Uranium-235 Min	*-12.200*		
		Uranium-235 Max	*4.13*		
2069I	WW008	Uranium-238	-28.7	pCi/L	3000
2069I	WW008	Uranium-238	57.1	pCi/L	3000
		Uranium-238 Average	*14.200*		
		Uranium-238 StdDev	*60.670*		
		Uranium-238 Min	*-28.700*		
		Uranium-238 Max	*57.1*		
2069K	WW011	Actinium-228	7.22	pCi/L	300000
2069K	WW011	Actinium-228	10.8	pCi/L	300000
		Actinium-228 Average	*9.010*		
		Actinium-228 StdDev	*2.531*		
		Actinium-228 Min	*7.220*		
		Actinium-228 Max	*10.8*		
2069K	WW011	Alpha, gross	4.32	pCi/L	
2069K	WW011	Alpha, gross	4.58	pCi/L	
		Alpha, gross Average	*4.450*		

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2013

Permit Number	Station	Analyte	Activity	Units	Regulatory Sewer Release Limits*
		Alpha, gross StdDev	*0.184*		
		Alpha, gross Min	*4.320*		
		Alpha, gross Max	*4.58*		
2069K	WW011	Americium-241	-9.1	pCi/L	200
2069K	WW011	Americium-241	-3.39	pCi/L	200
		Americium-241 Average	*-6.245*		
		Americium-241 StdDev	*4.038*		
		Americium-241 Min	*-9.100*		
		Americium-241 Max	*-3.39*		
2069K	WW011	Beryllium-7	-8.85	pCi/L	
2069K	WW011	Beryllium-7	6.51	pCi/L	
		Beryllium-7 Average	*-1.170*		
		Beryllium-7 StdDev	*10.861*		
		Beryllium-7 Min	*-8.850*		
		Beryllium-7 Max	*6.51*		
2069K	WW011	Beta, gross	26.5	pCi/L	
2069K	WW011	Beta, gross	33	pCi/L	
		Beta, gross Average	*29.750*		
		Beta, gross StdDev	*4.596*		
		Beta, gross Min	*26.500*		
		Beta, gross Max	*33*		
2069K	WW011	Bismuth-212	15.4	pCi/L	
2069K	WW011	Bismuth-212	26	pCi/L	
		Bismuth-212 Average	*20.700*		
		Bismuth-212 StdDev	*7.495*		
		Bismuth-212 Min	*15.400*		
		Bismuth-212 Max	*26*		
2069K	WW011	Bismuth-214	1.69	pCi/L	
2069K	WW011	Bismuth-214	7.83	pCi/L	
		Bismuth-214 Average	*4.760*		
		Bismuth-214 StdDev	*4.342*		
		Bismuth-214 Min	*1.690*		
		Bismuth-214 Max	*7.83*		
2069K	WW011	Cesium-137	-0.191	pCi/L	10000
2069K	WW011	Cesium-137	1.42	pCi/L	10000
		Cesium-137 Average	*0.615*		
		Cesium-137 StdDev	*1.139*		
		Cesium-137 Min	*-0.191*		
		Cesium-137 Max	*1.42*		
2069K	WW011	Cobalt-60	-0.874	pCi/L	30000
2069K	WW011	Cobalt-60	0.947	pCi/L	30000
		Cobalt-60 Average	*0.037*		
		Cobalt-60 StdDev	*1.288*		
		Cobalt-60 Min	*-0.874*		
		Cobalt-60 Max	*0.947*		
2069K	WW011	Lead-212	1.59	pCi/L	20000
2069K	WW011	Lead-212	2.4	pCi/L	20000
		Lead-212 Average	*1.995*		
		Lead-212 StdDev	*0.573*		

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2013

Permit Number	Station	Analyte	Activity	Units	Regulatory Sewer Release Limits*
		Lead-212 Min	*1.590*		
		Lead-212 Max	*2.4*		
2069K	WW011	Lead-214	-6.61	pCi/L	1000000
2069K	WW011	Lead-214	10.6	pCi/L	1000000
		Lead-214 Average	*1.995*		
		Lead-214 StdDev	*12.169*		
		Lead-214 Min	*-6.610*		
		Lead-214 Max	*10.6*		
2069K	WW011	Neptunium-237	-0.252	pCi/L	
2069K	WW011	Neptunium-237	1.95	pCi/L	
		Neptunium-237 Average	*0.849*		
		Neptunium-237 StdDev	*1.557*		
		Neptunium-237 Min	*-0.252*		
		Neptunium-237 Max	*1.95*		
2069K	WW011	Potassium-40	10.8	pCi/L	40000
2069K	WW011	Potassium-40	33.9	pCi/L	40000
		Potassium-40 Average	*22.350*		
		Potassium-40 StdDev	*16.334*		
		Potassium-40 Min	*10.800*		
		Potassium-40 Max	*33.9*		
2069K	WW011	Radium-223	1.77	pCi/L	
2069K	WW011	Radium-223	10.5	pCi/L	
		Radium-223 Average	*6.135*		
		Radium-223 StdDev	*6.173*		
		Radium-223 Min	*1.770*		
		Radium-223 Max	*10.5*		
2069K	WW011	Radium-224	27.6	pCi/L	
2069K	WW011	Radium-224	43.6	pCi/L	
		Radium-224 Average	*35.600*		
		Radium-224 StdDev	*11.314*		
		Radium-224 Min	*27.600*		
		Radium-224 Max	*43.6*		
2069K	WW011	Radium-226	-22.1	pCi/L	600
2069K	WW011	Radium-226	22	pCi/L	600
		Radium-226 Average	*-0.050*		
		Radium-226 StdDev	*31.183*		
		Radium-226 Min	*-22.100*		
		Radium-226 Max	*22*		
2069K	WW011	Radium-228	7.22	pCi/L	600
2069K	WW011	Radium-228	10.8	pCi/L	600
		Radium-228 Average	*9.010*		
		Radium-228 StdDev	*2.531*		
		Radium-228 Min	*7.220*		
		Radium-228 Max	*10.8*		
2069K	WW011	Sodium-22	-0.906	pCi/L	
2069K	WW011	Sodium-22	-0.356	pCi/L	
		Sodium-22 Average	*-0.631*		
		Sodium-22 StdDev	*0.389*		
		Sodium-22 Min	*-0.906*		

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2013

Permit Number	Station	Analyte	Activity	Units	Regulatory Sewer Release Limits*
		Sodium-22 Max	*-0.356*		
2069K	WW011	Thorium-227	-10.7	pCi/L	
2069K	WW011	Thorium-227	0.514	pCi/L	
		Thorium-227 Average	*-5.093*		
		Thorium-227 StdDev	*7.929*		
		Thorium-227 Min	*-10.700*		
		Thorium-227 Max	*0.514*		
2069K	WW011	Thorium-231	-23.6	pCi/L	300
2069K	WW011	Thorium-231	-14.8	pCi/L	300
		Thorium-231 Average	*-19.200*		
		Thorium-231 StdDev	*6.223*		
		Thorium-231 Min	*-23.600*		
		Thorium-231 Max	*-14.8*		
2069K	WW011	Thorium-234	-66.8	pCi/L	50000
2069K	WW011	Thorium-234	74.5	pCi/L	50000
		Thorium-234 Average	*3.850*		
		Thorium-234 StdDev	*99.914*		
		Thorium-234 Min	*-66.800*		
		Thorium-234 Max	*74.5*		
2069K	WW011	Tritium	-29.9	pCi/L	10000000
2069K	WW011	Tritium	-25.9	pCi/L	10000000
		Tritium Average	*-27.900*		
		Tritium StdDev	*2.828*		
		Tritium Min	*-29.900*		
		Tritium Max	*-25.9*		
2069K	WW011	Uranium-235	-6.79	pCi/L	3000
2069K	WW011	Uranium-235	9.47	pCi/L	3000
		Uranium-235 Average	*1.340*		
		Uranium-235 StdDev	*11.498*		
		Uranium-235 Min	*-6.790*		
		Uranium-235 Max	*9.47*		
2069K	WW011	Uranium-238	-66.8	pCi/L	3000
2069K	WW011	Uranium-238	74.5	pCi/L	3000
		Uranium-238 Average	*3.850*		
		Uranium-238 StdDev	*99.914*		
		Uranium-238 Min	*-66.800*		
		Uranium-238 Max	*74.5*		
2238A	CINT	Actinium-228	-1.04	pCi/L	300000
2238A	CINT	Actinium-228	0.747	pCi/L	300000
		Actinium-228 Average	*-0.147*		
		Actinium-228 StdDev	*1.264*		
		Actinium-228 Min	*-1.040*		
		Actinium-228 Max	*0.747*		
2238A	CINT	Alpha, gross	0.392	pCi/L	
2238A	CINT	Alpha, gross	2.2	pCi/L	
		Alpha, gross Average	*1.296*		
		Alpha, gross StdDev	*1.278*		
		Alpha, gross Min	*0.392*		
		Alpha, gross Max	*2.2*		

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2013

Permit Number	Station	Analyte	Activity	Units	Regulatory Sewer Release Limits*
2238A	CINT	Americium-241	0.684	pCi/L	200
2238A	CINT	Americium-241	1.3	pCi/L	200
		Americium-241 Average	*0.992*		
		Americium-241 StdDev	*0.436*		
		Americium-241 Min	*0.684*		
		Americium-241 Max	*1.3*		
2238A	CINT	Beryllium-7	-10.3	pCi/L	
2238A	CINT	Beryllium-7	8.11	pCi/L	
		Beryllium-7 Average	*-1.095*		
		Beryllium-7 StdDev	*13.018*		
		Beryllium-7 Min	*-10.300*		
		Beryllium-7 Max	*8.11*		
2238A	CINT	Beta, gross	1.2	pCi/L	
2238A	CINT	Beta, gross	1.25	pCi/L	
		Beta, gross Average	*1.225*		
		Beta, gross StdDev	*0.035*		
		Beta, gross Min	*1.200*		
		Beta, gross Max	*1.25*		
2238A	CINT	Bismuth-212	-12.4	pCi/L	
2238A	CINT	Bismuth-212	50.6	pCi/L	
		Bismuth-212 Average	*19.100*		
		Bismuth-212 StdDev	*44.548*		
		Bismuth-212 Min	*-12.400*		
		Bismuth-212 Max	*50.6*		
2238A	CINT	Bismuth-214	2.75	pCi/L	
2238A	CINT	Bismuth-214	4.33	pCi/L	
		Bismuth-214 Average	*3.540*		
		Bismuth-214 StdDev	*1.117*		
		Bismuth-214 Min	*2.750*		
		Bismuth-214 Max	*4.33*		
2238A	CINT	Cesium-137	-1.41	pCi/L	10000
2238A	CINT	Cesium-137	2.26	pCi/L	10000
		Cesium-137 Average	*0.425*		
		Cesium-137 StdDev	*2.595*		
		Cesium-137 Min	*-1.410*		
		Cesium-137 Max	*2.26*		
2238A	CINT	Cobalt-60	2.09	pCi/L	30000
2238A	CINT	Cobalt-60	2.89	pCi/L	30000
		Cobalt-60 Average	*2.490*		
		Cobalt-60 StdDev	*0.566*		
		Cobalt-60 Min	*2.090*		
		Cobalt-60 Max	*2.89*		
2238A	CINT	Lead-212	0.553	pCi/L	20000
2238A	CINT	Lead-212	1.08	pCi/L	20000
		Lead-212 Average	*0.817*		
		Lead-212 StdDev	*0.373*		
		Lead-212 Min	*0.553*		
		Lead-212 Max	*1.08*		
2238A	CINT	Lead-214	-7.88	pCi/L	1000000

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2013

Permit Number	Station	Analyte	Activity	Units	Regulatory Sewer Release Limits*
2238A	CINT	Lead-214	0.181	pCi/L	1000000
		Lead-214 Average	*-3.850*		
		Lead-214 StdDev	*5.700*		
		Lead-214 Min	*-7.880*		
		Lead-214 Max	*0.181*		
2238A	CINT	Neptunium-237	0.388	pCi/L	
2238A	CINT	Neptunium-237	2.48	pCi/L	
		Neptunium-237 Average	*1.434*		
		Neptunium-237 StdDev	*1.479*		
		Neptunium-237 Min	*0.388*		
		Neptunium-237 Max	*2.48*		
2238A	CINT	Potassium-40	-7.72	pCi/L	40000
2238A	CINT	Potassium-40	26.5	pCi/L	40000
		Potassium-40 Average	*9.390*		
		Potassium-40 StdDev	*24.197*		
		Potassium-40 Min	*-7.720*		
		Potassium-40 Max	*26.5*		
2238A	CINT	Radium-223	23.7	pCi/L	
2238A	CINT	Radium-223	36	pCi/L	
		Radium-223 Average	*29.850*		
		Radium-223 StdDev	*8.697*		
		Radium-223 Min	*23.700*		
		Radium-223 Max	*36*		
2238A	CINT	Radium-224	39.1	pCi/L	
2238A	CINT	Radium-224	66.8	pCi/L	
		Radium-224 Average	*52.950*		
		Radium-224 StdDev	*19.587*		
		Radium-224 Min	*39.100*		
		Radium-224 Max	*66.8*		
2238A	CINT	Radium-226	-26.1	pCi/L	600
2238A	CINT	Radium-226	27.7	pCi/L	600
		Radium-226 Average	*0.800*		
		Radium-226 StdDev	*38.042*		
		Radium-226 Min	*-26.100*		
		Radium-226 Max	*27.7*		
2238A	CINT	Radium-228	-1.04	pCi/L	600
2238A	CINT	Radium-228	0.747	pCi/L	600
		Radium-228 Average	*-0.147*		
		Radium-228 StdDev	*1.264*		
		Radium-228 Min	*-1.040*		
		Radium-228 Max	*0.747*		
2238A	CINT	Sodium-22	-0.0588	pCi/L	
2238A	CINT	Sodium-22	0.463	pCi/L	
		Sodium-22 Average	*0.202*		
		Sodium-22 StdDev	*0.369*		
		Sodium-22 Min	*-0.059*		
		Sodium-22 Max	*0.463*		
2238A	CINT	Thorium-227	-19.1	pCi/L	
2238A	CINT	Thorium-227	0.0505	pCi/L	

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2013

Permit Number	Station	Analyte	Activity	Units	Regulatory Sewer Release Limits*
		Thorium-227 Average	*-9.525*		
		Thorium-227 StdDev	*13.541*		
		Thorium-227 Min	*-19.100*		
		Thorium-227 Max	*0.0505*		
2238A	CINT	Thorium-231	-31.8	pCi/L	300
2238A	CINT	Thorium-231	-22.6	pCi/L	300
		Thorium-231 Average	*-27.200*		
		Thorium-231 StdDev	*6.505*		
		Thorium-231 Min	*-31.800*		
		Thorium-231 Max	*-22.6*		
2238A	CINT	Thorium-234	-123	pCi/L	50000
2238A	CINT	Thorium-234	7.09	pCi/L	50000
		Thorium-234 Average	*-57.955*		
		Thorium-234 StdDev	*91.988*		
		Thorium-234 Min	*-123.000*		
		Thorium-234 Max	*7.09*		
2238A	CINT	Tritium	-75.5	pCi/L	10000000
2238A	CINT	Tritium	10.4	pCi/L	10000000
		Tritium Average	*-32.550*		
		Tritium StdDev	*60.740*		
		Tritium Min	*-75.500*		
		Tritium Max	*10.4*		
2238A	CINT	Uranium-235	-9.89	pCi/L	3000
2238A	CINT	Uranium-235	1.12	pCi/L	3000
		Uranium-235 Average	*-4.385*		
		Uranium-235 StdDev	*7.785*		
		Uranium-235 Min	*-9.890*		
		Uranium-235 Max	*1.12*		
2238A	CINT	Uranium-238	-123	pCi/L	3000
2238A	CINT	Uranium-238	7.09	pCi/L	3000
		Uranium-238 Average	*-57.955*		
		Uranium-238 StdDev	*91.988*		
		Uranium-238 Min	*-123.000*		
		Uranium-238 Max	*7.09*		

NOTES:

Min = Minimum
Max = Maximum
pCi/L = picocuries per liter
StdDev = Standard Deviation
*** = 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 (ALI) for a reference man.**

TABLE A-7. Permitted Sanitary Outfalls of Inorganic Analyses, August 2013 and October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units	Regulatory Limit (ABCWUA)
CINT	2238A	19-Aug-2013	094596-009	Cyanide, total	ND	0.00167	U	mg/L	0.45
CINT	2238A	19-Aug-2013	094596-010	Cyanide, total	ND	0.00167	U	mg/L	0.45
CINT	2238A	19-Aug-2013	094596-011	Cyanide, total	ND	0.00167	U	mg/L	0.45
CINT	2238A	19-Aug-2013	094596-012	Cyanide, total	ND	0.00167	U	mg/L	0.45
CINT	2238A	20-Aug-2013	094597-001	Aluminum	0.0869	0.068	JB	mg/L	900
CINT	2238A	20-Aug-2013	094597-001	Arsenic	ND	0.005	U	mg/L	0.051
CINT	2238A	20-Aug-2013	094597-001	Boron	0.0369	0.015	J	mg/L	
CINT	2238A	20-Aug-2013	094597-001	Cadmium	ND	0.001	U	mg/L	0.05
CINT	2238A	20-Aug-2013	094597-001	Chromium	0.00402	0.001	JB	mg/L	4.1
CINT	2238A	20-Aug-2013	094597-001	Copper	0.0136	0.003		mg/L	5.3
CINT	2238A	20-Aug-2013	094597-002	Fluoride	0.628	0.033	N	mg/L	36
CINT	2238A	20-Aug-2013	094597-001	Lead	0.00549	0.0033	J	mg/L	1
CINT	2238A	20-Aug-2013	094597-001	Mercury	ND	0.000067	U	mg/L	
CINT	2238A	20-Aug-2013	094597-001	Molybdenum	0.0231	0.002		mg/L	2
CINT	2238A	20-Aug-2013	094597-001	Nickel	ND	0.0015	U	mg/L	2
CINT	2238A	20-Aug-2013	094597-001	Selenium	ND	0.006	U	mg/L	0.46
CINT	2238A	20-Aug-2013	094597-001	Silver	0.00649	0.001	B	mg/L	5
CINT	2238A	20-Aug-2013	094597-001	Zinc	0.00943	0.0033	J	mg/L	2.2
CINT	2238A	21-Aug-2013	094598-001	Aluminum	ND	0.068	U	mg/L	900
CINT	2238A	21-Aug-2013	094598-001	Arsenic	ND	0.005	U	mg/L	0.051
CINT	2238A	21-Aug-2013	094598-001	Boron	0.0335	0.015	J	mg/L	
CINT	2238A	21-Aug-2013	094598-001	Cadmium	ND	0.001	U	mg/L	0.05
CINT	2238A	21-Aug-2013	094598-001	Chromium	0.00352	0.001	JB	mg/L	4.1
CINT	2238A	21-Aug-2013	094598-001	Copper	ND	0.003	U	mg/L	5.3
CINT	2238A	21-Aug-2013	094598-002	Fluoride	1.67	0.033	N	mg/L	36
CINT	2238A	21-Aug-2013	094598-001	Lead	0.00423	0.0033	J	mg/L	1
CINT	2238A	21-Aug-2013	094598-001	Mercury	ND	0.000067	U	mg/L	
CINT	2238A	21-Aug-2013	094598-001	Molybdenum	0.0296	0.002		mg/L	2
CINT	2238A	21-Aug-2013	094598-001	Nickel	ND	0.0015	U	mg/L	2
CINT	2238A	21-Aug-2013	094598-001	Selenium	0.00895	0.006	JB	mg/L	0.46
CINT	2238A	21-Aug-2013	094598-001	Silver	0.00359	0.001	JB	mg/L	5
CINT	2238A	21-Aug-2013	094598-001	Zinc	0.0038	0.0033	J	mg/L	2.2
CINT	2238A	29-Oct-2013	094584-007	Ammonia	0.048	0.017	JB	mg/L	
CINT	2238A	30-Oct-2013	094591-007	Ammonia	0.526	0.017	B	mg/L	

TABLE A-7. Permitted Sanitary Outfalls of Inorganic Analyses, August 2013 and October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units	Regulatory Limit (ABCWUA)
WW001	2069A	29-Oct-2013	094579-001	Aluminum	0.18	0.068	J	mg/L	900
WW001	2069A	29-Oct-2013	094579-007	Ammonia	23.2	0.85	B	mg/L	
WW001	2069A	29-Oct-2013	094579-001	Arsenic	0.00598	0.005	J	mg/L	0.051
WW001	2069A	29-Oct-2013	094579-001	Boron	0.142	0.015		mg/L	
WW001	2069A	29-Oct-2013	094579-001	Cadmium	ND	0.001	U	mg/L	0.05
WW001	2069A	29-Oct-2013	094579-001	Chromium	0.00515	0.001		mg/L	4.1
WW001	2069A	29-Oct-2013	094579-001	Copper	0.0541	0.003		mg/L	5.3
WW001	2069A	29-Oct-2013	094579-002	Fluoride	0.558	0.033		mg/L	36
WW001	2069A	29-Oct-2013	094579-001	Lead	0.0185	0.0033		mg/L	1
WW001	2069A	29-Oct-2013	094579-001	Mercury	ND	0.000067	U	mg/L	
WW001	2069A	29-Oct-2013	094579-001	Molybdenum	0.0373	0.002		mg/L	2
WW001	2069A	29-Oct-2013	094579-001	Nickel	0.00204	0.0015	J	mg/L	2
WW001	2069A	29-Oct-2013	094579-001	Selenium	ND	0.006	U	mg/L	0.46
WW001	2069A	29-Oct-2013	094579-001	Silver	ND	0.001	U	mg/L	5
WW001	2069A	29-Oct-2013	094579-001	Zinc	0.087	0.0033		mg/L	2.2
WW001	2069A	30-Oct-2013	094586-001	Aluminum	0.175	0.068	J	mg/L	900
WW001	2069A	30-Oct-2013	094586-007	Ammonia	21.2	0.85	B	mg/L	
WW001	2069A	30-Oct-2013	094586-001	Arsenic	0.00843	0.005	J	mg/L	0.051
WW001	2069A	30-Oct-2013	094586-001	Boron	0.129	0.015		mg/L	
WW001	2069A	30-Oct-2013	094586-001	Cadmium	ND	0.001	U	mg/L	0.05
WW001	2069A	30-Oct-2013	094586-001	Chromium	0.00411	0.001	J	mg/L	4.1
WW001	2069A	30-Oct-2013	094586-001	Copper	0.0433	0.003		mg/L	5.3
WW001	2069A	30-Oct-2013	094586-002	Fluoride	8.41	0.165		mg/L	36
WW001	2069A	30-Oct-2013	094586-001	Lead	0.0324	0.0033		mg/L	1
WW001	2069A	30-Oct-2013	094586-001	Mercury	ND	0.000067	U	mg/L	
WW001	2069A	30-Oct-2013	094586-001	Molybdenum	0.036	0.002		mg/L	2
WW001	2069A	30-Oct-2013	094586-001	Nickel	0.00161	0.0015	J	mg/L	2
WW001	2069A	30-Oct-2013	094586-001	Selenium	0.0129	0.006	J	mg/L	0.46
WW001	2069A	30-Oct-2013	094586-001	Silver	ND	0.001	U	mg/L	5
WW001	2069A	30-Oct-2013	094586-001	Zinc	0.0859	0.0033		mg/L	2.2
WW006	2069F	28-Oct-2013	094592-009	Cyanide, total	0.00219	0.00167	J	mg/L	0.45
WW006	2069F	28-Oct-2013	094592-010	Cyanide, total	0.0031	0.00167	J	mg/L	0.45
WW006	2069F	28-Oct-2013	094592-011	Cyanide, total	ND	0.00167	U	mg/L	0.45
WW006	2069F	28-Oct-2013	094592-012	Cyanide, total	0.00191	0.00167	J	mg/L	0.45

TABLE A-7. Permitted Sanitary Outfalls of Inorganic Analyses, August 2013 and October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units	Regulatory Limit (ABCWUA)
WW006	2069F	29-Oct-2013	094580-001	Aluminum	0.217	0.068		mg/L	900
WW006	2069F	29-Oct-2013	094580-007	Ammonia	52.5	0.85	B	mg/L	
WW006	2069F	29-Oct-2013	094580-001	Arsenic	0.00524	0.005	J	mg/L	0.051
WW006	2069F	29-Oct-2013	094580-001	Boron	0.1	0.015		mg/L	
WW006	2069F	29-Oct-2013	094580-001	Cadmium	ND	0.001	U	mg/L	0.05
WW006	2069F	29-Oct-2013	094580-001	Chromium	0.00219	0.001	J	mg/L	4.1
WW006	2069F	29-Oct-2013	094580-001	Copper	0.0312	0.003		mg/L	5.3
WW006	2069F	29-Oct-2013	094580-002	Fluoride	0.629	0.033		mg/L	36
WW006	2069F	29-Oct-2013	094580-001	Lead	ND	0.0033	U	mg/L	1
WW006	2069F	29-Oct-2013	094580-001	Mercury	ND	0.000067	U	mg/L	
WW006	2069F	29-Oct-2013	094580-001	Molybdenum	0.0218	0.002		mg/L	2
WW006	2069F	29-Oct-2013	094580-001	Nickel	ND	0.0015	U	mg/L	2
WW006	2069F	29-Oct-2013	094580-001	Selenium	ND	0.006	U	mg/L	0.46
WW006	2069F	29-Oct-2013	094580-001	Silver	ND	0.001	U	mg/L	5
WW006	2069F	29-Oct-2013	094580-001	Zinc	0.124	0.0033		mg/L	2.2
WW006	2069F	30-Oct-2013	094587-001	Aluminum	0.173	0.068	J	mg/L	900
WW006	2069F	30-Oct-2013	094587-007	Ammonia	49.9	0.85	B	mg/L	
WW006	2069F	30-Oct-2013	094587-001	Arsenic	0.00572	0.005	J	mg/L	0.051
WW006	2069F	30-Oct-2013	094587-001	Boron	0.116	0.015		mg/L	
WW006	2069F	30-Oct-2013	094587-001	Cadmium	ND	0.001	U	mg/L	0.05
WW006	2069F	30-Oct-2013	094587-001	Chromium	0.00164	0.001	J	mg/L	4.1
WW006	2069F	30-Oct-2013	094587-001	Copper	0.0241	0.003		mg/L	5.3
WW006	2069F	30-Oct-2013	094587-002	Fluoride	0.728	0.033		mg/L	36
WW006	2069F	30-Oct-2013	094587-001	Lead	ND	0.0033	U	mg/L	1
WW006	2069F	30-Oct-2013	094587-001	Mercury	ND	0.000067	U	mg/L	
WW006	2069F	30-Oct-2013	094587-001	Molybdenum	0.0213	0.002		mg/L	2
WW006	2069F	30-Oct-2013	094587-001	Nickel	ND	0.0015	U	mg/L	2
WW006	2069F	30-Oct-2013	094587-001	Selenium	ND	0.006	U	mg/L	0.46
WW006	2069F	30-Oct-2013	094587-001	Silver	ND	0.001	U	mg/L	5
WW006	2069F	30-Oct-2013	094587-001	Zinc	0.0788	0.0033		mg/L	2.2
WW006 #2	2069F	29-Oct-2013	094595-009	Cyanide, total	0.00367	0.00167	J	mg/L	0.45
WW006 #2	2069F	29-Oct-2013	094595-010	Cyanide, total	0.00921	0.00167		mg/L	0.45
WW006 #2	2069F	29-Oct-2013	094595-011	Cyanide, total	0.00415	0.00167	J	mg/L	0.45
WW006 #2	2069F	29-Oct-2013	094595-012	Cyanide, total	0.00285	0.00167	J	mg/L	0.45

TABLE A-7. Permitted Sanitary Outfalls of Inorganic Analyses, August 2013 and October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units	Regulatory Limit (ABCWUA)
WW007	2069G	28-Oct-2013	094593-009	Cyanide, total	ND	0.00167	U	mg/L	0.45
WW007	2069G	28-Oct-2013	094593-010	Cyanide, total	ND	0.00167	U	mg/L	0.45
WW007	2069G	28-Oct-2013	094593-011	Cyanide, total	ND	0.00167	U	mg/L	0.45
WW007	2069G	28-Oct-2013	094593-012	Cyanide, total	ND	0.00167	U	mg/L	0.45
WW007	2069G	29-Oct-2013	094581-001	Aluminum	0.0723	0.068	J	mg/L	900
WW007	2069G	29-Oct-2013	094581-007	Ammonia	6.95	0.085	B	mg/L	
WW007	2069G	29-Oct-2013	094581-001	Arsenic	0.00616	0.005	J	mg/L	0.051
WW007	2069G	29-Oct-2013	094581-001	Boron	0.0765	0.015		mg/L	
WW007	2069G	29-Oct-2013	094581-001	Cadmium	ND	0.001	U	mg/L	0.05
WW007	2069G	29-Oct-2013	094581-001	Chromium	0.00426	0.001	J	mg/L	4.1
WW007	2069G	29-Oct-2013	094581-001	Copper	0.00378	0.003	J	mg/L	5.3
WW007	2069G	29-Oct-2013	094581-002	Fluoride	14.7	0.165		mg/L	36
WW007	2069G	29-Oct-2013	094581-001	Lead	ND	0.0033	U	mg/L	1
WW007	2069G	29-Oct-2013	094581-001	Mercury	ND	0.000067	U	mg/L	
WW007	2069G	29-Oct-2013	094581-001	Molybdenum	0.0222	0.002		mg/L	2
WW007	2069G	29-Oct-2013	094581-001	Nickel	ND	0.0015	U	mg/L	2
WW007	2069G	29-Oct-2013	094581-001	Selenium	ND	0.006	U	mg/L	0.46
WW007	2069G	29-Oct-2013	094581-001	Silver	ND	0.001	U	mg/L	5
WW007	2069G	29-Oct-2013	094581-001	Zinc	ND	0.0033	U	mg/L	2.2
WW007	2069G	30-Oct-2013	094588-001	Aluminum	ND	0.068	U	mg/L	900
WW007	2069G	30-Oct-2013	094588-007	Ammonia	18.9	0.85	B	mg/L	
WW007	2069G	30-Oct-2013	094588-001	Arsenic	ND	0.005	U	mg/L	0.051
WW007	2069G	30-Oct-2013	094588-001	Boron	0.0715	0.015		mg/L	
WW007	2069G	30-Oct-2013	094588-001	Cadmium	ND	0.001	U	mg/L	0.05
WW007	2069G	30-Oct-2013	094588-001	Chromium	0.00321	0.001	J	mg/L	4.1
WW007	2069G	30-Oct-2013	094588-001	Copper	0.00381	0.003	J	mg/L	5.3
WW007	2069G	30-Oct-2013	094588-002	Fluoride	12	0.165		mg/L	36
WW007	2069G	30-Oct-2013	094588-001	Lead	ND	0.0033	U	mg/L	1
WW007	2069G	30-Oct-2013	094588-001	Mercury	ND	0.000067	U	mg/L	
WW007	2069G	30-Oct-2013	094588-001	Molybdenum	0.0225	0.002		mg/L	2
WW007	2069G	30-Oct-2013	094588-001	Nickel	ND	0.0015	U	mg/L	2
WW007	2069G	30-Oct-2013	094588-001	Selenium	ND	0.006	U	mg/L	0.46
WW007	2069G	30-Oct-2013	094588-001	Silver	ND	0.001	U	mg/L	5
WW007	2069G	30-Oct-2013	094588-001	Zinc	ND	0.0033	U	mg/L	2.2

TABLE A-7. Permitted Sanitary Outfalls of Inorganic Analyses, August 2013 and October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units	Regulatory Limit (ABCWUA)
WW008	2069I	28-Oct-2013	094594-009	Cyanide, total	ND	0.00167	U	mg/L	0.45
WW008	2069I	28-Oct-2013	094594-010	Cyanide, total	0.00289	0.00167	J	mg/L	0.45
WW008	2069I	28-Oct-2013	094594-011	Cyanide, total	0.00522	0.00167		mg/L	0.45
WW008	2069I	28-Oct-2013	094594-012	Cyanide, total	ND	0.00167	U	mg/L	0.45
WW008	2069I	29-Oct-2013	094582-001	Aluminum	0.389	0.068		mg/L	900
WW008	2069I	29-Oct-2013	094582-001	Arsenic	0.00572	0.005	J	mg/L	0.051
WW008	2069I	29-Oct-2013	094582-001	Boron	0.0958	0.015		mg/L	
WW008	2069I	29-Oct-2013	094582-001	Cadmium	ND	0.001	U	mg/L	0.05
WW008	2069I	29-Oct-2013	094582-001	Chromium	0.00273	0.001	J	mg/L	4.1
WW008	2069I	29-Oct-2013	094582-001	Copper	0.112	0.003		mg/L	5.3
WW008	2069I	29-Oct-2013	094582-002	Fluoride	0.526	0.033		mg/L	36
WW008	2069I	29-Oct-2013	094582-001	Lead	ND	0.0033	U	mg/L	1
WW008	2069I	29-Oct-2013	094582-001	Mercury	ND	0.000067	U	mg/L	
WW008	2069I	29-Oct-2013	094582-001	Molybdenum	0.00458	0.002	J	mg/L	2
WW008	2069I	29-Oct-2013	094582-001	Nickel	0.016	0.0015		mg/L	2
WW008	2069I	29-Oct-2013	094582-001	Selenium	0.0254	0.006	J	mg/L	0.46
WW008	2069I	29-Oct-2013	094582-001	Silver	ND	0.001	U	mg/L	5
WW008	2069I	29-Oct-2013	094582-001	Zinc	2.6	0.0033		mg/L	2.2
WW008	2069I	29-Oct-2013	094582-R01	Zinc	2.46	0.0033	B	mg/L	2.2
WW008	2069I	30-Oct-2013	094589-001	Aluminum	0.321	0.068		mg/L	900
WW008	2069I	30-Oct-2013	094589-007	Ammonia	116	1.7	B	mg/L	
WW008	2069I	30-Oct-2013	094589-001	Arsenic	0.0101	0.005	J	mg/L	0.051
WW008	2069I	30-Oct-2013	094589-001	Boron	0.0901	0.015		mg/L	
WW008	2069I	30-Oct-2013	094589-001	Cadmium	ND	0.001	U	mg/L	0.05
WW008	2069I	30-Oct-2013	094589-001	Chromium	0.00245	0.001	J	mg/L	4.1
WW008	2069I	30-Oct-2013	094589-001	Copper	0.0935	0.003		mg/L	5.3
WW008	2069I	30-Oct-2013	094589-002	Fluoride	0.658	0.033		mg/L	36
WW008	2069I	30-Oct-2013	094589-001	Lead	ND	0.0033	U	mg/L	1
WW008	2069I	30-Oct-2013	094589-001	Mercury	ND	0.000067	U	mg/L	
WW008	2069I	30-Oct-2013	094589-001	Molybdenum	0.00478	0.002	J	mg/L	2
WW008	2069I	30-Oct-2013	094589-001	Nickel	0.0129	0.0015		mg/L	2
WW008	2069I	30-Oct-2013	094589-001	Selenium	ND	0.006	U	mg/L	0.46
WW008	2069I	30-Oct-2013	094589-001	Silver	ND	0.001	U	mg/L	5
WW008	2069I	30-Oct-2013	094589-001	Zinc	8.01	0.0033		mg/L	2.2

TABLE A-7. Permitted Sanitary Outfalls of Inorganic Analyses, August 2013 and October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units	Regulatory Limit (ABCWUA)
WW008	2069I	30-Oct-2013	094589-R01	Zinc	7.44	0.0033	B	mg/L	2.2
WW011	2069K	29-Oct-2013	094583-001	Aluminum	0.129	0.068	J	mg/L	900
WW011	2069K	29-Oct-2013	094583-007	Ammonia	16.7	0.17	B	mg/L	
WW011	2069K	29-Oct-2013	094583-001	Arsenic	0.00678	0.005	J	mg/L	0.051
WW011	2069K	29-Oct-2013	094583-001	Boron	0.0726	0.015		mg/L	
WW011	2069K	29-Oct-2013	094583-001	Cadmium	ND	0.001	U	mg/L	0.05
WW011	2069K	29-Oct-2013	094583-001	Chromium	0.00301	0.001	J	mg/L	4.1
WW011	2069K	29-Oct-2013	094583-001	Copper	0.0429	0.003		mg/L	5.3
WW011	2069K	29-Oct-2013	094583-002	Fluoride	0.609	0.033		mg/L	36
WW011	2069K	29-Oct-2013	094583-001	Lead	ND	0.0033	U	mg/L	1
WW011	2069K	29-Oct-2013	094583-001	Mercury	ND	0.000067	U	mg/L	
WW011	2069K	29-Oct-2013	094583-001	Molybdenum	0.0908	0.002		mg/L	2
WW011	2069K	29-Oct-2013	094583-001	Nickel	ND	0.0015	U	mg/L	2
WW011	2069K	29-Oct-2013	094583-001	Selenium	ND	0.006	U	mg/L	0.46
WW011	2069K	29-Oct-2013	094583-001	Silver	ND	0.001	U	mg/L	5
WW011	2069K	29-Oct-2013	094583-001	Zinc	0.0549	0.0033		mg/L	2.2
WW011	2069K	30-Oct-2013	094590-001	Aluminum	0.174	0.068	J	mg/L	900
WW011	2069K	30-Oct-2013	094590-007	Ammonia	19.6	0.85	B	mg/L	
WW011	2069K	30-Oct-2013	094590-001	Arsenic	0.00872	0.005	J	mg/L	0.051
WW011	2069K	30-Oct-2013	094590-001	Boron	0.0683	0.015		mg/L	
WW011	2069K	30-Oct-2013	094590-001	Cadmium	ND	0.001	U	mg/L	0.05
WW011	2069K	30-Oct-2013	094590-001	Chromium	0.00271	0.001	J	mg/L	4.1
WW011	2069K	30-Oct-2013	094590-001	Copper	0.0399	0.003		mg/L	5.3
WW011	2069K	30-Oct-2013	094590-002	Fluoride	8.59	0.165		mg/L	36
WW011	2069K	30-Oct-2013	094590-001	Lead	ND	0.0033	U	mg/L	1
WW011	2069K	30-Oct-2013	094590-001	Mercury	ND	0.000067	U	mg/L	
WW011	2069K	30-Oct-2013	094590-001	Molybdenum	0.12	0.002		mg/L	2
WW011	2069K	30-Oct-2013	094590-001	Nickel	ND	0.0015	U	mg/L	2

TABLE A-7. Permitted Sanitary Outfalls of Inorganic Analyses, August 2013 and October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units	Regulatory Limit (ABCWUA)
WW011	2069K	30-Oct-2013	094590-001	Selenium	ND	0.006	U	mg/L	0.46
WW011	2069K	30-Oct-2013	094590-001	Silver	0.0126	0.001		mg/L	5
WW011	2069K	30-Oct-2013	094590-001	Zinc	0.0931	0.0033		mg/L	2.2

NOTES:

ABCWUA = Albuquerque Bernalillo County Water Utility Authority
B = The analyte was found in the blank above the effective MDL.
MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
ND = The analyte was not detected (at MDL).
J = The associated value is an estimated quantity.
U = The analyte was analyzed for but not detected.

TABLE A-8. Summary of Sanitary Outfalls of Radiological Analyses, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Activity	Two Sigma Error	Laboratory Data Qualifier	MDA	Units
CINT	2238A	29-Oct-2013	094584-004	Actinium-228	-1.04	16.7	U	20.5	pCi/L
CINT	2238A	29-Oct-2013	094584-003	Alpha, gross	2.2	1.64	U	2.51	pCi/L
CINT	2238A	29-Oct-2013	094584-004	Americium-241	0.684	7.31	U	12.7	pCi/L
CINT	2238A	29-Oct-2013	094584-004	Beryllium-7	-10.3	18.8	U	31.8	pCi/L
CINT	2238A	29-Oct-2013	094584-003	Beta, gross	1.25	1.2	U	1.92	pCi/L
CINT	2238A	29-Oct-2013	094584-004	Bismuth-212	50.6	61	U	63.7	pCi/L
CINT	2238A	29-Oct-2013	094584-004	Bismuth-214	2.75	9.85	U	7.91	pCi/L
CINT	2238A	29-Oct-2013	094584-004	Cesium-137	2.26	2.73	U	4.7	pCi/L
CINT	2238A	29-Oct-2013	094584-004	Cobalt-60	2.89	2.77	U	4.9	pCi/L
CINT	2238A	29-Oct-2013	094584-004	Lead-212	1.08	6.19	U	7.81	pCi/L
CINT	2238A	29-Oct-2013	094584-004	Lead-214	-7.88	9.15	U	9.48	pCi/L
CINT	2238A	29-Oct-2013	094584-004	Neptunium-237	2.48	5.52	U	7.48	pCi/L
CINT	2238A	29-Oct-2013	094584-004	Potassium-40	26.5	73.8	U	38.4	pCi/L
CINT	2238A	29-Oct-2013	094584-004	Radium-223	36	44.3	U	73.7	pCi/L
CINT	2238A	29-Oct-2013	094584-004	Radium-224	39.1	41.7	U	76	pCi/L
CINT	2238A	29-Oct-2013	094584-004	Radium-226	27.7	92	U	64.4	pCi/L
CINT	2238A	29-Oct-2013	094584-004	Radium-228	-1.04	16.7	U	20.5	pCi/L
CINT	2238A	29-Oct-2013	094584-004	Sodium-22	0.463	2.33	U	4.31	pCi/L
CINT	2238A	29-Oct-2013	094584-004	Thorium-227	-19.1	20.4	U	26.4	pCi/L
CINT	2238A	29-Oct-2013	094584-004	Thorium-231	-31.8	41	U	39.2	pCi/L
CINT	2238A	29-Oct-2013	094584-004	Thorium-234	-123	142	U	130	pCi/L
CINT	2238A	29-Oct-2013	094584-005	Tritium	-75.5	83.2	U	173	pCi/L
CINT	2238A	29-Oct-2013	094584-004	Uranium-235	1.12	18.7	U	20.2	pCi/L
CINT	2238A	29-Oct-2013	094584-004	Uranium-238	-123	142	U	130	pCi/L
WW001	2069A	29-Oct-2013	094579-004	Actinium-228	1.69	15.3	U	9.77	pCi/L
WW001	2069A	29-Oct-2013	094579-003	Alpha, gross	-0.3	2.66	U	4.79	pCi/L
WW001	2069A	29-Oct-2013	094579-004	Americium-241	12.5	10.6	U	13.5	pCi/L
WW001	2069A	29-Oct-2013	094579-004	Beryllium-7	-0.287	13.1	U	22.4	pCi/L
WW001	2069A	29-Oct-2013	094579-003	Beta, gross	9.23	2.39		2.46	pCi/L
WW001	2069A	29-Oct-2013	094579-004	Bismuth-212	22.2	23.2	U	38.9	pCi/L
WW001	2069A	29-Oct-2013	094579-004	Bismuth-214	4.43	7.45	U	6.81	pCi/L
WW001	2069A	29-Oct-2013	094579-004	Cesium-137	0.447	1.6	U	2.74	pCi/L
WW001	2069A	29-Oct-2013	094579-004	Cobalt-60	-2.67	3.44	U	2.96	pCi/L

TABLE A-8. Summary of Sanitary Outfalls of Radiological Analyses, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Activity	Two Sigma Error	Laboratory Data Qualifier	MDA	Units
WW001	2069A	29-Oct-2013	094579-004	Lead-212	1.88	6.74	U	5.69	pCi/L
WW001	2069A	29-Oct-2013	094579-004	Lead-214	-2.68	7.32	U	6.57	pCi/L
WW001	2069A	29-Oct-2013	094579-004	Neptunium-237	-1.47	3.07	U	5.14	pCi/L
WW001	2069A	29-Oct-2013	094579-004	Potassium-40	-5.85	34.3	U	42.6	pCi/L
WW001	2069A	29-Oct-2013	094579-004	Radium-223	-45.1	46.3	U	51.8	pCi/L
WW001	2069A	29-Oct-2013	094579-004	Radium-224	33.6	35.5	U	51.2	pCi/L
WW001	2069A	29-Oct-2013	094579-004	Radium-226	-40.3	62.7	U	69.8	pCi/L
WW001	2069A	29-Oct-2013	094579-004	Radium-228	1.69	15.3	U	9.77	pCi/L
WW001	2069A	29-Oct-2013	094579-004	Sodium-22	-0.0512	1.73	U	2.64	pCi/L
WW001	2069A	29-Oct-2013	094579-004	Thorium-227	0.43	13.4	U	20.6	pCi/L
WW001	2069A	29-Oct-2013	094579-004	Thorium-231	-27.8	36.8	U	37.7	pCi/L
WW001	2069A	29-Oct-2013	094579-004	Thorium-234	42.8	125	U	134	pCi/L
WW001	2069A	29-Oct-2013	094579-005	Tritium	-44.6	87.3	U	173	pCi/L
WW001	2069A	29-Oct-2013	094579-004	Uranium-235	-14.9	18.7	U	17.2	pCi/L
WW001	2069A	29-Oct-2013	094579-004	Uranium-238	42.8	125	U	134	pCi/L
WW006	2069F	29-Oct-2013	094580-004	Actinium-228	18.6	17.3	U	18.7	pCi/L
WW006	2069F	29-Oct-2013	094580-003	Alpha, gross	6.95	3.33		4.69	pCi/L
WW006	2069F	29-Oct-2013	094580-004	Americium-241	-10.9	8.3	U	10.8	pCi/L
WW006	2069F	29-Oct-2013	094580-004	Beryllium-7	-10	18.3	U	30.5	pCi/L
WW006	2069F	29-Oct-2013	094580-003	Beta, gross	16.1	3.48		2.34	pCi/L
WW006	2069F	29-Oct-2013	094580-004	Bismuth-212	63.2	59.4	U	63.3	pCi/L
WW006	2069F	29-Oct-2013	094580-004	Bismuth-214	-2.49	8.31	U	9.26	pCi/L
WW006	2069F	29-Oct-2013	094580-004	Cesium-137	-0.957	2.3	U	3.83	pCi/L
WW006	2069F	29-Oct-2013	094580-004	Cobalt-60	1.21	2.62	U	4.2	pCi/L
WW006	2069F	29-Oct-2013	094580-004	Lead-212	5.48	5.78	U	5.84	pCi/L
WW006	2069F	29-Oct-2013	094580-004	Lead-214	-6.98	7.75	U	8.33	pCi/L
WW006	2069F	29-Oct-2013	094580-004	Neptunium-237	-1	4.11	U	6.89	pCi/L
WW006	2069F	29-Oct-2013	094580-004	Potassium-40	22.9	50.5	U	38	pCi/L
WW006	2069F	29-Oct-2013	094580-004	Radium-223	-44.4	52.4	U	68	pCi/L
WW006	2069F	29-Oct-2013	094580-004	Radium-224	16.9	52.5	U	66	pCi/L
WW006	2069F	29-Oct-2013	094580-004	Radium-226	9.94	79.4	U	65.8	pCi/L
WW006	2069F	29-Oct-2013	094580-004	Radium-228	18.6	17.3	U	18.7	pCi/L
WW006	2069F	29-Oct-2013	094580-004	Sodium-22	0.331	2.16	U	3.98	pCi/L

TABLE A-8. Summary of Sanitary Outfalls of Radiological Analyses, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Activity	Two Sigma Error	Laboratory Data Qualifier	MDA	Units
WW006	2069F	29-Oct-2013	094580-004	Thorium-227	0.317	15.4	U	26.6	pCi/L
WW006	2069F	29-Oct-2013	094580-004	Thorium-231	-48.8	39.3	U	35.4	pCi/L
WW006	2069F	29-Oct-2013	094580-004	Thorium-234	-40	101	U	118	pCi/L
WW006	2069F	29-Oct-2013	094580-005	Tritium	-65.4	84.6	U	174	pCi/L
WW006	2069F	29-Oct-2013	094580-004	Uranium-235	10.3	21	U	17.8	pCi/L
WW006	2069F	29-Oct-2013	094580-004	Uranium-238	-40	101	U	118	pCi/L
WW008	2069I	29-Oct-2013	094582-004	Actinium-228	1.91	11.7	U	12	pCi/L
WW008	2069I	29-Oct-2013	094582-003	Alpha, gross	1.75	2.13	U	3.52	pCi/L
WW008	2069I	29-Oct-2013	094582-004	Americium-241	-12.8	17	U	23.7	pCi/L
WW008	2069I	29-Oct-2013	094582-004	Beryllium-7	4.95	14.9	U	25.7	pCi/L
WW008	2069I	29-Oct-2013	094582-003	Beta, gross	33.5	6.27		3.54	pCi/L
WW008	2069I	29-Oct-2013	094582-004	Bismuth-212	25.6	27.8	U	41.9	pCi/L
WW008	2069I	29-Oct-2013	094582-004	Bismuth-214	15.1	8.51		5.67	pCi/L
WW008	2069I	29-Oct-2013	094582-004	Cesium-137	-1.3	1.78	U	2.89	pCi/L
WW008	2069I	29-Oct-2013	094582-004	Cobalt-60	0.414	1.81	U	3.22	pCi/L
WW008	2069I	29-Oct-2013	094582-004	Lead-212	-2.67	5.32	U	5.9	pCi/L
WW008	2069I	29-Oct-2013	094582-004	Lead-214	18.2	8.53		6.58	pCi/L
WW008	2069I	29-Oct-2013	094582-004	Neptunium-237	-0.883	3.39	U	5.81	pCi/L
WW008	2069I	29-Oct-2013	094582-004	Potassium-40	53.5	46		27.6	pCi/L
WW008	2069I	29-Oct-2013	094582-004	Radium-223	-17.2	35	U	58.2	pCi/L
WW008	2069I	29-Oct-2013	094582-004	Radium-224	33.8	39.5	U	58.6	pCi/L
WW008	2069I	29-Oct-2013	094582-004	Radium-226	32.4	83.6	U	59.3	pCi/L
WW008	2069I	29-Oct-2013	094582-004	Radium-228	1.91	11.7	U	12	pCi/L
WW008	2069I	29-Oct-2013	094582-004	Sodium-22	-1.56	1.85	U	2.77	pCi/L
WW008	2069I	29-Oct-2013	094582-004	Thorium-227	-8.47	14	U	23.1	pCi/L
WW008	2069I	29-Oct-2013	094582-004	Thorium-231	-19.7	41	U	46.9	pCi/L
WW008	2069I	29-Oct-2013	094582-004	Thorium-234	-28.7	171	U	211	pCi/L
WW008	2069I	29-Oct-2013	094582-005	Tritium	69.8	103	U	175	pCi/L
WW008	2069I	29-Oct-2013	094582-004	Uranium-235	4.13	17.7	U	20	pCi/L
WW008	2069I	29-Oct-2013	094582-004	Uranium-238	-28.7	171	U	211	pCi/L
WW011	2069K	29-Oct-2013	094583-004	Actinium-228	10.8	13.1	U	13.1	pCi/L
WW011	2069K	29-Oct-2013	094583-003	Alpha, gross	4.58	2.78		4.19	pCi/L
WW011	2069K	29-Oct-2013	094583-004	Americium-241	-3.39	11.1	U	17.4	pCi/L

TABLE A-8. Summary of Sanitary Outfalls of Radiological Analyses, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Activity	Two Sigma Error	Laboratory Data Qualifier	MDA	Units
WW011	2069K	29-Oct-2013	094583-004	Beryllium-7	6.51	13.4	U	23.2	pCi/L
WW011	2069K	29-Oct-2013	094583-003	Beta, gross	33	5.91		2.51	pCi/L
WW011	2069K	29-Oct-2013	094583-004	Bismuth-212	26	24.8	U	41.1	pCi/L
WW011	2069K	29-Oct-2013	094583-004	Bismuth-214	1.69	7.82	U	6.81	pCi/L
WW011	2069K	29-Oct-2013	094583-004	Cesium-137	1.42	1.62	U	2.83	pCi/L
WW011	2069K	29-Oct-2013	094583-004	Cobalt-60	-0.874	1.67	U	2.85	pCi/L
WW011	2069K	29-Oct-2013	094583-004	Lead-212	2.4	5.62	U	4.41	pCi/L
WW011	2069K	29-Oct-2013	094583-004	Lead-214	-6.61	7.12	U	6.51	pCi/L
WW011	2069K	29-Oct-2013	094583-004	Neptunium-237	-0.252	3.34	U	5.19	pCi/L
WW011	2069K	29-Oct-2013	094583-004	Potassium-40	33.9	47.4	X	29.8	pCi/L
WW011	2069K	29-Oct-2013	094583-004	Radium-223	1.77	29.1	U	51.4	pCi/L
WW011	2069K	29-Oct-2013	094583-004	Radium-224	43.6	39.7	U	49.5	pCi/L
WW011	2069K	29-Oct-2013	094583-004	Radium-226	22	74.3	U	47.4	pCi/L
WW011	2069K	29-Oct-2013	094583-004	Radium-228	10.8	13.1	U	13.1	pCi/L
WW011	2069K	29-Oct-2013	094583-004	Sodium-22	-0.356	1.53	U	2.63	pCi/L
WW011	2069K	29-Oct-2013	094583-004	Thorium-227	0.514	11.2	U	20	pCi/L
WW011	2069K	29-Oct-2013	094583-004	Thorium-231	-23.6	39	U	38.8	pCi/L
WW011	2069K	29-Oct-2013	094583-004	Thorium-234	74.5	181	U	135	pCi/L
WW011	2069K	29-Oct-2013	094583-005	Tritium	-29.9	89.1	U	173	pCi/L
WW011	2069K	29-Oct-2013	094583-004	Uranium-235	9.47	18.4	U	14.5	pCi/L
WW011	2069K	29-Oct-2013	094583-004	Uranium-238	74.5	181	U	135	pCi/L

NOTES:

MDA = minimum detectable activity
pCi/L = picocuries per liter
U = The result is less than the MDA.
X = Presumptive evidence analyte is not present.

TABLE A-9. Summary of Sanitary Outfalls of Volatile Organic Compounds, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
CINT	2238A	29-Oct-2013	094584-006	Acetone	278	3		µg/L
CINT	2238A	29-Oct-2013	094584-006	Benzene	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Bromochloromethane	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Bromodichloromethane	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Bromoform	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Bromomethane	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Butanone, 2-	ND	2	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Carbon disulfide	ND	1.5	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Carbon tetrachloride	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Chlorobenzene	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Chloroethane	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Chloroform	0.51	0.3	J	µg/L
CINT	2238A	29-Oct-2013	094584-006	Chloromethane	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Cyclohexane	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Dibromo-3-chloropropane, 1,2-	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Dibromochloromethane	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Dibromoethane, 1,2-	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Dichlorobenzene, 1,2-	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Dichlorobenzene, 1,3-	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Dichlorobenzene, 1,4-	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Dichlorodifluoromethane	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Dichloroethane, 1,1-	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Dichloroethane, 1,2-	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Dichloroethene, 1,1-	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Dichloroethene, cis-1,2-	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Dichloroethene, trans-1,2-	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Dichloropropane, 1,2-	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Dichloropropene, cis-1,3-	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Dichloropropene, trans-1,3-	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Ethyl benzene	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Hexanone, 2-	ND	2.2	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Isopropylbenzene	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Methyl Acetate	ND	1.5	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Methylcyclohexane	ND	3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Methylene chloride	ND	3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Pentanone, 4-methyl-, 2-	ND	1.5	U	µg/L

TABLE A-9. Summary of Sanitary Outfalls of Volatile Organic Compounds, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
CINT	2238A	29-Oct-2013	094584-006	Styrene	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Tert-butyl methyl ether	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Tetrachloroethane, 1,1,2,2-	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Tetrachloroethene	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Toluene	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-	ND	1.5	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Trichlorobenzene, 1,2,3-	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Trichlorobenzene, 1,2,4-	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Trichloroethane, 1,1,1-	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Trichloroethane, 1,1,2-	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Trichloroethene	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Trichlorofluoromethane	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Vinyl chloride	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Xylene	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Xylene, m- & p-	ND	0.3	U	µg/L
CINT	2238A	29-Oct-2013	094584-006	Xylene, o-	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Acetone	50	3		µg/L
WW001	2069A	29-Oct-2013	094579-006	Benzene	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Bromochloromethane	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Bromodichloromethane	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Bromoform	1.45	0.3		µg/L
WW001	2069A	29-Oct-2013	094579-006	Bromomethane	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Butanone, 2-	ND	2	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Carbon disulfide	ND	1.5	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Carbon tetrachloride	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Chlorobenzene	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Chloroethane	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Chloroform	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Chloromethane	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Cyclohexane	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Dibromo-3-chloropropane, 1,2-	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Dibromochloromethane	0.43	0.3	J	µg/L
WW001	2069A	29-Oct-2013	094579-006	Dibromoethane, 1,2-	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Dichlorobenzene, 1,2-	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Dichlorobenzene, 1,3-	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Dichlorobenzene, 1,4-	ND	0.3	U	µg/L

TABLE A-9. Summary of Sanitary Outfalls of Volatile Organic Compounds, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW001	2069A	29-Oct-2013	094579-006	Dichlorodifluoromethane	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Dichloroethane, 1,1-	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Dichloroethane, 1,2-	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Dichloroethene, 1,1-	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Dichloroethene, cis-1,2-	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Dichloroethene, trans-1,2-	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Dichloropropane, 1,2-	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Dichloropropene, cis-1,3-	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Dichloropropene, trans-1,3-	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Ethyl benzene	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Hexanone, 2-	ND	2.2	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Isopropylbenzene	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Methyl Acetate	ND	1.5	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Methylcyclohexane	ND	3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Methylene chloride	ND	3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Pentanone, 4-methyl-, 2-	ND	1.5	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Styrene	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Tert-butyl methyl ether	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Tetrachloroethane, 1,1,2,2-	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Tetrachloroethene	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Toluene	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-	ND	1.5	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Trichlorobenzene, 1,2,3-	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Trichlorobenzene, 1,2,4-	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Trichloroethane, 1,1,1-	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Trichloroethane, 1,1,2-	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Trichloroethene	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Trichlorofluoromethane	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Vinyl chloride	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Xylene	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Xylene, m- & p-	ND	0.3	U	µg/L
WW001	2069A	29-Oct-2013	094579-006	Xylene, o-	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Acetone	130	3		µg/L
WW006	2069F	29-Oct-2013	094580-006	Benzene	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Bromochloromethane	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Bromodichloromethane	ND	0.3	U	µg/L

TABLE A-9. Summary of Sanitary Outfalls of Volatile Organic Compounds, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW006	2069F	29-Oct-2013	094580-006	Bromoform	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Bromomethane	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Butanone, 2-	ND	2	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Carbon disulfide	ND	1.5	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Carbon tetrachloride	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Chlorobenzene	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Chloroethane	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Chloroform	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Chloromethane	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Cyclohexane	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Dibromo-3-chloropropane, 1,2-	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Dibromochloromethane	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Dibromoethane, 1,2-	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Dichlorobenzene, 1,2-	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Dichlorobenzene, 1,3-	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Dichlorobenzene, 1,4-	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Dichlorodifluoromethane	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Dichloroethane, 1,1-	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Dichloroethane, 1,2-	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Dichloroethene, 1,1-	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Dichloroethene, cis-1,2-	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Dichloroethene, trans-1,2-	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Dichloropropane, 1,2-	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Dichloropropene, cis-1,3-	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Dichloropropene, trans-1,3-	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Ethyl benzene	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Hexanone, 2-	ND	2.2	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Isopropylbenzene	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Methyl Acetate	ND	1.5	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Methylcyclohexane	ND	3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Methylene chloride	ND	3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Pentanone, 4-methyl-, 2-	ND	1.5	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Styrene	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Tert-butyl methyl ether	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Tetrachloroethane, 1,1,2,2-	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Tetrachloroethene	ND	0.3	U	µg/L

TABLE A-9. Summary of Sanitary Outfalls of Volatile Organic Compounds, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW006	2069F	29-Oct-2013	094580-006	Toluene	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-	ND	1.5	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Trichlorobenzene, 1,2,3-	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Trichlorobenzene, 1,2,4-	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Trichloroethane, 1,1,1-	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Trichloroethane, 1,1,2-	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Trichloroethene	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Trichlorofluoromethane	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Vinyl chloride	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Xylene	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Xylene, m- & p-	ND	0.3	U	µg/L
WW006	2069F	29-Oct-2013	094580-006	Xylene, o-	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Acetone	17.1	3		µg/L
WW007	2069G	29-Oct-2013	094581-006	Benzene	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Bromochloromethane	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Bromodichloromethane	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Bromoform	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Bromomethane	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Butanone, 2-	ND	2	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Carbon disulfide	ND	1.5	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Carbon tetrachloride	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Chlorobenzene	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Chloroethane	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Chloroform	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Chloromethane	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Cyclohexane	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Dibromo-3-chloropropane, 1,2-	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Dibromochloromethane	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Dibromoethane, 1,2-	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Dichlorobenzene, 1,2-	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Dichlorobenzene, 1,3-	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Dichlorobenzene, 1,4-	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Dichlorodifluoromethane	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Dichloroethane, 1,1-	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Dichloroethane, 1,2-	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Dichloroethene, 1,1-	ND	0.3	U	µg/L

TABLE A-9. Summary of Sanitary Outfalls of Volatile Organic Compounds, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW007	2069G	29-Oct-2013	094581-006	Dichloroethene, cis-1,2-	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Dichloroethene, trans-1,2-	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Dichloropropane, 1,2-	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Dichloropropene, cis-1,3-	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Dichloropropene, trans-1,3-	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Ethyl benzene	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Hexanone, 2-	ND	2.2	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Isopropylbenzene	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Methyl Acetate	ND	1.5	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Methylcyclohexane	ND	3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Methylene chloride	ND	3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Pentanone, 4-methyl-, 2-	ND	1.5	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Styrene	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Tert-butyl methyl ether	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Tetrachloroethane, 1,1,2,2-	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Tetrachloroethene	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Toluene	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-	ND	1.5	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Trichlorobenzene, 1,2,3-	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Trichlorobenzene, 1,2,4-	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Trichloroethane, 1,1,1-	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Trichloroethane, 1,1,2-	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Trichloroethene	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Trichlorofluoromethane	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Vinyl chloride	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Xylene	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Xylene, m- & p-	ND	0.3	U	µg/L
WW007	2069G	29-Oct-2013	094581-006	Xylene, o-	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Acetone	2430	30		µg/L
WW008	2069I	29-Oct-2013	094582-006	Benzene	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Bromochloromethane	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Bromodichloromethane	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Bromoform	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Bromomethane	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Butanone, 2-	ND	2	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Carbon disulfide	ND	1.5	U	µg/L

TABLE A-9. Summary of Sanitary Outfalls of Volatile Organic Compounds, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW008	2069I	29-Oct-2013	094582-006	Carbon tetrachloride	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Chlorobenzene	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Chloroethane	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Chloroform	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Chloromethane	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Cyclohexane	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Dibromo-3-chloropropane, 1,2-	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Dibromochloromethane	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Dibromoethane, 1,2-	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Dichlorobenzene, 1,2-	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Dichlorobenzene, 1,3-	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Dichlorobenzene, 1,4-	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Dichlorodifluoromethane	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Dichloroethane, 1,1-	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Dichloroethane, 1,2-	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Dichloroethene, 1,1-	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Dichloroethene, cis-1,2-	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Dichloroethene, trans-1,2-	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Dichloropropane, 1,2-	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Dichloropropene, cis-1,3-	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Dichloropropene, trans-1,3-	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Ethyl benzene	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Hexanone, 2-	ND	2.2	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Isopropylbenzene	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Methyl Acetate	ND	1.5	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Methylcyclohexane	ND	3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Methylene chloride	ND	3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Pentanone, 4-methyl-, 2-	ND	1.5	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Styrene	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Tert-butyl methyl ether	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Tetrachloroethane, 1,1,2,2-	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Tetrachloroethene	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Toluene	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-	ND	1.5	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Trichlorobenzene, 1,2,3-	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Trichlorobenzene, 1,2,4-	ND	0.3	U	µg/L

TABLE A-9. Summary of Sanitary Outfalls of Volatile Organic Compounds, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW008	2069I	29-Oct-2013	094582-006	Trichloroethane, 1,1,1-	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Trichloroethane, 1,1,2-	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Trichloroethene	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Trichlorofluoromethane	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Vinyl chloride	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Xylene	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Xylene, m- & p-	ND	0.3	U	µg/L
WW008	2069I	29-Oct-2013	094582-006	Xylene, o-	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Acetone	603	6		µg/L
WW011	2069K	29-Oct-2013	094583-006	Benzene	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Bromochloromethane	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Bromodichloromethane	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Bromoform	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Bromomethane	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Butanone, 2-	ND	2	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Carbon disulfide	ND	1.5	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Carbon tetrachloride	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Chlorobenzene	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Chloroethane	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Chloroform	0.53	0.3	J	µg/L
WW011	2069K	29-Oct-2013	094583-006	Chloromethane	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Cyclohexane	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Dibromo-3-chloropropane, 1,2-	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Dibromochloromethane	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Dibromoethane, 1,2-	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Dichlorobenzene, 1,2-	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Dichlorobenzene, 1,3-	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Dichlorobenzene, 1,4-	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Dichlorodifluoromethane	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Dichloroethane, 1,1-	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Dichloroethane, 1,2-	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Dichloroethene, 1,1-	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Dichloroethene, cis-1,2-	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Dichloroethene, trans-1,2-	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Dichloropropane, 1,2-	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Dichloropropene, cis-1,3-	ND	0.3	U	µg/L

TABLE A-9. Summary of Sanitary Outfalls of Volatile Organic Compounds, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW011	2069K	29-Oct-2013	094583-006	Dichloropropene, trans-1,3-	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Ethyl benzene	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Hexanone, 2-	ND	2.2	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Isopropylbenzene	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Methyl Acetate	ND	1.5	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Methylcyclohexane	ND	3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Methylene chloride	ND	3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Pentanone, 4-methyl-, 2-	ND	1.5	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Styrene	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Tert-butyl methyl ether	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Tetrachloroethane, 1,1,2,2-	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Tetrachloroethene	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Toluene	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-	ND	1.5	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Trichlorobenzene, 1,2,3-	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Trichlorobenzene, 1,2,4-	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Trichloroethane, 1,1,1-	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Trichloroethane, 1,1,2-	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Trichloroethene	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Trichlorofluoromethane	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Vinyl chloride	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Xylene	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Xylene, m- & p-	ND	0.3	U	µg/L
WW011	2069K	29-Oct-2013	094583-006	Xylene, o-	ND	0.3	U	µg/L

NOTES:

MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

ND = The analyte was not detected (at MDL).

J = The associated value is an estimated quantity.

µg/L = micrograms per liter

U = The analyte was analyzed for but not detected.

TABLE A-10. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
CINT	2238A	30-Oct-2013	094591-008	1,1'-Biphenyl	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Acenaphthene	ND	0.319	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Acenaphthylene	ND	0.319	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Acetophenone	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Anthracene	ND	0.319	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Atrazine	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Benzaldehyde	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Benzo(a)anthracene	ND	0.319	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Benzo(a)pyrene	ND	0.319	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Benzo(b)fluoranthene	ND	0.319	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Benzo(ghi)perylene	ND	0.319	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Benzo(k)fluoranthene	ND	0.319	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Bromophenyl phenyl ether, 4-	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Butylbenzyl phthalate	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Caprolactam	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Carbazole	ND	0.319	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Chloro-3-methylphenol, 4-	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Chlorobenzenamine, 4-	ND	3.51	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Chloroethoxy)methane, bis(2-	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Chloroethyl)ether, bis(2-	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Chloronaphthalene, 2-	ND	0.436	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Chlorophenol, 2-	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Chlorophenyl phenyl ether, 4-	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Chrysene	ND	0.319	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Cresol, m,p-	ND	3.94	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Cresol, o-	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Di-n-butyl phthalate	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Di-n-octyl phthalate	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Dibenz[a,h]anthracene	ND	0.319	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Dibenzofuran	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Dichlorobenzidine, 3,3'-	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Dichlorodiisopropyl ether, 2,2'-	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Dichlorophenol, 2,4-	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Diethylphthalate	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Dimethylphenol, 2,4-	ND	3.19	U	µg/L

TABLE A-10. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
CINT	2238A	30-Oct-2013	094591-008	Dimethylphthalate	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Dinitro-o-cresol	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Dinitrophenol, 2,4-	ND	5.32	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Dinitrotoluene, 2,4-	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Dinitrotoluene, 2,6-	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Dioxane, 1,4-	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Diphenyl amine	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Ethylhexyl)phthalate, bis(2-	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Fluoranthene	ND	0.319	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Fluorene	ND	0.319	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Hexachlorobenzene	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Hexachlorobutadiene	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Hexachlorocyclopentadiene	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Hexachloroethane	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Indeno(1,2,3-c,d)pyrene	ND	0.319	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Isophorone	ND	3.72	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Methylnaphthalene, 2-	ND	0.319	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Naphthalene	ND	0.319	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Nitro-benzene	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Nitroaniline, 2-	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Nitroaniline, 3-	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Nitroaniline, 4-	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Nitrophenol, 2-	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Nitrophenol, 4-	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Nitrosodipropylamine, n-	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Pentachlorophenol	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Phenanthrene	ND	0.319	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Phenol	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Pyrene	ND	0.319	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Trichlorobenzene, 1,2,4-	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Trichlorophenol, 2,4,5-	ND	3.19	U	µg/L
CINT	2238A	30-Oct-2013	094591-008	Trichlorophenol, 2,4,6-	ND	3.19	U	µg/L
WW001	2069A	30-Oct-2013	094586-008	1,1'-Biphenyl	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Acenaphthene	ND	0.3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Acenaphthylene	ND	0.3	Uh	µg/L

TABLE A-10. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW001	2069A	30-Oct-2013	094586-008	Acetophenone	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Anthracene	ND	0.3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Atrazine	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Benzaldehyde	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Benzo(a)anthracene	ND	0.3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Benzo(a)pyrene	ND	0.3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Benzo(b)fluoranthene	ND	0.3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Benzo(ghi)perylene	ND	0.3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Benzo(k)fluoranthene	ND	0.3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Bromophenyl phenyl ether, 4-	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Butylbenzyl phthalate	4.05	3	Jh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Caprolactam	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Carbazole	ND	0.3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Chloro-3-methylphenol, 4-	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Chlorobenzenamine, 4-	ND	3.3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Chloroethoxy)methane, bis(2-	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Chloroethyl)ether, bis(2-	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Chloronaphthalene, 2-	ND	0.41	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Chlorophenol, 2-	ND	3	*Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Chlorophenyl phenyl ether, 4-	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Chrysene	ND	0.3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Cresol, m,p-	ND	3.7	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Cresol, o-	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Di-n-butyl phthalate	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Di-n-octyl phthalate	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Dibenz[a,h]anthracene	ND	0.3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Dibenzofuran	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Dichlorobenzidine, 3,3'-	ND	3	NUh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Dichlorodiisopropyl ether, 2,2'-	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Dichlorophenol, 2,4-	ND	3	*Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Diethylphthalate	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Dimethylphenol, 2,4-	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Dimethylphthalate	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Dinitro-o-cresol	ND	3	*NUh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Dinitrophenol, 2,4-	ND	5	*NUh	µg/L

TABLE A-10. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW001	2069A	30-Oct-2013	094586-008	Dinitrotoluene, 2,4-	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Dinitrotoluene, 2,6-	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Dioxane, 1,4-	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Diphenyl amine	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Ethylhexyl)phthalate, bis(2-	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Fluoranthene	ND	0.3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Fluorene	ND	0.3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Hexachlorobenzene	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Hexachlorobutadiene	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Hexachlorocyclopentadiene	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Hexachloroethane	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Indeno(1,2,3-c,d)pyrene	ND	0.3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Isophorone	ND	3.5	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Methylnaphthalene, 2-	ND	0.3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Naphthalene	ND	0.3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Nitro-benzene	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Nitroaniline, 2-	ND	3	NUh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Nitroaniline, 3-	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Nitroaniline, 4-	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Nitrophenol, 2-	ND	3	*Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Nitrophenol, 4-	ND	3	*Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Nitrosodipropylamine, n-	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Pentachlorophenol	ND	3	*NUh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Phenanthrene	ND	0.3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Phenol	ND	3	*Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Pyrene	ND	0.3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Trichlorobenzene, 1,2,4-	ND	3	Uh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Trichlorophenol, 2,4,5-	ND	3	*NUh	µg/L
WW001	2069A	30-Oct-2013	094586-008	Trichlorophenol, 2,4,6-	ND	3	*NUh	µg/L
WW006	2069F	30-Oct-2013	094587-008	1,1'-Biphenyl	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Acenaphthene	ND	0.326	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Acenaphthylene	ND	0.326	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Acetophenone	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Anthracene	ND	0.326	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Atrazine	ND	3.26	U	µg/L

TABLE A-10. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW006	2069F	30-Oct-2013	094587-008	Benzaldehyde	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Benzo(a)anthracene	ND	0.326	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Benzo(a)pyrene	ND	0.326	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Benzo(b)fluoranthene	ND	0.326	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Benzo(ghi)perylene	ND	0.326	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Benzo(k)fluoranthene	ND	0.326	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Bromophenyl phenyl ether, 4-	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Butylbenzyl phthalate	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Caprolactam	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Carbazole	ND	0.326	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Chloro-3-methylphenol, 4-	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Chlorobenzenamine, 4-	ND	3.59	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Chloroethoxy)methane, bis(2-	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Chloroethyl)ether, bis(2-	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Chloronaphthalene, 2-	ND	0.446	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Chlorophenol, 2-	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Chlorophenyl phenyl ether, 4-	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Chrysene	ND	0.326	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Cresol, m,p-	ND	4.02	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Cresol, o-	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Di-n-butyl phthalate	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Di-n-octyl phthalate	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Dibenz[a,h]anthracene	ND	0.326	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Dibenzofuran	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Dichlorobenzidine, 3,3'-	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Dichlorodiisopropyl ether, 2,2'-	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Dichlorophenol, 2,4-	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Diethylphthalate	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Dimethylphenol, 2,4-	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Dimethylphthalate	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Dinitro-o-cresol	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Dinitrophenol, 2,4-	ND	5.43	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Dinitrotoluene, 2,4-	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Dinitrotoluene, 2,6-	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Dioxane, 1,4-	ND	3.26	U	µg/L

TABLE A-10. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW006	2069F	30-Oct-2013	094587-008	Diphenyl amine	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Ethylhexyl)phthalate, bis(2-	14.7	3.26		µg/L
WW006	2069F	30-Oct-2013	094587-008	Fluoranthene	ND	0.326	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Fluorene	ND	0.326	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Hexachlorobenzene	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Hexachlorobutadiene	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Hexachlorocyclopentadiene	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Hexachloroethane	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Indeno(1,2,3-c,d)pyrene	ND	0.326	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Isophorone	ND	3.8	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Methylnaphthalene, 2-	ND	0.326	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Naphthalene	ND	0.326	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Nitro-benzene	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Nitroaniline, 2-	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Nitroaniline, 3-	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Nitroaniline, 4-	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Nitrophenol, 2-	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Nitrophenol, 4-	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Nitrosodipropylamine, n-	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Pentachlorophenol	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Phenanthrene	ND	0.326	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Phenol	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Pyrene	ND	0.326	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Trichlorobenzene, 1,2,4-	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Trichlorophenol, 2,4,5-	ND	3.26	U	µg/L
WW006	2069F	30-Oct-2013	094587-008	Trichlorophenol, 2,4,6-	ND	3.26	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	1,1'-Biphenyl	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Acenaphthene	ND	0.319	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Acenaphthylene	ND	0.319	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Acetophenone	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Anthracene	ND	0.319	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Atrazine	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Benzaldehyde	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Benzo(a)anthracene	ND	0.319	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Benzo(a)pyrene	ND	0.319	U	µg/L

TABLE A-10. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW007	2069G	30-Oct-2013	094588-008	Benzo(b)fluoranthene	ND	0.319	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Benzo(ghi)perylene	ND	0.319	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Benzo(k)fluoranthene	ND	0.319	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Bromophenyl phenyl ether, 4-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Butylbenzyl phthalate	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Caprolactam	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Carbazole	ND	0.319	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Chloro-3-methylphenol, 4-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Chlorobenzenamine, 4-	ND	3.51	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Chloroethoxy)methane, bis(2-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Chloroethyl)ether, bis(2-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Chloronaphthalene, 2-	ND	0.436	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Chlorophenol, 2-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Chlorophenyl phenyl ether, 4-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Chrysene	ND	0.319	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Cresol, m,p-	ND	3.94	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Cresol, o-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Di-n-butyl phthalate	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Di-n-octyl phthalate	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Dibenz[a,h]anthracene	ND	0.319	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Dibenzofuran	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Dichlorobenzidine, 3,3'-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Dichlorodiisopropyl ether, 2,2'-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Dichlorophenol, 2,4-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Diethylphthalate	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Dimethylphenol, 2,4-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Dimethylphthalate	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Dinitro-o-cresol	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Dinitrophenol, 2,4-	ND	5.32	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Dinitrotoluene, 2,4-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Dinitrotoluene, 2,6-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Dioxane, 1,4-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Diphenyl amine	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Ethylhexyl)phthalate, bis(2-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Fluoranthene	ND	0.319	U	µg/L

TABLE A-10. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW007	2069G	30-Oct-2013	094588-008	Fluorene	ND	0.319	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Hexachlorobenzene	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Hexachlorobutadiene	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Hexachlorocyclopentadiene	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Hexachloroethane	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Indeno(1,2,3-c,d)pyrene	ND	0.319	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Isophorone	ND	3.72	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Methylnaphthalene, 2-	ND	0.319	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Naphthalene	ND	0.319	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Nitro-benzene	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Nitroaniline, 2-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Nitroaniline, 3-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Nitroaniline, 4-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Nitrophenol, 2-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Nitrophenol, 4-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Nitrosodipropylamine, n-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Pentachlorophenol	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Phenanthrene	ND	0.319	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Phenol	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Pyrene	ND	0.319	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Trichlorobenzene, 1,2,4-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Trichlorophenol, 2,4,5-	ND	3.19	U	µg/L
WW007	2069G	30-Oct-2013	094588-008	Trichlorophenol, 2,4,6-	ND	3.19	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	1,1'-Biphenyl	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Acenaphthene	ND	3.19	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Acenaphthylene	ND	3.19	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Acetophenone	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Anthracene	ND	3.19	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Atrazine	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Benzaldehyde	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Benzo(a)anthracene	ND	3.19	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Benzo(a)pyrene	ND	3.19	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Benzo(b)fluoranthene	ND	3.19	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Benzo(ghi)perylene	ND	3.19	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Benzo(k)fluoranthene	ND	3.19	U	µg/L

TABLE A-10. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW008	2069I	30-Oct-2013	094589-008	Bromophenyl phenyl ether, 4-	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Butylbenzyl phthalate	1340	63.8		µg/L
WW008	2069I	30-Oct-2013	094589-008	Caprolactam	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Carbazole	ND	3.19	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Chloro-3-methylphenol, 4-	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Chlorobenzenamine, 4-	ND	35.1	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Chloroethoxy)methane, bis(2-	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Chloroethyl)ether, bis(2-	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Chloronaphthalene, 2-	ND	4.36	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Chlorophenol, 2-	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Chlorophenyl phenyl ether, 4-	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Chrysene	ND	3.19	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Cresol, m,p-	ND	39.4	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Cresol, o-	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Di-n-butyl phthalate	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Di-n-octyl phthalate	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Dibenz[a,h]anthracene	ND	3.19	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Dibenzofuran	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Dichlorobenzidine, 3,3'-	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Dichlorodiisopropyl ether, 2,2'-	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Dichlorophenol, 2,4-	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Diethylphthalate	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Dimethylphenol, 2,4-	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Dimethylphthalate	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Dinitro-o-cresol	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Dinitrophenol, 2,4-	ND	53.2	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Dinitrotoluene, 2,4-	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Dinitrotoluene, 2,6-	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Dioxane, 1,4-	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Diphenyl amine	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Ethylhexyl)phthalate, bis(2-	266	31.9		µg/L
WW008	2069I	30-Oct-2013	094589-008	Fluoranthene	ND	3.19	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Fluorene	ND	3.19	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Hexachlorobenzene	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Hexachlorobutadiene	ND	31.9	U	µg/L

TABLE A-10. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW008	2069I	30-Oct-2013	094589-008	Hexachlorocyclopentadiene	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Hexachloroethane	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Indeno(1,2,3-c,d)pyrene	ND	3.19	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Isophorone	ND	37.2	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Methylnaphthalene, 2-	ND	3.19	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Naphthalene	ND	3.19	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Nitro-benzene	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Nitroaniline, 2-	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Nitroaniline, 3-	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Nitroaniline, 4-	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Nitrophenol, 2-	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Nitrophenol, 4-	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Nitrosodipropylamine, n-	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Pentachlorophenol	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Phenanthrene	ND	3.19	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Phenol	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Pyrene	ND	3.19	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Trichlorobenzene, 1,2,4-	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Trichlorophenol, 2,4,5-	ND	31.9	U	µg/L
WW008	2069I	30-Oct-2013	094589-008	Trichlorophenol, 2,4,6-	ND	31.9	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	1,1'-Biphenyl	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Acenaphthene	ND	0.313	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Acenaphthylene	ND	0.313	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Acetophenone	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Anthracene	ND	0.313	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Atrazine	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Benzaldehyde	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Benzo(a)anthracene	ND	0.313	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Benzo(a)pyrene	ND	0.313	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Benzo(b)fluoranthene	ND	0.313	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Benzo(ghi)perylene	ND	0.313	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Benzo(k)fluoranthene	ND	0.313	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Bromophenyl phenyl ether, 4-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Butylbenzyl phthalate	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Caprolactam	ND	3.13	U	µg/L

TABLE A-10. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW011	2069K	30-Oct-2013	094590-008	Carbazole	ND	0.313	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Chloro-3-methylphenol, 4-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Chlorobenzenamine, 4-	ND	3.44	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Chloroethoxy)methane, bis(2-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Chloroethyl)ether, bis(2-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Chloronaphthalene, 2-	ND	0.427	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Chlorophenol, 2-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Chlorophenyl phenyl ether, 4-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Chrysene	ND	0.313	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Cresol, m,p-	ND	3.85	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Cresol, o-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Di-n-butyl phthalate	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Di-n-octyl phthalate	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Dibenz[a,h]anthracene	ND	0.313	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Dibenzofuran	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Dichlorobenzidine, 3,3'-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Dichlorodiisopropyl ether, 2,2'-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Dichlorophenol, 2,4-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Diethylphthalate	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Dimethylphenol, 2,4-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Dimethylphthalate	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Dinitro-o-cresol	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Dinitrophenol, 2,4-	ND	5.21	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Dinitrotoluene, 2,4-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Dinitrotoluene, 2,6-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Dioxane, 1,4-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Diphenyl amine	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Ethylhexyl)phthalate, bis(2-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Fluoranthene	ND	0.313	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Fluorene	ND	0.313	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Hexachlorobenzene	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Hexachlorobutadiene	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Hexachlorocyclopentadiene	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Hexachloroethane	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Indeno(1,2,3-c,d)pyrene	ND	0.313	U	µg/L

TABLE A-10. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2013

Station	Permit Number	Date Collected	Sample Identification	Analyte	Result	MDL	Laboratory Data Qualifier	Units
WW011	2069K	30-Oct-2013	094590-008	Isophorone	ND	3.65	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Methylnaphthalene, 2-	ND	0.313	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Naphthalene	ND	0.313	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Nitro-benzene	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Nitroaniline, 2-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Nitroaniline, 3-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Nitroaniline, 4-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Nitrophenol, 2-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Nitrophenol, 4-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Nitrosodipropylamine, n-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Pentachlorophenol	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Phenanthrene	ND	0.313	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Phenol	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Pyrene	ND	0.313	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Trichlorobenzene, 1,2,4-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Trichlorophenol, 2,4,5-	ND	3.13	U	µg/L
WW011	2069K	30-Oct-2013	094590-008	Trichlorophenol, 2,4,6-	ND	3.13	U	µg/L

NOTES:

*** = Reletive percent difference not within acceptance limits.**

h = Sample preparation holding time exceeded.

MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

N = Results associated with a spike analysis were outside control limits.

µg/L = micrograms per liter

U = The analyte was analyzed for but not detected.

APPENDIX B

FY 2013 SITE SUSTAINABILITY PLAN

SAND2013-10633P

Exceptional service in the national interest

Sandia National Laboratories



FY 2014 Site Sustainability Plan

U.S. DEPARTMENT OF ENERGY | NNSA National Nuclear Security Administration

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. SAND2013-10633P

Sandia National Laboratories

Prepared	Jeffrey Jarry, Manager National Laboratory Environmental Steward (4144)	12-10-13 Date
Prepared	Stephanie Salinas, Manager National Laboratory Environmental Steward (4143)	12/6/13 Date
Prepared	Mark S. Crawford, Manager Fleet Services (10265)	12/9/13 Date
Prepared	Jack H. Mizner, Manager Strategic Corporate Partnerships (4853)	12/6/2013 Date
Prepared	David Anthony Perea, Manager Information Systems Engineering (9324)	12/10/13 Date
Reviewed	Stephen J. Ward, Senior Manager Strategic Corporate Partnerships (4850)	12/06/2013 Date
Reviewed	Arthur C. Ratzel, Director Facilities Management and Operations Center (4800)	12/6/2013 Date
Approved	Michael W. Hazen, Vice President Infrastructure Operations (4000)	6 Dec 2013 Date

Table of Contents

Page

1.0 Executive Summary 1
1.1 Introduction 1
1.1.1 Site Information, Description, and Operations 2
1.2 Vision and Sustainability Definition 3
1.2.1 Vision 3
1.2.2 Sustainability Definition and Strategies 3
1.3 Planning Assumptions, Principles, Practices, Strategies, and Energy Issues 3
1.3.1 Planning Assumptions 3
1.3.2 Principles 4
1.3.3 Best Management Practices 4
1.3.4 Corporate Strategies 5
1.3.5 Energy Issues 5
1.4 FY 2013 Success and Path Forward 6
1.4.1 FY 2013 Success 6
1.4.2 Path Forward - FY 2014 and Beyond 7
1.5 DOE SSPP and NNSA Goals and Sandia Objectives 9
2.0 Goal Performance Review and Plans 17
2.1 Goal 1: Greenhouse Gas Reduction and Comprehensive Greenhouse Gas Inventory 17
2.1.1 Scopes 1 and 2 Greenhouse Gas Emissions 17
2.1.2 Scope 3 Greenhouse Gas Emissions 20
2.1.3 Greenhouse Gas Emissions Summary 22
2.2 Goal 2: Buildings and Regional and Local Planning 24
2.2.1 Energy Intensity 24
2.2.2 EISA Section 432, Energy and Water Evaluations 30
2.2.3 Metering 30
2.2.4 Cool Roofs 31
2.2.5 High-Performance Sustainable Buildings - Existing 32
2.2.6 High-Performance Sustainable Buildings - New Construction 34
2.2.7 Regional and Local Planning 35
2.2.8 Site Innovation and Government-Wide Support 38
2.3 Goal 3: Fleet Management 38

2.3.1 FY 2013 Performance Status 38
2.3.2 Planned and Projected Performance 41
2.4 Goal 4: Water Use Efficiency and Management 42
2.4.1 Water Efficiency 42
2.4.2 Storm Water Management 45
2.5 Goal 5: Pollution Prevention (P2) and Waste Reduction 46
2.5.1 FY 2013 Performance Status 46
2.5.2 Planned and Projected Performance 48
2.6 Goal 6: Sustainable Acquisition 48
2.6.1 FY 2013 Performance Status 49
2.6.2 Plans and Projected Performance 49
2.7 Goal 7: Electronic Stewardship and Data Centers 50
2.7.1 FY 2013 Performance Status 50
2.7.2 Planned and Projected Performance 54
2.8 Goal 8: Renewable Energy 57
2.8.1 FY 2013 Performance Status 57
2.8.2 Planned and Projected Performance 59
2.9 Goal 9: Climate Change Adaptation 59

3.0 Budget and Funding 63
3.1 FY 2013 Performance Status 63
3.2 Planned and Projected Performance 63

4.0 Training and Awareness 64
4.1 FY 2013 Performance Status and Projected Performance 64

List of Figures

Page

Figure 2.1 Scopes 1 and 2 GHG Emissions in Metric Tons CO2e 19
Figure 2.2 SNL Scope 3 GHG Emissions in Metric Tons CO2e 20
Figure 2.3 SNL Total Scopes 1, 2, 3 GHG Emissions in Metric Tons CO2e 23
Figure 2.4 SNL FY 2013 Total GHG Emissions 23
Figure 2.5. SNL Total Energy Intensity in Btu/GSF/Yr 24
Figure 2.6 Total Site MBTU/Total Mission Cost 25
Figure 2.7 Total Site MBTU per Capita 25
Figure 2.8 SNL Regular Building Energy Intensity Reduction Progress 27
Figure 2.9 SNL Ten-Year Load Forecast 29
Figure 2.10 SNL Alternative Fuel Use 39
Figure 2.11 SNL Petroleum Fuel Use in Gallons 40

Figure 2.12 SNL Total Water Intensity in Gal/GSF/Yr 42
Figure 2.13 SNL Total Water Intensity Reduction Progress 43
Figure 2.14 SNL/NM FY 2013 Water Use 44
Figure 2.15 SNL Waste and Diversion 48
Figure 2.16 SNL Renewable Electric Generation 58

List of Tables

Page

Table 1.1 Sandia FY 2013 Energy Projects 6
Table 1.2 Sandia FY 2014 Energy Projects 8
Table 1.3 Sandia Objectives, Performance Status, and Projected Performance 9
Table 2.1 SNL Emissions Categories by GHG Protocol Scopes 17
Table 2.2 SNL Actual and Projected Electricity Consumption (x 10^6 kWh) 29
Table 2.3 Sandia Requirements to Meet Guiding Principles 33
Table 2.4 Sandia Plan to Meet Guiding Principles 33
Table 2.5 Performance Status and Plans and Projected Performance 35
Table 2.6 SNL Retired Fleet Replacement with AFVs 41
Table 2.7 SNL Renewable Energy Generation 59
Table 2.8 Current FY 2013 Performance Status and Planned and Projected Performance 60
Table 4.1 Current Performance Status and Planned and Projected Performance 64

Appendix A: Consolidated Energy Data Report (CEDR)
Appendix B: Baseline and Current Information Tables
Appendix C: Excluded Buildings and Self-Certification Form
Appendix D: FY 2014 Sandia National Laboratories Sustainability Commitments

Acknowledgments

SNL New Mexico

Marti Adams, 4821
Penny Avery, 4143
Erika Barraza, 4821
Amy Blumberg, 11100
Mary Bultmann, 4853
Matthew Brito, 4821
Dave Bryant, 4844
Kim Bustamante, 3654
Kathye Chávez, 9324
Ralph Cipriani, 4853
Jan Couto, 102651
Christopher Evans, 4853
Ann Koepp, 4856
Cheryn Lingerfelt, 10507
David J. Martínez, 9324
Samuel McCord, 4144
Carol Meincke, 4853
Ray Thomas, 1342
Sharon Moyer, 9548
Terry Nowlin, 4844
Jamie Gomez, 4143
Jeff T. Young, 10265
Todd Tillman, 4821
Tony Valencia, 9342
Douglas Vetter, 4143
Ralph Wrons, 4144
John Zavadil, 4856

SNL California

Mark Brynildson, 8517
Deanna Dicker, 8516
Lee Gardizi, 8516
Gabriel Gutierrez, 8514
Janet Harris, 8516
Robert Holland, 8516
Mike Kurtzer, 89451
David Rabb, 8514
Howard Royer, 8512
Wayne Schock, 8513
Gary Shamber, 8516
Kristina Sullivan, 8512
Craig Taylor, 8514
Doug Vrieling, 8512

.

Acronyms

Acronym	Definition
AFV	Alternative Fuel Vehicle
AQC	Air Quality Compliance
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
B-20	Biodiesel (20% biobased, 80% petroleum)
BAS	Building Automation System
BBtu	Billions of British Thermal Units
BMP	Best Management Practice
Btu	British Thermal Units
C&D	Construction and Demolition
CARB	California Air Resources Board
CEDR	Consolidated Energy Data Report
CEP	Chemical Exchange Program
CIS	Chemical Inventory System
CNG	Compressed Natural Gas
CO2e	Carbon Dioxide Equivalent
CRAC	Computer Room Air Conditioning
CUB	Central Utility Building
CW	Chilled Water
DCC	Data Center Consolidation
D&D	Decontamination and Demolition
DDC	Direct Digital Controls
DEAR	Department of Energy Acquisition Regulations
DI	Deionized
DOE	US Department of Energy
E-85	Ethanol-based fuel (85% ethanol, 15% unleaded)
EACCS	East Alameda County Conservation Strategy
EISA	Energy Independence and Security Act
EMS	Environmental Management System
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPAct	Energy Policy Act
EPEAT	Electronic Product Environmental Assessment Tool
ES&H	Environment, Safety and Health
FAST	Federal Automotive Statistical Tool
FDCCI	Federal Data Center Consolidation Initiative
FEMP	Federal Energy Management Program
FEMO	Facilities Engineering, Maintenance, and Operations
FIMS	Facilities Information Management System
FMOC	Facilities Management and Operations Center
FY	Fiscal Year
GHG	Greenhouse Gas
GIS	Geographic Information Systems
GP	Guiding Principles
GPON	Gigabit Passive Optical Network
GPP	General Plant Project
GSA	General Services Administration
GSF	Gross Square Feet
HEMSF	High-Energy Mission Support Facilities
HPC	High-Performance Computing
HPSB	High Performance Sustainable Building
HVAC	Heating Ventilation and Air Conditioning
HW	Hot Water
IGPP	Institutional General Plant Project
ILA	Industrial, Landscaping, and Agricultural
IT	Information Technology
IX	Institutional Transformation
JIT	Just in Time
kBtu	Kilo-British Thermal Unit

Acronym	Definition
KAFB	Kirtland Air Force Base
KTF	Kauai Test Facility
KWh	Kilowatt Hours
LED	Light-Emitting Diode
LEED®	Leadership in Energy and Environmental Design
LLNL	Lawrence Livermore National Laboratory
LM	Lockheed Martin
LPG	Liquid Propane Gas
LVOC	Livermore Valley Open Campus
MBtu	Thousands of British Thermal Units
MMBtu	Millions of British Thermal Units
MESA	Microsystems and Engineering Sciences Application Complex
MO	Mobile Office
MR	Major Renovation
MRCOG	Mid Region Council of Governments
MT	Metric Tons
MWh	Mega-Watt Hours
NC	New Construction
NG	Natural Gas
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
NSTTF	National Solar Thermal Test Facility
P2	Pollution Prevention
PC	Personal Computer
PPA	Purchased Power Agreement
PPTRS	Pollution Prevention Tracking and Reporting System
PUE	Power Utilization Effectiveness
PV	Photovoltaic
R&D	Research and Development
RAMP	Roofing Assessment Management Program
RE	Renewable Energy
REC	Renewable Energy Credit
RTC	Regional Test Center
SA	Sustainability Acquisition
SC/VP	Server Consolidation/Virtualization Project
SF6	Sulfur Hexafluoride
SF	Square feet or footage
SFO	Sandia Field Office
SIF	Sustainability Innovation Foundry
SNL	Sandia National Laboratories
SNL/CA	Sandia National Laboratories/California
SNL/HI	Sandia National Laboratories/Hawaii
SNL/NM	Sandia National Laboratories/New Mexico
SNL/NV	Sandia National Laboratories/Nevada
SON	Sandia Open Network
SRN	Sandia Restricted Network
SSP	Site Sustainability Plan
SSPP	Strategic Sustainability Performance Plan
SWEIS	Site-Wide Environmental Impact Statement
T&D	Transmission and Distribution
TA	Technical Area
TLCC	Tri-Laboratory Linux Capacity Cluster
TTR	Tonopah Test Range
UPS	Uninterruptible Power Supply
U.S.	United States
USAF	United States Air Force
USDA	U.S. Department of Agriculture
VFD	Variable Frequency Drive
Yr	Year

1.0 Executive Summary

1.1 Introduction

Clean energy and sustainability, long at the core of the United States (U.S.) Department of Energy (DOE) mission and championed at Sandia National Laboratories (SNL), are reinforced in Executive Orders (EO) 13423 *Strengthening Federal Environmental, Energy, and Transportation Management* and 13514, *Federal Leadership in Environmental, Energy and Economic Performance*. DOE has articulated its key strategies and goals in its current S*trategic Sustainability Performance Plan* (SSPP), which states that DOE will comply with EO 13514 by doing the following:

- Instituting wholesale cultural change to factor sustainability and greenhouse gas (GHG) emission reductions into all DOE corporate management decisions
- Planning, executing, evaluating, and continually improving DOE operations to maximize sustainable use of energy and natural resources
- Developing cost-effective energy efficiency and renewable energy (RE) projects
- Improving the performance of existing DOE building stock
- Using low-GHG-emitting energy sources to replace existing grid energy
- Preventing pollution and reducing or eliminating the generation of waste

The SNL Site Sustainability Plan (SSP) is prepared annually to support the DOE's SSPP and the National Nuclear Security Administration's (NNSA) sustainability goals and broader sustainability program. Accordingly, the content of this SNL SSP covers the SNL contributions toward meeting the DOE sustainability goals cited in the DOE's SSPP, as well as the DOE requirement to comply with EOs 13423 and 13514. This SSP fulfills the requirement for Sandia Corporation (Sandia).

Each DOE site is required to have an environmental management system (EMS) that implements sustainable practices for enhancing environmental, energy, and transportation management performance. SNL's EMS is a quality-based system modeled on the Plan-Do-Check-Act structure for continuous improvement. The SNL EMS is a part of SNL's Integrated Safety Management System and functions within the overall Integrated Laboratory Management System. The SNL EMS is International Organization for Standardization 14001-certified and incorporates all relevant federal, state, local, and DOE requirements.

The SNL EMS is coordinated and implemented through twenty environmental programs, six of which are included within the scope of this SSP. Each environmental program operates according to a program plan (or related document) consistent with the SNL EMS.

- Air Quality Compliance (AQC)
- Energy and Water
- Fleet Services
- Pollution Prevention (P2)
- Storm Water
- Waste Management

The SNL SSP supports the SNL EMS. It leverages existing environmental program plans and reporting structures and provides references for further detail. In cases where an SSPP goal is the same as a current SNL EMS corporate target, it is noted in Tables 1.1 and 1.2. The SNL SSP also serves as the deliverable to address the following DOE reporting requirements:

- DOE's Annual Energy Report, as required by the National Energy Conservation Policy Act, Energy Policy Act of 2005 (EPAct 2005), and the Energy Independence and Security Act of 2007 (EISA 2007)
- Section 432 of EISA 2007, which requires reporting of energy- and water-conservation measures that are identified as a result of site audits
- Commitments in the DOE SSPP

1.1.1 Site Information, Description, and Operations

Sandia conducts mission activities at four primary locations:

- SNL/New Mexico (SNL/NM)
- SNL/California (SNL/CA)
- SNL/Nevada – Tonopah Test Range (SNL/NV – TTR)
- SNL/Hawaii – Kauai Test Facility (SNL/HI – KTF)

Each location has unique energy, water, and transportation fuels resource-management challenges.

SNL/NM and SNL/CA account for most of SNL's total energy, water, and transportation fuel use and building square footage (SF). Therefore, although the objectives and targets of this plan include all locations, Sandia's sustainability activities focus predominantly on the SNL/NM and SNL/CA locations.

SNL/NM

SNL/NM is located on Kirtland Air Force Base (KAFB), at the base of the Manzano Mountains, adjacent to the City of Albuquerque, New Mexico. The location has approximately 6.17 million gross square feet (GSF) of existing facilities on 13,777 acres of land. Sandia purchases electricity, natural gas (NG), and water from external utility suppliers through an Interagency Support Agreement with KAFB. Sandia purchases liquid propane gas (LPG) and fuel oil independently from KAFB.

SNL/CA

SNL/CA is located three miles east of downtown Livermore and 40 miles east of San Francisco, California. The location has approximately 900,388 GSF of existing facilities on 410 acres of land. It is adjacent to Lawrence Livermore National Laboratory (LLNL), with residential areas to the west, industrial parks to the north, and agricultural lands to the east and south. Electricity, NG, and water are metered and billed by LLNL, which has contracts with outside agencies and municipalities.

SNL/NV – Tonopah Test Range

The Tonopah Test Range (TTR) is a full-scale test range and outdoor laboratory located north of Las Vegas, Nevada on Nellis Air Force Base. The location is used to develop, validate, and certify NNSA-designed weapon systems and components. It has approximately 120,925 GSF of existing facilities on 179,200 acres of land. Electricity, LPG, sewer, and water are metered and billed independently of Nellis Air Force Base.

SNL/HI – Kauai Test Facility

The KTF is a SNL rocket-launch range consisting mainly of rocket- and payload-assembly facilities and a launch-operations facility. The location has approximately 61,778 GSF of existing facilities on 133 acres of land.

1.2 Vision and Sustainability Definition

1.2.1 Vision

Sandia leads the DOE complex, the nation, and the world in innovative, large-scale institutional transformation to a sustainable, carbon-neutral environment while increasing mission effectiveness, resource reliability, and resource security. Each person at SNL understands and accepts his or her vital role in achieving this vision.

Sandia developed objectives that support the DOE goals articulated in the DOE SSPP (see section 1.5, *DOE SSPP and NNSA Goals and Sandia Objectives*).

1.2.2 Sustainability Definition and Strategies

For SNL, sustainability means making balanced environmental, social, and economic decisions about developing, operating, and maintaining our site to meet the human and mission needs of the present without compromising future generations and missions. Sandia recognizes that it is part of a larger community; the impacts of sustainable development on its site extend beyond its physical boundaries. To that end, Sandia is actively engaged in finding and implementing innovative sustainable solutions for its site and the nation.

Sandia identified high level sustainability strategies that will influence future decision making.

- Preserve it
  - Protect current environment
  - Do no (or minimal) harm
- Conserve it
  - Use none
  - Use less
  - Use what you have to better
- (Re)generate more of it
  - Make more
  - Correct past
- Reuse it
  - Recycle

The definition and strategies are included in Sandia's *Energy, Water, and Transportation Fuels Strategic Plan* and other relevant corporate documents.

1.3 Planning Assumptions, Principles, Practices, Strategies, and Energy Issues

This section identifies the following assumptions, principles, practices, and strategies used to develop the fiscal year (FY) 2014 SNL SSP and lists energy issues and concerns.

1.3.1 Planning Assumptions

The following assumptions, including funding assumptions, were used to develop the SNL SSP:

- At a minimum, Sandia will meet the goals of all applicable laws, regulations, EOs, and DOE directives with respect to energy and water efficiency and conservation improvements.
- Funding is available and allocated for projects necessary to meet the goals and objectives.
- Sandia will use AQC program GHG footprint methodology and tools; AQC program methodologies meet the requirements of the GHG Protocol.
- Sandia's first priorities are mission performance and effectiveness.
- The number of people onsite remains flat over the planning period.
- SNL GSF is expected to decline over the planning period.

1.3.2 Principles

Sandia will use the following principles, including funding principles, to direct decision making when prioritizing actions to achieve its objectives:

- Use a life-cycle cost-effective approach to evaluate and prioritize strategies and projects.
- Design and build sustainability into buildings, systems, and operations from the beginning rather than retrofitting later.
- Ensure that energy conservation and related savings give direct benefit to line organizations or to Sandia.
- Consider private-sector funding to implement energy and water conservation and RE projects.
- Develop corporate solutions, not location- or organization-based solutions.
- Consider impacts outside of Sandia when making decisions.
- Align initiatives, projects, and recommendations with at least one corporate strategy to be considered for implementation.

1.3.3 Best Management Practices

The following best management practices (BMPs) will be implemented to achieve Sandia's objectives:

- Use every opportunity to improve resource effectiveness on SNL projects, operations, and activities.
- Pursue non-carbon-emitting RE sources as they become more cost effective.
- Support Sandia research and development (R&D) efforts by using SNL locations as testbeds for new alternative and renewable technologies.
- Support Sandia energy-surety initiatives.
- Learn from and share BMPs with other institutions; incorporate innovative resource-management techniques.
- Establish a consistent and verifiable measurement system to track the cause-and-effect relationship between implementation activities and GHG, energy, and water footprint reduction.
- Integrate and institutionalize resource consumption-reduction strategies into all SNL planning, building location, design, construction, operations, infrastructure, and environment, safety, and health (ES&H) activities.
- Enable the Sandia workforce to reduce resource use.
- Limit or eliminate the number of excluded buildings; if buildings are not counted in the baseline Sandia cannot take credit for energy savings.
- Use the Sandia EMS aspects and impacts evaluation process to facilitate identification of objectives and targets relevant to energy, water, and materials sustainability measures, activities, and actions.

1.3.4 Corporate Strategies

The overall approach to reducing Sandia's energy consumption, GHG, and water footprints is to implement the following strategies:

- Reduce current demand; use less.
- Eliminate current demand; turn off or remove.
- Use resources efficiently; use fewer resources for the same task.

At the same time, Sandia plans to do the following:

- Manage future demand.
- Migrate to non-carbon-emitting energy sources.
- Reduce transportation fossil-fuel use.
- Deliver resources to mission-critical activities reliably and securely.

Additional strategies that might not directly reduce the energy consumption GHG and water footprints but are essential for successful energy and water resource management include the following:

- Provide metering and control systems to track and trend performance.
- Showcase SNL R&D activities.
- Promote a sustainable business model.
- Improve partnerships with external resource providers and collaborators.

Reducing, eliminating, and efficiently using energy and water resources in SNL existing buildings are the most cost-effective strategies for Sandia to pursue in the immediate to mid-term time frames. To implement these strategies, Sandia intends to continue to provide, operate, and maintain a robust system of meters and controls at the building level to track and trend performance.

Migrating to renewable non-carbon-emitting energy sources is a less cost-effective strategy to pursue in the same time frame. RE projects will be pursued based on favorable economics. The Institutional Transformation (IX) RE module will be used to determine when RE is cost effective.

EO 13514 requires federal agencies to pursue a “net zero” energy strategy, where all new federal buildings entering the planning process beginning in 2020 are designed to achieve zero net energy by 2030. There are several definitions of net zero energy; however, it is clear that significant RE must be part of the equation. It is also clear that although the EO states “all new federal buildings” there are many building types in the NNSA portfolio (i.e. high energy mission specific facilities [HEMSF]) that cannot achieve net zero.

Existing buildings with an energy use intensity of 30 to 35 kilo-British thermal unit (kBtu)/GSF or less are considered good candidates for net zero achievement. The best performing buildings at Sandia use over 50 kBtu/GSF, and many are much higher. Therefore, Sandia’s net zero energy strategy in the short to mid-term, or in other words, before entering the planning process beginning in FY 2020, is to include net zero energy requirements for appropriate new buildings as part of Sandia line item proposals.

Site net zero energy status is a long-term objective.

1.3.5 Energy Issues

Based on progress made toward meeting the goals and objectives in FY 2013, Sandia has identified the following specific energy issues and concerns:

- SF6 measurement and capture program must balance mission needs with GHG scope 1 reduction goals.

  - Sustained financial investment and management commitment is needed to manage and reduce SF6 fugitive emissions.
- Scope 3 GHG, although small relative to Scopes 1 and 2, needs focused attention.
- New data-center efficiency goals are aggressive, but poorly defined. Sandia is working on a comprehensive plan and implementation strategy.
- Significant mission growth may impact goal achievement.

Effectively managing future demand is critical if Sandia is to meet its objectives. Sandia's first priorities are mission performance and effectiveness. Mission growth, with associated growth in energy and water use, is anticipated over the planning period. Planning for mission growth before it occurs and managing growth during program implementation will increase the probability of sustainability success. Excluding buildings with significant program demand is not the best long-term option. Metering program energy and water use separately from building system use may be an effective tool for tracking program energy and water use while encouraging building energy- and water-conservation activities.

1.4 FY 2013 Success and Path Forward

This section describes the successes of FY 2013 and the path forward.

1.4.1 FY 2013 Success

In FY 2013, Sandia completed the projects summarized in Table 1.1 which resulted in significant energy savings. See section 2.2.1.1 and *Consolidated Energy Data Report* (CEDR) worksheet, "Conservation and RE Measures" for more detailed information. These savings will not be fully realized until FY 2014.

Table 1.1 Sandia FY 2013 Energy Projects

2013 Projects	Annual Budget	Estimated Savings Btus/yr.
Install lighting/HVAC occupancy sensors (Buildings 6587, 811, 758, 1090, 701, 895; installed but not programmed Buildings 752, 877, 879, 971)	$240,000	2.8 B
Convert buildings to full digital control (implemented Buildings C907, C941, 890, 886; designed), Buildings C914, 897, 891, 856.	$5,154,000	6.5 B
HVAC and chiller projects	$471,000	4 B
Energy audits/retro-commissioning-building tune-ups	$315,000	5 B
Institutional Transformation (IX) -ECIS collaboration (Energy Efficiency via Simulation)	$575,000	Best in Class
Sustainable Innovation Foundry (ECIS collaboration to address and integrate sustainability with mission work) – Sustainable Science and Technology: 40–70% of ECIS budget.	$50,000	Investment in the Future
Training and awareness	$15,000	
TOTAL	**$5,820,000**	**18.3 B**

1.4.2 Path Forward - FY 2014 and Beyond

Sandia recognizes that implementing energy conservation projects are key, but projects are only part of the equation to achieve energy goals for FY 2015 and beyond. The ongoing operation and maintenance of the buildings and site, occupant use of the buildings for their missions, the Facilities Management and Operations Center (FMOC) and line personnel training, development and availability of modeling and energy analysis tools, and Sandia personal behavior modifications will be required to support long term institutional change.

Building Operations and Maintenance

Continuing in FY 2014, Sandia will pursue the following operation and maintenance activities:

- Reducing building operating hours
  - Operating buildings 24 hours, 5 days/week increases energy use by an estimated 17.2%
  - Operating buildings 24/7, increases energy use by an estimated 32%
- Retrocommissioning projects
- Programming BAS
- Controlling sensors and meter calibration
- Checking into fume hood energy use (Building 6585 is the pilot for FY 2014)
  - Remove or cap-off systems not in use
  - Reduce flow during non-standard hours
- Installing air washers and plate and frame heat exchangers when conditions are appropriate
- Establishing and enforcing temperature set points
  - Decreasing summer set points 2 degrees increases energy by an estimated 1%
  - Increasing winter set points by 2 degrees increases energy by an estimated 5%

Facilities Organization/Line Organization Interaction

In FY 2014, Sandia Energy Management, ES&H, and Building Operations personnel will do the following:

- Engage line in energy audits of high process buildings
  - 983/986 – Pilot for Division 1000
    - Investigation/collaboration on efficient use of compressed air.
    - Match cleanroom laminar flow to clean class requirement.
  - 821/823 – Pilot for Division 6000
    - Engage Division 6000 Vice President in corporate solutions.
    - Make use of IX/eQuest (funded collaboration with Division 6000).
- Investigate cleanroom energy saving opportunities – applicable to 858N/S, 986, and others with cleanrooms class <10K.
  - Determine correct operating air flows and air handling configuration, benchmarking against industry standards.
  - Reduce air flow during non-standard hours (i.e., Building 858EF).
  - Optimize process exhaust, vacuum, and cooling water optimization.
- Begin community-based social marketing initiative.
  - Employ method to identify, evaluate and implement long-term behavior change.
- Continue collaboration and partnership with Energy Climate & Infrastructure Security (ECIS) and Science & Technology communities, including the Sustainability Innovation Foundry and the Institutional Transformation projects.
- Continue collaboration with Center 9300 for efficient data center operations.

Training and Tools

In FY 2014, Sandia Energy Management will offer training and provide tools to achieve positive energy savings:

- Training
  - BAS (for Facilities system engineers and building operators)
  - Energy Audits
  - eQuest and IX modeling and analytic tools
  - American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Standards 55 and 62 (ASHRAE 90.1 occurred in FY 2013)
  - Continue providing NNSA and Federal Energy Management Program (FEMP) funded training and technical assistance to other DOE and Federal sites on High Performance Sustainable Buildings.
- Tools
  - IX and eQuest
  - Energy Analytics and Diagnostics

FY 2014 Energy Projects

In FY 2014, Sandia will complete the projects summarized in Table 1.2 which will result in significant energy savings. See section 2.2.1.2 and CEDR worksheet "Conservation and RE Measures" for more detail on each project. The savings from these projects will not be fully realized until FY 2015.

Table 1.2 Sandia FY 2014 Energy Projects

2014 Projects	Annual Budget	Savings Btus/yr.
Install lighting/HVAC occupancy sensors (Buildings 859, 861, 885, 730, 877, 879, 727, 700, 703, and 720). Program Buildings 752, 877,879, 971, and 957.	$150,000	5 B
Convert buildings to full digital control (implement Buildings C914, C942, C943, 897, 856; 891; design Buildings C940, C942, 6585).	$4,180,000	10.4 B
Combine Bldg. 858N/858J chilled water loops	$600,000	8 B
Energy audits/retro-commissioning-building tune-ups, Energy Management Team support	$240,000	5 B
Institutional Transformation (IX)-ECIS collaboration (energy efficiency via simulation)	$425,000	Best in Class
Training and awareness, behavior change, exterior lighting study	$90,000	Investment in the Future
TOTAL	**$5,685,000**	**28.4 B**

1.5 DOE SSPP and NNSA Goals and Sandia Objectives

Sandia's commitment to sustainability goes beyond DOE SSPP and NNSA mandated goals. Sandia's internal goals and initiatives are supported by upper-level management, as evidenced by the following:

- Engaged leadership: Division 4000 Vice President, Michael Hazen, is the Corporate Sustainability Champion
- Sustained investment for energy projects.
  - Embed energy and sustainability in all facility and infrastructure planning and projects.
  - Continue $5 million commitment to energy- and water- conservation projects through FY 2016.

Table 1.3 summarizes Sandia's objectives, performance status, and projected performance in support of DOE's goals. See Appendix D of this document for specific FY 2014 goals and targets.

Table 1.3 Sandia Objectives, Performance Status, and Projected Performance

SSPP Goal #	SSP Section	DOE SSPP and NNSA Goal/ Sandia Objective	Performance Status through FY 2013	Planned Actions and Contribution	Risk of Nonattainment
GOAL 1: Greenhouse Gas Reduction and Comprehensive Greenhouse Gas Inventory					
1.1	2.1.1	28% Scope 1 and 2 GHG reduction by FY 2020 from a FY 2008 baseline (2013 target: 17%)	39% reduction in FY 2013 relative to FY 2008 baseline. Sandia considers this high risk primarily due to the nature of sulfur hexafluoride (SF6) applications.	In FY 2014, Sandia will continue Scopes 1 and 2 GHG reduction. *Included in SNL EMS as a target.*	High
1.2	2.1.2	13% Scope 3 GHG reduction by FY 2020 from a FY 2008 baseline (2013 target: 4%)	6.4% increase in FY 2013 relative to FY 2008 baseline. Sandia considers this to be high risk because Scope 3 emissions are difficult to control and measure.	Sandia will pursue focused improvements. Sandia will concentrate efforts on Scopes 1 and 2.	High
GOAL 2: Buildings and Regional & Local Planning					
2.1	2.2.1	30% energy-intensity (Btu/SF) reduction by FY 2015 from a FY 2003 baseline (2013 target: 24%)	2.36% reduction in FY 2013 relative to FY 2012 and 28.3% relative to FY 2003 baseline for regular (nonexcluded) buildings. Sandia considers this low risk despite potential mission changes and funding availability.	Continuing in FY 2014, Sandia will pursue the following energy-reduction activities: - Occupancy sensor (lighting and HVAC) installation - NightWatchman® deployment (see also Goal 7.3) - Heating, ventilation, and air conditioning (HVAC) system modifications, including "free cooling" projects - Night and weekend energy-use reduction - Building controls upgrades and modifications - Office space temperature set point	Low

SSPP Goal #	SSP Section	DOE SSPP and NNSA Goal/ Sandia Objective	Performance Status through FY 2013	Planned Actions and Contribution	Risk of Nonattainment
				policy - Behavior change *Included in SNL EMS as a target.*	
2.2	2.2.2	EISA Section 432 energy and water evaluations	Did not complete 25% of its covered facilities audits in FY 2013 due to emphasis on CAS audits and Guiding Principles audit/commissioning efforts.	See Consolidated Energy Data Report (CEDR) section 11, "Covered Facilities" for revised covered building list, schedule, and other information. Sandia added Central Utility Buildings (CUBs) to the covered facilities list. Sandia will audit at least 25% of its covered facilities in FY 2014 and 100% by FY 2016.	Low
2.3	2.2.3	Individual buildings metering for 90% of electricity by October 1, 2012; for 90% steam, natural gas (NG), and chilled water (CW) by October 1, 2015 (2013 target: 90% and 50% respectively)	- SNL FY 2013 Energy and Water Metering Plan was completed on schedule in December 2013. - All electric meters required by EPAct 2005 have been installed. - FY 2013 electricity individually building metered: 88.5% - Sandia does not use steam as an energy stream. - Sandia installed location and appropriate building-level NG meters at both SNL/NM and SNL/CA. - FY2013 NG individually building metered: 57.9% - Sandia installed appropriate building-level hot water (HW) British thermal unit (Btu) meters at SNL/NM. These will count toward meeting the NG FY 2015 objective. Sandia considers this medium risk because the final percentage cannot be calculated until all the HW meters are programmed into the BAS.	- Several new electric meters will be installed at the individual building level to meet the goal. - Objective will be met for NG, HW Btu, and CW Btu meters. New meters will be installed and existing meters programmed into the Building Automation System (BAS). - SNL/CA plans to install HW Btu and CW Btu meters to measure CUB energy use at individual buildings. - New and existing HW meters will count toward the NG FY 2015 objective when programmed into the BAS.	Medium

SSPP Goal #	SSP Section	DOE SSPP and NNSA Goal/ Sandia Objective	Performance Status through FY 2013	Planned Actions and Contribution	Risk of Nonattainment
			- Sandia meters 100% of its water usage at SNL/NM through advanced location meters, which register all potable water usage including industrial, landscaping, and agricultural (ILA). - SNL/CA water is supplied by LLNL and is monitored by a single meter.		
2.4	2.2.4	Cool roofs, unless uneconomical, for roof replacements, unless project already has CD-2 approval. New roofs must have thermal resistance of at least R-30.	Sandia meets this objective: SNL has 128 total cool roofs at SNL/NM and 22 cool roofs at SNL/CA.	See CEDR worksheet "Conservation and RE Measures" for proposed, new cool-roof projects. Sandia will replace roofs on 14 buildings with cool roofs in FY 2014.	Low
2.5	2.2.5	15% of existing buildings greater than 5,000 GSF are compliant with the Guiding Principles (GP) of High-Performance Sustainable Buildings (HPSBs) by FY 2015. (2013 target:11%)	10.1% of SNL existing buildings over 5,000 GSF (by number of buildings) were compliant in CY 2013. 12.2% of existing buildings over 5,000 GSF (by GSF) were compliant in CY 2013. Sandia considers this medium risk of attainment due to not meeting the interim goals and possible pending GP revisions before the 2015 target date.	Sandia will identify and assess potential buildings to meet HPSB objectives; Sandia has a plan to meet the objective. For the existing buildings currently tracked for GP compliance, Sandia stands at 81% GP met.	Medium
2.6	2.2.6	All new construction, major renovations (MRs), and alterations of buildings greater than 5,000 GSF must comply with the GPs.	Sandia constructed one new building in FY 2013. LEED® Gold certification is expected in early FY 2014. Sandia considers this low risk even though the LEED green building certification program (LEED®) for New Construction or GP for NC may not be the appropriate certification for High-Energy Mission Support Facilities (HEMSF), renovated, or altered buildings.	Sandia will meet this requirement for future new construction and comprehensive MR projects. Two new IGPPs are proposed in the next two years which will comply with the GP and be LEED Gold for New Construction. Alterations may not meet LEED for New Construction or GP for New Construction. NNSA is considering an exception process, which may address the issue.	Low

SSPP Goal #	SSP Section	DOE SSPP and NNSA Goal/ Sandia Objective	Performance Status through FY 2013	Planned Actions and Contribution	Risk of Nonattainment
GOAL 3: Fleet Management					
3.1	2.3.1	10% annual increase in fleet alternative fuel consumption by FY 2015 relative to a FY 2005 baseline (2013 target: 114% cumulative since 2005)	Objective has been met: - 148.9% increase since FY 2005 - 11% increase from FY 2012 to FY 2013	Sandia will continue to meet this objective. *Included in SNL EMS as a target*.	Low
3.2	2.3.1	2% annual reduction in fleet petroleum consumption by FY 2015 relative to a FY 2005 baseline (2013 target: 16% cumulative since 2005)	Objective has been met: - 39.3% reduction since FY 2005 - 7.9% reduction from FY 2012 to FY 2013. Sandia continues to exceed this objective by purchasing ethanol (E-85) and biodiesel (B-20) Alternative Fuel Vehicles (AFV)s.	Sandia will continue to meet this objective by purchasing E-85 and B-20 AFVs. *Included in SNL EMS as a target.*	Low
3.3	2.3.2	75% of light-duty vehicle purchases must consist of AFVs by FY 2015 (100% after FY 2015) (75% FY 2005 – 2015)	Objective has been met. Sandia continues to exceed this objective, purchasing 100% alternative fuel, light-duty vehicles in FY 2013.	Sandia will continue to exceed this objective.	Low
3.4	2.3.2	Reduce fleet inventory of non-mission critical vehicles by 35% by FY 2013 relative to a FY 2005 baseline.	Sandia is on track to meet the fleet inventory reduction objective for non-mission-critical vehicles by 35% by FY 2013 relative to an FY 2005 baseline.	Sandia will meet this objective.	Low
GOAL 4: Water Use Efficiency and Management					
4.1	2.4.1	26% water intensity reduction by FY 2020 from a FY 2007 baseline (2013 target: 12%)	Sandia exceeds the objective with a .36% decrease in FY 2013 relative to FY 2012 and a 30.44% decrease relative to FY 2007 baseline.	Sandia will continue to exceed this objective. *Included in SNL EMS as a target.*	Low
4.2	2.4.1	20% water-consumption reduction of industrial, landscaping, and agricultural (ILA) water by FY 2020 from a FY 2010 baseline (2013 target: 6%)	Included in previous objective.	Included in previous objective.	Low

SSPP Goal #	SSP Section	DOE SSPP and NNSA Goal/ Sandia Objective	Performance Status through FY 2013	Planned Actions and Contribution	Risk of Nonattainment
GOAL 5: Pollution Prevention and Waste Reduction					
5.1	2.5.1	Divert at least 50% of nonhazardous solid waste, excluding construction and demolition debris by FY 2015.	Ending FY 2013: - SNL/NM – 65% - SNL/CA – 79.5% SNL/CA is required by State regulations to divert 80% of nonhazardous solid waste.	Sandia will continue to seek new materials to divert and improve existing processes.	Low
5.2	2.5.2	Divert at least 50% of construction and demolition materials and debris by FY 2015	Ending FY 2013: - SNL/NM – 84% - SNL/CA – 77.4% SNL/CA is required State regulations to divert 80% of construction and demolition materials and debris.	Sandia will continue to improve existing processes.	Low
GOAL 6: Sustainable Acquisition					
6.1	2.6	Procurements meet requirements by including necessary provisions and clauses (Sustainable Procurements/Biobased Procurements). Note: At Sandia, these are Sustainable Acquisition /EPEAT.	SNL purchasing agreements and procurement documents meet the objective as follows: Changes to the SNL Management and Operations contract to include required Department of Energy Acquisition Regulations (DEAR) sustainable acquisition (SA) clause were completed in FY 2012. - Several Sandia Standard Specifications were modified to include the applicable sustainability requirements in FY 2013. - Section 1 of BPAs (blanket purchase agreements) for Just-In-Time (JIT) contracts and construction contracts include clauses that directs the contractor to adhere to Sandia's policies regarding the acquisition of and giving preference to recycled content, biobased, ENERGY STAR, Electronic Product Environmental Assessment Tool (EPEAT), and other environmentally preferable products,	The *FMOC Design Standards Manual* and remaining Standard Specifications will be updated in FY 2014.	Low

SSPP Goal #	SSP Section	DOE SSPP and NNSA Goal/ Sandia Objective	Performance Status through FY 2013	Planned Actions and Contribution	Risk of Nonattainment
			where applicable. - Information technology (IT) contracts specifically state that computers and monitors must be a minimum of EPEAT Silver to be available for purchase and meet ENERGY STAR requirements. - Imaging-equipment agreements specifically state, as of February 2013, that all printers available for purchase must meet EPEAT Bronze requirements.		
GOAL 7: Electronic Stewardship and Data Centers					
7.1	2.7.1.1 2.7.1.2	All data centers are metered to measure a monthly Power Utilization Effectiveness (PUE) (100% by FY 2015). (2013 target: 80%)	Sandia initiated the Data Center Consolidation project in the 4th quarter of FY 2012. Sandia anticipates that its enduring data center baseline number will significantly change. Sandia considers this high risk because it was a new goal for FY 2011 with a short timeframe. The definition of data center has changed and may continue to change, which will affect the baseline. Meter installation will depend on funding availability.	Sandia will complete the consolidation plan and determine a path forward for consolidation implementation, enduring data center identification, metering and measuring the PUE as required. Implementation of metering and monitoring capability in large corporate data centers to enable monthly PUE determination is ongoing.	High
7.2	2.7.1.2	Maximum annual weighted average PUE of 1.4 by FY 2015 (2013 target: 1.6)	Sandia considers this high risk because it is a new goal for FY 2011 with a short timeframe. The definition of data center has changed and may continue to change, which will affect the baseline.	Sandia will continue ongoing energy-reduction efforts associated with data center operations will continue to reduce PUE values.	High
7.3	2.7.1.3	Electronic stewardship - 100% of eligible personal computers (PCs), laptops, and monitors with power management actively implemented and in use by FY 2012.	Continued NightWatchman deployment at SNL/NM and SNL/CA SNL locations.	Continue NightWatchman deployment. Expand to Apple products as appropriate.	Low

SSPP Goal #	SSP Section	DOE SSPP and NNSA Goal/ Sandia Objective	Performance Status through FY2013	Planned Actions and Contribution	Risk of Nonattainment
GOAL 8: Renewable Energy					
8.1	2.8	20% of annual electricity consumption from renewable sources by FY 2020 (2013 target: 7.5%)	Sandia met this objective using Renewable Energy Credits (RECs) and implementing small RE projects. See CEDR worksheets "Operating Onsite Renewables" and "Purchased Renewables." Sandia purchased 7.5% (24,000 MWh) RECs in FY 2013 to meet this objective.	In FY 2014, Sandia will continue to pursue RECs. See CEDR worksheets "Conservation and RE Measures" and "Purchased Renewables" for proposed, new RE projects and RECs. Implementation of renewable energy systems is dependent on favorable economics.	Low
GOAL 9: Climate Change Adaptation					
9.1	2.9	Address DOE Climate Change Adaptation Plan goals	Sandia continued to work with other DOE Office of Science and NNSA laboratories in climate change program areas. Sandia planners and subject matter experts worked on regional projects and are involved in civic activities related to climate change adaptation. Continued the Institutional Transformation (IX) project, which when completed in FY 2014 will provide a computer simulation model and planning tool for Sandia and ultimately other large Federal institutions to evaluate life cycle energy and GHG reduction alternatives at the building and site levels SNL/NM - Partnered with KAFB and other site tenants to address shared energy security concerns - Partnered with the Navajo Nation on renewable energy projects SNL/CA Continued LVOC conceptual planning in partnership with LLNL.	Partner with other DOE laboratories such as the National Renewable Energy Laboratory and the Idaho National Laboratory. Participate in local and regional planning meetings related to environmental issues. Investigate opportunities to partner with local jurisdictions to understand climate adaptation challenges. Conduct a preliminary high-level assessment/analysis of potential major site-specific/local vulnerabilities to climate change by FY 2015. Update by FY 2015 its other climate adaptation related plans and strategies to address climate change adaptation considerations (e.g. Continuity of Operations, Fire Management, infrastructure and construction specifications, etc.) Update the Sandia Long-Range Development Framework to identify impacts to Sandia mission, facilities and infrastructure.	Medium

SSPP Goal #	SSP Section	DOE SSPP and NNSA Goal/ Sandia Objective	Performance Status through FY 2013	Planned Actions and Contribution	Risk of Nonattainment
			Continued to partner with SLAC, LBL, and LLNL to share and develop new resources to address changing state and county requirements.		

2.0 Goal Performance Review and Plans

This section describes Sandia's achievements and plans with regard to the goals set forth in the SSPP.

2.1 Goal 1: Greenhouse Gas Reduction and Comprehensive Greenhouse Gas Inventory

2.1.1 Scopes 1 and 2 Greenhouse Gas Emissions

The SSPP commits DOE to reduce its GHG Scopes 1 and 2 emissions by 28% by FY 2020 from a FY 2008 baseline. Sites are expected to aggressively strive toward the overall DOE goal. Sandia has accepted this challenge and has developed objectives accordingly. Table 2.1 lists GHG scope definitions.

Table 2.1 SNL Emissions Categories by GHG Protocol Scopes

Scope 1	Scope 2	Scope 3
Natural gas consumption Other stationary combustion Fleet fuel consumption Process gases and fugitive emissions	Purchased electricity	Employee commuting Business ground and air travel Transmission and distribution (T&D) losses Contracted (offsite) waste water treatment Contracted (offsite) municipal waste disposal
Notes: Other stationary combustion: diesel and gasoline used in generators, and jet fuel used for experimentation. Fleet is onsite transportation.		

2.1.1.1 FY 2013 Performance Status

Sandia has reduced GHG Scopes 1 and 2 emissions by 39% in FY 2013 from a FY 2008 baseline. The major source of SNL's Scope 1 GHG emissions is fugitive emissions, considered to be any emissions that cannot reasonably pass through a stack, chimney, vent, or otherwise be collected. At SNL, the primary source of fugitive GHG emissions is sulfur hexafluoride (SF6).

SF6 used in pulsed power and high-voltage research and development applications account for the majority of use at SNL/NM. Based on the equipment and processes involved, there is currently no suitable alternative to SF6 for these applications. These programs and the buildings that house them use large quantities of SF6, have leak detection and repair processes in place, and have SF6-reclamation units associated with them. Various other activities are conducted throughout SNL that do not recapture the gas. However, the amount of SF6 involved in those processes is minimal, typically less than 5%, in comparison to the pulsed power applications.

SF6 purchases, inventory, and locations are tracked using an online Chemical Inventory System (CIS). The CIS is an integrated chemical inventory and Material Safety Data Sheet management system which uses SNL-applied barcodes to track containers of SF6 from acquisition through disposal. Annual purchases can vary based on several factors including budget, management, purchasers, and proposed projects, and do not necessarily reflect annual usage or emissions. In

the past, Sandia used the CIS to track annual purchases of SF6 to provide a fairly accurate estimation of emissions over several years.

The FY 2010 SSPP committed DOE to acquire SF6 capture and storage equipment, develop training, and deploy a SF6-capture program at key DOE sites subject to funding availability by September 2012. The SNL AQC group and members of Pulsed Power Operations formed a working group in FY 2011 to identify potential areas for further reductions and improved tracking methods.

In FY 2012, Sandia began tracking SF6 additions to the systems at several of the pulsed power facilities (Z Pulsed Power Facility, HERMES III, RITS-6, Saturn, SPHINX, Sandia Lightning Simulator, and the Electro-Magnetic Environment Simulator). This method of tracking provides better information about SF6 emissions at the equipment level, as well as identification of losses prior to use. Sandia has already identified and taken measures to reduce emissions during storage at some of these facilities. Although the entire year of data was available to estimate SF6 emissions only at Z Pulsed Power in FY 2012, all of these pulsed power facilities were able to estimate emissions from their operations for FY 2013. Emissions from all other SNL operations continue to be estimated based on purchases. See SNL SF6 purchases and estimated use reported in CEDR worksheets.

The department that maintains and operates the Saturn and HERMES III accelerators made several improvements in FY 2013 to minimize SF6 emissions:

- Updated the Saturn SF6 gas supply and return manifolds with new fittings and piping to eliminate leaks
- Upgraded the Saturn SF6 gas delivery and return system with new Nycoil tubing, flexible tubing, isolation valve manifolds, and upgraded fittings to eliminate leak areas. The Nycoil tubing is much more durable and has a lower permeability than the tubing that was previously used.
- Received three new SF6 gas reclaimer units and scheduled them for installation. Personnel have received the necessary training to operate the equipment and the infrastructure has been installed. These units have much higher efficiency than those being replaced. They also have safety features that mitigate the release of SF6.
- Continued tracking the SF6 gas cylinder use during maintenance and shot modes of operation

All members on the Saturn and HERMES III operations team have been made aware of the importance of reducing the loss of SF6 gas and are incorporating that culture in their work routines. The department's management continuously encourages improvements and upgrades to the systems to reduce SF6 losses.

In FY 2011 Sandia/CA initiated a multiyear electrical switchgear refurbishment project, with the intent of reducing SF6 emissions from the site's 18 gas-insulated switchgear (GIS). The project began with sending three inactive switches (i.e., in storage) back to the manufacturer for refurbishment. Upon their return to Sandia/CA they were used to replace the three active, leaking switches; these three were then sent to the manufacturer for their refurbishment. By the end of FY 2013, six switches had been refurbished and reactivated, and an additional three switches are ready for shipment to the manufacturer for refurbishment.

This process will continue until all 18 switchgear have been replaced with refurbished units. This project was initiated to comply with the California Air Resources Board's (CARB) *Regulation for Reducing Sulfur Hexafluoride Emissions from Gas Insulated Switchgear* (CCR 95350 – 95359). This regulation sets a maximum allowable leak rate of 10% for 2011. The leak-rate limit declines by 1% each year until 2020, when it reaches a final allowable leak rate of 1%.

Figure 2.1 illustrates Scopes 1 and 2 GHG emissions in metric tons (MT) of carbon dioxide equivalent (CO_2e). Combined Scopes 1 and 2 emissions decreased by 29% between FY 2008 and FY 2009 but increased by 18% between FY 2009 and FY 2010 due to an increase in SF6 purchases. Between the baseline year of FY 2008 and FY 2013, Scopes 1 and 2 emissions decreased 39%.

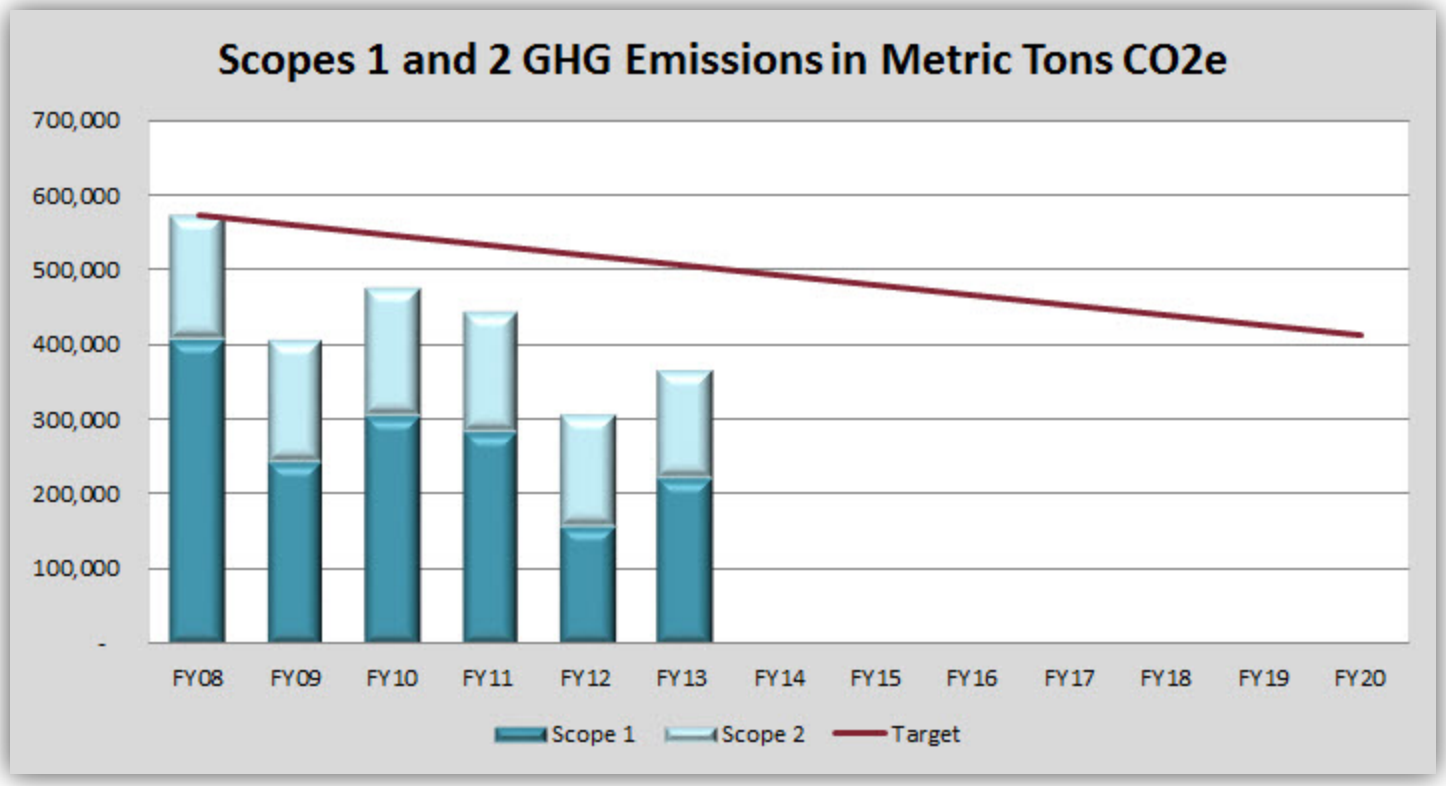


Figure 2.1 Scopes 1 and 2 GHG Emissions in Metric Tons CO2e

In FY 2013, the only component of SNL's Scope 2 GHG emissions was grid electricity because the majority of SNL's grid electricity generation is coal-fired. This is an important opportunity for SNL to reduce GHG emissions. There is a direct link between projects supporting electricity-use reduction and GHG emissions reduction. See the *Consolidated Energy Data Report* (CEDR) worksheets and section 2.1.2 for Plans and Projected Performance that will impact GHG emissions.

See section 2.2.1.2 for performance status as of FY 2013 to reduce energy and, as a result, Scopes 1 and 2 GHG emissions.

See the CEDR worksheets "Conservation and RE Measures" and “Building Inventory Changes" for a list of specific projects executed in FY 2013 and prior years.

2.1.1.2 Plans and Projected Performance

In FY 2013, Sandia’s Pulsed Power Engineering Department purchased a FLIR® optical gas detection camera to enhance the leak detection program at SNL’s pulsed power facilities. These infrared optical gas imaging cameras make SF6 leaks visible, allowing the user to identify leaks in a much broader area than the traditional “sniffer.”

In the past, Sandia did not have a process for documenting quantities of SF6 received from the vendor, gas lost during storage, or gas remaining in cylinders returned to the vendor. In FY 2012, most of the pulsed power facilities began documenting some of this data. Preliminary data indicate some opportunities for reducing emissions during storage. The Saturn/HERMES III organization has purchased and begun using new cylinder valve plugs with O-rings to mitigate losses that can result from poorly sealed valves. As new tracking data is reviewed and analyzed, there will be further improvements to gas handling to reduce losses.

Anticipated growth in Sandia’s pulsed power mission presents a challenge to achieving Scope 1 reduction objectives. While SF6 emissions per experiment are expected to decrease, overall emissions may increase, depending on total work scope.

See section 2.2.1.2 for planned activities to reduce energy and, as a result, Scopes 1 and 2 GHG emissions.

2.1.2 Scope 3 Greenhouse Gas Emissions

The SSPP commits DOE to reduce its Scope 3 GHG emissions by 13% by FY 2020 from a FY 2008 baseline. Sandia is committed to meeting this target.

2.1.2.1 FY 2013 Performance Status

Annual Scope 3 GHG emissions are shown in Figure 2.2. SNL's Scope 3 emissions show a 6.4% increase from the FY 2008 baseline to FY 2013.

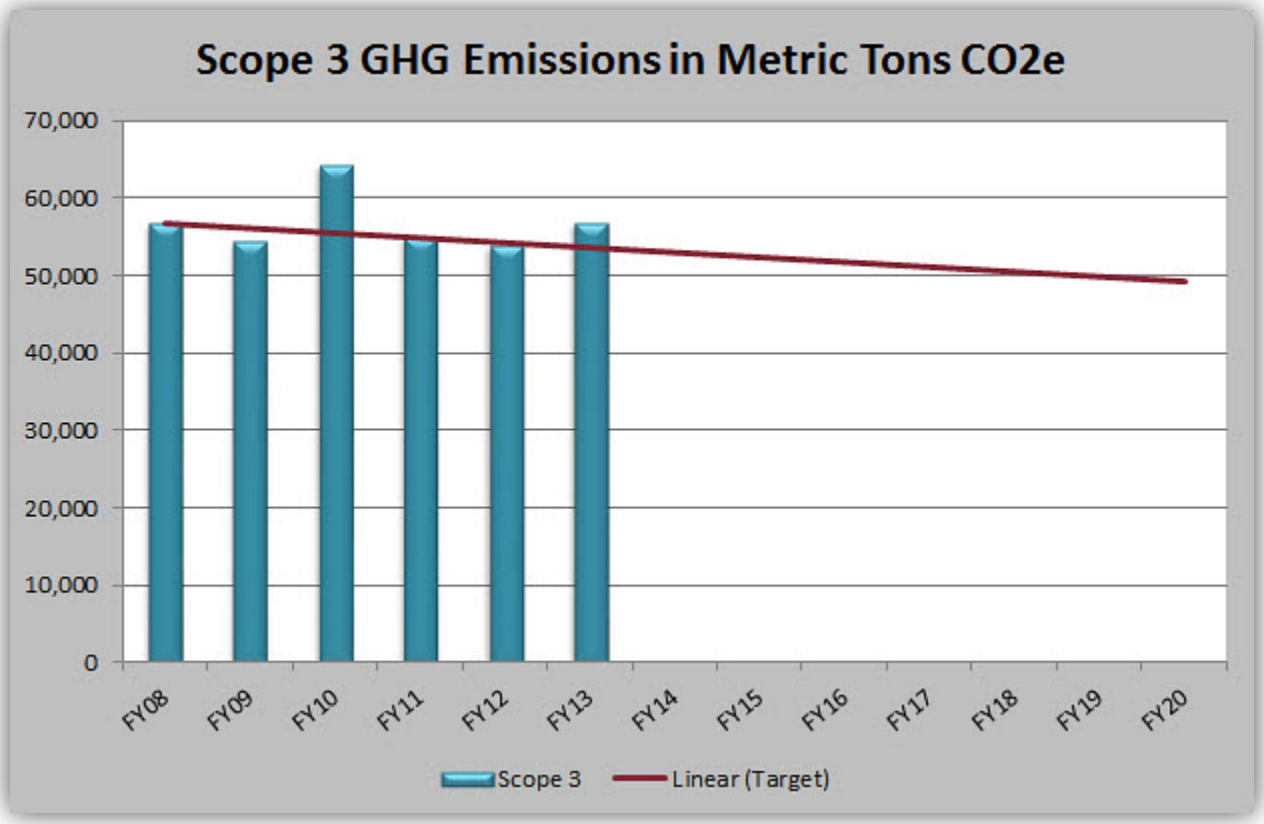


Figure 2.2 SNL Scope 3 GHG Emissions in Metric Tons CO2e

Employee Commuting

Sandia encourages Members of the Workforce to use alternatives to single-passenger commuting through the following incentive and assistance programs:

- Preferred parking: Sandia reassessed reserved parking for carpoolers in FY 2011 to maximize the incentive to carpool. The Commuter Assistance Program identified improvements to the number and locations of preferred parking for convenience based on information provided by registered carpoolers. Installations were completed in FY 2013.
- Carpool SharePoint site: An SNL internal website that serves as a central meeting point for people across SNL to find carpool and vanpool riders based on individual needs.

- Bike commuter SharePoint site: An SNL internal website that provides Sandia personnel with information about gear, routes, shower and locker facilities, safety, traffic, and "Bike Buddy" bike-commuter connector
- Bus pass discounts: The City of Albuquerque Transit Department currently uses the ABQ Ride Bus System to serve KAFB. There are seven different bus routes that service SNL/NM. Discounted monthly bus passes are available from Sandia Employee Recreational Programs for $20.00 a month ($10.00 discount).
- Express bus routes: At SNL/NM, established express bus routes from the west side of Albuquerque.
- Train: The New Mexico Rail Runner provides a train commuting option with 13 different stations from Santa Fe to Belen.
- Guaranteed Ride Home: SNL Members of the Workforce who use alternative modes of transportation at least three times a week are eligible to register for the City of Albuquerque's Guaranteed Ride Home program. If an emergency arises during the workday, this program will provide a free ride to the requested destination if it is within the ABQ Ride bus route service area.

Business Ground and Air Travel

Sandia has not established specific initiatives to reduce ground or air travel for the purpose of Scope 3 GHG reduction; however, Sandia has established corporate travel procedures (FIN100.1.TNT.5, *Travel on Business*) that promote efficiency in business travel. Sandia requires corporate travel be undertaken only when alternative methods to accomplish the business purpose are not suitable. Members of the Workforce are expected to help minimize rental expenses by sharing a vehicle.

Transmission and Distribution Losses

The *Technical Service Document* for the Federal GHG Accounting and Reporting Guidance uses the national average default value of 0.0618 for transmission and distribution (T&D) losses; this is the figure Sandia uses.

At SNL/NM, Sandia purchases low-loss substation and distribution transformers. All transformers have energy losses that reduce electrical system energy efficiency. Energy losses are due to the magnetizing losses of the core (no-load loss) and the conductor resistive losses (load loss) of the transformer. Transformers are available that have reduced core and winding losses; however, this reduction in losses corresponds to an increase in transformer price. At SNL/NM, Sandia uses transformer life-cycle, cost-procurement methodology to procure transformers. Using life-cycle cost evaluation, the more expensive, energy-efficient transformers can compete in the procurement system because the initial cost of the transformers is offset by lower annual operating costs.

Contracted (Offsite) Waste Water Treatment

Waste water discharge permits with the local Publicly Owned Treatment Works are in place for SNL/NM and SNL/CA. SNL/NV discharges waste water to an evaporation lagoon owned and operated by the U.S. Air Force (USAF).

Contracted (Offsite) Municipal Waste Disposal

Sandia contracts its offsite waste disposal, referred to as "commercial solid waste" disposal in its program documents. At SNL/NM Sandia uses the city of Albuquerque Cerro Colorado landfill and the Waste Management-owned Rio Rancho landfill for offsite waste disposal.

At SNL/CA, the Facilities Management organization owns and manages the solid waste disposal contracts and works in conjunction with SNL/CA Pollution Prevention program to ensure reporting and recycling requirements are met. SNL/CA uses two landfills; the Altamont Landfill, owned and operated by Waste Management Incorporated, and Vasco Road Landfill, owned and operated by Republic Services. SNL/CA is under strict State and County requirements to limit landfill disposal, and as such the Waste Management Inc. contract also provides recycling service of the following waste streams: asphalt, concrete, construction and debris, empty containers, green waste, wood waste, and tires.

At SNL/NV Sandia disposes normal dumpster refuse at the TTR USAF Class II Sanitary Landfill. Minor quantities of construction debris are disposed of at the USAF Landfill. For larger quantities of other “commercial solid waste” (salvage yard materials or large quantities of construction debris), Sandia has a contract with the Apex Landfill in Las Vegas. Sandia also has a contract to haul used tires to Phoenix Recycling Technologies in Las Vegas.

2.1.2.2 Plans and Projected Performance

Although Sandia will focus primarily on Scope 1 and 2 GHG emission reductions in the near term, Sandia plans future, Scope 3 GHG emissions-reductions activities as follows:

- Reduce vehicle miles traveled.
  - Encourage trip consolidation through carpooling and vanpooling.
  - Increase use of teleconferencing, video conferencing, and web conferencing
  - Reduce workforce business travel between SNL/NM and SNL/CA with increased use of teleconferencing, videoconferencing, and web-based collaboration tools.
  - Encourage telecommuting.
- Encourage fuel-efficient rental car use: Sandia is required to use Lockheed Martin (LM) corporate contract travel arrangements for rental car services and, therefore, does not define efficiencies of cars rented. This may potentially represent an opportunity for improvement through development of an LM corporate contract requiring fuel-efficient rental car use.
- Support the use of public transportation by Sandia personnel, by facilitating its use through negotiating schedules with the provider and by providing incentives for use of mass transit.

2.1.3 Greenhouse Gas Emissions Summary

This section summarizes the current state of SNL GHG emissions, given various elements of GHG emissions described in the preceding subsections. All GHG emission inventory data is available through the CEDR, Facilities Information Management System (FIMS), and Federal Automotive Statistical Tool (FAST).

Reducing, eliminating, and efficiently using energy resources in SNL existing buildings is the most cost-effective strategy for Sandia to pursue in the immediate to mid-term time frames.

Effectively managing future demand is also critical if Sandia is to meet its objectives. Sandia's first priorities are mission performance and effectiveness. Mission growth, with associated growth in energy and water use, is anticipated over the planning period. Planning for and managing growth before it occurs will increase the probability of sustainability success. Establishing appropriate and accurate GHG and energy and water baselines is also essential for success.

See Figure 2.3 for Scopes 1, 2, and 3 GHG emissions in MTs of CO2e.

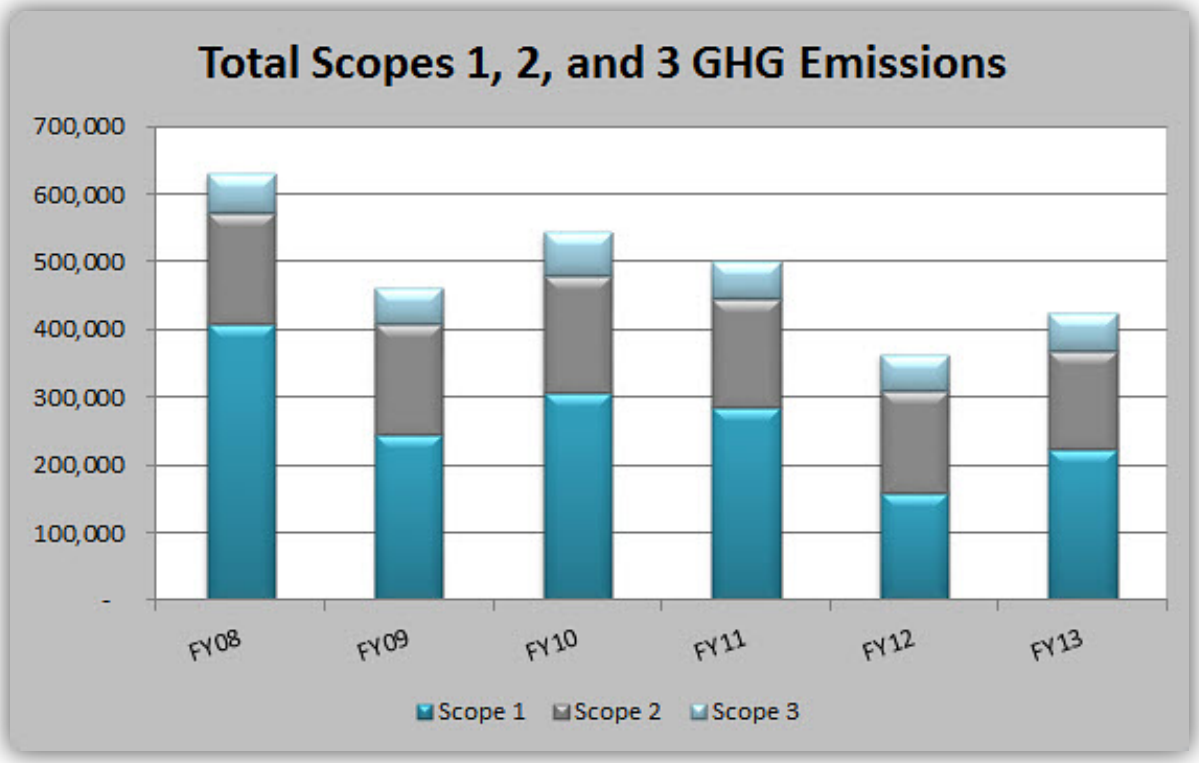


Figure 2.3 SNL Total Scopes 1, 2, 3 GHG Emissions in Metric Tons CO2e

The largest source of GHG emissions at SNL was SF6 emissions. With SF6's global-warming potential of 23,900, SF6 reductions provide opportunities for significant GHG reduction (see Figure 2.4).

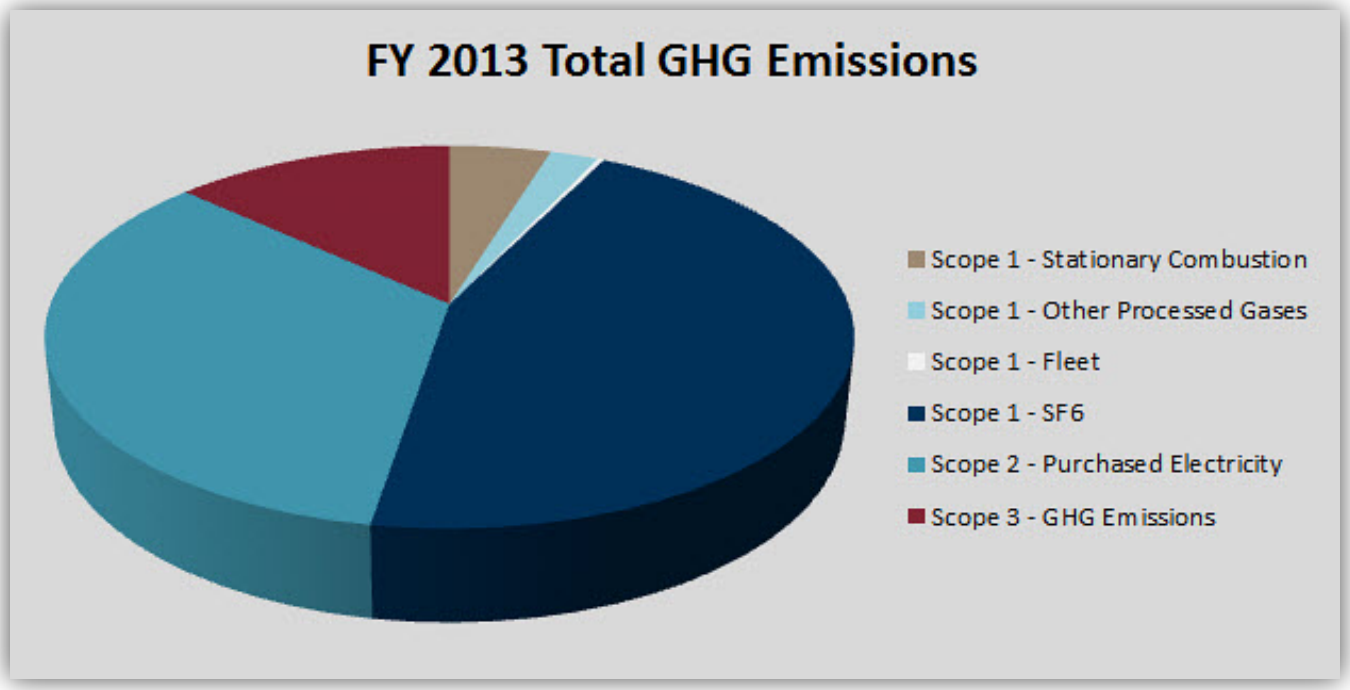


Figure 2.4 SNL FY 2013 Total GHG Emissions

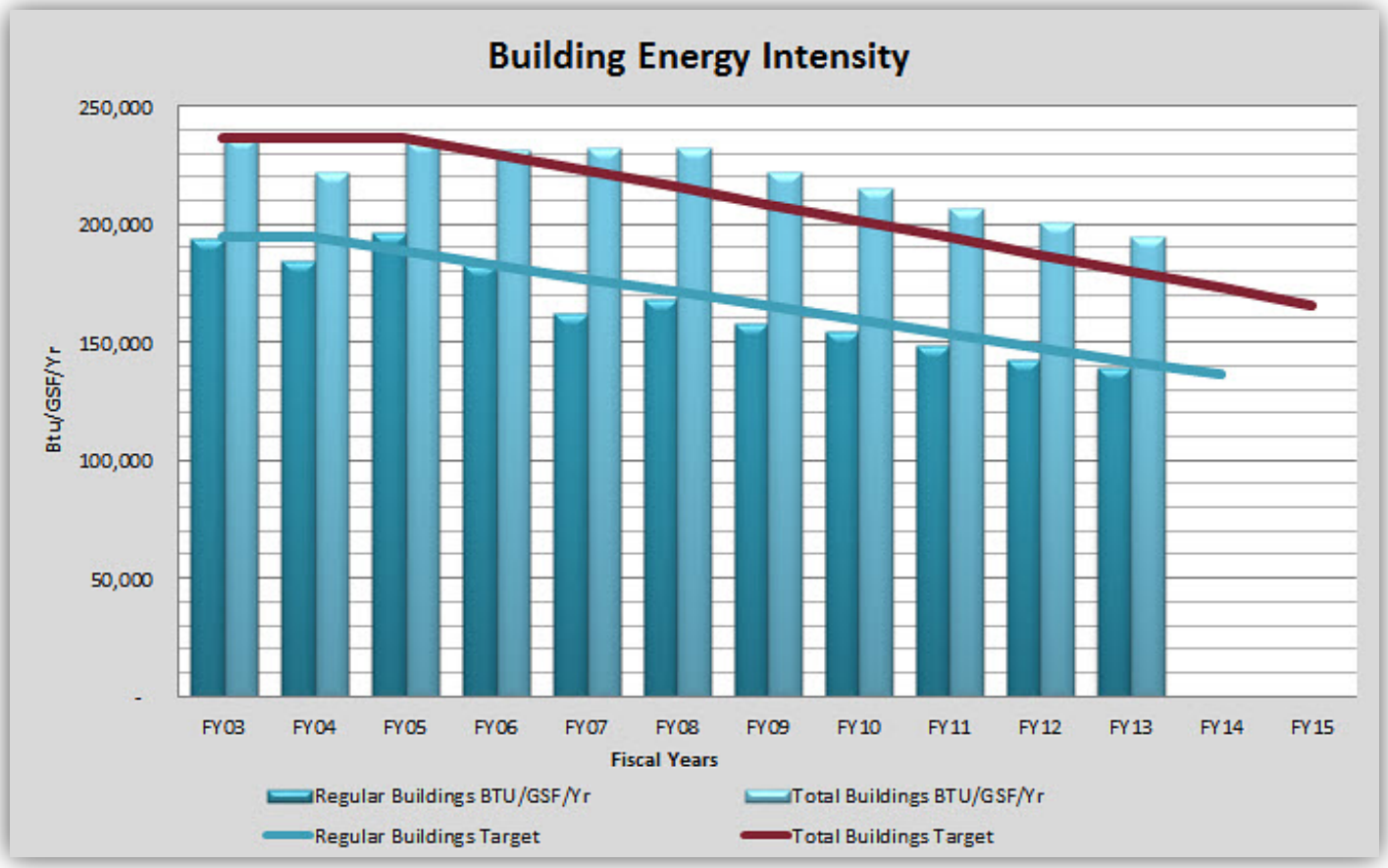
2.2 Goal 2: Buildings and Regional and Local Planning

2.2.1 Energy Intensity

EISA 2007 requires DOE to reduce its energy intensity by 30% by FY 2015 from a FY 2003 baseline. Sandia accepts the goal for regular buildings and will strive to achieve the goal for all buildings.

2.2.1.1 FY 2013 Performance Status

Sandia is on track to meet the EISA-required goal for energy-intensity reduction (see Figure 2.5). In regular (nonexcluded) buildings, Sandia reduced energy intensity per SF by 28.32% from FY 2003 to FY 2013 (see Figure 2.6). For all buildings, Sandia reduced energy intensity per SF by 17.75% from FY 2003 to FY 2013. These results reflect energy-conservation initiatives completed in FY 2012. See the CEDR worksheets "Conservation and RE Measures" and "Building Inventory Changes" for a list of specific projects executed in FY 2013 and prior years. See CEDR worksheet "Energy and Water" for energy-intensity information. See Appendix C for a copy of the final FIMS list of buildings (as of November 12, 2013) Sandia is excluding from the energy-intensity goal, as well as a copy of the DOE Building Exclusion Self-Certification form.



Notes:

Data does not include SNL/HI.
FY 2008 and prior data does not include offsite leases.
FY 2009 - FY 2013 data include offsite leases in which energy cost was not included in lease cost.

Figure 2.5. SNL Total Energy Intensity in Btu/GSF/Yr

In FY 2013, Sandia began tracking two additional voluntary metrics: Total Btu/Total Mission Dollar and Total Btu/Capita. Total MBtu (1,340,757) is based on the total site energy usage (NM, CA, and NV). For FY 2013:

Total MBtu/Total Mission Dollar (M) = 1,340,757/4,607 = 291.03 MBtu/Total Mission Dollar(M)

Total Mission Dollar is the total Sandia cost for all programs (including WFO and indirect costs) minus line item construction projects. Figures 2.6 and 2.7 illustrate the total site MBtu per total mission cost and per capita. Also see Table B-11 in Appendix B of this document.

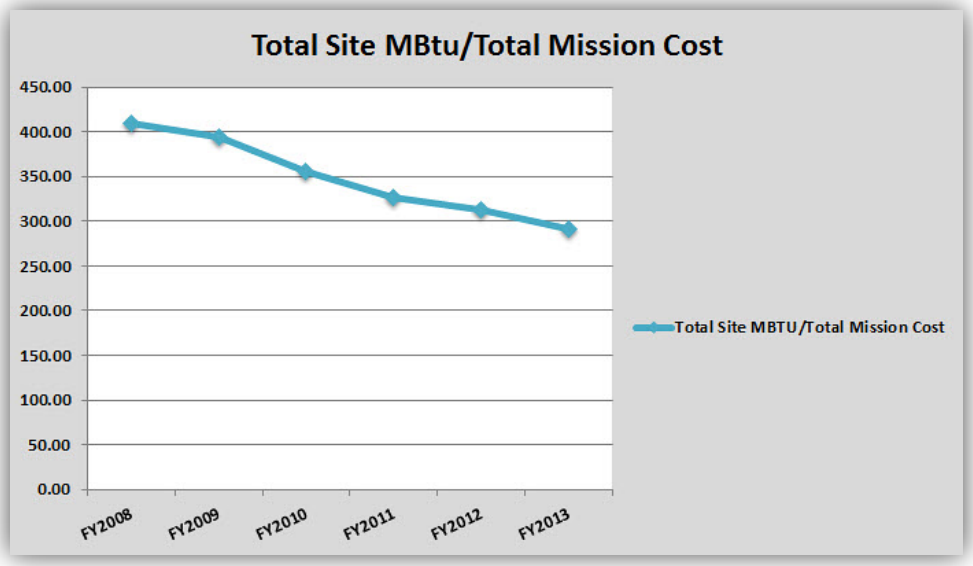


Figure 2.6 Total Site MBTU/Total Mission Cost

Total MBtu/Capita = 1,340,757/11,973 = 111.98 MBtu/ Capita

Capita is the total Sandia workforce number, including staff, and on-site staff augmentation contractors and visitors. The above calculation does not include SNL/HI. See Table B-10.

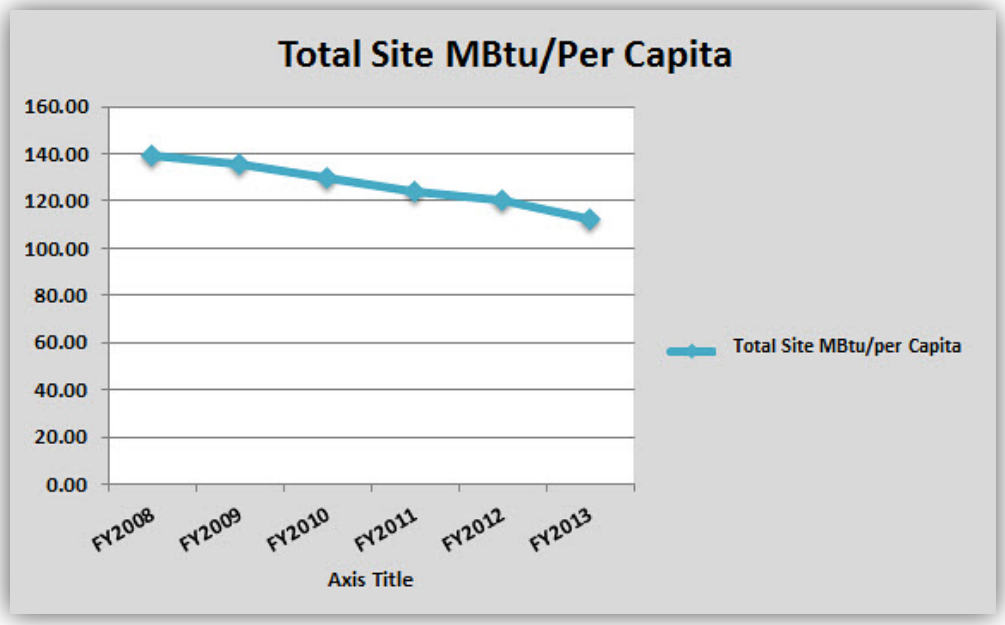


Figure 2.7 Total Site MBTU per Capita

In FY 2013, Sandia accomplished the following energy-conservation measures:

- Designed controls conversion from pneumatic to direct digital control (DDC) zone control in Buildings 891, 856, C914, 897
- Designed and constructed controls conversion from pneumatic to zone DDC control in Buildings C907, C910 and C941 at SNL/CA
- Installed and programmed meters to measure chilled water (CW) energy for Buildings 701, 886, 857, 700, Nitrogen Plant, 858N, 870, 702, 877, 858S, and 879
- Scoped various energy projects identified in Building 858N energy audit
- Installed combined occupancy/HVAC sensors in Buildings 701, 811, 1090, 758, 895; installed but not programmed Buildings 877, 879, 752, 971, 957
- Designed the replacement of Building 897 pneumatic T-stats and variable air volume boxes with electric and connect to site DDC system
- Converted controls pneumatic to DDC zone control in Buildings 886 and 890
- Provided meters to measure power utilization effectiveness (PUE) in Building 880A
- Installed occupancy sensors in various SNL/NM mobile offices (MOs) and T-Buildings
- Designed solar hot water (HW) systems for Building 823
- Replace chillers and complete installation of free cooling heat exchanger in Building 836
- Automate compressed air dryer controls in Building 858J
- Continued developing building energy models using eQUEST/DOE2
- Replaced T-12 lights with T-5 in a portion of the Building C912 basement at SNL/CA. The replacement of T-12 lights in C912 is an ongoing effort
- Finished construction to convert controls from pneumatic to zone level DDC control for Building C941 at SNL/CA. Also, some facility equipment was converted in C910 and C912 (approximately 10-15%). C914 is in the process of a total conversion, which will be complete in FY 2014.
- Operated most office buildings within a temperature band of 70 to 76°F, during standard working hours, in buildings connected to the Building Automation System (BAS)
- Assessed building operational hours continually (buildings are operated only for the period of time required to support their missions; the goal is to minimize 24/7 operations)
- At SNL/NM, used the BAS to shut off or set-back systems during nonstandard working hours in 104 buildings (these buildings are monitored for energy-reduction opportunities)
- Used the BAS to shut off or set-back systems during nonstandard working hours in 24 buildings at SNL/CA (these buildings are monitored for energy-reduction opportunities)
- Implemented a computer power-management program on many non-mission-critical desktop computers at SNL/NM and SNL/CA
- Decontaminated and demolished (D&D) eleven small buildings and mobile offices at SNL/NM for a total of 2,699 GSF in FY 2013

In FY 2013 the construction of Building 704, a new 26,419 GSF Institutional General Plant Project (IGPP) building east of Building 880 (the building will be LEED Gold certified and meet Guiding Principles for New Construction) is anticipated to cause an increase in energy consumption, but a decrease in energy intensity.

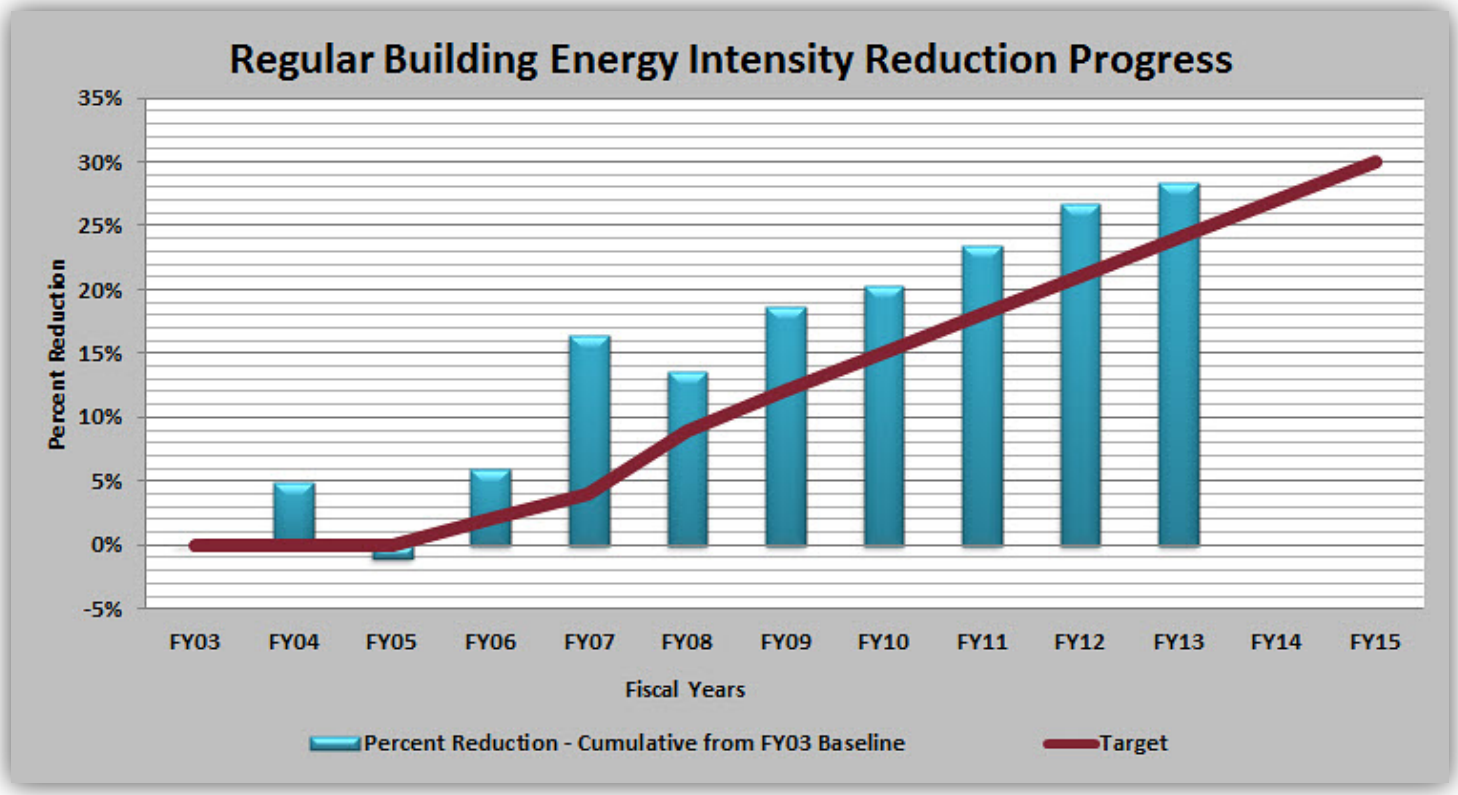


Figure 2.8 SNL Regular Building Energy Intensity Reduction Progress

2.2.1.2 Plans and Projected Performance

See the CEDR worksheets "Conservation and RE Measures" and "Building Inventory Changes" for planned major energy-intensity reduction and generation activities and new construction projects that will impact how future energy is expected to grow or decline in FY 2014 and beyond.

The high levels of electrical demand at night and on weekends (12,000 to 14,000 kilowatt (kW), 60 to 70% of the peak daily demand) present a significant opportunity for energy-demand reduction at SNL/NM. Although the demand is less, SNL/CA has a similar load profile and opportunities for energy reduction.

When completed in FY 2014, the following actions will result in a decrease in energy intensity:

- Design controls conversion from pneumatic to zone DDC control in Buildings C940, C942 and C943 at SNL/CA.
- Replace pneumatic controls in Building 6585. Assess 6585 for other ECM opportunities, including lighting/HVAC controls.
- Replace pneumatic T-stats and variable air volume boxes with electric and connect to site DDC. Replace chiller, install control valves on fan coil units, and install variable frequency drives (VFDs) on return-air fans in Building 897.
- Design and start construction on various energy projects identified in Building 858N energy audit. Connect CUB CW systems.
- Conduct energy audits to identify issues, deficiencies (return building to current design basis), and opportunities to improve energy and water resource efficiency or reduce demand, targeting lighting, telecommunications, computer, and mechanical systems.
- Install combined occupancy/HVAC sensors in Buildings 859, 861, 885, 730, 877, 879, 727, 700, 703, and 720. Program Buildings 752,877, 879, 971, and 957.

- Complete Technical Area (TA)-I preliminary design of new CW loop.
- Complete developing building energy models using eQUEST/DOE2.
- Reduce building and equipment operational time by doing the following:
  - Operate equipment and buildings 24/7 only when required by mission work.
  - Allow nighttime operation only when required by mission work.
- Continue implementation of the computer power-management program on all non-mission-critical desktop computers running Microsoft® Windows 7 at SNL locations. See section 2.7.1.1.
- Convert controls from pneumatic to DDC zone control in Buildings C914, C942, C943, 897, 856, and 891.
- Perform a study of all exterior lighting systems at all Sandia locations.
- Renovate Building C905 at SNL/CA to include a new energy efficient HVAC roof unit.
- Renovate a portion of Building C912 (9,000 GSF) to include new tenant improvements and mechanical system renovation.
- Design and install HVAC, controls, and chillers in Building 840.
- Complete renovation and occupancy of Building 840. (Although energy-saving measures have been incorporated into the design, the building energy use will increase when the building is fully occupied.)
- Provide meters to measure PUE in Buildings 725 and 899.
- Decontaminate and demolish (D&D) Building C927 (22,001 GSF) at SNL/CA.
- D&D Building 03-50 and MOs 03-100 and 03-101 (29,391 total) at SNL/NV.

In FY 2014 the construction of Building 730, a new 25,000 GSF General Plant Project (GPP) building (the building will be LEED Gold certified and meet Guiding Principles for New Construction) is anticipated to cause an increase in energy consumption, but a decrease in energy intensity.

The following planned actions will impact energy intensity after FY 2014:

- Construct Building 705, a new 25,000 GSF GPP building in TA-I in 2015. (The building will be LEED Gold certified and meet Guiding Principles for NC.)
- Construct Building 03-52, a new 13,500 GSF administrative building in SNL/NV in 2015.
- Construct Building 1050, a new 15,000 GSF corporate records storage building in 2015.
- Construct a new IGPP in SNL/CA.
- Reprogram controls to optimize operations in Building 870.
- Restore mechanical and control systems in Buildings 960 and 961.
- Replace air handlers and controls in Building 826.
- Convert controls from pneumatic to DDC zone control in Buildings 823, 905, and 857.
- Upgrade BAS in the remaining SNL/CA buildings.
- Investigate new technologies for lighting and lighting controls.
- Implement recommissioning or retrocommissioning based on audit recommendations.
- D&D Buildings 867, C9731 and several mobile offices (MOs) in SNL/CA for a total of 35,162 GSF. (Building 867 at 19,713 GSF is a relatively small energy consumer.) Building 09-52 at 8,324 GSF is scheduled for D&D in FY 2015 at SNL/NV. Building 892 is also slated for D&D within the next ten years.
- Accommodate new mission work.

Table 2.2 illustrates actual and projected electricity consumption at SNL and Figure 2.9 provides Sandia's ten-year load forecast for electricity use. Sandia does not anticipate major increases in electrical use at this time.

Table 2.2 SNL Actual and Projected Electricity Consumption (x 10^6 kWh)

	Actual FY13	Planned FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22
Total Electricity Consumption (MWh)	284,410	278,722	273,318	268,191	263,334	265,968	268,627	271,314	274,027	276,767
Electricity Consumption (MWh) – Regular Buildings	156,830	153,693	150,714	147,887	145,208	146,660	148,127	149,608	151,104	152,615
Electricity Consumption (MWh) – Excluded Buildings	127,580	128,856	130,144	131,446	132,760	134,088	135,429	136,783	138,151	139.532

Notes:
Assumes 1% increase/year before efficiencies
Assumes 3% decrease/year from FY 2013 actual through FY 2017
See CEDR section 3.4 for projected energy efficiencies
See CEDR section 3.3 for projected growth components

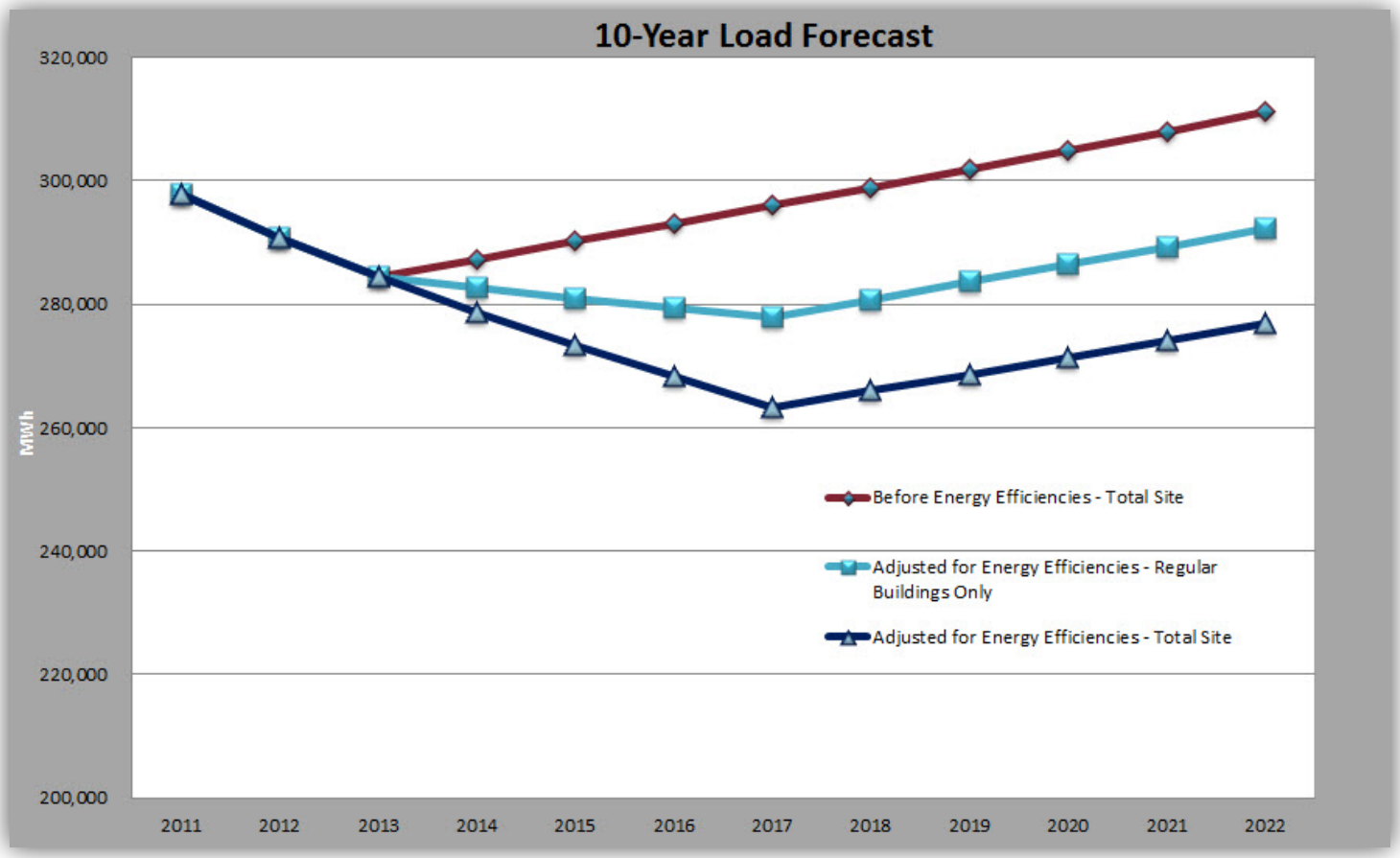


Figure 2.9 SNL Ten-Year Load Forecast

2.2.2 EISA Section 432, Energy and Water Evaluations

EISA 432 requires DOE to complete energy and water evaluations (audits) on its covered facilities every four years. June 2012 marked the end of the first cycle and the beginning of the second four-year period. EISA defines covered facilities as the top 75% energy-using buildings. DOE tracks covered facilities at the site level. In FY 2013, Sandia had 50 covered facilities, which equated to approximately 4.55 million GSF.

EISA also requires benchmarking for energy and water use. For buildings that may be ENERGY STAR candidates, Sandia uses the U. S. Environmental Protection Agency's (EPA) Portfolio Manager to benchmark building energy use. For other buildings, Sandia uses an internal benchmarking process.

2.2.2.1 FY 2013 Performance Status

Sandia did not complete 25% of the required EISA Section 432 energy audits for covered facilities on schedule. However, Sandia has a plan to complete 100% by June 2016. This status is reflected in CEDR sections 3.3 and 11.

In FY 2010, Sandia developed a comprehensive process to perform building-level energy and water audits. The process includes individual discipline checklists, energy lead profiles, energy baselines, a summary report, and deficiency and opportunity identification. Sandia has updated the process several times since its inception based on feedback from the subject matter experts who perform the audits. The energy and water audits are also used to meet Guiding Principle commissioning requirements and become the basis for CEDR section 3.1 and CTS ECM reporting requirements.

2.2.2.2 Plans and Projected Performance

Sandia's plan to meet EISA audit requirements for the next four-year period is shown in the CEDR, sections 3.3 and 11. Based on FY 2011 data, Sandia has approximately 50 covered facilities. Starting in FY 2014, Sandia will count central utility buildings (CUBs) as covered facilities for the purposes of EISA audits. This will increase the number of covered facilities to 57, with approximately 4.58 million GSF. Sandia apportions all the CUB energy use to the buildings served by the CUB. Sandia counts these buildings as required toward the 75% in addition to the CUBs.

2.2.3 Metering

DOE is required to install metering devices, advanced or standard, to the maximum extent practicable at all sites in each building and other facilities, and grounds for electricity, NG, steam, and water. This requirement stems from statutes including EPAct 2005, section 103, for electricity meters by October 1, 2012; and EISA 2007, section 434, for NG and steam meters by October 1, 2016.

The SSPP established the following goals:

- At least 90% of electricity use is metered at an individual building or process level by October 1, 2012, where life-cycle cost effective.
- At least 90% of NG, steam, and CW (90% for each utility) is metered at an individual or process level by October 1, 2015, where life-cycle cost effective.

Sandia accepts these objectives. This section discusses electric, NG, and CW meters. Sandia does not use steam at any of its locations. See section 2.4, *Water Use Efficiency and Management*, for a water meter discussion.

2.2.3.1 FY 2013 Performance Status

See Tables 1-5a, 1-5b, and 1.5d of the CEDR worksheet, "Funds, Metering, Training," for building-level electric, NG, and CW meter information.

Sandia completed a comprehensive metering plan update in December 2013. See the SNL FY 2013 *Energy and Water Metering Plan* for more information.

2.2.3.2 Plans and Projected Performance

Sandia will pursue the planned actions as identified in the SNL FY 2013 *Energy and Water Metering Plan*. Sandia is on track to meet the DOE SSPP and NNSA goals and stretch goals, where life-cycle cost effective, through FY 2015.

2.2.4 Cool Roofs

In accordance with DOE Secretary Steven Chu's memorandum dated June 1, 2010, unless determined uneconomical by a life-cycle cost analysis and unless the project already has CD-2 approval, roof replacements and roofs for new construction shall be cool roofs. New roofs must have a thermal resistance of at least R-30 to enhance overall building thermal performance.

2.2.4.1 FY 2013 Performance Status

- Sandia has met the intent of the DOE objective for cool roofs. See CEDR section "Conservation and RE Measures" for specific new roof-replacement projects:
- SNL/NM has approximately 3,338,971 GSF total roof area; 128 roofs or approximately 75% (2,490,548 GSF), that comply with the "cool roof" definition. They are either bright-white installed membrane roofs or existing roof membranes that have been coated with a bright-white roof coating. These numbers do not include Building 1008, MOs, T-buildings, or leased space.
- SNL/CA has approximately 621,773 GSF total roof area; 22 roofs, or approximately 65% (401,721 GSF), that comply with the "cool roof" definition. They are either bright-white installed membrane roofs or existing roof membranes that have been coated with a bright-white roof coating. These numbers do not include MOs, T-buildings, or leased space.
- All new construction and roof replacements use SNL Standard Specification 07533, which specifies an ENERGY STAR-compliant, 60-mil (Buildings 860 and 970 used an 80 mil) thermal propylene olefin bright-white membrane. The specification also requires minimum R-30 poly-iso insulation (9% minimum recycled content), wood nailers from preservative-treated lumber using nonchromated copper arsenate preservatives, and adhesives compliant with the volatile organic compound limits of California South Coast Air Quality Management District, Rule #1168.
- In FY 2013 at SNL/NM, Sandia completed a cool roof on one building:
  - Building 905 (Phase II), at approximately 27,780 GSF
- In FY 2013 at SNL/NM, Sandia completed a new building with a cool roof:
  - Building 704, at approximately 7,623 GSF
- At SNL/CA, Sandia did not complete any roofing projects in FY 2013.

2.2.4.2 Plans and Projected Performance

See the CEDR section, "Conservation and RE Measures," for planned, new cool-roof and cool-roof-replacement projects. Implementation of future roofing projects is dependent upon the availability of Roof Asset Management Program (RAMP) funding.

- The following buildings have been identified for cool-roof replacement design in FY 2014 at SNL/NM:
  - Building 962, at approximately 37,013 GSF

  - Building 9925, at approximately 6,828 GSF
  - Building 6580, at approximately 9,438 GSF
  - Building 6581, at approximately 4,000 GSF
  - Building 6588, at approximately 15,184 GSF
  - Building 840, at approximately 88,253 GSF
  - Building 857 South roofs, at approximately 10,387 GSF
  - Building 894 coating, at approximately 82,255 GSF
- In FY 2014 at SNL/NM, Sandia will construct a new building with a cool roof:
  - Building 730, at approximately 7,600 GSF
- At SNL/CA in FY 2014, the following buildings have been identified for cool-roof coating applications:
  - Building C923, at approximately 1,134 GSF
  - Building C925, at approximately 5,851 GSF
  - Building C929 coating, at approximately 23,333 GSF
  - Building C943 coating, at approximately 3,603 GSF
  - Building C979 coating, at approximately 5,022 GSF
  - Building C983 coating, at approximately 1,891 GSF

2.2.5 High-Performance Sustainable Buildings - Existing

The DOE SSPP has identified reporting requirements for high-performance, sustainable buildings (HPSBs), new construction, and major renovations (MRs), and existing buildings. Sandia complies with all these requirements.

2.2.5.1 FY 2013 Performance Status

EO 13423 required all agencies that own or lease real property to develop and implement a plan to ensure that at least 15% of their enduring buildings are compliant with the *Guiding Principles (GP) for Federal Leadership in High Performance Sustainable Buildings* by the end of 2015.

EO 13514 and the SSPP clarify the goal to be 15% of the number of buildings—not square footage—although both will be tracked. Buildings that fall under this requirement are limited to those greater than 5,000 SF. Additionally, EO 13514 and the SSPP require 15% by December 15, 2015, while stipulating continued progress towards 100%.

Sandia is tracking 159 buildings in the U.S. EPA ENERGY STAR system Portfolio Manager, using the federal HPSB checklist. These include 46 buildings currently projected to meet or exceed the GP goal by FY 2015. In FY 2013, the average percent GP complete for the 46 buildings was 81% (see Appendix B, Table B.10).

Nine existing buildings were originally planned to meet the Guiding Principles in FY 2013. Three buildings achieved them in FY 2013; Buildings 1090, 752, and 877. Five more achieved GP by the end of calendar year 2013. See Table 2.3 for details.

Table 2.3 Sandia Requirements to Meet Guiding Principles

	Baseline FY	Total (All Locations)	FY 2009 - 15% Required to Meet Guiding Principles	FY 2015 Projection Total (All Locations)	FY 2015 Projection - 15% Required to Meet Guiding Principles
# Buildings >5,000 GSF	**FY 2009**	**191**	**29**	**186**	**28**
GSF, Buildings >5,000 GSF	**FY 2009**	**6,623,821**	**993,000**	**6,611,033**	**991,655**

2.2.5.2 Plans and Projected Performance

Sandia will continue to demonstrate that a building meets the Guiding Principles through the use of the HPSB federal checklist embedded within EPA's Portfolio Manager. This information will also be reported in FIMS. Table 2.4 shows Sandia's current plan for meeting the 15% requirement.

The most difficult Guiding Principles to achieve are energy efficiency, ASHRAE 55 and 62 compliance, and occupancy sensor installation.

Table 2.4 Sandia Plan to Meet Guiding Principles

	LEED Grandfathered	FY 2010	FY 2011	FY 2012	FY/CY 2013	FY 2014	FY 2015	Beyond FY 2015
Buildings	518 720 898 899 858EL 858EF		750 C903 (new)	753 969	1090 752 971 704 (new) 811 877 879 858J (CUB) 899A (CUB)	886 856 859 885 C960 C940 730 (new) 6587 6584 726 (CUB) 770 727	836 905 809 C905 827 954 957 6585 705 (new) C943 (CUB) 861	758 6586 755 700
# for GP	6	0	2	2	9	12	11	4
Total GP	6	6	8	10	19	231	42	46
% Buildings (> 5,000 GSF)	3.1%	3.1%	4.2%	5.2%	10.1%	16.7%	22.6%	24.7
GSF	629,746	0	23,047	26,353	124,797	182,592	540,571	73,305
Total GSF	629,746	629,746	652,793	679,146	803,943	986,535	1,527,106	1,600,411
% GSF (>5,000 GSF)	9.5%	9.5%	9.8%	10.2	12.2%	15.0%	23.1%	24.2%

Notes:

1. Buildings 705 and 730 are new IGPP @ estimated 25,000 GSF each. They will be LEED Gold or better. Completion dates are approximate.
2. "Green" buildings are 90% or higher GP compliance.
3. Building count and GSF include CUBs
4. 4.Five buildings and MOs > 5,000 GSF will be demolished during FY2013–2015

2.2.6 High-Performance Sustainable Buildings - New Construction

2.2.6.1 FY 2013 Performance Status

The SSPP requires that all new buildings, MRs, and alterations of buildings greater than 5,000 GSF must comply with the Guiding Principles for Federal Leadership in High-Performance and Sustainable Buildings (Guiding Principles or GP) and where the work exceeds $5 million, must achieve the U.S. Green Building Council's certification, LEED Gold certification for New Construction. In addition, in accordance with section 109 of EPAct 2005, all new federal buildings in the design stage (i.e., CD-1 or lower) as of October 1, 2006, must be designed so that their energy consumption is 30% below the ASHRAE standard. DOE recently adopted ASHRAE 90.1 – 2010 as the new baseline for energy consumption performance.

See the CEDR worksheet, "Building Inventory Changes."

Sandia accomplished the following in FY 2013:

- Completed construction of one institutional general plant project (IGPP), Building 704, in FY 2013. The building meets the GP and LEED Gold for New Construction pending. This will bring the total number of LEED for New Construction-certified buildings at SNL to eight.

2.2.6.2 Plans and Projected Performance

See the CEDR worksheet, "Building Inventory Changes."

Sandia will accomplish the following:

- Meet or exceed LEED Gold for New Construction and GP requirements and maximize energy, water, and transportation resource credits to achieve HPSBs. The Building 840 MR project may fall under this category, if the project budget is greater than $5 million. Sandia may also explore LEED Core and Shell or LEED Commercial Interiors certification for this building in lieu of LEED for New Construction, if more appropriate.
- Work toward meeting Guiding Principles for Existing Buildings for Building C912 and C905 renovation projects; although these projects may exceed the $5 million budget threshold, they are not complete building renovations meeting the MR definition.
- Obtain LEED Gold for New Construction for institutional general plant projects (IGPPs) Buildings 730, and 705 in FY 2014, and 2015 respectively. This will bring the total number of LEED for New Construction-certified buildings at SNL to ten. Although these buildings may not comply with all the GP requirements, NNSA has determined that they should be counted toward the 15% goal.
- Use energy, water, and transportation resource-efficient practices when locating, designing, constructing, and operating new buildings.
- Ensure that design standards and specifications support sustainable design.
- Include a preference for buildings that are certified LEED Gold and meet GP requirements, and/or ENERGY STAR, and maximize energy, water, and transportation resource performance credits in all procurement specifications and selection criteria for acquiring new leased space such as build-to-suit lease solicitations and alternatively financed statements of work.
- Ensure that planning for new SNL facilities or new leases considers sites that are pedestrian friendly, near existing employment centers, and accessible to public transit.
- Avoid development of sensitive land resources.

EO 13514 requires Federal agencies to pursue a “net zero” energy strategy where all buildings entering the planning process beginning in 2020 are designed to achieve zero net energy by 2030. There are several definitions for what net

zero energy means; however, it is clear that significant RE must be part of the equation. It is also clear that although the EO states "all buildings," there are many building types in the NNSA portfolio (i.e. HEMSF) that cannot achieve net zero.

Sandia's net zero energy strategy in the short- to mid-term is to include net zero energy requirements for appropriate new buildings as part of Sandia line item proposals. Site net zero energy status is a long term objective.

2.2.7 Regional and Local Planning

EO 13514 instructs federal agencies, including DOE, to establish regional and local planning goals. The SSPP commits DOE to the actions as shown in Table 2.5.

2.2.7.1 FY 2013 Performance Status and Plans and Projected Performance

Table 2.5 Performance Status and Plans and Projected Performance

DOE SSPP Goal/ Sandia Objective	FY 2013 Performance Status	Plans and Projected Performance
Participate in regional transportation planning, with recognition of existing community transportation infrastructure, and incorporate such efforts into site policy and guidance documents.	**SNL/NM** - Completed engagement with Site-Wide Environmental Impact Statement (SWEIS) development at Albuquerque site - Strengthened the relationship with the Sandia Science and Technology Park in undertaking mutually beneficial planning and development initiatives **SNL/CA** - Incorporated regional transportation information, as appropriate into the Supplement Analysis for the Final Site-Wide Environmental Assessment for SNL/CA, DOE/EA-1422-SA-01. - Collaborated with the City of Livermore Planning Department on projects and outreach as appropriate, including transportation and GHG initiatives. - Participated in regional planning activities such as those to support the LVOC.	**SNL/NM** - Continue to attempt to obtain a recognized seat on the local Metropolitan Planning Organization Transportation Planning Policy Board that will well-serve the interests of DOE, NNSA, and Sandia - Continue to coordinate with the Sandia Science and Technology Park on long-range site planning and development policy issues **SNL/CA** Continue to participate in regional planning activities to support the LVOC

DOE SSPP Goal/ Sandia Objective	FY 2013 Performance Status	Plans and Projected Performance
Integrate Principles for Sustainable Federal Location Decision into site selection and lease procurement procedures.	**SNL/NM and SNL/CA** - Incorporated regional growth and transportation planning considerations in long-range site planning, site selection and development policy and guidance documents in accordance with Principles for Sustainable Federal Location Decision. - Examined opportunities to incorporate Principles for Sustainable Federal Location Decision into lease procurement procedures and lease Preliminary Real Estate Plan (PREP) documentation.	**SNL/NM and SNL/CA** - Continue to incorporate regional growth and transportation planning considerations in long-range site planning, site selection and development policy and guidance documents in accordance with Principles for Sustainable Federal Location Decision. - Continue to examine opportunities to incorporate Principles for Sustainable Federal Location Decision into lease procurement procedures and lease Preliminary Real Estate Plan (PREP) documentation in consultation with Sandia Field Office (SFO).
Ensure that planning for new federal facilities or new leases includes consideration of sites that are pedestrian friendly, near existing employment centers, and accessible to public transit, and emphasize existing central cities and in rural communities, existing or planned town centers.	**SNL/NM** In developing plans for proposed projects, continued to ensure the proposed projects' locations are pedestrian friendly, contiguous to the existing campus development footprint, accessible to public transit, and emphasize development within an existing employment center	**SNL/NM** As plans are refined for proposed projects, continue to ensure the proposed projects' locations are pedestrian friendly, contiguous to the existing campus development footprint, accessible to public transit, and emphasize development within an existing employment center
Identify and analyze impacts from energy usage and alternative energy sources in all Environmental Impact Statements and Environmental Assessments for proposals for new or expanded federal facilities under the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.).	**SNL/NM and SNL/CA** Ensured that National Environment Policy Act documentation considered energy usage and alternative energy sources for proposed new or expanded federal facilities.	**SNL/NM and SNL/CA** Ensure that National Environment Policy Act documentation considers energy usage and alternative energy sources for any proposed new or expanded federal facilities.

DOE SSPP Goal/ Sandia Objective	FY 2013 Performance Status	Plans and Projected Performance
Coordinate with regional programs for federal, state, tribal, and local ecosystem, watershed, and environmental management.	**SNL/NM** Continued participation in Albuquerque Sector Development Plans; development of new plans and refinement of existing plans. **SNL/CA** Included the goals of the East Alameda County Conservation Strategy (EACCS) into efforts to backfill and close the Recharge Basin. SNL/CA prepared a draft project scope in FY 2013 and distributed for review / approval.	**SNL/NM** - Work with NNSA/SFO to become a formal member of MRCOG Transportation Policy Committee. - Continue to participate in the MRCOG Intelligent Transport System Subcommittee and other subcommittees as appropriate. - Continue to coordinate with KAFB, City of Albuquerque, and Bernalillo County regarding environmental management of the Tijeras Arroyo. **SNL/CA** Continue to include the goals of the EACCS into efforts to backfill and close the Recharge Basin. In FY 2014, SNL/CA plans to continue efforts to refine the project scope and initiate informal consultation with the US Fish and Wildlife Service.
Identify regional transportation planning, ecosystem, watershed, and environmental-management initiatives affecting sites and opportunities to work with local authorities to align energy policies and siting of RE infrastructure.	**SNL/NM** - Continued to identify opportunities in the Sandia V Sub-Area planning program for locally generated RE development. - Continued to work with SNL Organization 6000 to examine the feasibility of developing RE capabilities at or near the National Solar Thermal Test Facility (NSTTF). **SNL/CA** - Identified RE sites in the SNL/CA Master Plan. - Coordinated with the City of Livermore Planning Department, informally as an outreach effort, to discuss where SNL/CA might be able to use its EMS to support City initiatives, which would include transportation/GHG initiatives.	**SNL/NM** - Continue to examine and evaluate sites for locally generated RE development. - Explore opportunities for PPAs in concert with DOE/NNSA and KAFB.

2.2.8 Site Innovation and Government-Wide Support

Sandia leverages its photovoltaic (PV) R&D technologies to support its RE and sustainability objectives. Sandia allows high-energy users on site to take advantage of power generated by SNL R&D activities. SNL high-energy users, such as computer services, partner with R&D solar researchers to cost-share PV acquisition and installation costs in return for reduced energy charges. In FY 2013, these activities generated approximately 287 megawatt hours (MWh) of electric power from systems totaling 250 kW.

In FY 2013, Sandia Facilities and R&D organizations collaborated on the following initiatives:

- Continued the Sustainability Innovation Foundry (SIF) which will facilitate and integrate Sandia's efforts at innovative, science-based systems engineering solutions to the issues of sustainability. The SIF will focus on Sandia's sustainability issues and solutions for applications at SNL and within the broader community.
- Completed studies to evaluate PV and energy storage installations
- Continued the IX project, which, when completed in FY 2014, will provide a planning tool to evaluate life cycle energy-reduction alternatives at the building, campus, and site levels

In the future, Sandia plans to pursue the following:

- Use SNL locations as test beds for R&D technologies.
- Evaluate microgrid for mission-critical energy-security applications.
- Explore further benefits of the energy partnership with KAFB at SNL/NM.
- Explore coordinated SNL/CA and LLNL opportunities for the LVOC.
- Expand R&D concentrated solar activities at the National Solar Thermal Test Facility (NSTTF).
- Install R&D concentrated solar activities at SNL/CA.
- Explore uses of power from fuel cells, wind, geothermal, and nuclear R&D work at SNL locations.
- Investigate fuel-cell backup and storage applications, where cost effective, as demonstration projects or in support of SNL R&D activities.

2.3 Goal 3: Fleet Management

The DOE transportation and fleet-management goals are as follows:

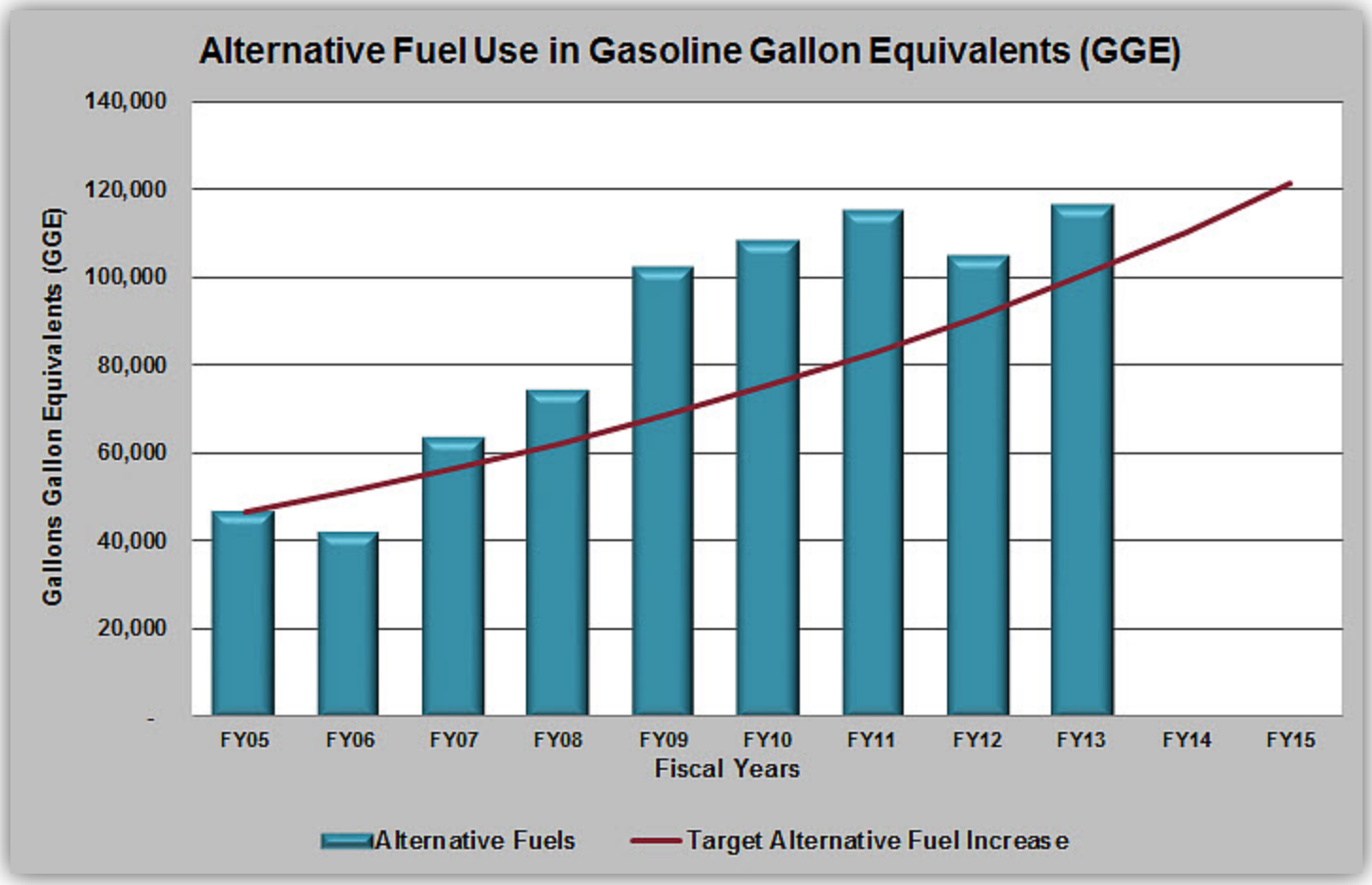
- Increase alternative fuel consumption by 10% annually by FY 2015 from a FY 2005 baseline
- Decrease fleet petroleum consumption by 2% annually by FY 2015 from a FY 2005 baseline
- Meet the EPAct 1992 alternative fuel vehicle (AFV)-acquisition requirement, whereby 75% of light-duty vehicles must be AFVs by FY 2015
- Reduce fleet inventory of non-mission critical vehicles by 35% by FY 2013 relative to a FY 2005 baseline

Sandia has accepted DOE's goals as its objectives.

2.3.1 FY 2013 Performance Status

Sandia achieved or is on track to achieve the transportation and fleet-management objectives:

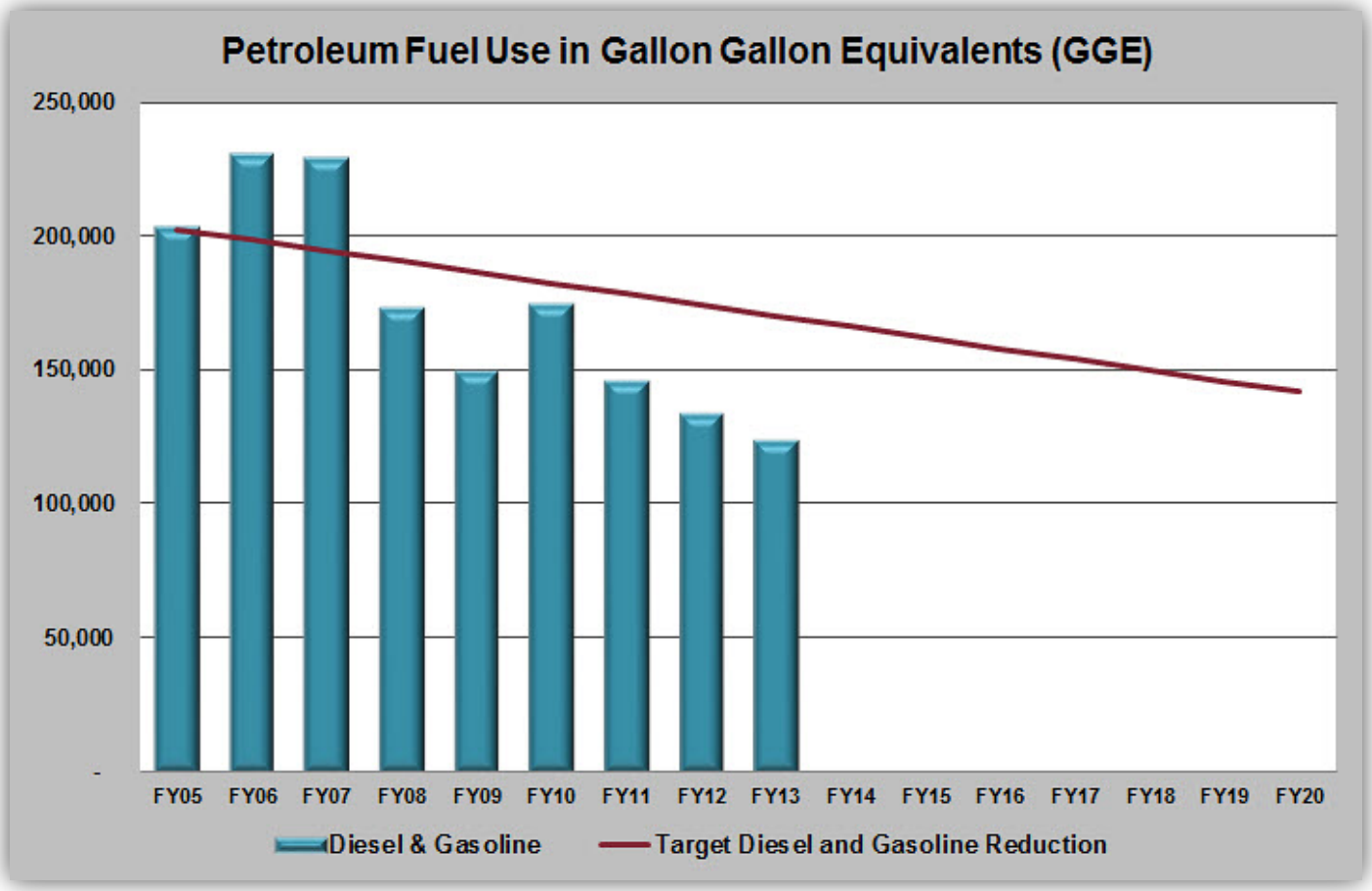
- Alternative fuel consumption increase: Sandia has increased alternative fuel consumption by 148.9% from a FY 2005 baseline, and 11.0% in FY 2013 from FY 2012 (see Figure 2.10).



Notes:
All locations.
Alternative fuels include B-20 (non-diesel portion), E-85, compressed natural gas (CNG), and electricity; electrical use includes only SNL/NM data.

Figure 2.10 SNL Alternative Fuel Use

- Petroleum fuel (diesel and gasoline) reduction: Sandia has reduced diesel and gasoline use by 39.3% from a FY 2005 baseline by using B-20, ethanol-based fuel (E-85), and compressed natural gas (CNG), as well as electric vehicles. (See Figure 2.11.)



Notes:
All locations.
Petroleum fuels include gasoline, diesel, and diesel portion of B-20 (bio-diesel).

Figure 2.11 SNL Petroleum Fuel Use in Gallons

- Vehicle acquisition:
  - In FY 2013, 100% of the retired light-duty vehicles were replaced by AFVs. Since FY 2005, Sandia has replaced its retired, light-duty fleet vehicles at an average rate of over 96% (See Table 2.6).
  - Acquired AFVs had access to and were required to use alternative fuel. High-efficiency vehicles were purchased or leased when cost competitive and available on the U.S. General Services Administration (GSA) schedule.
- SNL Fleet Services was recognized within the top 100 Best Fleets in North America in FY 2013 for the second straight year.
- Sandia is on track and supporting NNSA's fleet inventory reduction of non-mission-critical vehicles by 35% by FY 2013 relative to a FY 2005 baseline.

Fueling stations for E-85, B-20, and CNG exist at SNL/NM. Additionally, E-85 fueling stations are available for use at SNL/CA. AFVs are required to use these fueling stations. Diesel vehicles are required to use B-20 at SNL/NM.

2.3.2 Planned and Projected Performance

See the CEDR worksheet, "Energy and Water."

- Vehicle acquisition
  - Sandia will continue to replace retired fleet vehicles.
  - High-efficiency vehicles will be purchased or leased when cost competitive and available on the U.S. GSA schedule.
- Diesel and gasoline reduction: Sandia will continue to reduce diesel and gasoline consumption by purchasing AFVs (E-85 and B-20), evaluating fleet to reduce vehicle miles, and replacing gas-powered carts with electric carts. (See Table 2.6.)

Table 2.6 SNL Retired Fleet Replacement with AFVs

Year	Replacement with AFVs
FY 2005	98.2%
FY 2006	98.5%
FY 2007	95.0%
FY 2008	96.0%
FY 2009	98.0%
FY 2010	88.0%
FY 2011	100.0%
FY 2012	100.0%
FY 2013	100.0%

- The DOE SSPP sets petroleum fuel (diesel and gasoline)reduction goals; however, property regulations, codified in diesel- and gasoline-reduction goals, and the high cost of AFVs pose a challenge. Although hybrid vehicles (gas-electric configurations) are considered AFVs and impact the 75% AFV-replacement goal for light-duty vehicles, hybrid vehicles do not increase alternative fuel consumption.

- Increase overall fleet fuel economy.
  - Acquire higher-fuel-economy vehicles such as smaller-sized vehicles, hybrid-electric vehicles, and other advanced-technology vehicles.
  - Optimize use of alternative fuel, hybrid electric vehicles, and expand and maintain an alternative-fuel infrastructure.
- Employ "right-size" fleet.
  - Use the most fuel-efficient vehicle for the required task.
  - Provide the appropriate type and number of vehicles relative to need.
- Employ efficiency strategies that reduce energy.
  - Use low-rolling-resistance tires.
  - Use synthetic oil, which allows for extended replacement frequencies.

2.4 Goal 4: Water Use Efficiency and Management

This section is divided into descriptions of water efficiency and storm water management.

2.4.1 Water Efficiency

SNL/NM is located in Albuquerque, New Mexico, which receives an average of nine inches of annual rainfall. The SNL/NM water-distribution system is interconnected with the KAFB water system. Water is supplied from the Albuquerque aquifer. At SNL/NM, Sandia meters 100% of its usage through advanced location meters. These meters register all potable water usage including industrial, landscaping, and agricultural (ILA). The location metering system was in place prior to the FY 2007 baseline calculation. Sandia does not meter water usage at each individual building.

SNL/CA water is supplied by LLNL and is monitored by a single meter. All potable water used at the location is monitored by this meter.

See the SNL *FY 2013 Energy and Water Metering Plan* and Table 1-5e of the CEDR worksheet, "Funds, Metering, Training," for building-level water metering information.

Because ILA water use is potable and already metered by location, the calculation of a new baseline for ILA water usage is not needed for SNL.

DOE SSPP stipulates that DOE will reduce potable water intensity by no less than 26% by FY 2020, relative to a FY 2007 baseline. In addition, the SSPP requires a 20% consumption reduction in ILA water by FY 2020 from a FY 2010 baseline. These goals are consistent with the EO 13514 requirements for federal agencies.

The SSPP and EISA section 432 require that sites conduct water evaluations and identify measures to save water. The SSPP specifically commits DOE to developing site water-management plans and conducting water audits with a particular focus on leaks and once-through cooling. Sandia has accepted DOE's goals as its objectives.

FY 2013 Performance Status

Sandia has exceeded the goals set forth by the EO. Currently, Sandia has reduced water intensity by 30.44% based on the FY 2007 baseline. See Figures 2.12 and 2.13.

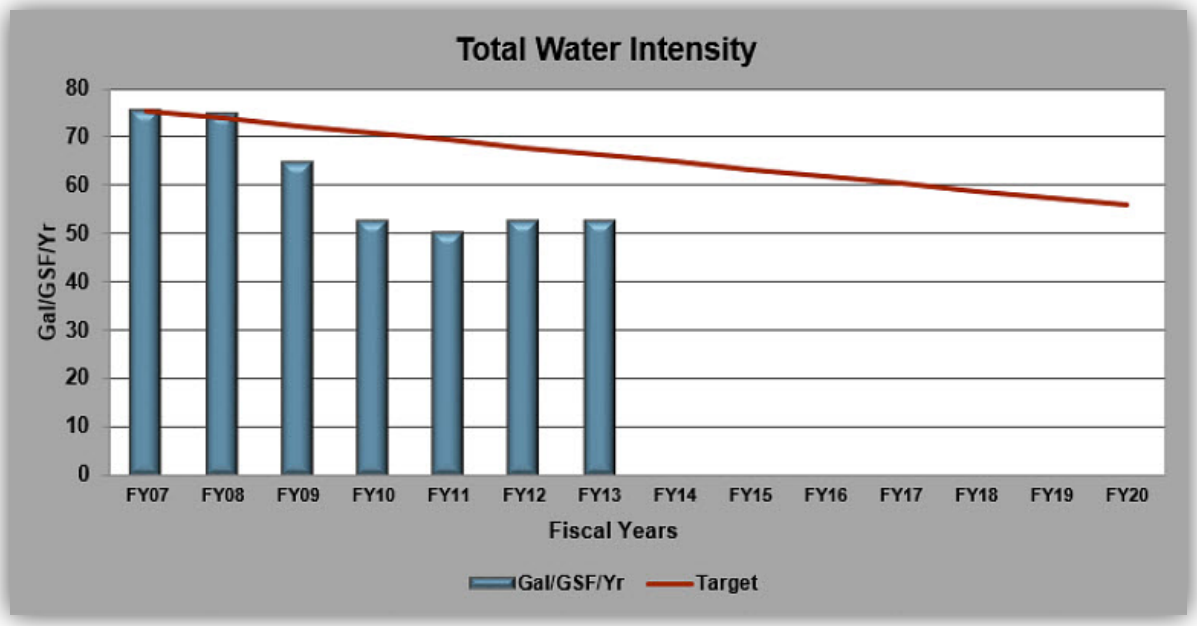


Figure 2.12 SNL Total Water Intensity in Gal/GSF/Yr

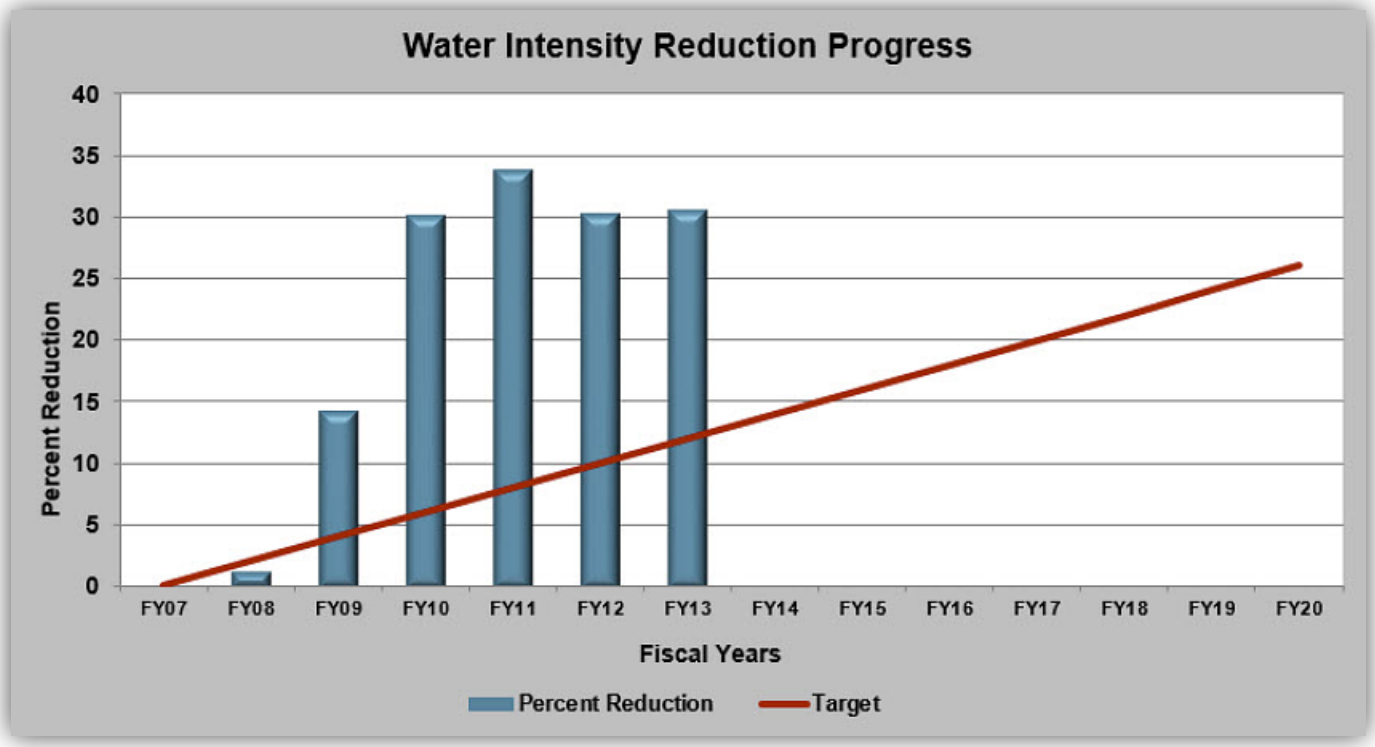


Figure 2.13 SNL Total Water Intensity Reduction Progress

Water is used in various ways across Sandia National Laboratories. In SNL/NM, chilled water is used for process and comfort cooling; potable water is used for irrigation, environmental restoration, domestic, construction, and laboratory use. See Figure 2.14. These uses are not metered individually. In FY 2013, cooling tower makeup water accounted for approximately 23% of Sandia's water.

The Microsystems and Engineering Sciences Application Complex (MESA) complex deionized (DI) plant is metered and used approximately 26% of Sandia's water. It was not the only source of DI water on site; however, the other laboratory DI systems are not metered separately from the building use so a reliable approximation cannot be made.

Based upon LEED criteria, building occupancy, and water audit data for fixture flow, approximately 9% of SNL/NM total water was used for domestic purposes.

There are currently 47 water meters monitoring landscape use. This accounts for about 90% of the total site landscaping at SNL/NM. Landscape water metering indicates roughly 12% of site water was used for irrigation. The environmental restoration program used roughly 1% of the total for supplemental watering of vegetation covers.

The remaining category, "Unknown," included the following:

- CW and process water used for customer operated and maintained process equipment
- Facilities equipment such as evaporative coolers and other water using equipment that does not have water treatment or metering installed
- Hydrant and fire sprinkler flushing preventive maintenance activities
- Construction and dust suppression activities
- Water main leaks

This information was unavailable for SNL/CA and other sites.

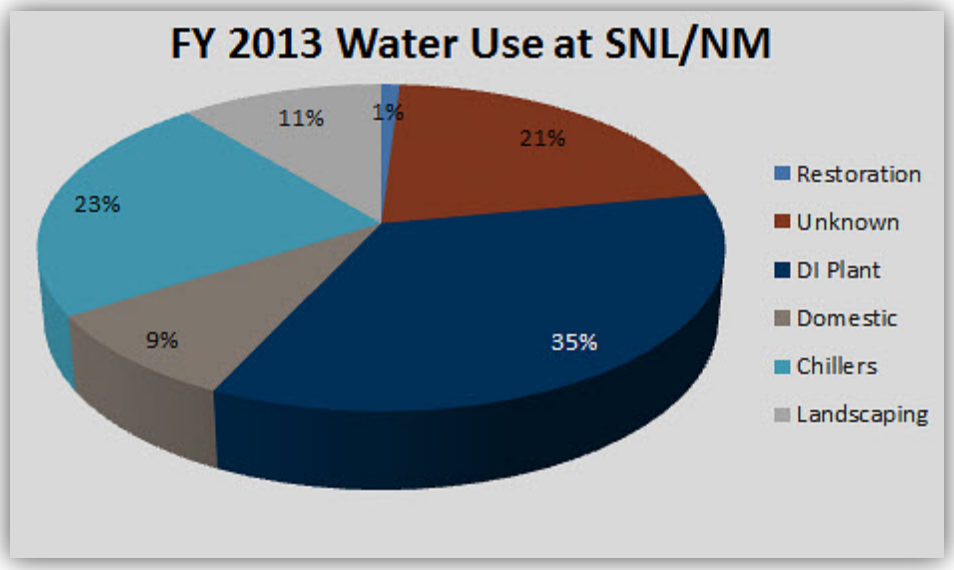


Figure 2.14 SNL/NM FY 2013 Water Use

Sandia continuously strives to conserve water. The maintenance and operations of water conserving systems, like the DI recycling system and the Central Irrigation Control System, is an ongoing and important part of Sandia's water conservation effort. The increase in water usage intensity since FY 2011 can be attributed to the ongoing drought in the area and an increase in construction. A major water line replacement, several leaks (repaired in late FY 2013), and the construction of Building 704 contributed to the increase in FY 2013. See Table 1-5e of the CEDR worksheet, "Funds, Metering, Training," for water meter information.

Planned and Projected Performance

See the CEDR worksheet, "Conservation and RE Measures."

Sandia will continue to explore water-conservation opportunities. Variables associated with cooling at SNL/NM include weather and significant changes to water chemistry caused by increased aquifer drawdown. At SNL/NM, Sandia anticipates a rise in cooling loads due to data centers and other process cooling demands. These issues will create challenges to maintaining the current reduction numbers until FY 2020, but Sandia plans to continue implementing conservation projects wherever feasible. Some of these projects include the following:

- Retrofit restrooms with high-efficiency fixtures.
- Install new building-level water meters as appropriate.
- Consider water savings when planning new data-center activities.

Construction is planned and will increase the amount of reclaim available for reuse in the cooling towers and air scrubbers. The increase in system capacity will allow for more buildings to be connected to the reclaim system and further offset the need for potable water use in the cooling towers. Sandia continues to investigate ways to improve the performance of these systems to increase efficiencies and, therefore, water savings.

Sandia conducts building water audits as part of condition assessment. Findings from these audits range from bathroom retrofits to elimination of once-through cooling loops. Inefficient and outdated fixtures will be replaced as funding becomes available.

2.4.2 Storm Water Management

The EPA provides regulatory oversight of the SNL/NM Storm Water Program under the Clean Water Act. SNL/NM is covered by the National Pollutant Discharge Elimination System (NPDES).

- Multi-Sector General Permit for Storm Water Discharges Associated with Industrial Activities
- Construction General Permit for Discharges Associated with Construction Activities

Sandia has developed storm water pollution prevention plans to control discharges to meet applicable water-quality standards and to eliminate, minimize, or reduce the amount of pollution in storm water discharged. Consideration is given to traditional storm water management practices and options for controlling storm water runoff including diversion, infiltration, and reuse.

Sandia has adopted facility-design standards to meet the requirements of EISA section 438 pertaining to storm water. The act is intended to ensure that any development or redevelopment project involving a federal facility with a footprint that exceeds 5,000 GSF uses site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property concerning temperature, rate, volume, and duration of flow. Sandia provides guidance and design standards in the *FMOC Design Standards Manual* for SNL/NM and in standardized construction specifications for SNL/CA.

The State Water Resources Control Board provides regulatory oversight of the SNL/CA Storm Water Program. SNL/CA is covered by the following NPDES permits:

- Waste Discharge Requirements for Discharges of Storm Water Associated With Industrial Activities Excluding Construction Activities
- Waste Discharge Requirements for Discharges of Storm Water Runoff Associated With Construction and Land Disturbance Activities

2.4.2.1 FY 2013 Performance Status

See the CEDR worksheet, "Building Inventory Changes."

Sandia accomplished the following:

- Revised the relevant portions of the *FMOC Design Standards Manual* for SNL/NM and the standard construction specifications for SNL/CA to provide criteria, guidance, and clarification to meet the storm-water management requirements of EISA section 438 and the EO
- Used the revised *FMOC Design Standards Manual* to develop appropriate plans for twelve existing buildings to meet the requirements of the *Storm Water Management Guiding Principle for Existing Buildings*
- Improved process to track preventive maintenance and inspection schedules using the Storm Drain and Preventive Maintenance database

2.4.2.2 Plans and Projected Performance

Sandia will do the following:

- Use the revised *FMOC Design Standards Manual* and the *FEMO Civil Design Standards Manual* to develop appropriate plans for 15% of existing buildings to meet the requirements of the *Storm Water Management Guiding Principle for Existing Buildings.*
- Ensure new construction meets the requirements in the revised *FMOC Design Standards Manual* and the *FEMO Civil Design Standards Manual* with regard to storm water management.

2.5 Goal 5: Pollution Prevention (P2) and Waste Reduction

The SSPP commits DOE to the following P2 goals:

- Divert at least 50% of nonhazardous solid waste excluding construction and demolition debris by FY 2015 (SNL/CA shall divert at least 80%).
- Divert at least 50% of construction and demolition materials by FY 2015 (SNL/CA shall divert at least 80%).

The SNL/CA additional goals were established to ensure SNL/CA prepares for compliance with Alameda County Ordinance 2012-1, which stipulates that recyclables and compostables make up less than 10 percent of material in landfills by 2020. These goals also support those stipulated in EO 13514, California Assembly Bill AB341, and the *Resource Conservation and Recovery Act,* which requires minimizing hazardous waste generation, and the Pollution Prevention Act, which declared it to be the national policy of the United States that

- Pollution should be prevented or reduced at the source whenever feasible.
- Pollution that cannot be prevented should be recycled in an environmentally safe manner, whenever feasible.
- Pollution that cannot be prevented or recycled should be treated in an environmentally safe manner whenever feasible.
- Disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner.

Sandia is committed to meeting the P2 goals through the following waste minimization and resource-conservation activities:

- "Buying green;" for example, reusing excess materials where possible to avoid purchases, buying only what is needed, buying recycled content products to close the loop, and reinvesting recycling revenues in infrastructure, contracts, and equipment that furthers waste reuse, recycling, or organics composting
- Solid-waste reduction through reuse and continuing identification and diversion of recyclable materials that are currently being disposed
- Better involvement with the FMOC and Procurement on construction and demolition project reuse and recycling
- Efforts to replace or reduce toxic chemicals in laboratory operations

In California, the Alameda County Ordinance mandates food and other compostables be recycled beginning July 1, 2014 and requires recyclables and compostables make up less than 10% of material landfilled by 2020.

2.5.1 FY 2013 Performance Status

See SNL data annually reported in the CEDR (formerly PPTRS). SNL/NM and SNL/CA data are reported separately. Because the SSP represents all SNL locations, numbers presented here are totals.

- SNL/CA shall divert at least 80% and SNL/NM shall divert at least 50% of nonhazardous solid waste excluding construction and demolition debris by FY 2015.
  - SNL/CA solid waste was static in FY 2013, and SNL/NM solid waste increased by 33mt. With no other known changes and an initial decrease in the first half of the year, this increase is being attributed to an incredibly wet monsoon season and mostly open-top solid waste dumpsters. The plan to upgrade or modify solid waste dumpsters to be closed-top should be complete before the FY 2014 wet monsoon season. Despite the weight increase, diversion at SNL/NM only went down two percent from the previous year.
  - SNL/NM in FY 2013 diverted 65% of nonhazardous solid waste excluding construction and demolition debris.

- SNL/CA in FY 2013 diverted 79.3% of nonhazardous solid waste excluding construction and demolition debris.
- SNL/NM food waste composting expanded in FY 2013 from two cafeteria locations to include a single pilot site between two office trailers. Composting expanded to six outdoor catered events as part of advertised "zero waste events."

- SNL/CA shall divert at least 80% and SNL/NM shall divert at least 50% of construction and demolition (C&D) waste by FY 2015.
  - The percentage of C&D waste diversion is highly variable due to the timing of concrete and asphalt recycling events every other year. The total diversion rate for FY 2012 and FY 2013 combined was 84%.
  - SNL Facilities organizations use a construction waste management specification requiring adherence to the waste management hierarchy of reduce, reuse, and recycle.
  - At SNL/NM, Sandia began composting plywood in FY 2013, diverting 41,940 pounds in just three quarters. From the construction of a new building, an additional 47,920 pounds of gypsum were composted.
  - At SNL/CA in FY 2013, Sandia diverted 77.4% of construction and demolition waste.
- Reduce printing paper use.
  - Just-in-Time (JIT) paper contract specifies a minimum 30% postconsumer recycled content, but 100% recycled content copy paper is also readily available from the vendor for a premium. Evidence shows some departments are willing to pay.
  - JIT imaging-equipment contracts require duplex-capable desktop printing equipment.
  - Multifunction copiers are available on the internal network for use as central printing, scanning, and faxing devices, and their network drivers are installed defaulted to grayscale duplex printing.
  - Instructions for setting network copiers to grayscale duplex printing are located on the internal Copier Fleet web site.
- Reduce and minimize the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of.
  - JIT chemical purchases webpage has been modified to emphasize the waste management hierarchy of reduce, reuse, recycle and to encourage the purchase of quantities actually needed and reduce the tendency to purchase in bulk.
  - Sandia reviewed internal mission and mission support processes to minimize chemical use. Sandia routinely recycles spent lead-based batteries but rarely recycles precious metals that would otherwise be disposed of as hazardous waste.
  - Sandia has a chemical exchange program (CEP) in place, and the JIT Chemical Purchases webpage also steers workforce to the CEP as an alternative to new chemical purchases.
- Implement integrated pest management and other appropriate landscape-management practices.
  - Implemented SNL/NM *Integrated Pest Management Plan*
  - Updated service contracts to reflect the plan

Figure 2.15 provides an illustration of SNL waste and diversion metrics.

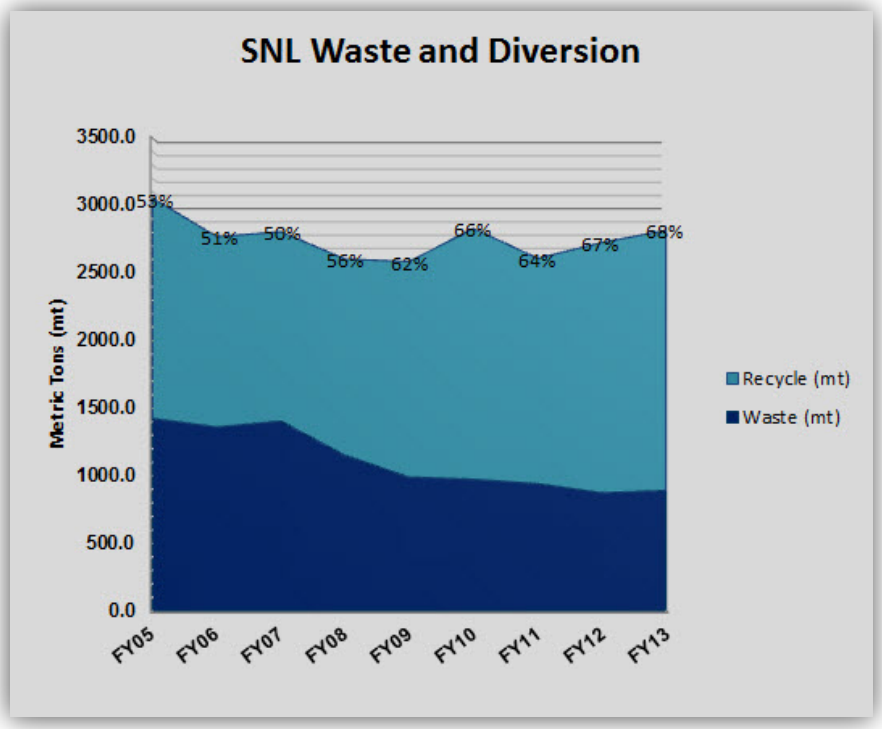


Figure 2.15 SNL Waste and Diversion

2.5.2 Planned and Projected Performance

- Identify the largest remaining material streams to target for reduction or diversion.
- Identify reuse streams for construction and demolition waste materials.
- Reduce and minimize the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of, and increase CEP participation.
- In 2014, Sandia Environmental Lifecycle Management (ELM) will implement a chemical acquisition process enhancement that will better utilize onsite inventory and tighten acquisition requirements.
- Revise the corporate procedure on technical work document preparation to address waste minimization and associated required documentation intended to improve compliance with the waste management hierarchy required in the corporate procedure on hazardous waste management.
- Implement integrated pest management and other appropriate landscape-management practices.
  - Update the SNL/NM *Gardener's Maintenance Plan* to meet GP requirements.
  - Revise the *Integrated Pest Management Plan* to include vegetative pests and SNL/CA requirements.

2.6 Goal 6: Sustainable Acquisition

The SSPP commits DOE to the following sustainable acquisition (SA) goals:

- Ensure that 95% of new contract actions, including task and delivery orders under new contracts and existing contracts, require the supply or use of products and services that are energy efficient (ENERGY STAR or Federal Energy Management Program (FEMP)-designated), water efficient, biobased, recycled content, or environmentally preferable (including Electronic Product Environmental Assessment Tool [EPEAT]-registered products), non-ozone depleting containing recycled content, or are nontoxic or less-toxic alternatives.

- Update DOE SA procurement plans, policies, and programs to ensure that all federally mandated, designated products and services are included in all relevant acquisitions.

The underlying purchasing requirements are also supported by several federal statutes:

- EPAct 2005, section 104, which requires federal agencies to incorporate energy-efficiency criteria consistent with ENERGY STAR and FEMP-designated products for all procurements involving energy-consuming products and services
- Resource Conservation and Recovery Act, section 6002, which requires federal agencies to purchase EPA-designated recycled-content products
- Farm Security and Rural Investment Act of 2002, section 9002, which requires the purchase of U.S. Department of Agriculture (USDA)-designated biobased products

Sandia has accepted DOE's goals as its objectives.

2.6.1 FY 2013 Performance Status

Select SNL purchasing data are annually reported in the CEDR (formerly in PPTRS). SNL/NM and SNL/CA data are reported separately. SNL purchasing agreements adhere to policies as follows:

- JIT Custodial Supplies contract was revised in FY 2013 to add and update requirements for recycled content, biobased, and other environmentally preferable products, where applicable.
- Imaging-equipment agreements were incorporated into existing information technology (IT) contracts (computers and monitors) and, as of February 2013, specifically stated that all printers available for purchase must meet EPEAT Bronze level (includes ENERGY STAR and duplex-printing requirements).

Improvements in purchasing include the following:

- Server virtualization is now the standard practice and results in significant reductions in server purchases, operations, and disposal, and associate power consumption and electronic equipment footprints.
- Applicable computer and monitor equipment purchases were 98% EPEAT compliant and 97% EPEAT Gold-compliant, including desktop and laptop work stations.
- Applicable imaging equipment purchases, i.e., printers and multifunction devices (print/copy/scan), were 93% EPEAT compliant through the remainder of FY 2013, with remainder of non-compliant being at least ENERGY STAR compliant. Although Bronze level requirement was recommended by EPA at the outset, 79% of applicable imaging equipment purchases were EPEAT Silver.

2.6.2 Plans and Projected Performance

Sandia will update corporate policies, processes, and procedures to reflect the incorporation of Department of Energy Acquisition Regulations (DEAR) clause 970.5223-7 on SA requirements into the SNL Management and Operations Prime Contract.

- Implement environmental criteria and scoring during contract request for quotation and proposal processes.
- Improve compliance with EPEAT requirements for purchases of thin clients, imaging equipment, and televisions (large screen LCD)
- Meet new FEMP requirements for server, purchases.
- Work toward achieving the 95% goal for recycled content and other sustainable products and 60% goal for biobased products:
  - Add or update SA language to section I new contracts and, when possible, existing contracts.

- Continue to update construction specifications, design manuals, and other pertinent Facilities documentation.
- Improve reporting of SA Priority Products purchases in construction contracts.
- Develop an auditable means of tracking and confirming the number of contract actions placed.

2.7 Goal 7: Electronic Stewardship and Data Centers

SSPP electronic stewardship and data center goals address energy management and optimization for IT systems including equipment found in offices, laboratories, production environments, computer rooms, and data centers. Activities supporting these goals are intended to reduce DOE's GHG emissions, support environmental management goals, and achieve the sustainability objectives of the Federal Data Center Consolidation Initiative (FDCCI).

The SSPP commits DOE to the following:

- Meter all data centers to measure a monthly PUE: 100% by FY 2015.
- Achieve a maximum annual weighted average PUE of 1.4 by FY 2015.
- Provide 100% of eligible personal computers (PCs), laptops, and monitors with power management actively implemented and in use by FY 2012.

Other electronic stewardship and data center sustainability measures identified in the FY 2013 SSPP include the following:

- Ensure acquisition of EPEAT-registered (95%), ENERGY STAR–qualified (100%), and FEMP–designated (95%) electronic office products when procuring electronics in eligible product categories.
- Ensure use of power management, duplex printing, and other energy-efficient or environmentally preferred options and features on all eligible, agency electronic products.
- Use environmentally sound practices for disposition of all excess or surplus electronic products.
- Increase the quantity of electronic assets disposed of through sound disposition practices.
- Require IT planning/life-cycle management to replace and/or waive equipment that does not meet compliance requirements.
- Update DOE policy to ensure implementation of BMPs for energy-efficient management of servers and federal data centers including how DOE will meet data center reduction goals of the FDCCI.
- Install dedicated meters for data centers.

Sandia has accepted DOE's goals as its objectives.

2.7.1 FY 2013 Performance Status

See the CEDR worksheet, "Data Centers." Data center buildings and rooms identified in the CEDR include only those of significant size owned and operated by SNL's Computing and Network Services organization. Although the potential for other enduring data centers and server rooms owned by other Sandia organizations exists, they have not been identified at this time.

Sandia is at high risk for not meeting the data center objectives for metering and PUE. These objectives were new in FY 2011. The definition of data center continues to change, which affects the baseline. Started in FY 2013, in FY 2014 Sandia, working with LANL and LLNL, plans to complete a white paper which will propose a realistic definition of data center and a consistent methodology for calculating PUE. Then, Sandia will determine how many enduring data centers it has to establish a baseline and determine a path forward for achieving these objectives.

The commitments concerning SA of electronic products are addressed in section 2.6., *Sustainable Acquisition*. The commitments concerning recycling and disposal of electronic products are addressed in section 2.5., *Pollution*

Prevention. See both the SNL/NM and SNL/CA CEDR worksheets for data on electronics reuse, recycling, and EPEAT purchase compliance.

In FY 2013, Sandia implemented the following electronic stewardship and data center improvements described in sections 2.7.1.1 through 2.7.1.3.

2.7.1.1 Personal Computer Power Management

Sandia addresses PC and monitor power management through implementation of NightWatchman, which is a desktop power-management software system. In January 2011, NightWatchman implementation became Sandia corporate policy. NightWatchman allows Sandia's IT services to manage the power consumption of Windows 7® desktops by sending them into automatic standby (or "sleep") during nonstandard work hours. To accommodate nonstandard work hours, as well as telecommuting and other offsite computing requirements, NightWatchman has a Web WakeUp feature, which allows a computer to be remotely "woken up" from anywhere and at any time. NightWatchman operates on all Sandia- owned Windows 7 desktop computers, except those with desktop management software exemptions and mission critical functions such as site security and uninterruptable laboratory experiments. Nightwatchman is not installed on laptops.

In FY 2013, approximately 10,800 desktop computers were controlled by NightWatchman power management.

2.7.1.2 Data Center Power Metering and Environmental Monitoring

At SNL/NM enduring corporate data center locations such as the Building 880 Annex (880A) and Building 725 power usage is tracked at the transformer level or switchboard level that serves the transformer. Sandia is improving corporate data center metering capabilities, as well as automating metered data acquisition and monitoring to enable autocalculation of efficiency metrics such as PUEs.In FY 2013, 100% of the data center rooms in Building 880A were metered and monitored at the electrical infrastructure level. Sandia has also implemented rack-level metering and monitoring for nearly 45% of all racks in Building 880A.

In FY 2013, Sandia completed metering on the main switchboards at Building 725. Sandia has the ability to measure power usage in a globalized sense.

In FY 2013 SNL completed deployment of environmental monitoring in Buildings 880A, 725, and 899.

2.7.1.3 Energy Consumption Reduction

This subsection describes the electronic stewardship and data center energy-use reduction measures Sandia implemented in FY 2013.

Gigabit Passive Optical Network (GPON) Technology

In FY 2013, the gigabit passive optical network (GPON) project to replace powered copper network components with non-powered fiber components completed 100% of the total migration effort and 47% decommissioning of power consuming network switches, saving an estimated 1,056,079 kWh annually.

In FY 2013, Sandia focused on pulling and decommissioning the larger switches as part of a negotiated equipment trade-in process which generated funds to offset GPON deployment costs. The FY 2013 decommissioning of these larger switches increased the power and cooling savings from the GPON project.

Also in FY 2013, approximately 10 tons of equipment was diverted from SNL's landfill/waste streams as a result of the GPON project, another example of waste minimization employed at SNL/NM.

Cold/Hot Aisle Containment

To reduce the load on data center computer room air conditioning (CRAC) unit operations, Sandia implemented "hot" and "cold" aisle containment measures in high-performance computing (HPC) clusters in Buildings 880A and 725. These containment systems enable the CRAC units to be operated at approximately 80% of total capacity, thus reducing consumption of fan and pump energy and water. To increase the effectiveness of hot/cold aisle containments and rack configurations, Sandia constructed return air ducting (plenums) over the Building 880A CRAC units to prevent the units from short cycling and hunting. In FY 2013 Sandia constructed return air plenums over 20% of the 725 CRAC units to address short cycling and hunting in the areas where containment systems were installed for high performance computer clusters.

Data Center Consolidation (DCC) Project

In FY 2013, Sandia initiated the Data Center Consolidation project led by the corporate IT organization. Preliminary analysis indicated that there are over 2,600 non-corporate servers in at least 300 individual rooms spread over more than 100 buildings. This presents significant opportunities to eliminate, virtualize, and collocate servers from line owned server rooms to corporate data centers. Among other benefits, consolidation will save energy. The project builds on previously successful SC/VP efforts and corporate storage initiatives.

In FY 2013, opportunities for consolidation, particularly on the Sandia Restricted Network (SRN) and Sandia Open Network (SON), were identified using the NetWork Information System (NWIS). Several server rooms in Buildings 892, 823, and 887 were decommissioned. Sandia prepared a plan for consolidation of data centers and server rooms at the California site.

In FY 2013 as part of the DCC project SNL renovated the network and telecommunications server room in 880. This renovation included updating the raised floor so that racks/equipment housed in this room could be arranged into a hot/cold aisle configuration. During renovation, approximately 2.2 tons of old cabling and ductwork was removed from under the floor and the ceiling plenum, which will significantly improve air flow management in this space.

Sandia developed a procedure to evaluate new server purchase requests.

Server Consolidation/Virtualization Project (SC/VP)

The server consolidation/virtualization project is ongoing since FY 2010 and includes the following measures:

- Information Technology Infrastructure Library and process improvement
- Hosted virtual desktops
- Private/public cloud-computing strategies
- Server virtualization
- Server utilization monitoring and power management
- Virtualization of e-mail infrastructure
- Data storage consolidation

Datacenter Consolidation/Virtualization Project (DCC/VP) seamlessly transforms how the infrastructure systems and services deliver large-scale applications to SNL. Physical servers are still in use at SNL, but Sandia policy has been "virtual is first."

In FY 2013, the DCC project began consolidating dispersed line-owned data centers and server rooms into the Building 880A corporate data center. The DCC project offers a wide range of services, from data storage to server collocation to full-on server virtualization, all of which are available at an extremely reasonable total cost of ownership. Typical physical servers achieve 10% to 15% total capacity utilization, yet require 100% power and cooling. Organizations typically run only one application per server. Server virtualization results in the retirement and nonreplacement of

obsolete servers which frees up floor space, power, and cooling capacity for more virtualization capacity in the future. The infrastructure consists of 61 host servers across multiple environments hosting over 1,200 virtual servers. In FY 2013, Sandia deployed 286 virtual servers, of which 30 resulted in physical servers being removed from the environment. In addition, customers avoided $1,716,000 in cost because they did not need to purchase physical hardware. Review of Availability Requirements for Information Technology Resources involved evaluation of system-availability needs relative to current operating requirements. Adjusting operating requirements to meet availability needs can result in reduced power consumption.

Equipment Rack Spot Cooling

In FY 2013, Sandia continued to deploy the SmartAire® fan tile solution at several rack locations to test the effectiveness of providing supplemental air flow during increased computer load activity. Sandia also implemented use of SmartAire fan tile solution in hot aisle containments in Building 880 to provide minimal comfort cooling for staff worked on rack equipment. These fan tiles were connected to timers to ensure they were not left in the open state when work in the hot aisle was completed, maintaining the energy efficiency gains of the hot aisle containment.

Sandia continued to test and evaluate other new technologies that could provide directional or spot cooling and reduce the demand on CRAC units and reduce energy consumption. Sandia also continued to explore rack-level warm water liquid cooling as another method of reducing CW consumption and more efficiently managing air flow.

Operating Temperature Increases

Sandia continued to increase CRAC unit temperature set points to decrease cooling-load requirements at data center and server room locations. In FY 2013 equipment purchases included criteria for allowable operating temperatures between 65° F and 75° F to increase operational flexibility for CRAC unit operating set points to further decrease cooling-load requirements. The combination of increased CRAC unit temperature set points and deployment of plate frame heat exchangers during has allowed the Buildings 880 and 725 data centers to increase ambient room operating temperatures to ~55-60^0 F (Building 880) and ~50^0 F (Building 725).

"Free Cooling"

In FY 2013, a cold-plate heat exchanger was installed, tested, and implemented in the Building 726 chiller plant, which is dedicated to supporting the Building 725 data center. This technology takes advantage of seasonal, cool, outside air to essentially provide a "free" cooling resource for generating CW. These actions allowed the data center to respond to increased computer loads concurrent with elevated ambient room temperatures by more strategically locating heat loads and more efficiently managing air flow to decrease the demand for the CRAC units to produce cool air.

Sandia continued to explore new technologies and methods for air flow management and elevated ambient operating temperatures in FY 2013.

CRAC Unit Replacement

In FY 2013, Sandia replaced two, 30-year-old CRAC units having no automated controls and no variable-speed drives with new units having capabilities to be centrally controlled and with VFDs. These units are located in portions of Building 880A. The new units were tied into the BAS and will be monitored and controlled. The units are equipped with VFDs to provide air delivery in response to increased or decreased IT demand (load). Buildings 899 and 725 were also tied into the BAS for the capability to monitor and control air flow delivery. Ducted return air plenums were installed for the Building 725 CRAC units.

Air Flow Management

In FY 2013, the backbone network equipment location in Building 880A was calculated to have a PUE of 1.87. Efforts to improve PUE included:

- Consolidating rack equipment to reduce the electronics footprint
- Relocating under-floor cabling to overhead cable trays, to improve the efficiency of air flow and distribution in the under floor plenum
- Refining the new (installed in FY 2012) CRAC unit control set points to increase operating temperature and decrease cooling load demand

Efficient Uninterruptible Power Supplies (UPS)

In FY 2013, Sandia installed a 300kW unit to replace a 325kW unit in the UPS system in portions of Building 880A. Future plans include reduced reliance on larger UPS systems by using smaller units for critical applications only.

Data Center Component Recycle and Reuse

In FY 2013, Sandia utilized the planned upgrade of the Building 725 Red Storm system to establish a repeatable process for higher-value reuse and recycle of retired HPC and other data center components. Sandia continued to seek opportunities to recycle and reuse components including deployment of recycle containers inside data center staging areas for metals.

Standardization of Information Technology Equipment

In FY 2013, Sandia deployed 47 standardized racks as part of data center consolidation. These standardized racks are self-contained units for air-cooled racks requiring no additional cool air delivery.

Computer Equipment Retirement

In FY 2013, the Red Storm HPC cluster was decommissioned and replaced by a Tri-Laboratory Linux Capacity Cluster (TLCC). Red Storm consumed 700-800 kW per year while the TLCC cluster operates at 50 kW and delivers two times the computer power of Red Storm in 1/3 the footprint. In addition to direct power savings, the lower heat load decreases the demand for cooling. The decommissioning of Red Storm also provided the opportunity to increase the ambient operating temperature of the data center space.

2.7.2 Planned and Projected Performance

Several measures implemented in FY 2013, described in section 2.7.1, *FY 2013 Performance Status*, to improve electronic stewardship and data center performance, are ongoing and will continue through FY 2014, in addition to the new initiatives described in the following sections.

2.7.2.1 Personal Computer Power Management

NightWatchman will continue to be deployed on existing appropriate personal computers.

2.7.2.2 Data Center Power Metering and Environmental Monitoring

At SNL/NM data center locations, Sandia continues to improve data center metering capabilities, as well as automating metered data acquisition and monitoring to enable autocalculation of efficiency metrics such as PUEs. Sandia will implement rack-level metering and monitoring for network and enterprise racks in Building 880A by FY2015. In FY 2014, Sandia plans to configure meters for monitoring capability through the BAS in Buildings 725 and 899. Sandia anticipates having the ability to perform automated calculations of PUEs for data centers located in Buildings 725, 880A, and 899 by the end of FY 2014.

2.7.2.3 Energy Consumption Reduction

This section describes electronic stewardship and data center energy-use reduction measures Sandia will implement in FY 2014.

Gigabit Passive Optical Network (GPON) Technology

GPON project will continue in FY 2014 and the decommissioning activities will continue to divert copper and recyclable components from SNL's landfill/waste streams. GPON is on target to save energy consumption by 1,056,079 kWh in FY 2014.

Cold/Hot Aisle Containment

To reduce the load on data center CRAC unit operations, Sandia will continue to implement "hot" and "cold" aisle containment measures in corporate data centers. Containment strategies will be evaluated for other enduring data center locations in FY 2014.

Data Center Consolidation (DCC) Project

In FY 2014, Sandia will continue to identify and prioritize opportunities to eliminate, virtualize, and collocate servers from line owned data centers and server rooms to corporate data centers. Additional data centers and server rooms will be decommissioned at all Sandia sites.

In FY 2014, an additional $550,000 will be invested to increase the capacity of the host environment therefore providing additional resources to continue the drawdown of physical hardware being used increasing the overall efficiency of the data center power and cooling usage.

Sandia line organizations are consolidating server equipment and associated capabilities as cost-austerity measures. These efforts are happening both on an internal organizational basis and as part of the DCC project.

Server Consolidation/Virtualization Project (SC/VP)

The SC/VP results in significant reductions in server purchases, operations and disposal, and associated power consumption and electronic equipment footprints. This project is ongoing and will continue in FY 2014. It is closely associated with the DCC project.

Review of Availability Requirements for Information Technology Resources

This review involves evaluation of system-availability needs relative to current operating requirements. Adjusting operating requirements to meet availability needs can result in reduced power consumption. This effort will continue in FY 2014.

Equipment Rack Spot Cooling

In FY 2014 Sandia will continue to test and evaluate new technologies that can provide directional or spot cooling and reduce the demand on CRAC units and thus will reduce energy consumption. Sandia will also continue exploring rack-level warm water, liquid cooling as another method of reducing chilled water consumption and more efficiently managing air flow.

Operating Temperature Increases

Sandia will continue to increase CRAC unit temperature set points to decrease cooling-load requirements at data center and server room locations. SNL intermediate distribution rooms will be maintained at cool temperatures and will be reviewed as part of the data center consolidation initiative.

"Free Cooling"

In FY 2014, the cold-plate heat exchanger in the Building 726 chiller plant which is dedicated to supporting the Building 725 data center will be connected to the BAS. Sandia will continue to explore new technologies and methods for air flow management and elevated ambient operating temperatures.

CRAC Unit Replacement

In FY 2014, the new units installed in FY 2013 will be tied into the BAS and will be monitored and controlled. The units are equipped with VFDs to provide air delivery in response to increased or decreased IT demand (load). Buildings 899 and 725 will also be tied into the BAS for the capability to monitor and control air flow delivery.

Air Flow Management

Sandia will continue to relocate under floor cabling to overhead cable trays in data centers.

Efforts to improve PUE will continue in FY 2014, including:

- Consolidating rack equipment to reduce the electronics footprint
- Relocating under-floor cabling to overhead cable trays to improve the efficiency of air flow and distribution in the under floor plenum
- Refining CRAC unit control set points to increase operating temperature and decrease cooling load demand

In FY 2014, Sandia will continue to improve cooling-equipment operation and power efficiencies in all data center rooms in Buildings 725, 880A, and 899 and improve associated PUE values.

Efficient Uninterruptible Power Supplies (UPS)

Future plans include reduced reliance on larger UPS systems by using smaller units for critical applications only in Building 725. In FY2014, Sandia will also develop criteria to determine where and when UPS is really necessary.

SNL is also looking at opportunities to utilize fuel cell, flywheel, or other types of backup power generation that is more energy efficient and reduces the SNL environmental impact over traditional UPS power.

Data Center Component Recycle and Reuse

In FY 2014, Sandia will continue to seek opportunities to recycle and reuse components including deployment of recycle containers inside data center staging areas for metals.

Performance Optimized Data Center (POD) for SNL/CA Site

In FY 2014, Sandia will evaluate the energy efficiency, cost, and risk associated with installing a POD as an alternative to renovating existing data center facilities. The POD alternative may include incorporating an RE source such as a fuel cell.

Standardization of Information Technology Equipment

In FY 2014, Sandia will continue to deploy standardized racks as part of data center consolidation.

Computer Equipment Retirement

Red Sky equipment will be retired in FY 2015.

2.8 Goal 8: Renewable Energy

DOE is required to have 7.5% of its electricity consumption come from RE sources by FY 2013 and 20% by FY 2020. The statute provides for a double bonus if the RE is produced onsite and if the RECs are retained. The language in EO 13423 is viewed as encouragement to sites to increase their total annual, thermal energy consumption from onsite RE sources to the maximum extent possible and stipulates that each site must install an RE project or show that RE is not feasible at the site because of economic or renewable resource barriers.

The RE goals are based on the total energy consumption at all facilities, including those excluded from the energy intensity-reduction requirements.

2.8.1 FY 2013 Performance Status

Sandia meets the electric RE objective through the purchase of RECs and through onsite and existing RE projects. See CEDR worksheets, "Operating Onsite Renewables" and "Purchased Renewables." Sandia strives to add onsite RE generation capacity when cost effective.

The estimated total RE generation at SNL for FY 2013 is approximately 406 megawatt-hours (MWh) for electric and 445 million British thermal units (MMBtu) for thermal. Onsite renewable electricity generation represents only 0.286% of SNL's total electricity consumption. Because onsite RE generation capacity is limited, Sandia satisfies the required 7.5% electricity consumption from RE sources through purchases of RECs (to cover site electric consumption) from Western Administration Power Authority. Figure 2.16 shows Sandia’s renewable electric generation through FY 2013.

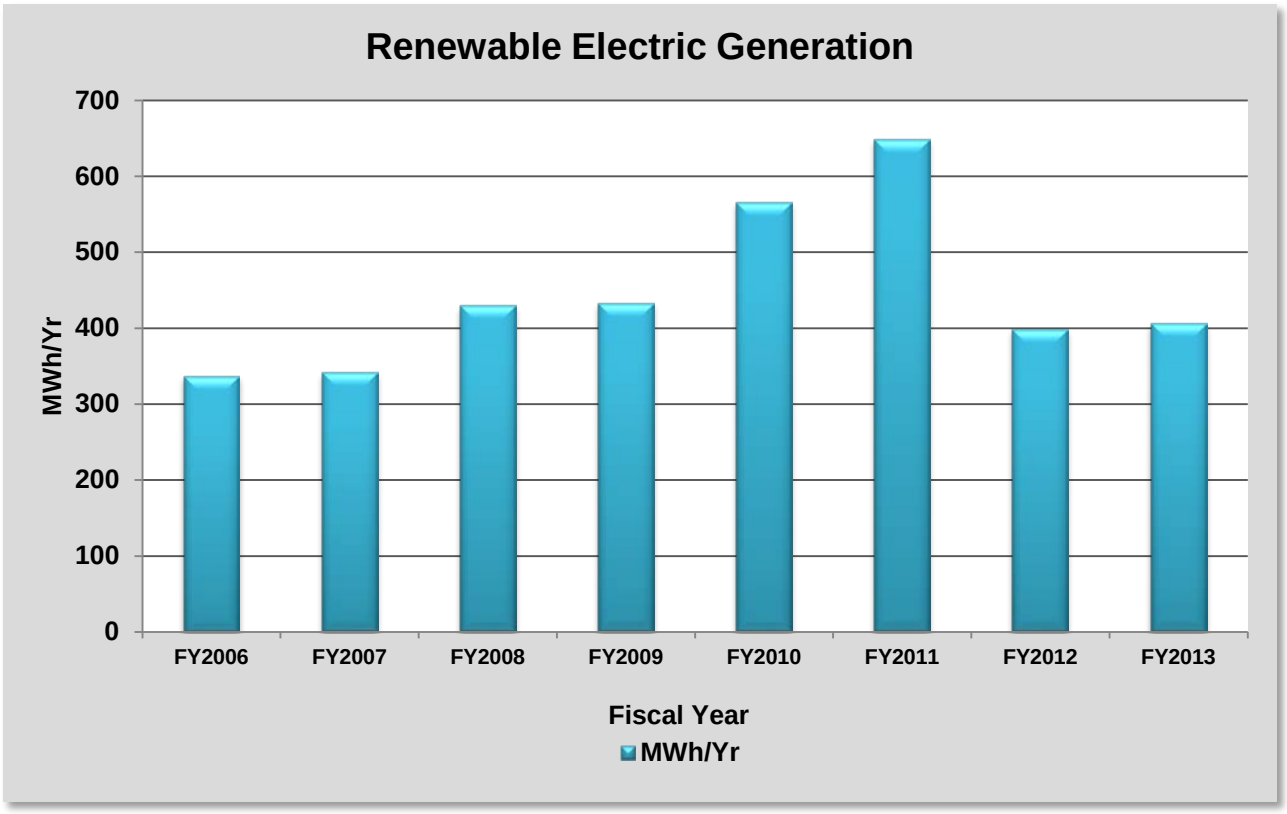


Figure 2.16 SNL Renewable Electric Generation

Actual metered data from some RE systems at SNL was unavailable during FY 2013. Where metered data was unavailable, energy produced by non-metered PV systems was estimated based on the system capacity and an assumed five sun-hours per day and 365 days of operation per year.

The PV arrays at Building 833 were retrofitted with metering capability in late FY 2010 and report actual metered data to date. Performance data for those PV systems identified in the CEDR worksheet as installed in FY 2012 represent full-year operation. Several SNL RE systems are associated with mission-related RE R&D activities. As a result, these specific systems are not considered permanent installations and may not be continuously operated. The Stirling Engine concentrated solar systems at the NSTTF site stopped running in October 2011, which decreased RE generation in FY 2012.

In FY 2012, Sandia installed the infrastructure for a 1MW Regional Test Center (RTC) at SNL/NM. This test bed allows solar vendors to test their PV systems at the NM site. This site is located south of the NSTTF Solar Tower and is referred to as Site Zero. A 5100W system was installed at Site Zero in FY 2013

Sandia promotes solar-powered LED lights for all new parking lots and walkways. These systems are typically small but reduce construction costs for projects (by avoiding digging, trenching, and running wire and conduit), avoid increase in lighting energy use, and promote solar and LED technologies. In FY 2013, Sandia installed an additional 12 solar powered LED lights to light intersections and bus stop shelters on the SNL/NM site.

Another solar technology Sandia uses to reduce infrastructure costs and energy are solar-powered carts. Currently, Sandia has a total of 27 solar carts in NM and CA.

2.8.2 Planned and Projected Performance

Sandia continues to add onsite RE capacity as shown on the CEDR worksheet "Conservation and RE Measures" worksheet, where life-cycle cost effective. Sandia's projected performance includes the following:

- Install approximately 90,000W of solar test beds from different vendors at the RTC Site Zero in FY 2014.
- Purchase RECs to meet the goal for FY 2014 and beyond.
- Continue to identify, analyze, and select development opportunities for small- and large-scale PV and concentrating photovoltaic systems at SNL/NM and SNL/CA locations where life-cycle cost effective.
- Continue to leverage R&D activities to reduce and offset energy consumption.
- Investigate use of purchased power agreements (PPAs) to construct and operate renewable generation systems. Specifically, pursue third-party PPAs to support energy security for mission-critical buildings at SNL/NM.
- Install solar-powered LED lights for all new external installations (parking lots and walkways) where life-cycle cost effective.
- Investigate incorporation of RE systems in new buildings, especially solar hot water heaters.

Table 2.5 projects RE generation, RECs, and other information over a ten-year period.

Table 2.7 SNL Renewable Energy Generation

Renewable Energy	Actual FY13	Planned FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22
Renewable Energy (MWh)	406	590	590	590	590	590	590	590	590	590
Renewable Energy Credits (MWh)	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000
Actual/Planned/Est Cost to Install *	147,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000
Unit Costs ($/MWh)	$6.02	$1.098	$1.098	$1.098	$1.098	$1.098	$1.098	$1.098	$1.098	$1.098

Notes:
*Costs for renewable energy credit (REC) purchases are unknown beyond FY 2015.
Numbers shown are for projects installed in FY 2013. Generation for FY14 and beyond is based on the addition of a total of 90kW at the RTC site.

2.9 Goal 9: Climate Change Adaptation

In accordance with EO 13514 and subsequent CEQ Implementing Instructions, DOE developed and submitted a Climate Change Adaptation Plan with its 2012 SSPP. The DOE *Climate Change Adaptation Plan* directs DOE Programs to ensure that all sites address climate change adaptation in their FY 2013 SSPs. ***DOE SSP guidance does not require that Goal 3 be addressed at the site level.***

Table 2.8 Current FY 2013 Performance Status and Planned and Projected Performance

DOE Goal/ Sandia Objective	FY 2013 Performance Status	Planned and Projected Performance
Goal 1: Improve Understanding of Climate Change Effects and Impacts		
Objective 1.1: Work with other agencies to improve our understanding of climate change.	Sandia supports DOE/EERE who in turn supports other agencies in the area of climate change research and development through the Energy, Climate, and Infrastructure Security Strategic Management Unit (ECIS SMU) Climate Security program area. The ECIS vision is to enhance the nation's security and prosperity through sustainable, transformative approaches to our most challenging energy, climate, and infrastructure problems. The Climate Security program works to understand and prepare the nation for the national security implications of climate change. The program area has identified five goals: - Assess U.S. prosperity and security impact risks by modeling climate and human response at the regional level with quantified uncertainty. - Design data-gathering and analysis systems to enable the U.S. to sign a global climate treaty. - Develop a credible technical path for achieving DOE's FY 2015 goal of an industrial-scale demonstration of carbon capture and sequestration (10MT/yr). - Joint Venture for Safe and Secure Offshore Petroleum R&D—an industry-government partnership to advance R&D and emergency response for offshore oil and gas exploration and production. - Deploy technology solutions that make government and private sector success in water safety, security, and sustainability, both domestically and globally. Current collaborations and interagency support through ECIS SMU programs include the following: - Sandia researchers are members of a global research team whose work in Barrow, Alaska is helping to transform scientist's understanding of climate change. This team supports the DOE Office of Science Atmospheric Radiation Measurement (ARM) program, which is DOE's largest global climate change research effort. Sandia has managed the ARM sites since 1998. - Sandia is partnering with NASA, NOAA, USDA and several major academic institutions to scope the technical requirements for a GHG information system (GHGIS) to accurately measure GHG emissions. - Sandia researchers generated the first truly integrated assessment of climate risk among the contiguous 48 states through the year 2050. - Climate modeling and analysis at Sandia seeks to develop a risk assessment methodology to evaluate	Continue to pursue and support opportunities for future collaborations and interagency support through the ARM and other ECIS SMU programs.

DOE Goal/ Sandia Objective	FY 2013 Performance Status	Planned and Projected Performance
	uncertain climatic conditions and the consequences posed to humanity. Results will influence national policy on security and energy issues, state level economies, and energy generation and use. - Continued the Institutional Transformation (IX) project, which when completed in FY 2014 will provide a computer simulation model and planning tool for Sandia and ultimately other large Federal institutions to evaluate life cycle-energy and GHG reduction alternatives at the building and site levels In addition, over the last decade the Climate Surety program has published many reports assessing climate uncertainty and understanding the impacts of climate change.	
Objective 1.2: Work with other Federal agencies and local jurisdictions (as appropriate) to develop regional partnerships for climate change information sharing and collaboration.	Sandia continues to work with other DOE Office of Science and NNSA laboratories in climate change program areas. Sandia planners and subject matter experts work on regional projects and are involved in civic activities related to climate change adaptation. **SNL/NM** - Partnered with KAFB and other site tenants to address shared energy security concerns - Partnered with the Navajo Nation on renewable energy projects **SNL/CA** Continued LVOC conceptual planning in partnership with LLNL Continued to partner with SLAC, LBL, and LLNL to share and develop new resources to address changing state and county requirements.	- Partner with other DOE laboratories such as the National Renewable Energy Laboratory and the Idaho National Laboratory. - Participate in City Planning efforts on future initiatives such as City of Livermore Climatic Action Plan. - Investigate opportunities to partner with local jurisdictions to understand climate adaptation challenges.
Goal 2: Improve Understanding of Climate Change Vulnerabilities and Risk		
Objective 2.2: Conduct detailed risk or vulnerability assessments, as appropriate, for specific DOE programs or facilities.	Sandia reviewed the April 2012 DOE High Level Analysis of Vulnerability to Climate Change. Near term challenges could include exposure to climate change effects (e.g., more frequent/intense severe storm events, heat waves, drought, wildfire, related power disruptions). Longer term challenges could include exposure to other climate change effects (e.g. sustained/more frequent water/energy shortages, increased water/energy costs, workforce, and transportation/supply chain issues).	- Conduct a preliminary high-level assessment/analysis of potential major site-specific/local vulnerabilities to climate change by FY 2015. - Based on plan findings, Sandia may consider undertaking specific efforts to better understand and/or begin preparing for local climate change effects at its facilities.

DOE Goal/ Sandia Objective	FY 2013 Performance Status	Planned and Projected Performance
Goal 4: Improve the Climate Resiliency of all DOE Sites		
Objective 4.1: Update all appropriate DOE site plans to address climate change resiliency.	Sandia included this section in this SSP.	- Update by FY 2015 its other climate adaptation-related plans and strategies to address climate change adaptation considerations (e.g., Continuity of Operations, Fire Management, infrastructure and construction specifications, etc.). - Update the Sandia Long-Range Development Framework to identify impacts to Sandia mission, facilities and infrastructure.
Objective 4.2: Identify or establish and participate in regional climate change adaptation partnerships, as appropriate, for all DOE facilities.	See Objective 1.2	See Objective 1.2.

3.0 Budget and Funding

The SSPP commits the DOE to establish a process to prioritize projects that most cost effectively meet sustainability goals, while generating the greatest cost savings for DOE as it executes its mission.

3.1 FY 2013 Performance Status

In FY 2013, Sandia did the following:

- Allocated $5.5 million to energy and water projects; this funding was generated from actual cost reductions from a new electric utility contract and energy conservation projects
- Considered projected energy and water savings when prioritizing all projects regardless of funding source; these projects are reported in the CEDR worksheets, "Conservation and RE Measures" and "Building Inventory Changes."

3.2 Planned and Projected Performance

Sandia will do the following:

- Continuing in FY 2014, invest $5 million electric utility cost savings in energy and sustainability projects and R&D support over the next three years.

Assuming stable footprint and no increase in mission energy use over the planning period, expected outcomes include the following:

- Reduced long-term operational costs
- Reduced out-year utility costs
- Larger, more-difficult/expensive projects
- Greater support for R&D energy initiatives including renewable-energy initiatives

4.0 Training and Awareness

4.1 FY 2013 Performance Status and Projected Performance

See "Training" in Table 1-4 of the CEDR.

Table 4.1 Current Performance Status and Planned and Projected Performance

DOE Goal/Sandia Objective	FY 2013 Performance Status	Planned and Projected Performance
Train personnel at each site to direct energy- and water-management programs and dedicate all or a substantial portion of their time to the effective implementation of energy- and water-management plans.	Sandia-required training courses are tracked by individual using Sandia's Training and Employee Development System. FY 2013 training and related activities included the following: **Energy and Water Management Program Staff** - Maintained existing Certified Energy Manager certifications. - Maintained LEED AP® status. - Participated in the Energy Efficiency Working Group of Energy Facilities Contractor Operations Group. - Conducted training on ASHRAE 90.1 **Operations and Maintenance Personnel, Building Operators, and Systems Engineers:** No specific energy and water management program training occurred in FY 2013. **Fleet Services** Training completed by Fleet Services Environmental Program staff is included in the training matrix maintained by the Fleet Services training coordinator. Note: Specific ES&H staff training is not included.	Continue training efforts pending funding availability.
Implement outreach programs to motivate employees to become more efficient in their use of energy, water, and green products and services and to minimize waste.	Activities included the following: - Conducted energy-awareness campaigns including Earth Day (April) and Energy Action Month (October). - Provided energy tips periodically in the email-based Sandia Daily News - Provided Energy Bulletins to the FMOC personnel on over 62 SNL/NM buildings. Energy Awareness Bulletins provide energy trend information; occupants use this information to promote energy conservation and general awareness - Conducted FEMP sponsored Guiding Principles training sessions for other DOE and NNSA sites - Conducted FEMP sponsored Guiding Principles training sessions for other Federal agencies	Continue outreach and awareness programs. Conduct GP training for DOE and non-DOE agencies.

DOE Goal/Sandia Objective	FY 2013 Performance Status	Planned and Projected Performance
	- Developed internal "SNL Energy & Sustainability" web site.	
Implement employee incentive programs to reward exceptional individual and team performance in increasing energy efficiency and water conservation, deploying renewable energy, minimizing waste, reducing utility costs, and reducing GHG emissions.	- SNL ES&H EMS sponsors annual EMS Excellence Awards, which recognize individual and team achievements in water conservation/energy reduction, risk mitigation and environmental protection, waste minimization, and recycling. - SNL Individual Performance Awards, Employee Recognition Awards (ERAs) and Presidential Quality Awards may also be used to recognize environmental achievements.	Continue existing efforts.

APPENDIX A: CONSOLIDATED ENERGY DATA REPORT (CEDR)

Worksheets

2.1	Funds, Metering, Training
1-1	Direct Agency Obligations
1-2	Awarded Energy Savings Performance Contracts – N/A for SNL
1-3	Awarded Utility Energy Services Contracts – N/A for SNL
1-4	EPAct 1992 Training
1-5a	EPAct 2005 Metering of Electrical Use
1-5b	EISA 2007 Metering of Natural Gas Use
1-5c	EISA 2007 Metering of Steam Use – N/A for SNL
1-5d	DOE O 436.1 and SSPP Metering of Chilled Water Use
1-5e	Water Management Best Practice Metering of Water Use
2.2	Sustainable Acquisition
3.1.	Energy and Water
3.2a.	Operating Onsite Renewables
3.2b.	Purchased Renewables
3.3	Conservation and RE Measures
3.4	Building Inventory Changes
4.1	Source Energy Savings Credit – N/A for SNL
5.1	Data Centers
5.2	Electronics Acquisition and Disposal
5.3	Electronics Operations and Maintenance
6.1	Mixed Refrigerants
6.2.	Fugitive F-gases
6.3	Industrial Process
7.1a	Onsite Wastewater
7.1b.	Contractor Wastewater
8.1	Air Business Travel
8.2	Ground Business Travel
8.3.	Commuter Travel
9.1a.	Onsite Landfill (optional)
9.1b.	Offsite MSW (optional)
10	Fleet Fuel (optional)
11	Covered Facilities

Note: CEDR worksheets have been provided in separate attachments.

APPENDIX B: BASELINE AND CURRENT INFORMATION TABLES

All data is current as of November 12, 2013. The tables support the SSP's objectives and graphs.

GHG Emissions FY 2008 Baseline and Current Information

Table B-1 SNL GHG Emissions Footprint in Metric Tons CO2e

FY	Scope 1				Scope 2	Scopes 1and 2 Total	% Scopes 1 and 2 Change (from prior year)	Scope 3	% Scope 3 Change (from prior year)	Total
	Stationary Combustion	Fleet	Sulfur Hexafluoride (SF6)	Other Process /Fugitive Gases	Purchased Electricity					
08	27,975	1,585	369,381	8,678	166,117	573,736	–	56,682	–	630,418
09	24,143	1,496	212,119	6,135	163,391	407,284	-29%	54,460	–4	461,744
10	24,169	1,966	273,684	6,651	172,473	478,943	18%	64,182	18	543,125
11	22,587	2,738	250,888	9,895	158,892	445,000	-7%	54,996	–14	499,996
12	20,475	1,401	129,204	8,251	149,866	309,197	-31%	53,843	-2%	363,040
13	20,277	1,307	191,716	9,682	144,613	354,612	15%	56,074	4%	410,685

Energy Consumption and Intensity FY 2003 Baseline and Current Information

Table B-2.SNL Total Energy Consumption and Energy Intensity

FY	Electricity in Billions of British Thermal Units (BBtu)	Fuel Oil (BBtu)	Natural Gas (BBtu)	Liquid Propane (LP) (BBtu)	Total Energy Consumption (BBtu)	Energy Intensity (Btu/ GSF/yr)	% Energy Consumption Change (from prior year)	% Energy Intensity Change (from prior year)	% Intensity Change from Baseline	GSF
03	858.300	0.817	606.363	19.220	1,484.700	236,866.26	–	–		6,268,094
04	895.374	0.872	491.546	18.711	1,406.503	222,060.57	–5.27	–7.10	-6.25	6,333,871
05	993.741	1.022	503.929	16.809	1,515.501	235,527.76	7.75	7.03	-.57	6,434,490
06	1,044.943	21.820	623.570	14.207	1,704.540	231,827.88	12.47	–1.57	-2.13	7,352,610
07	1,154.887	0.180	666.273	16.816	1,838.156	232,363.42	7.84	0.23	-1.90	7,910,716
08	1,063.667	0.152	533.001	23.347	1,620.160	232,367.04	–11.86	–0.22	-1.9	6,987,676
09	1,061.742	0.186	460.100	22.820	1,544.848	222,367.97	–4.65	–4.10	-6.12	6,947,572
10	1,045.236	0.186	419.151	24.734	1,489.307	215,357.64	–3.60	–3.15	-9.08	6,915,493
11	1,016.065	0.223	391.425	22.223	1,429.936	206,848.24	–4.15	–3.95	-12.67	6,912,971
12	1001.954	0.220	352.266	22.819	1,377.259	201,219.97	-3.68	–2.72	-15.05	6,844,541
13	970.410	0.263	350.827	19.258	1,340.758	194,814.46	-2.65	-3.18	-17.75	6,882,229

Notes:

- Collected data reflects consumption at NM, CA, and NV locations.
- FY 2009 – FY 2013 includes offsite leases where Sandia pays for energy costs separately from the lease cost.
- Data in this table have been rounded to 2 or 3 decimal places.

Data Sources:

- CEDR: Collects data on energy consumption and cost, broken down by energy type; water consumption and cost; and non-fleet fuel consumption and cost.
- FIMS: Collects site footprint and stores data on buildings that have been assessed for HPSB goals.
- BAS
- Electric metering systems
- Location and building NG meters

Table B-3 SNL Regular Buildings Energy Consumption and Energy Intensity

FY	Electricity (BBtu)	Fuel Oil (BBtu)	Natural Gas (BBtu)	Liquid Propane (LP) (BBtu)	Total Energy Consumption (BBtu)	Energy Intensity (Btu/ GSF/yr)	% Energy Consumption Change (from prior year)	% Energy Intensity Change (from prior year)	% Intensity Change from Baseline	GSF
03	569.366	0.817	488.309	19.220	1,077.72	194,532.99	–	–	0	5,540,041
04	594.400	0.872	420.848	18.711	1,034.84	184,959.73	-3.98	-4.92	-4.92	5,594,943
05	639.875	1.022	455.823	16.809	1,113.54	196,513.3	7.60	6.25	1.02	5,666,466
06	655.747	21.820	565.826	14.207	1,257.60	183,007.10	12.94	–6.87	-5.92	6,871,890
07	622.409	0.180	523.104	16.816	1,162.52	162,653.39	-7.56	–11.12	-16.39	7,147,201
08	580.934	0.152	371.481	23.340	975.91	168,132.30	–16.05	3.37	-13.57	5,804,448
09	579.435	0.186	309.429	22.820	911.87	158,192.98	–6.56	–5.91	-18.68	5,764,344
10	567.044	0.184	292.065	24.734	884.03	155,089.14	–3.05	–1.96	-20.28	5,700,117
11	556.134	0.223	270.365	22.223	848.95	149,000.58	-3.97	-3.93	-23.41	5,697,595
12	537.086	0.220	242.262	22.819	802.39	142,814.30	-5.48	-4.15	-26.59	5,618,381
13	535.106	0.263	234.110	19.258	788.737	139,443.43	-1.7	-2.36	-28.32	5,656,324

Notes:

- Collected data reflects consumption at NM, CA, and NV locations.
- FY 2009 – FY 2012 includes offsite leases where Sandia pays for energy costs separately from the lease cost.
- Data in this table have been rounded to 2 or 3 decimal places.

Data Sources:

- CEDR: Collects data on energy consumption and cost, broken down by energy type, water consumption and cost, and non-fleet fuel consumption and cost.
- FIMS: Collects site footprint and stores data on buildings that have been assessed for HPSB goals.
- BAS
- Electric metering systems
- Location and building NG meters

Tables B-4 and B-5 SNL Regular Buildings and Excluded Buildings GSF Adjustments

SNL FY13 GSF				
Regular Buildings				
	NM	**CA**	**NV**	**Total**
Reported by HQ	4,627,468	895,150	120,925	5,643,543
Sandia adjusted	4,640,249	895,150	120,925	5,656,324

Note: To remain consistent from prior years and because HQ does not include OSFs in its calculation, Sandia added the CUBs (850, 899A, 870I 810A) into the GSF. Total CUB GSF added = 12,781

SNL FY13 GSF				
Excluded Buildings				
	NM	**CA**	**NV**	**Total**
Reported by HQ	1,150,067	—	—	1,150,067
Sandia adjusted	1,225,905	—	—	1,225,905

Note: To remain consistent from prior years and because HQ does not include OSFs in its calculation, Sandia added the CUBs and Pump House (726, 858J, 858K), and 9980D (Molten Salt) to the excluded building list. Sandia also added the 2 leased facilities that SNL pays the utilities (CSRI, Hangar). Total GSF added = 75,838

Water Consumption and Water Intensity FY 2007 Baseline and Current Information

Table B-6 SNL Total Water Consumption and Water Intensity

FY	Water Consumption (gal)	Water Intensity (gal/GSF/yr)	% Intensity Change from Baseline	% Intensity Change from Previous Year	% Consumption Change from Baseline	% Reduction Target from Baseline	GSF
07	585,491,000	75.42	–	–	–	–	7,763,585
08	511,621,799	74.60	–1.09	–1.09	–12.62	2	6,858,172
09	441,827,763	64.80	–14.08	–13.14	–24.54	4	6,818,088
10	362,185,883	52.63	–30.02	–18.80	–38.14	6	6,881,993
11	344,243,773	50.04	–33.65	–4.92	–41.20	8	6,879,471
12	357,174,462	52.65	–30.19	5.21	–39.00	10	6,784,023
13	357,894,267	52.46	-30.44	-0.36	-38.87	12	6,821,711

Notes:

- FY 2007 through FY 2009 does not include the NV location.
- Leased buildings are not included in water consumption or GSF.

Data Sources:

- CEDR: Collects data on energy consumption and cost, broken down by energy type and whether they are excluded, water consumption and cost, and non-fleet fuel consumption and cost.
- FIMS: Collects site footprint and stores data on buildings that have been assessed for HPSB goals.
- BAS

Transportation Fuels FY 2005 Baseline and Current Information

Table B-7 SNL Total Fuel Usage (Gasoline Gallons Equivalent)

FY	Alternative Fuel Use				Petroleum Fuel Use (Diesel and Gasoline)	Total Fuel Use	% of Alternative Fuel Use	% Diesel and Petroleum Change (from prior year)
	E-85	Electricity	CNG	B-20				
05	39,306	417	706	6,294	202,691	249,414	19	0
06	35,387	0	528	5,946	230,523	272,384	15	14
07	55,590	0	1,071	6,418	228,957	292,036	22	-1
08	65,348	0	2,243	6,545	172,671	246,807	30	-25
09	94,676	0	1,755	5,618	102,049	251,470	41	-14
10	98,951	0	3,596	5,638	174,382	282,567	38	17
11	105,169	0	3,803	6,094	145,340	260,406	44	-17
12	98,682	0	639	5,392	133,635	238,348	44	-8
13	107,693	0	198	8,387	123,112	239,391	49	-8

Notes:

- All locations.
- Alternative fuels for electricity includes SNL/NM only.

Data Source: FAST – Collects current and past federal fleet fuel use, vehicle inventory, and vehicle acquisitions for the current year and plans two years into the future.

Total GSF Information

Table B-8 SNL Total GSF FY 2009 Greater than 5,000 GSF (Baseline)

SNL> 5000 GSF	SNL/NM	SNL/CA	SNL/HI	SNL/NV	Total
Owned	5,269,237	806,981	21,240	53,382	6,150,840
Owned (not in FIMS)	24,880	-	-	-	24,880
Leased offsite	381,217	5,238	-	-	386,455
Leased onsite	48,649	-	-	-	48,649
Permitted	12,997	-	-	-	12,997
Total	**5,736,980**	**812,219**	**21,240**	**53,382**	**6,623,821**

Table B-9 SNL Total GSF FY 2013 Greater than 5,000 GSF

SNL> 5000 GSF	SNL/NM	SNL/CA	SNL/HI	SNL/NV	Total
Owned	5,301,225	815,242	23,616	53,907	6,193,990
Owned (not in FIMS)	24,880	-	-	-	24,880
Leased offsite	365,884	5,238	-	-	371,122
Leased onsite	-	5,760	-	-	5,760
Permitted	12,997	-	-	-	12,997
Total	**5,704,986**	**826,240**	**23,616**	**53,907**	**6,608,749**

Workforce Information

Table B-10 SNL Total Workforce FY 2008 - 2013

Location	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
SNL/CA	1,216	1,175	1,272	1,214	1,269	1,314
SNL/HI	N/A	N/A	N/A	N/A	N/A	8
SNL/NV	N/A	N/A	N/A	N/A	N/A	49
SNL/NM						
TA-I	7,139	7,105	7,243	7,457	7291	7,631
TA-II	575	572	556	541	521	453
TA-III	115	835111	113	128	131	145
TA-IV	835	839	820	767	717	797
TA-V	198	198	201	202	197	213
26000 Igloo	20	19	20	9	14	14
CTF	92	101	116	97	93	95
Manzano	0	0	0	0	0	0
KAFB	93	97	29	103	102	124
Leased – NM	1,360	1,168	1,134	1,013	1,062	1,119
Leased - Other	N/A	N/A	N/A	16	18	16
GSA Assigned	N/A	N/A	N/A	3	3	3
Subtotal SNL/NM	10,427	10,210	10,232	10,336	10,149	10,610
Total	**11,643**	**11,385**	**11,504**	**11,550**	**11,418**	**11,981**

Notes:

- Data 9/30/2013 (Data Source: SNL SAPLE/Directory)
- Total workforce minus SNL/HI is used to generate per capita amount for metric
- Data is end of FY data except FY 2010 (June) and FY 2009 (April) (

Cost Information

Table B-11 SNL Total Cost FY 2008–2013

Cost Burdened Amount (M)	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Labor	$1,972	$2,050	$2,210	$2,477	$2,562	$2,648
Other Direct Costs (ODC)	$1,984	$1,864	$1,985	$1,899	$1,836	$1,959
Total	**$3,956**	**$3,913**	**$4,195**	**$4,376**	**$4,398**	**$4,607**

Notes:

- Data 9/30/2013 (Data Source: SNL Oracle)
- Analytical Reporting Capability (ARC) used to generate budget amount for metric

Data Source: SNL ARC

HPSB Guiding Principle Information

Table B-12 Federal Sustainability Portfolio Report

Building	Sustainability Path	Date Third-Party Certification Anticipated	Date Third Party Certification Achieved	Date Federal Guiding Principles Compliance Anticipated	Date Federal Guiding Principles Compliance Achieved	Checklist Completion Percentage				Building GSF
						Yes	No	In Process	Not Assessed	
Bldg. 1090 - ES&H	Guiding Principles for Sustainable Existing Building			09/30/2013	9/30/2013	100%	0%	0%	0%	15,960
Bldg. 518 - Center For Integrated Nanotechnologies	Third-Party Green Building Certification		06/30/2006			100%	0%	0%	0%	95,929
Bldg. 6584 - Administrative center for Test Engineering	Guiding Principles for Sustainable Existing Building			9/30/2014		96%	4%	0%	0%	18,894
Bldg. 6585 - Technology Support Center (TSC)	Guiding Principles for Sustainable Existing Building			12/15/2015		81%	0%	0%	19%	98,193
Bldg. 6586 - Gamma Irradiation Facility (GIF)	Guiding Principles for Sustainable Existing Building			12/15/2015		88%	0%	8%	4%	12,526
Bldg. 6587 - Photometrics and Data Acquisition Facility	Guiding Principles for Sustainable Existing Building			9/30/2014		96%	0%	4%	0%	13,082
Bldg. 700 - Advanced Manufacturing Prototyping Facility	Guiding Principles for Sustainable Existing Building			12/15/2015		77%	0%	8%	15%	22,776

Building	Sustainability Path	Date Third-Party Certification Anticipated	Date Third Party Certification Achieved	Date Federal Guiding Principles Compliance Anticipated	Date Federal Guiding Principles Compliance Achieved	Checklist Completion Percentage				Building GSF
						Yes	No	In Process	Not Assessed	
Bldg. 704 - Collaborative Office Building #1	Third-Party Green Building Certification	2/28/2014			9/30/2013 (met GP)	100%	0%	0%	0%	26,419
Bldg. 705 (Proposed New Building)	Third-Party Green Building Certification	12/31/2015				TBD	TBD	TBD	TBD	New Building
Bldg. 720 - Ion Beam Laboratory	Third-Party Green Building Certification		07/21/2010			100%	0%	0%	0%	27,854
Bldg. 726 - SCA Central Utility Building (South of 880)	Guiding Principles for Sustainable Existing Building					88%	0%	0%	11%	5,568
Bldg. 727 - INSRC (South of 880)	Guiding Principles for Sustainable Existing Building			9/30/2014		96%	0%	4%	0%	19,949
Bldg. 730 (New Building Under Construction)	Third-Party Green Building Certification	12/31/2014				TBD	TBD	TBD	TBD	New Building
Bldg. 750 - Taos MOB (South of 832)	Third-Party Green Building Certification		06/30/2010			100%	0%	0%	0%	14,683
Bldg. 752 - Space Mgmt. Office Bldg. (N of 890)	Guiding Principles for Sustainable Existing Building			09/30/2013	9/30/2013	100%	0%	0%	0%	17,167
Bldg. 753 - Integrated Systems Support Group	Guiding Principles for Sustainable Existing Building				09/30/2012	100%	0%	0%	0%	8,366

Building	Sustainability Path	Date Third-Party Certification Anticipated	Date Third Party Certification Achieved	Date Federal Guiding Principles Compliance Anticipated	Date Federal Guiding Principles Compliance Achieved	Checklist Completion Percentage				Building GSF
						Yes	No	In Process	Not Assessed	
Bldg. 755 - MFG Science Surety Components Instr. Lab	Guiding Principles for Sustainable Existing Building			12/15/2015		85%	0%	15%	0%	18,667
Bldg. 758 - Limited Office Building One - IGPP#7	Guiding Principles for Sustainable Existing Building			12/15/2015		88%	0%	8%	4%	19,336
Bldg. 770 - Limited Office Building Three	Guiding Principles for Sustainable Existing Building			9/30/2014		92%	0%	8%	0%	15,699
Bldg. 809 - High Bay Lab & Machine Shop	Guiding Principles for Sustainable Existing Building			12/15/2015		77%	0%	27%	23%	15,401
Bldg. 811 - Administration	Guiding Principles for Sustainable Existing Building			12/31/2013	12/1/2013	100%	0%	0%	0%	10,560
Bldg. 827 - Primary Standards Lab	Guiding Principles for Sustainable Existing Building			9/30/2014 (verify)		85%	0%	0%	15%	58,683
Bldg. 836 - Weapons Engineering & Drafting	Guiding Principles for Sustainable Existing Building			12/15/2015		81%	0%	4%	15%	93,461
Bldg. 856 - Education & Training	Guiding Principles for Sustainable Existing Building			9/30/2014		81%	0%	4%	15%	12,649

Building	Sustainability Path	Date Third-Party Certification Anticipated	Date Third Party Certification Achieved	Date Federal Guiding Principles Compliance Anticipated	Date Federal Guiding Principles Compliance Achieved	Checklist Completion Percentage				Building GSF
						Yes	No	In Process	Not Assessed	
Bldg. 859 - Rocket System Development Lab	Guiding Principles for Sustainable Existing Building			12/15/2015 (verify)		65%	0%	0%	35%	21,031
Bldg. 858EF - MESA Microfab - East Facility	Third-Party Green Building Certification		09/30/2007			100%	0%	0%	0%	95,046
Bldg. 858EL - MESA Microlab East Lab	Third-Party Green Building Certification		04/30/2008			100%	0%	0%	0%	171,500
Bldg. 858J - MESA Central Utilities Building 1	Guiding Principles for Sustainable Existing Building			12/31/2013	11/15/2013	100%	0%	0%	0%	8,925
Bldg. 861 - Cafeteria	Guiding Principles for Sustainable Existing Building			12/31/2015		65%	0%	8%	27%	13,914
Bldg. 877 - Independent VULN Assessment	Guiding Principles for Sustainable Existing Building			12/31/2013	10/31/2013	100%	0%	0%	0%	9,609
Bldg. 879 - Integrated MFG Design Facility	Guiding Principles for Sustainable Existing Building			9/30/2013	9/30/2013	100%	0%	0%	0%	10,560
Bldg. 885 - Facilities Management & Purchasing	Guiding Principles for Sustainable Existing Building			9/30/2014		73%	0%	19%	8%	5,120

Building	Sustainability Path	Date Third-Party Certification Anticipated	Date Third Party Certification Achieved	Date Federal Guiding Principles Compliance Anticipated	Date Federal Guiding Principles Compliance Achieved	Checklist Completion Percentage				Building GSF
						Yes	No	In Process	Not Assessed	
Bldg. 886 - Facilities Information Technology Bldg.	Guiding Principles for Sustainable Existing Building			9/30/2014		69%	0%	4%	27%	10,565
Bldg. 898 - Weapons Integration Facility	Third-Party Green Building Certification		05/31/2008			100%	0%	0%	0%	177,216
Bldg. 899 - Joint Computational Engineering. Lab. (JCEL)	Third-Party Green Building Certification		05/30/2008			100%	0%	0%	0%	62,201
Bldg. 899A - JCEL - MESA Ctrl. Util. Building (CUB)	Guiding Principles for Sustainable Existing Building			9/30/2014	11/15/2013	100%	0%	0%	0%	6,925
Bldg. 905 - Explosive Component Facility	Guiding Principles for Sustainable Existing Building			12/15/2015		73%	0%	4%	23%	101,592
Bldg. 954 - Maintenance Warehouse	Guiding Principles for Sustainable Existing Building			12/15/2015		69%	0%	4%	27%	36,223
Bldg. 957 - Shipping & Receiving	Guiding Principles for Sustainable Existing Building			12/15/2015		65%	0%	8%	27%	53,323
Bldg. 969 - TA IV Secure Office Building	Guiding Principles for Sustainable Existing Building				09/30/2012	100%	0%	0%	0%	17,987

Building	Sustainability Path	Date Third-Party Certification Anticipated	Date Third Party Certification Achieved	Date Federal Guiding Principles Compliance Anticipated	Date Federal Guiding Principles Compliance Achieved	Checklist Completion Percentage				Building GSF
						Yes	No	In Process	Not Assessed	
Bldg. 971 - Emerging Threats	Guiding Principles for Sustainable Existing Building			12/31/2013	10/31/2013	100%	0%	0%	0%	18,672
Bldg. C903 - Combustion Research Comp/VIZ/(CR CV)	Third-Party Green Building Certification		09/15/2011			100%	0%	0%	0%	8,364
Bldg. C905 - Combustion Research Office	Guiding Principles for Sustainable Existing Building			12/15/2015		27%	0%	42%	31%	37,778
Bldg. C940 - Integrated MFG Technology Lab Offices	Guiding Principles for Sustainable Existing Building			9/30/2014		42%	0%	35%	23%	22,777
Bldg. C943 - Integrated MFG Technology Lab EQ Room	Guiding Principles for Sustainable Existing Building			12/15/2015		31%	0%	38%	31%	7,003
Bldg. C960 - Facilities Management Building	Guiding Principles for Sustainable Existing Building			9/30/2014		42%	0%	38%	19%	12,260

APPENDIX C: EXCLUDED BUILDINGS AND SELF-CERTIFICATION FORM

SNL FY13 GSF				
Excluded Buildings				
	NM	**CA**	**NV**	**Total**
Reported by HQ	1,150,067	—	—	1,150,067
Sandia adjusted	1,225,905	—	—	1,225,905

Note: To remain consistent from prior years and because HQ does not include OSFs in its calculation, Sandia added the CUBs and Pump House (726, 858J, 858K), and 9980D (Molten Salt) to the excluded building list. Sandia also added the two leased facilities for which SNL pays the utilities (CSRI, Hangar). Total GSF added = 75,838.

DOE BUILDING EXCLUSION
SELF-CERTIFICATION FORM
FY 2013

FROM: Sandia National Laboratories
National Nuclear Security Administration – Sandia Field Office

TO: Sustainability Performance Office

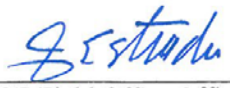
DATE: December 4, 2013

SUBJECT: SELF-CERTIFICATION FORM FOR THE ENERGY INTENSITY GOAL OF EISA 2007

Each building or group of buildings excluded under the criteria for a Part G or Part H exclusion are metered for energy consumption and their consumption is reported annually.
If any building has been excluded under the criteria for Part H for impracticability then all practicable energy and water conservation measures with a payback of less than 10 years have been installed. A justification statement that explains why process-dedicated energy in the facility may impact the ability to meet the goal has been provided in the FIMS Report 063.

I certify that the buildings listed on the Excluded Buildings List produced by FIMS as Report 063 dated 15 November 2013 for Sandia National Laboratories in Appendix C meet the exclusion criteria in *Guidelines Establishing Criteria for Excluding Buildings* published by FEMP on January 27, 2006.

Joe Estrada
DOE Field Office Official – printed name


DOE Field Office Official

12/04/2013
Date

Contact Information:
Joe Estrada
Title: General Engineer, Sustainability Program Manager
Phone: (505) 845-5326
eMail: joe.estrada@nnsa.doe.gov

(FIMS 063)

11/20/2013

U.S. Department of Energy
Facilities Information Management System
Energy Consuming Excluded Buildings and Trailers List

Program Office NNSA

Site 22001 SNL - New Mexico

Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
701	136781	PROCESS ENVIRONMENT & TECH LAB	H - Impracticability	Building	151,055	151,055
The building is driven by laboratory loads that operate 24/7. Therefore it is impracticable to meet all energy reduction requirements. The building energy streams are metered and reported annually. Energy and water audits are performed on a four year cycle to identify potential ECMs. ECMs are implemented as funds become available.						
725	143687	SUPER COMPUTING ANNEX (SCA) (S OF 726)	G - Metered intensive loads	Building	25,232	25,232
The building is a computing facility fully process driven. The facility is metered.						
827	125799	WPNS PROD PRIM STANDARDS LAB (S OF 880)	H - Impracticability	Building	58,683	58,683
The building is driven by loads that operate 24/7. Therefore it is impracticable to meet all energy reduction requirements. The building energy streams are metered and reported annually. Energy and water audits are performed on a four year cycle to identify potential ECMs. ECMs are implemented as funds become available.						
829	129626	COMM SWITCH BLDG	G - Metered intensive loads	Building	4,938	4,938
The building is fully process driven and includes loads that are not influenced by conventional building energy conservation methods. Building energy consumption is metered and reported annually.						
840	87266	DEV SHOP & OFFICE	E - Skewed energy usage	Building	83,070	83,070
The building is currently being evaluated for major renovation and future use. Therefore, the energy consumption will be skewed.						
840A	126504	MECHANICAL BLDG	D - Essentially only lighting	Building	252	252
The building is essentially a storage building and all energy consumption is represented by building 840.						

This report qualifies DOE Owned, DOE Leased, and Contractor Leased buildings and trailers where the Energy Consuming Metered Process (Excluded) Facilities gsft is greater than zero.

(FIMS 063)

U.S. Department of Energy
Facilities Information Management System
Energy Consuming Excluded Buildings and Trailers List

11/20/2013

Program Office NNSA

Site 22001 SNL - New Mexico

Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
840C	126506	EQUIP BLDG	D - Essentially only lighting	Building	195	195
The building is essentially a storage building and all energy consumption is represented by building 840.						
858EF	203970	MESA MICROFAB - EAST FACILITY	H - Impracticability	Building	95,046	95,046
This LEED certified building implemented all life cycle cost effective measures. The building is part of a group of buildings and driven by loads that operate 24/7. It is impracticable to meet all energy reduction requirements. Building energy streams are partially metered individually and as a group and are reported annually. Audits are performed on a four year cycle to identify potential ECMs.						
858EL	203971	MESA MICROLAB - EAST LAB	H - Impracticability	Building	171,500	171,500
This LEED Silver certified building implemented all life cycle cost effective ECMs. The building is part of a group of buildings and driven by loads that operate 24/7. It is impracticable to meet all energy reduction requirements. The building energy streams are partially metered individually and as a group and are reported annually. Audits are performed to identify potential ECMs.						
858G	126529	WAREHOUSE STORAGE BLDG. (E OF 858)	D - Essentially only lighting	Building	4,000	4,000
The building is essentially a storage building and consumes very little energy consumption.						
858I	204279	MICROFAB STORAGE	D - Essentially only lighting	Building	815	815
The building is essentially a storage building and consumes very little energy consumption.						
858L	132331	858 SAFETY BUILDING	D - Essentially only lighting	Building	347	347
The building is essentially a storage building and consumes very little energy consumption. The building is metered as part of the 858 complex						

This report qualifies DOE Owned, DOE Leased, and Contractor Leased buildings and trailers where the Energy Consuming Metered Process (Excluded) Facilities gsft is greater than zero.

(FIMS 063)

11/20/2013

U.S. Department of Energy
Facilities Information Management System
Energy Consuming Excluded Buildings and Trailers List

Program Office NNSA

Site 22001 SNL - New Mexico

Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
858N	140088	RADIATION-HARDENED INTEGRATED CIRCUITS	H - Impracticability	Building	179,443	179,443
Part of a group of buildings and driven by loads that operate 24/7. Therefore it is impracticable to meet all energy reduction requirements. The building energy streams are partially metered individually and partially as a group and reported annually. Energy and water audits are performed on a four year cycle to identify potential ECMs. ECMs are implemented as funds become available.						
858S	87286	MICROELECTRONICS LAB	H - Impracticability	Building	73,452	73,452
Part of a group of buildings and driven by loads that operate 24/7. Therefore it is impracticable to meet all energy reduction requirements. The building energy streams are partially metered individually and partially as a group and reported annually. Energy and water audits are performed on a four year cycle to identify potential ECMs. ECMs are implemented as funds become available.						
878	87312	PROCESS DEVELOPMENT LAB	H - Impracticability	Building	138,298	138,298
Part of a group of buildings and driven by loads that operate 24/7. Therefore it is impracticable to meet all energy reduction requirements. The building energy streams are partially metered individually and partially as a group and reported annually. Energy and water audits are performed on a four year cycle to identify potential ECMs. ECMs are implemented as funds become available.						
880A	140089	COMPUTING, 880 ANNEX	G - Metered intensive loads	Building	50,197	50,197
The building is driven by process loads that are critical to fulfilling its mission. Building's natural gas metered with building 880. Electricity is separately metered.						
986	88112	COMPONENT DEVELOPMENT-LAB	G - Metered intensive loads	Building	17,615	17,615
Part of a group of buildings and driven by loads that operate 24/7. Therefore it is impracticable to meet all energy reduction requirements. The building energy streams are partially metered individually and partially as a group and reported annually. Energy and water audits are performed on a four year cycle to identify potential ECMs. ECMs are implemented as funds become available.						
AANC	125841	CITY HANGAR	C - Fully serviced lease	Building	27,018	27,018
Fully Serviced Lease						

This report qualifies DOE Owned, DOE Leased, and Contractor Leased buildings and trailers where the Energy Consuming Metered Process (Excluded) Facilities gsft is greater than zero.

(FIMS 063)

11/20/2013

U.S. Department of Energy
Facilities Information Management System
Energy Consuming Excluded Buildings and Trailers List

Program Office NNSA

Site 22001 SNL - New Mexico

Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
AML Fully Serviced Lease	125835	ADVANCED MATLS LAB	C - Fully serviced lease	Building	29,753	29,753
CB4100 Fully Serviced Lease	201337	CARLSBAD-4100 NATIONAL PARK HWY	C - Fully serviced lease	Building	19,852	19,852
CERL Fully Serviced Lease	209518	CYBER ENGINEERING RESEARCH LABORATORY	C - Fully serviced lease	Building	25,450	25,450
CSRI Sandia pays for the energy of this facility under separate contract but are not allowed to make any modifications to the facility.	203796	COMPUTER SCIENCE RESEARCH INSTITUTE	C - Fully serviced lease	Building	33,500	33,500
IPB Fully Serviced Lease	140539	INTERNATIONAL PROGRAMS BLDG (aka 10600)	C - Fully serviced lease	Building	67,013	67,013
IPOC Fully Serviced Lease	204427	INNOVATION PARKWAY OFFICE CENTER	C - Fully serviced lease	Building	150,000	150,000

This report qualifies DOE Owned, DOE Leased, and Contractor Leased buildings and trailers where the Energy Consuming Metered Process (Excluded) Facilities gsft is greater than zero.

(FIMS 063)

11/20/2013

U.S. Department of Energy
Facilities Information Management System
Energy Consuming Excluded Buildings and Trailers List

Program Office NNSA

Site 22001 SNL - New Mexico

Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
SSC200 Fully Serviced Lease	202691	SANDIA SYNERGY CENTER	C - Fully serviced lease	Building	3,437	3,437
SSC300 Fully Serviced Lease	203907	SANDIA SYNERGY CENTER	C - Fully serviced lease	Building	4,340	4,340
A-APTS Fully Serviced Lease	135347	POINT BARROW APARTMENTS (BLDG 354)	C - Fully serviced lease	Building	4,322	4,322
A-BARC Fully Serviced Lease	205887	ALASKA BARROW ARCTIC RESEARCH CENTER	C - Fully serviced lease	Building	1,141	1,141
MINNESOTA Fully Serviced Lease	141387	MINNESOTA OFFICE	C - Fully serviced lease	Building	8,298	8,298

This report qualifies DOE Owned, DOE Leased, and Contractor Leased buildings and trailers where the Energy Consuming Metered Process (Excluded) Facilities gsft is greater than zero.

(FIMS 063)

11/20/2013

U.S. Department of Energy
Facilities Information Management System
Energy Consuming Excluded Buildings and Trailers List

Program Office NNSA

Site 22002 SNL - California

Property ID Justification Comments:	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross SQFT	Excluded SQFT
C-ARB Fully Serviced Lease	135348	ARBORS APARTMENTS - CALIFORNIA	C - Fully serviced lease	Building	5,238	5,238

This report qualifies DOE Owned, DOE Leased, and Contractor Leased buildings and trailers where the Energy Consuming Metered Process (Excluded) Facilities gsft is greater than zero.

APPENDIX D: SANDIA NATIONAL LABORATORIES FY 2014 SITE SUSTAINABILITY COMMITMENTS

Sandia National Laboratories FY 2014 Site Sustainability Commitments

SSPP Goal #	DOE/NNSA Goals and Performance Measures	DOE/NNSA FY 2014 Target	Site FY 2014 Target
GOAL 1: Greenhouse Gas (GHG) Reduction and Comprehensive GHG Inventory			
1.1	28% Scope 1 and 2 GHG reduction by FY 2020 from an FY 2008 baseline $\frac{229{,}494\ CO2E}{573{,}736\ CO2E}$ = 40%	-19%	-40%
1.2	13% Scope 3 GHG reduction by FY 2020 from an FY 2008 baseline $\frac{2{,}834\ CO2E}{56{,}682\ CO2E}$ = 5%	-5%	-5%
GOAL 2: Buildings, Energy Savings Performance Contract (ESPC) Initiative Schedule, and Regional and Local Planning			
2.1	30% energy intensity (Btu per gross square feet [GSF]) reduction by FY 2015 from an FY 2003 baseline $\frac{58{,}360\ Btu}{194{,}534\ Btu} = 30\%$	-27%	-30%
2.2	EISA Section 432 energy and water evaluations	25% evaluated	25% evaluated
2.3	Individual buildings metering for 90% of electricity (by October 1,2012); for 90% of steam, natural gas, and chilled water (by October 1, 2015)	90% electric and 75% steam/gas/ chilled	90% electric and 70% gas/chilled water
2.4	Cool roofs, unless uneconomical, for roof replacements unless project already has CD-2 approval. New roofs must have thermal resistance of at least R-30.	--	--
2.5	15% of existing buildings greater than 5,000 GSF are compliant with the Guiding Principles (GPs) of HPSB by FY 2015 $\frac{25\ Buildings}{189\ Buildings} = 13\%$	13%	13%
2.6	All new construction, major renovations, and alterations of buildings greater than 5,000 GSF must comply with the GPs		
GOAL 3: Fleet Management			
3.1	10% annual increase in fleet alternative fuel consumption by FY 2015 relative to an FY 2005 baseline $\frac{75{,}328\ gallons}{50{,}219\ gallons} = 150\%$	114%	150%
3.2	2% annual reduction in fleet petroleum consumption by FY 2020 relative to an FY 2005 baseline $\frac{99{,}984\ gallons}{249{,}961\ gallons} = 40\%$	-16%	-40%
3.3	100% of light duty vehicle purchases must consist of alternative fuel vehicles (AFV) by FY 2015 and thereafter (75% FY 2000 – 2015)	75%	100%
3.4	Reduce fleet inventory of non-mission critical vehicles by 35% by FY 2013 relative to an FY 2005 baseline	-35%	-35%

SSPP Goal #	DOE/NNSA Goals and Performance Measures	DOE/NNSA FY 2014 Target	Site FY 2014 Target
GOAL 4: Water Use Efficiency and Manage			
4.1	26% potable water intensity (Gallons per gross square foot) reduction by FY 2020 from an FY 2007 baseline $\frac{175{,}647{,}300\ gallons}{585{,}491{,}000\ gallons} = 30\%$	-14%	-30%
4.2	20% water consumption (Gallons) reduction of industrial, landscaping, and agricultural (ILA) water by FY 2020 from an FY 2010 baseline	-8%	Included in above
GOAL 5: Pollution Prevention and Waste Reduction			
5.1	Divert at least 50% of non-hazardous solid waste, excluding construction and demolition debris, by FY 2015	--	SNL/NM – 65% SNL/CA – 80%
5.2	Divert at least 50% of construction and demolition materials and debris by FY 2015	--	SNL/NM – 80% SNL/CA – 80%
GOAL 6: Sustainable Acquisition			
6.1	Procurements meet requirements by including necessary provisions and clauses (Sustainable Procurements/ Biobased Procurements)	-- --	--
GOAL 7: Electronic Stewardship and Data Centers			
7.1	All data centers are metered to measure a monthly PUE of 100% by FY 2015	90%	TBD
7.2	Maximum annual weighted average PUE of 1.4 by FY 2015	1.50	TBD
7.3	Electronic Stewardship - 100% of eligible personal computers, laptops, and monitors with power management actively implemented and in use by FY 201	100%	100%
GOAL 8: Renewable Energy			
8.1	20% of annual electric consumption from renewable sources by FY 2020	9.3	9.3
GOAL 9: Climate Change Adaptation			
9.1	Address DOE Climate Change Adaptation Plan goals	--	--

APPENDIX C

CY2013 ANNUAL GROUNDWATER MONITORING REPORT SAND2013-15438R

SANDIA REPORT
Unlimited Release
SAND2014-15438R
Printed June 2014

Calendar Year 2013

Annual Groundwater Monitoring Report

Prepared by
Sandia National Laboratories, Albuquerque, New Mexico

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Approved for public release; further dissemination unlimited

Sandia National Laboratories

U.S. DEPARTMENT OF ENERGY

National Nuclear Security Administration

SANDIA REPORT
Unlimited Release
SAND2014-15438R
Printed June 2014

Annual Groundwater Monitoring Report
Calendar Year 2013

Long-Term Stewardship Consolidated Groundwater Monitoring Program
Sandia National Laboratories, New Mexico
June 2014

Prepared by:
Long-Term Stewardship (4142) in coordination with
Environmental Restoration Operations (6234)

Long-Term Stewardship (4142)
Sandia National Laboratories, New Mexico
Albuquerque, New Mexico 87185-0729

This page intentionally left blank.

Acknowledgments

The production of this document is a joint effort between the Sandia National Laboratories, New Mexico Long-Term Stewardship Program and Environmental Restoration Operations.

Contributing Authors

Copland, John
Griffith, Stacy
Jackson, Tim
Li, Jun
Lum, Clinton
Mitchell, Michael
Skelly, Michael

Abstract

Sandia National Laboratories, New Mexico (SNL/NM) is a government-owned/contractor-operated laboratory. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM for the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA). The DOE/NNSA Sandia Field Office administers the contract and oversees contractor operations at the site. Sandia conducts two types of groundwater surveillance monitoring at SNL/NM: (1) on a site-wide basis as part of the SNL/NM Long-Term Stewardship (LTS) Program's Groundwater Monitoring Program (GMP) Groundwater Surveillance Task and (2) as site-specific groundwater monitoring at LTS/Environmental Restoration (ER) Operations sites with ongoing groundwater investigations.

This Annual Groundwater Monitoring Report summarizes data collected during groundwater monitoring events conducted at GMP locations and at the following SNL/NM sites through December 31, 2013: Burn Site Groundwater Study Area; Chemical Waste Landfill; Mixed Waste Landfill; Solid Waste Management Units 8/58, 49, 68, 116, 149, and 154; Technical Area V Study Area; and the Tijeras Arroyo Groundwater Study Area. Environmental monitoring and surveillance programs are required by the New Mexico Environment Department (NMED) and DOE Order 436.1, *Departmental Sustainability,* and DOE Order 231.1B, *Environment, Safety, and Health Reporting*.

This page intentionally left blank

EXECUTIVE SUMMARY ES-1

1.0 INTRODUCTION 1-1

1.1 Site Description 1-1

1.1.1 Climate 1-1
1.1.2 Geologic Setting 1-1
1.1.3 Hydrogeology 1-6
1.1.4 Surface Water Hydrology 1-6

1.2 Groundwater Monitoring 1-7

1.2.1 Long-Term Stewardship and Environmental Restoration Operations Monitoring 1-15
1.2.2 Long-Term Stewardship Groundwater Monitoring Program 1-15
1.2.3 Groundwater Monitoring Regulatory Criteria and DOE Orders 1-15

1.3 Field Methods, Analytical Methods, and Quality Control Procedures 1-16

1.3.1 Field Methods and Measurements 1-16

1.3.1.1 Groundwater Elevation 1-16
1.3.1.2 Well Purging and Water Quality Measurements 1-16
1.3.1.3 Pump Decontamination 1-17
1.3.1.4 Sample Collection Sampling Procedures 1-17
1.3.1.5 Sample Handling and Shipment 1-17
1.3.1.6 Waste Management 1-18

1.3.2 Analytical Methods 1-18
1.3.3 Quality Control Samples 1-19
1.3.4 Field Quality Control Samples 1-20

1.3.4.1 Duplicate Environmental Samples 1-20
1.3.4.2 Equipment Blank Samples 1-20
1.3.4.3 Trip Blank Samples 1-20

1.3.5 Laboratory Quality Control Samples 1-20

1.4 References 1-20

2.0 LONG-TERM STEWARDSHIP CONSOLIDATED GROUNDWATER MONITORING PROGRAM 2-1

2.1 Introduction 2-1
2.2 Regulatory Criteria 2-2
2.3 Scope of Activities 2-4

2.3.1 Groundwater Quality Surveillance Monitoring 2-4
2.3.2 Monitoring Well Installation 2-6

2.4 Field Methods and Measurements 2-6
2.5 Analytical Methods 2-6
2.6 Summary of Monitoring Results 2-6
2.6.1 Analytical Results 2-6
2.6.2 Groundwater Elevation Measurements 2-8
2.6.2.1 Groundwater Recharge and Withdrawal 2-8
2.6.2.2 Groundwater Elevations 2-10
2.7 Quality Control Results 2-12
2.8 Variances and Nonconformances 2-13
2.9 Summary and Conclusions 2-13
2.10 References 2-14
3.0 CHEMICAL WASTE LANDFILL 3-1
3.1 Introduction 3-1
3.1.1 Monitoring History 3-3
3.1.2 Monitoring Network 3-3
3.1.3 Summary of Activities 3-3
3.1.4 Summary of Future Activities 3-3
3.1.5 Conceptual Site Model 3-5
3.2 Regulatory Criteria 3-6
3.3 Scope of Activities 3-6
3.4 Field Methods and Measurements 3-7
3.5 Analytical Methods 3-8
3.6 Summary of Analytical Results 3-8
3.6.1 Volatile Organic Compounds 3-8
3.6.2 Metals 3-8
3.6.3 Water Quality Parameters 3-8
3.7 Quality Control Results 3-9
3.7.1 Field Quality Control Samples 3-9
3.7.1.1 Duplicate Environmental Samples 3-9
3.7.1.2 Field Blank Samples 3-9
3.7.1.3 Trip Blank Samples 3-9
3.7.1.4 Equipment Blank Samples 3-9
3.7.2 Laboratory Quality Control Samples 3-9
3.8 Variances and Nonconformances 3-10
3.9 Summary and Conclusions 3-10
3.10 References 3-10

4.0 MIXED WASTE LANDFILL 4-1

4.1 Introduction 4-1

4.1.1 Monitoring History 4-1
4.1.2 Monitoring Network 4-3
4.1.3 Summary of Activities 4-5
4.1.4 Summary of Future Activities 4-5
4.1.5 Conceptual Site Model 4-5

4.2 Regulatory Criteria 4-6
4.3 Scope of Activities 4-6
4.4 Field Methods and Measurements 4-8
4.5 Analytical Methods 4-9
4.6 Summary of Analytical Results 4-9

4.6.1 Volatile Organic Compounds 4-9
4.6.2 General Chemistry Parameters 4-9
4.6.3 Metals 4-9
4.6.4 Radiological Parameters 4-12
4.6.5 Water Quality Parameters 4-13

4.7 Quality Control Results 4-13

4.7.1 Field Quality Control Samples 4-13

4.7.1.1 Duplicate Environmental Samples 4-13
4.7.1.2 Equipment Blank Samples 4-13
4.7.1.3 Field Blank Samples 4-14
4.7.1.4 Trip Blank Samples 4-14

4.7.2 Laboratory Quality Control Samples 4-14

4.8 Variances and Nonconformances 4-14
4.9 Summary and Conclusions 4-14
4.10 References 4-15

5.0 TECHNICAL AREA V GROUNDWATER 5-1

5.1 Introduction 5-1

5.1.1 Location 5-1
5.1.2 Site History 5-1
5.1.3 Monitoring History 5-1
5.1.4 Current Monitoring Network 5-7
5.1.5 Summary of Calendar Year 2013 Activities 5-7
5.1.6 Summary of Future Activities 5-7
5.1.7 Current Conceptual Model 5-9

5.1.7.1 Regional Hydrogeologic Conditions 5-10
5.1.7.2 Hydrologic Conditions at the TA-V Study Area 5-11

5.1.7.3 Local Direction of Flow 5-12
5.1.7.4 Contaminant Sources 5-12
5.1.7.5 Contaminant Distribution and Transport in Groundwater 5-15

5.2 Regulatory Criteria 5-19
5.3 Scope of Activities 5-23
5.4 Field Methods and Measurements 5-25
5.5 Analytical Methods 5-25
5.6 Summary of Analytical Results 5-25
5.7 Quality Control Results 5-26
5.8 Variances and Nonconformances 5-29
5.9 Summary and Conclusions 5-30
5.10 References 5-31

6.0 TIJERAS ARROYO GROUNDWATER STUDY AREA 6-1

6.1 Introduction 6-1

6.1.1 Location 6-1
6.1.2 Site History 6-1
6.1.3 Monitoring History 6-3
6.1.4 Current Monitoring Network 6-7
6.1.5 Summary of Calendar Year 2013 Activities 6-7
6.1.6 Summary of Future Activities 6-7
6.1.7 Conceptual Model 6-7

6.1.7.1 Regional Hydrogeologic Conditions 6-12
6.1.7.2 Hydrologic Conditions at the TAG Study Area 6-12
6.1.7.3 Local Direction of Flow 6-12
6.1.7.4 Contaminant Sources 6-17
6.1.7.5 Contaminant Distribution and Transport in Groundwater 6-21

6.2 Regulatory Criteria 6-22
6.3 Scope of Activities 6-23
6.4 Field Methods and Measurements 6-23
6.5 Analytical Methods 6-23
6.6 Summary of Analytical Results 6-23
6.7 Quality Control Results 6-26
6.8 Variances and Nonconformances 6-28
6.9 Summary and Conclusions 6-28
6.10 References 6-30

7.0 BURN SITE GROUNDWATER STUDY AREA 7-1

7.1 Introduction 7-1

7.1.1 Location 7-1
7.1.2 Site History 7-1
7.1.3 Monitoring History 7-5
7.1.4 Current Monitoring Network 7-7
7.1.5 Summary of Calendar Year 2013 Activities 7-9

7.1.6 Summary of Future Activities....7-9
7.1.7 Conceptual Site Model....7-9
7.1.7.1 Regional Hydrogeologic Conditions....7-10
7.1.7.2 Hydrogeologic Conditions at the BSG Study Area....7-10
7.1.7.3 Local Direction of Flow....7-11
7.1.7.4 Contaminant Sources....7-12
7.1.7.5 Contaminant Distribution and Transport in Groundwater....7-12
7.2 Regulatory Criteria....7-13
7.3 Scope of Activities....7-15
7.4 Field Methods and Measurements....7-17
7.5 Analytical Methods....7-17
7.6 Summary of Analytical Results....7-17
7.7 Quality Control Results....7-19
7.8 Variances and Nonconformances....7-20
7.9 Summary and Conclusions....7-21
7.10 References....7-22
8.0 SOLID WASTE MANAGEMENT UNITS 8/58....8-1
8.1 Introduction....8-1
8.1.1 Location....8-1
8.1.2 Site History....8-3
8.1.3 Monitoring History....8-5
8.1.4 Current Monitoring Network....8-5
8.1.5 Summary of Calendar Year 2013 Activities....8-5
8.1.6 Summary of Future Activities....8-9
8.1.7 Current Conceptual Model....8-9
8.1.7.1 Regional Hydrogeologic Conditions....8-9
8.1.7.2 Hydrogeologic Conditions at SWMUs 8/58....8-9
8.1.7.3 Conceptual Site Model for SWMUs 8/58....8-13
8.1.7.4 Contaminant Sources....8-15
8.1.7.5 Contaminant Distribution and Transport in Groundwater....8-15
8.2 Regulatory Criteria....8-15
8.3 Scope of Activities....8-16
8.4 Field Methods and Measurements....8-16
8.5 Groundwater Elevation....8-18
8.6 Analytical Methods....8-18
8.7 Summary of Analytical Results....8-18
8.8 Quality Control Results....8-19
8.8.1 Field Quality Control Samples....8-19
8.8.1.1 Duplicate Environmental Samples....8-19
8.8.1.2 Equipment Blank Samples....8-20
8.8.1.3 Trip Blank Samples....8-20
8.8.1.4 Field Blank Samples....8-21

8.8.2 Laboratory Quality Control Samples 8-21

8.9 Variances and Nonconformances 8-21
8.10 Summary and Conclusions 8-22
8.11 References 8-22

9.0 SOLID WASTE MANAGEMENT UNIT 49 9-1

9.1 Introduction 9-1

9.1.1 Location 9-1
9.1.2 Site History 9-1
9.1.3 Monitoring History 9-4
9.1.4 Current Monitoring Network 9-5
9.1.5 Summary of Calendar Year 2013 Activities 9-5
9.1.6 Summary of Future Activities 9-5
9.1.7 Current Conceptual Model 9-5

9.1.7.1 Regional Hydrogeologic Conditions 9-5
9.1.7.2 Hydrogeologic Conditions at SWMU 49 9-6
9.1.7.3 Contaminant Sources 9-7
9.1.7.4 Contaminant Distribution and Transport in Groundwater 9-7

9.2 Regulatory Criteria 9-7
9.3 Scope of Activities 9-8
9.4 Field Methods and Measurements 9-9
9.5 Analytical Methods 9-9
9.6 Summary of Analytical Results 9-9
9.7 Quality Control Results 9-10
9.8 Variances and Nonconformances 9-11
9.9 Summary and Conclusions 9-11
9.10 References 9-11

10.0 SOLID WASTE MANAGEMENT UNIT 68 10-1

10.1 Introduction 10-1

10.1.1 Location 10-1
10.1.2 Site History 10-3
10.1.3 Monitoring History 10-7
10.1.4 Current Monitoring Network 10-7
10.1.5 Summary of Calendar Year 2013 Activities 10-7
10.1.6 Summary of Future Activities 10-7
10.1.7 Current Conceptual Model 10-7

10.1.7.1 Regional Hydrogeologic Conditions 10-7
10.1.7.2 Hydrogeologic Conditions at SWMU 68 10-9
10.1.7.3 Conceptual Site Model for SWMU 68 10-14
10.1.7.4 Contaminant Sources 10-14
10.1.7.5 Contaminant Distribution and Transport in Groundwater 10-14

10.2 Regulatory Criteria 10-15
10.3 Scope of Activities 10-15
10.4 Field Methods and Measurements 10-17
10.5 Groundwater Elevation 10-17
10.6 Analytical Methods 10-17
10.7 Summary of Analytical Results 10-17
10.8 Quality Control Results 10-18

10.8.1 Field Quality Control Samples 10-18

10.8.1.1 Duplicate Environmental Samples 10-18
10.8.1.2 Equipment Blank Samples 10-19
10.8.1.3 Trip Blank Samples 10-20
10.8.1.4 Field Blank Samples 10-20

10.8.2 Laboratory Control Samples 10-20

10.9 Variances and Nonconformances 10-20
10.10 Summary and Conclusions 10-20
10.11 References 10-21

11.0 SOLID WASTE MANAGEMENT UNIT 116 11-1

11.1 Introduction 11-1

11.1.1 Location 11-1
11.1.2 Site History 11-1
11.1.3 Monitoring History 11-3
11.1.4 Current Monitoring Network 11-3
11.1.5 Summary of Calendar Year 2013 Activities 11-3
11.1.6 Summary of Future Activities 11-3
11.1.7 Current Conceptual Model 11-3

11.1.7.1 Regional Hydrogeologic Conditions 11-5
11.1.7.2 Hydrogeologic Conditions at SWMU 116 11-5
11.1.7.3 Local Direction of Flow 11-6
11.1.7.4 Contaminant Sources 11-6
11.1.7.5 Contaminant Distribution and Transport in Groundwater 11-6

11.2 Regulatory Criteria 11-6
11.3 Scope of Activities 11-7
11.4 Field Methods and Measurements 11-7
11.5 Analytical Methods 11-8
11.6 Summary of Analytical Results 11-8
11.7 Quality Control Results 11-9
11.8 Variances and Nonconformances 11-9

11.8.1 Variances and Nonconformances 11-9
11.8.2 Data Validation 11-9

11.9 Summary and Conclusions 11-9
11.10 References 11-10

12.0 SOLID WASTE MANAGEMENT UNIT 149 12-1

12.1 Introduction 12-1

12.1.1 Location 12-1
12.1.2 Site History 12-1
12.1.3 Monitoring History 12-5
12.1.4 Current Monitoring Network 12-6
12.1.5 Summary of Calendar Year 2013 Activities 12-6
12.1.6 Summary of Future Activities 12-6
12.1.7 Current Conceptual Model 12-6

12.1.7.1 Regional Hydrogeologic Conditions 12-6
12.1.7.2 Hydrogeologic Conditions at SWMU 149 12-7
12.1.7.3 Contaminant Sources 12-8
12.1.7.4 Contaminant Distribution and Transport in Groundwater 12-8

12.2 Regulatory Criteria 12-8
12.3 Scope of Activities 12-9
12.4 Field Methods and Measurements 12-9
12.5 Groundwater Elevation 12-10
12.6 Analytical Methods 12-10
12.7 Summary of Analytical Results 12-10
12.8 Quality Control Results 12-12

12.8.1 Field Quality Control Samples 12-12

12.8.1.1 Duplicate Environmental Samples 12-12
12.8.1.2 Equipment Blank Samples 12-12
12.8.1.3 Trip Blank Samples 12-12
12.8.1.4 Field Blank Samples 12-12

12.8.2 Laboratory Control Samples 12-13

12.9 Variances and Nonconformances 12-13
12.10 Summary and Conclusions 12-13
12.11 References 12-13

13.0 SOLID WASTE MANAGEMENT UNIT 154 13-1

13.1 Introduction 13-1

13.1.1 Location 13-1
13.1.2 Site History 13-1
13.1.3 Monitoring History 13-6
13.1.4 Current Monitoring Network 13-7
13.1.5 Summary of Calendar Year 2013 Activities 13-7

13.1.6 Summary of Future Activities....13-8
13.1.7 Conceptual Model....13-8

13.1.7.1 Regional Hydrogeologic Conditions....13-8
13.1.7.2 Hydrogeologic Conditions at SWMU 154....13-8
13.1.7.3 Contaminant Sources....13-10
13.1.7.4 Contaminant Distribution and Transport in Groundwater....13-10

13.2 Regulatory Criteria....13-10
13.3 Scope of Activities....13-11
13.4 Field Methods and Measurements....13-11
13.5 Groundwater Elevation....13-12
13.6 Analytical Methods....13-13
13.7 Summary of Analytical Results....13-13
13.8 Quality Control Results....13-15

13.8.1 Field Quality Control Samples....13-15

13.8.1.1 Duplicate Environmental Samples....13-15
13.8.1.2 Equipment Blank Samples....13-15
13.8.1.3 Trip Blank Samples....13-15
13.8.1.4 Field Blank Samples....13-15

13.8.2 Laboratory Control Samples....13-15

13.9 Variances and Nonconformances....13-16
13.10 Summary and Conclusions....13-16
13.11 References....13-17

ATTACHMENT 2A Long-Term Stewardship Consolidated Groundwater Monitoring Program Analytical Results Tables....2A-1
ATTACHMENT 2B Long-Term Stewardship Consolidated Groundwater Monitoring Program Plots....2B-1
ATTACHMENT 2C Long-Term Stewardship Consolidated Groundwater Monitoring Program Charts and Hydrographs....2C-1
ATTACHMENT 3A Chemical Waste Landfill Analytical Results Tables....3A-1
ATTACHMENT 3B Chemical Waste Landfill Hydrographs....3B-1
ATTACHMENT 4A Mixed Waste Landfill Analytical Results Tables....4A-1
ATTACHMENT 4B Mixed Waste Landfill Hydrographs....4B-1
ATTACHMENT 5A Technical Area V Analytical Results Tables....5A-1
ATTACHMENT 5B Technical Area V Plots....5B-1
ATTACHMENT 5C Technical Area V Hydrographs....5C-1
ATTACHMENT 5D Technical Area V Soil-Vapor Monitoring, Calendar Year 2013 Activities....5D-1
ATTACHMENT 6A Tijeras Arroyo Groundwater Analytical Results Tables....6A-1
ATTACHMENT 6B Tijeras Arroyo Groundwater Plots....6B-1
ATTACHMENT 6C Tijeras Arroyo Groundwater Hydrographs....6C-1
ATTACHMENT 7A Burn Site Groundwater Analytical Results Tables....7A-1

ATTACHMENT 7B Burn Site Groundwater Plots 7B-1
ATTACHMENT 7C Burn Site Groundwater Hydrographs 7C-1
ATTACHMENT 8A Solid Waste Management Units 8/58 Analytical Results Tables 8A-1
ATTACHMENT 8B Solid Waste Management Units 8/58 Plots 8B-1
ATTACHMENT 8C Solid Waste Management Units 8/58 Hydrographs 8C-1
ATTACHMENT 9A Solid Waste Management Unit 49 Analytical Results Tables 9A-1
ATTACHMENT 9B Solid Waste Management Unit 49 Hydrographs 9B-1
ATTACHMENT 10A Solid Waste Management Unit 68 Analytical Results Tables 10A-1
ATTACHMENT 10B Solid Waste Management Unit 68 Hydrographs 10B-1
ATTACHMENT 11A Solid Waste Management Unit 116 Analytical Results Tables 11A-1
ATTACHMENT 11B Solid Waste Management Unit 116 Hydrographs 11B-1
ATTACHMENT 12A Solid Waste Management Unit 149 Analytical Results Tables 12A-1
ATTACHMENT 12B Solid Waste Management Unit 149 Hydrographs 12B-1
ATTACHMENT 13A Solid Waste Management Unit 154 Analytical Results Tables 13A-1
ATTACHMENT 13B Solid Waste Management Unit 154 Plots 13B-1
ATTACHMENT 13C Solid Waste Management Unit 154 Hydrographs 13C-1

Chapter Tables

1-1 Sample Collection Events for Groundwater Quality Monitoring at SNL/NM from January through December 2013 1-9

1-2 Summary of SNL/NM Groundwater Monitoring Results for Calendar Year 2013..... 1-10

1-3 Summary of Exceedances for SNL/NM Groundwater Monitoring Wells Sampled During Calendar Year 2013 1-13

1-4 Field Water Quality Parameters Measured at Monitoring Wells..... 1-17

1-5 Chemical Analytical Methods..... 1-18

1-6 Radiochemical Analytical Methods 1-19

1-7 Quality Control Sample Types for Groundwater Sampling and Analysis..... 1-19

2-1 Groundwater Quality Regulations 2-3

2-2 Groundwater Elevations Measured in Monitoring Wells by SNL/NM and Other Organizations 2-9

2-3 Precipitation Data for Kirtland Air Force Base, Calendar Years 2012 and 2013..... 2-10

2-4 Total Kirtland Air Force Base Groundwater Well Production 2-10

3-1 CWL Post-Closure Care Permit Monitoring Well Network and Calendar Year 2013 Compliance Activities..... 3-5

3-2 Analytical Parameters for the CWL Monitoring Wells, Calendar Year 2013..... 3-7

4-1 MWL Monitoring Well Network and Calendar Year 2013 Compliance Activities..... 4-5

4-2 Analytical Parameters for the MWL Monitoring Wells, Calendar Year 2013 4-8

4-3 MWL-MW4 Unfiltered Metals Results Summary, Calendar Year 2013 4-10

4-4 Summary of Maximum Filtered and Unfiltered Metals Results from MWL Monitoring Wells with Stainless Steel Screens 4-12

5-1 Historical Timeline of the TA-V Study Area 5-3

5-2 Groundwater Monitoring Wells at the TA-V Study Area 5-9

5-3 Wastewater Disposal History at TA-V 5-15

Chapter Tables (continued)

5-4 Groundwater Monitoring Well Network and Sampling Dates for the TA-V Study Area, Calendar Year 2013 5-23

5-5 Parameters Sampled at TA-V Wells for Each Sampling Event, Calendar Year 2013 5-24

6-1 Historical Timeline of the TAG Study Area 6-4

6-2 Groundwater Monitoring Wells in the TAG Study Area 6-9

6-3 Comparison of the Perched Groundwater System and the Regional Aquifer in the Tijeras Arroyo Groundwater Study Area (SNL November 2005) 6-13

6-4 Groundwater Monitoring Well Network and Sampling Dates for the TAG Study Area, Calendar Year 2013 6-24

6-5 Parameters Sampled at TAG Wells for Each Sampling Event, Calendar Year 2013 6-25

7-1 Historical Timeline of the Burn Site Groundwater Study Area 7-3

7-2 Groundwater Monitoring Wells at the Burn Site Groundwater Study Area 7-6

7-3 Summary of Historical Nitrate Concentrations in Groundwater Monitoring Wells that Exceed the MCL at the Burn Site Groundwater Study Area 7-13

7-4 Groundwater Monitoring Well Network and Sampling Dates for the Burn Site Groundwater Study Area, Calendar Year 2013 7-16

7-5 Parameters Sampled at Burn Site Groundwater Study Area Wells for Each Sampling Event, Calendar Year 2013 7-16

8-1 Historical Timeline of SWMUs 8/58 8-6

8-2 Lithologic and Hydrogeologic Elevation Data for Monitoring Wells at SWMUs 8/58 8-11

8-3 Groundwater Monitoring Well Network and Sampling Dates for SWMUs 8/58, Calendar Year 2013 8-17

8-4 Parameters Sampled at SWMUs 8/58 for Each Sampling Event, Calendar Year 2013 8-17

9-1 Historical Timeline of SWMU 49 9-3

Chapter Tables (continued)

9-2 Lithologic and Hydrogeologic Elevation Data for Monitoring Well CYN-MW5 at SWMU 49 9-6

9-3 Groundwater Monitoring Well Network and Sampling Date for SWMU 49, Calendar Year 2013 9-8

9-4 Parameters Sampled at SWMU 49 9-9

10-1 Historical Timeline of SWMU 68 10-4

10-2 Lithologic and Hydrogeologic Elevation Data for Monitoring Wells at SWMU 68 10-10

10-3 Groundwater Monitoring Well Network and Sampling Dates for SWMU 68, Calendar Year 2013 10-16

10-4 Parameters Sampled at SWMU 68 for Each Sampling Event, Calendar Year 2013 ... 10-16

11-1 Historical Timeline of SWMU 116 11-2

11-2 Lithologic and Hydrogeologic Elevation Data for Monitoring Well CTF-MW1 at SWMU 116 11-5

11-3 Groundwater Monitoring Well Network and Sampling Dates for SWMU 116, Calendar Year 2013 11-7

11-4 Parameters Sampled at SWMU 116 11-8

12-1 Historical Timeline of SWMU 149 12-4

12-2 Lithologic and Hydrogeologic Elevation Data for Monitoring Well CTF-MW3 near SWMU 149 12-8

12-3 Sampling Dates and SAPs for Monitoring Well CTF-MW3 near SWMU 149, Calendar Year 2013 12-9

12-4 Parameters Sampled at SWMU 149 for Each Sampling Event, Calendar Year 2013 12-9

13-1 Historical Timeline of SWMU 154 13-3

13-2 Lithologic and Hydrogeologic Elevation Data for Monitoring Well CTF-MW2 near SWMU 154 13-9

Chapter Tables (concluded)

13-3 Sampling Dates and SAPs for Monitoring Well CTF-MW2 near SWMU 154, Calendar Year 2013 13-12

13-4 Parameters Sampled at SWMU 154 for Each Sampling Event, Calendar Year 2013 13-12

Chapter Figures

1-1 Albuquerque Basin, North-Central New Mexico 1-2

1-2 Generalized Geology in the Vicinity of SNL/NM and KAFB (Van Hart 2003) 1-4

1-3 Hydrogeologically Distinct Areas Primarily Controlled by Faults (Modified from SNL 1995) 1-5

1-4 Wells and Springs within SNL/NM and KAFB 1-8

2-1 Groundwater Monitoring Program Water Quality Monitoring Network 2-5

3-1 Location of the Chemical Waste Landfill within Technical Area III 3-2

3-2 Chemical Waste Landfill Monitoring Well Locations and Potentiometric Surface Map, October 2013 3-4

4-1 Location of the Mixed Waste Landfill within Technical Area III 4-2

4-2 Location of Groundwater Monitoring Wells at the Mixed Waste Landfill 4-4

4-3 Localized Potentiometric Surface of the Basin Fill Aquifer at the Mixed Waste Landfill, October 2013 4-7

4-4 May 2009 Photograph of the MWL-MW4 Sampling Pump and Inflatable Packer 4-11

5-1 Location of the TA-V Study Area 5-2

5-2 TA-V Monitoring Well Locations (16 Active Groundwater Monitoring Wells) 5-8

5-3 TA-V Study Area Potentiometric Surface Map (October 2013) 5-13

5-4 Distribution of TCE in Groundwater at SNL/NM TA-V, October/November 2013 5-17

5-5 Distribution of Nitrate plus Nitrite in Groundwater at SNL/NM TA-V, October/November 2013 5-21

Chapter Figures (continued)

6-1 Location of the TAG Study Area 6-2

6-2 Tijeras Arroyo Groundwater (TAG) Investigation Monitoring Well Locations 6-8

6-3 TAG Conceptual Model Illustration (Van Hart June 2003) 6-10

6-4 Tijeras Arroyo Groundwater Investigation Potentiometric Surface Map for the Perched Groundwater System (October 2013) 6-15

6-5 Tijeras Arroyo Groundwater Investigation Potentiometric Surface Map for the Regional Aquifer (October 2013) 6-19

7-1 Location of the Burn Site Groundwater Study Area 7-2

7-2 Burn Site Groundwater Study Area Potentiometric Surface Map (October 2013) 7-8

7-3 Nitrate plus Nitrite Concentration Contour Map for the Burn Site Groundwater Study Area 7-18

8-1 Location of SWMUs 8/58 8-2

8-2 Groundwater Monitoring Wells CCBA-MW1 and CCBA-MW2 Installed at SWMUs 8/58 8-4

8-3 SWMUs 8/58 Potentiometric Surface Map 8-12

8-4 Piper Trilinear Diagram of Major Ion Chemistry for Monitoring Wells CCBA-MW1 and CCBA-MW2 at SWMUs 8/58, CY 2013 8-14

9-1 Location and Groundwater Elevation at SWMU 49 9-2

10-1 Location of SWMU 68 10-2

10-2 Groundwater Monitoring Wells OBS-MW1, OBS-MW2, and OBS-MW3 Installed at SWMU 68 10-8

10-3 Piper Trilinear Diagram of Major Ion Chemistry for Monitoring Wells OBS-MW1, OBS-MW2, and OBS-MW3 at SWMU 68, CY 2013 10-12

10-4 SWMU 68 Potentiometric Surface Map (October 2013) 10-13

11-1 Location and Groundwater Elevation at SWMU 116 11-4

12-1 Location of Monitoring Well CTF-MW3 near SWMU 149 12-2

12-2 SWMU 149 Groundwater Flow Direction (October 2013) 12-11

Chapter Figures (concluded)

13-1 Location of Monitoring Well CTF-MW2 near SWMU 154..... 13-2

13-2 SWMU 154 Groundwater Flow Direction (October 2013) 13-5

Table

1 Inventory of Groundwater Monitoring Wells Located at SNL/NM and Surrounding Areas, updated 3 March 2014, AGMR CY2013

2 Base-Wide Groundwater Levels 2013, updated 3 March 2014, AGMR CY2013

Plate

1 SNL/NM Monitoring Well Locations and Base-Wide Potentiometric Surface Map for the Kirtland Air Force Base Vicinity, October/November 2013

Abbreviations and Acronyms

ABCWUA	Albuquerque Bernalillo County Water Utility Authority
amsl	above mean sea level
AOC	area of concern
AOP	Administrative Operating Procedure
ARG	Ancestral Rio Grande
bgs	below ground surface
BSG	Burn Site Groundwater
CAC	Corrective Action Complete
CCBA	Coyote Canyon Blast Area
CFR	Code of Federal Regulations
CME	Corrective Measures Evaluation
CMI	Corrective Measures Implementation
CMIP	Corrective Measures Implementation Plan
CMS	Corrective Measures Study
COA	City of Albuquerque
COC	constituent of concern
CTF	Coyote Test Field
CWL	Chemical Waste Landfill
CY	Calendar Year
DO	dissolved oxygen
DOE	U.S. Department of Energy
DRO	diesel range organics
DSS	Drain and Septic System
EB	equipment blank
EDMS	Environmental Data Management System
EMS	Environmental Management System
EOD	Explosive Ordnance Disposal
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
ET	evapotranspirative
FB	field blank
FOP	Field Operating Procedure
GEL	GEL Laboratories LLC
GMP	Groundwater Monitoring Program
GRO	gasoline range organics
GWPP	Groundwater Protection Program
HE	high explosive
HPT	High Performing Team
HSWA	Hazardous and Solid Waste Amendments
IMWP	Interim Measures Work Plan
IRP	Installation Restoration Program (U.S. Air Force)
JP-4	jet propellant, fuel grade 4
KAFB	Kirtland Air Force Base
LCS	laboratory control sample
LE	Landfill Excavation

Abbreviations and Acronyms (continued)

LRRI	Lovelace Respiratory Research Institute
LTMMP	Long-Term Monitoring and Maintenance Plan
LTS	Long-Term Stewardship
LWDS	Liquid Waste Disposal System
MAC	maximum allowable concentration (established by the NMED)
MCL	maximum contaminant level
MDA	minimum detectable activity
MDL	method detection limit
MWL	Mixed Waste Landfill
NFA	No Further Action
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
NNSA	National Nuclear Security Administration
NOD	Notice of Disapproval
NPN	nitrate plus nitrite
OB	Oversight Bureau
ORP	oxidation-reduction potential
PCCP	Post-Closure Care Permit
PCE	tetrachloroethene
PGWS	perched groundwater system
PQL	practical quantitation limit
PVC	polyvinyl chloride
QC	quality control
QED™	QED Environmental Systems MicroPurge® low-flow sampling method
RCRA	Resource Conservation and Recovery Act
RDX	hexahydro-trinitro-triazine
RFI	RCRA Facility Investigation
RPD	relative percent difference
RSI	Request for Supplemental Information
Sandia	Sandia Corporation
SAP	Sampling and Analysis Plan
SC	specific conductance
SDWA	Safe Drinking Water Act
SFO	Sandia Field Office
SMO	Sample Management Office
SNL/NM	Sandia National Laboratories, New Mexico
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TA	Technical Area
TAG	Tijeras Arroyo Groundwater (Investigation)
TAL	Target Analyte List
TA-V study area	Technical Area-V Groundwater Investigation Study Area
TB	trip blank
TCE	trichloroethene (equivalent to trichlorethylene)

Abbreviations and Acronyms (concluded)

tetryl	methyl 2,4,6-trinitrophenylnitramine
the Order	Compliance Order on Consent
TOC	total organic carbon
TOX	total organic halogens
TPH	total petroleum hydrocarbons
UCS	Underground Conduit System
USAF	U.S. Air Force
USGS	U.S. Geological Survey
VA	Veterans Administration
VCM	voluntary corrective measure
VE	Vapor Extraction
VOC	volatile organic compound

Units

µg/L	microgram(s) per liter
ac-ft	acre feet
ft	foot (feet)
ft^3/yr	cubic feet per year
ft/ft	feet per foot
ft/min	feet per minute
ft/yr	feet per year
gal.	gallon(s)
in/yr	inches per year
Ma	Mega Annum
mg/L	milligram(s) per liter
NTU	nephelometric turbidity units
pCi/g	picocuries per gram
pCi/L	picocuries per liter
pH	potential of hydrogen
ppbv	part(s) per billion by volume
sq mi	square mile(s)
yr	year(s)

Monitoring Well Location Descriptions

AVN-#	Area V (North)
CCBA-#	Coyote Canyon Blast Area
CTF-#	Coyote Test Field
CWL-#	Chemical Waste Landfill
CYN-#	Lurance Canyon
EOD	Explosive Ordnance Disposal
HERTF	High Energy Research Test Facility
IP	Isleta Pueblo
ITRI	Inhalation Toxicology Research Institute
LMF	Large Melt Facility
LWDS-#	Liquid Waste Disposal System
MP-#	Montessa Park
MRN-#	Magazine Road North
MVMW#	Mountain View Monitoring Well
MWL-#	Mixed Waste Landfill
NMED-#	New Mexico Environment Department
NWTA3-#	Northwest Technical Area III
OBS-#	Old Burn Site
PGS-#	Parade Ground South
PL-#	Power Line Road, west
SFR-#	South Fence Road
STW-#	Solar Tower (West)
SWTA-#	Southwest Technical Area III
TA1-W-#	Technical Area I (Well)
TA2-NW-#	Technical Area II (Northwest)
TA2-SW-#	Technical Area II (Southwest)
TA2-W-#	Technical Area II (Well)
TAV-#	Technical Area V
TJA-#	Tijeras Arroyo
TRE-#	Thunder Road East
TRN-#	Target Road North
TRS-#	Target Road South
TSA-#	Transportation Safeguards Academy
WYO-#	Wyoming
12AUP-#	ER Site 12A Underflow Piezometer

**** Meteorological Towers***

* SC1	School House
* A-21	TA-I
* A-36	TA-III and TA-V

This page intentionally left blank.

Annual Groundwater Monitoring Report

Executive Summary

Sandia Corporation (Sandia) conducts groundwater surveillance monitoring for the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) at Sandia National Laboratories, New Mexico (SNL/NM) on a site-wide basis as part of the SNL/NM Long-Term Stewardship (LTS) Program's Groundwater Monitoring Program (GMP) Groundwater Surveillance Task, and on a site-specific basis at LTS/Environmental Restoration (ER) Operations (formerly ER Project) sites with ongoing groundwater investigations. The SNL/NM facility is located on Kirtland Air Force Base (KAFB) in central New Mexico.

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia, a wholly owned subsidiary of Lockheed Martin Corporation, for the DOE/NNSA under Contract DE-AC04-94AL85000.

This Annual Groundwater Monitoring Report documents the results of the groundwater monitoring activities at SNL/NM for Calendar Year (CY) 2013. This report has been prepared to meet the environmental reporting requirements for the CY 2013 Annual Site Environmental Report, providing an annual update of groundwater data to regulators, stakeholders, and outside agencies. In addition, it serves as a valuable tool to inform the public about the groundwater quality at SNL/NM. This report includes both water quality sampling results and water level measurements. Separate chapters focus on the investigation activities at each of the following monitoring networks maintained at SNL/NM: GMP site-wide surveillance (Chapter 2.0); Chemical Waste Landfill (CWL) (Chapter 3.0); Mixed Waste Landfill (MWL) (Chapter 4.0); Technical Area (TA)-V (Chapter 5.0); Tijeras Arroyo Groundwater (TAG) (Chapter 6.0); Burn Site Groundwater (BSG) (Chapter 7.0); Solid Waste Management Units (SWMUs) 8/58 (Chapter 8.0); SWMU 49 (Chapter 9.0); SWMU 68 (Chapter 10.0); SWMU 116 (Chapter 11.0); SWMU 149 (Chapter 12.0); and SWMU 154 (Chapter 13.0).

Chapter 1.0 provides the general site description for the SNL/NM facility and describes the regulatory criteria and sample collection methods for both SNL/NM site-specific and site-wide groundwater monitoring tasks. The regional aquifer supplying the Albuquerque Bernalillo County Water Utility Authority (ABCWUA), Veterans Administration, and KAFB production wells is located within the Albuquerque Basin. The regional aquifer is mostly contained within the upper unit and, to some extent, the middle unit of the Santa Fe Group. The edge of the basin on the east side is defined by the Sandia, Manzanita, and Manzano Mountains. KAFB straddles the east side of the basin and is divided approximately in half by basin-bounding faults. On KAFB, the basin is primarily defined by the north-south-trending Sandia fault and the Hubbell Springs fault. The Tijeras fault, a strike-slip fault that trends northeast-southwest, intersects the Sandia and Hubbell Springs faults forming a system of faults collectively referred to as the Tijeras fault complex. The faults form a distinct hydrogeological boundary between the regional aquifer within the basin (approximately 500 feet [ft] below ground surface [bgs]) and the more shallow bedrock aquifer systems within the uplifted areas (generally between 50 to 325 ft bgs).

The LTS Program monitors the GMP network to provide site-wide characterization data. In addition, SNL/NM LTS and ER Operations maintain 11 site-specific groundwater monitoring networks at the following locations:

- CWL
- MWL

- TA-V
- TAG
- BSG
- SWMUs 8/58
- SWMU 49
- SWMU 68
- SWMU 116
- SWMU 149
- SWMU 154

At SNL/NM, SWMUs are regulated under the Hazardous and Solid Waste Amendment (HSWA) module of the SNL/NM Resource Conservation and Recovery Permit. In the HSWA module, a SWMU is defined as "any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste." Monitoring and/or corrective action requirements generally are determined on a SWMU-specific basis following a site investigation. A Compliance Order on Consent (the Order) between the New Mexico Environment Department (NMED), the DOE, and Sandia governs corrective actions for these sites and, accordingly, monitoring performed at the MWL; the TA-V, TAG, BSG Study Areas; and SWMUs 8/58, 49, 68, 116, 149, and 154. The CWL is a closed, regulated unit undergoing post-closure care in accordance with the CWL Post-Closure Care Permit (PCCP) that became effective on June 2, 2011. Groundwater monitoring requirements, procedures, and protocols are detailed CWL PCCP Attachment 2, Groundwater Sampling and Analysis Plan.

Groundwater Quality Monitoring Activities and Results

During CY 2013, groundwater samples were collected from monitoring wells for the 12 investigations (GMP and 11 LTS/ER Operations sites). The analytical results for samples from all monitoring wells were compared with maximum contaminant levels (MCLs) established by the U.S. Environmental Protection Agency (EPA). The results for GMP monitoring wells were also compared with NMED maximum allowable concentrations (MACs) promulgated for groundwater by the State of New Mexico Water Quality Control Commission (NMWQCC). The activities and results are summarized for each location in the following sections, and the data are presented in the attachments following each chapter.

In this report, groundwater monitoring data are presented for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (gamma spectroscopy, gross alpha/beta activity, and tritium) are provided voluntarily by the DOE/NNSA and Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Order, as specified in Section III.A of the Order.

Groundwater Monitoring Program

Chapter 2.0 documents the results of the CY 2013 groundwater surveillance monitoring activities conducted as part of the SNL/NM GMP. Water levels were measured at 118 monitoring wells by SNL/NM personnel. Water level measurements were obtained either monthly or quarterly depending on the response characteristics of the groundwater system at each well location to pumping or other stresses. The surveillance activities include the annual collection and analysis of groundwater samples from 12 monitoring wells and 1 surface water sample from a spring. Annual sampling of groundwater was conducted during April/May 2013, with some well-specific resampling completed in August and September 2013. Samples collected from all locations were analyzed for Safe Drinking Water Act list volatile organic compounds (VOCs), total organic halogens, total phenols, total alkalinity, nitrate plus nitrite (NPN), total cyanide, major anions, Target Analyte List (TAL) metals plus uranium, mercury, radionuclides by gamma spectroscopy, gross alpha/beta activity, radium-226, and radium-228. Additional

samples were collected at selected monitoring wells for analysis of high explosive (HE) compounds and isotopic uranium.

No analytical parameters exceed established MCLs or MACs, except for beryllium and fluoride. The concentrations of these analytes that exceed MCLs or MACs in groundwater samples are similar to the results reported for previous years.

Fluoride was detected above the NMWQCC groundwater protection MAC of 1.6 milligrams per liter (mg/L) at four sampling locations (Coyote Springs and monitoring wells SFR-2S, SFR-4T, and TRE-1). The concentrations range from 1.74 to 2.87 mg/L. The EPA MCL for fluoride is 4.0 mg/L.

Beryllium was detected in the surface water sample from Coyote Springs at a concentration of 0.00754 mg/L. The MCL for beryllium is 0.004 mg/L. Beryllium has been consistently detected in the surface water samples from Coyote Springs and is considered to be of natural origin.

Groundwater elevation measurements were obtained throughout CY 2013 at 97 locations on a monthly or quarterly basis. Groundwater elevation measurements obtained from representative monitoring wells were used to construct contours of the potentiometric surface. The contours display a pattern that reflects the impact of the groundwater withdrawal by water supply wells located in the northwestern portion of KAFB and within the city.

Groundwater elevations were also obtained from wells completed in the perched groundwater system (PGWS) to construct a separate potentiometric surface (groundwater elevation) contour map. The contours indicate groundwater flow in the PGWS is toward the southeast. Water levels are declining in the northwest and increasing slightly in the east presumably due to the drainage of the system to the east and perhaps some additional recharge from the Tijeras Arroyo.

Chemical Waste Landfill

Chapter 3.0 discusses the CWL semiannual groundwater monitoring activities performed during January and July 2013. Groundwater samples were collected from four monitoring wells (CWL-BW5, CWL-MW9, CWL-MW10, and CWL-MW11) and analyzed for trichloroethene (TCE), 1,1,2-trichloro-1,2,2-trifluoroethane, tetrachloroethene, 1,1-dichloroethene, chloroform, trichlorofluoromethane, nickel, and chromium (January); and for TCE, nickel, and chromium (July). No analytes were detected at concentrations exceeding the associated EPA MCLs in any of the CWL groundwater samples. The analytical results are comparable to historical values.

Mixed Waste Landfill

Chapter 4.0 discusses the MWL annual groundwater sampling activities conducted in January and February 2013. Groundwater samples were collected from seven monitoring wells (MWL-BW2, MWL-MW4, MWL-MW5, MWL-MW6, MWL-MW7, MWL-MW8, and MWL-MW9) and analyzed for VOCs, TAL metals plus uranium, anions (i.e., bromide, chloride, fluoride, and sulfate), total alkalinity, NPN, radionuclides by gamma spectroscopy, gross alpha/beta activity, and tritium as specified in the Order. No analytes were detected at concentrations exceeding the associated EPA MCLs, except for chromium in the unfiltered sample fraction from monitoring well MWL-MW4. This exceedance appears to be related to the corrosion of stainless steel components of the packer and dedicated sampling system in this well (no other wells at MWL have a dedicated sampling system). The analytical results for the other six monitoring wells are comparable to historical values.

Technical Area V Groundwater Study Area

Chapter 5.0 discusses the TA-V groundwater monitoring activities conducted during CY 2013. Both TCE and nitrate have been identified as constituents of concern (COCs) in groundwater at the TA-V

Groundwater Study Area (TA-V study area) based on detections above the EPA MCL in samples collected from monitoring wells. Currently 16 wells in the TA-V Study Area are monitored for water quality and water levels. Table XI-1 of the Order specifies that the sampling frequency for groundwater monitoring at TA-V is quarterly. Unique features of the TA-V Study Area include low concentrations of TCE and nitrate in the regional aquifer.

The conceptual site model of contaminant transport at TA-V includes release from the source term, migration through the vadose zone, and movement in groundwater. The potential sources of TCE and/or nitrate in the TA-V Study Area include wastewater disposal systems and seepage pits. Based on the historical use and disposal of chlorinated solvents, the extent of TCE in groundwater is probably associated with multiple aqueous releases of solvents and subsequent vapor phase transport through the vadose zone. The slow rate of groundwater flow (4 to 20 feet per year) influences the present distribution of TCE in the aquifer.

Only NPN and TCE were detected above the MCLs in groundwater samples from TA-V Study Area wells. NPN concentrations exceed the MCL of 10 mg/L in samples from monitoring wells LWDS-MW1, TAV-MW10, and AVN-1 with a maximum concentration of 13.0 mg/L in the sample collected from monitoring well LWDS-MW1 in November 2013.

During CY 2013, TCE exceeded the MCL of 5 micrograms per liter (μg/L) in samples from five monitoring wells (LWDS-MW1, TAV-MW6, TAV-MW10, TAV-MW12, and TAV-MW14). The maximum concentration of TCE detected during this reporting period is 18.4 μg/L found in the sample from monitoring well LWDS-MW1 collected in March 2013.

The analytical results for this reporting period are consistent with historical concentrations. The current conceptual site model for the TA-V Study Area does not require modification based on the sampling results for CY 2013.

The following activities took place for the TA-V Study Area during CY 2013:

- Monthly or quarterly water level measurements were obtained for all TA-V Study Area wells.
- Semiannual and quarterly groundwater sampling events were conducted at 16 wells in February/March, May/June, July/August, and October/November 2013.
- The final quarterly soil vapor sampling was conducted at monitoring wells TAV-SV01, TAV-SV02, and TAV-SV03 in February/March 2013.

Tijeras Arroyo Groundwater Study Area

Chapter 6.0 addresses groundwater monitoring activities conducted during CY 2013 at the TAG Study Area. Currently, 21 wells in the TAG Study Area are monitored for water quality, and 30 wells are monitored for water levels. Two groundwater systems are present in the TAG Study Area: the PGWS at approximately 220 to 330 ft bgs and the regional aquifer groundwater system at approximately 440 to 570 ft bgs. Groundwater monitoring wells are completed within either the PGWS or regional aquifer. Unique features of the TAG Study Area include concentrations of TCE below to just above the MCL at scattered locations in the PGWS and concentrations of nitrate above the MCL at scattered locations in the PGWS and regional aquifer.

For CY 2013, wells were sampled in March, June, August/September, and November. The samples were analyzed for VOCs, NPN, anions, TAL metals (plus uranium), gross alpha/beta activity, tritium, and

radionuclides by gamma spectroscopy. Depending on their locations and historical concentrations of COCs, wells were sampled quarterly, semiannually, or annually during this reporting period.

Both TCE and nitrate have been identified as COCs in groundwater at the TAG Study Area based on historical groundwater monitoring results. Only NPN and TCE were detected above MCLs in samples from TAG Study Area wells. In CY 2013, NPN concentrations exceeded the MCL of 10 mg/L in samples from monitoring wells TA2-SW1-320, TA2-W-19, TJA-2, TJA-4, and TJA-7, with a maximum concentration of 38.5 mg/L in the sample from monitoring well TJA-4 collected during the November 2013 sampling event. NPN concentrations in monitoring wells TA2-SW1-320, TJA-4, and TJA-7 have generally exceeded the MCL for the life of the wells, whereas NPN concentrations occasionally have exceeded the MCL in samples from monitoring wells TJA-2 and TA2-W-19.

During CY 2013, TCE exceeded the MCL of 5 µg/L in the groundwater sample from one PGWS well, WYO-4. The maximum concentration of TCE detected during this reporting period is 9.23 µg/L in the sample from monitoring well WYO-4 collected during the August 2013 sampling event. TCE concentrations in samples from monitoring well WYO-4 slightly exceed the MCL, and trends are level to slightly increasing over time.

The analytical results for this reporting period are consistent with historical concentrations. The current conceptual site model for the TAG Study Area does not require modification based on the sampling results for CY 2013.

The following activities took place for the TAG Study Area during CY 2013:

- Monthly, quarterly, or annual water level measurements were obtained from TAG monitoring wells.
- Quarterly groundwater sampling events were conducted at seven monitoring wells (TA2-SW1-320, TA2-W-19, TA2-W-26, TJA-2, TJA-4, TJA-7, and WYO-4) in March, June, August/September, and November 2013. The sampling frequency for monitoring well TJA-3 was modified to quarterly sampling in November 2013.
- Semiannual groundwater sampling was conducted at four monitoring wells (TA2-W-01, TA2-W-27, TJA-3, and TJA-6) in March and August/September 2013.
- Annual groundwater sampling was conducted at 10 monitoring wells (PGS-2, TA1-W-01, TA1-W-02, TA1-W-03, TA1-W-04, TA1-W-05, TA1-W-06, TA1-W-08, TA2-NW1-595, and WYO-3) in August/September 2013.

Burn Site Groundwater Study Area

Chapter 7.0 discusses the groundwater monitoring activities conducted during CY 2013 at the BSG Study Area, which is located around the active Lurance Canyon Burn Site facility. Groundwater investigations were initiated in 1997 at the request of the NMED after elevated nitrate levels were discovered in the Burn Site Well (a nonpotable production well used for fire suppression). The study area consists of 10 monitoring wells, and samples were collected and analyzed for VOCs, HE compounds, total petroleum hydrocarbons (TPH)-diesel range organics, TPH-gasoline range organics, anions, NPN, TAL metals (plus uranium), gross alpha/beta activity, isotopic uranium, tritium, and radionuclides by gamma spectroscopy. Additional samples for alkalinity and major cations (as calcium, magnesium, potassium, and sodium) were collected from monitoring well CYN-MW13 only.

Only NPN was detected above the MCL in samples from BSG Study Area wells. NPN results exceed the MCL of 10 mg/L in samples from monitoring wells CYN-MW9, CYN-MW11, CYN-MW12, and CYN-MW13 with a maximum concentration of 41.9 mg/L in the sample from monitoring well CYN-MW9 collected during the December 2013 sampling event.

The analytical results for this reporting period are consistent with historical concentrations. The current conceptual site model requires light modification based on the sampling results for CY 2013.

The following activities took place for the BSG Study Area during CY 2013:

- Semiannual groundwater sampling was conducted at eight monitoring wells (CYN-MW4, CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, and CYN-MW13) in April/May and December 2013.

Solid Waste Management Units 8/58

Chapter 8.0 discusses the groundwater monitoring activities conducted during CY 2013 at SWMUs 8/58, which are located in the Arroyo del Coyote watershed that captures runoff from the western flank of the Manzanita Mountains. Monitoring wells CCBA-MW1 and CCBA-MW2 were installed in August 2011, and these wells have been sampled quarterly since then. The groundwater samples from each well were analyzed for VOCs, SVOCs, HE compounds, NPN, major anions (i.e., bromide, chloride, fluoride, and sulfate), major cations (i.e., calcium, magnesium, potassium, and sodium), alkalinity, TAL metals plus uranium, perchlorate, total cyanide, radionuclides by gamma spectroscopy, gross alpha/beta activity, and isotopic uranium.

No parameters were detected above established MCLs, except for fluoride. Fluoride exceeds the established MCL of 4.0 mg/L in monitoring well CCBA-MW1 samples at concentrations ranging from 4.57 to 5.00 mg/L.

The following activities took place for SWMUs 8/58 during CY 2013:

- Quarterly groundwater sampling was conducted at monitoring wells CCBA-MW1 and CCBA-MW2 in January, April, July, and October 2013.

Solid Waste Management Unit 49

Chapter 9.0 discusses the SWMU 49 annual groundwater monitoring activities performed during CY 2013. SWMU 49 is located in Lurance Canyon and consists of a surface discharge area associated with a former trailer used as a darkroom and the area around a drainpipe outfall from Building 9820. The DOE/NNSA and Sandia received a letter from the NMED on April 14, 2010, that lists SWMU 49 under the heading of "SWMUs/AOCs to be Subject to Groundwater Monitoring Controls" and further states that SWMU 49 requires long-term monitoring of groundwater on an annual basis as a site control. Annual sampling was completed in 2013, and samples were analyzed for general chemistry, VOCs, HE compounds, perchlorate, metals, cyanide, NPN, gross alpha/beta activity, and radionuclides by gamma spectroscopy. No analytes were detected above their respective MCLs.

The following activities took place for SWMU 49 during CY 2013:

- Annual groundwater sampling was conducted at monitoring well CYN-MW5 in January 2013.

- Periodic groundwater elevation data were obtained from monitoring well CYN-MW5.

Solid Waste Management Unit 68
Chapter 10.0 discusses the quarterly groundwater monitoring activities performed during CY 2013 at SWMU 68, which is located in Coyote Test Field. Monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 were installed in August 2011, and these wells have been sampled quarterly since then. The groundwater samples from each well were analyzed for VOCs, SVOCs, HE compounds, NPN, major anions (i.e., bromide, chloride, fluoride, and sulfate), major cations (i.e., calcium, magnesium, potassium, and sodium), alkalinity, TAL metals plus uranium, perchlorate, total cyanide, hexavalent chromium, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium. No parameters were detected above established MCLs.

The following activities took place for SWMU 68 during CY 2013:

- Quarterly groundwater sampling was conducted at monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 in January, April, July, and October 2013.

Solid Waste Management Unit 116
Chapter 11.0 discusses the SWMU 116 annual groundwater monitoring activities performed during CY 2013. SWMU 116 is located on the western margin of the Manzanita Mountain foothills and includes the immediate area surrounding the five seepage pits and septic tank located south of Building 9990. The DOE/NNSA and Sandia received a letter from the NMED on April 14, 2010, that lists SWMU 116 under the heading of "SWMUs/AOCs to be Subject to Groundwater Monitoring Controls" and further states that SWMU 116 requires long-term monitoring of groundwater on an annual basis as a site control. Annual sampling was completed in 2013, and samples were analyzed for general chemistry, VOCs, HE compounds, perchlorate, TAL metals plus uranium, cyanide, NPN, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium. No analytes were detected above their respective MCLs.

The following activities took place for SWMU 116 during CY 2013:

- Annual groundwater sampling was conducted at monitoring well CTF-MW1 in January 2013.

- Periodic groundwater elevation data were obtained from monitoring well CTF-MW1.

Solid Waste Management Unit 149
Chapter 12.0 discusses the quarterly groundwater monitoring activities performed during CY 2013 at SWMU 149, which is located in the Coyote Test Field. Monitoring well CTF-MW3 was sampled quarterly and the samples were analyzed for VOCs, TAL metals, general chemistry parameters, perchlorate, and NPN. No analytical results for the monitoring well CTF-MW3 groundwater samples exceed the corresponding MCLs.

The following activities took place for monitoring well CTF-MW3 near SWMU 149 during CY 2013:

- Quarterly groundwater sampling was conducted at monitoring well CTF-MW3 in March, June, and December 2013. Groundwater samples were not collected in September 2013 because severe thunderstorms eroded both roads to monitoring well CTF-MW3.

- Quarterly reporting of analytical results for monitoring well CTF-MW3 was conducted.

Solid Waste Management Unit 154

Chapter 13.0 discusses the quarterly groundwater monitoring activities performed during CY 2013 at SWMU 154, which is located in Coyote Test Field. Monitoring well CTF-MW2 was sampled quarterly and the samples were analyzed for VOCs, SVOCs, HE compounds, NPN, major anions, alkalinity, TAL total metals plus uranium, perchlorate, radionuclides by gamma spectroscopy, gross alpha/beta activity, and isotopic uranium.

For all four quarters, arsenic was detected above the established MCL of 0.010 mg/L. Arsenic concentrations ranged from 0.0366 to 0.0496 mg/L, with the maximum concentration reported for the filtered sample collected in March 2013. No other analytical results for the monitoring well CTF-MW2 groundwater samples exceed the corresponding MCLs.

The following activities took place for monitoring well CTF-MW2 near SWMU 154 during CY 2013:

- Quarterly groundwater sampling was conducted at monitoring well CTF-MW2 in March, June, September, and December 2013.
- Quarterly reporting of analytical results for groundwater samples from monitoring well CTF-MW2 was conducted.

Future Groundwater Monitoring Events

The groundwater monitoring events conducted on a site-wide basis as part of the SNL/NM GMP and at site-specific LTS/ER Operations sites will continue on a quarterly, semiannual, annual, and biennial basis during CY 2014, as specified by regulatory guidance. The results for these monitoring events will be presented in the Annual Groundwater Monitoring Report for CY 2014.

1.0 Introduction

Sandia Corporation (Sandia) conducts general groundwater surveillance monitoring for the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) at Sandia National Laboratories, New Mexico (SNL/NM) on a site-wide basis as part of the SNL/NM Long-Term Stewardship (LTS) Program's Groundwater Monitoring Program (GMP) Groundwater Surveillance Task, and site-specific groundwater monitoring at LTS/Environmental Restoration (ER) Operations (formerly ER Project) sites with ongoing groundwater investigations. The purpose of this document is to report to regulators and other stakeholders the results of the consolidated groundwater monitoring activities at SNL/NM for Calendar Year (CY) 2013. Separate chapters focus on the investigation activities at each of the following monitoring networks maintained at SNL/NM: GMP site-wide surveillance (Chapter 2.0); Chemical Waste Landfill (CWL) (Chapter 3.0); Mixed Waste Landfill (MWL) (Chapter 4.0); Technical Area (TA)-V (Chapter 5.0); Tijeras Arroyo Groundwater (TAG) (Chapter 6.0); Burn Site Groundwater (BSG) (Chapter 7.0); Solid Waste Management Units (SWMUs) 8/58 (Chapter 8.0); SWMU 49 (Chapter 9.0); SWMU 68 (Chapter 10.0); SWMU 116 (Chapter 11.0); SWMU 149 (Chapter 12.0); and SWMU 154 (Chapter 13.0).

1.1 Site Description

The SNL/NM facility is located on Kirtland Air Force Base (KAFB), New Mexico. KAFB is a 51,559-acre (80.56 square miles [sq mi]) military installation that includes 20,486 acres withdrawn from the Cibola National Forest through an agreement with the U.S. Forest Service. Located at the foot of the Manzanita Mountains, KAFB has a mean elevation of 5,384 feet (ft) above mean sea level and a maximum elevation of 7,986 ft above mean sea level. KAFB and SNL/NM are located adjacent to the City of Albuquerque, which borders KAFB on its north, northeast, west, and southwest boundaries (Figure 1-1).

The SNL/NM facility is a government-owned, contractor-operated, multi-program laboratory overseen by the DOE/NNSA through the Sandia Field Office in Albuquerque, New Mexico. Sandia, a wholly-owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM under Contract DE-AC04-94AL85000.

1.1.1 Climate

The Albuquerque area is characterized by low precipitation and wide temperature extremes that are typical of high-altitude, dry, continental climates. The average annual precipitation measured at Albuquerque International Sunport is 9.47 inches (National Oceanic and Atmospheric Administration National Weather Service station). Half of this precipitation occurs from June through August in the form of brief but intense thunderstorms. The evaporation potential is high because of the low humidity and generally warm temperatures.

1.1.2 Geologic Setting

SNL/NM is located near the east-central edge of the Albuquerque Basin. The Albuquerque Basin (also known as the Middle Rio Grande Basin) is one of a series of north-south–trending basins that was formed during the extension of the Rio Grande Rift. The basin is approximately 3,000 sq mi. Rift formation initiated in the late Oligocene and continued into the early Pleistocene, with the primary period of extension occurring between 30 and 5 Mega annum (Ma); or million years before present. Tectonic activity, which began uplifting the Sandia, Manzanita, and Manzano Mountains, was most prevalent from about 15 to 5 Ma (Thorn *et al.* 1993). The rift today extends from south central Colorado to northern Mexico. The vertical displacement between the rock units exposed at the top of Sandia Crest and the equivalent units located at the bottom of the basin is more than 3 miles.

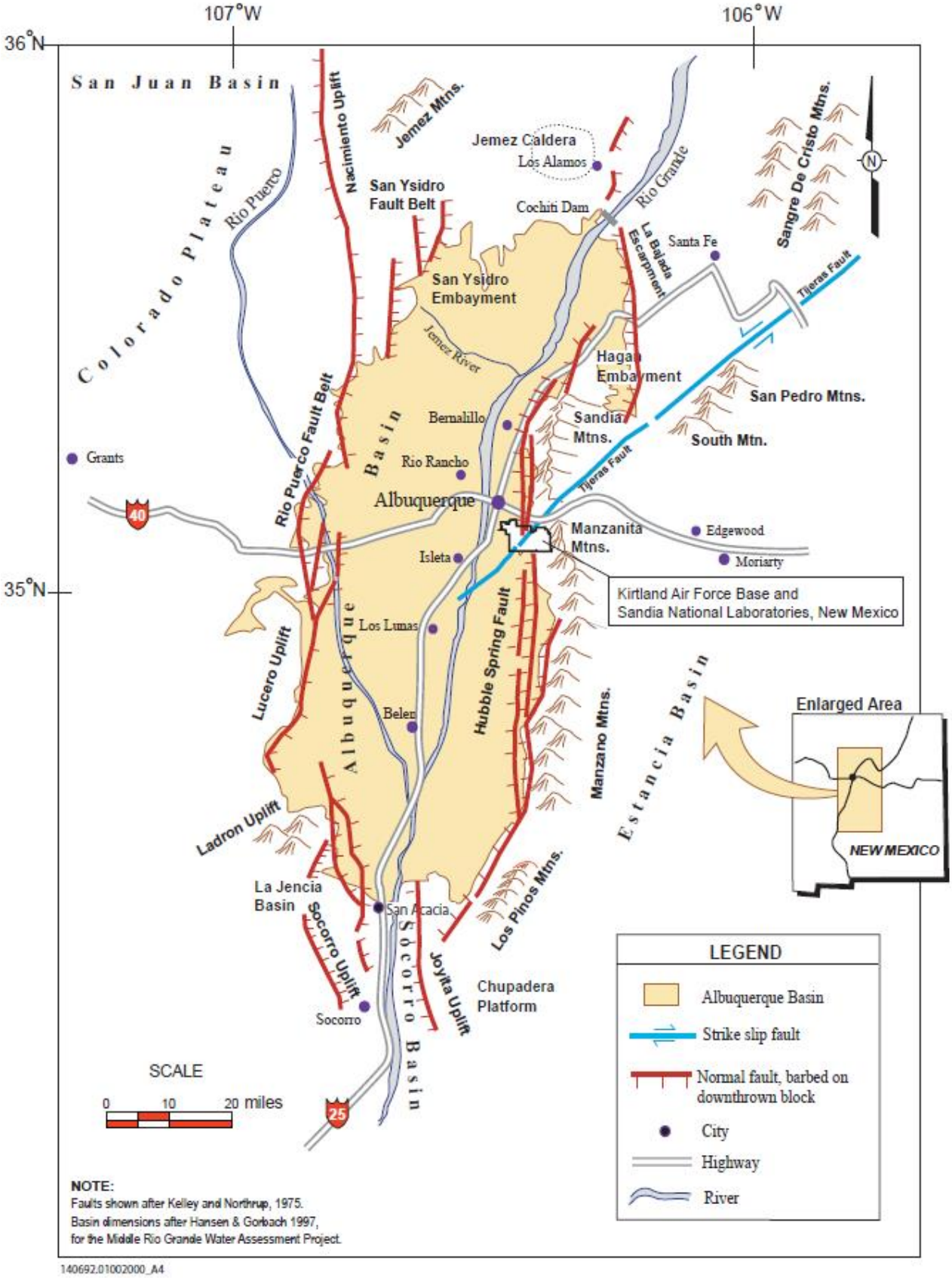


Figure 1-1. Albuquerque Basin, North-Central New Mexico

As shown on Figure 1-1, the structural boundaries of the Albuquerque Basin are as follows:

- Colorado Plateau on the west
- Nacimiento Uplift and the Jemez Mountains to the north
- La Bajada Escarpment to the northeast
- Sandia, Manzanita, Manzano, and Los Pinos mountains to the east
- Joyita and Socorro uplifts to the south
- Ladron and Lucero uplifts to the southwest

As the Rio Grande Rift continued to expand, the Albuquerque Basin subsided. Over the last 30 Ma, the Ancestral Rio Grande meandered across the valley formed by the subsidence and deposited sediments in broad stream channels and floodplains derived from sources to the north. The basin also filled with aeolian deposits and alluvial materials shed from surrounding uplifts (Hawley and Haase 1992). This sequence of sediments is called the Santa Fe Group. The thickness of the Santa Fe Group is up to 16,400 ft at the deepest part of the basin (Lozinsky 1994). The entire sequence consists of unconsolidated sediments, which thin toward the edge of the basin and are truncated by normal faults at the basin-bounding uplifts. Units overlying the Santa Fe Group include Pliocene Ortiz gravel and Rio Grande fluvial deposits, which are interbedded with Tertiary and Quaternary basaltic and pyroclastic materials. Based on recent geophysical models, the Albuquerque Basin has been further divided into three, 2-4 mile deep, interconnected structural depressions from north to south: the Santo Domingo, Calabacillas, and Belen subbasins. KAFB lies near the intersection of the Calabacillas and Belen subbasins along a broad, northwest elongate structural high called the Mountainview prong that separates the two subbasins (Grauch and Connell, 2013). These tectonic/sedimentation features contribute greatly to the complex structural setting described below.

As shown on Figures 1-2 and 1-3, the four primary faults on the east side of KAFB are (1) the Sandia fault, (2) the West Sandia fault, (3) the Hubbell Spring fault (West, Central, and East fault segments), and (4) the Tijeras fault. The Sandia fault is thought to be the primary boundary between the Sandia Mountains and the Albuquerque Basin. The Hubbell Spring fault extends northward from Socorro County and terminates on KAFB in the vicinity of the Tijeras fault. The Sandia and the Hubbell Spring faults are north-south-trending, down-to-the-west, en-echelon normal faults bounding the east side of the Albuquerque Basin.

The Tijeras fault is an ancient strike-slip fault that developed in the Precambrian or early Paleozoic (approximately 600 Ma) and was reactivated in association with the Laramide Orogeny during the Cretaceous period (Kelley 1977). The fault also demonstrates Quaternary movement (Kelson et al. 1999, GRAM 1995). This fault has been traced at least as far north as Madrid, New Mexico, and continues into the Sangre de Cristo Mountains as the Cañoncito fault. Preferential erosion along the fault formed Tijeras Canyon, which divides the Sandia and Manzanita Mountains. The fault trends southwest from Tijeras Canyon, intersects the northeast boundary of KAFB, and crosses KAFB east and south of Manzano Base. Manzano Base occupies an uplift of four peaks defined by the Tijeras fault on the east side and the Sandia fault on the west side. The Sandia, Hubbell Spring, and Tijeras faults converge near the southeast end of TA-III. This complicated system of faults, defining the east edge of the basin, is referred to collectively as the Tijeras fault complex.

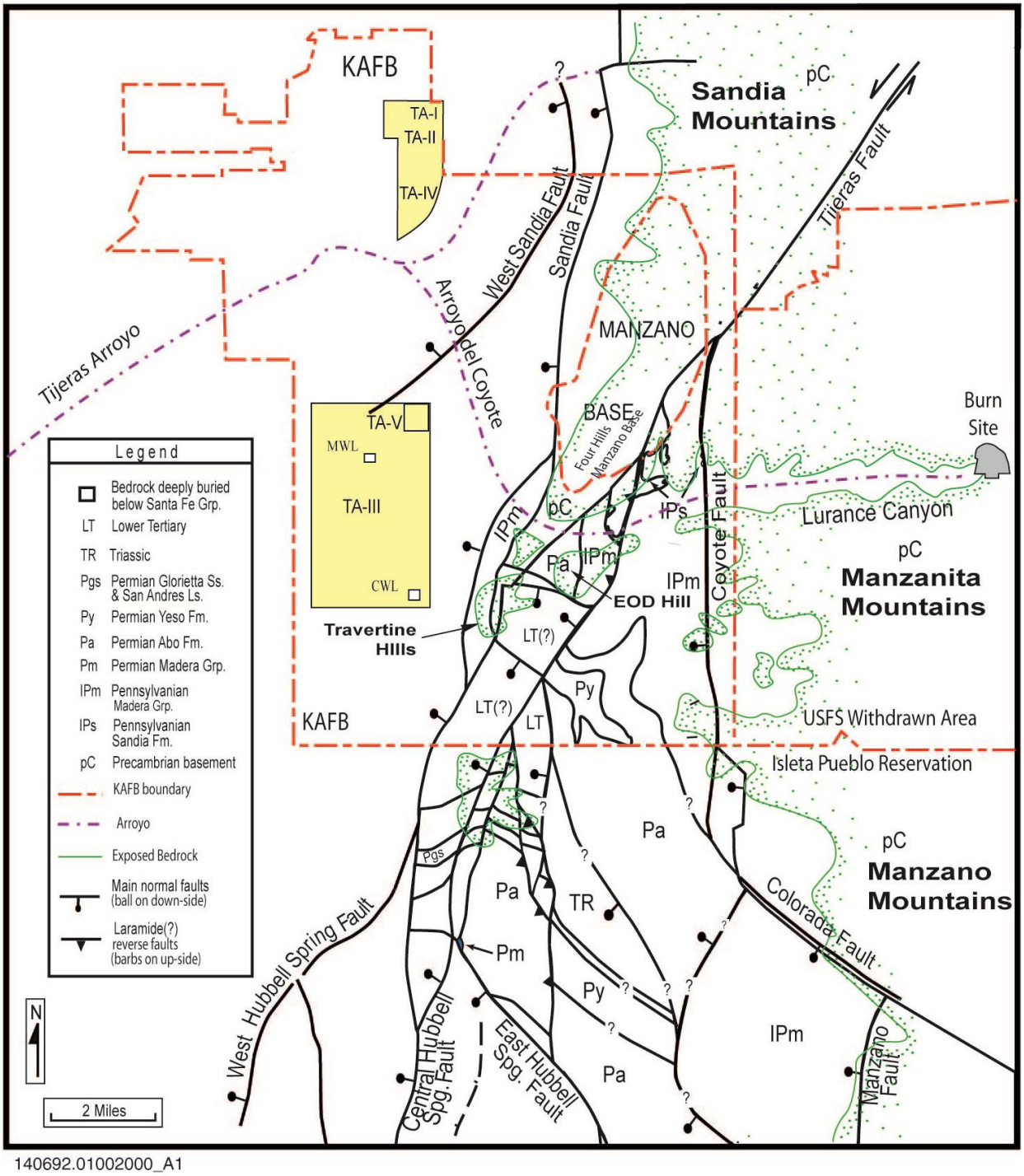


Figure 1-2. Generalized Geology in the Vicinity of SNL/NM and KAFB (Van Hart 2003)

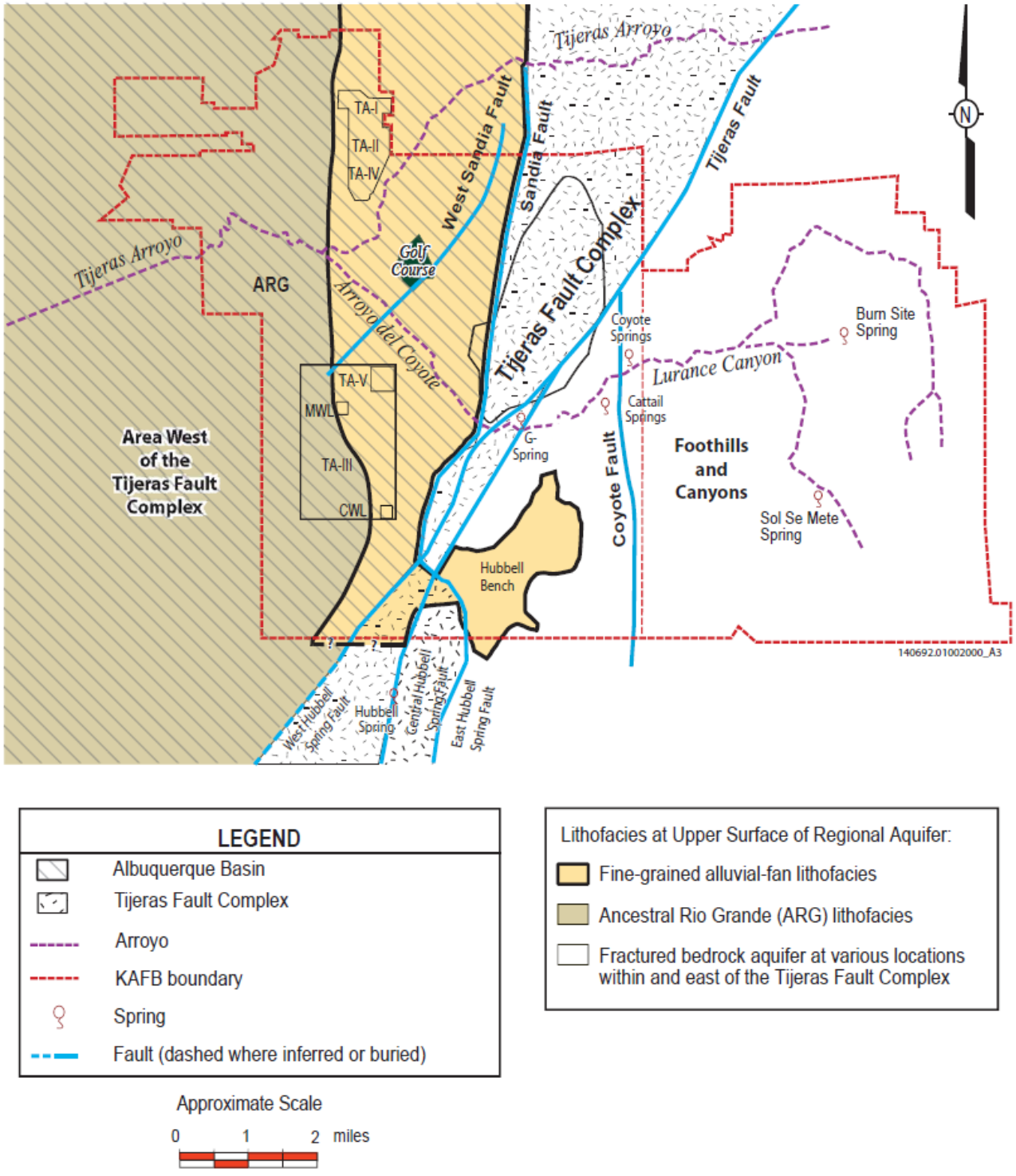


Figure 1-3. Hydrogeologically Distinct Areas Primarily Controlled by Faults (Modified from SNL 1995)

1.1.3 Hydrogeology

Figure 1-3 shows the three distinct hydrogeologic regions for the KAFB area: (1) the Albuquerque Basin, (2) the Tijeras fault complex, and (3) the foothills and canyons region. The primary division is between the east and west sides of the Tijeras fault complex, which is the transitional zone. This division marks the boundary between the two regional aquifer systems. It is important to note that the boundaries shown on Figure 1-3 identify the approximate hydrologic settings. A deep aquifer is present within the Albuquerque Basin where the regional aquifer lies at approximately 500 ft below ground surface. A perched groundwater system (PGWS) also lies above the regional aquifer in the vicinity of TA-I, TA-II, and TA-IV in the TAG Area of Concern (AOC). The PGWS is not shown on Figure 1-3, but is discussed in detail in Chapter 6.0. The PGWS extends south to the KAFB Golf Course area, north to portions of TA-I, west of TA-II, and along the west side of the KAFB Landfill. Possible explanations for the existence of a PGWS are arroyo recharge, irrigation of the golf course and other vegetated areas, water leakage from utility distribution lines, waste water discharges, and infiltration from a former unlined KAFB sewage lagoon system (SNL February 1998).

East of the Tijeras fault complex, a thin layer of alluvium covers the bedrock. The hydrogeology in this area is poorly understood due to the complex geology created by the fault systems. On the east side of the Tijeras fault complex the depth-to-groundwater ranges from about 45 to 325 ft below ground surface. Most of the nonpotable water supply and monitoring wells east of the faults are completed in fractured bedrock at relatively shallow depths and produce modest yields of groundwater.

Groundwater in the bedrock aquifers on the east side of KAFB generally flows west out of the canyons toward the Tijeras fault complex (Plate 1). The groundwater gradient is relatively steep, 0.03 feet per foot, in crossing the Tijeras fault complex from east to west. The change in the groundwater elevation is 350 ft over 15,840 ft. The steep gradient suggests that westward groundwater flow is retarded by the Tijeras fault complex. Within the sediments of the Albuquerque Basin, the gradient flattens out quickly to about 0.005 feet per foot (feet of vertical change per foot of horizontal distance). The historic direction of regional groundwater flow within the basin was westward from the mountains toward the Rio Grande. However, due to groundwater pumping at KAFB, Veterans Administration, and Albuquerque Bernalillo County Water Utility Authority (ABCWUA) production wells, a depression in the regional aquifer has created a broad trough originating at the well fields near the northwest corner of KAFB. The impact of the seasonal variation in water production by both KAFB and ABCWUA wells can be observed as fluctuations in the groundwater elevations of some SNL/NM and KAFB monitoring wells as far to the southeast as TA-III.

1.1.4 Surface Water Hydrology

The Rio Grande, located approximately 3 miles west of KAFB, is the major surface hydrologic feature in central New Mexico. The Rio Grande originates in the San Juan Mountains of Colorado and terminates at the Gulf of Mexico, near Brownsville, Texas. The Rio Grande has a total length of 1,760 miles and is the third longest river system in North America. Surface water (with the exception of several springs) within the boundaries of KAFB is found only as ephemeral streams (arroyos) that flow for short periods from runoff after storm events or during the spring melt of mountain snowpack. The primary surface water feature that drains the eastern foothills on KAFB is the Tijeras Arroyo. The Arroyo del Coyote joins Tijeras Arroyo just south of TA-IV (about 1 mile west of the golf course [Figure 1-3]). Both Tijeras Arroyo and Arroyo del Coyote carry significant runoff after heavy thunderstorms that usually occur from June through August. The Tijeras Arroyo, above the confluence with Arroyo del Coyote, drains about 80 sq mi, while Arroyo del Coyote drains about 39 sq mi (U.S. Army Corps of Engineers [USACE] 1979). The total watershed for Tijeras Arroyo, which includes the Sandia and Manzanita Mountains and portions of KAFB, is approximately 126 sq mi. All active SNL/NM facilities are located outside the 100-year floodplain of both Tijeras Arroyo and Arroyo del Coyote.

Several springs on KAFB are associated with the uplifts in the Tijeras Fault Complex and Foothills and Canyons hydrogeologic areas: (1) Coyote Springs, Cattail Springs, and G Spring within Arroyo del Coyote, (2) Burn Site Spring in Lurance Canyon, and (3) Sol se Mete Spring within the Manzanita Mountains. Coyote Springs and Sol se Mete are perennial springs (continuously flowing), while the others are ephemeral springs. Hubbell Spring (a perennial spring) is located just south of KAFB on Isleta Pueblo. The wetland areas created by these springs, though very limited in extent, provide a unique ecological niche in an otherwise arid habitat.

Groundwater recharge in the vicinity of KAFB is primarily derived from the eastern mountain front and along the major arroyos. However, the amount of recharge occurring in the foothills and canyons is not well characterized. The estimated recharge for that portion of Tijeras Arroyo on KAFB is estimated to be up to 2.2 million cubic feet per year (50 acre ft/year) (SNL 1998). The best estimate for the groundwater recharge associated with Arroyo del Coyote is 0.4 million cubic feet per year (9.2 acre feet/year). Infiltration studies conducted by the ER Site-Wide Hydrogeologic Characterization Project determined that recharge is negligible from direct precipitation due to the high rate of evapotranspiration for most other areas on KAFB, especially on alluvial-fan slopes and other relatively flat areas.

1.2 Groundwater Monitoring

Extensive groundwater monitoring is conducted at KAFB. The U.S. Air Force Installation Restoration Program has a large monitoring well network associated with several closed landfills and a closed sewage lagoon system. Additional KAFB wells are sited to monitor and characterize several nitrate plumes and an extensive KAFB jet fuel/aviation gasoline plume associated with the KAFB Bulk Fuels Facility. SNL/NM personnel monitor groundwater on KAFB at locations associated with DOE/NNSA-owned facilities and sites permitted by the U.S. Air Force for DOE/NNSA use. Groundwater monitoring is conducted by SNL/NM LTS/ER Operations on a site-wide and site-specific basis. Figure 1-4 illustrates the extensive monitoring well network at KAFB. Plate 1 more accurately portrays the monitoring well network and is presented at the end of this Annual Groundwater Monitoring Report along with Table 1, which provides construction details for the groundwater monitoring wells. Table 1-1 lists the CY 2013 sampling events conducted at the GMP and LTS/ER Operations monitoring networks maintained at SNL/NM.

Water quality and groundwater analytical results for the monitoring activities are summarized in Table 1-2. Detected analytes that exceed the U.S. Environmental Protection Agency (EPA) drinking water regulatory criteria (EPA May 2009) for samples collected by SNL/NM personnel during groundwater monitoring activities in CY 2013 are listed in Table 1-3.

In this report, groundwater monitoring data are presented for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (gamma spectroscopy and gross alpha/beta activity) are provided voluntarily by the DOE/NNSA and Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Compliance Order on Consent (the Order) between the New Mexico Environment Department (NMED), Sandia, and the DOE, as specified in Section III.A of the Order (NMED April 2004).

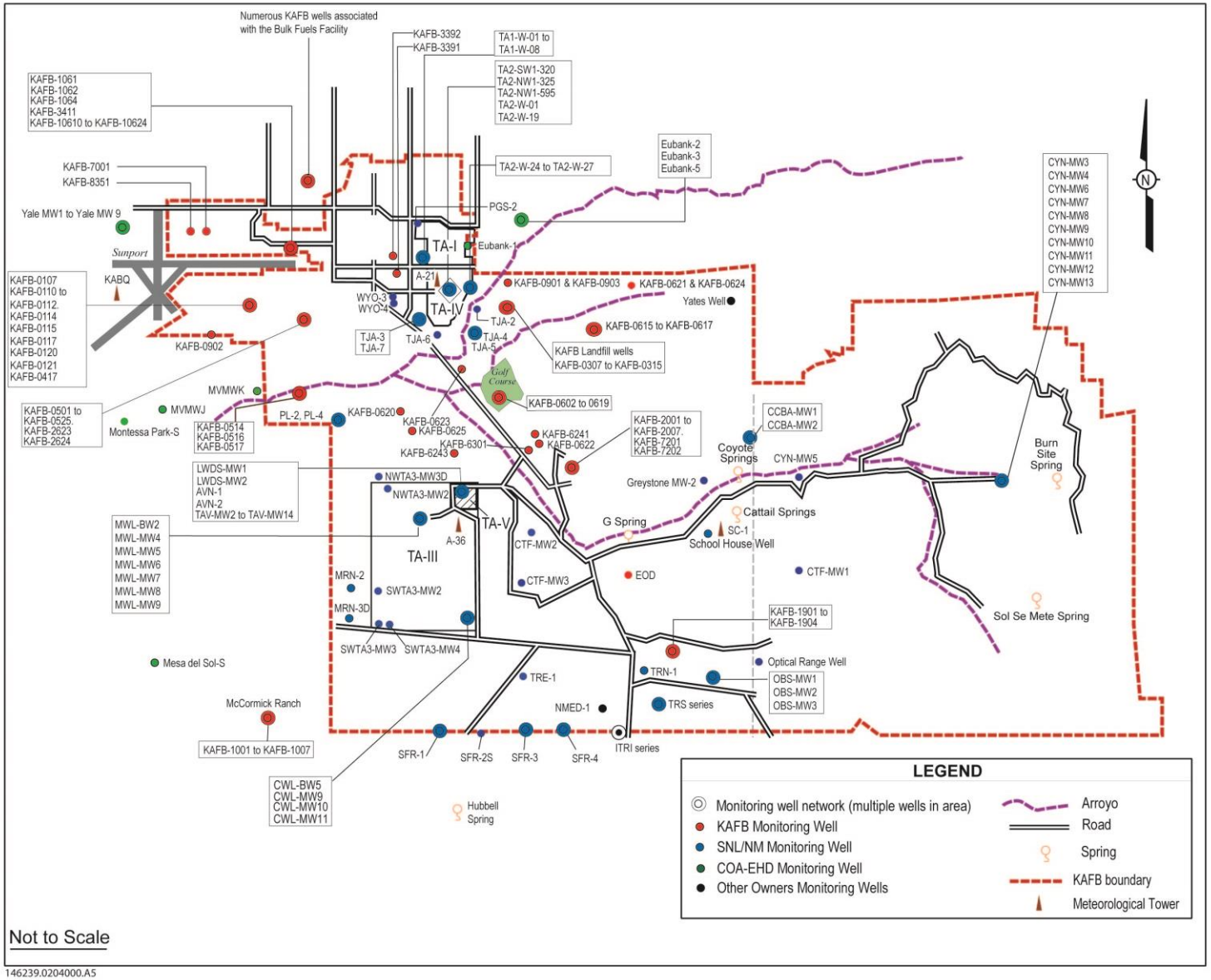


Figure 1-4. Wells and Springs within SNL/NM and KAFB

Table 1-1. Sample Collection Events for Groundwater Quality Monitoring at SNL/NM from January through December 2013

Sampling Event	GMP	CWL	MWL	TA-V	TAG	BSG	SWMUs 8/58	SWMU 49	SWMU 68	SWMU 116	SWMU 149	SWMU 154
January 13		√	√				√	√	√	√		
February 13			√	√								
March 13				√	√						√	√
April 13	√					√	√		√			
May 13	√			√		√						
June 13				√	√						√	√
July 13		√		√			√		√			
August 13	√				√							
September 13	√				√							√
October 13				√			√		√			
November 13				√	√							
December 13						√					√	√

NOTES:
BSG = Burn Site Groundwater.
CWL = Chemical Waste Landfill.
GMP = Groundwater Monitoring Program.
MWL = Mixed Waste Landfill.
SNL/NM = Sandia National Laboratories, New Mexico.
SWMU = Solid Waste Management Unit.
TA-V = Technical Area V.
TAG = Tijeras Area Groundwater.

Table 1-2. Summary of SNL/NM Groundwater Monitoring Results for Calendar Year 2013

	SNL/NM Groundwater Monitoring
Number of Active Wells Monitored	79
Number of Analyses Performed	20,485
Percent of Non-detected Results	79 %

Analyte	Number of Detects	Number of Non-Detects	Minimum Detected Value	Maximum Detected Value	Mean Detected Value	Standard Deviation for Detected Values	MCL
Summary of Field Water Quality Parameters (units as indicated below)							
pH in SU	179	0	5.71	7.95	7.21	0.3623	NE
Specific Conductivity in μmhos/cm	179	0	336.1	3907	747.8	552.1	NE
Temperature in °C	179	0	5.05	26.73	18.74	2.882	NE
Turbidity in NTU	179	0	0.19	20.6	1.49	2.412	NE
Detected Organic Compounds in μg/L							
Benzo (a) pyrene	1	32	0.640	0.640	0.640	N/A	0.200
Benzo (b) fluoranthene	2	31	0.442	0.640	0.541	0.140	NE
Benzo (k) fluoranthene	2	31	0.411	0.980	0.696	0.402	NE
Bromodichloromethane	3	198	0.580	0.760	0.6467	0.0987	NE
Chloroform	11	195	0.320	0.830	0.5709	0.1868	NE
Dibromochloromethane	2	199	0.380	0.450	0.415	0.0495	NE
Dichloroethane, 1,1-	13	188	0.330	1.27	0.6562	0.3261	NE
Dichloroethene, 1,1-	1	205	0.940	0.940	0.940	N/A	7.0
Dichloroethene, cis-1,2-	42	159	0.320	4.40	1.568	1.279	70
Diesel Range Organics	3	17	71.7	99.4	85.67	13.85	NE
RDX	5	46	0.248	0.357	0.3336	0.0479	NE
Tetrachloroethene	11	195	0.320	1.62	0.903	0.383	5.0
Toluene	4	197	0.320	0.490	0.405	0.0785	1,000
Trichloro-1,2,2-trifluoroethane, 1,1,2-	1	187	14.8	14.8	14.8	N/A	NE
Trichloroethene	80	131	0.330	18.4	5.289	5.477	5.0

Table 1-2. Summary of SNL/NM Groundwater Monitoring Results for Calendar Year 2013 *(Continued)*

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	58	97	0.0154	0.304	0.07321	0.0687	NE
Antimony	1	154	0.00108	0.00108	0.00108	N/A	0.006
Arsenic	36	119	0.00175	0.0496	0.01427	0.01906	0.010
Barium	155	0	0.00253	0.228	0.06409	0.03856	2.0
Beryllium	19	136	0.000207	0.00754	0.001947	0.00177	0.004
Cadmium	13	142	0.000131	0.000548	0.000263	0.00015	0.005
Calcium	234	0	36.8	378	90.21	70.03	NE
Chromium	33	132	0.00209	0.112	0.00891	0.01992	0.100
Cobalt	111	44	0.0001	0.0108	0.001149	0.002786	NE
Copper	84	71	0.000369	0.0335	0.001936	0.004766	NE
Iron	199	3	0.0461	3.08	0.3143	0.5826	NE
Lead	3	152	0.00109	0.00153	0.001293	0.000222	NE
Magnesium	234	0	4.61	83.6	21.54	14.879	NE
Manganese	83	119	0.001	3.02	0.381	0.948	NE
Mercury	1	170	0.0003	0.0003	0.0003	N/A	0.002
Nickel	142	23	0.00057	0.417	0.00846	0.03828	NE
Potassium	234	0	1.16	47.4	5.392	8.752	NE
Selenium	125	30	0.00158	0.0335	0.005868	0.007547	0.050
Silver	2	153	0.00032	0.00236	0.00134	0.00144	NE
Sodium	234	0	13.6	1220	75.57	121.33	NE
Thallium	12	143	0.000468	0.00136	0.001117	0.000227	0.002
Uranium	146	1	0.000296	0.0298	0.00689	0.006392	0.030
Vanadium	110	45	0.001	0.0105	0.005334	0.002295	NE
Zinc	62	93	0.0035	0.422	0.0658	0.1171	NE

Table 1-2. Summary of SNL/NM Groundwater Monitoring Results for Calendar Year 2013 *(Concluded)*

Analyte	Number of Detects	Number of Non-Detects	Minimum Detected Value	Maximum Detected Value	Mean Detected Value	Standard Deviation for Detected Values	MCL
Detected Inorganic Parameters in mg/L							
Nitrate plus nitrite	203	5	0.124	41.9	7.669	8.501	10
Bromide	116	3	0.125	3.23	0.5814	0.5392	NE
Chloride	167	0	9.25	503	59.45	82.93	NE
Fluoride	118	1	0.231	5.00	1.4258	1.0707	4.0
Sulfate	167	0	15.1	2010	97.8	179.1	NE
Total Organic Halogens	10	6	0.0028	0.055	0.01557	0.01514	NE
Total Organic Carbon #1	49	17	0.402	1.58	0.6886	0.2065	NE
Total Organic Carbon #2	47	19	0.572	1.94	0.8880	0.2296	NE
Total Organic Carbon #3	49	17	0.459	1.88	0.7549	0.2298	NE
Total Organic Carbon #4	49	17	0.471	1.84	0.7820	0.2198	NE
Total Organic Carbon Average	49	17	0.489	1.81	0.7762	0.2167	NE
Total Phenols	10	11	0.00181	0.0726	0.01654	0.0216	NE
Alkalinity as $CaCO_3$	157	0	47.7	1580	241.6	254.7	NE
Detected Radiochemistry Activities in pCi/L (unless noted otherwise)							
Alpha, gross (corrected)	101	14	-39.77	26.94	2.433	7.556	15.0[a]
Americium-241	1	110	-28.0	-28.0	-28.0	N/A	NE
Beta, gross	108	7	0.87	76.5	9.18	14.28	4 mrem/yr
Potassium-40	5	99	62.10	83.8	69.60	8.52	NE
Radium-226	11	5	0.331	1.92	0.701	0.431	5.0[b]
Radium-228	10	6	0.542	1.43	0.8814	0.2674	5.0[b]
Uranium-233/234	49	0	0.36	60.9	18.20	15.89	NE
Uranium-235/236	42	7	0.0529	0.822	0.2681	0.1687	NE
Uranium-238	49	0	0.077	10.9	3.302	2.330	NE

NOTES:

[a]The 15.0 pCi/L MCL is for corrected gross alpha activity.

[b]The 5.0 pCi/L MCL is for combined Ra-226 and Ra-228.

°C = Degree(s) Celsius.
µg/L = Microgram(s) per liter.
µmhos/cm = Micromhos per centimeter.
4 mrem/yr = Any combination of beta- and/or gamma-emitting radionuclides (as dose rate).
$CaCO_3$ = Calcium as carbon carbonate.
corrected = Gross alpha results reported as corrected values (uranium activities subtracted out).
MCL = Maximum contaminant level. Established by the U.S. Environmental Protection Agency Primary Drinking Water Regulations (40 CFR 141.11[b]), National Primary Drinking Water Standards (EPA May 2009).
mg/L = Milligram(s) per liter.
mrem/yr = Millirem per year.
N/A = Not applicable.
NE = Not established.
NTU = Nephelometric turbidity units.
pCi/L = Picocurie(s) per liter.
pH = Potential of hydrogen (negative logarithm of the hydrogen ion concentration).
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine
SNL/NM = Sandia National Laboratories, New Mexico.
SU = Standard Unit(s).

Table 1-3. Summary of Exceedances for SNL/NM Groundwater Monitoring Wells Sampled During Calendar Year 2013

Analyte	Well (Relevant Chapter)	Exceedance	Date
Arsenic MCL = 0.010 mg/L	CTF-MW2 (Ch. 13)	0.0456 mg/L	March 2013
		0.0496 mg/L[a]	
		0.046 mg/L	June 2013
		0.0477 mg/L[a]	
		0.0438 mg/L	September 2013
		0.0448 mg/L[a]	
		0.039 mg/L	December 2013
		0.0366 mg/L[a]	
	CTF-MW2 (Duplicate) (Ch. 13)	0.0444 mg/L	March 2013
		0.0463 mg/L[a]	
Beryllium MCL = 0.004 mg/L	Coyote Springs (Ch. 2)	0.00754 mg/L	May 2013
Chromium MCL = 0.10 mg/L	MWL-MW4 (Ch. 4)	0.112 mg/L	February 2013
Fluoride MCL = 4 mg/L	CCBA-MW1 (Ch. 8)	4.97 mg/L	January 2013
		4.57 mg/L	April 2013
		4.78 mg/L	July 2013
		4.93 mg/L	October 2013
	CCBA-MW1 (Duplicate) (Ch. 8)	5.00 mg/L	January 2013
		4.82 mg/L	July 2013
Nitrate plus Nitrite (as Nitrogen) MCL = 10.0 mg/L	AVN-1 (Ch. 5)	10.1 mg/L	July 2013
	CYN-MW9 (Ch. 7)	33.7 mg/L	April 2013
		41.9 mg/L	December 2013
	CYN-MW11 (Ch. 7)	12.3 mg/L	December 2013
	CYN-MW11 (Duplicate) (Ch. 7)	10.1 mg/L	December 2013
	CYN-MW12 (Ch. 7)	14.7 mg/L	April 2013
		14.4 mg/L	December 2013
	CYN-MW13 (Ch. 7)	33.5 mg/L	April 2013
		35.0 mg/L	May 2013
		33.7 mg/L	December 2013
	CYN-MW13 (Duplicate) (Ch. 7)	32.6 mg/L	April 2013
		32.3 mg/L	May 2013
	LWDS-MW1 (Ch. 5)	12.0 mg/L	March 2013
		11.7 mg/L	June 2013
		11.5 mg/L	July 2013
		13.0 mg/L	November 2013
	LWDS-MW1 (Duplicate) (Ch. 5)	12.4 mg/L	March 2013
	TA2-SW1-320 (Ch. 6)	21.4 mg/L	March 2013
		25.4 mg/L	June 2013
		21.9 mg/L	September 2013
		27.0 mg/L	November 2013
	TA2-W-19 (Ch. 6)	10.2 mg/L	March 2013
		12.4 mg/L	June 2013
		10.7 mg/L	September 2013
		12.7 mg/L	November 2013
	TJA-2 (Ch. 6)	12.5 mg/L	March 2013
		12.8 mg/L	June 2013
		11.8 mg/L	September 2013
		11.9 mg/L	November 2013
	TJA-2 (Duplicate) (Ch. 6)	11.4 mg/L	September 2013

Table 1-3. Summary of Exceedances for SNL/NM Groundwater Monitoring Wells Sampled During Calendar Year 2013 *(Concluded)*

Analyte	Well (Relevant Chapter)	Exceedance	Date
Nitrate plus Nitrite (as Nitrogen) MCL = 10.0 mg/L	TJA-4 (Ch. 6)	29.6 mg/L	March 2013
		33.2 mg/L	June 2013
		29.2 mg/L	September 2013
		36.9 mg/L	November 2013
	TJA-4 (Duplicate) (Ch. 6)	38.5 mg/L	November 2013
	TJA-7 (Ch. 6)	23.0 mg/L	March 2013
		27.2 mg/L	June 2013
		23.7 mg/L	September 2013
		27.2 mg/L	November 2013
	TJA-7 (Duplicate) (Ch. 6)	22.1 mg/L	March 2013
	TAV-MW10 (Ch. 5)	12.4 mg/L	February 2013
		12.2 mg/L	June 2013
		11.2 mg/L	July 2013
		12.9 mg/L	November 2013
Trichloroethene MCL = 5.0 µg/L	LWDS-MW1 (Ch. 5)	18.1 µg/L	March 2013
		18.1 µg/L	June 2013
		17.6 µg/L	July 2013
		15.9 µg/L	November 2013
	LWDS-MW1 (Duplicate) (Ch. 5)	18.4 µg/L	March 2013
	TAV-MW6 (Ch. 5)	13.3 µg/L	February 2013
		15.8 µg/L	June 2013
		16.1 µg/L	July 2013
		15.8 µg/L	November 2013
	TAV-MW6 (Duplicate) (Ch. 5)	15.2 µg/L	July 2013
	TAV-MW10 (Ch. 5)	13.6 µg/L	February 2013
		15.8 µg/L	June 2013
		16.4 µg/L	July 2013
		16.9 µg/L	November 2013
	TAV-MW12 (Ch. 5)	7.85 µg/L	February 2013
		7.14 µg/L	June 2013
		8.36 µg/L	July 2013
		9.35 µg/L	November 2013
	TAV-MW12 (Duplicate) (Ch. 5)	9.43 µg/L	November 2013
	TAV-MW14 (Ch. 5)	6.54 µg/L	February 2013
		6.47 µg/L	June 2013
		6.22 µg/L	July 2013
		7.90 µg/L	November 2013
	TAV-MW14 (Duplicate) (Ch. 5)	6.65 µg/L	February 2013
	WYO-4 (Ch. 6)	8.40 µg/L	March 2013
		8.40 µg/L	June 2013
		9.23 µg/L	August 2013
		8.49 µg/L	November 2013
Gross Alpha 15 pCi/L	CTF-MW2 (Ch. 13)	23.54 pCi/L	September 2013
		21.25 pCi/L	December 2013
	CTF-MW2 (Reanalysis) (Ch. 13)	26.94 pCi/L	September 2013

NOTES:
[a]Analytical result for filtered groundwater sample. All other analytical results are for unfiltered groundwater samples.

µg/L = Microgram(s) per liter.
CCBA = Coyote Canyon Blas Area.
CTF = Coyote Test Field.
CYN = Canyons.
LWDS = Liquid Waste Disposal System.
MCL = Maximum contaminant level.
mg/L = Milligram(s) per liter.
MW = Monitoring well.
MWL = Mixed Waste Landfill.
pCi/L = Picocuries per liter.
SNL/NM = Sandia National Laboratories, New Mexico.
SW = Southwest.
TA = Technical Area.
TAV = Technical Area V (monitoring well designation only).
TJA = Tijeras Arroyo.
WYO = Wyoming.

1.2.1 Long-Term Stewardship and Environmental Restoration Operations Monitoring

SNL/NM LTS/ER Operations conducts groundwater monitoring where groundwater contamination is documented, or in areas where the potential exists for groundwater contamination from legacy surface or near-surface contamination. Currently there are 11 LTS/ER Operations groundwater monitoring networks: CWL, MWL, TA-V, TAG, BSG, SWMUs 8/58, SWMU 49, SWMU 68, SWMU 116, SWMU 149, and SWMU 154. The LTS/ER Operations groundwater monitoring wells are located upgradient and downgradient of known legacy surface contamination sites with associated groundwater investigations.

1.2.2 Long-Term Stewardship Groundwater Monitoring Program

The SNL/NM LTS Program's GMP conducts groundwater surveillance monitoring through a network of wells on KAFB, most of which are located in areas near SNL/NM operational test facilities. Groundwater surveillance monitoring allows the detection and evaluation of the impacts (if any) of current SNL/NM operations on groundwater.

1.2.3 Groundwater Monitoring Regulatory Criteria and DOE Orders

Groundwater monitoring performed by SNL/NM LTS Program's GMP and LTS/ER Operations are directed based on three different sets of regulations and requirements. Groundwater surveillance conducted at the GMP network is directed by DOE Order 436.1, *Departmental Sustainability* (DOE 2011a) and DOE Order 231.1B, *Environment, Safety, and Health Reporting* (DOE 2011b). Groundwater monitoring results at all sites are compared with federal and state water quality standards and DOE drinking water guidelines, where established.

In addition to the DOE Directives, ER sites at SNL/NM are identified, characterized, and remediated (if required) under the Resource Conservation and Recovery Act (RCRA) regulations. In 1984, RCRA was supplemented by the Hazardous and Solid Waste Amendments (HSWA), which specifically addressed remediation of legacy contamination including groundwater at SWMUs.

At SNL/NM, SWMUs are regulated under the HSWA module of the SNL/NM RCRA Permit. In the HSWA module, a SWMU is defined as "any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste." Monitoring and/or corrective action requirements generally are determined on a SWMU-specific basis following a site investigation. The Order became effective in 2004 and specified that corrective actions for releases of hazardous waste or hazardous constituents were to be conducted under the Order rather than under the RCRA Permit, with the exception of new releases from operating units; closure and post-closure at operating units; implementation of controls for any SWMU on the Permit's "Corrective Action Complete with Controls" list; and any releases of hazardous waste or hazardous constituents that occur after the Order is no longer effective.

The MWL, TA-V, TAG, and BSG are undergoing corrective action in accordance with the Order between the NMED, Sandia, and the DOE (NMED April 2004). Each of the TA-V, TAG, and BSG sites must comply with requirements set forth in the Order for site characterization and the development of a Corrective Measures Evaluation for each site. The NMED is the regulatory agency responsible for enforcing the requirements identified in the Order for each of the three Corrective Measures Evaluations (SNL 2004a, 2004b, and 2004c). The Order also extends NMED regulatory jurisdiction to the placement and installation of new groundwater monitoring wells and decommissioning at SNL/NM.

In addition, SWMUs 8/58, 49, 68, 116, 149, and 154 are undergoing corrective action in accordance with the Order and addressed in a letter received from the NMED by the DOE/NNSA and Sandia on April 14, 2010, entitled: *Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008),*

Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001 (NMED April 2010). The NMED's letter lists these SWMUs under the heading of "SWMUs Requiring Additional Corrective Action" or "SWMUs/AOCs to be Subject to Groundwater Monitoring Controls," and further states that these SWMUs require long-term monitoring of groundwater on a quarterly or annual basis.

CWL closure was approved by the NMED and the CWL Post-Closure Care Permit (PCCP) became effective on June 2, 2011 (Kieling June 2011), transitioning monitoring activities from ER Operations to LTS. The CWL PCCP supersedes the CWL Closure Plan (SNL December 1992) as the enforceable regulatory document. Therefore, all groundwater monitoring at the CWL after June 2011 are performed by the LTS Program in accordance with requirements specified in the PCCP (Kieling June 2011). Required monitoring (groundwater and soil-gas), inspections, and maintenance activities are documented annually in Post-Closure Care Reports submitted to NMED by March 31 of each year and document all PCCP-required activities for the previous calendar. As required by the PCCP, the *CWL Annual Post-Closure Care Report for Calendar Year 2012* was submitted to the NMED in March 2013 (SNL March 2013). The CWL Annual Post-Closure Care Report for CY 2013 will be submitted to NMED in March 2014.

1.3 Field Methods, Analytical Methods, and Quality Control Procedures

The monitoring procedures, as conducted by LTS/ER Operations personnel, are consistent with procedures identified in the EPA technical enforcement guidance document (EPA 1986a). This section discusses procedures that apply to all groundwater investigations. Any site-specific differences from the procedures discussed in Section 1.3 are presented in Chapters 2.0 through 13.0.

1.3.1 Field Methods and Measurements

The following sections provide an overview of the sampling and data collection procedures.

1.3.1.1 Groundwater Elevation

Throughout CY 2013, water level measurements were obtained to determine groundwater flow directions, hydraulic gradients, and changes in water table and potentiometric surface elevations. Water levels are periodically measured in SNL/NM monitoring wells according to the instructions and requirements specified in SNL/NM Field Operating Procedure (FOP) 03-02, *Groundwater Level Data Acquisition and Management* (SNL April 2013). The water level information was used to create the potentiometric surface maps and hydrographs presented in Chapters 2.0 through 13.0.

1.3.1.2 Well Purging and Water Quality Measurements

A portable Bennett™ groundwater sampling system was used to collect the groundwater samples from all wells, except at wells with construction issues that require dedicated sampling system pumps. The minimum purge requirements for a portable piston pump is one saturated screen volume (including annulus) and two tubing volumes for a dedicated low-flow sampling system. Field water quality measurements for turbidity, potential of hydrogen (pH), temperature, specific conductance (SC), oxidation-reduction potential, and dissolved oxygen (DO) (Table 1-4) were recorded for the well prior to collecting groundwater samples, according to SNL/NM FOP 05-01 (SNL January 2012a). Groundwater temperature, SC, oxidation-reduction potential, dissolved oxygen, and pH were measured using a YSI™ Model 6920 water quality meter. Turbidity was measured with a HACH™ Model 2100P portable turbidity meter.

Table 1-4. Field Water Quality Parameters Measured at Monitoring Wells

Field Parameter	Comments
pH	Stability measure: Four consecutive measures within 0.1 pH units.
Temperature (°C)	Stability measure: Four consecutive measures within 1°C.
Specific Conductance (µmhos/cm)	Stability measure: Four consecutive measurements within 5 percent.
Turbidity (NTU)	Stability measure: Four consecutive measurements within 10 percent or less than 5 NTU.
Sample Flow Rate	Measured in gpm.
Dissolved Oxygen	Percentage of saturation value and/or measured in mg/L.
Oxidation-Reduction Potential	Measured in mV.

NOTES:

°C = Degree(s) Celsius.
µmhos/cm = Micromhos(s) per centimeter.
gpm = Gallon(s) per minute.
mg/L = Milligram(s) per liter.
mV = Millivolt(s).
NTU = Nephelometric turbidity units.
pH = Potential of hydrogen.

The amount of water required to achieve stability of field parameters is fairly consistent for a particular monitoring well. However, the ability of the aquifer to produce water varies greatly from well to well. In accordance with the site-specific Mini-Sampling and Analysis Plans (SAPs) (as identified in Chapter 2.0 through 13.0), purging continued until four stable measurements for temperature, SC, pH, and turbidity were obtained. Groundwater stability is considered acceptable when measurements are less than 5 nephelometric turbidity units (NTU) or within 10 percent for turbidity values greater than 5 NTU, 0.1 pH units, 1.0 degree Celsius, and SC is within 5 percent. Associated Field Measurement Logs documenting details of well purging and water quality measurements for each sampling event have been submitted to the SNL/NM Records Center.

1.3.1.3 Pump Decontamination

The sampling pump and tubing bundle associated with the portable Bennett™ groundwater sampling system were decontaminated prior to installation into monitoring wells according to procedures described in SNL/NM FOP 05-03 (SNL January 2012b). An equipment blank (EB) is collected to verify the equipment decontamination process. For wells equipped with dedicated nitrogen gas-powered bladder pumps or piston pumps, pump decontamination is not required.

1.3.1.4 Sample Collection Sampling Procedures

Groundwater samples are collected using a nitrogen gas-powered portable piston pump (Bennett™) and/or a low-flow system in accordance with SNL/NM FOP 05-01 (SNL January 2012a). Sample bottles are filled directly from the pump discharge line and water sampling manifold, with the volatile organic compound (VOC) samples collected at the lowest achievable discharge rate.

1.3.1.5 Sample Handling and Shipment

The SNL/NM Sample Management Office (SMO) processes environmental samples collected by LTS/ER Operations personnel. The SMO staff reviews the Mini-SAPs (as identified in Chapters 2.0 through 13.0), obtains sampling kits, issues sample control and tracking numbers, tracks the chain-of-custody, and reviews analytical results to determine method, contract, and regulatory project-specific compliance (SNL November 2013). All groundwater samples are analyzed by off-site laboratories using EPA-specified protocols. Analytical laboratories report associated quality control (QC) data that are reviewed against quality assurance requirements specified in the *Procedure for Completing the Contract Verification*

Review, SMO-05-03, Revision 05 (SNL November 2013) and Administrative Operating Procedure (AOP) 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL May 2011).

1.3.1.6 Waste Management

Purge and decontamination wastewater generated from sampling activities were placed into 55-gallon polyethylene drums and stored at the Environmental Resources Field Office waste accumulation area. All waste was managed in accordance with SNL/NM FOP 05-04 (SNL January 2012c) All wastewater was discharged to the sanitary sewer in accordance with ABCWUA requirements after waste characterization data were compared to discharge limits.

1.3.2 Analytical Methods

All groundwater samples are analyzed by off-site laboratories using EPA-specified protocols. Groundwater samples were submitted to GEL Laboratories, LLC (GEL) for analysis. Samples were analyzed in accordance with applicable EPA and DOE methods (Tables 1-5 and 1-6).

Table 1-5. Chemical Analytical Methods

Analyte	Analytical Method[a,b,c,d,e]
Alkalinity (total, bicarbonate, carbonate)	SM2320B
Anions	SW846-9056
Filtered Metals (including Cations)	SW846-3005/6010/6020/7470
HE compounds	SW846-8321A
NPN	EPA 353.2
Hexavalent Chromium	SW846-7196A
Perchlorate	EPA 314.0
Sulfide	SW846-9034/9034B
SVOCs	SW846-8270C
Metals	SW846-6010/6020/7470
Total Cyanide	SW846-9012A
Total Organic Carbon	SW846-9060A
Total Organic Halogens	SW846-9020
TPH Diesel Range Organics	SW846-3535A/8015D
TPH Gasoline Range Organics	SW846-8015B
Total Phenol	SW846-9066
VOCs	SW846-8260B

NOTES:

[a]Clesceri, L.S., A.E. Greenburg, and A.D. Eaton 1998 or EPA 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B.

[b]EPA 1999 (and updates), *Perchlorate in Drinking Water Using Ion Chromatography,* EPA 815/R-00-014.

[c]EPA 1986b (and updates), *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed., Rev. 1, U.S. Environmental Protection Agency, Washington, D.C.

[d]EPA 1984, *Methods for Chemical Analysis of Water and Wastes,* EPA 600-4-79-020.

[e]EPA 1983, *The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0*, EPA-600/4-84-017.

EPA = U.S. Environmental Protection Agency.
HE = High explosive(s).
NPN = Nitrate plus nitrite (reported as nitrogen).
SM = Standard Method.
SVOC = Semivolatile organic compound.
SW = Solid Waste.
TPH = Total petroleum hydrocarbons.
VOC = Volatile organic compound.

Table 1-6. Radiochemical Analytical Methods

Analyte	Analytical Method[a,b]
Gamma Spectroscopy (short list)	EPA 901.0
Gross Alpha/Beta Activity	EPA 900.0
Isotopic Uranium	HASL-300
Radium-226	EPA 903.1
Radium-228	EPA 904.0
Tritium	EPA 906.0

NOTES:
[a]EPA 1980. *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*, EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.
[b]U.S. Department of Energy, 1990, *EML Procedures Manual,* 27th ed., Vol. 1, Rev. 1992, HASL-300, Environmental Measurements Laboratory.
EPA = U.S. Environmental Protection Agency.
HASL = Health and Safety Laboratory.

1.3.3 Quality Control Samples

Field and laboratory QC samples were prepared and analyzed with the environmental samples to determine accuracy and precision of the methods, and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process. Table 1-7 shows the types of QC samples that accompany groundwater quality samples in the sampling and analysis process. All chemical data were reviewed and qualified in accordance with AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL May 2011). Although some analytical results were qualified during the data validation process, no significant data quality issues were noted for most studies. Data validation qualifiers are provided with the analytical results in the data tables attached to Chapters 2.0 through 13.0. The data validation report associated with each sampling event has been submitted to the SNL/NM Records Center.

Table 1-7. Quality Control Sample Types for Groundwater Sampling and Analysis

QC Sample Type	Description
Field QC	
Equipment blanks[a]	Determine the effectiveness of the decontamination process of the portable sampling pump (Bennett™) to ensure that cross-contamination did not occur between wells.
Duplicate samples	Establish the precision of the sampling process.
Trip blanks	Determine whether contamination by VOCs occurred during sample handling, shipment, or storage by submitting deionized water samples with environmental samples for VOC analysis.
Field Blanks	Assess whether contamination of the VOC samples had resulted from ambient field conditions.
Laboratory QC	
Method blanks	Determine contaminants introduced during the sample preparation and handling process in the laboratory.
LCS	Monitor the accuracy and precision of the laboratory's analytical method using laboratory-prepared samples spiked with a known concentration of an analyte. These samples are analyzed in the same batch with the groundwater samples. LCS results are reported as a percent recovery.
Batch matrix spike and matrix spike duplicate samples	Measure the percent recovery and RPD of chemical spikes added to an existing sample to determine the sample matrix effect. (The matrix is groundwater.)
Sample replicate	Used to determine precision in the laboratory for non-organic analyses.

NOTES:
[a]Equipment blanks are collected for selected wells only.
LCS = Laboratory control sample.
QC = Quality control.
RPD = Relative percent difference.
VOC = Volatile organic compound.

1.3.4 Field Quality Control Samples

Field QC samples included duplicate environmental, EB, and trip blank (TB) samples. The field QC samples were submitted for analysis along with the groundwater samples in accordance with QC procedures specified in site-specific Mini-SAPs (Chapters 2.0 through 13.0).

1.3.4.1 Duplicate Environmental Samples

Duplicate environmental samples were analyzed to estimate the overall reproducibility of the sampling and analytical process. A duplicate environmental sample is collected immediately after the original environmental sample to reduce variability caused by time and/or sampling mechanics. The results for duplicate environmental sample analyses (concentrations above detection limits only) are used to calculate relative percent difference values.

1.3.4.2 Equipment Blank Samples

The portable Bennett™ sampling pump and tubing bundle were decontaminated prior to installation into monitoring wells according to procedures described in SNL/NM FOP 05-03 (SNL January 2012b). An EB is collected to verify the effectiveness of the equipment decontamination process. The results for the EB analyses are discussed in Chapters 2.0 through 13.0.

1.3.4.3 Trip Blank Samples

TB samples are submitted whenever samples are collected for VOC analysis. These samples are used to determine potential contamination during sampling, transportation, analysis, and storage. The TB samples consist of laboratory reagent-grade water with hydrochloric acid preservative contained in 40-milliliter glass vials. They are prepared by the analytical laboratory and are included in the sampling kits. TB samples accompanied each sample shipment. The results for the TB analyses are discussed in Chapters 2.0 through 13.0.

1.3.5 Laboratory Quality Control Samples

Laboratory and method-required batch QC samples are also prepared by the laboratory during sample preparation and analysis. These are used to assist with data validation and data defensibility. They include method blanks, laboratory control samples, matrix spike, matrix spike duplicates, sample replicates, and surrogate spike samples. Batch laboratory QC samples were analyzed concurrently with all groundwater samples to determine accuracy, precision, possible contamination, and matrix effects. All chemical data were reviewed and qualified in accordance with AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL May 2011). Laboratory data qualifiers are provided with the analytical results in the tables attached to Chapters 2.0 through 13.0.

1.4 References

Clesceri et al. 1998 Clesceri, L.S., A.E. Greenburg, and A.D. Eaton, 1998. *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Standard Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.

DOE 2011a U.S. Department of Energy (DOE), 2011. *Departmental Sustainability*, DOE Order 436.1, U.S. Department of Energy, Washington, D.C., May 2.

DOE 2011b U.S. Department of Energy (DOE), 2011. *Environment, Safety, and Health Reporting*, DOE Order 231.1B, U.S. Department of Energy, Washington, D.C., June 27.

DOE 1990 U.S. Department of Energy (DOE), 1990. *EML Procedures Manual*, 27th ed., Vol. 1, Rev. 1992, HASL-300, Environmental Measurements Laboratory.

EPA May 2009 U.S. Environmental Protection Agency (EPA), May 2009. *National Primary Drinking Water Regulations*, EPA 816-F-09-0004, U.S. Environmental Protection Agency, Washington, D.C.

EPA 1999 U.S. Environmental Protection Agency (EPA), 1999. *Perchlorate in Drinking Water Using Ion Chromatography*, EPA 815/R-00-014, U.S. Environmental Protection Agency, Washington, D.C.

EPA 1986a U.S. Environmental Protection Agency (EPA), 1986. *RCRA Ground-Water Monitoring Technical Enforcement Guidance Document*, OSWER-9950.1. U.S. Environmental Protection Agency, Washington, D.C.

EPA 1986b U.S. Environmental Protection Agency (EPA), 1986. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed., (and updates), U.S. Environmental Protection Agency, Washington, D.C.

EPA 1984 U.S. Environmental Protection Agency (EPA), 1984. *Methods for Chemical Analysis of Water and Wastes.* EPA 600-4-79-020, U.S. Environmental Protection Agency, Washington, D.C.

EPA 1983 U.S. Environmental Protection Agency (EPA), 1983. *The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0*, EPA 600-4-84-017, U.S. Environmental Protection Agency, Cincinnati, Ohio.

EPA 1980 U.S. Environmental Protection Agency (EPA), 1980. *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*, EPA 600-4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.

GRAM 1995 GRAM, Inc., 1995. *Conceptual Geological Model of the Sandia National Laboratories and Kirtland Air Force Base*, Environmental Restoration Program, Sandia National Laboratories, New Mexico, prepared by GRAM, Inc. and William Lettis & Associates, Inc., December.

Grauch and Connell 2013 Grauch, V.J.S., and Connell, S.D., 2013. *New perspectives on the geometry of the Albuquerque Basin, Rio Grande rift, New Mexico: Insights from geophysical models of rift-fill thickness*, in Hudson, M.R., and Grauch, V.J.S., eds., New Perspectives on Rio Grande Basins: From Tectonics to Groundwater: Geological Society of America Special Paper 494, p. 427-462.

Hansen and Gorbach 1997 Hansen, S., and C. Gorbach, 1997. *Middle Rio Grande Water Assessment, Final Report*. U.S. Bureau of Reclamation, Albuquerque Area Office, Albuquerque, New Mexico.

Hawley and Haase 1992 Hawley, J.W., and C.S. Haase, 1992. *Hydrogeologic Framework of the Northern Albuquerque Basin*, Open File Report 387, New Mexico Bureau of Mines and Mineral Resources, Socorro, New Mexico.

Kelley 1977 Kelley, V.C., 1977. *Geology of Albuquerque Basin, New Mexico*, Memoir 33, New Mexico Bureau of Mines and Mineral Resources, Socorro, New Mexico.

Kelley and Northrup 1975 Kelley, V. C., and S. A. Northrup, 1975. *Geology of Sandia Mountains and Vicinity, New Mexico*, Memoir 29, New Mexico Bureau of Mines and Mineral Resources, Socorro, New Mexico.

Kelson et al. 1999 Kelson, K.I., C.S. Hitchcock, and J.B.J. Harrison, 1999. *Paleoseismology of the Tijeras Fault Near Golden, New Mexico. Albuquerque Geology*, F.J. Pazzaglia and S. Lucas (eds.), *New Mexico Geological Society, Fiftieth Annual Field Conference*, New Mexico Geological Society, Socorro, New Mexico, September.

Kieling June 2011 Kieling, J.E. (New Mexico Environment Department), June 2011. Letter to P. Wagner (U.S. Department of Energy) and S.A. Orrell (Sandia Corporation), *Notice of Approval, Closure of Chemical Waste Landfill and Post-Closure Care Permit in Effect, Sandia National Laboratories, EPA ID No. NM5890110518, HWB-SNL-10-013*, June 2.

Lozinsky 1994 Lozinsky, R.P., 1994. *Cenozoic stratigraphy, sandstone petrology, and depositional history of the Albuquerque basin, central New Mexico*, Geological Society of America, Special Paper 291, p. 73–82.

NMED April 2010 New Mexico Environment Department (NMED), April 2010. *Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008), Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001*. New Mexico Environment Department, Santa Fe, New Mexico, April 14, 2010.

NMED April 2004 New Mexico Environment Department (NMED), April 2004. *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order*, New Mexico Environment Department, Santa Fe, New Mexico, April 29.

SNL November 2013 Sandia National Laboratories, New Mexico (SNL/NM), November 2013. *Procedure for Completing the Contract Verification Review, SMO-05-03, Revision 05,* Sandia National Laboratories, Albuquerque, New Mexico, November 12, 2013.

SNL April 2013 Sandia National Laboratories, New Mexico (SNL/NM), April 2013. *Groundwater Level Data Acquisition and Management,* FOP 03-02, Rev. 05, Sandia National Laboratories, Albuquerque, New Mexico, April 1, 2013.

SNL March 2013 Sandia National Laboratories, New Mexico (SNL/NM), March 2013. *Chemical Waste Landfill Annual Post-Closure Care Report for Calendar Year 2012*, Sandia National Laboratories, Albuquerque, New Mexico, March 2013.

SNL January 2012a Sandia National Laboratories, New Mexico (SNL/NM), January 2012. *Long-Term Environmental Stewardship Groundwater Monitoring Well Sampling and Field Analytical Measurements,* FOP 05-01, Revision 04, Sandia National Laboratories, Albuquerque, New Mexico, January 24, 2012.

SNL January 2012b Sandia National Laboratories, New Mexico (SNL/NM), January 2012. *Long-Term Environmental Stewardship Groundwater Sampling Equipment Decontamination,* FOP 05-03, Revision 04, Sandia National Laboratories, Albuquerque, New Mexico, January 24, 2012.

SNL January 2012c Sandia National Laboratories, New Mexico (SNL/NM), January 2012. *Long-Term Environmental Stewardship Groundwater Monitoring Waste Management,* FOP 05-04, Revision 04, Sandia National Laboratories, Albuquerque, New Mexico, January 24, 2012.

SNL May 2011 Sandia National Laboratories, New Mexico (SNL/NM), May 2011. *Data Validation Procedure for Chemical and Radiochemical Data*, AOP 00-03, Revision 3, Sample Management Office, Sandia National Laboratories, New Mexico, May 11, 2011.

SNL 2004a Sandia National Laboratories, New Mexico (SNL/NM), 2004. *Corrective Measures Evaluation Work Plan, Tijeras Arroyo Groundwater*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico, July.

SNL 2004b Sandia National Laboratories, New Mexico (SNL/NM), 2004. *Corrective Measures Evaluation Work Plan, Technical Area V Groundwater, Revision 0*, SAND Report SAND2004-6113, Sandia National Laboratories, Albuquerque, New Mexico, December.

SNL 2004c Sandia National Laboratories, New Mexico (SNL/NM), 2004. *Corrective Measures Evaluation Work Plan for Sandia National Laboratories/New Mexico Burn Site,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico, June.

SNL 1998 Sandia National Laboratories, New Mexico (SNL/NM), 1998. *Revised Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report, Revised February 1998*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico, February.

SNL 1995 Sandia National Laboratories, New Mexico (SNL/NM), 1995. *Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL December 1992 Sandia National Laboratories, New Mexico (SNL/NM), 1992. *Chemical Waste Landfill Final Closure Plan and Postclosure Permit Application,* Sandia National Laboratories, Albuquerque, New Mexico, December, amended January 2003.

Thorn et al. 1993 Thorn, C.R., D.P. McAda, and J.M. Kernodle, 1993. *Geohydrologic Framework and Hydrologic Conditions in the Albuquerque Basin, Central New Mexico*, USGS Water Resources Investigation Report 93 4149, U.S. Geological Survey, Albuquerque, New Mexico.

USACE 1979 U.S. Army Corps of Engineers (USACE), 1979. *Special Flood Hazard Information: Tijeras Arroyo and Arroyo del Coyote, Kirtland AFB, New Mexico*, U.S. Army Corps of Engineers, Albuquerque District, Albuquerque, New Mexico.

Van Hart 2003 Van Hart, D., 2003. *Geologic Investigation: An Update of Subsurface Geology on Kirtland Air Force Base, New Mexico*, SAND Report SAND2003-1869, Sandia National Laboratories, Albuquerque, New Mexico, June.

2.0 Long-Term Stewardship Consolidated Groundwater Monitoring Program

2.1 Introduction

This chapter documents the results for the Calendar Year (CY) 2013 groundwater surveillance monitoring activities conducted as part of the Sandia National Laboratories, New Mexico (SNL/NM) Long-Term Stewardship Consolidated Groundwater Monitoring Program (GMP) (formerly referred to as the Groundwater Protection Program). The surveillance activities include the annual collection and analysis of groundwater samples from 12 monitoring wells and one surface-water sample from a spring. As part of the activities, SNL/NM used groundwater elevation data from 126 monitoring wells. Groundwater elevation measurements were obtained either monthly or quarterly depending on the response characteristics of the groundwater system at each well location due to climate, aquifer properties, pumping, or other stresses.

The purpose of monitoring the GMP network is to protect groundwater resources at SNL/NM and the surrounding area by identifying potential sources of contamination, working with other SNL/NM organizations to prevent groundwater contamination, implementing effective groundwater surveillance to detect contamination if it should occur, and initiating abatement or remedial action where necessary. To accomplish this mission, Sandia personnel perform the following tasks:

- Evaluates the potential effects of SNL/NM operations on groundwater through groundwater quality sampling and analysis and groundwater elevation measurements.
- Records and maintains groundwater information in a database.
- Maintains documents and records and ensures that all necessary reports are submitted to the appropriate agencies in a timely manner.
- Prepares and maintains administrative and field operating procedures for groundwater monitoring activities.
- Provides assistance to well owners in the areas of well installation, well inspection and maintenance, and well plugging and abandonment.
- Establishes requirements for well registration and well construction data tracking.
- Coordinates with the Surface Water Discharge Program to prevent groundwater contamination.
- Develops groundwater education and community outreach programs.
- Provides stakeholders an annual update of SNL/NM groundwater data through this Annual Groundwater Monitoring Report.

The groundwater surveillance monitoring involves completing the following objectives:

- Establishing baseline water quality and groundwater flow information for the regional aquifer and the perched groundwater system (PGWS) at SNL/NM.
- Determining the impact, if any, of operations at SNL/NM on the quality and quantity of groundwater.
- Demonstrating compliance with all federal, state, and local groundwater requirements.

The GMP is responsible for tracking information for all wells operated by SNL/NM personnel, including Long-Term Stewardship/Environmental Restoration (ER) Operations (formerly ER Project) monitoring wells and characterization boreholes. The GMP Well Registry and Oversight Task was established to ensure that all wells operated by SNL/NM personnel are properly constructed and maintained to protect groundwater resources in accordance with guidelines specified by the New Mexico Office of the State Engineer (NMOSE) in *Rules and Regulations Governing Well Driller Licensing; Construction, Repair and Plugging of Wells* (NMOSE 2005). The GMP lead works with SNL/NM personnel to review new monitoring well installation plans, record construction information, track well ownership and maintenance records, perform annual well inspections, and consult with owners when plugging and abandoning or replacing a monitoring well is required. The goal is to provide full life-cycle management of monitoring wells and boreholes. Additional information for the GMP is provided in the *SNL/NM Long-Term Stewardship Consolidated Groundwater Monitoring Program Plan* (SNL May 2013).

2.2 Regulatory Criteria

Sandia is in compliance with the requirement to have a site-wide Environmental Management System (EMS) in accordance with the U.S. Department of Energy (DOE) Order 436.1 (DOE 2011). The following actions ensure the implementation of a successful GMP that includes all relevant elements of an EMS at the facility:

- Possible sources of current and future groundwater contamination are identified and the potential for future contamination is evaluated.
- All applicable federal, state, and DOE requirements are met.
- Appropriate groundwater protection goals are established for all affected or potentially affected groundwater consistent with water quality and current or likely future use.
- Strategies for predicting and preventing future contamination and for controlling existing contamination are developed.
- The history of GMP activities is documented for future site management.
- The quality of baseline groundwater and vadose zone conditions are documented.
- Environmental monitoring with surveillance program elements for the groundwater and the vadose zone, including baseline subsurface conditions, are described.
- A systematic approach is established for the monitoring program that provides the information needed to predict and respond to potential contamination associated with significant site activities and to achieve the groundwater protection goals.

In April 2004, the Compliance Order on Consent (the Order) (NMED 2004) became effective between the DOE, Sandia, and the New Mexico Environment Department (NMED). Among other sampling requirements primarily affecting ER sites for a variety of potential contaminants, the Order includes a requirement to conduct four continuous quarters of sampling and analysis for perchlorate for newly constructed monitoring wells. The protocol establishes a screening level/method detection limit (MDL) of 4 micrograms per liter (µg/L). If the sampling results indicate the presence of perchlorate either at or greater than 4 µg/L, then DOE/National Nuclear Security Administration (NNSA) and Sandia are required to assess the nature and extent of perchlorate contamination and incorporate the results of this assessment into a Corrective Measures Evaluation. Sampling and analysis at the noncompliant well will continue on a quarterly basis until at least four consecutive nondetections are obtained. Section VII.C of the Order clarifies that the Corrective Measures Evaluation process will be initiated where there is a documented release to the environment, and where corrective measures are necessary to protect human health and the environment.

The NMED DOE Oversight Bureau (OB) splits a percentage of groundwater samples collected by the GMP. The samples are analyzed by laboratories under contract to the NMED DOE OB. The NMED DOE OB provides independent verification of environmental monitoring results obtained by Sandia on behalf of the DOE/NNSA Sandia Field Office (SFO). Additional requirements associated with groundwater quality regulations are presented in Table 2-1.

Table 2-1. Groundwater Quality Regulations

Regulation/Requirements	Standards and Guides	Regulating Agency
National Primary Drinking Water Regulations (40 CFR 141)	MCL	EPA (2001 and 2009)
NMWQCC[a] Standards for Groundwater (20 6.2.3103A NMAC Human Health Standards) (NMED 2001)	MAC	NMWQCC (NMED 2001)
DOE Drinking Water Guidelines for Radioisotopes[b] (DOE Order 5400.5)	DCG	DOE (1993)

NOTES:

[a]MACs for human health and domestic water supply standards are identified in the analytical results tables in Attachment 2A. Domestic water supply standards are based on aesthetic considerations, not on the direct human health risks used for promulgating MCLs.

[b]DOE drinking water guidelines set allowable radionuclide levels in drinking water (DOE 1993, *Drinking Water Guidelines for Radioisotopes*). The levels are calculated based on published DCGs and correspond to a 4 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 from the EPA standards, where established.

CFR = Code of Federal Regulations.
DCG = Derived Concentration Guide.
DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
MAC = Maximum allowable concentration.
MCL = Maximum contaminant level.
mrem/yr = Millirem per year.
NMAC = New Mexico Administrative Code.
NMED = New Mexico Environment Department.
NMWQCC = New Mexico Water Quality Control Commission.

Although radionuclides (gamma spectroscopy and gross alpha/beta activity) are being monitored, the information related to radionuclides is provided voluntarily by the DOE/NNSA and Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements imposed by the NMED, as specified in Section III.A of the Order (NMED 2004).

2.3 Scope of Activities

2.3.1 Groundwater Quality Surveillance Monitoring

Annual sampling of groundwater was conducted during the period from April 26 to May 14, 2013. Samples were collected from 12 wells and one spring. Groundwater surveillance samples were collected from the following monitoring wells: Greystone-MW2, MRN-2, MRN-3D, NWTA3-MW3D, PL-2, PL-4, SFR-2S, SFR-4T, SWTA3-MW2, SWTA3-MW3, SWTA3-MW4, and TRE-1. A water sample was collected from Coyote Springs. Sampling locations are shown on Figure 2-1. The analytical results for the groundwater samples are presented in Tables 2A-1 through 2A-7 in Attachment 2A.

Samples collected from all locations were analyzed for the following analytes:

- Safe Drinking Water Act list volatile organic compounds (VOCs)
- Total organic halogens (TOX)
- Total phenols
- Total alkalinity
- Nitrate plus nitrite (NPN)
- Total cyanide
- High explosives (HE), selected wells only
- Major anions (chloride, bromide, fluoride, and sulfate)
- Target Analyte List (TAL) metals plus total uranium
- Mercury
- Gamma spectroscopy (short list)
- Gross alpha and beta activity
- Radium-226 and radium-228
- Isotopic uranium (uranium-233/234, uranium-235/236, and uranium-238), selected wells only

All samples were filtered in the field using in-line filters of 0.45-micron pore size, except those for VOC, HE, and mercury fractions. Analysis for HE compounds was conducted on groundwater samples collected from monitoring wells SFR-2S, SWTA3-MW3, SWTA3-MW4, and TRE-1. These wells are located in or downgradient of the Coyote Canyon Test Field and are associated with the Dynamic Explosives Test Site located in the Coyote Canyon Test Field. Duplicate environmental samples from monitoring wells MRN-2, PL-4, and SWTA3-MW3 were submitted for all analyses.

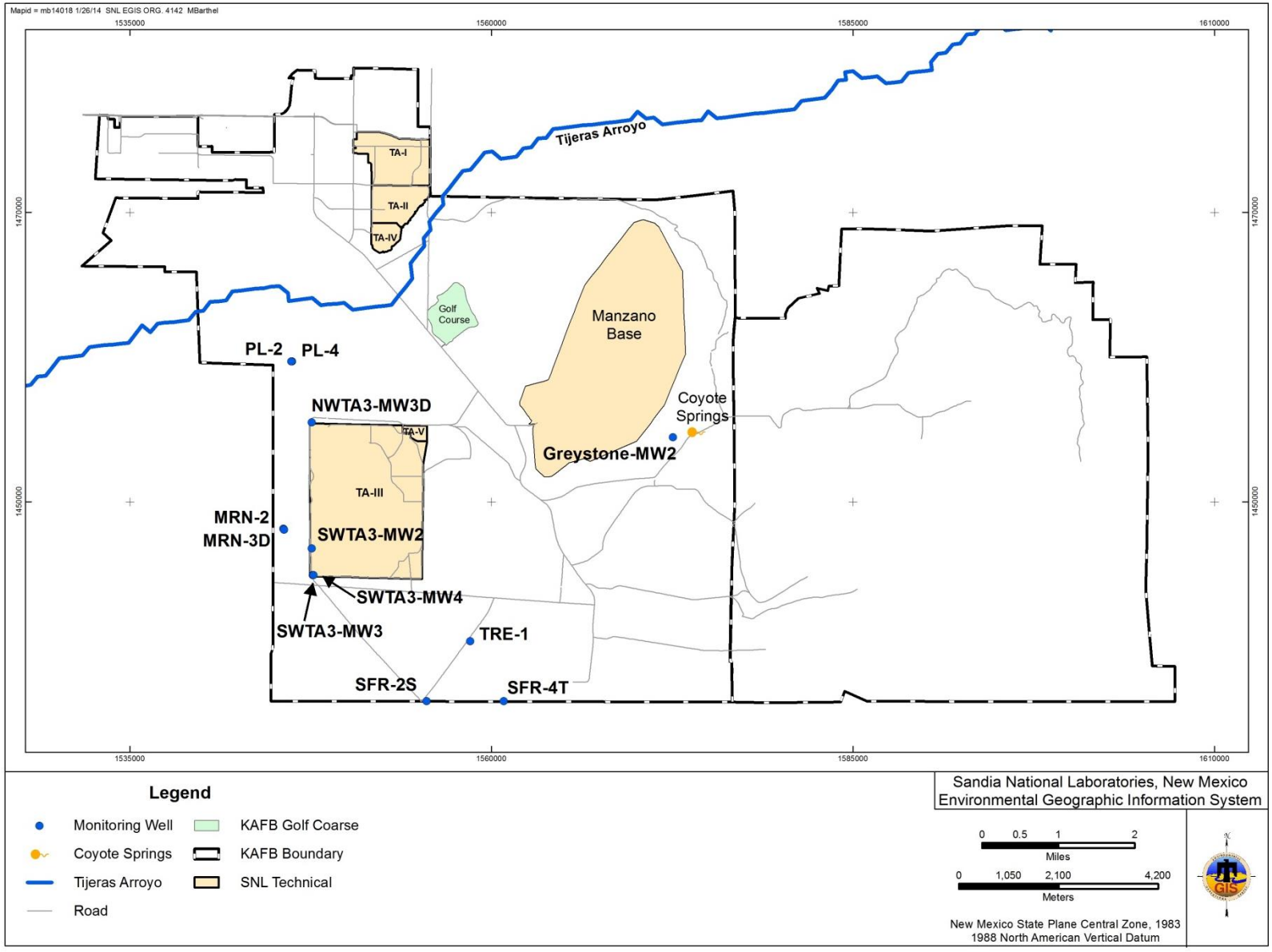


Figure 2-1. Groundwater Monitoring Program Water Quality Monitoring Network

Groundwater elevation monitoring is a means to assess the physical changes of the groundwater system over time. This includes changes in the potentiometric surface, gradients, the quantity of water available, as well as the direction and velocity of groundwater movement. The GMP gathers groundwater information from a large network of wells within and in the vicinity of Kirtland Air Force Base (KAFB). In addition to wells owned by the DOE/NNSA, data are solicited from the U.S. Air Force (USAF) ER Program, City of Albuquerque (COA) Environmental Health Department (EHD), the Lovelace Respiratory Research Institute (LRRI), and U.S. Geological Service (USGS) (Figure 1-4 and Plate 1). Groundwater elevations in wells were measured quarterly or monthly during CY 2013, depending on the owner's requirements and the well characteristics. Groundwater elevations at the wells are depicted on Plate 1 and were used for preparing a base-wide potentiometric surface map of the regional aquifer (see discussion in Section 2.6.2.2).

Groundwater pumped from KAFB, Albuquerque Bernalillo County Water Utility Authority (ABCWUA), and Veterans Administration water-supply wells represent the primary groundwater withdrawal from the regional aquifer. From the potentiometric surface map (Plate 1), groundwater flow directions can be identified and horizontal gradients can be determined. Specific results for annual precipitation, water production, and the impact on the groundwater elevations are discussed in Section 2.6.2. Precipitation measurements can be used as an indirect estimate of potential groundwater recharge. Available precipitation also impacts the demand on groundwater withdrawal.

2.3.2 Monitoring Well Installation

No new monitoring wells were installed by the GMP during CY 2013.

2.4 Field Methods and Measurements

The monitoring procedures conducted for GMP groundwater monitoring are described in detail in Section 1.3. The water level information obtained in 2013 was used to develop the potentiometric surface map presented in Plate 1 and the hydrographs presented on Figures 2B-6 through 2B-11 (Attachment 2B).

2.5 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using U.S. Environmental Protection Agency (EPA)-specified protocols as described in Section 1.3.2 (Tables 1-5 and 1-6).

2.6 Summary of Monitoring Results

2.6.1 Analytical Results

Groundwater and surface water samples were submitted to GEL Laboratories LLC (GEL) for both chemical and radiological analysis. Samples submitted to GEL were analyzed in accordance with applicable EPA analytical methods. Groundwater sampling results are compared with EPA maximum contaminant levels (MCLs) for drinking water supplies (EPA 2001 and 2009) and NMED maximum allowable concentrations (MACs) for human health standards of groundwater as promulgated by the New Mexico Water Quality Control Commission (NMWQCC) (NMED 2001). Analytical reports from GEL, including certificates of analyses, analytical methods, MDLs, practical quantitation limits (PQLs), minimum detectable activity (MDA) values and critical levels for radiochemistry analyses, dates of analyses, results of quality control (QC) analyses, and data validation findings are filed in the SNL/NM Records Center. Analytical results, laboratory QC qualifiers, and third-party validation qualifiers are archived in the Environmental Data Management System (EDMS) electronic database.

Table 2A-1 (Attachment 2A) summarizes detected VOC and HE compound results for groundwater samples collected in April and May 2013. No HE compounds were detected above laboratory MDLs. No VOCs were detected at concentrations above established MCLs or MACs from any groundwater sample. No VOCs were detected above laboratory MDLs, except chloroform and trichloroethene (TCE). Chloroform was detected below the MAC of 100 micrograms per liter (μg/L) in TRE-1 at a concentration of 0.630 μg/L. TCE was reported in SWTA3-MW4 at a concentration of 0.670 μg/L. This is the initial detection of TCE, and SNL/NM performed re-sampling to verify the initial detection. SWTA3-MW4 was resampled on August 1, 2013 and September 25, 2013. The August 2013 data were qualified as not detected during data validation because TCE was reported in the associated QC blank sample. No VOCs were reported above laboratory MDLs in the September 2013 samples. Table 2A-2 (Attachment 2A) lists the laboratory MDLs for VOC and HE compounds.

Table 2A-3 (Attachment 2A) summarizes NPN results. NPN was detected in all well samples above associated MDLs, and ranged from 0.235 to 4.81 milligrams per liter (mg/L). All NPN results are below the MCL/MAC of 10 mg/L.

Table 2A-4 (Attachment 2A) summarizes alkalinity, major anions (as bromide, chloride, fluoride, and sulfate), TOX, total phenols, and total cyanide results. None of the analytes listed were detected above established MCLs or MACs, except for fluoride. Fluoride was detected above the MAC of 1.6 mg/L in samples from Coyote Springs and monitoring wells SFR-2S, SFR-4T, and TRE-1 at concentrations ranging from 1.74 to 2.87 mg/L. The elevated fluoride concentrations routinely observed in Coyote Springs is in an area of shallow groundwater and exposed bedrock containing fluoride-bearing minerals. Fluoride in groundwater is suspected to be naturally occurring (geogenic). The time trend plots for Coyote Springs and for wells in which fluoride concentrations exceed the MCL are presented on Figures 2C-1 through 2C-4 (Attachment 2C).

Detections of TOX were reported in samples from all sampling locations. But TOX was qualified as not detected during data validation in six of the samples because TOX was reported at concentrations less than the values reported in associated blank samples. The detected TOX were all "J" values (estimated values), at concentrations ranging from 0.0028 to 0.055 mg/L.

Total phenol was not detected at five of the sample locations, but ranged from 0.00181 to 0.0204 mg/L at the other sample locations. SNL/NM personnel requested GEL reanalyze total phenol in samples from monitoring wells PL-4, SWTA3-MW3, and TRE-1 because the original results were not comparable to historical values or the associated environmental duplicate sample. Both original and reanalysis results are reported in Table 2A-4.

Total cyanide was not detected in any of the samples from Coyote Springs or the monitoring wells.

Mercury was analyzed using unfiltered samples and is reported as total mercury. Mercury was not detected above associated laboratory MDLs in any groundwater sample. Total mercury results are summarized in Table 2A-5 (Attachment 2A).

Samples from GMP monitoring wells were analyzed for TAL metals plus uranium. Dissolved TAL metal results are summarized in Table 2A-6 (Attachment 2A). No metal parameters, other than beryllium, were detected above established regulatory limits in any groundwater samples. Beryllium was detected above the MCL of 0.004 mg/L in the sample from Coyote Springs at a concentration of 0.00754 mg/L. The time trend plot for beryllium concentrations for Coyote Springs is shown on Figure 2C-5 (Attachment 2C). The beryllium result for Coyote Springs is consistent with prior years of monitoring data as is demonstrated in the trend plot (Figure 2C-5).

Results for radiological analyses are summarized in Table 2A-7 (Attachment 2A), and include analyses for alpha- and beta-emitting radioisotopes (gross alpha/beta activities), radium-226, radium-228, and gamma spectroscopy results for short-list gamma radiation-emitting radioisotopes (americium-241, cesium-137, cobalt-60, and potassium-40). All reported activities are below established MCLs or MACs. Potassium-40 results in NWTA3-MW3D and SWTA3-MW4, and the americium-241 result in SWTA3-MW2 were qualified as unusable during data validation because the laboratory did not meet minimum peak identification criteria.

Isotopic uranium (uranium-233/234, uranium-235/236, and uranium-238) analyses were conducted on those samples from wells that previously had high gross alpha activity or are located where groundwater is in contact with bedrock that contains minerals that are high in naturally occurring radioisotopes. Isotopic uranium was collected at Coyote Springs and monitoring wells Greystone-MW2, SFR-2S, SFR-4T, and TRE-1 because groundwater contacts bedrock, which contains minerals high in naturally occurring uranium.

Gross alpha activity is measured as a screening tool and in accordance with 40 Code of Federal Regulations, Parts 9, 141, and 142, Table I-4 does not include uranium, which is measured independently. Therefore, gross alpha activity measurements were corrected by subtracting the total uranium activity. Radiological results are further reviewed by an SNL/NM Certified Health Physicist to assure that the samples are nonradioactive. The corrected gross alpha activity results are all below the MCL of 15 pCi/L, with a maximum value of 4.18 pCi/L.

Table 2A-8 (Attachment 2A) summarizes field water quality measurements collected prior to sampling. Field water quality measurements are used to document water chemistry stability and include turbidity, potential of hydrogen (pH), temperature, specific conductance (SC), oxidation-reduction potential (ORP), and dissolved oxygen (DO).

2.6.2 Groundwater Elevation Measurements

Construction details for monitoring wells located on or near KAFB are listed in Table 1. During CY 2013, SNL/NM GMP personnel measured groundwater elevations in 96 SNL/NM monitoring wells (Table 2). The groundwater elevations were measured with an electric well sounder. Data were also available for 22 additional monitoring wells owned by KAFB, COA, NMOSE, and LRRI. The groundwater elevation data are maintained in the Sandia EDMS. Groundwater elevation data for CY 2013 are provided in Table 2. The total number of wells listed by the respective organization is provided in Table 2-2.

2.6.2.1 Groundwater Recharge and Withdrawal

Factors influencing groundwater elevation fluctuations include groundwater withdrawals by production wells and potential recharge from precipitation.

Annual Precipitation

The regional climate for the Albuquerque Basin area is semiarid. Long-term average precipitation ranges from 9.45 inches per year (in/yr) (30-year norm based on 1981-2010 data) at Albuquerque International Sunport up to 35 in/yr at the crest of the Sandia Mountains. The normal seasonal distribution of precipitation in the Albuquerque area is for the majority to occur during the months of June through August when monsoonal thunderstorm activity is greatest. For CY 2013, the wettest months were July and September.

Table 2-2. Groundwater Elevations Measured in Monitoring Wells by SNL/NM and Other Organizations

Total Wells	Measuring Agency	Well Owner	Location
96	SNL/NM GMP	DOE/NNSA	Site-wide surveillance network wells, CWL, MWL, TA-V, TAG Investigation, and Burn Site Groundwater Study Area
22	SNL/NM GMP	KAFB	ECP Long-term Monitoring Program
4	COA EHD	COA	Eubank Landfill north of KAFB and Yale Avenue Landfill west of KAFB
1	SNL/NM GMP	COA	Eubank-1, West of Eubank Landfill
1	USGS	NMOSE	Mesa Del Sol-S well
1	USGS	COA	Montessa Park-S well
1	LRRI	DOE/NNSA	Southern boundary of KAFB

NOTES:
COA = City of Albuquerque.
CWL = Chemical Waste Landfill.
DOE = U.S. Department of Energy.
ECP = Environmental Compliance Program.
EHD = Environmental Health Department.
GMP = Groundwater Monitoring Program.
KAFB = Kirtland Air Force Base.
LRRI = Lovelace Respiratory Research Institute.
MWL = Mixed Waste Landfill.
NMOSE = New Mexico Office of the State Engineer.
NNSA = National Nuclear Security Administration.
SNL/NM = Sandia National Laboratories, New Mexico.
TA-V = Technical Area V.
TAG = Tijeras Arroyo Groundwater.
USGS = U.S. Geological Survey.

Precipitation data relevant to KAFB hydrogeology are available from four rain-gauge locations. Three on-site and one off-site meteorological towers are used to evaluate the precipitation pattern for KAFB:

- A21 tower located in Technical Area (TA)-II (Figure 1-4);
- A36 tower located in TA-III/V (Figure 1-4);
- SC1 tower located near Schoolhouse Well in the foothills of the Manzanita Mountains (Figure 1-4).
- National Weather Service meteorological station "KABQ" at the Albuquerque International Sunport located at the northwest corner of KAFB.

Annual precipitation during CY 2013 at the four locations is shown in Table 2-3. Data for CY 2012 are also presented for comparison. The differences in precipitation totals from the four locations show the isolated nature of rain showers in the Albuquerque area. The 9.32 inches of precipitation measured at the Albuquerque International Sunport (KABQ) during CY 2013 is 3.86 inches more than the corresponding period for the previous year; and it is 0.13 inches below the 30-year (1981-2010) norm of 9.45 inches. Monthly distribution of precipitation during CY 2013 at the four locations is shown on Figure 2B-1 (Attachment 2B). Figure 2B-2 shows the annual distribution of precipitation at these four locations for the period from January 2003 to December 2013.

Table 2-3. Precipitation Data for Kirtland Air Force Base, Calendar Years 2012 and 2013

Year	Meteorological Station			
	A21	A36	SC1	KABQ
CY 2012	3.98	4.51	6.51	5.46
CY 2013	11.46	12.11	11.00	9.32

NOTES:
Data are in inches of rainfall.
A21 = SNL/NM meteorological station in TA-II.
A36 = SNL/NM meteorological station in TA-III/V.
CY = Calendar Year.
KABQ = National Weather Service meteorological station at the Albuquerque International Sunport.
SC1 = SNL/NM meteorological station in the foothills of the Manzanita Mountains.

Groundwater Withdrawal

The KAFB production wells are screened over a depth from about 500 to 2,000 feet (ft) below ground surface and extract groundwater from the upper and middle unit of the Santa Fe Group. During CY 2013, KAFB pumped groundwater primarily from seven water supply wells.

KAFB supplies all the water for SNL/NM and other DOE/NNSA facilities located on KAFB. Figure 2B-3 (Attachment 2B) shows the CY 2013 monthly production for KAFB water supply wells. The highest level of production was in June at 118,580,000 gallons (gal.); the lowest occurred in January at 33,290,000 gal. The variability in production in response to demand is reflected in the cyclic fluctuation of groundwater elevations in monitoring wells within the region of influence of these pumping wells and is evident when shown in hydrographs. Figure 2B-4 shows the CY 2013 monthly production for each KAFB water supply well. Figure 2B-5 shows the trend of total annual groundwater production at KAFB for all wells, beginning in 2001. Table 2-4 provides a comparison of water pumped during CY 2013 to the previous year.

Table 2-4. Total Kirtland Air Force Base Groundwater Well Production

Units	CY 2012	CY 2013
Million gallons	874	826
Acre feet	2,683	2,534

NOTES:
Acre feet = 325,851 gallons.
CY = Calendar Year.

2.6.2.2 Groundwater Elevations

Groundwater elevations were interpreted using potentiometric surface maps and hydrographs.

Base-Wide Potentiometric Surface Map

Groundwater elevation data for monitoring wells installed by Sandia, USAF ER Program, COA EHD, LRRI, USGS, and NMOSE were used to construct the base-wide CY 2013 potentiometric surface map of the regional aquifer as shown on Plate 1. A total of 126 monitoring wells with water levels for October/November 2013 were used for interpreting the groundwater elevation data and constructing the contours (Table 1). Even though various well owners measure water levels on differing schedules, the use of two months of data is considered temporally concordant because water levels are typically not seasonally affected across KAFB.

The base-wide map represents the potentiometric surface of the regional aquifer and incorporates wells completed at the water table west of the Tijeras Fault Zone and wells completed in bedrock east of the

fault zone (Figure 1-3). West of the Tijeras Fault Zone, the regional aquifer is under unconfined (water table) conditions and is present within the Santa Fe Group, which consists of a fine-grained alluvial-fan lithofacies and the coarser Ancestral Rio Grande lithofacies (Figure 1-3). Within and east of the Tijeras Fault Zone, the regional aquifer is typically under confined conditions (positive pressure head) and is primarily present within fractured Paleozoic bedrock (primarily limestone and sandstone) and Precambrian bedrock (primarily granite and metamorphic rocks). The fault zone partially restricts groundwater underflow from the bedrock recharging the unconsolidated basin-fill deposits (the Santa Fe Group) of the Albuquerque Basin.

In general, groundwater flows westward away from the Manzanita Mountains and toward the Rio Grande. An extensive trough in the water table along the western edge of KAFB is due to drawdowns created by KAFB and ABCWUA water-supply wells. As a result, water levels across much of KAFB are steadily declining. This trough extends as far south as the Isleta Pueblo Reservation. The KAFB and ABCWUA Ridgecrest production well fields are located near the northern boundary of KAFB. The flat gradient in the middle of the trough is indicative of flow through the highly permeable sediments of the Ancestral Rio Grande fluvial deposits, which are the most productive aquifer material in the area.

Relatively steeper gradients in the eastern portion of KAFB are due to less permeable materials, higher ground surface elevation along the eastern mountain front of the Albuquerque Basin, and the presence of various faults (Plate 1).

Perched Groundwater System Potentiometric Surface Map

During the installation of monitoring wells for groundwater characterization at TA-II in 1993, a shallow water-bearing zone was encountered at a depth of 300 ft below ground surface. This was 200 ft above the regional aquifer. The installation of additional wells completed in this PGWS defined the lateral extent of the system, which is approximately 3.5 square miles. The western edge of the PGWS trends along the eastern side of former KAFB sewage lagoons. The northern edge of the PGWS coincides with the northern boundary of TA-I. To the east, the PGWS is defined using USAF ER Program monitoring wells along the west side of the KAFB Landfill. The southern tip appears to be south of the Tijeras Arroyo Golf Course along the northeastern side of Pennsylvania Avenue. The area covered by the PGWS comprises much of the Tijeras Arroyo Groundwater study area, and the elevation data for wells completed in the PGWS were used to construct the potentiometric surface map that is presented and discussed in Chapter 6.0.

Monitoring Well Hydrographs

This section discusses historical and recent trends in groundwater elevations in the vicinity of SNL/NM, as demonstrated in the hydrographs for 12 GMP monitoring wells (Figures 2B-6 through 2B-11). The groundwater elevation data for these wells are considered to be representative of groundwater across KAFB. Historical data from quarterly and monthly groundwater elevation measurements through CY 2013 were used for plotting the hydrographs.

Since their construction, the 12 monitoring wells have had mostly declining water levels due to limited recharge from precipitation and groundwater withdrawals in the regional aquifer. Specific information gleaned from the hydrographs includes the following:

- **Greystone-MW2 (Figure 2B-6)**—Overall declining trend with superimposed seasonal effects of 1 to 2 ft that are mostly due to monsoonal thunderstorms; the well is located in Lurance Canyon and has a shallow screen set in alluvium.

- **MRN-2 and MRN-3D (Figure 2B-7)**—Declining trend up until early 2011; since then groundwater elevations have stabilized.

- **NWTA3-MW3D, PL-2, and PL-4 (Figure 2B-8)**—Declining trend up until late 2010/early 2011; since then, groundwater elevations have stabilized and show a slight increasing trend in NWTA3-MW3D and a slight to moderate increasing trend in monitoring wells PL-2 and PL-4.

- **SFR-2S and TRE-1 (Figure 2B-9)**—Slight to moderate declining trend since 2004.

- **SFR-4T (Figure 2B-10)**—Cyclical pattern with yearly fluctuations of 20 to 30 ft since 2001, but less pronounced cyclical pattern in 2011, 2012, and 2013.

- **SWTA3-MW2, SWTA3-MW3, and SWTA3-MW4 (Figure 2B-11)**—Moderate declining trend up until late 2011; since then, groundwater elevations continue to decline but appear to be stabilizing.

2.7 Quality Control Results

The QC samples are collected in the field at the time of environmental sample collection. Field QC samples are described in Section 1.3 and include duplicate environmental, equipment blank (EB), trip blank (TB), and field blank (FB) samples.

Duplicate environmental samples were collected from monitoring wells MRN-2, PL-4, SWTA3-MW3, and during both resampling events at SWTA3-MW4 and analyzed for all parameters to estimate the overall reproducibility of the sampling and analytical process. Relative percent difference (RPD) calculations of environmental samples and duplicate environmental samples were performed for detected chemical analytes only. The duplicate sample results show good agreement (RPD values less than 20 for organics and less than 35 for inorganic analyses) for all calculated parameters, except alkalinity, bromide, and total phenol. The RPD for alkalinity in MRN-2 was calculated at 103. The RPD for bromide on PL-4 was calculated at 74, but is considered an estimated value, because bromide was detected below the PQL. The RPD for total phenol (initial analysis) in SWTA3-MW3 was calculated at 94.

EB samples were collected prior to well purging and sampling at monitoring wells MRN-2, PL-4, SWTA3-MW3, and SWTA3-MW4 (resample) and submitted for all analyses.

Bromodichloromethane, bromoform, chloride, chloroform, chromium, copper, dibromochloromethane, sodium, TOX, total phenol, gross beta, radium-226, and radium-228 were detected in the EB samples. No corrective action was required for bromodichloromethane, bromoform, chloride, chloroform, dibromochloromethane, sodium, gross beta, radium-226, and radium-228 because these parameters were not detected in associated environmental samples, or were detected at concentrations greater than five times the blank result. Chromium, copper, and TOX were detected at concentrations less than five times the associated environmental sample results and were qualified as not detected during data validation. Total phenol was detected at a concentration less than five times in the PL-4 environmental samples, and these environmental sample results were qualified as not detected during data validation.

The TB samples were submitted whenever samples were collected for VOC analysis to assess whether contamination of the samples had occurred during shipment and storage. A total of 20 trip blanks were submitted with the CY 2013 samples. No VOCs were detected above associated laboratory MDLs.

Seven FB samples were collected for VOCs to assess whether contamination of the samples resulted from ambient conditions during sample collection. FB samples were prepared by pouring deionized water into sample containers at the monitoring wells PL-4, NWTA3-MW3D, and SWTA3-MW4 sampling points to simulate the transfer of environmental samples from the sampling system to the sample container. The VOC compounds bromodichloromethane, bromoform, chloroform, and dibromochloromethane were detected above laboratory MDLs. No corrective action was necessary, because these compounds were not detected in the associated environmental samples.

QC samples are also prepared at the laboratory to determine whether contaminant chemicals are introduced into laboratory processes and procedures. These include method blanks, laboratory control samples, matrix spike, matrix spike duplicate, and surrogate spike samples. Although some analytical results were qualified during the data validation process, and all data were determined as acceptable and reported QC measures to be adequate, except for the values listed below:

- The americium-241 activity in SWTA3-MW2 was qualified as unusable during data validation because the laboratory was unable to meet minimum peak identification criteria.

- The potassium-40 activity in NWTA3-MW3D and SWTA-MW4 were qualified as unusable during data validation because the laboratory was unable to meet minimum peak identification criteria.

2.8 Variances and Nonconformances

Project variances from requirements specified in the GMP Mini-Sampling and Analysis Plan (SAP) (SNL April 2013) identified during the CY 2013 sampling activities are identified below.

- TCE was detected in the May 2013 SWTA3-MW4 sample at a concentration of 0.670 μg/L; this is the initial detection of TCE. SNL/NM personnel resampled SWTA3-MW4 for VOCs on August 1, 2013 and September 25, 2013. The August 2013 results were qualified as not detected during data validation because TCE was reported in the associated QC blank sample. No VOCs were reported above laboratory MDLs in the September 2013 environmental samples.

- SNL/NM personnel requested GEL reanalyze total phenol in samples from PL-4, SWTA3-MW3, and TRE-1 because original results were not comparable to historical values or the associated environmental duplicate sample. Results from both original and reanalysis are reported in Table 2A-4.

2.9 Summary and Conclusions

The annual groundwater surveillance monitoring sampling event was conducted between April 26 and September 25, 2013. Groundwater samples were collected from 12 monitoring wells and one spring. The analytical results for the groundwater samples are similar to the results reported for previous years. No VOCs or HE compounds were detected at concentrations above established MCLs or MACs in any groundwater sample. The TCE originally detected in SWTA3-MW4 is thought to be an artifact of sampling or decontamination procedures and do not reflect actual groundwater concentrations. Subsequent sampling and analyses did not detect TCE, which is consistent with historical results.

NPN was detected in all well samples above associated MDLs, and ranged from 0.235 to 4.81 mg/L. All NPN results are below the MCL/MAC of 10 mg/L.

The elevated total phenol concentrations originally detected in samples from PL-4, SWTA3-MW3, and TRE-1 are thought to be an artifact of analytical laboratory issues and do not reflect actual groundwater concentrations. Subsequent re-analyses did not detect total phenol, or detected much lower concentrations of total phenol, which is consistent with historical results.

Fluoride was detected above the MAC of 1.6 mg/L (NMED 2001) in samples from Coyote Springs and monitoring wells SFR-2S, SFR-4T, and TRE-1 at concentrations ranging from 1.74 to 2.87 mg/L. The MCL for fluoride is 4.0 mg/L.

No metals, other than beryllium, were detected above established regulatory limits in any groundwater sample. Beryllium was detected above the MCL of 0.004 mg/L in the sample from Coyote Springs at a concentration of 0.00754 mg/L.

Groundwater elevations were obtained during CY 2013 at 96 SNL/NM monitoring wells on a monthly or quarterly basis. Groundwater elevations from the SNL/NM wells and wells owned by other agencies were used to construct a base-wide potentiometric surface map of the regional aquifer. The contours display a pattern that reflects the impact of the groundwater withdrawal by water supply wells located in the northwestern portion of KAFB and by ABCWUA production wells located north of the base.

2.10 References

40 CFR 141 Code of Federal Regulations, Title 40—Protection of the Environment, Part 141--National Primary Drinking Water Regulations.

DOE 2011 U.S. Department of Energy (DOE), 2011. *Departmental Sustainability*, DOE Order 436.1, U.S. Department of Energy, Washington, D.C., May 2.

DOE 1993 U.S. Department of Energy (DOE), 1993. *Drinking Water Guidelines for Radioisotopes*, DOE Order 5400.5, U.S. Department of Energy, Washington, D.C.

EPA 2009 U.S. Environmental Protection Agency (EPA), 2009. *National Primary Drinking Water Regulations*, EPA 816-F 09-004, U.S. Environmental Protection Agency, Washington, D.C.

EPA 2001 U.S. Environmental Protection Agency (EPA), 2001. *National Primary Drinking Water Regulations*, Title 40, Code of Federal Regulations, Part 141, Subpart B, Office of Water, U.S. Environmental Protection Agency, Washington, D.C.

NMED 2004 New Mexico Environment Department (NMED), 2004. *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order*, New Mexico Environment Department, Santa Fe, New Mexico, April 29.

NMED 2001 New Mexico Environment Department (NMED), 2001. *New Mexico Water Quality Control Commission Regulations*, Section 20.6.2 of the New Mexico Administrative Code, *Environmental Protection, Water Quality, Groundwater and Surface Water Protection*, New Mexico Environment Department, Santa Fe, New Mexico, January 15.

NMOSE 2005 New Mexico Office of the State Engineer (NMOSE), 2005. *Rules and Regulations Governing Well Driller Licensing; Construction, Repair and Plugging of Wells*, Office of the State Engineer, Santa Fe, New Mexico, August 31.

SNL April 2013 Sandia National Laboratories, New Mexico (SNL/NM), 2013. *Groundwater Protection Program Mini-SAP for FY13 Annual Groundwater Surveillance*, Sandia National Laboratories, Albuquerque, New Mexico, April.

SNL May 2013 Sandia National Laboratories, New Mexico (SNL/NM), 2013. *SNL/NM Long-Term Stewardship Consolidated Groundwater Monitoring Program Plan*, Sandia National Laboratories, Albuquerque, New Mexico, May.

This page intentionally left blank.

Attachment 2A
Long-Term Stewardship
Consolidated Groundwater Monitoring Program
Analytical Results Tables

This page intentionally left blank.

Attachment 2A Tables

2A-1 Summary of Detected Volatile Organic Compounds and High Explosive Compounds, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 2A-5

2A-2 Method Detection Limits for Volatile Organic Compounds and High Explosive Compounds, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 2A-6

2A-3 Summary of Nitrate plus Nitrite Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 2A-7

2A-4 Summary of Alkalinity, Anion, Total Organic Halogens, Total Phenol, and Total Cyanide Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 2A-8

2A-5 Summary of Mercury Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 2A-12

2A-6 Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 2A-13

2A-7 Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Radium, and Isotopic Uranium Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 2A-29

2A-8 Summary of Field Water Quality Measurements[h], Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 2A-34

Footnotes for Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task Analytical Results Tables 2A-35

This page intentionally left blank.

Table 2A-1
Summary of Detected Volatile Organic Compounds and High Explosive Compounds, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL/MAC[d] (µg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SWTA3-MW4 06-May-13	Trichloroethene	0.670	0.300	1.00	5.00	100	J		093900-001	SW846 8260
SWTA3-MW4 01-Aug-13	Trichloroethene	0.380	0.300	1.00	5.00	100	J	1.0U	094493-001	SW846 8260
SWTA3-MW4 (Duplicate) 01-Aug-13	Trichloroethene	0.380	0.300	1.00	5.00	100	J	1.0U	094494-001	SW846 8260
TRE-1 01-May-13	Chloroform	0.630	0.300	1.00	NE	100	J		093894-001	SW846 8260

Refer to footnotes on page 2A-35.

Table 2A-2
Method Detection Limits for Volatile Organic Compounds and High Explosive Compounds, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2013

Analyte	MDL[b] (µg/L)	Analytical Method[g]	Analyte	MDL[b] (µg/L)	Analytical Method[g]
1,1,1,2-Tetrachloroethane	0.300	SW846 8260	Ethyl benzene	0.300	SW846 8260
1,1,1-Trichloroethane	0.300	SW846 8260	Hexachlorobutadiene	0.300	SW846 8260
1,1,2,2-Tetrachloroethane	0.300	SW846 8260	Isopropylbenzene	0.300	SW846 8260
1,1,2-Trichloroethane	0.300	SW846 8260	Methylene chloride	3.00	SW846 8260
1,1-Dichloroethane	0.300	SW846 8260	Naphthalene	0.400	SW846 8260
1,1-Dichloroethene	0.300	SW846 8260	Styrene	0.300	SW846 8260
1,1-Dichloropropene	0.300	SW846 8260	Tert-butyl methyl ether	0.300	SW846 8260
1,2,3-Trichlorobenzene	0.300	SW846 8260	Tetrachloroethene	0.300	SW846 8260
1,2,3-Trichloropropane	0.300	SW846 8260	Toluene	0.300	SW846 8260
1,2,4-Trichlorobenzene	0.300	SW846 8260	Trichloroethene	0.300	SW846 8260
1,2,4-Trimethylbenzene	0.300	SW846 8260	Trichlorofluoromethane	0.300	SW846 8260
1,2-Dibromo-3-chloropropane	0.300	SW846 8260	Vinyl chloride	0.300	SW846 8260
1,2-Dibromoethane	0.300	SW846 8260	cis-1,2-Dichloroethene	0.300	SW846 8260
1,2-Dichlorobenzene	0.300	SW846 8260	cis-1,3-Dichloropropene	0.300	SW846 8260
1,2-Dichloroethane	0.300	SW846 8260	m-, p-Xylene	0.300	SW846 8260
1,2-Dichloropropane	0.300	SW846 8260	n-Butylbenzene	0.300	SW846 8260
1,3,5-Trimethylbenzene	0.300	SW846 8260	n-Propylbenzene	0.300	SW846 8260
1,3-Dichlorobenzene	0.300	SW846 8260	o-Xylene	0.300	SW846 8260
1,3-Dichloropropane	0.300	SW846 8260	sec-Butylbenzene	0.300	SW846 8260
1,4-Dichlorobenzene	0.300	SW846 8260	tert-Butylbenzene	0.300	SW846 8260
2,2-Dichloropropane	0.300	SW846 8260	trans-1,2-Dichloroethene	0.300	SW846 8260
2-Chlorotoluene	0.300	SW846 8260	trans-1,3-Dichloropropene	0.300	SW846 8260
4-Chlorotoluene	0.300	SW846 8260	1,3,5-Trinitrobenzene	0.0847 – 0.0874	SW846 8321A
4-Isopropyltoluene	0.300	SW846 8260	1,3-Dinitrobenzene	0.0847 – 0.0874	SW846 8321A
Benzene	0.300	SW846 8260	2,4,6-Trinitrotoluene	0.0847 – 0.0874	SW846 8321A
Bromobenzene	0.300	SW846 8260	2,4-Dinitrotoluene	0.0847 – 0.0874	SW846 8321A
Bromochloromethane	0.300	SW846 8260	2,6-Dinitrotoluene	0.0847 – 0.0874	SW846 8321A
Bromodichloromethane	0.300	SW846 8260	2-Amino-4,6-dinitrotoluene	0.0847 – 0.0874	SW846 8321A
Bromoform	0.300	SW846 8260	2-Nitrotoluene	0.0868 – 0.0896	SW846 8321A
Carbon tetrachloride	0.300	SW846 8260	3-Nitrotoluene	0.0847 – 0.0874	SW846 8321A
Chlorobenzene	0.300	SW846 8260	4-Amino-2,6-dinitrotoluene	0.0847 – 0.0874	SW846 8321A
Chloroethane	0.300	SW846 8260	4-Nitrotoluene	0.159 – 0.164	SW846 8321A
Chloroform	0.300	SW846 8260	HMX	0.0847 – 0.0874	SW846 8321A
Chloromethane	0.300	SW846 8260	Nitro-benzene	0.0847 – 0.0874	SW846 8321A
Dibromochloromethane	0.300	SW846 8260	Pentaerythritol tetranitrate	0.106 – 0.109	SW846 8321A
Dibromomethane	0.300	SW846 8260	RDX	0.0847 – 0.0874	SW846 8321A
Dichlorodifluoromethane	0.300	SW846 8260	Tetryl	0.0847 – 0.0874	SW846 8321A

Refer to footnotes on page 2A-35.

Table 2A-3
Summary of Nitrate plus Nitrite Results,
Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
Coyote Springs 02-May-13	Nitrate plus nitrite	0.370	0.017	0.050	10.0			093896-018	EPA 353.2
Greystone-MW2 26-Apr-13	Nitrate plus nitrite	4.64	0.170	0.500	10.0			093888-018	EPA 353.2
MRN-2 14-May-13	Nitrate plus nitrite	4.49	0.085	0.250	10.0			093923-018	EPA 353.2
MRN-2 (Duplicate) 14-May-13	Nitrate plus nitrite	4.52	0.085	0.250	10.0			093924-018	EPA 353.2
MRN-3D 13-May-13	Nitrate plus nitrite	2.33	0.085	0.250	10.0			093919-018	EPA 353.2
NWTA3-MW3D 10-May-13	Nitrate plus nitrite	1.02	0.017	0.050	10.0			093916-018	EPA 353.2
PL-2 08-May-13	Nitrate plus nitrite	2.62	0.085	0.250	10.0			093908-018	EPA 353.2
PL-4 09-May-13	Nitrate plus nitrite	4.77	0.170	0.500	10.0			093913-018	EPA 353.2
PL-4 (Duplicate) 09-May-13	Nitrate plus nitrite	4.81	0.170	0.500	10.0			093914-018	EPA 353.2
SFR-2S 29-Apr-13	Nitrate plus nitrite	0.865	0.085	0.250	10.0			093890-018	EPA 353.2
SFR-4T 30-Apr-13	Nitrate plus nitrite	0.235	0.017	0.050	10.0			093892-018	EPA 353.2
SWTA3-MW2 03-May-13	Nitrate plus nitrite	0.770	0.017	0.050	10.0			093898-018	EPA 353.2
SWTA3-MW3 07-May-13	Nitrate plus nitrite	0.549	0.017	0.050	10.0			093905-018	EPA 353.2
SWTA3-MW3 (Duplicate) 07-May-13	Nitrate plus nitrite	0.548	0.017	0.050	10.0			093906-018	EPA 353.2
SWTA3-MW4 06-May-13	Nitrate plus nitrite	0.907	0.017	0.050	10.0			093900-018	EPA 353.2
TRE-1 01-May-13	Nitrate plus nitrite	2.17	0.085	0.250	10.0			093894-018	EPA 353.2

Refer to footnotes on page 2A-35.

Table 2A-4
Summary of Alkalinity, Anion, Total Organic Halogens, Total Phenol, and Total Cyanide Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
Coyote Springs	Total Organic Halogens	0.055	0.0018	0.005	NE	NE		J	093896-003	SW846 9020
02-May-13	Bromide	ND	0.067	0.200	NE	NE	U		093896-016	SW846 9056
	Chloride	503	6.70	20.0	NE	NE			093896-016	SW846 9056
	Fluoride	**1.77**	0.033	0.100	4.0	1.60			093896-016	SW846 9056
	Sulfate	133	13.3	40.0	NE	NE			093896-016	SW846 9056
	Alkalinity	1060	0.725	1.00	NE	NE			093896-022	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U		093896-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	093896-027	SW846 9012
Greystone-MW2	Total Organic Halogens	0.014	0.0018	0.005	NE	NE		J	093888-003	SW846 9020
26-Apr-13	Bromide	0.617	0.067	0.200	NE	NE			093888-016	SW846 9056
	Chloride	119	1.34	4.00	NE	NE			093888-016	SW846 9056
	Fluoride	0.864	0.033	0.100	4.0	1.60			093888-016	SW846 9056
	Sulfate	50.8	2.66	8.00	NE	NE			093888-016	SW846 9056
	Alkalinity	481	0.725	1.00	NE	NE			093888-022	SM2320B
	Total Phenol	0.00197	0.00167	0.005	NE	NE	J		093888-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	093888-027	SW846 9012
MRN-2	Total Organic Halogens	0.0078	0.0018	0.005	NE	NE		0.060UJ	093933-003	SW846 9020
14-May-13	Bromide	0.242	0.067	0.200	NE	NE			093923-016	SW846 9056
	Chloride	12.0	0.335	1.00	NE	NE			093923-016	SW846 9056
	Fluoride	0.694	0.033	0.100	4.0	1.60			093923-016	SW846 9056
	Sulfate	49.0	0.665	2.00	NE	NE			093923-016	SW846 9056
	Alkalinity	150	0.725	1.00	NE	NE			093923-022	SM2320B
	Total Phenol	0.0204	0.00167	0.005	NE	NE			093923-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	093923-027	SW846 9012
MRN-2 (Duplicate)	Total Organic Halogens	0.0062	0.0018	0.005	NE	NE		0.060UJ	093934-003	SW846 9020
14-May-13	Bromide	0.241	0.067	0.200	NE	NE			093924-016	SW846 9056
	Chloride	16.1	0.335	1.00	NE	NE			093924-016	SW846 9056
	Fluoride	0.679	0.033	0.100	4.0	1.60			093924-016	SW846 9056
	Sulfate	55.6	0.665	2.00	NE	NE			093924-016	SW846 9056
	Alkalinity	47.7	0.725	1.00	NE	NE			093924-022	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U		093924-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	093924-027	SW846 9012

Refer to footnotes on page 2A-35.

Table 2A-4 *(Continued)*
Summary of Alkalinity, Anion, Total Organic Halogens, Total Phenol, and Total Cyanide Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MRN-3D	Total Organic Halogens	0.0084	0.0018	0.005	NE	NE		J	093931-003	SW846 9020
13-May-13	Bromide	0.203	0.067	0.200	NE	NE			093919-016	SW846 9056
	Chloride	13.9	0.670	2.00	NE	NE			093919-016	SW846 9056
	Fluoride	0.537	0.033	0.100	4.0	1.60			093919-016	SW846 9056
	Sulfate	70.8	1.33	4.00	NE	NE			093919-016	SW846 9056
	Alkalinity	146	0.725	1.00	NE	NE			093919-022	SM2320B
	Total Phenol	0.00257	0.00167	0.005	NE	NE	J		093919-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	093919-027	SW846 9012
NWTA3-MW3D	Total Organic Halogens	0.0058	0.0018	0.005	NE	NE		J	093930-003	SW846 9020
10-May-13	Bromide	ND	0.067	0.200	NE	NE	U		093916-016	SW846 9056
	Chloride	9.92	0.335	1.00	NE	NE			093916-016	SW846 9056
	Fluoride	0.741	0.033	0.100	4.0	1.60			093916-016	SW846 9056
	Sulfate	49.2	0.665	2.00	NE	NE			093916-016	SW846 9056
	Alkalinity	134	0.725	1.00	NE	NE			093916-022	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U		093916-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	093916-027	SW846 9012
PL-2	Total Organic Halogens	0.0028	0.0018	0.005	NE	NE	J	J	093926-003	SW846 9020
08-May-13	Bromide	0.191	0.067	0.200	NE	NE	J		093908-016	SW846 9056
	Chloride	13.8	0.335	1.00	NE	NE			093908-016	SW846 9056
	Fluoride	0.476	0.033	0.100	4.0	1.60			093908-016	SW846 9056
	Sulfate	71.5	0.665	2.00	NE	NE			093908-016	SW846 9056
	Alkalinity	151	0.725	1.00	NE	NE			093908-022	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U		093908-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	093908-027	SW846 9012
PL-4	Total Organic Halogens	0.0022	0.0018	0.005	NE	NE	J	0.05UJ	093928-003	SW846 9020
09-May-13	Bromide	0.275	0.067	0.200	NE	NE			093913-016	SW846 9056
	Chloride	15.0	0.335	1.00	NE	NE			093913-016	SW846 9056
	Fluoride	0.344	0.033	0.100	4.0	1.60			093913-016	SW846 9056
	Sulfate	66.4	0.665	2.00	NE	NE			093913-016	SW846 9056
	Alkalinity	163	0.725	1.00	NE	NE			093913-022	SM2320B
	Total Phenol	0.020	0.00167	0.005	NE	NE		0.0044UJ	093913-026	SW846 9066
	Total Phenol	ND	0.00167	0.005	NE	NE	h, H, U	UJ	093913-R26	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	093913-027	SW846 9012

Refer to footnotes on page 2A-35.

Table 2A-4 *(Continued)*
Summary of Alkalinity, Anion, Total Organic Halogens, Total Phenol, and Total Cyanide Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
PL-4 (Duplicate)	Total Organic Halogens	0.0075	0.0018	0.005	NE	NE	H	0.05UJ	093929-003	SW846 9020
09-May-13	Bromide	0.126	0.067	0.200	NE	NE	J		093914-016	SW846 9056
	Chloride	14.9	0.335	1.00	NE	NE			093914-016	SW846 9056
	Fluoride	0.358	0.033	0.100	4.0	1.60			093914-016	SW846 9056
	Sulfate	65.2	0.665	2.00	NE	NE			093914-016	SW846 9056
	Alkalinity	153	0.725	1.00	NE	NE			093914-022	SM2320B
	Total Phenol	0.014	0.00167	0.005	NE	NE		0.0044UJ	093914-026	SW846 9066
	Total Phenol	ND	0.00167	0.005	NE	NE	h, H, U	UJ	093914-R26	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	093914-027	SW846 9012
SFR-2S	Total Organic Halogens	0.016	0.0018	0.005	NE	NE		J	093890-003	SW846 9020
29-Apr-13	Bromide	0.676	0.067	0.200	NE	NE			093890-016	SW846 9056
	Chloride	134	1.34	4.00	NE	NE			093890-016	SW846 9056
	Fluoride	**1.74**	0.033	0.100	4.0	1.60			093890-016	SW846 9056
	Sulfate	75.2	2.66	8.00	NE	NE			093890-016	SW846 9056
	Alkalinity	391	0.725	1.00	NE	NE			093890-022	SM2320B
	Total Phenol	0.00181	0.00167	0.005	NE	NE	J		093890-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	093890-027	SW846 9012
SFR-4T	Total Organic Halogens	0.023	0.0018	0.005	NE	NE		J	093892-003	SW846 9020
30-Apr-13	Bromide	1.61	0.067	0.200	NE	NE			093892-016	SW846 9056
	Chloride	194	13.4	40.0	NE	NE			093892-016	SW846 9056
	Fluoride	**2.87**	0.033	0.100	4.0	1.60			093892-016	SW846 9056
	Sulfate	2010	26.6	80.0	NE	NE			093892-016	SW846 9056
	Alkalinity	104	0.725	1.00	NE	NE			093892-022	SM2320B
	Total Phenol	0.00838	0.00167	0.005	NE	NE			093892-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	093892-027	SW846 9012
SWTA3-MW2	Total Organic Halogens	0.0089	0.0018	0.005	NE	NE		J	093898-003	SW846 9020
03-May-13	Bromide	0.200	0.067	0.200	NE	NE			093898-016	SW846 9056
	Chloride	15.7	0.335	1.00	NE	NE			093898-016	SW846 9056
	Fluoride	1.08	0.033	0.100	4.0	1.60			093898-016	SW846 9056
	Sulfate	60.9	0.665	2.00	NE	NE			093898-016	SW846 9056
	Alkalinity	179	0.725	1.00	NE	NE			093898-022	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U		093898-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	093898-027	SW846 9012

Refer to footnotes on page 2A-35.

Table 2A-4 *(Concluded)*
Summary of Alkalinity, Anion, Total Organic Halogens, Total Phenol, and Total Cyanide Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SWTA3-MW3	Total Organic Halogens	0.0084	0.0018	0.005	NE	NE		0.065UJ	093905-003	SW846 9020
07-May-13	Bromide	0.125	0.067	0.200	NE	NE	J		093905-016	SW846 9056
	Chloride	13.2	0.335	1.00	NE	NE			093905-016	SW846 9056
	Fluoride	1.37	0.033	0.100	4.0	1.60			093905-016	SW846 9056
	Sulfate	63.2	0.665	2.00	NE	NE			093905-016	SW846 9056
	Alkalinity	158	0.725	1.00	NE	NE			093905-022	SM2320B
	Total Phenol	0.00957	0.00167	0.005	NE	NE			093905-026	SW846 9066
	Total Phenol	ND	0.00167	0.005	NE	NE	h, H, U	UJ	093905-R26	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	093905-027	SW846 9012
SWTA3-MW3	Total Organic Halogens	0.0072	0.0018	0.005	NE	NE		0.065UJ	093906-003	SW846 9020
(Duplicate)	Bromide	0.161	0.067	0.200	NE	NE	J		093906-016	SW846 9056
07-May-13	Chloride	13.1	0.335	1.00	NE	NE			093906-016	SW846 9056
	Fluoride	1.29	0.033	0.100	4.0	1.60			093906-016	SW846 9056
	Sulfate	63.3	0.665	2.00	NE	NE			093906-016	SW846 9056
	Alkalinity	158	0.725	1.00	NE	NE			093906-022	SM2320B
	Total Phenol	0.0264	0.00167	0.005	NE	NE			093906-026	SW846 9066
	Total Phenol	0.00247	0.00167	0.005	NE	NE	h, H, J	NJ-	093906-R26	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	093906-027	SW846 9012
SWTA3-MW4	Total Organic Halogens	0.0058	0.0018	0.005	NE	NE		J	093900-003	SW846 9020
06-May-13	Bromide	0.200	0.067	0.200	NE	NE			093900-016	SW846 9056
	Chloride	16.0	0.335	1.00	NE	NE			093900-016	SW846 9056
	Fluoride	1.57	0.033	0.100	4.0	1.60			093900-016	SW846 9056
	Sulfate	50.8	0.665	2.00	NE	NE			093900-016	SW846 9056
	Alkalinity	179	0.725	1.00	NE	NE			093900-022	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U		093900-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	093900-027	SW846 9012
TRE-1	Total Organic Halogens	0.016	0.0018	0.005	NE	NE		J	093894-003	SW846 9020
01-May-13	Bromide	0.826	0.067	0.200	NE	NE			093894-016	SW846 9056
	Chloride	135	3.35	10.0	NE	NE			093894-016	SW846 9056
	Fluoride	**1.77**	0.033	0.100	4.0	1.60			093894-016	SW846 9056
	Sulfate	105	6.65	20.0	NE	NE			093894-016	SW846 9056
	Alkalinity	475	0.725	1.00	NE	NE			093894-022	SM2320B
	Total Phenol	0.0726	0.00167	0.005	NE	NE			093894-026	SW846 9066
	Total Phenol	0.0192	0.00167	0.005	NE	NE	h, H, N	J-	093894-R26	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	093894-027	SW846 9012

Refer to footnotes on page 2A-35.

Table 2A-5
Summary of Mercury Results,
Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Mercury Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
Coyote Springs 02-May-13	ND	0.000067	0.0002	0.002	U		093896-010	SW846 7470A
Greystone-MW2 26-Apr-13	ND	0.000067	0.0002	0.002	U	UJ	093888-010	SW846 7470A
MRN-2 14-May-13	ND	0.000067	0.0002	0.002	U	UJ	093923-010	SW846 7470A
MRN-2 (Duplicate) 14-May-13	ND	0.000067	0.0002	0.002	U	UJ	093924-010	SW846 7470A
MRN-3D 13-May-13	ND	0.000067	0.0002	0.002	U	UJ	093919-010	SW846 7470A
NWTA3-MW3D 10-May-13	ND	0.000067	0.0002	0.002	U	UJ	093916-010	SW846 7470A
PL-2 08-May-13	ND	0.000067	0.0002	0.002	U	UJ	093908-010	SW846 7470A
PL-4 09-May-13	ND	0.000067	0.0002	0.002	U	UJ	093913-010	SW846 7470A
PL-4 (Duplicate) 09-May-13	ND	0.000067	0.0002	0.002	U	UJ	093914-010	SW846 7470A
SFR-2S 29-Apr-13	ND	0.000067	0.0002	0.002	U	UJ	093890-010	SW846 7470A
SFR-4T 30-Apr-13	ND	0.000067	0.0002	0.002	U	UJ	093892-010	SW846 7470A
SWTA3-MW2 03-May-13	ND	0.000067	0.0002	0.002	U		093898-010	SW846 7470A
SWTA3-MW3 07-May-13	ND	0.000067	0.0002	0.002	U	UJ	093905-010	SW846 7470A
SWTA3-MW3 (Duplicate) 07-May-13	ND	0.000067	0.0002	0.002	U	UJ	093906-010	SW846 7470A
SWTA3-MW4 06-May-13	ND	0.000067	0.0002	0.002	U	UJ	093900-010	SW846 7470A
TRE-1 01-May-13	ND	0.000067	0.0002	0.002	U	UJ	093894-010	SW846 7470A

Refer to footnotes on page 2A-35.

Table 2A-6
Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
Coyote Springs	Aluminum	0.230	0.015	0.050	NE	NE			093896-009	SW846 6020
02-May-13	Antimony	ND	0.001	0.003	0.006	NE	U		093896-009	SW846 6020
	Arsenic	0.00463	0.0017	0.005	0.010	0.100	J		093896-009	SW846 6020
	Barium	0.0428	0.0006	0.002	2.00	1.00			093896-009	SW846 6020
	Beryllium	**0.00754**	0.0002	0.0005	0.004	NE			093896-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		093896-009	SW846 6020
	Calcium	304	0.600	2.00	NE	NE			093896-009	SW846 6020
	Chromium	0.0026	0.002	0.010	0.100	0.050	J		093896-009	SW846 6020
	Cobalt	0.0108	0.0001	0.001	NE	NE			093896-009	SW846 6020
	Copper	0.00171	0.00035	0.001	NE	NE		J-	093896-009	SW846 6020
	Iron	0.754	0.033	0.100	NE	NE			093896-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		093896-009	SW846 6020
	Magnesium	72.4	0.100	0.300	NE	NE			093896-009	SW846 6020
	Manganese	1.55	0.010	0.050	NE	NE			093896-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		093896-009	SW846 7470
	Nickel	0.0323	0.0005	0.002	NE	NE			093896-009	SW846 6020
	Potassium	33.9	0.080	0.300	NE	NE			093896-009	SW846 6020
	Selenium	0.00291	0.0015	0.005	0.050	0.050	J	J	093896-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		093896-009	SW846 6020
	Sodium	462	0.800	2.50	NE	NE			093896-009	SW846 6020
	Thallium	0.00136	0.00045	0.002	0.002	NE	J		093896-009	SW846 6020
	Uranium	0.0075	0.000067	0.0002	0.03	0.03			093896-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	NE	U		093896-009	SW846 6010
	Zinc	0.0466	0.0035	0.010	NE	NE			093896-009	SW846 6020

Refer to footnotes on page 2A-35.

Table 2A-6 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
Greystone-MW2	Aluminum	ND	0.015	0.050	NE	NE	U		093888-009	SW846 6020
26-Apr-13	Antimony	ND	0.001	0.003	0.006	NE	U		093888-009	SW846 6020
	Arsenic	0.00284	0.0017	0.005	0.010	0.100	J		093888-009	SW846 6020
	Barium	0.145	0.0006	0.002	2.00	1.00			093888-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		093888-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		093888-009	SW846 6020
	Calcium	152	0.600	2.00	NE	NE			093888-009	SW846 6020
	Chromium	0.00214	0.002	0.010	0.100	0.050	J		093888-009	SW846 6020
	Cobalt	0.000565	0.0001	0.001	NE	NE	J		093888-009	SW846 6020
	Copper	0.00233	0.00035	0.001	NE	NE		J-	093888-009	SW846 6020
	Iron	0.345	0.033	0.100	NE	NE			093888-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		093888-009	SW846 6020
	Magnesium	31.4	0.010	0.030	NE	NE			093888-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		093888-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	UJ	093888-009	SW846 7470
	Nickel	0.00333	0.0005	0.002	NE	NE			093888-009	SW846 6020
	Potassium	5.57	0.080	0.300	NE	NE			093888-009	SW846 6020
	Selenium	0.00158	0.0015	0.005	0.050	0.050	J	J	093888-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		093888-009	SW846 6020
	Sodium	110	0.800	2.50	NE	NE			093888-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		093888-009	SW846 6020
	Uranium	0.00817	0.000067	0.0002	0.03	0.03			093888-009	SW846 6020
	Vanadium	0.00294	0.001	0.005	NE	NE	J		093888-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	NE	U		093888-009	SW846 6020

Refer to footnotes on page 2A-35.

Table 2A-6 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MRN-2	Aluminum	ND	0.015	0.050	NE	NE	U		093923-009	SW846 6020
14-May-13	Antimony	ND	0.001	0.003	0.006	NE	U		093923-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		093923-009	SW846 6020
	Barium	0.0562	0.0006	0.002	2.00	1.00			093923-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		093923-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		093923-009	SW846 6020
	Calcium	53.8	0.300	1.00	NE	NE	N		093923-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	0.050	U		093923-009	SW846 6020
	Cobalt	0.000109	0.0001	0.001	NE	NE	J		093923-009	SW846 6020
	Copper	0.0012	0.00035	0.001	NE	NE		0.010UJ	093923-009	SW846 6020
	Iron	0.102	0.033	0.100	NE	NE			093923-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		093923-009	SW846 6020
	Magnesium	15.7	0.010	0.030	NE	NE			093923-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		093923-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	UJ	093923-009	SW846 7470
	Nickel	0.00138	0.0005	0.002	NE	NE	J		093923-009	SW846 6020
	Potassium	3.35	0.080	0.300	NE	NE			093923-009	SW846 6020
	Selenium	0.00204	0.0015	0.005	0.050	0.050	J		093923-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		093923-009	SW846 6020
	Sodium	22.6	0.080	0.250	NE	NE	N		093923-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		093923-009	SW846 6020
	Uranium	0.00327	0.000067	0.0002	0.03	0.03			093923-009	SW846 6020
	Vanadium	0.00728	0.001	0.005	NE	NE			093923-009	SW846 6010
	Zinc	0.00391	0.0035	0.010	NE	NE	J		093923-009	SW846 6020

Refer to footnotes on page 2A-35.

Table 2A-6 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MRN-2 (Duplicate)	Aluminum	ND	0.015	0.050	NE	NE	U		093924-009	SW846 6020
14-May-13	Antimony	ND	0.001	0.003	0.006	NE	U		093924-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		093924-009	SW846 6020
	Barium	0.0551	0.0006	0.002	2.00	1.00			093924-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		093924-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		093924-009	SW846 6020
	Calcium	52.7	0.300	1.00	NE	NE	N		093924-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	0.050	U		093924-009	SW846 6020
	Cobalt	0.000127	0.0001	0.001	NE	NE	J		093924-009	SW846 6020
	Copper	0.000697	0.00035	0.001	NE	NE	J	0.010UJ	093924-009	SW846 6020
	Iron	0.101	0.033	0.100	NE	NE			093924-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		093924-009	SW846 6020
	Magnesium	15.7	0.010	0.030	NE	NE			093924-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		093924-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	UJ	093924-009	SW846 7470
	Nickel	0.00132	0.0005	0.002	NE	NE	J		093924-009	SW846 6020
	Potassium	3.33	0.080	0.300	NE	NE			093924-009	SW846 6020
	Selenium	0.00179	0.0015	0.005	0.050	0.050	J		093924-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		093924-009	SW846 6020
	Sodium	24.4	0.080	0.250	NE	NE	N		093924-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		093924-009	SW846 6020
	Uranium	0.00319	0.000067	0.0002	0.03	0.03			093924-009	SW846 6020
	Vanadium	0.00725	0.001	0.005	NE	NE			093924-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	NE	U		093924-009	SW846 6020

Refer to footnotes on page 2A-35.

Table 2A-6 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MRN-3D	Aluminum	ND	0.015	0.050	NE	NE	U		093919-009	SW846 6020
13-May-13	Antimony	ND	0.001	0.003	0.006	NE	U		093919-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		093919-009	SW846 6020
	Barium	0.117	0.0006	0.002	2.00	1.00			093919-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		093919-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		093919-009	SW846 6020
	Calcium	60.3	0.300	1.00	NE	NE	N		093919-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	0.050	U		093919-009	SW846 6020
	Cobalt	0.000157	0.0001	0.001	NE	NE	J		093919-009	SW846 6020
	Copper	0.00131	0.00035	0.001	NE	NE			093919-009	SW846 6020
	Iron	0.111	0.033	0.100	NE	NE			093919-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		093919-009	SW846 6020
	Magnesium	14.0	0.010	0.030	NE	NE			093919-009	SW846 6020
	Manganese	0.0111	0.001	0.005	NE	NE			093919-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	UJ	093919-009	SW846 7470
	Nickel	0.00149	0.0005	0.002	NE	NE	J		093919-009	SW846 6020
	Potassium	4.25	0.080	0.300	NE	NE			093919-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	0.050	U		093919-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		093919-009	SW846 6020
	Sodium	27.3	0.080	0.250	NE	NE	N		093919-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		093919-009	SW846 6020
	Uranium	0.00357	0.000067	0.0002	0.03	0.03			093919-009	SW846 6020
	Vanadium	0.00568	0.001	0.005	NE	NE			093919-009	SW846 6010
	Zinc	0.0551	0.0035	0.010	NE	NE			093919-009	SW846 6020

Refer to footnotes on page 2A-35.

Table 2A-6 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
NWTA3-MW3D	Aluminum	ND	0.015	0.050	NE	NE	U		093916-009	SW846 6020
10-May-13	Antimony	ND	0.001	0.003	0.006	NE	U		093916-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		093916-009	SW846 6020
	Barium	0.0862	0.0006	0.002	2.00	1.00			093916-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		093916-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		093916-009	SW846 6020
	Calcium	39.4	0.060	0.200	NE	NE	N		093916-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	0.050	U		093916-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	NE	U		093916-009	SW846 6020
	Copper	0.00111	0.00035	0.001	NE	NE			093916-009	SW846 6020
	Iron	0.0786	0.033	0.100	NE	NE	J		093916-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		093916-009	SW846 6020
	Magnesium	7.75	0.010	0.030	NE	NE			093916-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		093916-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	UJ	093916-009	SW846 7470
	Nickel	0.00115	0.0005	0.002	NE	NE	J		093916-009	SW846 6020
	Potassium	3.58	0.080	0.300	NE	NE			093916-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	0.050	U		093916-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		093916-009	SW846 6020
	Sodium	35.4	0.080	0.250	NE	NE	N		093916-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		093916-009	SW846 6020
	Uranium	0.00358	0.000067	0.0002	0.03	0.03			093916-009	SW846 6020
	Vanadium	0.00804	0.001	0.005	NE	NE			093916-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	NE	U		093916-009	SW846 6020

Refer to footnotes on page 2A-35.

Table 2A-6 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
PL-2	Aluminum	ND	0.015	0.050	NE	NE	U		093908-009	SW846 6020
08-May-13	Antimony	ND	0.001	0.003	0.006	NE	U		093908-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		093908-009	SW846 6020
	Barium	0.0757	0.0006	0.002	2.00	1.00			093908-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		093908-009	SW846 6020
	Cadmium	0.00016	0.00011	0.001	0.005	0.010	J		093908-009	SW846 6020
	Calcium	65.5	0.300	1.00	NE	NE			093908-009	SW846 6020
	Chromium	0.00456	0.002	0.010	0.100	0.050	J		093908-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	NE	U		093908-009	SW846 6020
	Copper	0.000686	0.00035	0.001	NE	NE	J		093908-009	SW846 6020
	Iron	0.122	0.033	0.100	NE	NE			093908-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		093908-009	SW846 6020
	Magnesium	10.5	0.010	0.030	NE	NE			093908-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		093908-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	UJ	093908-009	SW846 7470
	Nickel	0.00477	0.0005	0.002	NE	NE			093908-009	SW846 6020
	Potassium	3.73	0.080	0.300	NE	NE			093908-009	SW846 6020
	Selenium	0.00164	0.0015	0.005	0.050	0.050	J	J	093908-009	SW846 6020
	Silver	0.000321	0.0002	0.001	NE	0.050	J		093908-009	SW846 6020
	Sodium	29.8	0.080	0.250	NE	NE			093908-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		093908-009	SW846 6020
	Uranium	0.0041	0.000067	0.0002	0.03	0.03			093908-009	SW846 6020
	Vanadium	0.00468	0.001	0.005	NE	NE	J		093908-009	SW846 6010
	Zinc	0.0117	0.0035	0.010	NE	NE			093908-009	SW846 6020

Refer to footnotes on page 2A-35.

Table 2A-6 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
PL-4	Aluminum	ND	0.015	0.050	NE	NE	U		093913-009	SW846 6020
09-May-13	Antimony	ND	0.001	0.003	0.006	NE	U		093913-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		093913-009	SW846 6020
	Barium	0.0613	0.0006	0.002	2.00	1.00			093913-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		093913-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		093913-009	SW846 6020
	Calcium	72.7	0.300	1.00	NE	NE			093913-009	SW846 6020
	Chromium	0.0037	0.002	0.010	0.100	0.050	J	0.014U	093913-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	NE	U		093913-009	SW846 6020
	Copper	0.000749	0.00035	0.001	NE	NE	J	0.0088U	093913-009	SW846 6020
	Iron	0.143	0.033	0.100	NE	NE			093913-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		093913-009	SW846 6020
	Magnesium	13.3	0.010	0.030	NE	NE			093913-009	SW846 6020
	Manganese	0.0109	0.001	0.005	NE	NE			093913-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	UJ	093913-009	SW846 7470
	Nickel	0.00178	0.0005	0.002	NE	NE	J		093913-009	SW846 6020
	Potassium	5.02	0.080	0.300	NE	NE			093913-009	SW846 6020
	Selenium	0.00194	0.0015	0.005	0.050	0.050	J	J	093913-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		093913-009	SW846 6020
	Sodium	27.4	0.080	0.250	NE	NE			093913-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		093913-009	SW846 6020
	Uranium	0.00385	0.000067	0.0002	0.03	0.03			093913-009	SW846 6020
	Vanadium	0.00352	0.001	0.005	NE	NE	J		093913-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	NE	U		093913-009	SW846 6020

Refer to footnotes on page 2A-35.

Table 2A-6 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
PL-4 (Duplicate)	Aluminum	ND	0.015	0.050	NE	NE	U		093914-009	SW846 6020
09-May-13	Antimony	ND	0.001	0.003	0.006	NE	U		093914-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		093914-009	SW846 6020
	Barium	0.0619	0.0006	0.002	2.00	1.00			093914-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		093914-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		093914-009	SW846 6020
	Calcium	73.8	0.300	1.00	NE	NE			093914-009	SW846 6020
	Chromium	0.00374	0.002	0.010	0.100	0.050	J	0.014U	093914-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	NE	U		093914-009	SW846 6020
	Copper	0.000727	0.00035	0.001	NE	NE	J	0.0088U	093914-009	SW846 6020
	Iron	0.134	0.033	0.100	NE	NE			093914-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		093914-009	SW846 6020
	Magnesium	13.0	0.010	0.030	NE	NE			093914-009	SW846 6020
	Manganese	0.011	0.001	0.005	NE	NE			093914-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	UJ	093914-009	SW846 7470
	Nickel	0.00184	0.0005	0.002	NE	NE	J		093914-009	SW846 6020
	Potassium	5.19	0.080	0.300	NE	NE			093914-009	SW846 6020
	Selenium	0.00178	0.0015	0.005	0.050	0.050	J	J	093914-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		093914-009	SW846 6020
	Sodium	25.5	0.080	0.250	NE	NE			093914-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		093914-009	SW846 6020
	Uranium	0.0039	0.000067	0.0002	0.03	0.03			093914-009	SW846 6020
	Vanadium	0.00294	0.001	0.005	NE	NE	J		093914-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	NE	U		093914-009	SW846 6020

Refer to footnotes on page 2A-35.

Table 2A-6 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SFR-2S	Aluminum	ND	0.015	0.050	NE	NE	U		093890-009	SW846 6020
29-Apr-13	Antimony	ND	0.001	0.003	0.006	NE	U		093890-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		093890-009	SW846 6020
	Barium	0.059	0.0006	0.002	2.00	1.00			093890-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		093890-009	SW846 6020
	Cadmium	0.000548	0.00011	0.001	0.005	0.010	J	J+	093890-009	SW846 6020
	Calcium	133	0.600	2.00	NE	NE			093890-009	SW846 6020
	Chromium	0.00352	0.002	0.010	0.100	0.050	J		093890-009	SW846 6020
	Cobalt	0.00042	0.0001	0.001	NE	NE	J		093890-009	SW846 6020
	Copper	0.00128	0.00035	0.001	NE	NE		J-	093890-009	SW846 6020
	Iron	0.301	0.033	0.100	NE	NE			093890-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		093890-009	SW846 6020
	Magnesium	38.5	0.010	0.030	NE	NE			093890-009	SW846 6020
	Manganese	0.00309	0.001	0.005	NE	NE	J		093890-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	UJ	093890-009	SW846 7470
	Nickel	0.0197	0.0005	0.002	NE	NE			093890-009	SW846 6020
	Potassium	7.63	0.080	0.300	NE	NE			093890-009	SW846 6020
	Selenium	0.00217	0.0015	0.005	0.050	0.050	J	J	093890-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		093890-009	SW846 6020
	Sodium	91.3	0.800	2.50	NE	NE			093890-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		093890-009	SW846 6020
	Uranium	0.0176	0.000067	0.0002	0.03	0.03			093890-009	SW846 6020
	Vanadium	0.00292	0.001	0.005	NE	NE	J		093890-009	SW846 6010
	Zinc	0.00506	0.0035	0.010	NE	NE	J		093890-009	SW846 6020

Refer to footnotes on page 2A-35.

Table 2A-6 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SFR-4T	Aluminum	ND	0.015	0.050	NE	NE	U		093892-009	SW846 6020
30-Apr-13	Antimony	ND	0.001	0.003	0.006	NE	U		093892-009	SW846 6020
	Arsenic	0.00286	0.0017	0.005	0.010	0.100	J		093892-009	SW846 6020
	Barium	0.00967	0.0006	0.002	2.00	1.00			093892-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		093892-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		093892-009	SW846 6020
	Calcium	64.7	0.300	1.00	NE	NE			093892-009	SW846 6020
	Chromium	0.00275	0.002	0.010	0.100	0.050	J		093892-009	SW846 6020
	Cobalt	0.000181	0.0001	0.001	NE	NE	J		093892-009	SW846 6020
	Copper	0.00286	0.00035	0.001	NE	NE			093892-009	SW846 6020
	Iron	0.314	0.033	0.100	NE	NE			093892-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		093892-009	SW846 6020
	Magnesium	4.61	0.010	0.030	NE	NE			093892-009	SW846 6020
	Manganese	0.00641	0.001	0.005	NE	NE			093892-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	UJ	093892-009	SW846 7470
	Nickel	0.00414	0.0005	0.002	NE	NE			093892-009	SW846 6020
	Potassium	2.68	0.080	0.300	NE	NE			093892-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	0.050	U	UJ	093892-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		093892-009	SW846 6020
	Sodium	1220	4.00	12.5	NE	NE			093892-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		093892-009	SW846 6020
	Uranium	0.000296	0.000067	0.0002	0.03	0.03			093892-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	NE	U		093892-009	SW846 6010
	Zinc	0.0383	0.0035	0.010	NE	NE			093892-009	SW846 6020

Refer to footnotes on page 2A-35.

Table 2A-6 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SWTA3-MW2	Aluminum	ND	0.015	0.050	NE	NE	U		093898-009	SW846 6020
03-May-13	Antimony	ND	0.001	0.003	0.006	NE	U		093898-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		093898-009	SW846 6020
	Barium	0.0745	0.0006	0.002	2.00	1.00			093898-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		093898-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		093898-009	SW846 6020
	Calcium	47.6	0.060	0.200	NE	NE			093898-009	SW846 6020
	Chromium	0.00271	0.002	0.010	0.100	0.050	J		093898-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	NE	U		093898-009	SW846 6020
	Copper	0.000606	0.00035	0.001	NE	NE	J		093898-009	SW846 6020
	Iron	0.112	0.033	0.100	NE	NE			093898-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		093898-009	SW846 6020
	Magnesium	14.8	0.010	0.030	NE	NE			093898-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		093898-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		093898-009	SW846 7470
	Nickel	0.00147	0.0005	0.002	NE	NE	J		093898-009	SW846 6020
	Potassium	4.63	0.080	0.300	NE	NE			093898-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	0.050	U	UJ	093898-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		093898-009	SW846 6020
	Sodium	39.4	0.080	0.250	NE	NE			093898-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		093898-009	SW846 6020
	Uranium	0.00352	0.000067	0.0002	0.03	0.03			093898-009	SW846 6020
	Vanadium	0.0054	0.001	0.005	NE	NE			093898-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	NE	U		093898-009	SW846 6020

Refer to footnotes on page 2A-35.

Table 2A-6 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SWTA3-MW3	Aluminum	ND	0.015	0.050	NE	NE	U		093905-009	SW846 6020
07-May-13	Antimony	ND	0.001	0.003	0.006	NE	U		093905-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		093905-009	SW846 6020
	Barium	0.0568	0.0006	0.002	2.00	1.00			093905-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		093905-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		093905-009	SW846 6020
	Calcium	39.3	0.060	0.200	NE	NE			093905-009	SW846 6020
	Chromium	0.00318	0.002	0.010	0.100	0.050	J	0.013U	093905-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	NE	U		093905-009	SW846 6020
	Copper	0.000546	0.00035	0.001	NE	NE	J	0.0062U	093905-009	SW846 6020
	Iron	0.0953	0.033	0.100	NE	NE	J		093905-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		093905-009	SW846 6020
	Magnesium	11.8	0.010	0.030	NE	NE			093905-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		093905-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	UJ	093905-009	SW846 7470
	Nickel	0.00131	0.0005	0.002	NE	NE	J		093905-009	SW846 6020
	Potassium	4.83	0.080	0.300	NE	NE			093905-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	0.050	U	UJ	093905-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		093905-009	SW846 6020
	Sodium	52.4	0.400	1.25	NE	NE			093905-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		093905-009	SW846 6020
	Uranium	0.00268	0.000067	0.0002	0.03	0.03			093905-009	SW846 6020
	Vanadium	0.00709	0.001	0.005	NE	NE			093905-009	SW846 6010
	Zinc	0.00546	0.0035	0.010	NE	NE	J		093905-009	SW846 6020

Refer to footnotes on page 2A-35.

Table 2A-6 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SWTA3-MW3	Aluminum	ND	0.015	0.050	NE	NE	U		093906-009	SW846 6020
(Duplicate)	Antimony	ND	0.001	0.003	0.006	NE	U		093906-009	SW846 6020
07-May-13	Arsenic	ND	0.0017	0.005	0.010	0.100	U		093906-009	SW846 6020
	Barium	0.0561	0.0006	0.002	2.00	1.00			093906-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		093906-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		093906-009	SW846 6020
	Calcium	39.1	0.060	0.200	NE	NE			093906-009	SW846 6020
	Chromium	0.00351	0.002	0.010	0.100	0.050	J	0.013U	093906-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	NE	U		093906-009	SW846 6020
	Copper	0.000566	0.00035	0.001	NE	NE	J	0.0062U	093906-009	SW846 6020
	Iron	0.0868	0.033	0.100	NE	NE	J		093906-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		093906-009	SW846 6020
	Magnesium	11.8	0.010	0.030	NE	NE			093906-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		093906-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	UJ	093906-009	SW846 7470
	Nickel	0.00132	0.0005	0.002	NE	NE	J		093906-009	SW846 6020
	Potassium	5.18	0.080	0.300	NE	NE			093906-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	0.050	U	UJ	093906-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		093906-009	SW846 6020
	Sodium	54.5	0.400	1.25	NE	NE			093906-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		093906-009	SW846 6020
	Uranium	0.00267	0.000067	0.0002	0.03	0.03			093906-009	SW846 6020
	Vanadium	0.00822	0.001	0.005	NE	NE			093906-009	SW846 6010
	Zinc	0.0056	0.0035	0.010	NE	NE	J		093906-009	SW846 6020

Refer to footnotes on page 2A-35.

Table 2A-6 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SWTA3-MW4	Aluminum	ND	0.015	0.050	NE	NE	U		093900-009	SW846 6020
06-May-13	Antimony	ND	0.001	0.003	0.006	NE	U		093900-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		093900-009	SW846 6020
	Barium	0.0501	0.0006	0.002	2.00	1.00			093900-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		093900-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		093900-009	SW846 6020
	Calcium	36.8	0.060	0.200	NE	NE			093900-009	SW846 6020
	Chromium	0.0053	0.002	0.010	0.100	0.050	J		093900-009	SW846 6020
	Cobalt	0.000104	0.0001	0.001	NE	NE	J		093900-009	SW846 6020
	Copper	0.000565	0.00035	0.001	NE	NE	J		093900-009	SW846 6020
	Iron	0.0925	0.033	0.100	NE	NE	J		093900-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		093900-009	SW846 6020
	Magnesium	11.3	0.010	0.030	NE	NE			093900-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		093900-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	UJ	093900-009	SW846 7470
	Nickel	0.000981	0.0005	0.002	NE	NE	J		093900-009	SW846 6020
	Potassium	4.58	0.080	0.300	NE	NE			093900-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	0.050	U	UJ	093900-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		093900-009	SW846 6020
	Sodium	60.8	0.400	1.25	NE	NE			093900-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		093900-009	SW846 6020
	Uranium	0.00254	0.000067	0.0002	0.03	0.03			093900-009	SW846 6020
	Vanadium	0.00741	0.001	0.005	NE	NE			093900-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	NE	U		093900-009	SW846 6020

Refer to footnotes on page 2A-35.

Table 2A-6 *(Concluded)*
Summary of Target Analyte List Metals and Uranium Results,
Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TRE-1	Aluminum	ND	0.015	0.050	NE	NE	U		093894-009	SW846 6020
01-May-13	Antimony	ND	0.001	0.003	0.006	NE	U		093894-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		093894-009	SW846 6020
	Barium	0.0435	0.0006	0.002	2.00	1.00			093894-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		093894-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		093894-009	SW846 6020
	Calcium	172	0.600	2.00	NE	NE			093894-009	SW846 6020
	Chromium	0.00238	0.002	0.010	0.100	0.050	J		093894-009	SW846 6020
	Cobalt	0.00028	0.0001	0.001	NE	NE	J		093894-009	SW846 6020
	Copper	0.000914	0.00035	0.001	NE	NE	J	J-	093894-009	SW846 6020
	Iron	0.371	0.033	0.100	NE	NE			093894-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		093894-009	SW846 6020
	Magnesium	38.7	0.010	0.030	NE	NE			093894-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		093894-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U	UJ	093894-009	SW846 7470
	Nickel	0.00344	0.0005	0.002	NE	NE			093894-009	SW846 6020
	Potassium	7.63	0.080	0.300	NE	NE			093894-009	SW846 6020
	Selenium	0.00257	0.0015	0.005	0.050	0.050	J	J	093894-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		093894-009	SW846 6020
	Sodium	120	0.800	2.50	NE	NE			093894-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		093894-009	SW846 6020
	Uranium	0.019	0.000067	0.0002	0.03	0.03			093894-009	SW846 6020
	Vanadium	0.00298	0.001	0.005	NE	NE	J		093894-009	SW846 6010
	Zinc	0.00368	0.0035	0.010	NE	NE	J		093894-009	SW846 6020

Refer to footnotes on page 2A-35.

Table 2A-7
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Radium, and Isotopic Uranium Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL/MAC[d]		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
Coyote Springs	Americium-241	4.32 ± 14.6	23.2	11.3	NE	NE	U	BD	093896-033	EPA 901.1
02-May-13	Cesium-137	-0.818 ± 1.76	3.03	1.44	NE	NE	U	BD	093896-033	EPA 901.1
	Cobalt-60	0.207 ± 1.90	3.51	1.64	NE	NE	U	BD	093896-033	EPA 901.1
	Potassium-40	67.9 ± 51.6	30.8	14.2	NE	NE		J	093896-033	EPA 901.1
	Gross Alpha	-5.85	NA	NA	15 pCi/L	NE	NA	None	093896-034	EPA 900.0
	Gross Beta	39.5 ± 8.84	8.46	4.10	4mrem/yr	NE			093896-034	EPA 900.0
	Uranium-233/234	10.6 ± 1.68	0.204	0.0901	NE	NE			093896-035	HASL-300
	Uranium-235/236	0.154 ± 0.0944	0.0949	0.0325	NE	NE		J	093896-035	HASL-300
	Uranium-238	2.64 ± 0.494	0.123	0.0497	NE	NE			093896-035	HASL-300
	Radium-226	1.92 ± 0.569	0.398	0.162	5 pCi/L	30 pCi/L		J	093896-038	EPA 903.1
	Radium-228	0.982 ± 0.425	0.443	0.197	5 pCi/L	30 pCi/L		J	093896-039	EPA 904.0
Greystone-MW2	Americium-241	-4.2 ± 11.0	15.7	7.70	NE	NE	U	BD	093888-033	EPA 901.1
26-Apr-13	Cesium-137	-0.306 ± 1.98	3.42	1.65	NE	NE	U	BD	093888-033	EPA 901.1
	Cobalt-60	2.25 ± 2.16	3.65	1.73	NE	NE	U	BD	093888-033	EPA 901.1
	Potassium-40	71.0 ± 37.8	71.0	13.7	NE	NE	U	BD	093888-033	EPA 901.1
	Gross Alpha	0.14	NA	NA	15 pCi/L	NE	NA	None	093888-034	EPA 900.0
	Gross Beta	11.8 ± 3.27	3.89	1.89	4mrem/yr	NE		J	093888-034	EPA 900.0
	Uranium-233/234	10.2 ± 1.31	0.0694	0.0306	NE	NE			093888-035	HASL-300
	Uranium-235/236	0.195 ± 0.0591	0.0322	0.011	NE	NE			093888-035	HASL-300
	Uranium-238	2.27 ± 0.326	0.0419	0.0169	NE	NE			093888-035	HASL-300
	Radium-226	0.604 ± 0.313	0.289	0.0994	5 pCi/L	30 pCi/L		J	093888-038	EPA 903.1
	Radium-228	0.250 ± 0.286	0.467	0.209	5 pCi/L	30 pCi/L	U	BD	093888-039	EPA 904.0
MRN-2	Americium-241	-2.27 ± 9.26	15.1	7.35	NE	NE	U	BD	093923-033	EPA 901.1
14-May-13	Cesium-137	0.198 ± 3.41	2.77	1.33	NE	NE	U	BD	093923-033	EPA 901.1
	Cobalt-60	2.72 ± 2.00	3.13	1.48	NE	NE	U	BD	093923-033	EPA 901.1
	Potassium-40	-4.06 ± 28.1	37.3	17.8	NE	NE	U	BD	093923-033	EPA 901.1
	Gross Alpha	2.20	NA	NA	15 pCi/L	NE	NA	None	093923-034	EPA 900.0
	Gross Beta	2.52 ± 0.818	1.03	0.493	4mrem/yr	NE		NJ+	093923-034	EPA 900.0
	Radium-226	0.331 ± 0.227	0.291	0.110	5 pCi/L	30 pCi/L		NJ+	093923-038	EPA 903.1
	Radium-228	0.272 ± 0.300	0.489	0.232	5 pCi/L	30 pCi/L	U	BD	093923-039	EPA 904.0

Refer to footnotes on page 2A-35.

Table 2A-7 *(Continued)*
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Radium, and Isotopic Uranium Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL/MAC[d]		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MRN-2 (Duplicate)	Americium-241	-2.38 ± 5.93	9.95	4.85	NE	NE	U	BD	093924-033	EPA 901.1
14-May-13	Cesium-137	0.568 ± 1.46	2.63	1.26	NE	NE	U	BD	093924-033	EPA 901.1
	Cobalt-60	1.56 ± 1.84	3.14	1.49	NE	NE	U	BD	093924-033	EPA 901.1
	Potassium-40	14.0 ± 36.3	25.5	11.9	NE	NE	U	BD	093924-033	EPA 901.1
	Gross Alpha	1.60	NA	NA	15 pCi/L	NE	NA	None	093924-034	EPA 900.0
	Gross Beta	3.40 ± 0.897	0.947	0.452	4mrem/yr	NE		NJ+	093924-034	EPA 900.0
	Radium-226	-0.0295 ± 0.224	0.477	0.194	5 pCi/L	30 pCi/L	U	BD	093924-038	EPA 903.1
	Radium-228	0.836 ± 0.390	0.476	0.221	5 pCi/L	30 pCi/L		J	093924-039	EPA 904.0
MRN-3D	Americium-241	1.51 ± 5.73	8.49	4.16	NE	NE	U	BD	093919-033	EPA 901.1
13-May-13	Cesium-137	0.718 ± 1.65	2.88	1.39	NE	NE	U	BD	093919-033	EPA 901.1
	Cobalt-60	2.20 ± 3.21	2.85	1.34	NE	NE	U	BD	093919-033	EPA 901.1
	Potassium-40	-41.1 ± 37.9	38.3	18.4	NE	NE	U	BD	093919-033	EPA 901.1
	Gross Alpha	3.22	NA	NA	15 pCi/L	NE	NA	None	093919-034	EPA 900.0
	Gross Beta	3.37 ± 0.960	1.12	0.537	4mrem/yr	NE		J	093919-034	EPA 900.0
	Radium-226	0.710 ± 0.394	0.499	0.203	5 pCi/L	30 pCi/L		J	093919-038	EPA 903.1
	Radium-228	0.906 ± 0.395	0.479	0.227	5 pCi/L	30 pCi/L		J	093919-039	EPA 904.0
NWTA3-MW3D	Americium-241	3.09 ± 9.89	17.5	8.52	NE	NE	U	BD	093916-033	EPA 901.1
10-May-13	Cesium-137	0.943 ± 1.75	2.97	1.42	NE	NE	U	BD	093916-033	EPA 901.1
	Cobalt-60	1.07 ± 1.77	3.24	1.52	NE	NE	U	BD	093916-033	EPA 901.1
	Potassium-40	32.0 ± 38.4	27.5	12.8	NE	NE	X	R	093916-033	EPA 901.1
	Gross Alpha	2.06	NA	NA	15 pCi/L	NE	NA	None	093916-034	EPA 900.0
	Gross Beta	4.39 ± 1.16	1.30	0.625	4mrem/yr	NE		J	093916-034	EPA 900.0
	Radium-226	0.557 ± 0.342	0.429	0.175	5 pCi/L	30 pCi/L		J	093916-038	EPA 903.1
	Radium-228	1.10 ± 0.446	0.478	0.221	5 pCi/L	30 pCi/L		J	093916-039	EPA 904.0
PL-2	Americium-241	0.800 ± 6.16	9.51	4.66	NE	NE	U	BD	093908-033	EPA 901.1
08-May-13	Cesium-137	1.33 ± 2.05	3.46	1.67	NE	NE	U	BD	093908-033	EPA 901.1
	Cobalt-60	1.11 ± 2.00	3.53	1.67	NE	NE	U	BD	093908-033	EPA 901.1
	Potassium-40	-40.4 ± 41.5	45.2	21.7	NE	NE	U	BD	093908-033	EPA 901.1
	Gross Alpha	1.93	NA	NA	15 pCi/L	NE	NA	None	093908-034	EPA 900.0
	Gross Beta	6.56 ± 1.51	1.47	0.712	4mrem/yr	NE		J	093908-034	EPA 900.0
	Radium-226	0.537 ± 0.292	0.330	0.125	5 pCi/L	30 pCi/L		J	093908-038	EPA 903.1
	Radium-228	0.677 ± 0.367	0.468	0.210	5 pCi/L	30 pCi/L		J	093908-039	EPA 904.0

Refer to footnotes on page 2A-35.

Table 2A-7 *(Continued)*
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Radium, and Isotopic Uranium Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL/MAC[d]		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
PL-4	Americium-241	5.89 ± 9.68	13.7	6.70	NE	NE	U	BD	093913-033	EPA 901.1
09-May-13	Cesium-137	2.84 ± 4.30	2.90	1.39	NE	NE	U	BD	093913-033	EPA 901.1
	Cobalt-60	0.616 ± 1.74	3.11	1.46	NE	NE	U	BD	093913-033	EPA 901.1
	Potassium-40	-43.2 ± 41.7	40.8	19.5	NE	NE	U	BD	093913-033	EPA 901.1
	Gross Alpha	4.18	NA	NA	15 pCi/L	NE	NA	None	093913-034	EPA 900.0
	Gross Beta	5.41 ± 1.30	1.31	0.633	4mrem/yr	NE		J	093913-034	EPA 900.0
	Radium-226	0.463 ± 0.298	0.394	0.160	5 pCi/L	30 pCi/L		J	093913-038	EPA 903.1
	Radium-228	0.261 ± 0.291	0.471	0.204	5 pCi/L	30 pCi/L	U	BD	093913-039	EPA 904.0
PL-4 (Duplicate)	Americium-241	2.68 ± 7.26	11.7	5.69	NE	NE	U	BD	093914-033	EPA 901.1
09-May-13	Cesium-137	0.372 ± 1.70	2.91	1.40	NE	NE	U	BD	093914-033	EPA 901.1
	Cobalt-60	0.926 ± 1.62	2.98	1.39	NE	NE	U	BD	093914-033	EPA 901.1
	Potassium-40	6.34 ± 33.1	41.1	19.6	NE	NE	U	BD	093914-033	EPA 901.1
	Gross Alpha	2.63	NA	NA	15 pCi/L	NE	NA	None	093914-034	EPA 900.0
	Gross Beta	5.28 ± 1.39	1.56	0.755	4mrem/yr	NE		J	093914-034	EPA 900.0
	Radium-226	0.579 ± 0.301	0.360	0.146	5 pCi/L	30 pCi/L		J	093914-038	EPA 903.1
	Radium-228	0.385 ± 0.295	0.428	0.184	5 pCi/L	30 pCi/L	U	BD	093914-039	EPA 904.0
SFR-2S	Americium-241	5.44 ± 6.61	9.41	4.60	NE	NE	U	BD	093890-033	EPA 901.1
29-Apr-13	Cesium-137	-0.709 ± 3.57	2.91	1.40	NE	NE	U	BD	093890-033	EPA 901.1
	Cobalt-60	0.340 ± 1.72	3.12	1.47	NE	NE	U	BD	093890-033	EPA 901.1
	Potassium-40	1.50 ± 28.7	24.7	11.5	NE	NE	U	BD	093890-033	EPA 901.1
	Gross Alpha	0.30	NA	NA	15 pCi/L	NE	NA	None	093890-034	EPA 900.0
	Gross Beta	13.0 ± 3.45	3.93	1.91	4mrem/yr	NE		J	093890-034	EPA 900.0
	Uranium-233/234	19.4 ± 2.48	0.0729	0.0321	NE	NE			093890-035	HASL-300
	Uranium-235/236	0.303 ± 0.0782	0.0338	0.0116	NE	NE			093890-035	HASL-300
	Uranium-238	5.30 ± 0.711	0.044	0.0177	NE	NE			093890-035	HASL-300
	Radium-226	0.318 ± 0.324	0.514	0.209	5 pCi/L	30 pCi/L	U	BD	093890-038	EPA 903.1
	Radium-228	0.637 ± 0.345	0.412	0.176	5 pCi/L	30 pCi/L		J	093890-039	EPA 904.0

Refer to footnotes on page 2A-35.

Table 2A-7 *(Continued)*
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Radium, and Isotopic Uranium Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL/MAC[d]		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SFR-4T	Americium-241	-2.26 ± 6.13	8.80	4.31	NE	NE	U	BD	093892-033	EPA 901.1
30-Apr-13	Cesium-137	-0.36 ± 1.63	2.80	1.35	NE	NE	U	BD	093892-033	EPA 901.1
	Cobalt-60	2.92 ± 3.48	3.35	1.60	NE	NE	U	BD	093892-033	EPA 901.1
	Potassium-40	-32.5 ± 36.9	41.2	19.8	NE	NE	U	BD	093892-033	EPA 901.1
	Gross Alpha	-16.44	NA	NA	15 pCi/L	NE	NA	None	093892-034	EPA 900.0
	Gross Beta	6.68 ± 7.12	11.8	5.73	4mrem/yr	NE	U	BD	093892-034	EPA 900.0
	Uranium-233/234	0.361 ± 0.0981	0.118	0.0521	NE	NE			093892-035	HASL-300
	Uranium-235/236	0.00637 ± 0.0216	0.0548	0.0188	NE	NE	U	BD	093892-035	HASL-300
	Uranium-238	0.0773 ± 0.0451	0.0714	0.0287	NE	NE		J	093892-035	HASL-300
	Radium-226	0.270 ± 0.215	0.298	0.109	5 pCi/L	30 pCi/L	U	BD	093892-038	EPA 903.1
	Radium-228	0.345 ± 0.298	0.449	0.192	5 pCi/L	30 pCi/L	U	BD	093892-039	EPA 904.0
SWTA3-MW2	Americium-241	12.0 ± 8.21	8.94	4.35	NE	NE	X	R	093898-033	EPA 901.1
03-May-13	Cesium-137	-0.229 ± 1.52	2.70	1.29	NE	NE	U	BD	093898-033	EPA 901.1
	Cobalt-60	4.67 ± 3.15	4.67	1.64	NE	NE	U	BD	093898-033	EPA 901.1
	Potassium-40	-20.1 ± 32.5	37.8	18.0	NE	NE	U	BD	093898-033	EPA 901.1
	Gross Alpha	2.43	NA	NA	15 pCi/L	NE	NA	None	093898-034	EPA 900.0
	Gross Beta	6.30 ± 1.55	1.70	0.827	4mrem/yr	NE		J	093898-034	EPA 900.0
	Radium-226	0.0853 ± 0.243	0.459	0.187	5 pCi/L	30 pCi/L	U	BD	093898-038	EPA 903.1
	Radium-228	1.03 ± 0.423	0.475	0.223	5 pCi/L	30 pCi/L		J	093898-039	EPA 904.0
SWTA3-MW3	Americium-241	5.52 ± 8.53	14.2	6.96	NE	NE	U	BD	093905-033	EPA 901.1
07-May-13	Cesium-137	1.04 ± 1.62	2.73	1.31	NE	NE	U	BD	093905-033	EPA 901.1
	Cobalt-60	2.18 ± 1.98	3.18	1.51	NE	NE	U	BD	093905-033	EPA 901.1
	Potassium-40	-31.7 ± 30.9	39.8	19.1	NE	NE	U	BD	093905-033	EPA 901.1
	Gross Alpha	2.58	NA	NA	15 pCi/L	NE	NA	None	093905-034	EPA 900.0
	Gross Beta	4.38 ± 1.05	1.00	0.479	4mrem/yr	NE		J	093905-034	EPA 900.0
	Radium-226	0.238 ± 0.208	0.320	0.130	5 pCi/L	30 pCi/L	U	BD	093905-038	EPA 903.1
	Radium-228	0.542 ± 0.329	0.441	0.195	5 pCi/L	30 pCi/L		J	093905-039	EPA 904.0
SWTA3-MW3	Americium-241	0.968 ± 14.4	22.2	10.8	NE	NE	U	BD	093906-033	EPA 901.1
(Duplicate)	Cesium-137	0.290 ± 1.77	3.19	1.53	NE	NE	U	BD	093906-033	EPA 901.1
07-May-13	Cobalt-60	0.879 ± 1.87	3.45	1.62	NE	NE	U	BD	093906-033	EPA 901.1
	Potassium-40	-33.1 ± 40.6	44.8	21.3	NE	NE	U	BD	093906-033	EPA 901.1
	Gross Alpha	1.25	NA	NA	15 pCi/L	NE	NA	None	093906-034	EPA 900.0
	Gross Beta	5.26 ± 1.25	1.16	0.557	4mrem/yr	NE		J	093906-034	EPA 900.0
	Radium-226	0.671 ± 0.350	0.387	0.158	5 pCi/L	30 pCi/L		NJ+	093906-038	EPA 903.1
	Radium-228	0.446 ± 0.316	0.466	0.213	5 pCi/L	30 pCi/L	U	BD	093906-039	EPA 904.0

Refer to footnotes on page 2A-35.

Table 2A-7 *(Concluded)*

Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Radium, and Isotopic Uranium Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL/MAC[d]		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SWTA3-MW4	Americium-241	2.13 ± 15.3	23.5	11.5	NE	NE	U	BD	093900-033	EPA 901.1
06-May-13	Cesium-137	0.766 ± 1.69	3.02	1.45	NE	NE	U	BD	093900-033	EPA 901.1
	Cobalt-60	1.66 ± 1.79	3.10	1.45	NE	NE	U	BD	093900-033	EPA 901.1
	Potassium-40	90.1 ± 23.3	28.2	13.1	NE	NE	X	R	093900-033	EPA 901.1
	Gross Alpha	3.39	NA	NA	15 pCi/L	NE	NA	None	093900-034	EPA 900.0
	Gross Beta	4.24 ± 1.07	1.09	0.524	4mrem/yr	NE		J	093900-034	EPA 900.0
	Radium-226	0.896 ± 0.358	0.371	0.151	5 pCi/L	30 pCi/L		J	093900-038	EPA 903.1
	Radium-228	0.674 ± 0.365	0.464	0.207	5 pCi/L	30 pCi/L		J	093900-039	EPA 904.0
TRE-1	Americium-241	1.71 ± 8.69	15.1	7.35	NE	NE	U	BD	093894-033	EPA 901.1
01-May-13	Cesium-137	0.880 ± 3.57	2.73	1.31	NE	NE	U	BD	093894-033	EPA 901.1
	Cobalt-60	-0.494 ± 1.69	2.91	1.37	NE	NE	U	BD	093894-033	EPA 901.1
	Potassium-40	7.07 ± 28.3	38.6	18.5	NE	NE	U	BD	093894-033	EPA 901.1
	Gross Alpha	0.28	NA	NA	15 pCi/L	NE	NA	None	093894-034	EPA 900.0
	Gross Beta	14.1 ± 4.10	5.06	2.47	4mrem/yr	NE		J	093894-034	EPA 900.0
	Uranium-233/234	23.2 ± 2.96	0.0742	0.0327	NE	NE			093894-035	HASL-300
	Uranium-235/236	0.304 ± 0.079	0.0344	0.0118	NE	NE			093894-035	HASL-300
	Uranium-238	5.62 ± 0.752	0.0448	0.018	NE	NE			093894-035	HASL-300
	Radium-226	0.440 ± 0.287	0.395	0.161	5 pCi/L	30 pCi/L		J	093894-038	EPA 903.1
	Radium-228	1.43 ± 0.524	0.454	0.205	5 pCi/L	30 pCi/L		J	093894-039	EPA 904.0

Refer to footnotes on page 2A-35.

Table 2A-8
Summary of Field Water Quality Measurements[h],
Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Sample Date	Temperature (^{0}C)	Specific Conductivity (µmhos/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
Coyote Springs	02-May-13	13.46	2900	203.5	6.02	1.48	19.8	2.05
Greystone-MW2	26-Apr-13	16.64	1076	255.5	6.87	0.28	72.4	7.01
MRN-2	14-May-13	20.34	397	159.1	7.40	1.55	70.5	6.37
MRN-3D	13-May-13	20.41	434	73.5	7.31	1.38	58.7	5.29
NWTA3-MW3D	10-May-13	19.75	350	126.0	7.46	1.95	50.5	4.61
PL-2	08-May-13	19.30	422	167.6	7.43	0.65	66.6	6.13
PL-4	09-May-13	19.94	452	167.4	7.15	1.86	70.3	6.41
SFR-2S	29-Apr-13	18.49	1037	140.5	6.73	20.6	79.0	7.38
SFR-4T	30-Apr-13	19.58	3907	-47.0	7.95	1.79	9.4	0.85
SWTA3-MW2	03-May-13	18.24	410	145.4	7.38	1.05	47.9	4.51
SWTA3-MW3	07-May-13	20.81	416	113.7	7.39	1.95	49.6	4.42
SWTA3-MW4	06-May-13	18.66	426	146.8	7.45	0.80	51.5	4.80
	01-Aug-13	21.59	498	145.6	7.61	2.09	58.3	5.23
	25-Sep-13	20.48	501	183.5	7.30	2.68	55.5	4.98
TRE-1	01-May-13	18.89	1241	192.4	6.59	0.27	75.2	6.96

Refer to footnotes on page 2A-35.

Footnotes for Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task Analytical Results Tables

%	= percent.
µg/L	= micrograms per liter.
CFR	= Code of Federal Regulations.
EPA	= U.S. Environmental Protection Agency.
HMX	= octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
ID	= Identifier.
mg/L	= milligrams per liter.
mrem/yr	= millirem per year.
No.	= Number.
pCi/L	= picocuries per liter.
RDX	= hexahydro-1,3,5-trinitro-1,3,5-triazine.
Tetryl	= methyl-2,4,6-trinitrophenylnitramine.

[a]Result

Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 2A- 1-4).

Bold = Indicates the value exceed the established MCL and/or MAC.

ND = not detected (at method detection limit). Activities of zero or less are considered to be not detected.

[b]MDL or MDA

MDL applies to the data listed in Tables 2A-1 through 2A-6. MDA applies to radiological data in Table 2A-7.

MDA = Minimum detectable activity. The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.

MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

NA = not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

[c]PQL or Critical Level

The PQL applies to Tables 2A-1 through 2A-6. Critical Level applies to Table 2A-7.

Critical level = The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

NA = Not Applicable (for gross alpha activities). The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

[d]MCL or MAC

Regulatory limits: the MCL is listed first, followed by the MAC. A single value is listed when the MCL and MAC are equal (for example, Nitrate plus nitrate). If no value exists, NE is used.

MAC = Maximum Allowable Concentration. MAC in groundwater is specified for the contaminants listed in 20.6.2.3103A New Mexico Administrative Code, New Mexico Water Quality Control Commission Regulations: Environmental Protection, Water Quality, Groundwater and Surface Water Protection, Human Health Standards, New Mexico Environment Department, 2001.

MCL = Maximum contaminant level. MCLs were established by the EPA Office of Water, National Primary Water Regulations (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- Gross alpha particle activity, excluding total uranium = 15 pCi/L (40 CFR Parts 9, 141, and 142,
- Table 2A-1-4).
- Beta and/or Gamma-emitting radionuclides (any combination) = 4 mrem/yr (as dose rate).
- Combined radium-226 and radium-228 MAC = 30 pCi/L.
- Combined radium-226 and radium-228 MCL = 5 pCi/L.

NE = Not Established.

Footnotes for Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task Analytical Results Tables (Concluded)

[e]Lab Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

h = Prep holding time exceeded.
H = Analytical holding time exceeded.
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
N = Results associated with a spike analysis that was outside control limits.
NA = Not applicable.
U = Analyte is absent or below the method detection limit.
X = Data rejected due to peak not meeting identification criteria.

[f]Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = The associated value is an estimated quantity.
J+ = The associated numerical value is an estimated quantity with a suspected positive bias.
J- = The associated numerical value is an estimated quantity with a suspected negative bias.
None = No data validation for corrected gross alpha activity.
NJ+ = Presumptive evidence of the presence of the material at an estimated quantity with a suspected positive bias.
NJ- = Presumptive evidence of the presence of the material at an estimated quantity with a suspected negative bias.
U = The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
UJ = The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R = The data are unusable, and resampling or reanalysis are necessary for verification.

[g]Analytical Method

Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.
DOE, 1990, "EML [Environmental Measurements Laboratory] Procedures Manual," 27th ed., Vol. 1, Rev. 1992, HASL-300.
EPA, 1980, "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio
EPA, 1984, "Methods for Chemical Analysis of Water and Wastes." EPA 600-4-79-020.
EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.

DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
HASL = Health and Safety Laboratory.
SM = Standard Method.

[h]Field Water Quality Measurements

Field measurements were collected prior to sampling.

°C = degrees Celsius.
% Sat = percent saturation.
μmhos/cm = micromhos per centimeter.
mg/L = milligrams per liter.
mV = millivolts.
NTU = nephelometric turbidity units.
pH = potential of hydrogen (negative logarithm of the hydrogen ion concentration).

Attachment 2B
Long-Term Stewardship
Consolidated Groundwater Monitoring Program
Plots

This page intentionally left blank.

Attachment 2B Plots

2B-1 Fluoride Concentrations, Coyote Springs 2B-5

2B-2 Fluoride Concentrations, SFR-2S 2B-6

2B-3 Fluoride Concentrations, SFR-4T 2B-7

2B-4 Fluoride Concentrations, TRE-1 ..... 2B-8

2B-5 Beryllium Concentrations, Coyote Springs 2B-9

This page intentionally left blank.

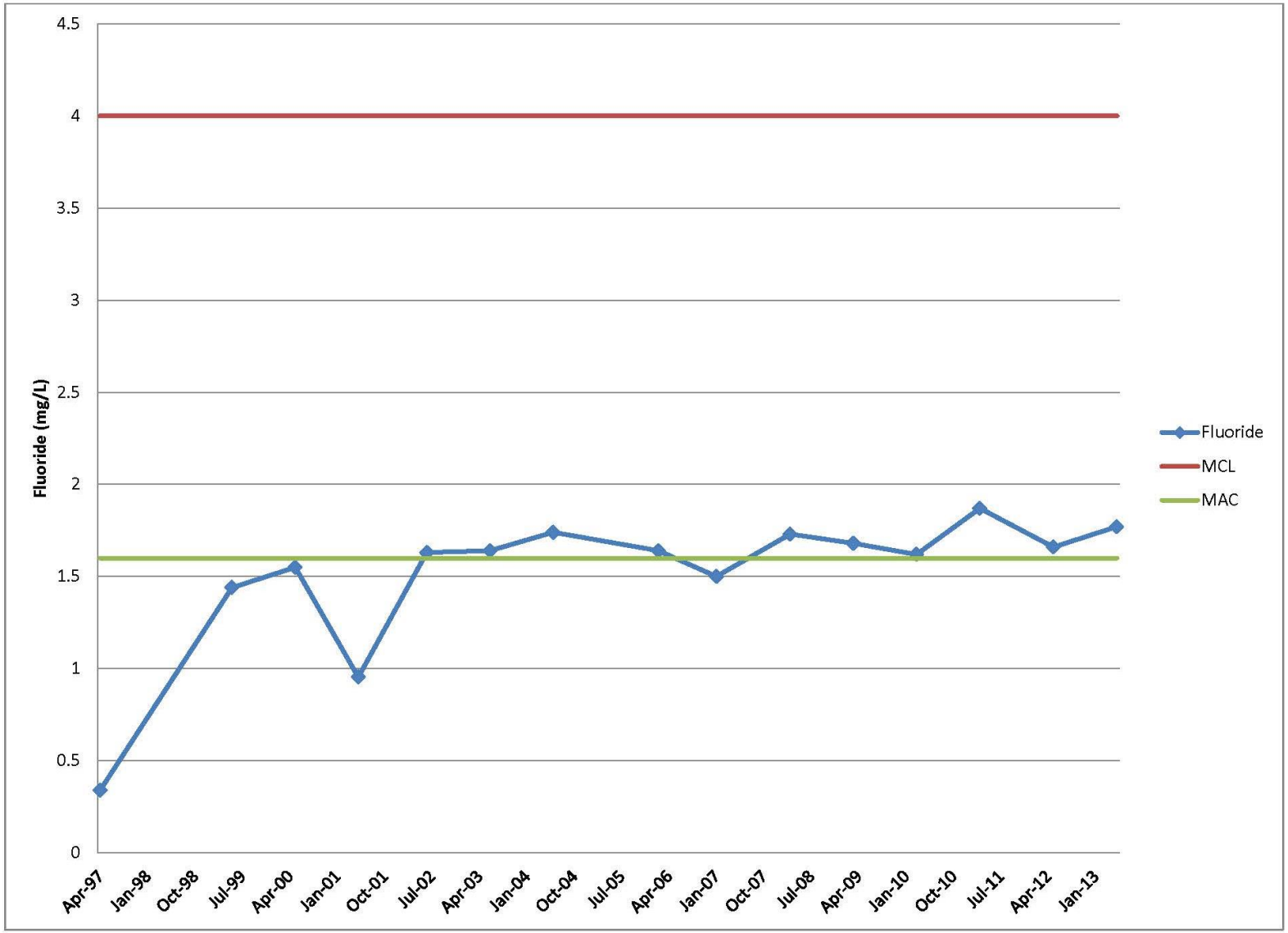


Figure 2B-1. Fluoride Concentrations, Coyote Springs

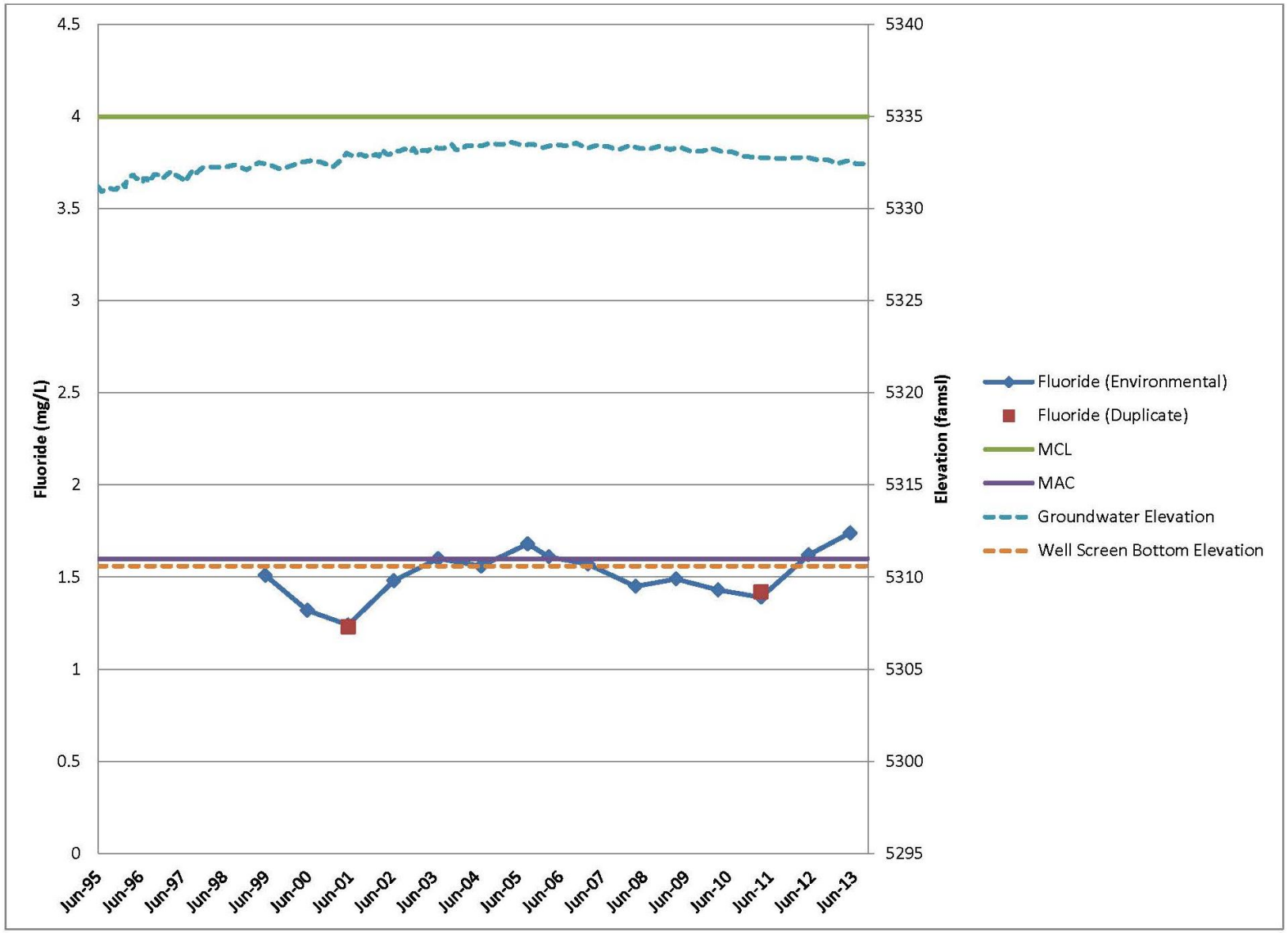


Figure 2B-2. Fluoride Concentrations, SFR-2S

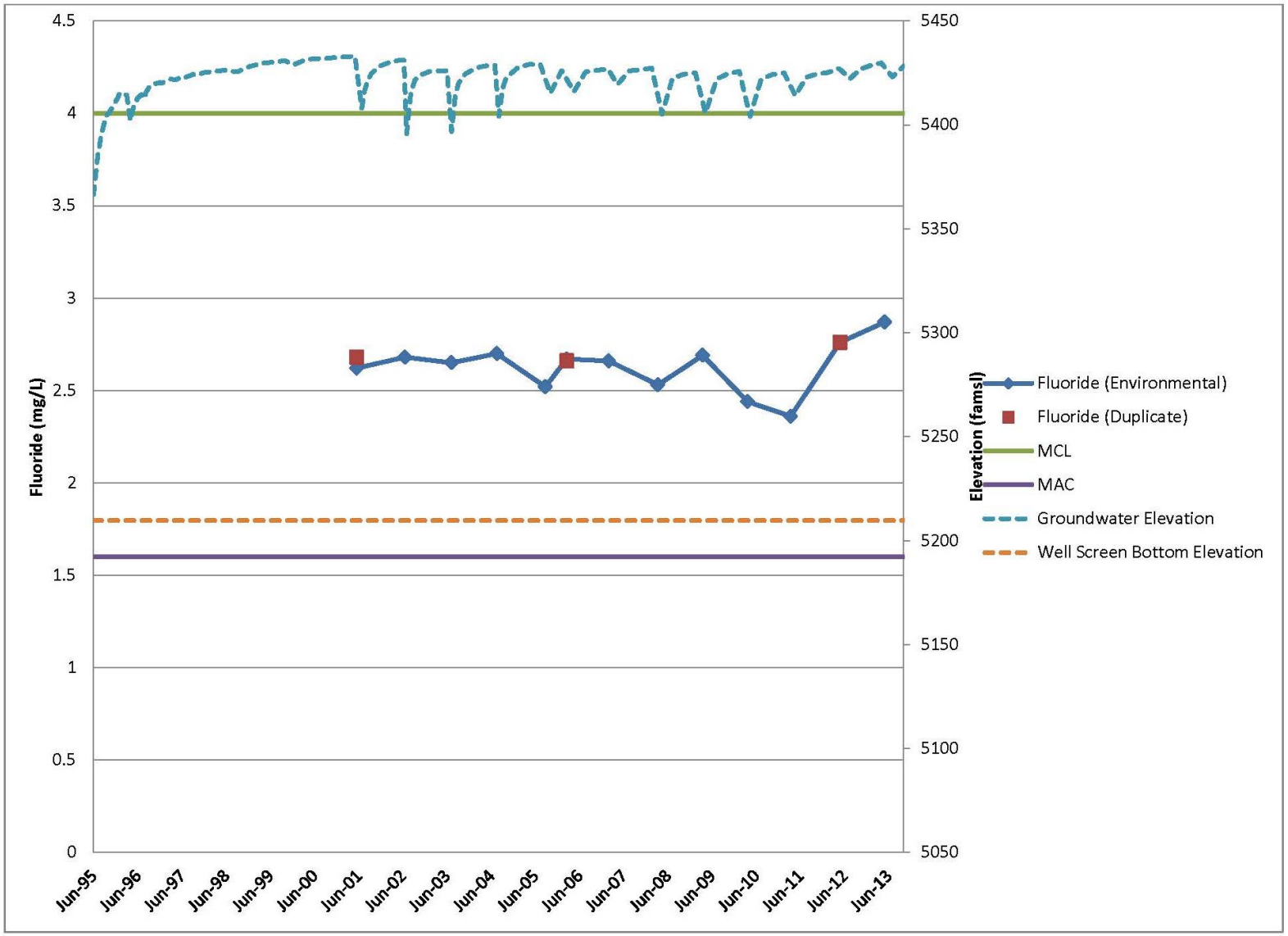


Figure 2B-3. Fluoride Concentrations, SFR-4T

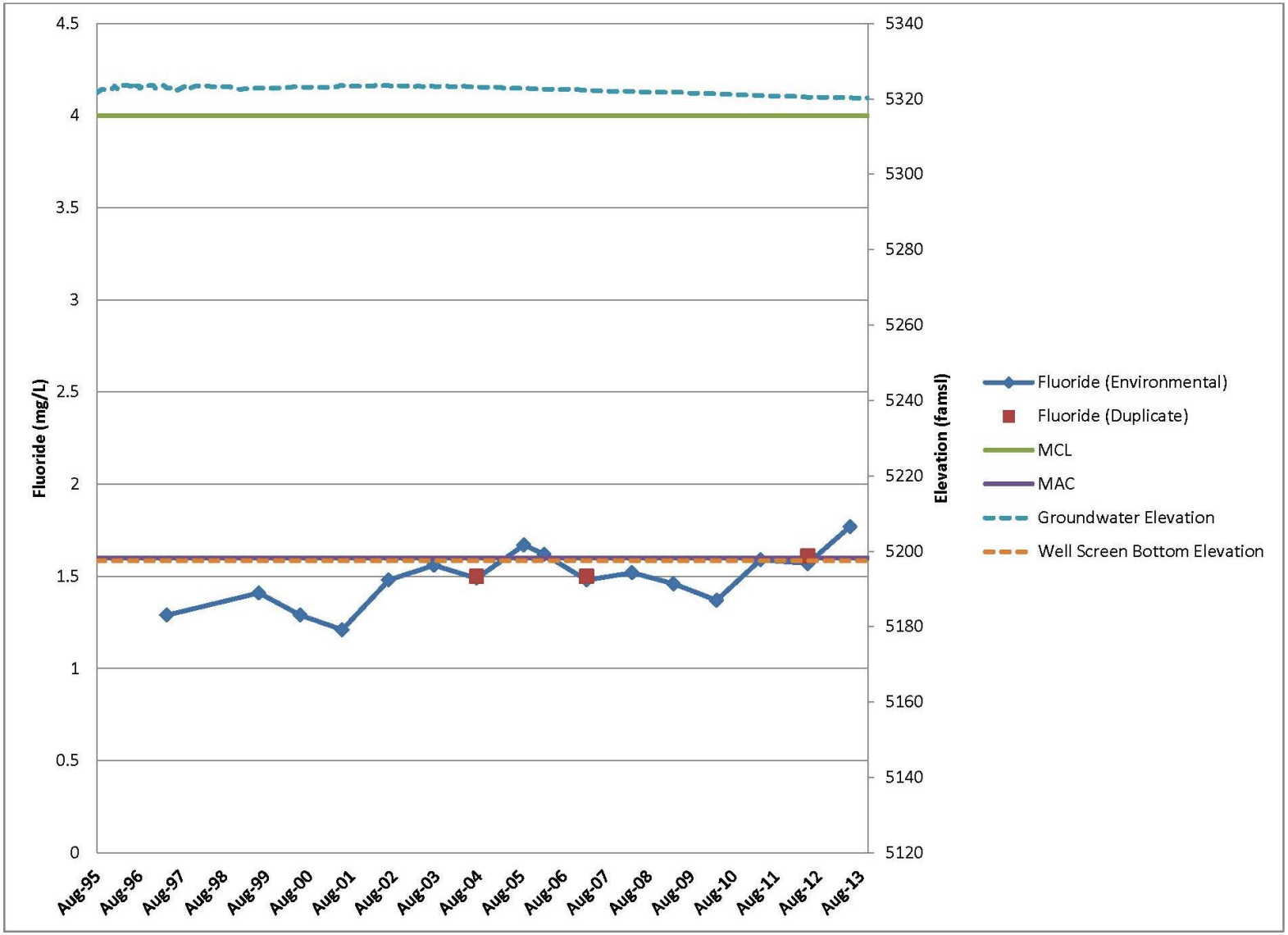


Figure 2B-4. Fluoride Concentrations, TRE-1

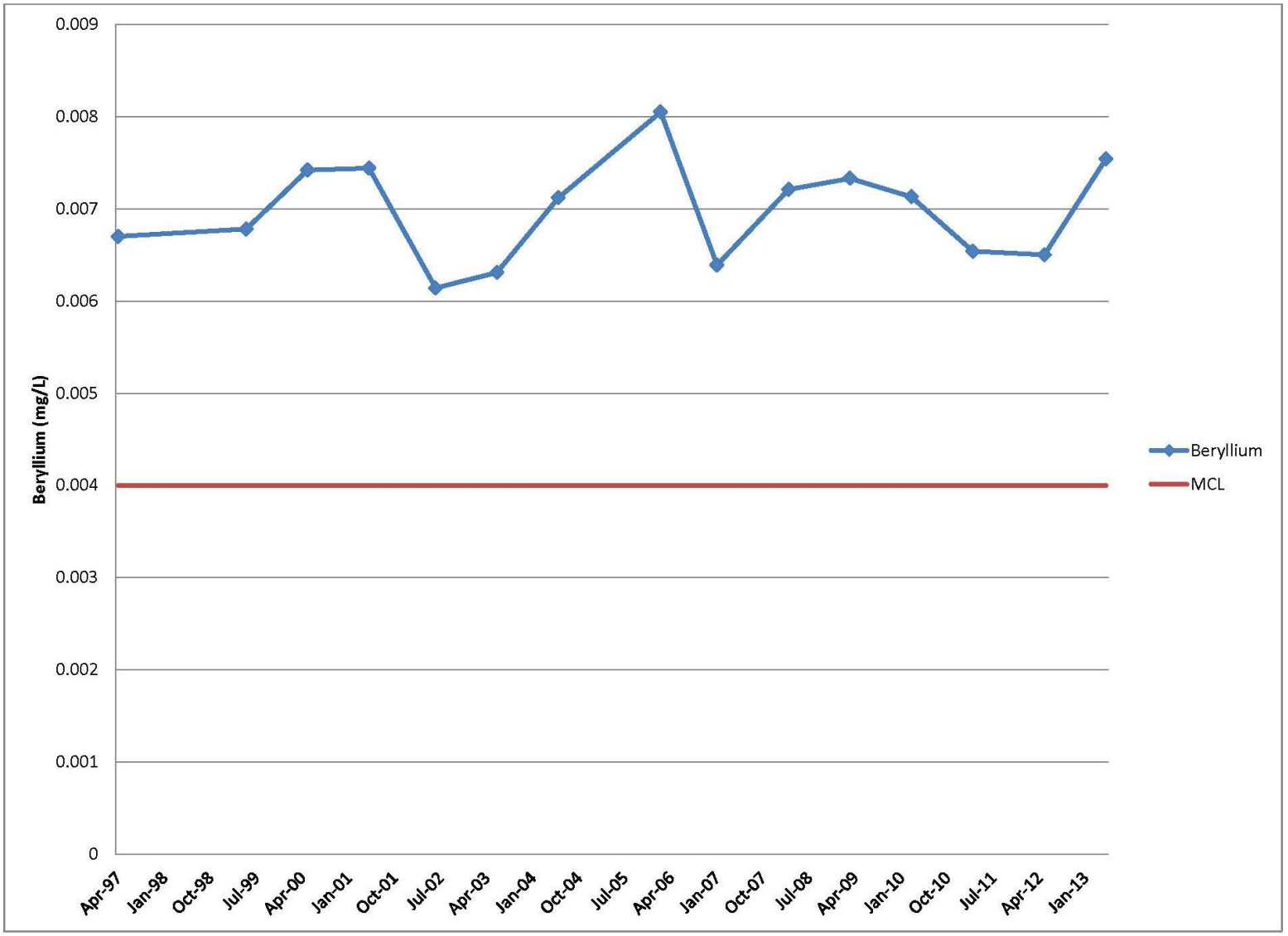


Figure 2B-5. Beryllium Concentrations, Coyote Springs

This page intentionally left blank.

Attachment 2C
Long-Term Stewardship
Consolidated Groundwater Monitoring Program
Charts and Hydrographs

This page intentionally left blank.

Attachment 2C Charts and Hydrographs

2C-1 Precipitation Data for SNL/NM, CY2013 ..... 2C-5

2C-2 Annual Precipitation Data for SNL/NM, January 2002 to December 2013 ..... 2C-6

2C-3 Monthly Groundwater Pumped by KAFB Water Supply Wells, CY2013 ..... 2C-7

2C-4 Groundwater Pumped by KAFB Water Supply Wells, CY2013 ..... 2C-8

2C-5 Annual Groundwater Pumped by KAFB Water Supply Wells, 2001 to 2013 ..... 2C-9

2C-6 GMP Study Wells (1 of 6) 2C-10

2C-7 GMP Study Wells (2 of 6) 2C-11

2C-8 GMP Study Wells (3 of 6) 2C-12

2C-9 GMP Study Wells (4 of 6) 2C-13

2C-10 GMP Study Wells (5 of 6) 2C-14

2C-11 GMP Study Wells (6 of 6) 2C-15

This page intentionally left blank.

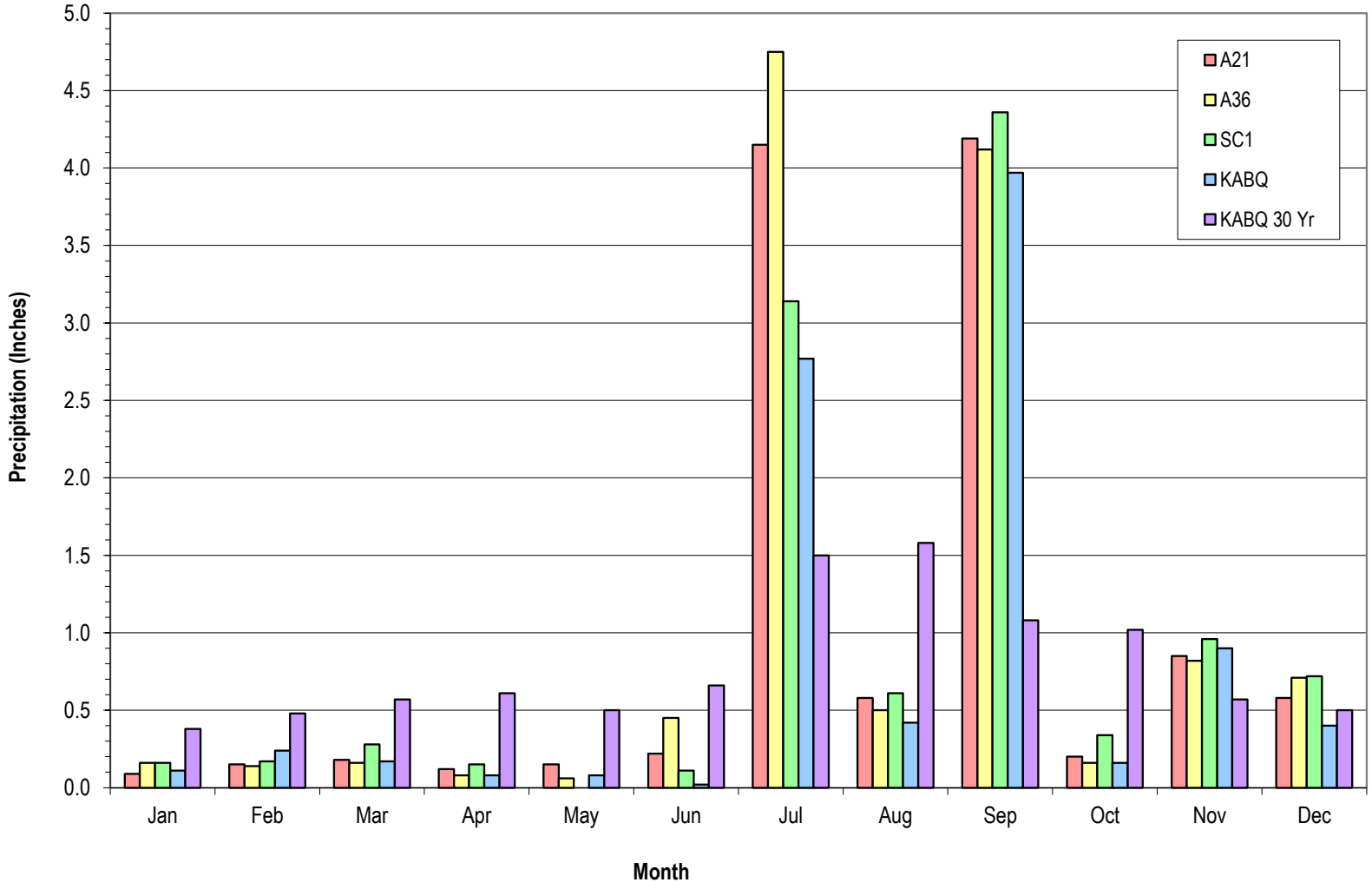


Figure 2C-1. Precipitation Data for SNL/NM, CY2013

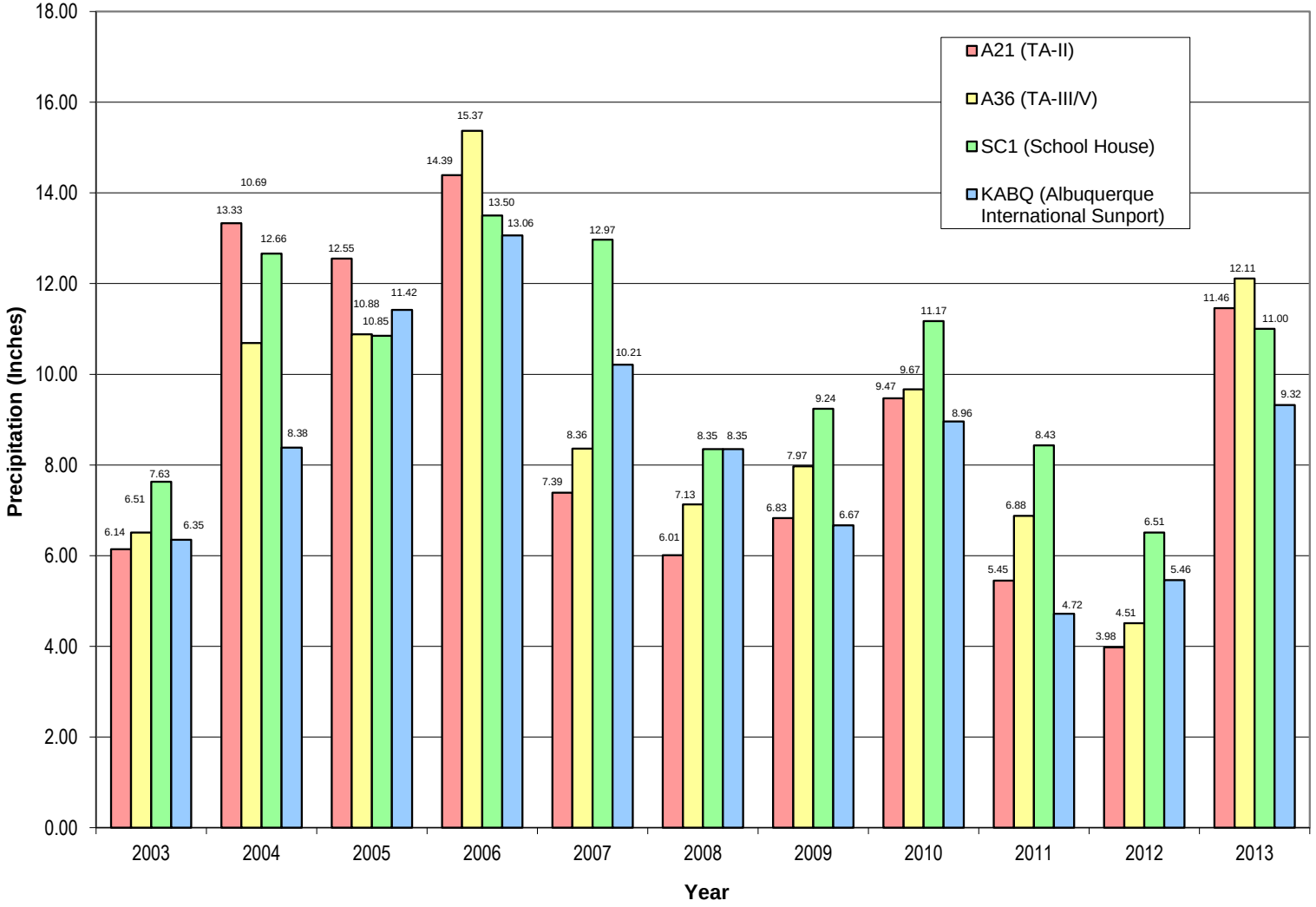


Figure 2C-2. Annual Precipitation Data for SNL/NM, January 2002 to December 2013

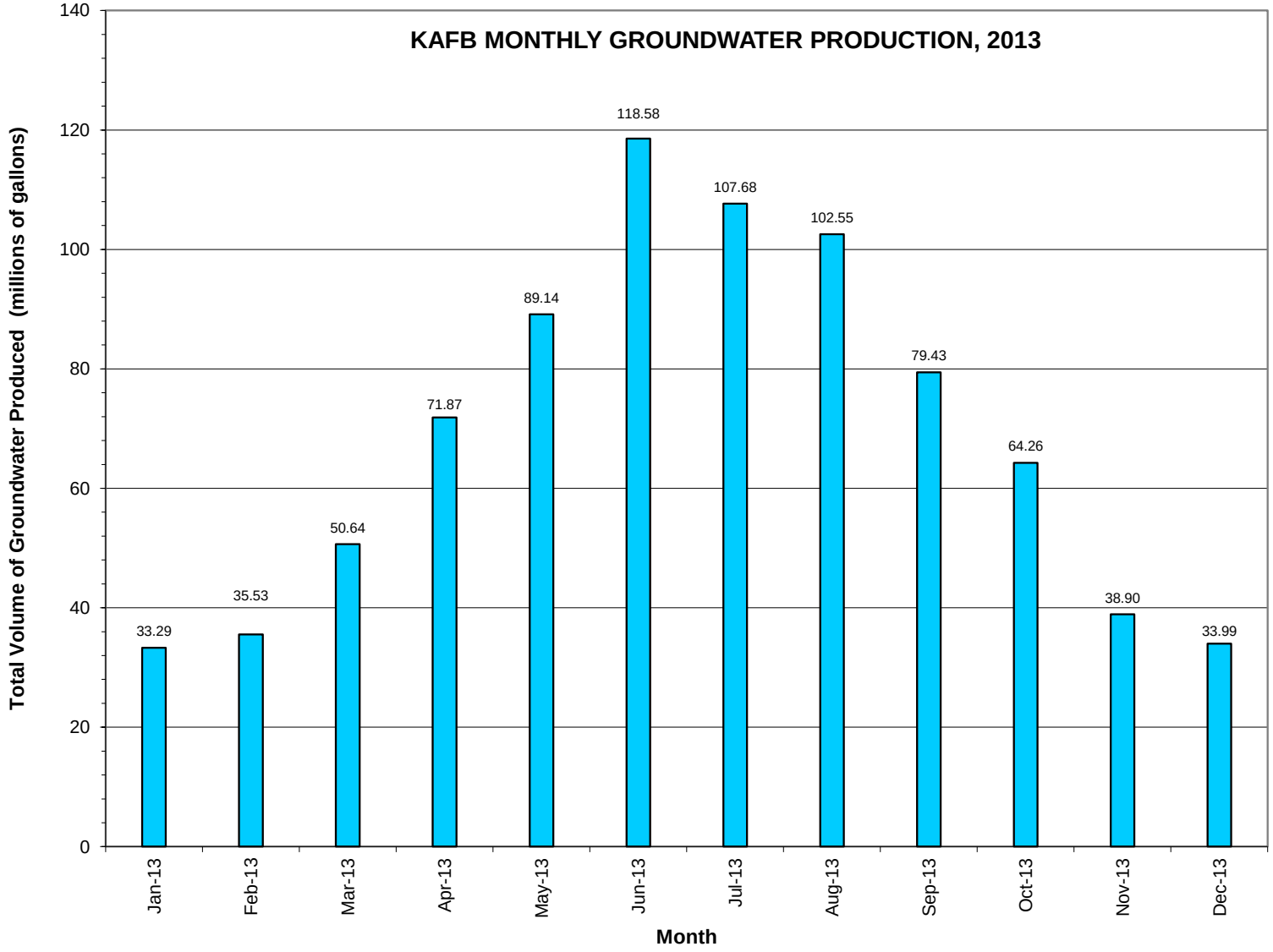


Figure 2C-3. Monthly Groundwater Pumped by KAFB Water Supply Wells, CY2013

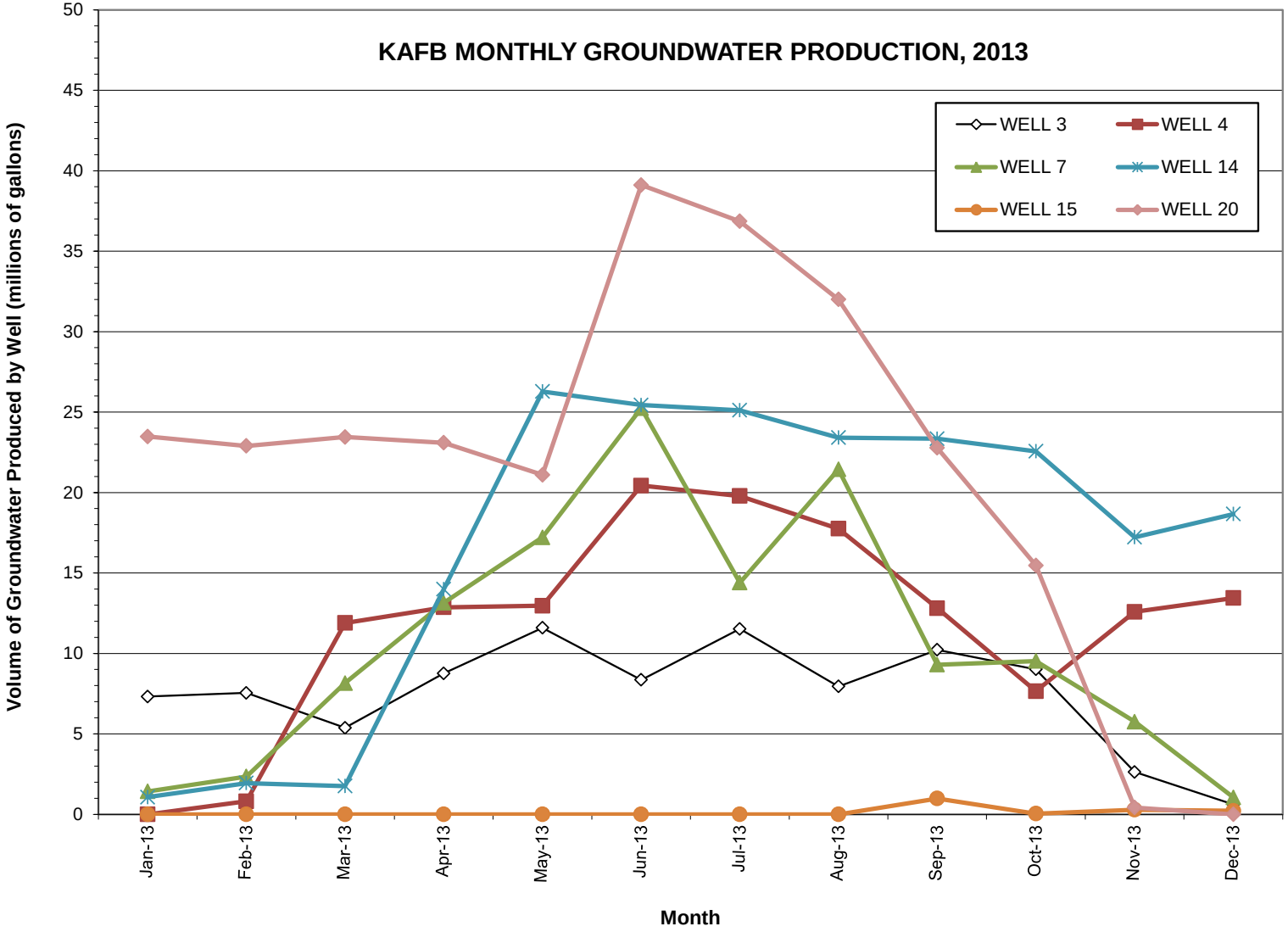


Figure 2C-4. Groundwater Pumped by KAFB Water Supply Wells, CY2013

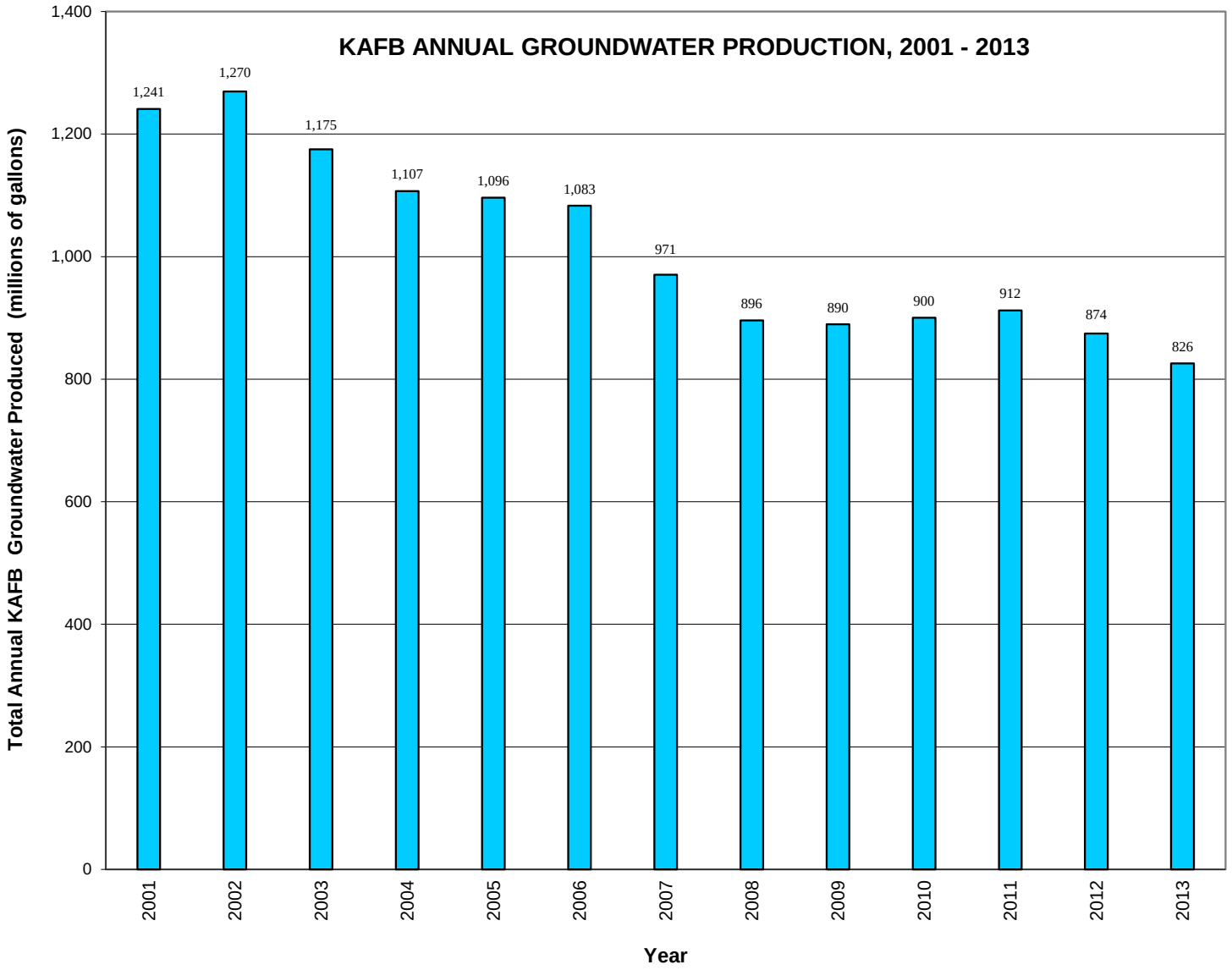


Figure 2C-5. Annual Groundwater Pumped by KAFB Water Supply Wells, 2001 to 2013

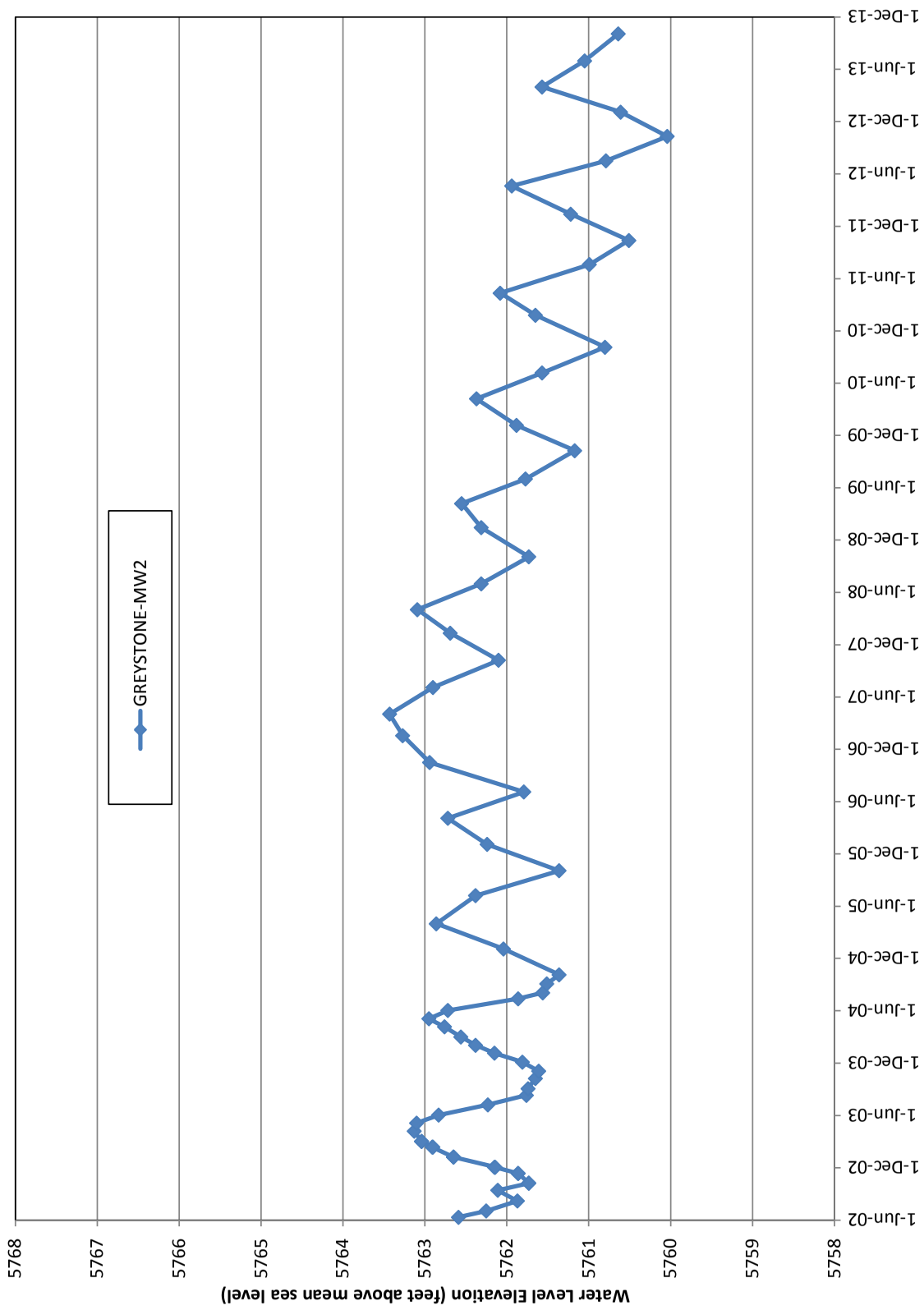


Figure 2C-6. GMP Study Wells (1 of 6)

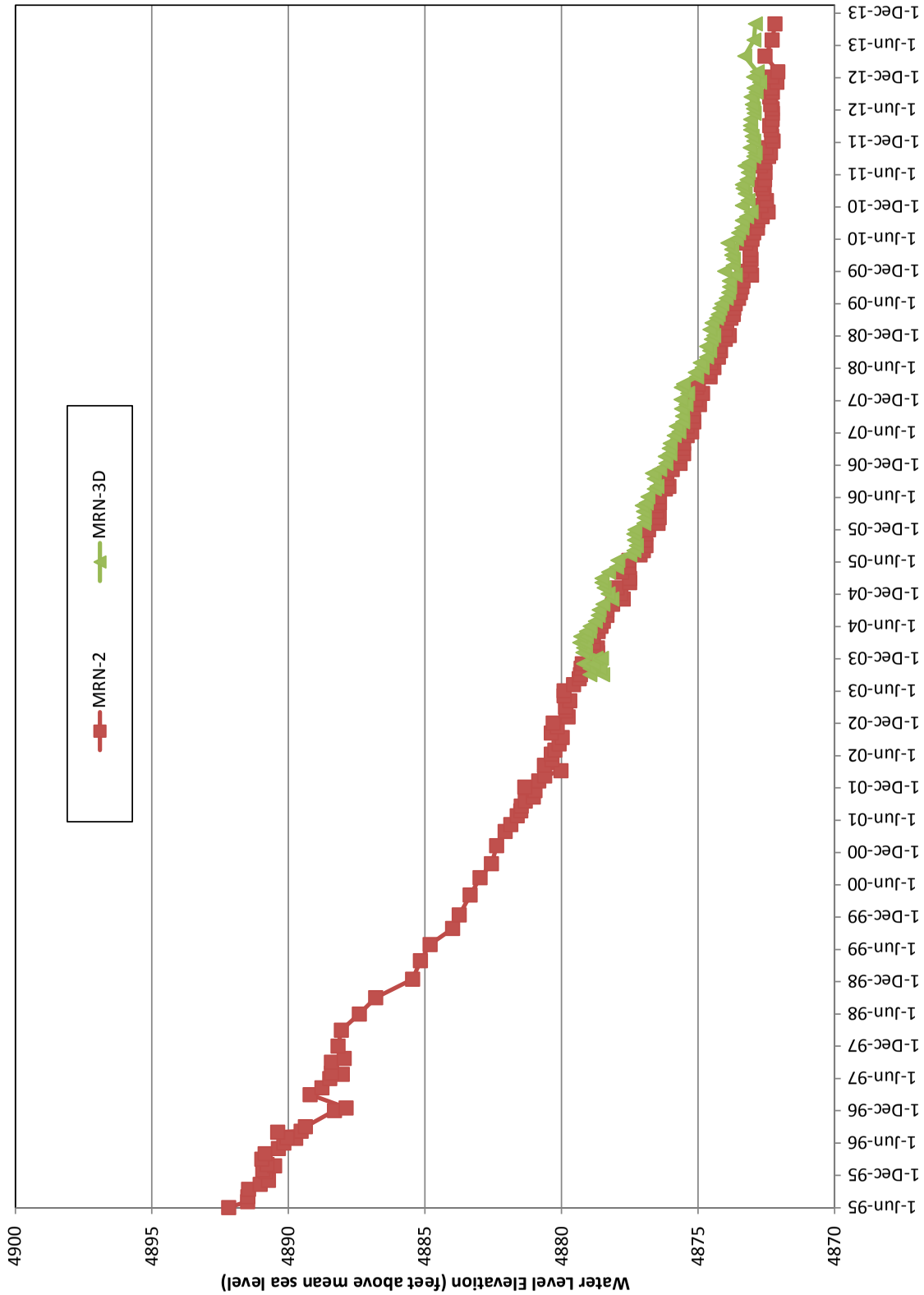


Figure 2C-7. GMP Study Wells (2 of 6)

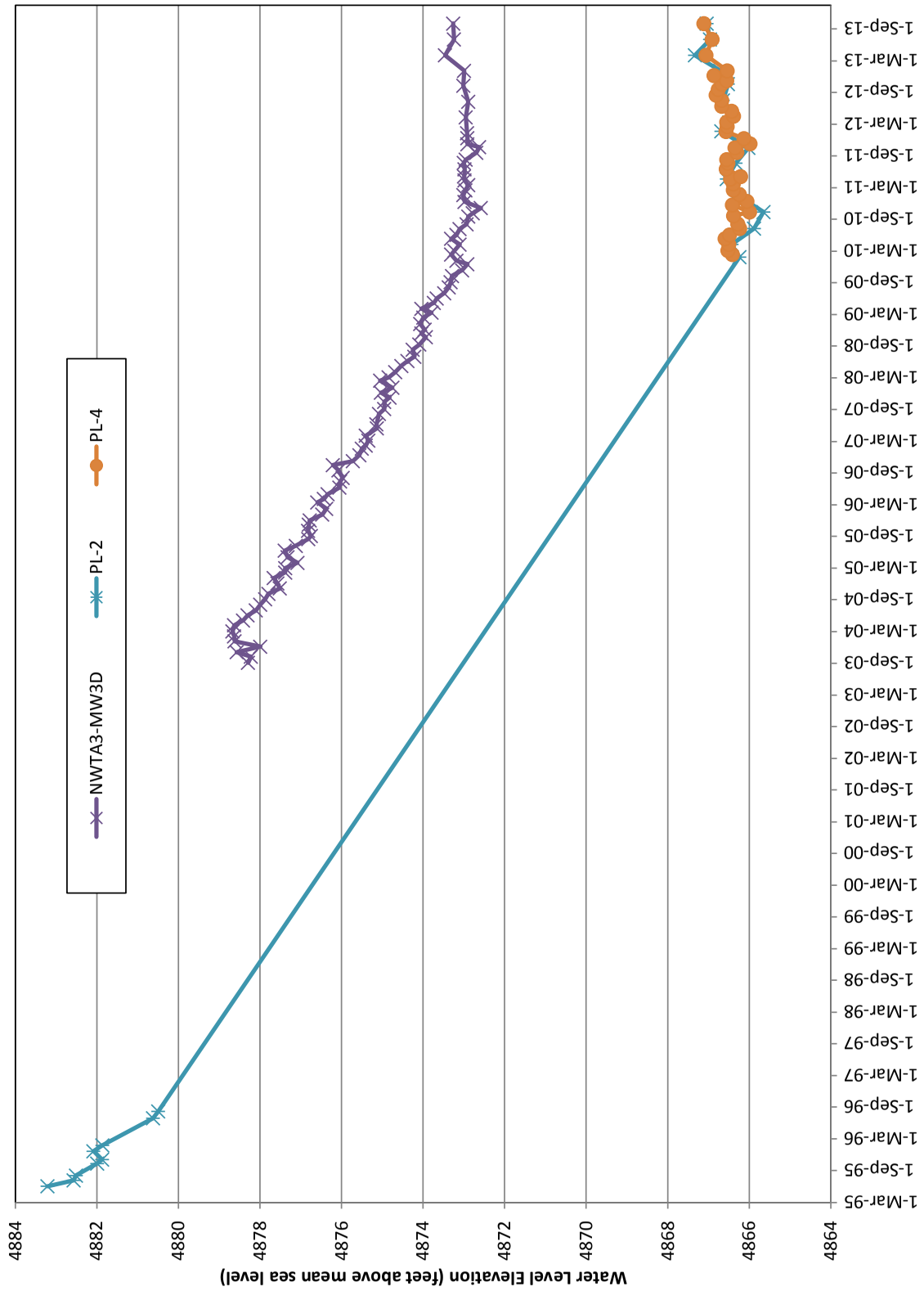


Figure 2C-8. GMP Study Wells (3 of 6)

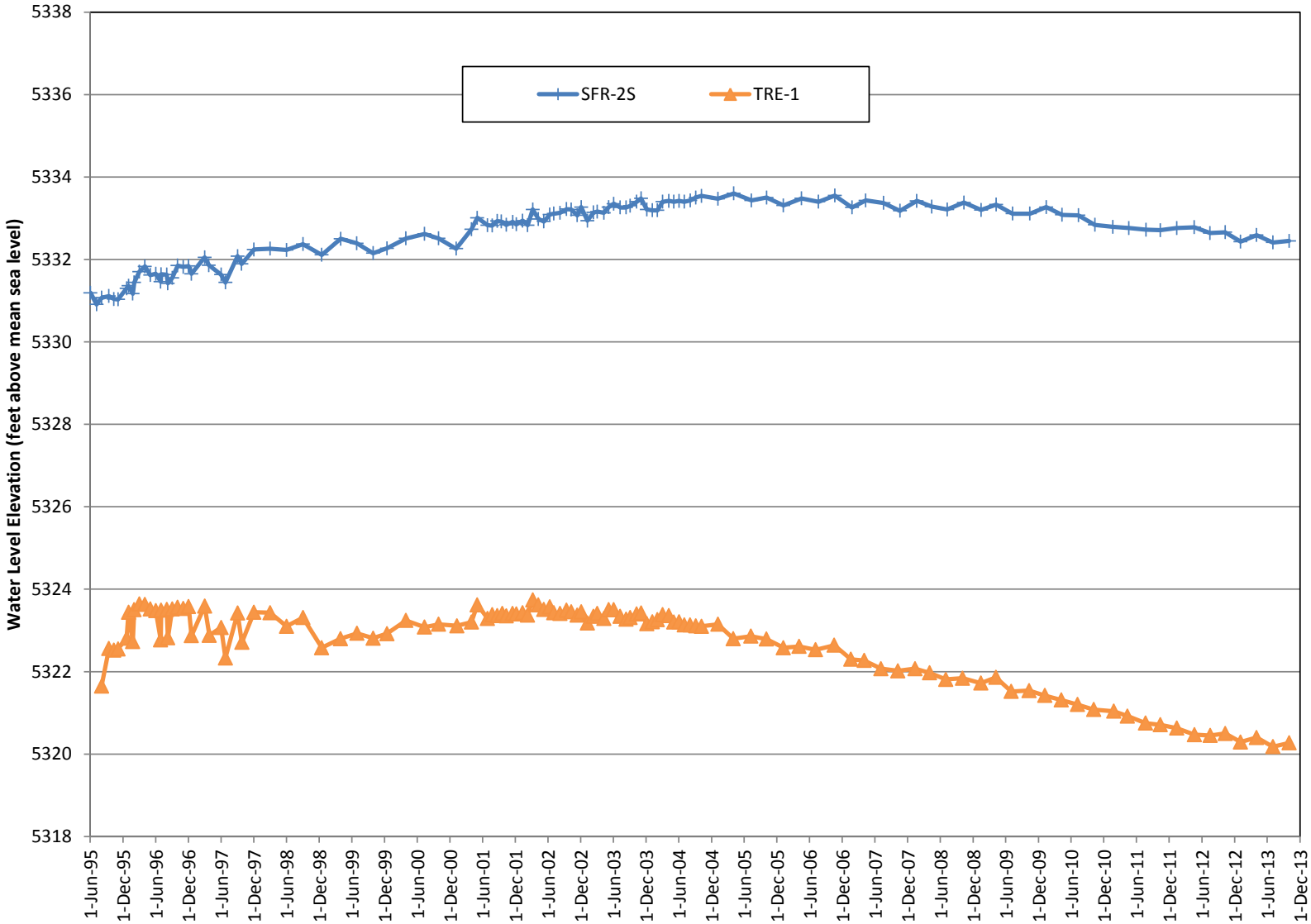


Figure 2C-9. GMP Study Wells (4 of 6)

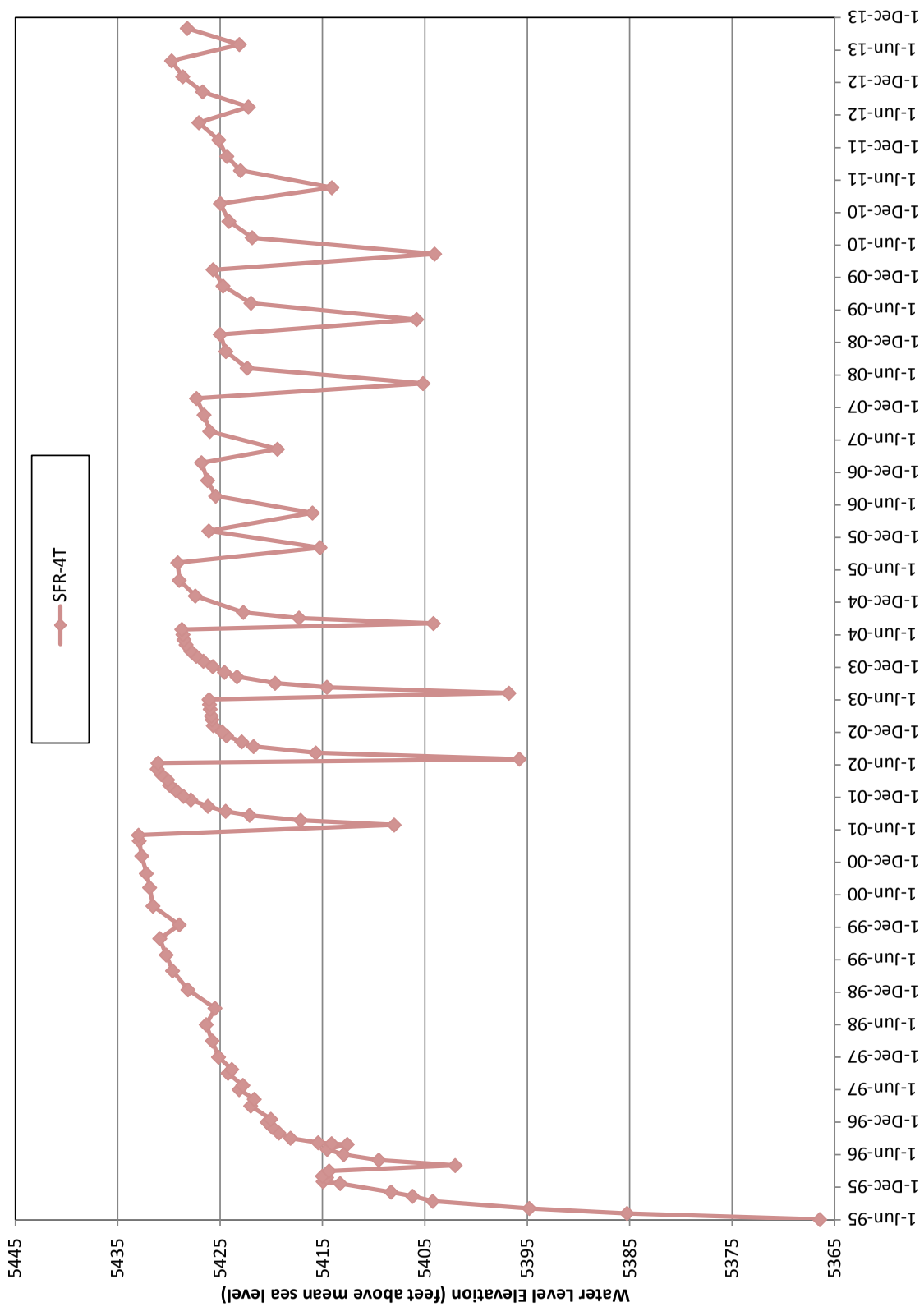


Figure 2C-10. GMP Study Wells (5 of 6)

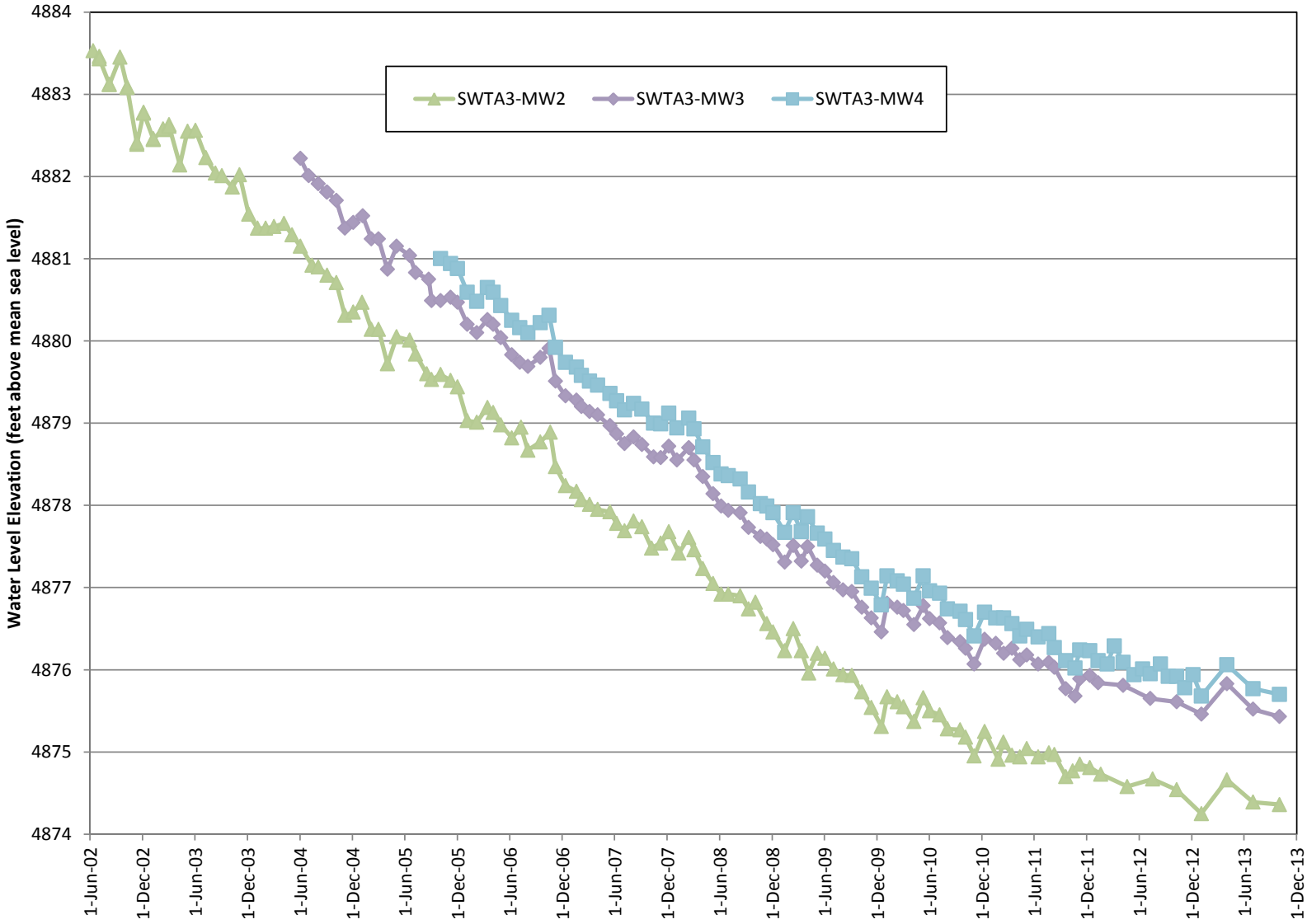


Figure 2C-11. GMP Study Wells (6 of 6)

This page intentionally left blank.

3.0 Chemical Waste Landfill

3.1 Introduction

The Chemical Waste Landfill (CWL) is a 1.9-acre former disposal site located in the southeastern corner of Technical Area III at Sandia National Laboratories, New Mexico (SNL/NM) (Figure 3-1). From 1962 until 1981, the CWL was used for the disposal of chemical, radioactive, and solid waste generated by SNL/NM research activities. From 1982 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.

In 1990, trichloroethene (TCE) was identified in groundwater at a concentration exceeding the regulatory limit of 5 micrograms per liter (µg/L). This finding led to the development and incorporation of a corrective action program into the *Chemical Waste Landfill Final Closure Plan and Postclosure Permit Application* (Final Closure Plan; SNL December 1992). The SNL/NM Environmental Restoration Project implemented two voluntary corrective measures (VCMs), the Vapor Extraction and Landfill Excavation VCMs. As part of the Vapor Extraction VCM that was conducted from 1996 through 1998, the volatile organic compound (VOC) soil-gas plume was reduced and controlled, further degradation of groundwater beneath the CWL was prevented, and TCE concentrations in groundwater were reduced to levels below the regulatory limit. As part of the Landfill Excavation VCM, the CWL was excavated from September 1998 through February 2002. The removal of all former disposal areas was confirmed by geophysical surveys and the results of final verification soil samples demonstrated that end-state conditions meet industrial risk-based standards (SNL September 2010) approved by New Mexico Environment Department (NMED). More than 52,000 cubic yards of contaminated soil and debris were removed from this former disposal area (SNL April 2003).

In April 2004 after completion of backfilling activities to a depth of four feet below ground surface, the U.S. Department of Energy/National Nuclear Security Administration and Sandia Corporation requested approval to install an at-grade vegetative soil cover as an interim measure (Wagner April 2004) while NMED comments on the April 2003 CWL Corrective Measures Study (CMS) Report were being resolved. On September 22, 2004, the NMED approved this request with conditions (Kieling September 2004). The conditions of approval were addressed in the subsequent revised Remedial Action Proposal that was submitted as Annex I of the revised CWL CMS Report (SNL December 2004). Construction of the at-grade evapotranspirative cover began in March 2005 and was completed in September 2005.

On May 21, 2007, the NMED issued a Notice of Public Comment Period (Kieling May 2007) with regard to three documents: the CWL CMS Report (SNL December 2004), Draft Post-Closure Care Permit (PCCP) (NMED May 2007), and a Final Closure Plan Amendment (SNL February 2006). The 60-day public comment period began on May 21, 2007 and was completed on August 20, 2007. Informal negotiations were initiated by the NMED in August 2008 with all parties that requested a public hearing, and final changes to the Closure Plan Amendment and Draft PCCP were resolved without a public hearing. In October 2009 the NMED issued the final CWL PCCP, and approved the CWL CMS Report and Closure Plan Amendment as changed (NMED October 2009a and October 2009b).

From April through August 2010, monitoring wells CWL-MW4, CWL-MW5L, CWL-MW5U, CWL-MW6L, CWL-MW6U, and CWL-BW4A were decommissioned, and new monitoring wells CWL-MW9, CWL-MW10, CWL-MW11, and CWL-BW5 were installed. The new monitoring wells became the exclusive groundwater monitoring network for the CWL in accordance with the approved Closure Plan amendment. The Final Resource Conservation and Recovery Act (RCRA) Closure Report documenting closure in accordance with all CWL Closure Plan requirements was submitted to the

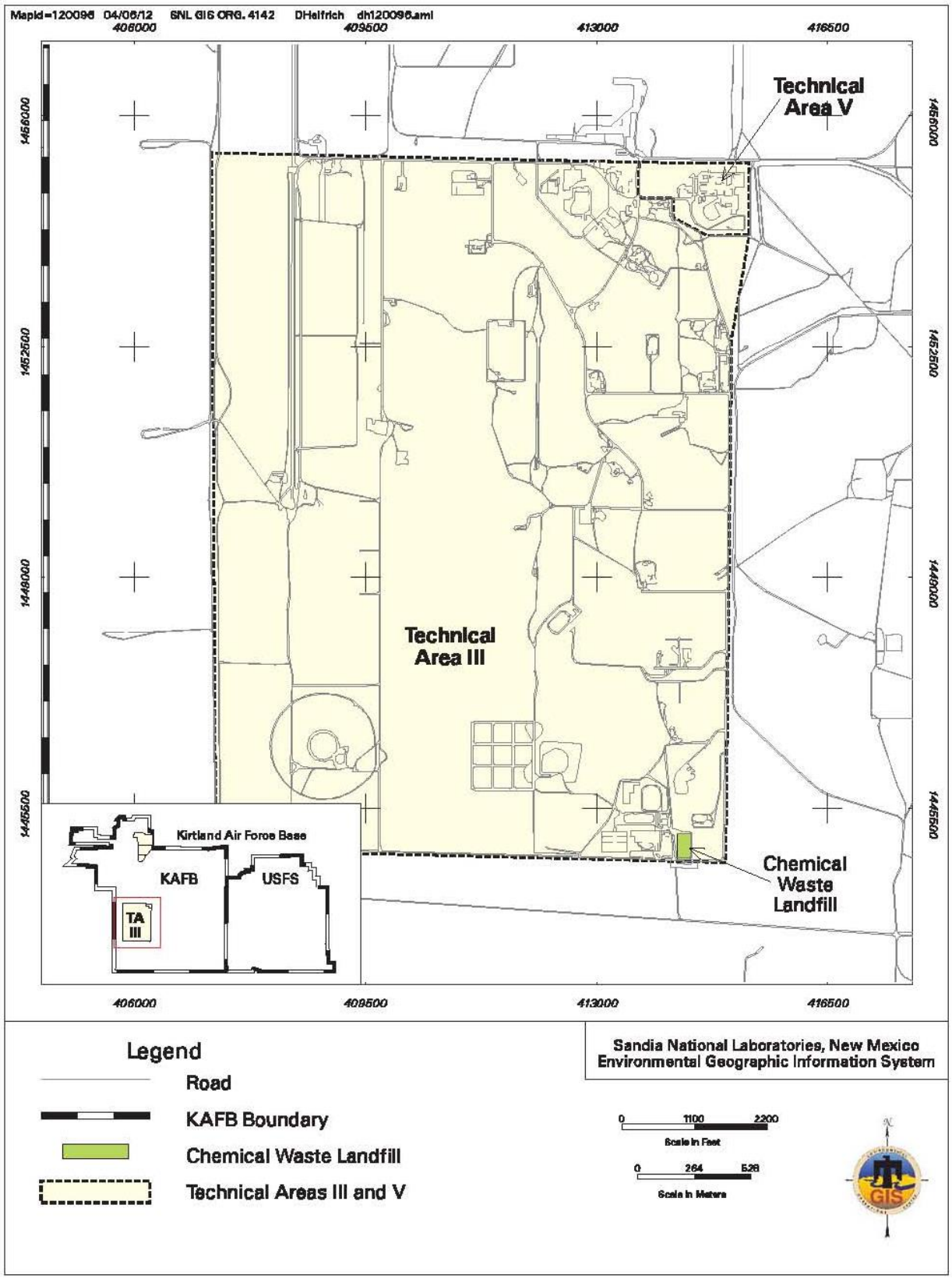


Figure 3-1. Location of the Chemical Waste Landfill within Technical Area III

NMED on September 27, 2010 (SNL September 2010). The Well Installation and Decommissioning Report was included as an Appendix to the CWL Final RCRA Closure Report.

CWL closure was approved by the NMED and the CWL PCCP (NMED October 2009a) became effective on June 2, 2011 (Kieling June 2011). The CWL PCCP supersedes the Final Closure Plan (SNL December 1992) as the enforceable regulatory document. Therefore, all groundwater monitoring activities at the CWL after June 2011 are performed by the Long-Term Stewardship Program in accordance with requirements specified in the CWL PCCP (NMED October 2009a). Required monitoring (groundwater and soil-gas), inspections, and maintenance activities are documented annually in Post-Closure Care Reports submitted to NMED by March 31 of each year and document all PCCP-required activities for the previous calendar year (CY). As required by the PCCP, the CWL Annual Post-Closure Care Report for CY 2012 (SNL March 2013) was submitted to the NMED in March 2013 and was approved in October 2013 (Kieling October 2013). The *Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2013* will be submitted to NMED in March 2014.

3.1.1 Monitoring History

Groundwater monitoring began in 1985 at the CWL (IT December 1985) as required by Section 20.4.1.600 of the New Mexico Administrative Code (NMAC), incorporating Title 40, Code of Federal Regulations (CFR), Part 265, Subpart F. Monitoring under the Final Closure Plan (SNL December 1992 and subsequent revisions) was conducted until June 2, 2011 when the CWL PCCP became effective. Since this time groundwater monitoring has been performed at the CWL in accordance with the CWL PCCP (NMED October 2009a).

3.1.2 Monitoring Network

The CWL compliance groundwater monitoring network includes monitoring wells CWL-BW5, CWL-MW9, CWL-MW10, and CWL-MW11. These four wells are shown on Figure 3-2 and listed in Table 3-1.

3.1.3 Summary of Activities

The CY 2013 semiannual groundwater monitoring activities for the CWL were performed during January and July 2013 in accordance with Attachment 2 of the CWL PCCP, (NMED October 2009a). In January, groundwater samples were analyzed for the enhanced list of VOCs, chromium, and nickel. The enhanced list of VOCs includes 1,1-dichloroethene, 1,1,2-trichloro-1,2,2-trifluoroethane, chloroform, tetrachloroethene, TCE, and trichlorofluoromethane. In July, groundwater samples were analyzed for TCE, chromium, and nickel. Attachment 3A presents tables showing the analytical results for the CWL monitoring wells sampled during CY 2013.

A comprehensive presentation of all required monitoring, inspections, maintenance, and repair activities will be presented in the *Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2013* that will be submitted to the NMED in March 2014.

3.1.4 Summary of Future Activities

As defined in the CWL PCCP (NMED October 2009a), the post-closure care period for the CWL is 30 years and the compliance period for which the groundwater protection standard applies is 47 years; both periods began on June 2, 2011 when NMED approved closure (Kieling June 2011). The NMED may shorten or extend the post-closure care period under 20.4.1.500 NMAC, incorporating 40 CFR 264.117(a)(2).

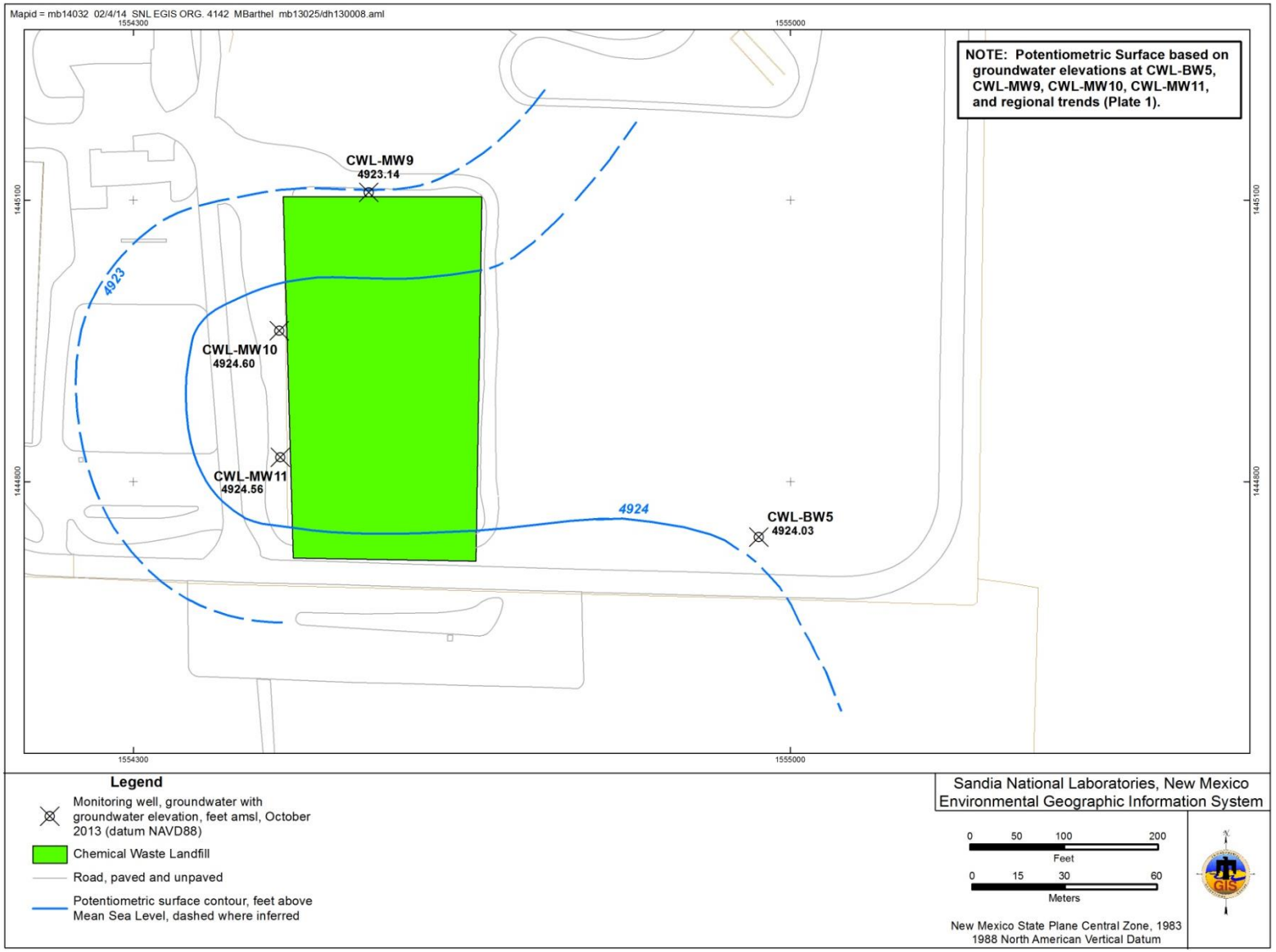


Figure 3-2. Chemical Waste Landfill Monitoring Well Locations and Potentiometric Surface Map, October 2013

Table 3-1. CWL Post-Closure Care Permit Monitoring Well Network and Calendar Year 2013 Compliance Activities

Well ID	WQ	WL	Comment
CWL-BW5	✓	✓	Upgradient well
CWL-MW9	✓	✓	Downgradient well
CWL-MW10	✓	✓	Downgradient well
CWL-MW11	✓	✓	Downgradient well

NOTES:
Check marks in the WQ and WL columns indicate the WQ sampling and WL measurements that were conducted during January and July 2013 Sampling Events.
BW = Background Well.
CWL = Chemical Waste Landfill.
ID = Identification.
MW = Monitoring Well.
WL = Water level.
WQ = Water quality.

In accordance with the CWL PCCP (NMED October 2009a), groundwater monitoring is required on a semi-annual basis. One of the two semi-annual events must include analyses for the enhanced list of VOCs, chromium, and nickel. The other semi-annual event must include TCE, chromium, and nickel.

3.1.5 Conceptual Site Model

The constituents of concern in groundwater are TCE, chromium, and nickel (NMED October 2009a). A detailed conceptual site model is provided in Annex E of the CWL CMS Report (SNL December 2004). The model is summarized as follows.

Groundwater at the CWL is contained within the regional aquifer, which consists of unconsolidated Santa Fe Group deposits (i.e., fine-grained alluvial-fan deposits). The depth to water is approximately 500 feet (ft) below ground surface. Groundwater flows generally westward away from the Manzanita Mountains and toward the Rio Grande. Several water-supply wells operated by Kirtland Air Force Base (KAFB) and the Albuquerque Bernalillo County Water Utility Authority (ABCWUA) have profoundly modified the natural groundwater flow regime to the west and north of the CWL by creating a trough in the water table in the western and northern portions of KAFB. As a result, water levels at the CWL have been steadily declining since monitoring began in 1985.

Since monitoring began at the CWL in 1985, the average rate of decline has been somewhat variable, but typically in the range of 0.4 to 0.8 feet per year (ft/yr). The groundwater elevation decline between October 2012 and October 2013 at the CWL wells ranged from 0.22 (CWL-MW11) to 0.92 (CWL-BW5) feet (Figure 3B-1 in Attachment 3B). Recharge from the infiltration of direct precipitation at the CWL is negligible due to high evapotranspiration, low precipitation, the thick sequence of unsaturated Santa Fe Group deposits above the water table, and the evapotranspirative cover that was installed in 2005. Groundwater recharge of the regional aquifer primarily occurs by the infiltration of precipitation in the Manzanita Mountains located approximately 5 miles to the east.

The CWL potentiometric surface map for October 2013 is presented on Figure 3-2. The map is consistent with the conceptual site model and the base-wide potentiometric surface map presented on Plate 1. As shown on Plate 1, the potentiometric surface contours beneath Technical Area III generally trend north to south with the inferred groundwater flow direction being generally westward. The apparent localized deflection in the potentiometric surface immediately beneath the CWL (Figure 3-2) probably reflects site-specific geologic controls (i.e., lateral and vertical changes in the hydraulic conductivity of the saturated,

anisotropic, alluvial-fan sediments that were deposited in an east to west direction). Slug testing of the four groundwater monitoring wells completed in 2012 indicates CWL-MW10 has the lowest average hydraulic conductivity (5 ft/yr) relative to the other wells. CWL-MW9 has the highest average hydraulic conductivity at 16 ft/yr, and both CWL-MW11 and CWL-BW5 tested at 12 ft/yr. While actual flow paths in laterally discontinuous alluvial sediments are complex and highly dependent upon horizontal permeability, hydraulic conductivity testing indicates CWL-MW10 is installed within tighter, slower sediments than CWL-MW9 to the north and CWL-BW5/CWL-MW11 to the south. This information is consistent with groundwater purging data; CWL-MW10 is the only well that purges dry during routine sampling. As the regional aquifer surface declines and groundwater flows from the east to the west, the central part of the site reacts more slowly, creating a localized salient in the potentiometric surface (i.e., a very gentle ridge or localized high). Previous groundwater monitoring wells installed in this area (west of the central part of the CWL) have also exhibited these characteristics (low yield, purge dry, low hydraulic conductivity; CWL-MW2A and CWL-MW2BU/L).

Based on the potentiometric surface map, the horizontal gradient at the CWL was approximately 0.011 ft/ft in October 2013. Groundwater velocities were calculated using:

- The current potentiometric surface gradient,
- The hydraulic conductivity range (i.e., high and low values) from the four groundwater monitoring wells, and
- A porosity of 29 percent as determined from the laboratory analyses of CWL soil samples (SNL October 1995).

The calculated velocities range from approximately 1.8×10^{-4} to 2.8×10^{-3} feet per day (equivalent to 6.3×10^{-8} to 1.0×10^{-6} centimeters per second). This is equivalent to approximately 0.07 to 1.02 ft/yr. These very low values are consistent with previous estimates for horizontal groundwater flow at the water table in the CWL vicinity. Groundwater travel times from the CWL to the KAFB and ABCWUA water supply wells are on the order of hundreds to thousands of years (SNL February 2001).

3.2 Regulatory Criteria

The CWL is a remediated, closed, regulated unit undergoing post-closure care in accordance with the CWL PCCP (NMED October 2009a) that became effective on June 2, 2011. Groundwater monitoring requirements, procedures, and protocols are detailed in the CWL PCCP, Attachment 2, Groundwater Sampling and Analysis Plan (NMED October 2009a).

3.3 Scope of Activities

The groundwater monitoring performed at the CWL during CY 2013 is summarized in Section 3.1.3. Table 3-2 lists the parameters and CWL monitoring wells sampled.

Groundwater samples collected for chemical analyses were submitted to GEL Laboratories LLC (GEL) in Charleston, South Carolina. All chemical analytical results are compared with EPA maximum contaminant levels (MCLs) for drinking water (EPA 2009). The analytical results are summarized in Attachment 3A, Tables 3A-1 and 3A-2.

Table 3-2. Analytical Parameters for the CWL Monitoring Wells, Calendar Year 2013

Parameters	CY 2013 Semiannual Event	CWL Monitoring Wells
TCE; 1,1,2-Trichloro-1,2,2-trifluoroethane; Tetrachloroethene; 1,1-Dichloroethene; Chloroform; Trichlorofluoromethane; Chromium; and Nickel	January	CWL-BW5, CWL-MW9, CWL-MW9 dup, CWL-MW10, and CWL-MW11
TCE, Chromium, and Nickel	July	CWL-BW5, CWL-MW9, CWL-MW10, CWL-MW10 dup, and CWL-MW11

NOTES:
BW = Background Well.
CWL = Chemical Waste Landfill.
CY = Calendar Year.
dup = Duplicate.
MW = Monitoring Well.
TCE = Trichloroethene.

Field and laboratory quality control (QC) samples were used to determine the accuracy of the methods used and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process as discussed in Section 1.3.3. Field QC samples included duplicate environmental, equipment blank (EB), field blank (FB), and trip blank (TB) samples. Laboratory QC samples included method blank, laboratory control, matrix spike, matrix spike duplicate, and surrogate spike samples.

3.4 Field Methods and Measurements

Groundwater sampling and depth-to-groundwater measurements were conducted in conformance with procedures specified in the CWL PCCP (NMED October 2009a), which are consistent with the methods described in Section 1.3. Purging requirements at the CWL include specifications for making a "best faith effort" to decrease flow rates, such that low yield wells do not purge dry. These efforts include equipping the existing sampling system with small diameter tubing and a flow meter valve located along the discharge line. In addition, during the purging process at wells prone to purging dry, the flow rate is continually adjusted to achieve as low a flow rate as possible without causing the pump to be damaged or fail. This represents a "best faith effort" to purge the wells at the slowest rate possible given equipment limitations as specified in CWL PCCP Attachment 2, Section 2.12.

Field water quality parameters were measured in the field for temperature, specific conductance, oxidation-reduction potential, pH, and dissolved oxygen using an YSI™ Model 6920 Water Quality Meter during the purging process. Turbidity was measured with a Hach™ Model 2100P turbidity meter. Field water quality parameters are presented in Table 3A-3 (Attachment 3A) and groundwater elevation measurements at the CWL monitoring wells from CY 2010 through CY 2013 are presented in Attachment 3B, Figure 3B-1.

The minimum purging volume requirement was satisfied at three of the four monitoring wells. Monitoring well CWL-MW10 purged dry prior to removal of the minimum volume. This well was purged to dryness during both the January and July monitoring events, allowed to recover, and then sampled to collect the most representative groundwater sample possible given the low yield of this well. During January, approximately 19 gallons were purged from CWL-MW10 prior to the well going dry. The average flow rate was 0.17 gallons per minute (gpm), and the estimated flow rate was 0.13 gpm during the final four gallons (equivalent to 0.64 and 0.49 liters per minute, respectively). During July, approximately 16 gallons were purged from CWL-MW10 prior to the well going dry. The average flow rate was 0.15 gpm, and the estimated flow rate was 0.10 gpm during the final four gallons (equivalent to 0.57 and 0.38 liters per minute, respectively).

Groundwater samples were submitted to the off-site laboratory (GEL) following analysis request/chain of custody protocol.

3.5 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using EPA-specified protocols described in Section 1.3.2 (Tables 1-5 and 1-6).

3.6 Summary of Analytical Results

The analytical results and water quality parameters are presented in Attachment 3A, Tables 3A-1 through 3A-3. Analytical results that are above the analytical laboratory method detection limit (MDL), but below the practical quantitation limit are qualified as estimated values and designated with a "J" qualifier in Tables 3A-1 and 3A-2. Analytical laboratory reports, including certificates of analyses, analytical methods, MDLs, practical quantitation limits, dates of analyses, results of QC analyses, and data validation findings are filed in the SNL/NM Customer Funded Records Center. Data qualifiers based on the data validation process are presented with the associated results in the tables in Attachment 3A. Data validation and QC sample results are discussed in Section 3.7.

For the purposes of this report, all CY 2013 analytical results were compared with established EPA MCLs where applicable. However, as stipulated in the CWL PCCP (SNL October 2009a), the only regulatory standards that apply to CWL groundwater monitoring results are PCCP-defined concentration limits. These NMED-defined regulatory standards apply only to a statistical evaluation of the constituent data set from a given monitoring well (i.e., the 95th percent lower confidence limit of the mean for a particular constituent); not to individual results. The full statistical evaluation of CWL CY 2013 groundwater monitoring results will be presented in the CWL Annual Post-Closure Care Report for CY 2013 (to be submitted to NMED in March 2014). None of the detected constituents exceed the respective MCLs. The analytical results are discussed in greater detail in the following sections.

3.6.1 Volatile Organic Compounds

The analytical results for the enhanced list of VOCs (January) and TCE (July) are summarized in Attachment 3A, Table 3A-1. TCE was the only VOC detected above the laboratory MDL; it was detected in all samples from monitoring well CWL-MW10. TCE was detected in the environmental samples at concentrations of 4.63 and 3.13 µg/L. TCE was also detected at a concentration of 2.89 µg/L in the July duplicate sample from monitoring well CWL-MW10. All of these results are below the MCL of 5.0 µg/L.

3.6.2 Metals

The analytical results for nickel and chromium are summarized in Attachment 3A, Table 3A-2. Chromium was detected above the laboratory MDL of 0.002 milligrams per liter (mg/L) in the January environmental samples from monitoring wells CWL-MW10 and CWL-MW11 at estimated concentrations of 0.00321 and 0.00304 mg/L, respectively (note the CWL-MW10 chromium detection was qualified as a non-detect during data validation – see Section 3.7.2). Chromium was not detected above the laboratory MDL of 0.002 mg/L in the July samples and was not detected above the MCL of 0.10 mg/L in any of the samples. Nickel was detected in each sample at concentrations ranging from 0.00172 mg/L to 0.00637 mg/L, although all but one of the January detections were qualified as non-detects during data validation (see Section 3.7.2). All nickel detections were low concentrations; no MCL has been established for nickel.

3.6.3 Water Quality Parameters

The water quality parameters measured immediately prior to sample collection are listed in Attachment 3A, Table 3A-3. These field parameters consist of temperature, specific conductance, oxidation-reduction potential, pH, turbidity, and dissolved oxygen.

3.7 Quality Control Results

Field and laboratory QC samples were prepared to determine the accuracy of the methods used and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process. All data were reviewed in accordance with Administrative Operating Procedure (AOP) 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL May 2011). The results for each QC analysis and the impact on data quality are discussed in the following sections.

3.7.1 Field Quality Control Samples

Field QC samples included duplicate environmental samples, FBs, TBs, and EBs. The purpose of each field QC sample type is presented in Section 1.3.3. The following sections discuss the analytical results for each QC sample type.

3.7.1.1 Duplicate Environmental Samples

One duplicate sample was collected from monitoring well CWL-MW9 in January and one duplicate sample was collected from monitoring well CWL-MW10 in July, and the results were compared to the results for the corresponding environmental sample. Relative percent difference (RPD) values were calculated for the detected parameters. For the environmental duplicate sample pair collected at CWL-MW9 in January, no VOCs or chromium were detected and the nickel results were qualified during data validation as non-detections. Therefore, RPD values were not calculated. The RPD values for the environmental duplicate sample pair collected at CWL-MW10 in July show good correlation with RPD values of 8 for TCE and 2 for nickel. The agreement between duplicate environmental and environmental sample results are within the acceptable range for RPD values of less than 20 for organic compounds and less than 35 for metals (NMED October 2009a).

3.7.1.2 Field Blank Samples

Two FB samples were collected in January and analyzed for the enhanced list of VOCs. Two FB samples were collected in July and analyzed for TCE only. The only detections were chloroform in the two January FB samples. No corrective action was required because chloroform was not detected in any of the environmental samples.

3.7.1.3 Trip Blank Samples

Five TB samples were submitted with the January samples and analyzed for the enhanced list of VOCs, and five TB samples were submitted with July samples and analyzed for TCE. VOCs were not detected in these samples.

3.7.1.4 Equipment Blank Samples

One EB sample was collected in January and analyzed for the enhanced list of VOCs, chromium, and nickel. One EB sample was collected in July and analyzed for TCE, chromium, and nickel. Chloroform and chromium were detected in the January EB sample. No corrective action was necessary because chloroform and chromium were not detected in the environmental sample associated with the EB sample (i.e., CWL-MW9 samples).

3.7.2 Laboratory Quality Control Samples

Internal laboratory QC samples, including method blanks, duplicate laboratory control samples, batch matrix spike, matrix spike duplicate, and surrogate spike samples, were analyzed concurrently with the groundwater samples. All laboratory data were reviewed and qualified in accordance with AOP 00-03, Revision 3, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL May 2011). All data were in compliance with analytical methods and laboratory procedures (i.e., technically defensible). The

data validation reports are filed in the SNL/NM Customer Funded Records Center. Minor issues documented during the data validation process are summarized below.

For the January 2013 sampling event, the chromium result in the CWL-MW10 sample and the nickel results in CWL-BW5, CWL-MW9 (including the duplicate sample), and CWL-MW11 samples were qualified as not detected during data validation. The results are very low concentrations that are less than five times the concentration detected in the associated laboratory method blank samples; therefore, they were qualified as not detected.

For the July 2013 sampling event, the nickel results in CWL-BW5, CWL-MW9, and CWL-MW11 environmental samples were qualified as estimated values with a negative bias during data validation based on the associated laboratory QC sample (interference check sample) results.

3.8 Variances and Nonconformances

No variances or nonconformances from specified sampling and analysis requirements or project-specific issues were identified during the January and July 2013 sampling activities at the CWL.

3.9 Summary and Conclusions

During CY 2013, groundwater samples were collected from four CWL PCCP monitoring wells (CWL-BW5, CWL-MW9, CWL-MW10, and CWL-MW11) in January and July and analyzed for TCE, 1,1,2-trichloro-1,2,2-trifluoroethane, tetrachloroethene, 1,1-dichloroethene, chloroform, trichlorofluoromethane, nickel, and chromium (January); and TCE, nickel, and chromium (July). No analytes were detected at concentrations exceeding the EPA MCLs.

Based on the field and laboratory QC sample and data validation results, the CY 2013 groundwater monitoring data meet data quality objectives and are in compliance with analytical methods and laboratory procedures (i.e., representative and technically defensible).

3.10 References

EPA 2009 U.S. Environmental Protection Agency (EPA), 2009. National Primary Drinking Water Regulations, EPA 816-F 09-004, U.S. Environmental Protection Agency, Washington, D.C., May.

IT December 1985 IT Corporation (IT), December 1985. *RCRA Interim Status Groundwater Monitoring Plan, Chemical Waste Landfill,* prepared for Environmental Impacts and Restoration Division, Sandia National Laboratories, New Mexico, IT Corporation, Albuquerque, New Mexico.

Kieling October 2013 Kieling, J.E. (New Mexico Environment Department), October 2013. Letter to P. Wagner (U.S. Department of Energy) and M. Hazen (Sandia Corporation), *Approval, Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2012, March 2013, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-13-002*, October 16, 2013.

Kieling June 2011 Kieling, J.E. (New Mexico Environment Department), June 2011. Letter to P. Wagner (U.S. Department of Energy) and S.A. Orrell (Sandia Corporation), *Notice of Approval, Closure of Chemical Waste Landfill and Post-Closure Care Permit in Effect, Sandia National Laboratories, EPA ID No. NM5890110518, HWB-SNL-10-013,* June 2, 2011.

Kieling September 2004 Kieling, J.E. (New Mexico Environment Department), September 2004. Letter to P. Wagner (U.S. Department of Energy) and P.B. Davies (Sandia Corporation), *Approval with Conditions of the Landfill Cover Interim Measure at the Chemical Waste Landfill, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-04-027*, September 22, 2004.

Kieling May 2007 Kieling, J.E. (New Mexico Environment Department), May 2007. *Notice of Public Comment Period and Opportunity to Request a Public Hearing on a Closure Plan Amendment, Corrective Measures Study, and Draft Post-Closure Care Permit for the Chemical Waste Landfill at Sandia National Laboratories*, May 21, 2007.

NMED October 2009a New Mexico Environment Department (NMED), October 2009. *Final Permit Decision and Response to Comments, Post-Closure Care Permit for the Chemical Waste Landfill, Sandia National Laboratories, EPA ID# NM5890110518, SNL-06-002*, New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico, October 15, 2009.

NMED October 2009b New Mexico Environment Department (NMED), October 2009. *Notice of Approval, Final Remedy and Closure Plan Amendment, Chemical Waste Landfill, Sandia National Laboratories, EPA ID No. NM5890110518, NMED-HWB-05-016*, New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico, October 16, 2009.

NMED May 2007 New Mexico Environment Department (NMED), May 2007. *Resource Conservation and Recovery Act, Post-Closure Care Operating Permit, EPA ID No. NM5890110518, to the U.S. Department of Energy/Sandia Corporation, for the Sandia National Laboratories Chemical Waste Landfill*, New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico, May 21, 2007.

SNL March 2013 Sandia National Laboratories, New Mexico (SNL/NM), March 2013. *Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2012*, Sandia National Laboratories, Albuquerque, New Mexico, March 2013.

SNL May 2011 Sandia National Laboratories, New Mexico (SNL/NM), May 2011. *Data Validation Procedure for Chemical and Radiochemical Data*, AOP 00-03, Revision 3, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2010 Sandia National Laboratories, New Mexico (SNL/NM), September 2010. *Chemical Waste Landfill Final Resource Conservation and Recovery Act Closure Report*, Sandia National Laboratories, Albuquerque, New Mexico, September 27, 2010.

SNL February 2006 Sandia National Laboratories, New Mexico (SNL/NM), February 2006. *Chemical Waste Landfill Final Closure Plan – Chapter 12 Revision*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL December 2004 Sandia National Laboratories, New Mexico (SNL/NM), December 2004. *Chemical Waste Landfill Corrective Measures Study Report*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL April 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 February 2001 Sandia National Laboratories, New Mexico (SNL/NM), February 2001. *Draft Long-Term Monitoring Strategy for Groundwater*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL October 1995 Sandia National Laboratories, New Mexico (SNL/NM), October 1995. *Chemical Waste Landfill Groundwater Assessment Report*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL December 1992 Sandia National Laboratories, New Mexico (SNL/NM), December 1992. *Chemical Waste Landfill Final Closure Plan and Postclosure Permit Application*, Sandia National Laboratories, Albuquerque, New Mexico, amended January 2003.

Wagner April 2004 Wagner, P. (U.S. Department of Energy), April 2004. Letter to J. Kieling (New Mexico Environment Department), *Request for Approval of an Interim Measure (Cover) at the Chemical Waste Landfill*, April 19, 2004.

Attachment 3A
Chemical Waste Landfill
Analytical Results Tables

This page intentionally left blank.

Attachment 3A Tables

3A-1 Summary of Volatile Organic Compound Results, Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 3A-5

3A-2 Summary of Chromium and Nickel Results, Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 3A-7

3A-3 Summary of Field Water Quality Measurements[h], Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 3A-8

Footnotes for Chemical Waste Landfill Groundwater Monitoring Tables 3A-9

This page intentionally left blank.

Table 3A-1
Summary of Volatile Organic Compound Results,
Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CWL-BW5	1,1-Dichloroethene	ND	0.300	1.00	7.00	U		093275-001	SW846 8260B
08-Jan-13	Chloroform	ND	0.300	1.00	NE	U		093275-001	SW846 8260B
	Tetrachloroethene	ND	0.300	1.00	5.00	U		093275-001	SW846 8260B
	Trichloroethene	ND	0.300	1.00	5.00	U		093275-001	SW846 8260B
	Trichlorofluoromethane	ND	0.300	1.00	NE	U		093275-001	SW846 8260B
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	1.50	5.00	NE	U		093275-001	SW846 8260B
CWL-MW9	1,1-Dichloroethene	ND	0.300	1.00	7.00	U		093282-001	SW846 8260B
09-Jan-13	Chloroform	ND	0.300	1.00	NE	U		093282-001	SW846 8260B
	Tetrachloroethene	ND	0.300	1.00	5.00	U		093282-001	SW846 8260B
	Trichloroethene	ND	0.300	1.00	5.00	U		093282-001	SW846 8260B
	Trichlorofluoromethane	ND	0.300	1.00	NE	U		093282-001	SW846 8260B
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	1.50	5.00	NE	U		093282-001	SW846 8260B
CWL-MW9	1,1-Dichloroethene	ND	0.300	1.00	7.00	U		093283-001	SW846 8260B
(Duplicate)	Chloroform	ND	0.300	1.00	NE	U		093283-001	SW846 8260B
09-Jan-13	Tetrachloroethene	ND	0.300	1.00	5.00	U		093283-001	SW846 8260B
	Trichloroethene	ND	0.300	1.00	5.00	U		093283-001	SW846 8260B
	Trichlorofluoromethane	ND	0.300	1.00	NE	U		093283-001	SW846 8260B
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	1.50	5.00	NE	U		093283-001	SW846 8260B
CWL-MW10	1,1-Dichloroethene	ND	0.300	1.00	7.00	U		093287-001	SW846 8260B
14-Jan-13	Chloroform	ND	0.300	1.00	NE	U		093287-001	SW846 8260B
	Tetrachloroethene	ND	0.300	1.00	5.00	U		093287-001	SW846 8260B
	Trichloroethene	4.63	0.300	1.00	5.00			093287-001	SW846 8260B
	Trichlorofluoromethane	ND	0.300	1.00	NE	U		093287-001	SW846 8260B
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	1.50	5.00	NE	U		093287-001	SW846 8260B
CWL-MW11	1,1-Dichloroethene	ND	0.300	1.00	7.00	U		093292-001	SW846 8260B
10-Jan-13	Chloroform	ND	0.300	1.00	NE	U		093292-001	SW846 8260B
	Tetrachloroethene	ND	0.300	1.00	5.00	U		093292-001	SW846 8260B
	Trichloroethene	ND	0.300	1.00	5.00	U		093292-001	SW846 8260B
	Trichlorofluoromethane	ND	0.300	1.00	NE	U		093292-001	SW846 8260B
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	1.50	5.00	NE	U		093292-001	SW846 8260B

Refer to footnotes on page 3A-9.

Table 3A-1 *(Concluded)*
Summary of Volatile Organic Compound Results,
Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CWL-BW5 08-Jul-13	Trichloroethene	ND	0.300	1.00	5.00	U		094278-001	SW846 8260B
CWL-MW9 09-Jul-13	Trichloroethene	ND	0.300	1.00	5.00	U		094282-001	SW846 8260B
CWL-MW10 12-Jul-13	Trichloroethene	3.13	0.300	1.00	5.00			094294-001	SW846 8260B
CWL-MW10 (Duplicate) 12-Jul-13	Trichloroethene	2.89	0.300	1.00	5.00			094295-001	SW846 8260B
CWL-MW11 10-Jul-13	Trichloroethene	ND	0.300	1.00	5.00	U		094287-001	SW846 8260B

Refer to footnotes on page 3A-9.

Table 3A-2
Summary of Chromium and Nickel Results,
Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CWL-BW5	Chromium	ND	0.002	0.010	0.100	U		093275-015	SW846 6020
08-Jan-13	Nickel	0.0036	0.0005	0.002	NE	B	0.0048U	093275-015	SW846 6020
CWL-MW9	Chromium	ND	0.002	0.010	0.100	U		093282-015	SW846 6020
09-Jan-13	Nickel	0.00399	0.0005	0.002	NE	B	0.0048U	093282-015	SW846 6020
CWL-MW9 (Duplicate)	Chromium	ND	0.002	0.010	0.100	U		093283-015	SW846 6020
09-Jan-13	Nickel	0.00344	0.0005	0.002	NE	B	0.0048U	093283-015	SW846 6020
CWL-MW10	Chromium	0.00321	0.002	0.010	0.100	B, J	0.018U	093287-015	SW846 6020
14-Jan-13	Nickel	0.00404	0.0005	0.002	NE	B		093287-015	SW846 6020
CWL-MW11	Chromium	0.00304	0.002	0.010	0.100	J		093292-015	SW846 6020
10-Jan-13	Nickel	0.00333	0.0005	0.002	NE	B	0.0048U	093292-015	SW846 6020
CWL-BW5	Chromium	ND	0.002	0.010	0.100	U		094278-015	SW846 6020
08-Jul-13	Nickel	0.00637	0.0005	0.002	NE		J-	094278-015	SW846 6020
CWL-MW9	Chromium	ND	0.002	0.010	0.100	U		094282-015	SW846 6020
09-Jul-13	Nickel	0.00198	0.0005	0.002	NE	J	J-	094282-015	SW846 6020
CWL-MW10	Chromium	ND	0.002	0.010	0.100	U		094294-015	SW846 6020
12-Jul-13	Nickel	0.00234	0.0005	0.002	NE			094294-015	SW846 6020
CWL-MW10 (Duplicate)	Chromium	ND	0.002	0.010	0.100	U		094295-015	SW846 6020
12-Jul-13	Nickel	0.00238	0.0005	0.002	NE			094295-015	SW846 6020
CWL-MW11	Chromium	ND	0.002	0.010	0.100	U		094287-015	SW846 6020
10-Jul-13	Nickel	0.00172	0.0005	0.002	NE	J	J-	094287-015	SW846 6020

Refer to footnotes on page 3A-9.

Table 3A-3
Summary of Field Water Quality Measurements[h],
Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
CWL-BW5	08-Jan-13	16.78	1024	226.5	6.64	0.68	77.6	7.44
CWL-MW9	09-Jan-13	18.22	906	44.1	6.68	0.68	21.4	2.00
CWL-MW10	14-Jan-13	9.10	797	156.9	6.98	2.67	26.1	3.00
CWL-MW11	10-Jan-13	14.44	929	198.0	6.68	0.67	50.1	5.10
CWL-BW5	08-Jul-13	22.62	1200	104.1	6.85	0.78	77.6	6.61
CWL-MW9	09-Jul-13	21.64	1066	14.5	6.91	0.71	26.4	2.32
CWL-MW10	12-Jul-13	22.04	966	60.8	7.16	2.70	21.1	1.84
CWL-MW11	10-Jul-13	26.73	1119	120.4	6.88	1.25	55.6	4.96

Refer to footnotes on page 3A-9.

Footnotes for Chemical Waste Landfill Groundwater Monitoring Tables

% = percent.
µg/L = micrograms per liter.
BW = background well.
CWL = Chemical Waste Landfill.
EPA = U.S. Environmental Protection Agency.
ID = Identifier.
mg/L = milligrams per liter.
MW = monitoring well.
No. = Number.

[a]Result
Bold = Indicates the value exceeds the established MCL.
ND = not detected (at MDL).

[b]MDL
MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

[c]PQL
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

[d]MCL
MCL = Maximum contaminant level. MCLs were established by the EPA Office of Water, National Primary Water Regulations (EPA May 2009).
NE = not established.

[e]Laboratory Qualifier
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
B = Analyte is detected in associated laboratory method blank.
J = Estimated value, the analyte concentration fell above the effective MDL and below the PQL.
U = Analyte is absent or below the MDL.

[f]Validation Qualifier
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
J- = The associated numerical value is an estimated quantity with a suspected negative bias.
U = The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.

[g]Analytical Method
EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.

[h]Field Water Quality Measurements
Field measurements were collected prior to sampling.
°C = degrees Celsius.
% Sat = percent saturation.
µmhos/cm = micromhos per centimeter.
mg/L = milligrams per liter.
mV = millivolts.
NTU = nephelometric turbidity units.
pH = potential of hydrogen (negative logarithm of the hydrogen ion concentration).

This page intentionally left blank.

Attachment 3B
Chemical Waste Landfill
Hydrographs

This page intentionally left blank.

Attachment 3B Hydrographs

3B-1 CWL Study Area Wells 3B-5

This page intentionally left blank.

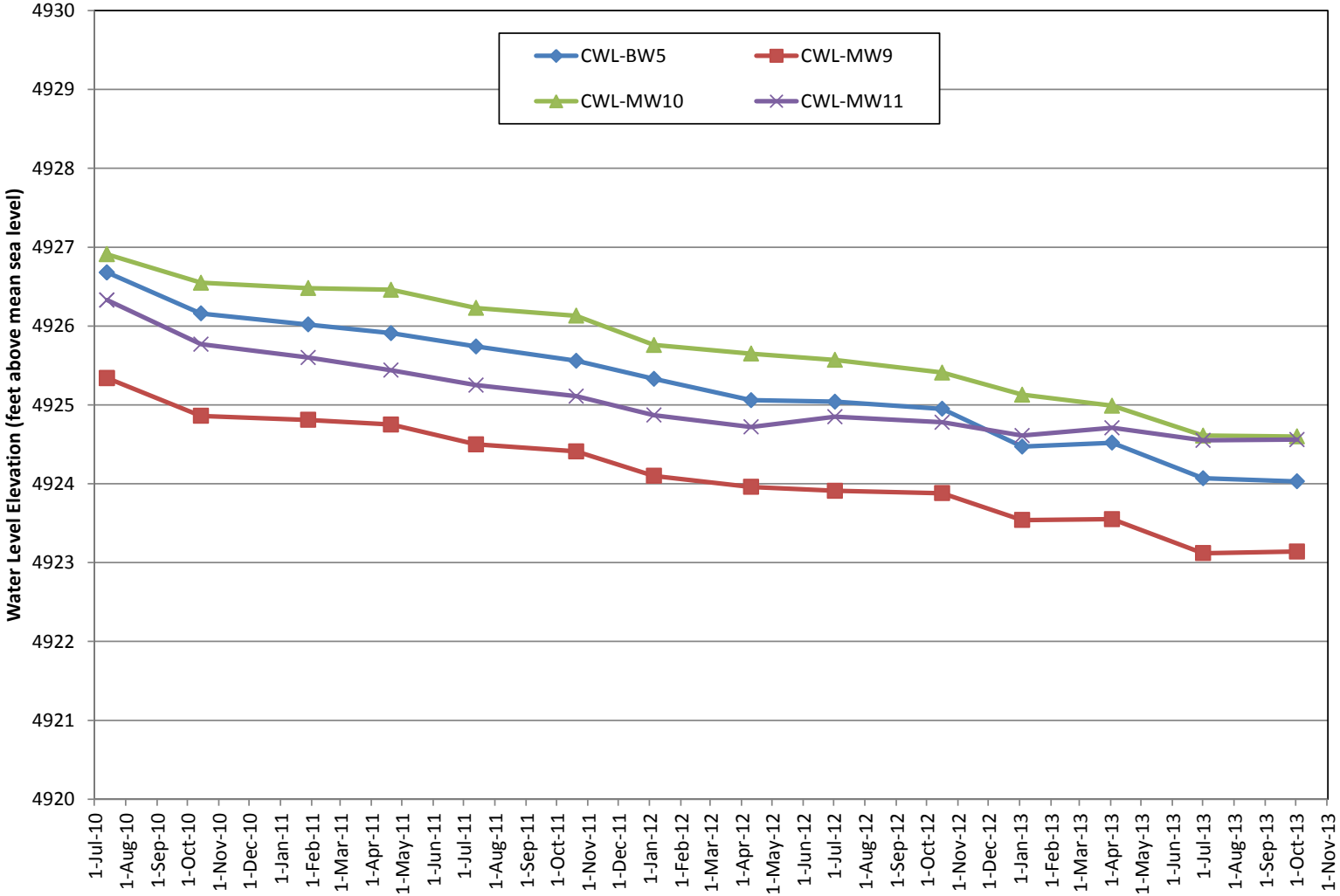


Figure 3B-1. CWL Study Area Wells

This page intentionally left blank.

4.0 Mixed Waste Landfill

4.1 Introduction

The Mixed Waste Landfill (MWL) is a 2.6-acre site in the north-central portion of Technical Area III at Sandia National Laboratories, New Mexico (SNL/NM) (Figure 4-1). The MWL consists of two distinct disposal areas: the classified area (occupying 0.6 acres) and the unclassified area (occupying 2.0 acres). Approximately 100,000 cubic feet of low-level radioactive and mixed waste containing approximately 6,300 curies of activity (at the time of disposal) were disposed of in the MWL from March 1959 through December 1988. Classified wastes were buried in cylindrical pits in the classified area and unclassified wastes were buried in shallow trenches in the unclassified area.

The Phase 1 Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) was conducted in 1989 and 1990 (SNL September 1990) and the Phase 2 RFI was conducted from 1992 to 1995. The Phase 2 RFI confirmed tritium as the constituent of concern in soil at the MWL (Peace et al. 2002). As directed by the New Mexico Environment Department (NMED), the MWL Corrective Measures Study (SNL May 2003) was submitted to the NMED in May 2003. The NMED held a public comment period on the MWL Corrective Measures Study from August 11 to December 9, 2004, and a public hearing was held from December 2 to December 3 and December 8 to December 9, 2004. On May 26, 2005, the Secretary of the NMED selected a vegetative cover with a biointrusion barrier (i.e., evapotranspirative [ET] cover) as the final remedy for the MWL and required a Corrective Measures Implementation (CMI) Plan within 180 days that included fate and transport modeling (NMED May 2005). The MWL CMI Plan (SNL November 2005) was submitted in November 2005 and conditionally approved by the NMED in December 2008 (Bearzi December 2008). The MWL ET cover construction was completed from May through September 2009. The MWL CMI Report documenting cover construction in accordance with the CMI Plan was submitted to NMED in January 2010 (SNL January 2010). The CMI Report was approved by NMED on October 14, 2011 (Bearzi October 2011) after a 90-day NMED public comment period (November 29, 2010 through February 28, 2011) that included a public meeting on December 14, 2010. The MWL Long-Term Monitoring and Maintenance Plan (LTMMP) previously submitted in September 2007 was revised (SNL March 2012) and submitted to the NMED in March 2012 within 180 days of CMI Report approval as required by the NMED Final Order on the MWL (NMED May 2005). As part of the regulatory review and approval process for the MWL LTMMP, NMED completed a 150-day public comment period from September 14, 2012 through February 11, 2013 that included a public meeting on October 16, 2012. The revised MWL LTMMP is pending NMED approval. Implementation of the monitoring, inspection, and reporting requirements of the LTMMP will begin immediately upon NMED approval and the first five-year reevaluation report specified in the Final Order (NMED May 2005) will be submitted five years after the date of LTMMP approval.

4.1.1 Monitoring History

Groundwater monitoring has been conducted at the MWL since 1990. The original groundwater monitoring well network at the MWL (monitoring wells MWL-BW1, MWL-MW1, MWL-MW2, and MWL-MW3) was installed in 1988 and 1989. In 1993, monitoring well MWL-MW4 was completed at an angle of 6 degrees from vertical and was screened at two discrete intervals, 20 feet (ft) apart, to evaluate vertical potentiometric gradients and changes in aquifer parameters with depth. An inflatable packer separates the screened intervals, and nitrogen-gas pressure is maintained in the packer to prevent commingling of water from the two screened sections of the aquifer. Monitoring wells MWL-MW5 and MWL-MW6 were installed in 2000 at a distance of approximately 200 and 500 ft west of the MWL, respectively, with the screened intervals placed below the top of the regional water table in the coarse-grained Ancestral Rio Grande (ARG) deposits.

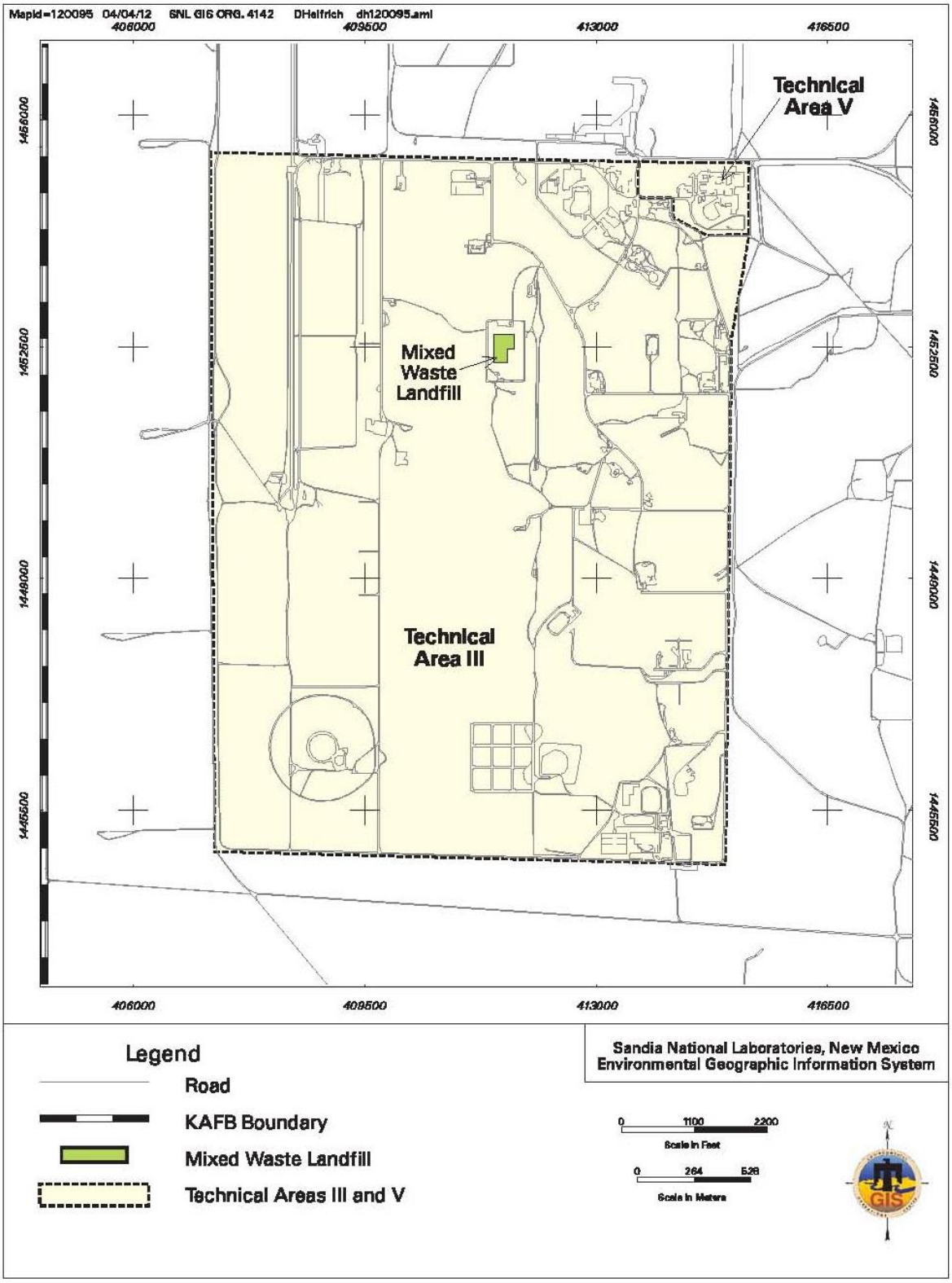


Figure 4-1. Location of the Mixed Waste Landfill within Technical Area III

The MWL groundwater monitoring network was modified in 2008 (SNL May 2009). Due to the declining water table and corrosion of stainless-steel well screens, four monitoring wells were plugged and abandoned (MWL-BW1, MWL-MW1, MWL-MW2, and MWL-MW3) and four new monitoring wells were installed (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) (SNL April 2008 and September 2008). The four wells installed in 2008 comprise the MWL groundwater monitoring network for the uppermost part of the regional aquifer and were approved by the NMED (Bearzi October 2008 and January 2009).

Monitoring wells MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9 were considered new wells and, as required by the Compliance Order on Consent (the Order) (NMED April 2004), were sampled a minimum of eight consecutive quarters for a defined suite of parameters in addition to sampling for perchlorate for at least four consecutive quarters. The four consecutive quarters of perchlorate sampling were completed in Calendar Year (CY) 2009 with no detections at or above the screening level of 4 micrograms per liter; therefore, these wells have been removed from the perchlorate monitoring network. The required eight quarterly sampling events were completed in CY 2010. All seven MWL wells are now sampled annually as required by the Order.

In April 2010, the U.S. Department of Energy (DOE)/National Nuclear Security Administration (NNSA) and Sandia Corporation (Sandia) received a letter from the NMED, which required further investigation to determine the source of very low toluene concentrations in some groundwater samples collected from the MWL in 2008 through early 2010 (Bearzi April 2010). The very low concentrations of toluene detected in samples from the MWL groundwater monitoring wells are consistent with detections in samples from other SNL/NM monitoring wells and do not represent a release to the environment or widespread low-concentration toluene contamination in the regional aquifer. They appear to be related to a laboratory and/or ambient environmental source(s) and reflect the ubiquitous nature of toluene and the very low analytical detection limit. The DOE/NNSA and Sandia submitted a report in August 2010 that was subsequently revised to address two NMED comments (Bearzi September 2010). The revised version of the report (SNL October 2010) was approved by NMED in January 2011 (Bearzi January 2011).

Groundwater at the MWL has been extensively characterized and monitored since 1990 for major ion chemistry, volatile organic compounds (VOCs), semivolatile organic compounds, nitrate, metals, radionuclides, and perchlorate. More than twenty years of data indicate that groundwater has not been contaminated by the MWL (Goering et al. 2002; SNL December 2001, January 2002, July 2002, October 2002, June 2003, September 2003, July 2004; Lyon and Goering 2006; SNL November 2006, January 2008, May 2009, June 2010, October 2010, September 2011, June 2012, and June 2013).

4.1.2 Monitoring Network

The current groundwater monitoring network at the MWL consists of seven wells, as shown on Figure 4-2 and listed in Table 4-1. Of the seven wells, four have screen intervals across the upper surface of the regional aquifer (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) and are considered compliance wells that monitor the top of the regional water table. These four wells are completed within the interfingering, fine-grained, Santa Fe Group alluvial-fan deposits. Wells MWL-MW5 and MWL-MW6 are installed with their screen intervals below the upper surface of the regional aquifer; at least part of their screen intervals are within the coarse-grained ARG deposits that underlie the Santa Fe Group alluvial sediments. Monitoring well MWL-MW4 has two screen intervals separated by an inflatable packer; the upper interval is completed across the regional aquifer water table. References in this report to groundwater samples and water levels from monitoring well MWL-MW4 refer to groundwater withdrawn or measured from the upper screened interval, and references made to the bottom of this well refer to the depth to the top of the packer. The lower screen interval of MWL-MW4 is completed within the coarse-grained ARG deposits, but is not part of the current monitoring network (i.e., not sampled or used to measure groundwater elevation).



Figure 4-2. Location of Groundwater Monitoring Wells at the Mixed Waste Landfill

Table 4-1. MWL Monitoring Well Network and Calendar Year 2013 Compliance Activities

Well ID	Installation Year	WQ [a]	WL [a]	Comment [b]
MWL-BW2	2008	✓	✓	Annual
MWL-MW4 [c]	1993	✓	✓	Annual
MWL-MW5	2000	✓	✓	Annual
MWL-MW6	2000	✓	✓	Annual
MWL-MW7	2008	✓	✓	Annual
MWL-MW8	2008	✓	✓	Annual
MWL-MW9	2008	✓	✓	Annual

NOTES:
[a]Check marks in the WQ and WL columns indicate WQ sampling and WL measurements were completed.
[b]Annual groundwater monitoring of all wells was conducted in January and February.
[c]Upper screen of monitoring well MWL-MW4 is monitored and represents uppermost portion of regional aquifer.
BW = Background Well.
ID = Identification.
MW = Monitoring Well.
MWL = Mixed Waste Landfill.
WL = Water level.
WQ = Water quality.

4.1.3 Summary of Activities

Annual groundwater sampling was conducted in January and February 2013 at the MWL as summarized in Table 4-1. Groundwater samples were collected from the seven monitoring wells (MWL-BW2, MWL-MW4, MWL-MW5, MWL-MW6, MWL-MW7, MWL-MW8, and MWL-MW9) and analyzed for VOCs, Target Analyte List (TAL) metals plus uranium, anions (as bromide, chloride, fluoride, and sulfate), alkalinity, nitrate plus nitrite (NPN), gamma spectroscopy, gross alpha/beta activity, and tritium. Duplicate environmental samples were collected at monitoring wells MWL-MW5, MWL-MW8, and MWL-MW9. Attachment 4A provides summary tables for the CY 2013 analytical results.

4.1.4 Summary of Future Activities

The revised MWL LTMMP (SNL March 2012) was submitted to NMED in March 2012. The LTMMP defines the long-term monitoring, maintenance, inspection, and repair requirements for the MWL, including semiannual groundwater monitoring. All LTMMP monitoring, inspection, and maintenance requirements will be implemented upon NMED approval and reported to NMED annually in a separate MWL report. Groundwater monitoring activities and results will also continue to be provided in this Annual Groundwater Monitoring Report.

4.1.5 Conceptual Site Model

A detailed conceptual site model is provided in the MWL Phase 2 RFI Report (Peace et al. 2002) and the *Mixed Waste Landfill Groundwater Report, 1990 through 2001, Sandia National Laboratories, Albuquerque, New Mexico* (Goering et al. 2002). An update to the conceptual site model integrating the findings from the four monitoring wells installed in 2008 is presented in the *Mixed Waste Landfill Annual Groundwater Monitoring Report, Calendar Year 2009* (SNL June 2010) and the *Annual Groundwater Monitoring Report, Calendar Year 2012* (SNL June 2013).

The upper surface of the regional aquifer at the MWL is contained within the unconsolidated, fine-grained alluvial-fan deposits of the Santa Fe Group. The more transmissive, coarser-grained ARG sediments underlie the fine-grained alluvial deposits beneath the MWL. The depth to water is approximately 500 ft below ground surface and groundwater flows generally westward away from the Manzanita Mountains and towards the Rio Grande. Several water-supply wells operated by Kirtland Air Force Base

(KAFB) and the Albuquerque Bernalillo County Water Utility Authority have profoundly modified the natural groundwater flow regime near the MWL by creating a trough in the water table in the western and northern portions of KAFB (Plate 1). As a result, water levels at the MWL have continued to decline since monitoring began in 1990.

Figure 4-3 shows the October 2013 potentiometric surface of the regional aquifer beneath the MWL. Groundwater flows towards the west and northwest. Based on the contours, the horizontal gradient varies from approximately 0.02 to 0.08 ft per foot. The map is consistent with the conceptual site model and the base-wide potentiometric surface map presented on Plate 1. As shown on Plate 1, the potentiometric surface contours beneath Technical Area III generally trend north to south with the inferred groundwater flow direction being generally westward.

The rate of groundwater elevation decline at the existing MWL monitoring wells is shown in Attachment 4B, Figures 4B-1 and 4B-2. For the five-year period from October 2008 to October 2013, the rate of groundwater elevation decline in all wells except MWL-MW4 has been very low, and less than 2 ft overall (Figures 4B-1 and 4B-2 of Attachment 4B). Recharge from infiltration of direct precipitation at the MWL is negligible due to high evapotranspiration, low precipitation, the thick sequence of unsaturated Santa Fe Group deposits above the water table, and the presence of the MWL ET Cover. Groundwater recharge of the regional aquifer occurs by the infiltration of precipitation in the Manzanita Mountains located approximately 5 miles to the east.

4.2 Regulatory Criteria

The MWL is regulated as Solid Waste Management Unit 76 under the Hazardous and Solid Waste Amendments module of the SNL/NM RCRA Permit. The NMED issued the Order in April 2004, which transferred the regulatory authority for corrective action at the MWL to the Order (NMED April 2004). This report has been formatted to address the content criteria set forth in the Order for Periodic Monitoring Reports.

Although radionuclides are being monitored and screened at the MWL, the information related to radionuclides is provided voluntarily by the DOE/NNSA and Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements imposed by the NMED, as specified in Section III.A of the Order (NMED April 2004).

4.3 Scope of Activities

The CY 2013 annual groundwater sampling is summarized in Section 4.1.3. Table 4-2 lists the analytical parameters and MWL wells sampled. SNL/NM field personnel conducted the sampling from January 29 to February 11, 2013. Groundwater sampling activities were conducted in conformance with the Order (NMED April 2004) and procedures outlined in the *Mixed Waste Landfill Groundwater Monitoring, Mini-Sampling and Analysis Plan for Fiscal Year 2013 Annual Sampling* (SNL January 2013).

The MWL groundwater samples were submitted for analysis to GEL Laboratories LLC (GEL) in Charleston, South Carolina. All groundwater sampling results are compared with U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) for drinking water supplies (EPA 2001 and 2009). The analytical results are summarized in Attachment 4A, Tables 4A-1 through 4A-7.

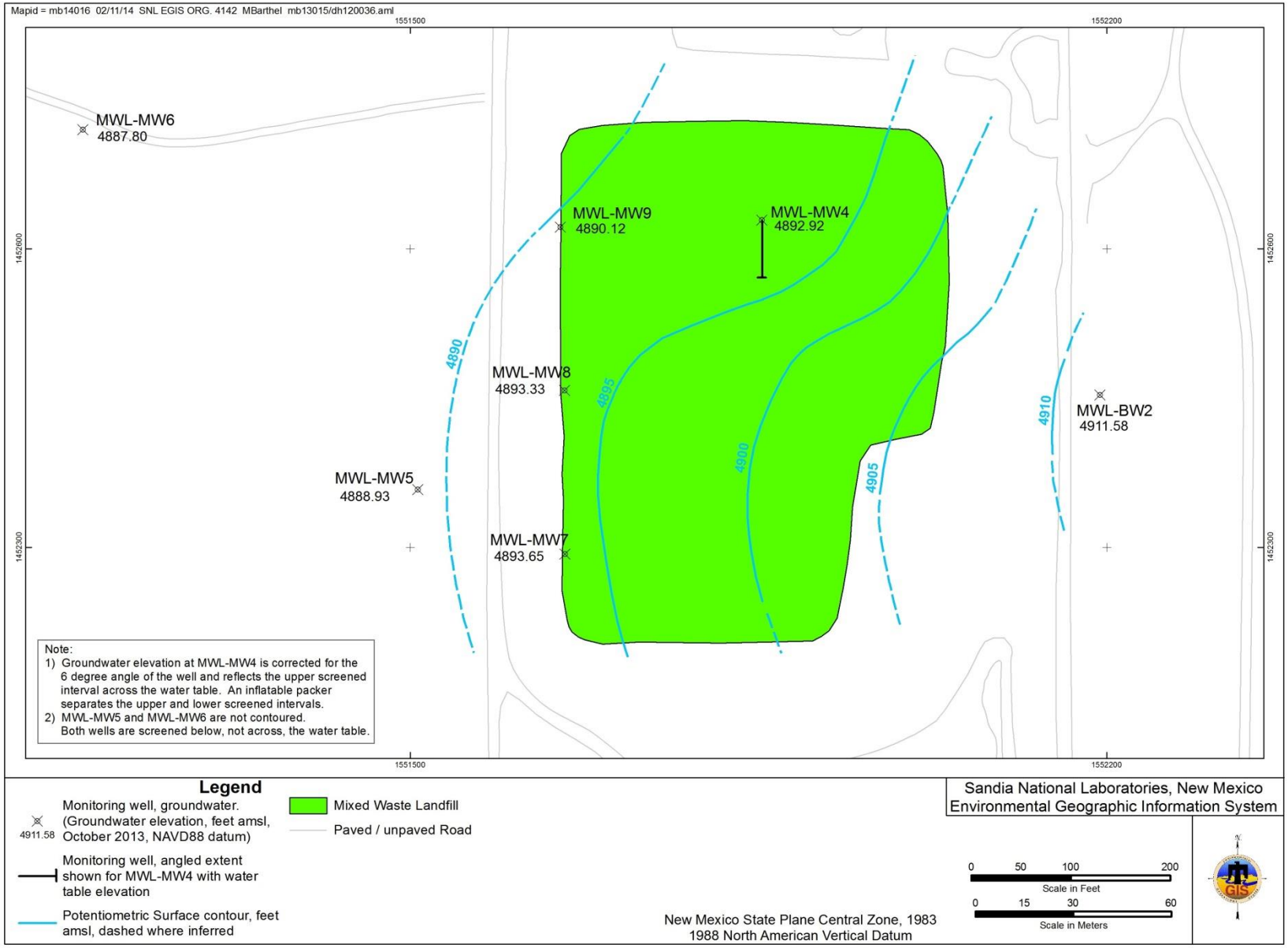


Figure 4-3. Localized Potentiometric Surface of the Basin Fill Aquifer at the Mixed Waste Landfill, October 2013

Table 4-2. Analytical Parameters for the MWL Monitoring Wells, Calendar Year 2013

Analytical Parameter	Calendar Year 2013[a]
Volatile Organic Compounds	MWL-BW2 MWL-MW4 MWL-MW5 MWL-MW5 (dup) MWL-MW6 MWL-MW7 MWL-MW8 MWL-MW8 (dup) MWL-MW9 MWL-MW9 (dup-VOCs only)
TAL metals plus Uranium	
Nitrate plus Nitrite (as nitrogen)	
Major Anions (Bromide, Fluoride, Chloride, and Sulfate)	
Total Alkalinity as Bicarbonate and Calcium Carbonate	
Radionuclides: Gamma-Emitting Radionuclides Gross Alpha Activity Gross Beta Activity Tritium	

NOTES:
[a]Annual groundwater sampling was conducted in February, with resampling of MWL-MW8 for VOCs only in March.
BW = Background Well.
dup = Duplicate.
MW = Monitoring Well.
MWL = Mixed Waste Landfill.
TAL = Target Analyte List.
VOC = Volatile Organic Compound.

Field and laboratory quality control (QC) samples were prepared to determine the accuracy of the methods used and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process as discussed in Section 1.3.3. Field QC samples included duplicate environmental, equipment blank (EB), field blank (FB), and trip blank (TB) samples. Laboratory QC analyses performed included method blank, laboratory control sample, matrix spike, matrix spike duplicate, and surrogate spike analyses.

Water quality parameters were measured in the field for temperature, specific conductance, oxidation-reduction potential, pH, and dissolved oxygen using an YSI™ Model 6920 Water Quality Meter during the purging process. Turbidity was measured with a Hach™ Model 2100P turbidity meter.

4.4 Field Methods and Measurements

Groundwater sampling and depth-to-groundwater measurements were conducted in conformance with procedures specified in the *Mixed Waste Landfill Groundwater Monitoring, Mini-Sampling and Analysis Plan for Fiscal Year 2013 Annual Sampling* (SNL January 2013), which are consistent with the methods described in Section 1.3. Field water quality parameters are presented in Table 4A-7 (Attachment 4A) and current CY 2013 and historical groundwater elevation measurements at the MWL monitoring wells are presented in Attachment 4B, Figures 4B-1 and 4B-2.

A portable Bennett™ groundwater sampling system was used to collect groundwater samples from all wells, except MWL-MW4. Monitoring well MWL-MW4 is equipped with a dedicated Bennett™ sampling system. The purging volume requirement was achieved for four of the seven monitoring wells (MWL-BW2, MWL-MW5, MWL-MW6, and MWL-MW7). The minimum purge requirements were not met at monitoring wells MWL-MW4, MWL-MW8, and MWL-MW9. These three monitoring wells were purged to dryness, allowed to recover, and then sampled to collect the most representative groundwater sample possible given the low yield of these wells.

Groundwater samples were submitted to the off-site laboratory (GEL) following analysis request/chain-of-custody protocol.

4.5 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using EPA-specified protocols described in Section 1.3.2 (Tables 1-5 and 1-6).

4.6 Summary of Analytical Results

The analytical results for chemical, general chemistry, and radiological constituents are presented in Attachment 4A, Tables 4A-1 through 4A-6. Field water quality measurements are presented in Attachment 4A, Table 4A-7. Analytical results that are above the analytical laboratory method detection limit (MDL), but below the practical quantitation limit (PQL) are qualified as estimated values and designated with a "J" qualifier in Tables 4A-1 through 4A-6. Data qualifiers based on the data validation process are presented with the associated results in the Attachment 4A tables. Data validation and QC sample results associated with each sampling event are discussed in Section 4.7.

All the CY 2013 analytical results were compared with established EPA MCLs where applicable. None of the detected constituents exceed the respective MCLs, except for chromium in the unfiltered sample from monitoring well MWL-MW4. The analytical results are discussed in greater detail in the following sections.

4.6.1 Volatile Organic Compounds

No VOCs were detected at concentrations above the laboratory MDLs in any groundwater samples. The laboratory MDLs for VOCs are presented in Attachment 4A, Table 4A-1.

4.6.2 General Chemistry Parameters

The general chemistry analytical results are presented in Attachment 4A, Tables 4A-2 and 4A-3. NPN was not detected above the nitrate MCL of 10 milligrams per liter (mg/L) in any groundwater sample. NPN was detected at concentrations ranging from 1.26 mg/L in the field duplicate sample from monitoring well MWL-MW5 to 3.23 mg/L in the environmental sample from monitoring well MWL-MW7. The NPN results are summarized in Table 4A-2. Table 4A-3 summarizes the alkalinity and major anions (bromide, chloride, fluoride, and sulfate) results. No parameters were detected above established MCLs.

4.6.3 Metals

Metal analysis includes two sets of analyses and results, filtered and unfiltered fractions. Groundwater samples obtained for total metal analyses are collected without filtering. Dissolved metal samples are collected after groundwater is passed through in-line filters of 0.45 micron pore size. The difference in concentrations between the total and dissolved fraction may be attributed to the original metallic ion content of the particles and any sorption of ions to the suspended particles.

Table 4A-4 (Attachment 4A) summarizes the metal results, including total uranium, for the unfiltered groundwater samples and Table 4A-5 (Attachment 4A) summarizes the metal results, including total uranium, for the filtered samples collected during the CY 2013 annual monitoring event at the MWL. Samples were analyzed for TAL metals according to EPA Methods 6010, 6020, and 7470 (EPA 1986).

No metal parameters were detected above established MCLs in any groundwater sample, except chromium. Chromium was detected above the MCL of 0.10 mg/L in the unfiltered sample from monitoring well MWL-MW4 at a concentration of 0.112 mg/L, which is the maximum concentration for the MWL-MW4 historic monitoring data set. In the filtered sample from monitoring well MWL-MW4, chromium was not detected above the laboratory MDL of 0.002 mg/L.

A trend plot showing unfiltered chromium results for samples from monitoring well MWL-MW4 is provided in Attachment 4B, Figure 4B-3. This plot includes groundwater elevation data and unfiltered sample results from a total of 19 sampling events conducted from April 1997 through February 2013. The MWL-MW4 unfiltered data set is dominated by very low detections and non-detections. Prior to CY 2013, the maximum unfiltered chromium concentration was 0.00599 mg/L (April 2001 sample), and from 2008 through 2012 chromium was detected only once in unfiltered samples at a concentration of 0.00259 mg/L (February 2012 sample). The February 2013 unfiltered sample result of 0.112 mg/L represents an unusual increase in chromium concentration (i.e., approximately 2 orders of magnitude), which is 18.7 times higher than the February 2012 result. In contrast, the February 2013 filtered sample result was a non-detection, with a laboratory method detection limit of 0.002 mg/L.

Other metals results for the February 2013 MWL-MW4 unfiltered sample were reported at concentrations significantly higher than previous maximum concentrations. As summarized in Table 4-3, cobalt, copper, iron, and nickel were all reported at new maximum concentrations in the February 2013 unfiltered sample. Cobalt, copper, and iron display a similar pattern to the unfiltered chromium results depicted in Figure 4B-3 (Attachment 4B), characterized by a narrow concentration range through 2012, followed by a sharp increase in 2013 concentrations. Similar to the chromium filtered versus unfiltered results, the filtered sample concentrations for cobalt, copper, and iron are much lower and consistent with historical results.

Table 4-3. MWL-MW4 Unfiltered Metals Results Summary, Calendar Year 2013

Metal	Maximum Concentration 1997–2012	February 2013 Concentration
Chromium	0.00559 mg/L (April 2001 sample)	0.112 mg/L
Cobalt	0.000888 mg/L (June 2007 sample)	0.00229 mg/L
Copper	0.00326 mg/L (June 2011 sample)	0.0335 mg/L
Iron	0.569 mg/L (April 2008 sample)	2.92 mg/L
Nickel	0.194 mg/L (February 2013 sample)	0.417 mg/L

NOTES:
mg/L = Milligrams per liter.

A trend plot showing unfiltered nickel results for monitoring well MWL-MW4 is provided in Attachment 4B, Figure 4B-4. All unfiltered results through 2010 are below or near the NMED-approved background concentration of 0.28 mg/L. Results from 2011, 2012, and 2013 show an increase in concentration by an order of magnitude, as well as an increasing trend (0.13, 0.194, and 0.417 mg/L, respectively). Although generally similar, there are two differences when comparing the MWL-MW4 nickel results to the MWL-MW4 chromium, cobalt, copper, and iron results. First, the substantial increase in the concentration of nickel occurred two years before the increase was observed for chromium, cobalt, copper, and iron (2011 versus 2013). Second, unfiltered and filtered nickel results are similar and do not show substantial differences in concentration (i.e., order of magnitude difference) observed in the 2013 results for chromium, cobalt, copper, and iron. However, the overall trend for unfiltered nickel results is similar to the trend of unfiltered chromium results, as shown in Figures 4B-3 and 4B-4 (Attachment B).

The sharp increases in unfiltered concentrations of chromium, cobalt, copper, iron, and nickel in recent samples from monitoring well MWL-MW4 are indicative of a source within the well and consistent with unfiltered metals results from previous MWL monitoring wells that had stainless steel well screens. The source is most likely corrosion by-products from the dedicated stainless steel sampling pump in monitoring well MWL-MW4. Because of the two screen intervals and orientation (six degree angle from vertical), MWL-MW4 is equipped with both an inflatable packer (separating the two screen intervals) and a dedicated sampling system (sampling pump, connecting rods, mounting bracket, lifting cable, and tubing). Machined stainless steel pipe connects the packer to the bottom of the sampling pump, and the entire assembly is held in the well by one-inch diameter metal rods. The packer and sampling system were removed in May 2009 prior to construction of the MWL ET Cover to allow the inner and outer well

casing to be extended to accommodate the additional height of the ET Cover. Figure 4-4 was taken in May 2009 after the packer and pump were removed from the well. The pump is largely comprised of stainless steel, and the pump intake (to right of technician's hand) shows visible oxide staining indicative of corrosion. The packer contains less overall metal and based on a visual inspection appeared to be in relatively good shape. The pump and packer were sent the manufacturer for routine maintenance and cleaning prior to the March 2010 re-installation. Monitoring well MWL-MW4 is the only MWL monitoring well equipped with dedicated equipment, and evidence of corrosion has been observed every time the equipment has been removed for routine maintenance. This equipment has not been removed since March 2010 and MWL-MW4 is not included in the groundwater monitoring network defined in the MWL LTMMP (SNL March 2012). The well is 20 years old and the water level is declining towards the bottom of the upper well screen (Figures 4B-3 and 4B-4, Attachment B).



Figure 4-4. May 2009 Photograph of the MWL-MW4 Sampling Pump and Inflatable Packer

Table 4-4 summarizes the maximum filtered and unfiltered metals concentrations from previous MWL groundwater monitoring wells with stainless steel screens, including background monitoring well MWL-BW1. These wells were decommissioned in 2008 due to declining water levels and evidence of stainless steel well screen corrosion (Bearzi March 2007 and July 2007). This table compares unfiltered and filtered maximum concentrations, and demonstrates three relevant points. First, elevated results for chromium, cobalt, copper, iron, and nickel were observed in all four of these wells. Second, maximum unfiltered sample concentrations for chromium, cobalt, copper, iron, and nickel are all similar to (but generally higher than) the February 2013 MWL-MW4 sample results. Third, unfiltered samples show maximum concentrations one or more orders of magnitude higher than the filtered results. However, consistent with MWL-MW4 nickel sample results, filtered and unfiltered nickel concentrations are similar (i.e., not substantially different) for samples from MWL-MW1 and MWL-MW3.

Table 4-4. Summary of Maximum Filtered and Unfiltered Metals Results from MWL Monitoring Wells with Stainless Steel Screens

MWL Monitoring Well	Metal	Maximum Filtered Concentration in Milligrams per Liter (mg/L)	Maximum Unfiltered Concentration in Milligrams per Liter (mg/L)
MWL-BW1	Chromium	0.002280	0.09420
	Cobalt	0.000220	0.004520
	Copper	0.001940	0.00807
	Iron	0.070900	1.820
	Nickel	0.01280	0.1910
MWL-MW1	Chromium	0.004220	1.1000
	Cobalt	0.000590	0.004040
	Copper	0.003720	0.02440
	Iron	0.2600	6.100
	Nickel	0.4050	0.5380
MWL-MW2	Chromium	0.005530	0.16200
	Cobalt	0.000148	0.000790
	Copper	0.00737	0.01040
	Iron	0.2390	0.3990
	Nickel	0.007110	0.1240
MWL-MW3	Chromium	0.004520	0.1690
	Cobalt	0.000770	0.003310
	Copper	0.00556	0.01360
	Iron	0.1370	4.220
	Nickel	0.1200	0.1570

NOTES:
BW = Background well.
mg/L = Milligram(s) per liter.
MW = Monitoring well.
MWL = Mixed Waste Landfill.

In summary, the February 2013 unfiltered metals results for chromium, cobalt, copper, iron, and nickel, as well as the 2011 through 2013 unfiltered and filtered nickel results, are anomalous and appear to be related to the corrosion of the stainless steel dedicated sampling pump and possibly other metal components associated with the dedicated sampling system in the well. Evidence of corrosion was observed when the equipment was removed from the well in May 2009 during ET Cover construction. MWL-MW4 is the only groundwater monitoring well at the MWL with dedicated sampling equipment installed in the well, and is the only well showing any indication of elevated metals concentrations. Filtered and unfiltered metals results are consistent with metals results from previous MWL monitoring wells with stainless steel screen sections that were decommissioned in 2008 due to evidence of well screen corrosion and declining water levels.

4.6.4 Radiological Parameters

Groundwater samples from the MWL monitoring wells were screened for gamma-emitting radionuclides, gross alpha/beta activity, and tritium (Table 4A-6, Attachment 4A) and the analytical results are compared with the established EPA MCLs (no MCL has been established for tritium).

Gross alpha activity is measured as a screening tool and in accordance with 40 Code of Federal Regulations, Parts 9, 141, and 142, Table I-4 does not include uranium, which is measured independently. Therefore, gross alpha activity measurements were corrected by subtracting the total uranium activity. Radiological results are further reviewed by an SNL/NM Certified Health Physicist to assure that the samples are nonradioactive. Corrected gross alpha activity results are all below the MCL of 15 picocuries per liter and range from 2.78 to 9.02 picocuries per liter. Gross beta results do not exceed established

MCLs. Tritium and short-list gamma spectroscopy radionuclides activities were below the laboratory minimum detectable activity levels in all groundwater samples. The potassium-40 results for the duplicate samples from monitoring wells MWL-MW5 and MWL-MW8 and the cobalt-60 result for the sample from MWL-MW9 were "X" flagged by the laboratory and rejected during data validation due to the analytical instrument peak not meeting identification criteria. These results are "false positives" for radionuclides that are typically not detected. Potassium-40 was not detected in the corresponding environmental samples from monitoring wells MWL-MW5 and MWL-MW8. All radiological parameter results are summarized in Table 4A-6 (Attachment 4A).

4.6.5 Water Quality Parameters

The field water quality parameters measured immediately before sampling are presented in Attachment 4A, Table 4A-7. These field parameters consist of temperature, specific conductance, oxidation-reduction potential, pH, turbidity, and dissolved oxygen.

4.7 Quality Control Results

Field and laboratory QC samples were used to determine the accuracy of the methods used and to monitor for inadvertent sample contamination that can occur during the sampling and analysis process. All data were reviewed in accordance with Administrative Operating Procedure (AOP) 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL May 2011). The results for each QC analysis and the impact on data quality are discussed in the following sections.

4.7.1 Field Quality Control Samples

The QC samples collected in the field included duplicate environmental, EB, FB, and TB samples. The purpose of each field QC sample type is presented in Section 1.3.3. The following sections discuss the analytical results for each QC sample type.

4.7.1.1 Duplicate Environmental Samples

Duplicate environmental samples were collected from monitoring wells MWL-MW5 and MWL-MW8 and analyzed for all constituents. The results were compared to the results for the corresponding environmental sample. The duplicate sample collected from monitoring well MWL-MW9 was analyzed for VOCs only. Relative percent difference values were calculated for constituents that were detected above the laboratory MDL in both samples.

CY 2013 duplicate environmental sample results show good correlation. All calculated relative percent difference values are less than 20 for organic compounds and less than or equal to 35 for metals for all calculated parameters.

4.7.1.2 Equipment Blank Samples

Two EB samples (also referred to as a rinsate blanks) associated with monitoring wells MWL-MW5 and MWL-MW8 were collected during the CY 2013 sampling event and submitted for all analyses. One EB sample associated with MWL-MW9 was collected and analyzed for VOCs only.

Various constituents detected in EB samples at low concentrations included bromodichloromethane, bromoform, chloroform, chloride, cobalt, copper, dibromochloromethane, magnesium, manganese, nickel, and sodium. For all but three of these constituents, no corrective action was required because these analytes were not detected in associated environmental samples, or were detected in environmental samples at concentrations greater than five times the EB result. Cobalt, copper, and nickel were detected in the EB samples; associated environmental and duplicate sample concentrations were less than five times the reported concentrations in the EB samples, and therefore, were qualified during data validation as not detected (i.e., "U" qualified). For the unfiltered sample fractions, low concentration detections of

copper (MWL-MW5 and MWL-MW8 environmental and duplicate pairs) and nickel (MWL-MW5 environmental and duplicate pair) were qualified as not detected during data validation. For the filtered sample fractions, low concentration detections of cobalt (MWL-MW5 environmental and duplicate pair) and copper (MWL-MW5 and MWL-MW8 environmental and duplicate pairs) were qualified as not detected during data validation.

4.7.1.3 Field Blank Samples

A total of seven FB samples were collected during the CY 2013 sampling and submitted for VOC analysis. Bromodichloromethane, bromoform, chloroform, and dibromochloromethane were detected in the FB samples. No corrective action was required because these compounds were not detected in associated environmental samples.

4.7.1.4 Trip Blank Samples

A total of 10 TB samples were submitted with the February and March 2013 samples for analysis of VOCs. No VOCs were detected in these samples.

4.7.2 Laboratory Quality Control Samples

Internal laboratory QC samples, including method blanks and duplicate laboratory control samples, were analyzed concurrently with the groundwater samples. Additionally, batch matrix spike, matrix spike duplicate, and surrogate spike samples were analyzed. All environmental sample, field QC sample, and laboratory QC sample results were reviewed and qualified in accordance with AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL May 2011).

Although some analytical results were qualified during the data validation, no significant data quality problems were noted for any CY 2013 MWL groundwater monitoring samples. Data validation reports are filed in the SNL/NM Customer Funded Records Center.

4.8 Variances and Nonconformances

All analytical and field methods were performed according to the requirements specified in the MWL groundwater monitoring Mini-Sampling and Analysis Plan for FY 2011 (SNL January 2013). No variances and/or nonconformances from requirements in the MWL Mini-Sampling and Analysis Plan were identified during CY 2013 sampling activities and there were no variances from the plans.

4.9 Summary and Conclusions

During CY 2013 environmental groundwater samples were collected from seven MWL groundwater monitoring wells. Sample parameters included VOCs, unfiltered and filtered fractions for TAL metals plus uranium, anions (as bromide, chloride, fluoride, and sulfate), alkalinity, NPN, gamma spectroscopy, gross alpha/beta activity, and tritium analyses. Groundwater monitoring results were compared with established EPA MCLs for drinking water (EPA 2009). No parameters were detected above established MCLs, except for chromium in the unfiltered sample fraction from monitoring well MWL-MW4. This exceedance and elevated results for unfiltered cobalt, copper, iron, and nickel appear to be related to the corrosion of stainless steel dedicated sampling pump and possibly other metal components associated with the dedicated sampling system (no other wells at MWL have dedicated equipment).

Based on the field and laboratory QC sample and data validation results, the CY 2013 groundwater monitoring data meet data quality objectives and are in compliance with analytical methods and laboratory procedures (i.e., representative and technically defensible).

4.10 References

Bearzi October 2011 Bearzi, J.P. (New Mexico Environment Department), October 2011. Letter to P. Wagner (U.S. Department of Energy NNSA/Sandia Site Office) and S.A. Orrell (Sandia National Laboratories, New Mexico), *Notice of Approval, Mixed Waste Landfill Corrective Measures Implementation Report, January 2010, Sandia National Laboratories, EPA ID# NM5890110518, SNL-10-005.* October 14, 2011.

Bearzi January 2011 Bearzi, J.P. (New Mexico Environment Department), January 2011. Letter to P. Wagner (U.S. Department of Energy) and J. Hruby (Sandia Corporation), *Notice of Approval, Mixed Waste Landfill Toluene Investigation Report, Revised October 2010, Sandia National Laboratories, EPA ID No. NM5890110518, HWB-SNL-10-011,* New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico, January 13, 2011.

Bearzi September 2010 Bearzi, J.P. (New Mexico Environment Department), September 2010. Letter to P. Wagner (U.S. Department of Energy) and M. Walck (Sandia Corporation), *Notice of Disapproval, Mixed Waste Landfill Toluene Investigation Report,* August 2010, New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico, September 30, 2010.

Bearzi April 2010 Bearzi, J.P. (New Mexico Environment Department), April 2010. Letter to P. Wagner (U.S. Department of Energy) and M. Walck (Sandia Corporation), *Toluene Detections in Groundwater, Sandia National Laboratories Mixed Waste Landfill,* New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico, April 30, 2010.

Bearzi January 2009 Bearzi, J.P. (New Mexico Environment Department), January 2009. Letter to K. Davis (U.S. Department of Energy) and F. Nimick (Sandia Corporation), *Notice of Approval: Summary Report for the Mixed Waste Landfill Monitoring Well Plug and Abandonment and Installation – Decommissioning of Groundwater Monitoring Wells MWL-MW1, MWL-MW2, and MWL-MW3, Installation of Groundwater Monitoring Wells MWL-MW7, MWL-MW8, and MWL-MW9, September, 2008, Sandia National Laboratories EPA ID#NM5890110518, HWB-SNL-08-020,* January 15, 2009.

Bearzi December 2008 Bearzi, J.P. (New Mexico Environment Department), December 2008. Letter to K. Davis (U.S. Department of Energy) and F. Nimick (Sandia Corporation), *Conditional Approval, Mixed Waste Landfill Corrective Measures Implementation Plan, November 2005, Sandia National Laboratories NM5890110518, SNL-05-025,* December 22, 2008.

Bearzi October 2008 Bearzi, J.P. (New Mexico Environment Department), October 2008. Letter to P. Wagner (U.S. Department of Energy) and F. Nimick (Sandia Corporation), *Notice of Approval: Summary Report for the Mixed Waste Landfill Monitoring Well Plug and Abandonment and Installation – Decommissioning of Groundwater Monitoring Well MWL-BW-1, Installation of Groundwater Monitoring Well MWL-BW2, April, 2008, Sandia National Laboratories EPA ID#NM5890110518, HWB-SNL-08-015,* October 31, 2008.

Bearzi July 2007 Bearzi, J. (New Mexico Environment Department Hazardous Waste Bureau), July 2007. Letter to P. Wagner (U.S. Department of Energy) and F. Nimick (Sandia National Laboratories), *Replacement of Mixed Waste Landfill Groundwater Monitoring Wells MWL-MW1 and MWL-MW3, Sandia National Laboratories, EPA ID NM5890110518,* July 2, 2007.

Bearzi March 2007 Bearzi, J. (New Mexico Environment Department Hazardous Waste Bureau), March 2007. Letter to P. Wagner (U.S. Department of Energy) and F. Nimick (Sandia National Laboratories), *Replacement of Mixed Waste Landfill Groundwater Monitoring Well MWL-BW1, Sandia National Laboratories, EPA ID NM5890110518,* March 26, 2007.

EPA 2009 U.S. Environmental Protection Agency (EPA), 2009. *National Primary Drinking Water Regulations,* EPA 816-F 09-004, U.S. Environmental Protection Agency, Washington, D.C., May.

EPA 2001 U.S. Environmental Protection Agency (EPA), 2001. *National Primary Drinking Water Regulations,* Title 40, Code of Federal Regulations, Part 141, Subpart B, Office of Water, U.S. Environmental Protection Agency, Washington, D.C.

EPA 1986 U.S. Environmental Protection Agency (EPA), November 1986. *Test Methods for Evaluating Solid Waste*," SW-846, 3rd ed., and all updates, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

Goering et al. 2002 Goering, T.J., G.M. Haggerty, D. Van Hart, and J.L. Peace, 2002. *Mixed Waste Landfill Groundwater Report, 1990 through 2001, Sandia National Laboratories, Albuquerque, New Mexico,* SAND2002-4098, Sandia National Laboratories, Albuquerque, New Mexico.

Lyon and Goering 2006 Lyon, M.L., and T.J. Goering, January 2006. *Mixed Waste Landfill Annual Groundwater Monitoring Report, April 2005,* SAND2006-0391, Sandia National Laboratories, Albuquerque, New Mexico.

NMED May 2005 New Mexico Environment Department (NMED), May 2005. *Final Order, State of New Mexico Before the Secretary of the Environment in the Matter of Request for a Class 3 Permit Modification for Corrective Measures for the Mixed Waste Landfill, Sandia National Laboratories, Bernalillo County, New Mexico, EPA ID #5890110518,* New Mexico Environment Department, Santa Fe, New Mexico, May 26, 2005.

NMED April 2004 New Mexico Environment Department (NMED), April 2004. *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order*, New Mexico Environment Department, Santa Fe, New Mexico, April 29, 2004.

Peace et al. 2002 Peace, J.L., T.J. Goering, and M.D. McVey, 2002. *Report of the Mixed Waste Landfill Phase 2 RCRA Facility Investigation, Sandia National Laboratories, Albuquerque, New Mexico,* SAND Report SAND2002-2997, prepared by Sandia National Laboratories, Albuquerque, New Mexico for the U.S. Department of Energy under Contract DE-AC04-94AL85000, September.

SNL June 2013 Sandia National Laboratories, New Mexico (SNL/NM), June 2013. *Annual Groundwater Monitoring Report, Calendar Year 2012,* SAND Report SAND2013-4700P, prepared by Sandia National Laboratories, Albuquerque, New Mexico for the U.S. Department of Energy under Contract DE-AC04-94AL85000.

SNL January 2013 Sandia National Laboratories, New Mexico (SNL/NM), January 2013. *Mixed Waste Landfill Groundwater Monitoring Mini-Sampling and Analysis Plan for Fiscal Year 2013 Annual Sampling*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2012 Sandia National Laboratories, New Mexico (SNL/NM), June 2012. *Annual Groundwater Monitoring Report, Calendar Year 2011*, SAND Report SAND2012-4311P, prepared by Sandia National Laboratories, Albuquerque, New Mexico for the U.S. Department of Energy under Contract DE-AC04-94AL85000.

SNL March 2012 Sandia National Laboratories/New Mexico (SNL/NM), March 2012. *Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2011 Sandia National Laboratories, New Mexico (SNL/NM), September 2011. *Mixed Waste Landfill Annual Groundwater Monitoring Report, Calendar Year 2010*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL May 2011 Sandia National Laboratories, New Mexico (SNL/NM), May 2011. *Data Validation Procedure for Chemical and Radiochemical Data*, AOP 00-03, Revision 3, Sample Management Office, Sandia National Laboratories, Albuquerque, New Mexico, May 11, 2011.

SNL October 2010 Sandia National Laboratories, New Mexico (SNL/NM), October 2010. *Mixed Waste Landfill Toluene Investigation Report*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2010 Sandia National Laboratories, New Mexico (SNL/NM), June 2010. *Mixed Waste Landfill Annual Groundwater Monitoring Report, Calendar Year 2009*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL January 2010 Sandia National Laboratories, New Mexico (SNL/NM), January 2010, Revision 1. *Mixed Waste Landfill Corrective Measures Implementation Report*, Environmental Restoration Project, Sandia National Laboratories, New Mexico.

SNL May 2009 Sandia National Laboratories, New Mexico (SNL/NM), May 2009. *Mixed Waste Landfill Annual Groundwater Monitoring Report, Calendar Year 2008*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2008 Sandia National Laboratories, New Mexico (SNL/NM), September 2008. *Summary Report for Mixed Waste Landfill Monitoring Well Plug and Abandonment and Installation: Decommissioning of Groundwater Monitoring Wells MWL-MW1, MWL-MW2, and MWL-MW3; Installation of Groundwater Monitoring Wells MWL-MW7, MWL-MW8, and MWL-MW9*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL April 2008 Sandia National Laboratories, New Mexico (SNL/NM), April 2008. *Summary Report for Mixed Waste Landfill Monitoring Well Plug and Abandonment and Installation: Decommissioning of Groundwater Monitoring Well MWL-BW1; Installation of Groundwater Monitoring Well MWL-BW2*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL January 2008 Sandia National Laboratories, New Mexico (SNL/NM), January 2008. *Mixed Waste Landfill Annual Groundwater Monitoring Report, Spring 2007 Sampling Event*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL November 2006 Sandia National Laboratories, New Mexico (SNL/NM), November 2006. *Mixed Waste Landfill Annual Groundwater Monitoring Report, April 2006 Sampling Event, Sandia National Laboratories/New Mexico*, prepared by Shaw Environmental, Inc. for Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL November 2005 Sandia National Laboratories, New Mexico (SNL/NM), November 2005. *Mixed Waste Landfill Corrective Measures Implementation Plan*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL July 2004 Sandia National Laboratories, New Mexico (SNL/NM), July 2004. *Mixed Waste Landfill Annual Groundwater Monitoring Report, April 2004*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2003 Sandia National Laboratories, New Mexico (SNL/NM), September 2003. *Mixed Waste Landfill Annual Groundwater Monitoring Report, April 2003, Addendum – Cadmium Verification Sampling, September 2003*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2003 Sandia National Laboratories, New Mexico (SNL/NM), June 2003. *Mixed Waste Landfill Annual Groundwater Monitoring Report, April 2003*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL May 2003 Sandia National Laboratories, New Mexico (SNL/NM), May 2003. *Mixed Waste Landfill Corrective Measures Study*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico, May 21, 2003.

SNL October 2002 Sandia National Laboratories, New Mexico (SNL/NM), October 2002. *Mixed Waste Landfill Quarterly Groundwater Monitoring Report, MWL-MW5 and MWL-MW6, October 2002*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL July 2002 Sandia National Laboratories, New Mexico (SNL/NM), July 2002. *Mixed Waste Landfill Quarterly Groundwater Monitoring Report, MWL-MW5 and MWL-MW6, July 2002*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL January 2002 Sandia National Laboratories, New Mexico (SNL/NM), January 2002. *Mixed Waste Landfill Quarterly Groundwater Monitoring Report, MWL-MW4, MWL-MW5 and MWL-MW6, January 2002*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL December 2001 Sandia National Laboratories, New Mexico (SNL/NM), December 2001. *Mixed Waste Landfill Corrective Measures Study Workplan*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 1990 Sandia National Laboratories, New Mexico (SNL/NM), September 1990. *Report of the Phase 1 RCRA Facility Investigation of the Mixed Waste Landfill*, Environmental Impact and Restoration Division, Sandia National Laboratories, Albuquerque, New Mexico.

This page intentionally left blank.

Attachment 4A
Mixed Waste Landfill
Analytical Results Tables

This page intentionally left blank.

Attachment 4A Tables

4A-1 Method Detection Limits for Volatile Organic Compounds (Method[g] SW846-8260B), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 4A-5

4A-2 Summary of Nitrate plus Nitrite Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013..... 4A-6

4A-3 Summary of Alkalinity and Anion Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013..... 4A-7

4A-4 Summary of Unfiltered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 4A-9

4A-5 Summary of Filtered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 4A-18

4A-6 Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 4A-27

4A-7 Summary of Field Water Quality Measurements[h], Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013..... 4A-29

Footnotes for Mixed Waste Landfill Groundwater Analytical Results Tables..... 4A-31

This page intentionally left blank.

Table 4A-1
Method Detection Limits for Volatile Organic Compounds (Method[g] SW846 8260B), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Analyte	MDL[b] (µg/L)	Analyte	MDL[b] (µg/L)
1,1,1-Trichloroethane	0.300	Chlorobenzene	0.300
1,1,2,2-Tetrachloroethane	0.300	Chloroethane	0.300
1,1,2-Trichloroethane	0.300	Chloroform	0.300
1,1-Dichloroethane	0.300	Chloromethane	0.300
1,1-Dichloroethene	0.300	Cyclohexane	0.300
1,2,3-Trichlorobenzene	0.300	Dibromochloromethane	0.300
1,2,4-Trichlorobenzene	0.300	Dichlorodifluoromethane	0.300
1,2-Dibromo-3-chloropropane	0.300	Ethyl benzene	0.300
1,2-Dibromoethane	0.300	Isopropylbenzene	0.300
1,2-Dichlorobenzene	0.300	Methyl acetate	1.50
1,2-Dichloroethane	0.300	Methylcyclohexane	3.00
1,2-Dichloropropane	0.300	Methylene chloride	3.00
1,3-Dichlorobenzene	0.300	Styrene	0.300
1,4-Dichlorobenzene	0.300	Tert-butyl methyl ether	0.300
2,2-trifluoroethane, 1,1,2-Trichloro-1	1.50	Tetrachloroethene	0.300
2-Butanone	2.00	Toluene	0.300
2-Hexanone	2.20	Trichloroethene	0.300
4-methyl-, 2-Pentanone	1.50	Trichlorofluoromethane	0.300
Acetone	3.00	Vinyl chloride	0.300
Benzene	0.300	Xylene	0.300
Bromochloromethane	0.300	cis-1,2-Dichloroethene	0.300
Bromodichloromethane	0.300	cis-1,3-Dichloropropene	0.300
Bromoform	0.300	m-, p-Xylene	0.300
Bromomethane	0.300	o-Xylene	0.300
Carbon disulfide	1.50	trans-1,2-Dichloroethene	0.300
Carbon tetrachloride	0.300	trans-1,3-Dichloropropene	0.300

Refer to footnotes on page 4A-31.

Table 4A-2
Summary of Nitrate plus Nitrite Results,
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-BW2 29-Jan-13	Nitrate plus nitrite	2.18	0.085	0.250	10.0			093409-018	EPA 353.2
MWL-MW4 11-Feb-13	Nitrate plus nitrite	2.43	0.170	0.500	10.0			093441-018	EPA 353.2
MWL-MW5 30-Jan-13	Nitrate plus nitrite	1.28	0.085	0.250	10.0			093414-018	EPA 353.2
MWL-MW5 (Duplicate) 30-Jan-13	Nitrate plus nitrite	1.26	0.085	0.250	10.0			093415-018	EPA 353.2
MWL-MW6 31-Jan-13	Nitrate plus nitrite	1.66	0.085	0.250	10.0			093418-018	EPA 353.2
MWL-MW7 07-Feb-13	Nitrate plus nitrite	3.23	0.085	0.250	10.0			093438-018	EPA 353.2
MWL-MW8 06-Feb-13	Nitrate plus nitrite	1.40	0.085	0.250	10.0			093429-018	EPA 353.2
MWL-MW8 (Duplicate) 06-Feb-13	Nitrate plus nitrite	1.41	0.085	0.250	10.0			093430-018	EPA 353.2
MWL-MW9 04-Feb-13	Nitrate plus nitrite	2.20	0.085	0.250	10.0			093423-018	EPA 353.2

Refer to footnotes on page 4A-31.

Table 4A-3
Summary of Alkalinity and Anion Results,
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-BW2	Bicarbonate alkalinity	244	0.725	1.00	NE			093409-022	SM 2320B
29-Jan-13	Carbonate alkalinity	ND	0.725	1.00	NE	U		093409-022	SM 2320B
	Bromide	0.359	0.067	0.200	NE			093409-016	SW846 9056
	Chloride	66.1	0.335	1.00	NE			093409-016	SW846 9056
	Fluoride	0.741	0.033	0.100	4.0			093409-016	SW846 9056
	Sulfate	44.6	0.665	2.00	NE			093409-016	SW846 9056
MWL-MW4	Bicarbonate alkalinity	191	0.725	1.00	NE			093441-022	SM 2320B
11-Feb-13	Carbonate alkalinity	ND	0.725	1.00	NE	U		093441-022	SM 2320B
	Bromide	0.479	0.067	0.200	NE			093441-016	SW846 9056
	Chloride	48.3	0.670	2.00	NE			093441-016	SW846 9056
	Fluoride	0.931	0.033	0.100	4.0			093441-016	SW846 9056
	Sulfate	38.4	1.33	4.00	NE			093441-016	SW846 9056
MWL-MW5	Bicarbonate alkalinity	332	0.725	1.00	NE			093414-022	SM 2320B
30-Jan-13	Carbonate alkalinity	ND	0.725	1.00	NE	U		093414-022	SM 2320B
	Bromide	0.501	0.067	0.200	NE			093414-016	SW846 9056
	Chloride	84.1	0.670	2.00	NE			093414-016	SW846 9056
	Fluoride	0.789	0.033	0.100	4.0			093414-016	SW846 9056
	Sulfate	54.0	1.33	4.00	NE			093414-016	SW846 9056
MWL-MW5 (Duplicate)	Bicarbonate alkalinity	333	0.725	1.00	NE			093415-022	SM 2320B
30-Jan-13	Carbonate alkalinity	ND	0.725	1.00	NE	U		093415-022	SM 2320B
	Bromide	0.426	0.067	0.200	NE			093415-016	SW846 9056
	Chloride	84.3	0.670	2.00	NE			093415-016	SW846 9056
	Fluoride	0.790	0.033	0.100	4.0			093415-016	SW846 9056
	Sulfate	53.9	1.33	4.00	NE			093415-016	SW846 9056
MWL-MW6	Bicarbonate alkalinity	314	0.725	1.00	NE			093418-022	SM 2320B
31-Jan-13	Carbonate alkalinity	ND	0.725	1.00	NE	U		093418-022	SM 2320B
	Bromide	0.457	0.067	0.200	NE			093418-016	SW846 9056
	Chloride	78.5	0.670	2.00	NE			093418-016	SW846 9056
	Fluoride	0.760	0.033	0.100	4.0			093418-016	SW846 9056
	Sulfate	51.8	1.33	4.00	NE			093418-016	SW846 9056
MWL-MW7	Bicarbonate alkalinity	217	0.725	1.00	NE			093438-022	SM 2320B
07-Feb-13	Carbonate alkalinity	ND	0.725	1.00	NE	U		093438-022	SM 2320B
	Bromide	0.277	0.067	0.200	NE			093438-016	SW846 9056
	Chloride	47.6	0.335	1.00	NE			093438-016	SW846 9056
	Fluoride	1.09	0.033	0.100	4.0			093438-016	SW846 9056
	Sulfate	37.8	0.133	0.400	NE			093438-016	SW846 9056

Refer to footnotes on page 4A-31.

Table 4A-3 *(Concluded)*
Summary of Alkalinity and Anion Results,
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW8	Bicarbonate alkalinity	223	0.725	1.00	NE			093429-022	SM 2320B
06-Feb-13	Carbonate alkalinity	ND	0.725	1.00	NE	U		093429-022	SM 2320B
	Bromide	0.300	0.067	0.200	NE			093429-016	SW846 9056
	Chloride	49.2	0.335	1.00	NE			093429-016	SW846 9056
	Fluoride	0.990	0.033	0.100	4.0			093429-016	SW846 9056
	Sulfate	38.1	0.133	0.400	NE			093429-016	SW846 9056
MWL-MW8 (Duplicate)	Bicarbonate alkalinity	224	0.725	1.00	NE			093430-022	SM 2320B
06-Feb-13	Carbonate alkalinity	ND	0.725	1.00	NE	U		093430-022	SM 2320B
	Bromide	0.346	0.067	0.200	NE			093430-016	SW846 9056
	Chloride	41.2	0.335	1.00	NE			093430-016	SW846 9056
	Fluoride	1.03	0.033	0.100	4.0			093430-016	SW846 9056
	Sulfate	38.0	0.133	0.400	NE			093430-016	SW846 9056
MWL-MW9	Bicarbonate alkalinity	227	0.725	1.00	NE			093423-022	SM 2320B
04-Feb-13	Carbonate alkalinity	ND	0.725	1.00	NE	U		093423-022	SM 2320B
	Bromide	0.272	0.067	0.200	NE			093423-016	SW846 9056
	Chloride	41.0	0.335	1.00	NE			093423-016	SW846 9056
	Fluoride	1.03	0.033	0.100	4.0			093423-016	SW846 9056
	Sulfate	38.7	0.133	0.400	NE			093423-016	SW846 9056

Refer to footnotes on page 4A-31.

Table 4A-4
Summary of Unfiltered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-BW2	Aluminum	0.173	0.015	0.050	NE			093409-009	SW846 6020
29-Jan-13	Antimony	ND	0.001	0.003	0.006	U		093409-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093409-009	SW846 6020
	Barium	0.0988	0.0006	0.002	2.00		J-	093409-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093409-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093409-009	SW846 6020
	Calcium	74.3	1.20	4.00	NE	B		093409-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093409-009	SW846 6020
	Cobalt	0.000213	0.0001	0.001	NE	J		093409-009	SW846 6020
	Copper	0.00114	0.00035	0.001	NE			093409-009	SW846 6020
	Iron	0.382	0.033	0.100	NE			093409-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093409-009	SW846 6020
	Magnesium	24.7	0.010	0.030	NE			093409-009	SW846 6020
	Manganese	0.0138	0.001	0.005	NE			093409-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093409-009	SW846 7470
	Nickel	0.00257	0.0005	0.002	NE			093409-009	SW846 6020
	Potassium	4.10	0.080	0.300	NE			093409-009	SW846 6020
	Selenium	0.00256	0.0015	0.005	0.050	J		093409-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093409-009	SW846 6020
	Sodium	62.4	1.60	5.00	NE			093409-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093409-009	SW846 6020
	Uranium	0.00686	0.000067	0.0002	0.030			093409-009	SW846 6020
	Vanadium	0.00616	0.001	0.005	NE			093409-009	SW846 6010
	Zinc	0.0102	0.0035	0.010	NE			093409-009	SW846 6020

Refer to footnotes on page 4A-31.

Table 4A-4 *(Continued)*
Summary of Unfiltered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW4	Aluminum	0.0284	0.015	0.050	NE	J		093441-009	SW846 6020
11-Feb-13	Antimony	ND	0.001	0.003	0.006	U		093441-009	SW846 6020
	Arsenic	0.00426	0.0017	0.005	0.010	J		093441-009	SW846 6020
	Barium	0.0861	0.0006	0.002	2.00			093441-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093441-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093441-009	SW846 6020
	Calcium	58.9	0.300	1.00	NE			093441-009	SW846 6020
	Chromium	**0.112**	0.002	0.010	0.100			093441-009	SW846 6020
	Cobalt	0.00229	0.0001	0.001	NE			093441-009	SW846 6020
	Copper	0.0335	0.00035	0.001	NE			093441-009	SW846 6020
	Iron	2.92	0.033	0.100	NE			093441-009	SW846 6020
	Lead	0.00126	0.0005	0.002	NE	J		093441-009	SW846 6020
	Magnesium	18.5	0.010	0.030	NE		J	093441-009	SW846 6020
	Manganese	0.0503	0.001	0.005	NE			093441-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093441-009	SW846 7470
	Nickel	0.417	0.0005	0.002	NE			093441-009	SW846 6020
	Potassium	5.10	0.080	0.300	NE		J	093441-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		093441-009	SW846 6020
	Silver	0.00236	0.0002	0.001	NE			093441-009	SW846 6020
	Sodium	56.7	0.400	1.25	NE			093441-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093441-009	SW846 6020
	Uranium	0.00455	0.000067	0.0002	0.030			093441-009	SW846 6020
	Vanadium	0.0105	0.001	0.005	NE			093441-009	SW846 6010
	Zinc	0.144	0.0035	0.010	NE			093441-009	SW846 6020

Refer to footnotes on page 4A-31.

Table 4A-4 *(Continued)*
Summary of Unfiltered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW5	Aluminum	ND	0.015	0.050	NE	U		093414-009	SW846 6020
30-Jan-13	Antimony	ND	0.001	0.003	0.006	U		093414-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093414-009	SW846 6020
	Barium	0.116	0.0006	0.002	2.00		J-	093414-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093414-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093414-009	SW846 6020
	Calcium	99.9	1.20	4.00	NE	B		093414-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093414-009	SW846 6020
	Cobalt	0.000142	0.0001	0.001	NE	J		093414-009	SW846 6020
	Copper	0.000817	0.00035	0.001	NE	J	0.012UJ	093414-009	SW846 6020
	Iron	0.185	0.033	0.100	NE			093414-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093414-009	SW846 6020
	Magnesium	33.8	0.010	0.030	NE			093414-009	SW846 6020
	Manganese	0.0085	0.001	0.005	NE			093414-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093414-009	SW846 7470
	Nickel	0.00201	0.0005	0.002	NE		0.0026U	093414-009	SW846 6020
	Potassium	5.71	0.080	0.300	NE			093414-009	SW846 6020
	Selenium	0.00193	0.0015	0.005	0.050	J		093414-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093414-009	SW846 6020
	Sodium	74.9	1.60	5.00	NE			093414-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093414-009	SW846 6020
	Uranium	0.00908	0.000067	0.0002	0.030			093414-009	SW846 6020
	Vanadium	0.00548	0.001	0.005	NE			093414-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093414-009	SW846 6020

Refer to footnotes on page 4A-31.

Table 4A-4 *(Continued)*
Summary of Unfiltered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW5 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		093415-009	SW846 6020
30-Jan-13	Antimony	ND	0.001	0.003	0.006	U		093415-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093415-009	SW846 6020
	Barium	0.114	0.0006	0.002	2.00		J-	093415-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093415-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093415-009	SW846 6020
	Calcium	98.3	1.20	4.00	NE	B		093415-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093415-009	SW846 6020
	Cobalt	0.000139	0.0001	0.001	NE	J		093415-009	SW846 6020
	Copper	0.000619	0.00035	0.001	NE	J	0.012UJ	093415-009	SW846 6020
	Iron	0.182	0.033	0.100	NE			093415-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093415-009	SW846 6020
	Magnesium	33.9	0.010	0.030	NE			093415-009	SW846 6020
	Manganese	0.0086	0.001	0.005	NE			093415-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093415-009	SW846 7470
	Nickel	0.00208	0.0005	0.002	NE		0.0026U	093415-009	SW846 6020
	Potassium	5.71	0.080	0.300	NE			093415-009	SW846 6020
	Selenium	0.00201	0.0015	0.005	0.050	J		093415-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093415-009	SW846 6020
	Sodium	74.3	1.60	5.00	NE			093415-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093415-009	SW846 6020
	Uranium	0.0093	0.000067	0.0002	0.030			093415-009	SW846 6020
	Vanadium	0.00521	0.001	0.005	NE			093415-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093415-009	SW846 6020

Refer to footnotes on page 4A-31.

Table 4A-4 *(Continued)*
Summary of Unfiltered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW6	Aluminum	ND	0.015	0.050	NE	U		093418-009	SW846 6020
31-Jan-13	Antimony	ND	0.001	0.003	0.006	U		093418-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093418-009	SW846 6020
	Barium	0.117	0.0006	0.002	2.00			093418-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093418-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093418-009	SW846 6020
	Calcium	92.4	1.20	4.00	NE			093418-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093418-009	SW846 6020
	Cobalt	0.000115	0.0001	0.001	NE	J		093418-009	SW846 6020
	Copper	0.000849	0.00035	0.001	NE	J		093418-009	SW846 6020
	Iron	0.183	0.033	0.100	NE			093418-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093418-009	SW846 6020
	Magnesium	30.8	0.010	0.030	NE			093418-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093418-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093418-009	SW846 7470
	Nickel	0.00228	0.0005	0.002	NE			093418-009	SW846 6020
	Potassium	5.80	0.080	0.300	NE			093418-009	SW846 6020
	Selenium	0.00224	0.0015	0.005	0.050	J		093418-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093418-009	SW846 6020
	Sodium	70.8	1.60	5.00	NE			093418-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093418-009	SW846 6020
	Uranium	0.0102	0.000067	0.0002	0.030			093418-009	SW846 6020
	Vanadium	0.0064	0.001	0.005	NE			093418-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093418-009	SW846 6020

Refer to footnotes on page 4A-31.

Table 4A-4 *(Continued)*
Summary of Unfiltered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW7	Aluminum	ND	0.015	0.050	NE	U		093438-009	SW846 6020
07-Feb-13	Antimony	ND	0.001	0.003	0.006	U		093438-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093438-009	SW846 6020
	Barium	0.093	0.0006	0.002	2.00			093438-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093438-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093438-009	SW846 6020
	Calcium	58.3	0.600	2.00	NE	B		093438-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093438-009	SW846 6020
	Cobalt	0.000105	0.0001	0.001	NE	J		093438-009	SW846 6020
	Copper	0.000927	0.00035	0.001	NE	J	J	093438-009	SW846 6020
	Iron	0.115	0.033	0.100	NE			093438-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093438-009	SW846 6020
	Magnesium	18.3	0.010	0.030	NE			093438-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093438-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093438-009	SW846 7470
	Nickel	0.00152	0.0005	0.002	NE	J		093438-009	SW846 6020
	Potassium	4.66	0.080	0.300	NE			093438-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		093438-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093438-009	SW846 6020
	Sodium	41.0	0.080	0.250	NE			093438-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093438-009	SW846 6020
	Uranium	0.00747	0.000067	0.0002	0.030			093438-009	SW846 6020
	Vanadium	0.0076	0.001	0.005	NE			093438-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093438-009	SW846 6020

Refer to footnotes on page 4A-31.

Table 4A-4 *(Continued)*
Summary of Unfiltered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW8	Aluminum	0.0265	0.015	0.050	NE	J		093429-009	SW846 6020
06-Feb-13	Antimony	ND	0.001	0.003	0.006	U		093429-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093429-009	SW846 6020
	Barium	0.122	0.006	0.020	2.00			093429-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093429-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093429-009	SW846 6020
	Calcium	60.8	0.600	2.00	NE	B		093429-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093429-009	SW846 6020
	Cobalt	0.000135	0.0001	0.001	NE	J		093429-009	SW846 6020
	Copper	0.00182	0.00035	0.001	NE		0.015UJ	093429-009	SW846 6020
	Iron	0.150	0.033	0.100	NE			093429-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093429-009	SW846 6020
	Magnesium	19.1	0.010	0.030	NE			093429-009	SW846 6020
	Manganese	0.0223	0.001	0.005	NE			093429-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093429-009	SW846 7470
	Nickel	0.00215	0.0005	0.002	NE			093429-009	SW846 6020
	Potassium	5.06	0.080	0.300	NE			093429-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		093429-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093429-009	SW846 6020
	Sodium	42.3	0.080	0.250	NE			093429-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093429-009	SW846 6020
	Uranium	0.00755	0.000067	0.0002	0.030			093429-009	SW846 6020
	Vanadium	0.00242	0.001	0.005	NE	J		093429-009	SW846 6010
	Zinc	0.00515	0.0035	0.010	NE	J		093429-009	SW846 6020

Refer to footnotes on page 4A-31.

Table 4A-4 *(Continued)*
Summary of Unfiltered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW8 (Duplicate)	Aluminum	0.0378	0.015	0.050	NE	J		093430-009	SW846 6020
06-Feb-13	Antimony	ND	0.001	0.003	0.006	U		093430-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093430-009	SW846 6020
	Barium	0.120	0.0006	0.002	2.00			093430-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093430-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093430-009	SW846 6020
	Calcium	59.1	0.600	2.00	NE	B		093430-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093430-009	SW846 6020
	Cobalt	0.000144	0.0001	0.001	NE	J		093430-009	SW846 6020
	Copper	0.00195	0.00035	0.001	NE		0.015UJ	093430-009	SW846 6020
	Iron	0.162	0.033	0.100	NE			093430-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093430-009	SW846 6020
	Magnesium	19.2	0.010	0.030	NE			093430-009	SW846 6020
	Manganese	0.0227	0.001	0.005	NE			093430-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093430-009	SW846 7470
	Nickel	0.00218	0.0005	0.002	NE			093430-009	SW846 6020
	Potassium	5.10	0.080	0.300	NE			093430-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		093430-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093430-009	SW846 6020
	Sodium	43.2	0.080	0.250	NE			093430-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093430-009	SW846 6020
	Uranium	0.00726	0.000067	0.0002	0.030			093430-009	SW846 6020
	Vanadium	0.00174	0.001	0.005	NE	J		093430-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093430-009	SW846 6020

Refer to footnotes on page 4A-31.

Table 4A-4 *(Concluded)*
Summary of Unfiltered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW9	Aluminum	0.0358	0.015	0.050	NE	J		093423-009	SW846 6020
04-Feb-13	Antimony	ND	0.001	0.003	0.006	U		093423-009	SW846 6020
	Arsenic	0.00185	0.0017	0.005	0.010	J		093423-009	SW846 6020
	Barium	0.0897	0.0006	0.002	2.00			093423-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093423-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093423-009	SW846 6020
	Calcium	58.9	0.600	2.00	NE	B		093423-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093423-009	SW846 6020
	Cobalt	0.000168	0.0001	0.001	NE	J		093423-009	SW846 6020
	Copper	0.00108	0.00035	0.001	NE		J	093423-009	SW846 6020
	Iron	0.172	0.033	0.100	NE			093423-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093423-009	SW846 6020
	Magnesium	18.6	0.010	0.030	NE			093423-009	SW846 6020
	Manganese	0.00862	0.001	0.005	NE			093423-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093423-009	SW846 7470
	Nickel	0.00208	0.0005	0.002	NE			093423-009	SW846 6020
	Potassium	4.73	0.080	0.300	NE			093423-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		093423-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093423-009	SW846 6020
	Sodium	40.7	0.080	0.250	NE			093423-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093423-009	SW846 6020
	Uranium	0.00923	0.000067	0.0002	0.030			093423-009	SW846 6020
	Vanadium	0.00921	0.001	0.005	NE			093423-009	SW846 6010
	Zinc	0.00376	0.0035	0.010	NE	J		093423-009	SW846 6020

Refer to footnotes on page 4A-31.

Table 4A-5
Summary of Filtered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-BW2	Aluminum	ND	0.015	0.050	NE	U		093409-010	SW846 6020
29-Jan-13	Antimony	ND	0.001	0.003	0.006	U		093409-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093409-010	SW846 6020
	Barium	0.0929	0.0006	0.002	2.00		J-	093409-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093409-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093409-010	SW846 6020
	Calcium	72.7	1.20	4.00	NE	B		093409-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093409-010	SW846 6020
	Cobalt	0.000313	0.0001	0.001	NE	J		093409-010	SW846 6020
	Copper	0.000649	0.00035	0.001	NE	J		093409-010	SW846 6020
	Iron	0.135	0.033	0.100	NE			093409-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093409-010	SW846 6020
	Magnesium	24.6	0.010	0.030	NE			093409-010	SW846 6020
	Manganese	0.0093	0.001	0.005	NE			093409-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093409-010	SW846 7470
	Nickel	0.00218	0.0005	0.002	NE			093409-010	SW846 6020
	Potassium	3.98	0.080	0.300	NE			093409-010	SW846 6020
	Selenium	0.00265	0.0015	0.005	0.050	J		093409-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093409-010	SW846 6020
	Sodium	61.3	1.60	5.00	NE			093409-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093409-010	SW846 6020
	Uranium	0.00679	0.000067	0.0002	0.030			093409-010	SW846 6020
	Vanadium	0.00567	0.001	0.005	NE			093409-010	SW846 6010
	Zinc	0.00979	0.0035	0.010	NE	J		093409-010	SW846 6020

Refer to footnotes on page 4A-31.

Table 4A-5 *(Continued)*
Summary of Filtered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW4	Aluminum	ND	0.015	0.050	NE	U		093441-010	SW846 6020
11-Feb-13	Antimony	ND	0.001	0.003	0.006	U		093441-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093441-010	SW846 6020
	Barium	0.0864	0.0006	0.002	2.00			093441-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093441-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093441-010	SW846 6020
	Calcium	62.1	0.300	1.00	NE			093441-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093441-010	SW846 6020
	Cobalt	0.000296	0.0001	0.001	NE	J		093441-010	SW846 6020
	Copper	0.00213	0.00035	0.001	NE			093441-010	SW846 6020
	Iron	0.137	0.033	0.100	NE			093441-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093441-010	SW846 6020
	Magnesium	18.9	0.010	0.030	NE		J	093441-010	SW846 6020
	Manganese	0.00414	0.001	0.005	NE	J		093441-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093441-010	SW846 7470
	Nickel	0.179	0.0005	0.002	NE			093441-010	SW846 6020
	Potassium	4.48	0.080	0.300	NE		J	093441-010	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		093441-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093441-010	SW846 6020
	Sodium	48.6	0.080	0.250	NE			093441-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093441-010	SW846 6020
	Uranium	0.00549	0.000067	0.0002	0.030			093441-010	SW846 6020
	Vanadium	0.00821	0.001	0.005	NE			093441-010	SW846 6010
	Zinc	0.0462	0.0035	0.010	NE			093441-010	SW846 6020

Refer to footnotes on page 4A-31.

Table 4A-5 *(Continued)*
Summary of Filtered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW5	Aluminum	ND	0.015	0.050	NE	U		093414-010	SW846 6020
30-Jan-13	Antimony	ND	0.001	0.003	0.006	U		093414-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093414-010	SW846 6020
	Barium	0.113	0.0006	0.002	2.00		J-	093414-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093414-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093414-010	SW846 6020
	Calcium	96.0	1.20	4.00	NE	B		093414-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093414-010	SW846 6020
	Cobalt	0.000126	0.0001	0.001	NE	J	0.00064U	093414-010	SW846 6020
	Copper	0.000995	0.00035	0.001	NE	J	0.011UJ	093414-010	SW846 6020
	Iron	0.179	0.033	0.100	NE			093414-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093414-010	SW846 6020
	Magnesium	32.5	0.010	0.030	NE			093414-010	SW846 6020
	Manganese	0.00226	0.001	0.005	NE	J		093414-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093414-010	SW846 7470
	Nickel	0.00199	0.0005	0.002	NE	J		093414-010	SW846 6020
	Potassium	5.47	0.080	0.300	NE			093414-010	SW846 6020
	Selenium	0.00225	0.0015	0.005	0.050	J		093414-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093414-010	SW846 6020
	Sodium	72.8	1.60	5.00	NE			093414-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093414-010	SW846 6020
	Uranium	0.00914	0.000067	0.0002	0.030			093414-010	SW846 6020
	Vanadium	0.00559	0.001	0.005	NE			093414-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093414-010	SW846 6020

Refer to footnotes on page 4A-31.

Table 4A-5 *(Continued)*
Summary of Filtered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW5 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		093415-010	SW846 6020
30-Jan-13	Antimony	ND	0.001	0.003	0.006	U		093415-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093415-010	SW846 6020
	Barium	0.107	0.0006	0.002	2.00		J-	093415-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093415-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093415-010	SW846 6020
	Calcium	94.0	1.20	4.00	NE	B		093415-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093415-010	SW846 6020
	Cobalt	0.000128	0.0001	0.001	NE	J	0.00064U	093415-010	SW846 6020
	Copper	0.000713	0.00035	0.001	NE	J	0.011UJ	093415-010	SW846 6020
	Iron	0.178	0.033	0.100	NE			093415-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093415-010	SW846 6020
	Magnesium	31.9	0.010	0.030	NE			093415-010	SW846 6020
	Manganese	0.00217	0.001	0.005	NE	J		093415-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093415-010	SW846 7470
	Nickel	0.00199	0.0005	0.002	NE	J		093415-010	SW846 6020
	Potassium	5.25	0.080	0.300	NE			093415-010	SW846 6020
	Selenium	0.00236	0.0015	0.005	0.050	J		093415-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093415-010	SW846 6020
	Sodium	70.2	1.60	5.00	NE			093415-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093415-010	SW846 6020
	Uranium	0.00876	0.000067	0.0002	0.030			093415-010	SW846 6020
	Vanadium	0.00481	0.001	0.005	NE	J		093415-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093415-010	SW846 6020

Refer to footnotes on page 4A-31.

Table 4A-5 *(Continued)*
Summary of Filtered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW6	Aluminum	ND	0.015	0.050	NE	U		093418-010	SW846 6020
31-Jan-13	Antimony	ND	0.001	0.003	0.006	U		093418-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093418-010	SW846 6020
	Barium	0.114	0.0006	0.002	2.00			093418-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093418-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093418-010	SW846 6020
	Calcium	97.6	1.20	4.00	NE			093418-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093418-010	SW846 6020
	Cobalt	0.000124	0.0001	0.001	NE	J		093418-010	SW846 6020
	Copper	0.000678	0.00035	0.001	NE	J		093418-010	SW846 6020
	Iron	0.178	0.033	0.100	NE			093418-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093418-010	SW846 6020
	Magnesium	30.8	0.010	0.030	NE			093418-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093418-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093418-010	SW846 7470
	Nickel	0.00191	0.0005	0.002	NE	J		093418-010	SW846 6020
	Potassium	5.68	0.080	0.300	NE			093418-010	SW846 6020
	Selenium	0.00202	0.0015	0.005	0.050	J		093418-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093418-010	SW846 6020
	Sodium	72.6	1.60	5.00	NE			093418-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093418-010	SW846 6020
	Uranium	0.0101	0.000067	0.0002	0.030			093418-010	SW846 6020
	Vanadium	0.00713	0.001	0.005	NE			093418-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093418-010	SW846 6020

Refer to footnotes on page 4A-31.

Table 4A-5 *(Continued)*
Summary of Filtered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW7	Aluminum	ND	0.015	0.050	NE	U		093438-010	SW846 6020
07-Feb-13	Antimony	ND	0.001	0.003	0.006	U		093438-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093438-010	SW846 6020
	Barium	0.0929	0.0006	0.002	2.00			093438-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093438-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093438-010	SW846 6020
	Calcium	56.3	0.600	2.00	NE	B		093438-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093438-010	SW846 6020
	Cobalt	0.000135	0.0001	0.001	NE	J		093438-010	SW846 6020
	Copper	0.00107	0.00035	0.001	NE		J	093438-010	SW846 6020
	Iron	0.105	0.033	0.100	NE			093438-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093438-010	SW846 6020
	Magnesium	18.4	0.010	0.030	NE			093438-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093438-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093438-010	SW846 7470
	Nickel	0.00156	0.0005	0.002	NE	J		093438-010	SW846 6020
	Potassium	4.65	0.080	0.300	NE			093438-010	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		093438-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093438-010	SW846 6020
	Sodium	42.0	0.080	0.250	NE			093438-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093438-010	SW846 6020
	Uranium	0.00761	0.000067	0.0002	0.030			093438-010	SW846 6020
	Vanadium	0.00776	0.001	0.005	NE			093438-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093438-010	SW846 6020

Refer to footnotes on page 4A-31.

Table 4A-5 *(Continued)*
Summary of Filtered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW8	Aluminum	ND	0.015	0.050	NE	U		093429-010	SW846 6020
06-Feb-13	Antimony	ND	0.001	0.003	0.006	U		093429-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093429-010	SW846 6020
	Barium	0.120	0.0006	0.002	2.00			093429-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093429-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093429-010	SW846 6020
	Calcium	62.4	0.600	2.00	NE	B		093429-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093429-010	SW846 6020
	Cobalt	0.000114	0.0001	0.001	NE	J		093429-010	SW846 6020
	Copper	0.00151	0.00035	0.001	NE		0.008UJ	093429-010	SW846 6020
	Iron	0.107	0.033	0.100	NE			093429-010	SW846 6020
	Lead	0.00109	0.0005	0.002	NE	J		093429-010	SW846 6020
	Magnesium	19.3	0.010	0.030	NE			093429-010	SW846 6020
	Manganese	0.0131	0.001	0.005	NE			093429-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093429-010	SW846 7470
	Nickel	0.00196	0.0005	0.002	NE	J		093429-010	SW846 6020
	Potassium	5.11	0.080	0.300	NE			093429-010	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		093429-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093429-010	SW846 6020
	Sodium	43.0	0.080	0.250	NE			093429-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093429-010	SW846 6020
	Uranium	0.00742	0.000067	0.0002	0.030			093429-010	SW846 6020
	Vanadium	0.00191	0.001	0.005	NE	J		093429-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093429-010	SW846 6020

Refer to footnotes on page 4A-31.

Table 4A-5 *(Continued)*
Summary of Filtered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW8 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		093430-010	SW846 6020
06-Feb-13	Antimony	ND	0.001	0.003	0.006	U		093430-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093430-010	SW846 6020
	Barium	0.118	0.0006	0.002	2.00			093430-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093430-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093430-010	SW846 6020
	Calcium	60.3	0.600	2.00	NE	B		093430-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093430-010	SW846 6020
	Cobalt	0.000116	0.0001	0.001	NE	J		093430-010	SW846 6020
	Copper	0.00154	0.00035	0.001	NE		0.008UJ	093430-010	SW846 6020
	Iron	0.109	0.033	0.100	NE			093430-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093430-010	SW846 6020
	Magnesium	18.8	0.010	0.030	NE			093430-010	SW846 6020
	Manganese	0.0128	0.001	0.005	NE			093430-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093430-010	SW846 7470
	Nickel	0.00186	0.0005	0.002	NE	J		093430-010	SW846 6020
	Potassium	4.98	0.080	0.300	NE			093430-010	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		093430-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093430-010	SW846 6020
	Sodium	42.4	0.080	0.250	NE			093430-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093430-010	SW846 6020
	Uranium	0.00737	0.000067	0.0002	0.030			093430-010	SW846 6020
	Vanadium	0.00178	0.001	0.005	NE	J		093430-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093430-010	SW846 6020

Refer to footnotes on page 4A-31.

Table 4A-5 *(Concluded)*
Summary of Filtered Target Analyte List Metals plus Uranium Results,
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW9	Aluminum	ND	0.015	0.050	NE	U		093423-010	SW846 6020
04-Feb-13	Antimony	ND	0.001	0.003	0.006	U		093423-010	SW846 6020
	Arsenic	0.00307	0.0017	0.005	0.010	J		093423-010	SW846 6020
	Barium	0.0896	0.0006	0.002	2.00			093423-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093423-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093423-010	SW846 6020
	Calcium	59.1	0.600	2.00	NE	B		093423-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093423-010	SW846 6020
	Cobalt	0.00018	0.0001	0.001	NE	J		093423-010	SW846 6020
	Copper	0.00134	0.00035	0.001	NE		J	093423-010	SW846 6020
	Iron	0.108	0.033	0.100	NE			093423-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093423-010	SW846 6020
	Magnesium	18.7	0.010	0.030	NE			093423-010	SW846 6020
	Manganese	0.00225	0.001	0.005	NE	J		093423-010	SW846 6020
	Mercury	0.0003	0.000067	0.0002	0.002		NJ-	093423-010	SW846 7470
	Nickel	0.00174	0.0005	0.002	NE	J		093423-010	SW846 6020
	Potassium	4.73	0.080	0.300	NE			093423-010	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		093423-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093423-010	SW846 6020
	Sodium	40.6	0.080	0.250	NE			093423-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093423-010	SW846 6020
	Uranium	0.00911	0.000067	0.0002	0.030			093423-010	SW846 6020
	Vanadium	0.00975	0.001	0.005	NE			093423-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093423-010	SW846 6020

Refer to footnotes on page 4A-31.

Table 4A-6
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-BW2	Americium-241	6.54 ± 7.97	12.0	5.88	NE	U	BD	093409-033	EPA 901.1
29-Jan-13	Cesium-137	-0.843 ± 3.15	3.66	1.77	NE	U	BD	093409-033	EPA 901.1
	Cobalt-60	1.38 ± 1.81	3.22	1.52	NE	U	BD	093409-033	EPA 901.1
	Potassium-40	12.0 ± 41.7	28.2	13.2	NE	U	BD	093409-033	EPA 901.1
	Gross Alpha	5.80	NA	NA	15 pCi/L	NA	None	093409-034	EPA 900.0
	Gross Beta	7.55 ± 1.79	1.83	0.890	4mrem/yr		J	093409-034	EPA 900.0
	Tritium	10.2 ± 65.4	118	54.0	NE	U	BD	093409-036	EPA 906.0 M
MWL-MW4	Americium-241	0.304 ± 9.59	16.0	7.83	NE	U	BD	093441-033	EPA 901.1
11-Feb-13	Cesium-137	0.367 ± 2.54	3.38	1.63	NE	U	BD	093441-033	EPA 901.1
	Cobalt-60	1.20 ± 1.83	2.88	1.35	NE	U	BD	093441-033	EPA 901.1
	Potassium-40	-4.41 ± 34.9	43.4	20.8	NE	U	BD	093441-033	EPA 901.1
	Gross Alpha	6.60	NA	NA	15 pCi/L	NA	None	093441-034	EPA 900.0
	Gross Beta	7.38 ± 1.51	1.04	0.497	4mrem/yr		J	093441-034	EPA 900.0
	Tritium	-29.5 ± 78.3	152	68.7	NE	U	BD	093441-036	EPA 906.0 M
MWL-MW5	Americium-241	0.840 ± 7.72	12.5	6.09	NE	U	BD	093414-033	EPA 901.1
30-Jan-13	Cesium-137	-0.757 ± 1.73	2.82	1.35	NE	U	BD	093414-033	EPA 901.1
	Cobalt-60	-0.77 ± 1.85	3.20	1.51	NE	U	BD	093414-033	EPA 901.1
	Potassium-40	62.6 ± 25.6	62.6	15.5	NE	U	BD	093414-033	EPA 901.1
	Gross Alpha	9.02	NA	NA	15 pCi/L	NA	None	093414-034	EPA 900.0
	Gross Beta	8.21 ± 2.31	2.88	1.41	4mrem/yr		J	093414-034	EPA 900.0
	Tritium	17.1 ± 66.7	119	54.5	NE	U	BD	093414-036	EPA 906.0 M
MWL-MW5 (Duplicate)	Americium-241	8.97 ± 11.5	16.3	7.97	NE	U	BD	093415-033	EPA 901.1
30-Jan-13	Cesium-137	-0.257 ± 2.07	3.58	1.73	NE	U	BD	093415-033	EPA 901.1
	Cobalt-60	0.164 ± 1.83	3.28	1.55	NE	U	BD	093415-033	EPA 901.1
	Potassium-40	81.1 ± 39.4	33.0	15.6	NE	X	R	093415-033	EPA 901.1
	Gross Alpha	4.27	NA	NA	15 pCi/L	NA	None	093415-034	EPA 900.0
	Gross Beta	8.35 ± 2.27	2.70	1.31	4mrem/yr			093415-034	EPA 900.0
	Tritium	-43.9 ± 62.1	122	55.9	NE	U	BD	093415-036	EPA 906.0 M
MWL-MW6	Americium-241	7.48 ± 8.39	12.8	6.23	NE	U	BD	093418-033	EPA 901.1
31-Jan-13	Cesium-137	0.721 ± 1.67	2.86	1.37	NE	U	BD	093418-033	EPA 901.1
	Cobalt-60	-0.264 ± 1.63	2.92	1.37	NE	U	BD	093418-033	EPA 901.1
	Potassium-40	1.24 ± 42.2	31.8	15.0	NE	U	BD	093418-033	EPA 901.1
	Gross Alpha	5.17	NA	NA	15 pCi/L	NA	None	093418-034	EPA 900.0
	Gross Beta	7.33 ± 2.11	2.60	1.27	4mrem/yr		J	093418-034	EPA 900.0
	Tritium	34.5 ± 91.8	164	73.2	NE	U	BD	093418-036	EPA 906.0 M

Refer to footnotes on page 4A-31.

Table 4A-6 *(Concluded)*
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW7	Americium-241	-1.07 ± 6.40	11.0	5.35	NE	U	BD	093438-033	EPA 901.1
07-Feb-13	Cesium-137	-2.27 ± 2.80	2.78	1.33	NE	U	BD	093438-033	EPA 901.1
	Cobalt-60	-4.75 ± 3.70	3.17	1.50	NE	U	BD	093438-033	EPA 901.1
	Potassium-40	-26.8 ± 33.9	39.7	19.0	NE	U	BD	093438-033	EPA 901.1
	Gross Alpha	5.50	NA	NA	15 pCi/L	NA	None	093438-034	EPA 900.0
	Gross Beta	6.59 ± 1.41	0.993	0.469	4mrem/yr		J	093438-034	EPA 900.0
	Tritium	4.17 ± 106	182	88.5	NE	U	BD	093438-036	EPA 906.0 M
MWL-MW8	Americium-241	-7.92 ± 7.42	10.4	5.10	NE	U	BD	093429-033	EPA 901.1
06-Feb-13	Cesium-137	-0.448 ± 2.60	2.95	1.42	NE	U	BD	093429-033	EPA 901.1
	Cobalt-60	1.20 ± 2.08	3.07	1.45	NE	U	BD	093429-033	EPA 901.1
	Potassium-40	12.2 ± 33.1	23.8	11.0	NE	U	BD	093429-033	EPA 901.1
	Gross Alpha	5.24	NA	NA	15 pCi/L	NA	None	093429-034	EPA 900.0
	Gross Beta	76.5 ± 12.7	1.02	0.488	4mrem/yr		J	093429-034	EPA 900.0
	Tritium	-2.1 ± 106	184	89.2	NE	U	BD	093429-036	EPA 906.0 M
MWL-MW8 (Duplicate)	Americium-241	0.622 ± 7.05	10.3	5.06	NE	U	BD	093430-033	EPA 901.1
06-Feb-13	Cesium-137	-1.68 ± 2.09	3.18	1.54	NE	U	BD	093430-033	EPA 901.1
	Cobalt-60	1.38 ± 1.89	3.34	1.59	NE	U	BD	093430-033	EPA 901.1
	Potassium-40	35.7 ± 45.5	30.5	14.4	NE	X	R	093430-033	EPA 901.1
	Gross Alpha	6.84	NA	NA	15 pCi/L	NA	None	093430-034	EPA 900.0
	Gross Beta	7.32 ± 1.50	0.994	0.474	4mrem/yr		J	093430-034	EPA 900.0
	Tritium	-114 ± 101	181	87.9	NE	U	BD	093430-036	EPA 906.0 M
MWL-MW9	Americium-241	2.53 ± 11.2	16.6	8.12	NE	U	BD	093423-033	EPA 901.1
04-Feb-13	Cesium-137	1.27 ± 2.11	3.61	1.75	NE	U	BD	093423-033	EPA 901.1
	Cobalt-60	5.69 ± 2.86	3.31	1.56	NE	X	R	093423-033	EPA 901.1
	Potassium-40	-24.2 ± 36.5	42.5	20.3	NE	U	BD	093423-033	EPA 901.1
	Gross Alpha	2.78	NA	NA	15 pCi/L	NA	None	093423-034	EPA 900.0
	Gross Beta	7.90 ± 1.62	1.18	0.568	4mrem/yr		J	093423-034	EPA 900.0
	Tritium	80.9 ± 108	181	88.0	NE	U	BD	093423-036	EPA 906.0 M

Refer to footnotes on page 4A-31.

Table 4A-7
Summary of Field Water Quality Measurements[h],
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
MWL-BW2	29-Jan-13	15.29	646	95.8	7.01	2.23	20.3	1.89
MWL-MW4	11-Feb-13	17.12	531	229.5	7.71	1.75	74.3	7.19
MWL-MW5	30-Jan-13	18.37	825	170.3	6.90	0.64	30.1	2.82
MWL-MW6	31-Jan-13	18.93	792	174.6	6.99	0.47	32.6	3.02
MWL-MW7	07-Feb-13	18.27	538	228.6	7.24	0.59	64.2	6.04
MWL-MW8	06-Feb-13	16.26	551	218.6	7.27	1.60	58.4	5.71
MWL-MW9	04-Feb-13	15.01	540	218.2	7.21	1.45	49.3	4.89

Refer to footnotes on page 4A-31.

This page intentionally left blank.

Footnotes for Mixed Waste Landfill Groundwater Analytical Results Tables

%	= percent.
µg/L	= micrograms per liter.
CFR	= Code of Federal Regulations.
EPA	= U.S. Environmental Protection Agency.
ID	= Identifier.
No.	= Number.
mg/L	= milligrams per liter.
mrem/yr	= millirem per year.

[a]Result

Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 1-4).

Bold	= Indicates the value bold exceeds the established MCL.
ND	= not detected (at method detection limit). Activities of zero or less are considered to be not detected.

[b]MDL or MDA

MDL applies to the data listed in Tables 4A-1 through 4A-5. MDA applies to radiological data in Table 4A-6.

MDL	= Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
MDA	= Minimum detectable activity. The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.
NA	= Not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

[c]PQL or Critical Level

The PQL applies to Tables 4A-1 through 4A-5. Critical Level applies to Table 4A-6.

NA	= Not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.
Critical level	= The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
PQL	= Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

[d]MCL

MCL = Maximum contaminant level. MCLs were established by the EPA Office of Water, National Primary Water Regulations (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- Gross alpha particle activity, excluding total uranium = 15 pCi/L (40 CFR Parts 9, 141, and 142, Table 1-4).
- Beta and/or Gamma-emitting radionuclides (any combination) = 4 mrem/yr (as dose rate).

NE = Not established.

[e]Lab Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

B	= Analyte is detected in associated laboratory method blank.
J	= Estimated value, the analyte concentration is below the PQL.
NA	= Not applicable.
U	= Analyte is absent or below the method detection limit.
X	= Data rejected due to high counting uncertainty.

Footnotes for Mixed Waste Landfill Groundwater Analytical Results Tables (Concluded)

[f]Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = The associated value is an estimated quantity.
J- = The associated numerical value is an estimated quantity with a suspected negative bias.
None = No data validation for corrected gross alpha activity.
NJ- = Presumptive evidence of the presence of the material at an estimated quantity with a suspected negative bias.
R = The data are unusable (compound may or may not be present). Resampling or reanalysis are necessary for verification.
U = The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
UJ = The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

[g]Analytical Method

Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.
EPA, 1980, "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.
EPA, 1984, "Methods for Chemical Analysis of Water and Wastes." EPA 600-4-79-020.
EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.

[h]Field Water Quality Measurements

Field measurements collected prior to sampling.

°C = degrees Celsius.
% Sat = percent saturation.
μmhos/cm = micromhos per centimeter.
mg/L = milligrams per liter.
mV = millivolts.
NTU = nephelometric turbidity units.
pH = potential of hydrogen (negative logarithm of the hydrogen ion concentration).

Attachment 4B
Mixed Waste Landfill
Hydrographs

This page intentionally left blank.

Attachment 4B Hydrographs

4B-1 MWL Study Area Wells (1 of 2) 4B-5

4B-2 MWL Study Area Wells (2 of 2) 4B-6

4B-3 Unfiltered Chromium Concentrations, MWL-MW4 ..... 4B-7

4B-4 Unfiltered Nickel Concentrations, MWL-MW4 ..... 4B-8

This page intentionally left blank.

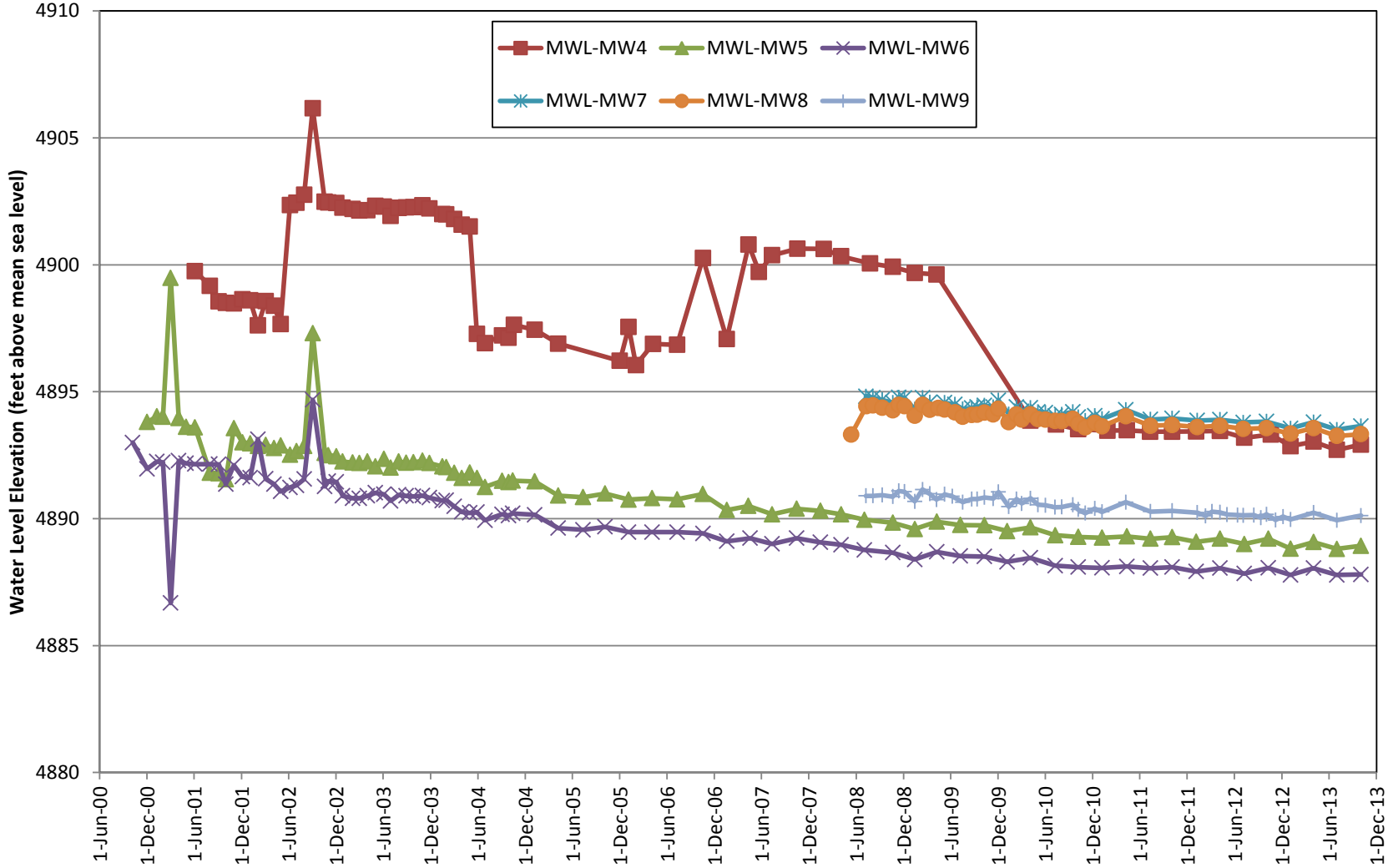


Figure 4B-1. MWL Study Area Wells (1 of 2)

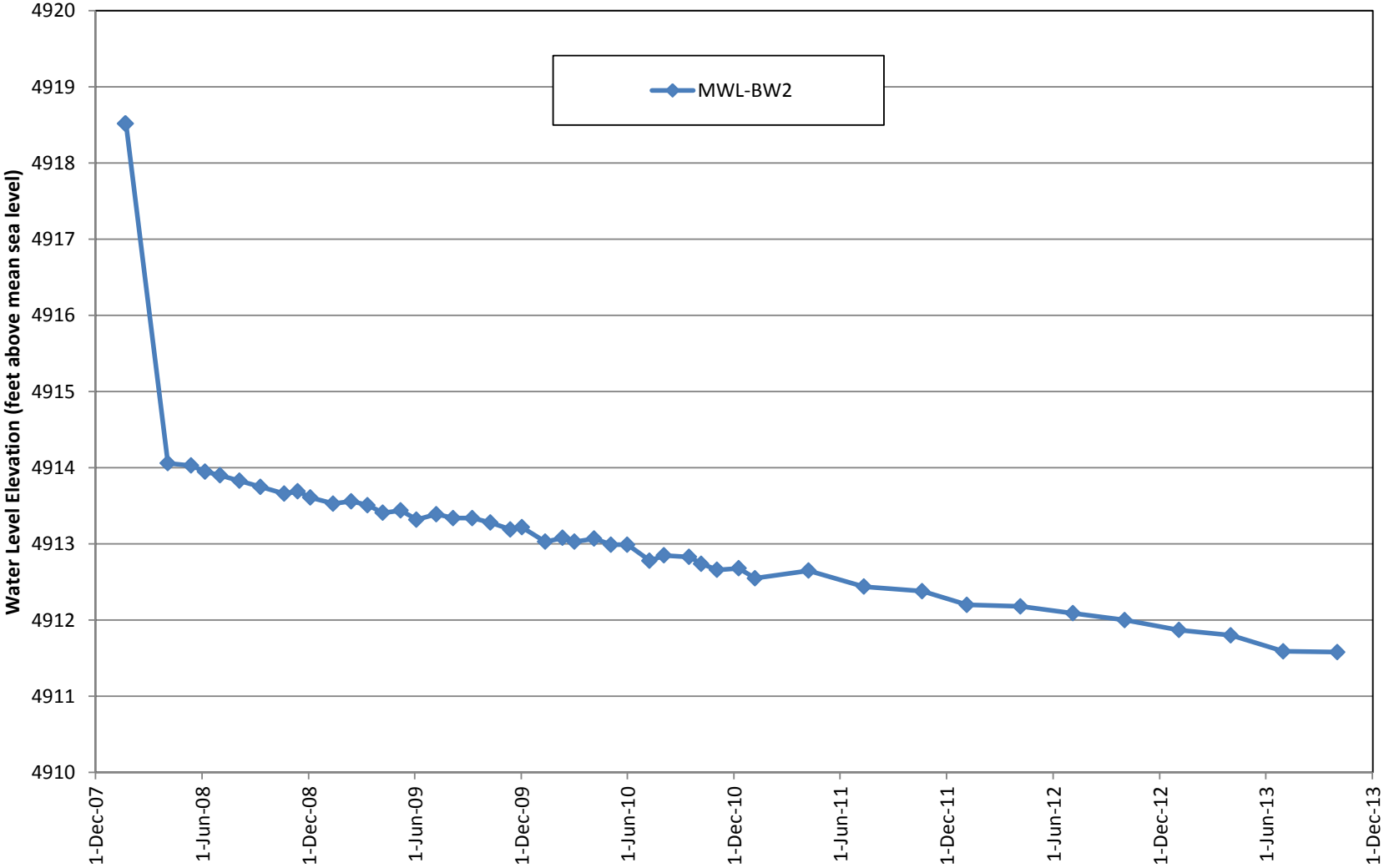


Figure 4B-2. MWL Study Area Wells (2 of 2)

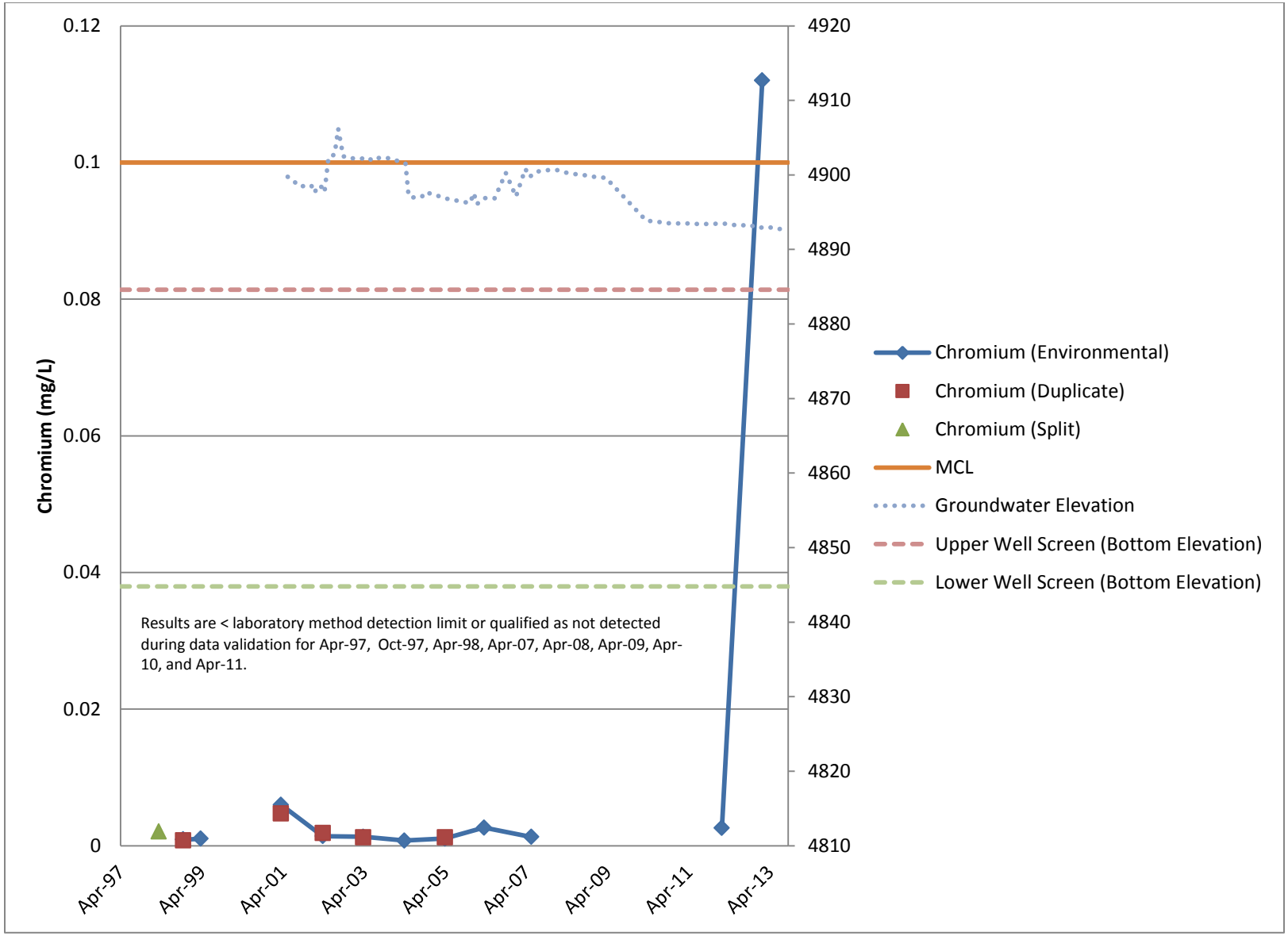


Figure 4B-3. Unfiltered Chromium Concentrations, MWL-MW4

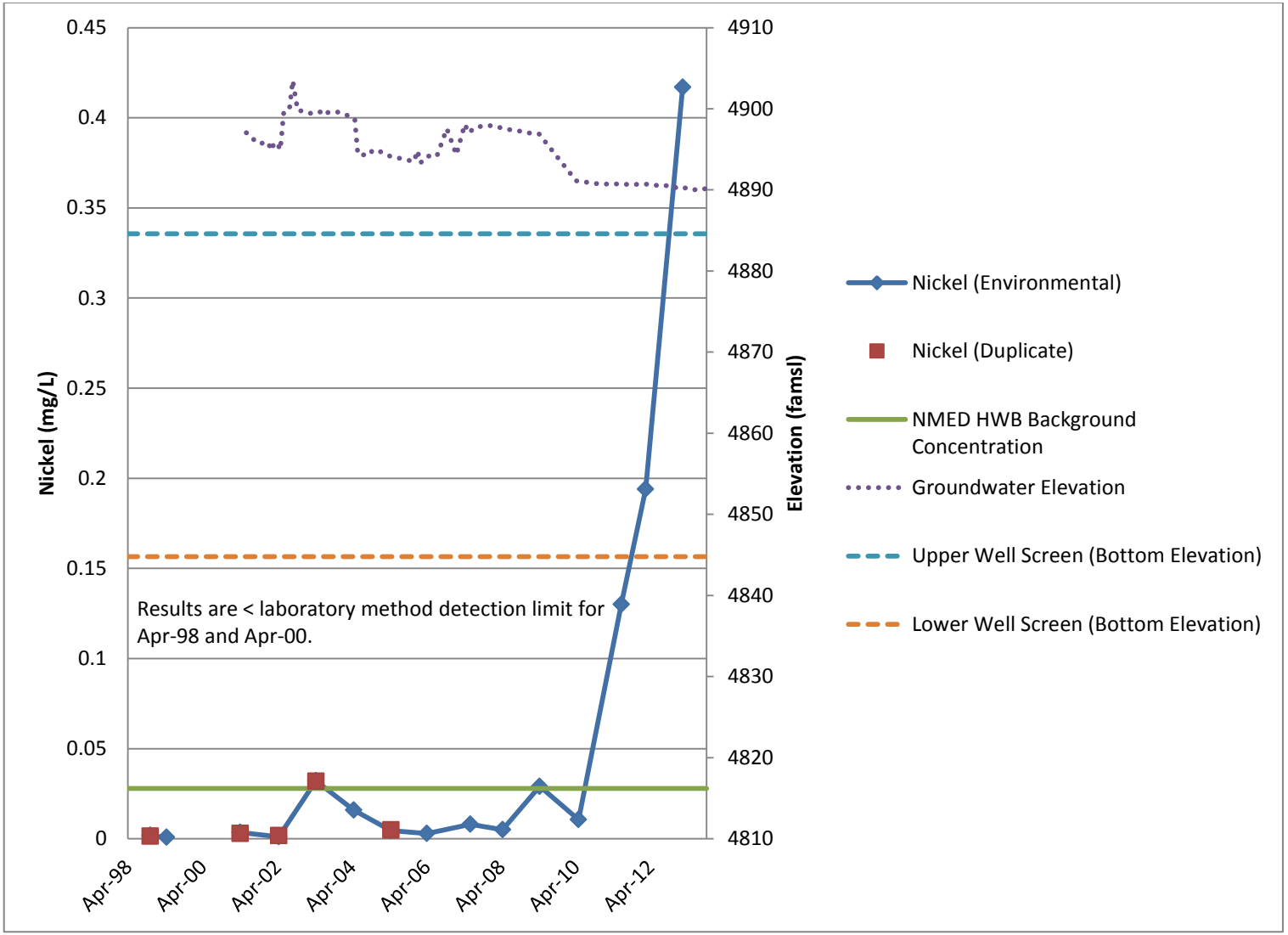


Figure 4B-4. Unfiltered Nickel Concentrations, MWL-MW4

5.0 Technical Area V Groundwater

5.1 Introduction

Trichloroethene (TCE) and nitrate have been identified as constituents of concern (COCs) in groundwater at the Technical Area (TA)-V Groundwater Investigation Study Area (TA-V Study Area; also referred to as "TA-V Area Groundwater Investigation Area of Concern") based on detections above the U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) in samples collected from monitoring wells. Since 1993, the maximum concentrations detected in the TA-V Study Area have been 26 micrograms per liter (μg/L) of TCE and 19 milligrams per liter (mg/L) of nitrate (as nitrogen). The EPA MCLs and State of New Mexico drinking water standards for TCE and nitrate are 5 μg/L and 10 mg/L (as nitrogen), respectively. Unique features of the TA-V Study Area include low concentrations of TCE and nitrate in the alluvial aquifer.

5.1.1 Location

TA-V occupies approximately 35 acres in the northeastern corner of TA-III (Figure 5-1) at Sandia National Laboratories, New Mexico (SNL/NM). TA-V is located in the north-central portion of Kirtland Air Force Base (KAFB), south of the City of Albuquerque (Figure 5-1). The SNL/NM facility is a government-owned, contractor-operated, multi-program laboratory overseen by the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) through the Sandia Field Office in Albuquerque, New Mexico. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM under Contract DE-AC04-94AL85000.

TA-V is situated within the Albuquerque Basin, and the vadose zone at TA-V is approximately 500 feet (ft) in thickness and consists of heterogeneous, lenticular, coarse- to fine-grained deposits. The underlying aquifer at TA-V consists of unconsolidated fine-grained, clay-rich, alluvial-fan sediments. Groundwater in the vicinity of TA-V flows generally from east to west. To the west of TA-V, groundwater flow paths turn to the north in response to pumping from municipal well fields located north of KAFB, and from water supply wells located in the northern portion of KAFB.

5.1.2 Site History

TA-V facilities are designed to test radiation effects on components and include two research reactors (the Annular Core Research Reactor and the Sandia Pulsed Reactor), as well as the Gamma Irradiation Facility and Hot Cell Facility. Historically, wastewater containing contaminants derived from TA-V facilities was disposed of to drain fields, seepage pits, and unlined surface impoundments. SNL/NM Environmental Restoration (ER) Operations (formerly ER Project) personnel have conducted numerous groundwater investigations in the TA-V Study Area since 1992 (Table 5-1). Many of these investigations were site-specific and conducted in support of various Solid Waste Management Unit (SWMU) assessments. Other investigations in the TA-V Study Area were more regional studies conducted by the SNL/NM Site-Wide Hydrogeologic Characterization Project (SNL February 1998).

5.1.3 Monitoring History

Investigations of groundwater quality in the TA-V Study Area have been conducted by SNL/NM over the past 20 years (Table 5-1). Groundwater monitoring at TA-V began in October 1992. TCE was first detected in monitoring well LWDS-MW1 in October 1993 and was later detected in monitoring well TAV-MW1 in September 1995. Since then, low concentrations of TCE have been consistently detected during quarterly sampling events. Potential sources for TCE in groundwater include the Liquid Waste Disposal System (LWDS) drain field and surface impoundments and the TA-V seepage pits (Section 5.1.7).

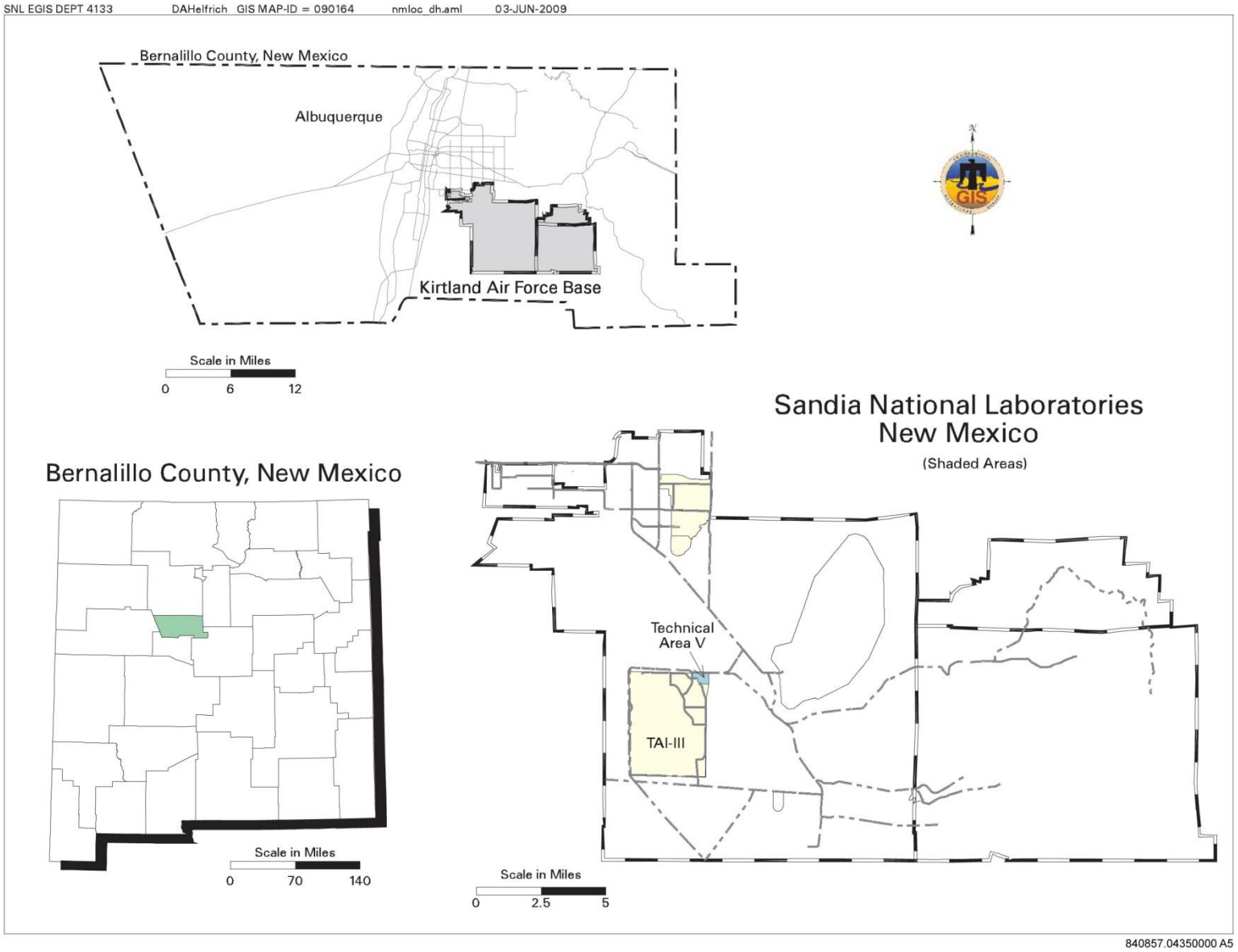


Figure 5-1. Location of the TA-V Study Area

Table 5-1. Historical Timeline of the TA-V Study Area

Month	Year	Event	Reference
May	1959	KAFB water supply well KAFB-10 is installed west of TA-V. Water from the well was used as auxiliary water for fire protection.	NMOSE May 1959
April	1992	The LWDS RFI Work Plan is submitted. The investigation will examine SWMUs 4, 5, and 52.	SNL March 1993
	1992–1993	Two groundwater monitoring wells are installed as part of the LWDS investigation. LWDS-MW2 installed October 1992, and LWDS-MW1 installed May 1993.	SNL September 1995
November	1993	LWDS-MW1 and LWDS-MW2 are sampled. The first sampling event of LWDS-MW1 in November 1993 reveals TCE near the then method detection limit of 5 μg/L, and the detection is confirmed during a later sampling event at values exceeding the MCL of 5 μg/L.	SNL March 1995
June	1994	Submit notification letter from DOE to EPA regarding TCE detection in LWDS-MW1.	DOE June 1994
March	1995	Groundwater sample analytical results for TA-V wells LWDS-MW1 and LWDS-MW2 reported in the Calendar Year (CY) 1994 SNL/NM Annual Groundwater Monitoring Report.	SNL March 1995
June	1995	Report submitted discussing water quality issues reported in the CY 1994 SNL/NM Annual Groundwater Monitoring Report. TCE was consistently detected during 1994 in LWDS-MW1.	IT June 1995
January–June	1995	Wells AVN-1 and AVN-2 installed.	SNL 1995
April	1995	Wells TAV-MW1 and TAV-MW2 installed.	SNL March 1996
	1995	The LWDS RFI is performed and completed.	SNL September 1995
March	1996	Groundwater sampling analytical results for TA-V wells reported in the CY 1995 SNL/NM Annual Groundwater Monitoring Report.	SNL March 1996
March	1996	Submit a letter to the NMED with notification of a single elevated nitrate detection for groundwater monitoring well LWDS-MW1. The result is 10.1 mg/L, exceeding the MCL of 10 mg/L.	DOE March 1996
April	1996	KAFB-10 was plugged and abandoned as there was a potential for the ungrouted annulus for this production well to act as a conduit.	SNL April 1996
March	1997	Groundwater sampling analytical results for TA-V wells reported in the CY 1996 SNL/NM Annual Groundwater Monitoring Report.	SNL March 1997
April	1997	Wells TAV-MW3, TAV-MW4, and TAV-MW5 installed.	SNL March 1999a
September	1997	NMED issues an RSI stating that additional characterization at TA-V is needed. Numerous other issues are discussed pertaining to each of the LWDS sites (SWMUs 4, 5, and 52).	NMED September 1997
January	1998	Provide responses to the NMED September 1997 RSI.	SNL January 1998
March	1998	Groundwater sampling analytical results for TA-V wells reported in the CY 1997 SNL/NM Annual Groundwater Monitoring Report.	SNL March 1998

Table 5-1. Historical Timeline of the TA-V Study Area *(Continued)*

Month	Year	Event	Reference
October	1998	Provide cross sections to NMED for the LWDS as required in the September 1997 RSI from NMED.	DOE October 1998
March	1999	Groundwater sampling analytical results for TA-V wells reported in the Fiscal Year (FY) 1998 SNL/NM Annual Groundwater Monitoring Report.	SNL March 1999b
March	1999	Submit a summary report detailing groundwater conditions for the TA-III/V area that includes sites from OU 1306 (TA-III) and OU 1307 (LWDS).	SNL March 1999a
March	2000	Groundwater sampling analytical results for TA-V wells reported in the FY 1999 SNL/NM Annual Groundwater Monitoring Report	SNL March 2000
April	2001	Groundwater sampling analytical results for TA-V wells reported in the FY 2000 SNL/NM Annual Groundwater Monitoring Report.	SNL April 2001
March - May	2001	Wells TAV-MW6, TAV-MW7, TAV-MW8, and TAV-MW9 installed.	SNL October 2001
November	2001	A summary of groundwater sampling results from TA-V wells for FYs 1999 and 2000 are compiled into a report. This is an update of the March 1999 summary report.	SNL November 2001
March	2002	Groundwater sampling analytical results for TA-V wells reported in the FY 2001 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2002
March	2003	Groundwater sampling analytical results for TA-V wells reported in the FY 2002 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2003
June	2003	Subsurface geology at KAFB, including the TA-V area, is updated.	Van Hart June 2003
March	2004	Groundwater sampling analytical results for TA-V wells reported in the FY 2003 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2004
April	2004	The NMED issues the Compliance Order on Consent (the Order) to the DOE/Sandia, which identified TA-V as an area with groundwater contamination requiring a CME.	NMED April 2004
May	2004	Submit the *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Technical Area-V*. This document was required by the Order.	SNL April 2004a
May	2004	Submit the *Corrective Measures Evaluation Work Plan, Technical Area V Groundwate*r. This document was required by the Order.	SNL April 2004b
October	2004	The NMED issues an approval with modifications to the TA-V CME Work Plan and the Current Conceptual Model of Groundwater Flow and Contaminant Transport.	NMED October 2004

Table 5-1. Historical Timeline of the TA-V Study Area *(Continued)*

Month	Year	Event	Reference
December	2004	Submit responses to the NMED approval with modifications of October 2004. The responses are included in the revised *Corrective Measures Evaluation Work Plan, Technical Area V Groundwater, Revision 0*.	SNL December 2004
July	2005	Submit the *Corrective Measures Evaluation Report for Technical Area V Groundwater*. The report details the selection of a preferred remedial alternative, cleanup goals, and the corrective measures implementation plan.	SNL July 2005
October	2005	Submit request to NMED for change in sampling frequency for TA-V wells.	DOE October 2005
October	2005	Groundwater sampling analytical results for TA-V wells reported in the FY 2004 SNL/NM Annual Groundwater Monitoring Report.	SNL October 2005
March	2006	Request the removal of well AVN-2 from the TA-V monitoring network due to insufficient water for sampling caused by declining water levels. The well would be returned to service if water levels in the well recover.	DOE March 2006
November	2006	Groundwater sampling analytical results for TA-V wells reported in the FY 2005 SNL/NM Annual Groundwater Monitoring Report.	SNL November 2006
March	2007	Groundwater sampling analytical results for TA-V wells reported in the FY 2006 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2007
January–March	2008	Well TAV-MW1 plugged and abandoned, and well TAV-MW10 installed as replacement for TAV-MW1.	SNL June 2008
March	2008	Groundwater sampling analytical results for TA-V wells reported in the FY 2007 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2008
July	2008	NMED issues a NOD on the July 2005 CME Report for TA-V Groundwater.	NMED July 2008
September	2008	The 13 TA-V monitoring wells are resurveyed to establish new northing and easting coordinates and elevations for each well.	SNL October 2008
December	2008	Sandia, DOE/NNSA, and NMED personnel attend an MNA seminar presented by Savannah River National Laboratory personnel and also discuss technical issues and the need for additional characterization work at TA-V.	SRNL December 2008
April	2009	NMED requires characterization of perchlorate in groundwater in one well in the TA-V Study Area.	NMED April 2009
April	2009	Submit a response to the NOD on the July 2005 CME Report for TA-V Groundwater.	SNL April 2009
June	2009	Groundwater sampling analytical results for TA-V wells reported in the CY 2008 SNL/NM Annual Groundwater Monitoring Report.	SNL June 2009
August	2009	NMED issues a second NOD on the July 2005 CME Report for TA-V Groundwater.	NMED August 2009

Table 5-1. Historical Timeline of the TA-V Study Area *(Concluded)*

Month	Year	Event	Reference
November	2009	Submit a response to the second NOD on the July 2005 CME Report for TA-V Groundwater.	SNL November 2009
December	2009	NMED issues a third NOD on the July 2005 CME Report for TA-V Groundwater.	NMED December 2009
February	2010	Submit a response to the third NOD on the July 2005 CME Report for TA-V Groundwater.	SNL February 2010
May	2010	NMED issues a notice of conditional approval for the TA-V Groundwater Investigation Work Plan associated with July 2005 TA-V Groundwater CME Report.	NMED May 2010
October	2010	Begin installation of groundwater monitoring wells TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14.	SNL February 2010
November	2010	Complete installation of groundwater monitoring wells TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14.	SNL June 2011
October	2010	Groundwater sampling analytical results for TA-V wells reported in the CY 2009 SNL/NM Annual Groundwater Monitoring Report.	SNL October 2010
November	2010	Submit a report on the geophysical log and slug test results for the new TA-V wells.	SNL November 2010
December	2010	NMED issues approval for the modification of soil-vapor monitoring well design.	NMED December 2010
March	2011	Complete installation of soil-vapor monitoring wells TAV-SV01, TAV-SV02, and TAV-SV03.	SNL June 2011
June	2011	Submit a Summary Report for TA-V Groundwater and Soil-Vapor Monitoring Well Installation.	SNL June 2011
July	2011	DOE/NNSA and Sandia meet with NMED to discuss the results from the first quarter of groundwater and soil-vapor monitoring.	SNL July 2011
September	2011	Groundwater sampling analytical results for TA-V wells reported in the CY 2010 SNL/NM Annual Groundwater Monitoring Report.	SNL September 2011
September	2012	Groundwater sampling analytical results for TA-V wells reported in the CY 2011 SNL/NM Annual Groundwater Monitoring Report.	SNL September 2012
June	2013	Groundwater sampling analytical results for TA-V wells reported in the CY 2012 SNL/NM Annual Groundwater Monitoring Report.	SNL June 2013

NOTES:

AVN = Area V (North).
CME = Corrective Measures Evaluation.
CY = Calendar Year.
DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
FY = Fiscal Year.
IT = IT Corporation.
KAFB = Kirtland Air Force Base.
LWDS = Liquid Waste Disposal System.
MCL = Maximum Contaminant Level.
µg/L = Microgram(s) per liter.
mg/L = Milligram(s) per liter.
MNA = Monitored Natural Attenuation.
MW = Monitoring well.
NMED = New Mexico Environment Department.
NMOSE = New Mexico Office of the State Engineer.
NNSA = National Nuclear Security Administration.
NOD = Notice of Disapproval.
OU = Operable Unit.
RCRA = Resource Conservation and Recovery Act.
RFI = RCRA Facility Investigation.
RSI = Request for Supplemental Information.
Sandia = Sandia Corporation.
SNL = Sandia National Laboratories.
SNL/NM = Sandia National Laboratories/New Mexico.
SRNL = Savannah River National Laboratory.
SWMU = Solid Waste Management Unit.
TA = Technical Area.
TCE = Trichloroethene.
The Order = The Compliance Order on Consent.

In April 2004, the Compliance Order on Consent (the Order) became effective between the New Mexico Environment Department (NMED), DOE, and Sandia. The Order specifies TA-V as an area of groundwater contamination (NMED April 2004). Since the initial discoveries of TCE and nitrate at the TA-V Study Area, numerous characterization activities have been conducted (Table 5-1), which are summarized in the *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Technical Area-V* (SNL April 2004a). In response to the Order, this document was submitted to the NMED along with the *Corrective Measures Evaluation Work Plan, Technical Area V Groundwater* (SNL April 2004b) by DOE/NNSA and Sandia in April 2004. After fulfilling the requirements of the Corrective Measures Evaluation (CME) Work Plan, DOE/NNSA and Sandia submitted the CME Report to the NMED in July 2005 (SNL July 2005). In May 2010, NMED issued a notice of conditional approval for the TA-V Groundwater Investigation Work Plan associated with July 2005 TA-V Groundwater CME Report (NMED May 2010), and additional groundwater monitoring wells were installed subsequently. Groundwater monitoring results for TA-V wells have been summarized in the annual groundwater monitoring reports.

5.1.4 Current Monitoring Network

In Calendar Year (CY) 2013, 16 wells in the TA-V Study Area were being monitored for water quality and water levels (Figure 5-2; Table 5-2). Table XI-1 of the Order (NMED April 2004) specifies that the sampling frequency for groundwater monitoring at TA-V is quarterly.

5.1.5 Summary of Calendar Year 2013 Activities

The following activities took place for the TA-V Study Area during CY 2013:

- Obtained monthly or quarterly water level measurements for all TA-V Study Area wells.
- Prepared sampling and analysis plans (SAPs) and conducted semiannual and quarterly groundwater sampling events at 16 wells (Table 5-2) in February/March, May/June, July/August, and October/November 2013 (SNL January 2013, April 2013, July 2013, and September 2013).
- Prepared tables of analytical results (Attachment 5A), concentration versus time plots (Attachment 5B), and hydrographs (Attachment 5C) in support of this report.
- Conducted the final quarterly soil-vapor sampling event at the three soil-vapor monitoring wells in February/March 2013. The analytical results for these three sampling events are presented in the report entitled *Technical Area V Soil-Vapor Monitoring, Calendar Year 2013 Activities* (Attachment 5D), which includes analytical tables and figures.

5.1.6 Summary of Future Activities

The following activities are anticipated for the TA-V Study Area during CY 2014:

- Obtain periodic water level measurements for TA-V Study Area wells.
- Conduct quarterly or semiannual groundwater sampling at 16 TA-V Study Area wells.
- Update the Current Conceptual Model (SNL April 2004a) and the CME Report (SNL July 2005).

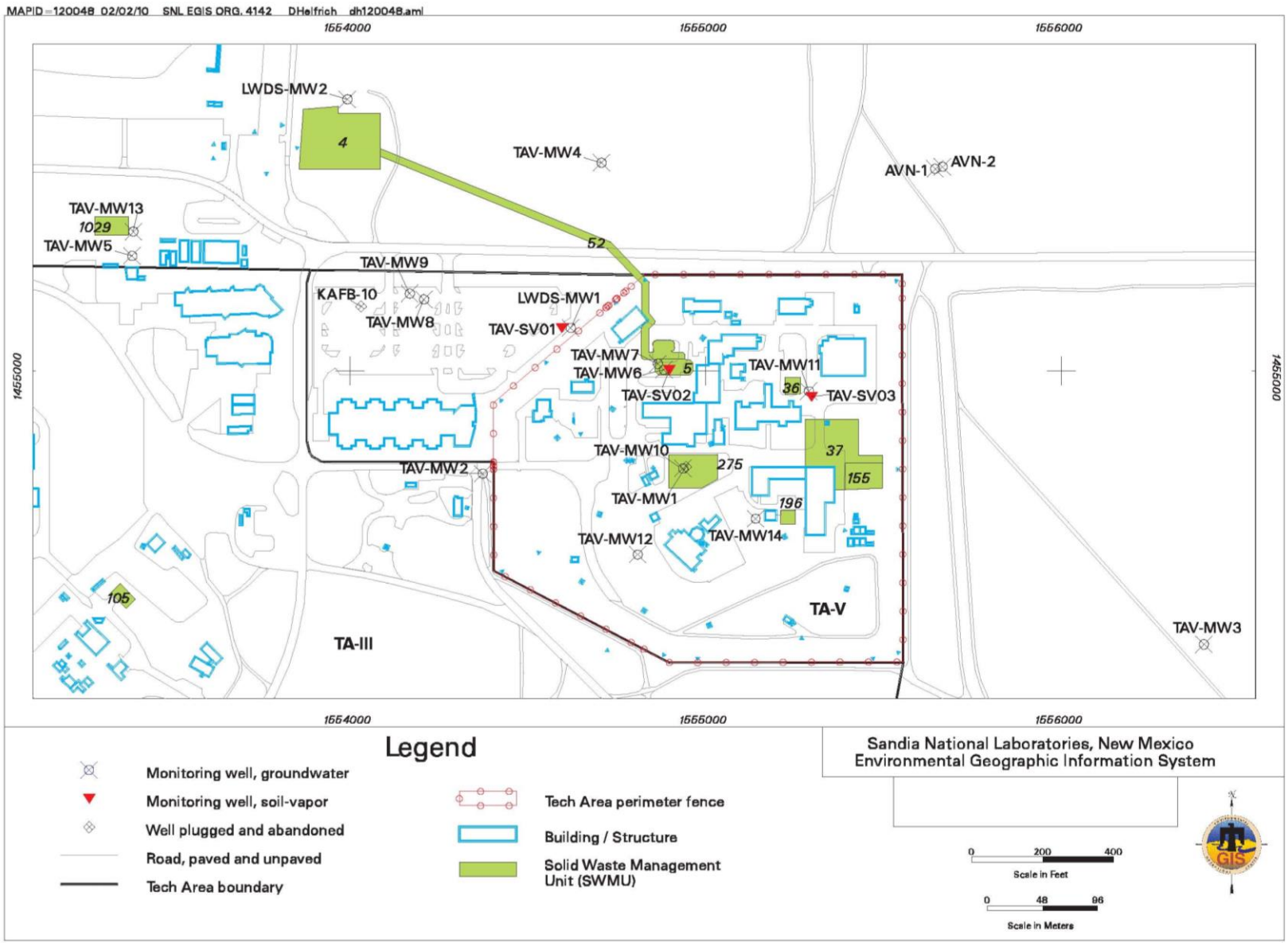


Figure 5-2. TA-V Monitoring Well Locations (16 Active Groundwater Monitoring Wells)

Table 5-2. Groundwater Monitoring Wells at the TA-V Study Area

Well	Installation Year	WQ	WL	Comments
LWDS-MW1	1993	√	√	Regional aquifer, water table completion
LWDS-MW2	1992	√	√	Regional aquifer, water table completion
AVN-1	1995	√	√	Regional aquifer, deep completion (570–590 ft bgs)
AVN-2	1995			Regional aquifer; water table completion (currently dry)
TAV-MW1	1995			Regional aquifer, plugged and abandoned February 2008
TAV-MW2	1995	√	√	Regional aquifer, water table completion
TAV-MW3	1997	√	√	Regional aquifer, water table completion
TAV-MW4	1997	√	√	Regional aquifer, water table completion
TAV-MW5	1997	√	√	Regional aquifer, water table completion
TAV-MW6	2001	√	√	Regional aquifer, water table completion
TAV-MW7	2001	√	√	Regional aquifer, deep completion (597–617 ft bgs)
TAV-MW8	2001	√	√	Regional aquifer, water table completion
TAV-MW9	2001	√	√	Regional aquifer, deep completion (582–602 ft bgs)
TAV-MW10	2008	√	√	Regional aquifer, replaced TAV-MW1
TAV-MW11	2010	√	√	Regional aquifer, water table completion
TAV-MW12	2010	√	√	Regional aquifer, water table completion
TAV-MW13	2010	√	√	Regional aquifer, deep completion (525–545 ft bgs)
TAV-MW14	2010	√	√	Regional aquifer, water table completion

NOTES: Check marks in the WQ and WL columns indicate WQ sampling and WL measurements were obtained during this reporting period.
AVN = Area V (North).
bgs = Below ground surface.
ft = Foot (feet).
LWDS = Liquid Waste Disposal System.
MW = Monitoring well.
TAV = Technical Area V (monitoring well designation only).
TA-V = Technical Area V.
WL = Water level.
WQ = Water quality.

5.1.7 Current Conceptual Model

The conceptual site model of contaminant transport at TA-V includes release from the potential sources, migration through the vadose zone, and movement in groundwater.

TCE and other organic chemicals were presumably present in wastewater that was discharged to the LWDS drain field from 1962 to 1967 and to the TA-V seepage pits from the 1960s until the early 1980s, when disposal practices were modified to protect the environment. Wastewater was disposed of at the surface impoundments from 1967 to 1972. Wastewater continued to be discharged to the seepage pits from the early 1980s until 1992, but it contained no TCE.

Water containing dissolved concentrations of TCE and other organic chemicals moved through the alluvial-fan lithofacies into the aquifer. Upon cessation of disposal, vertical pathways to the aquifer were drained by gravity. Continued flushing of the vadose zone beneath the seepage pits until 1992 likely removed significant sources of secondary contaminants.

Low concentrations of TCE present in the aquifer today are a result of these initial releases. The slow rate of horizontal groundwater flow (4 to 20 feet per year [ft/yr]) is responsible for the present distribution of TCE in the aquifer.

Nitrate concentrations in groundwater at TA-V, which are presumably derived from unknown upgradient sources, have exceeded the MCL in the two upgradient AVN wells (AVN-1 and AVN-2 [now dry]) that are currently being studied by KAFB. Concentrations have also exceeded the MCL in samples from wells located in TA-V (LWDS-MW1 and TAV-MW10), suggesting an additional local source of nitrate. However, septic waste was not discharged or disposed of to the three SWMUs (4, 5, and 275) at TA-V.

5.1.7.1 Regional Hydrogeologic Conditions

SNL/NM TA-V is located within the Albuquerque Basin of the Rio Grande Rift in north-central New Mexico. The Rio Grande Rift is marked by a series of sediment-filled structural basins and adjoining uplifted mountain ranges. One of these basins, the Albuquerque Basin (also known as the Middle Rio Grande Basin), covers about 3,060 square miles in central New Mexico and extends from Cochiti Reservoir on the north to San Acacia, New Mexico, on the south. The Albuquerque Basin includes KAFB and TA-V.

The sedimentary deposits of the Santa Fe Group and overlying alluvium that fill the Albuquerque Basin contain the Santa Fe Group aquifer system. This aquifer system provides the primary source of municipal, domestic, and industrial water in the Albuquerque area. The structure of the aquifer system within the Middle Rio Grande Basin today is complex (Bartolino and Cole 2002). The major hydrostratigraphic units in the aquifer are tabular and wedge-shaped bodies that are truncated and displaced by numerous faults. Few of the major units are present continuously throughout the basin, and most "pinch out" against the subsurface basement blocks. These major units are hundreds to thousands of feet thick, extend over tens of square miles, and primarily consist of unconsolidated and partially cemented deposits that interfinger in complex arrangements.

Prior to development of water resources in the Albuquerque area, groundwater flow direction in the Albuquerque Basin generally was from the north to the south, with a westward component of flow from recharge areas along mountain-front boundaries to the east (Bartolino and Cole 2002). As the Santa Fe Group aquifer has been developed as a source for municipal and industrial water supplies, groundwater flow directions have been altered toward pumping centers to the north of TA-V. Regional discharge occurs as groundwater moves out of the Albuquerque Basin into downgradient basins on the Rio Grande Rift as underflow or through discharge to the Rio Grande.

Contaminant transport at TA-V is constrained by geologic features. The stratigraphic units of hydrologic significance consist of the alluvial-fan lithofacies and Ancestral Rio Grande (ARG) lithofacies. TA-V is largely underlain by a thick section of alluvial-fan deposits. These deposits consist of the alluvial-fan lithofacies of the Santa Fe Group overlain by younger post-Santa Fe Group alluvial-fan deposits. The deepest monitoring well in the study area (AVN-1) penetrated 650 ft of these deposits. The total thickness of the alluvial-fan deposits at TA-V is not known.

The alluvial-fan lithofacies is further subdivided into lower and upper sections. The lower section consists of a fine-grained, clay-rich unit. This unit has been identified as low-energy piedmont deposits derived from upland soil that developed during a preglacial humid climate. The upper section consists of relatively coarse-grained sediments deposited in a higher-energy environment. The water table of the Santa Fe Group aquifer at TA-V is located in the fine-grained lower unit of alluvial-fan deposits. The post-Santa Fe Group alluvial-fan deposits blanket the area around TA-V and compose the upper few tens of feet of the vadose zone. These deposits were derived primarily from alluvial fans that developed from Coyote Canyon to the east.

The ARG deposits interfinger with alluvial-fan deposits west of TA-V. These deposits consist predominantly of uniformly coarse sand and gravel that were deposited with the integration of the Rio Grande drainage system.

5.1.7.2 Hydrologic Conditions at the TA-V Study Area

Direct precipitation may provide one possible source of local recharge. The average annual precipitation at TA-V is 8.7 inches (SNL April 2004a). Much of this precipitation is derived from summer thunderstorms that occur between July and October. Because the rate of evapotranspiration in the Albuquerque area greatly exceeds precipitation, this source of recharge is considered to be minimal as a mechanism for transporting contaminants through the thick vadose zone at TA-V. Estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL February 1998).

The Tijeras Arroyo and Arroyo del Coyote are located north and northeast of TA-V, respectively. The flow of surface water in the arroyo consists of brief ephemeral flows from mountainous drainages located to the east. Part of the recharge derived from infiltration of these flows is returned to the atmosphere through evapotranspiration. Some water that infiltrates the arroyo channels may move past the root zone and provide some local recharge. The distances between these ephemeral channels and TA-V precludes a significant effect on local groundwater flow and potential contaminant transport.

The vadose zone at TA-V, consisting of approximately 500 ft of unconsolidated to semiconsolidated alluvial-fan sediments, forms the potential pathway for COC transport from contaminant sources to the aquifer. Upper sections of the alluvial-fan sediments are relatively coarse-grained, becoming fine-grained and clay-rich with depth.

The unsaturated and saturated hydraulic properties of the vadose zone at TA-V are highly variable and anisotropic because of the heterogeneous textures, lenticularity, layering, and variations in carbonate cementation. Disposal of large volumes of wastewater from the LWDS drain field, the LWDS surface impoundments, and the TA-V seepage pits may occur along preferential pathways of saturated or nearly saturated flow through the thick vadose zone to the aquifer. Vertical flow through the discontinuous, layered, lenticular sediments in the vadose zone may be attenuated or diverted at horizons of contrasting hydraulic properties. Discharge of wastewater to the drain field was discontinued in 1967. Discharge to the surface impoundments and seepage pits was discontinued in 1972 and 1992, respectively.

No evidence of groundwater perching has been observed at TA-V. Based on moisture content measurements in vadose-zone sediment samples, drainage of residual water from the vadose zone to the aquifer was rapid after discharge ceased; minimal moisture from wastewater discharge at TA-V remains in the vadose zone.

The wide range of hydraulic conductivity estimates derived from aquifer tests at TA-V is attributed to the textural heterogeneities associated with the alluvial-fan lithofacies. The average horizontal hydraulic conductivity for these sediments is estimated to be about 1.24×10^{-4} ft per minute (SNL March 1999a). Vertical hydraulic conductivity is estimated to be one-tenth to one-hundredth the horizontal hydraulic conductivity.

5.1.7.3 Local Direction of Flow

Water levels measured in 16 monitoring wells were used to construct a map of the regional aquifer potentiometric surface at TA-V (Figure 5-3). The potentiometric surface indicates that the regional groundwater flow beneath TA-V is generally to the northwest, with localized flow paths to the west and southwest. The horizontal gradient ranges from approximately 0.0007 to 0.002 feet per foot. Calculated groundwater flow velocities based on aquifer testing range from 4 to 10 ft/yr (SNL March 1999a). Water-table contours for October 2013 suggest that a subtle groundwater mound is present at TA-V (Figure 5-3). This apparent groundwater mound is considered to be an artifact of regional water level declines within a heterogeneous aquifer and does not likely represent residual mounding from wastewater disposal that was discontinued in the early 1990s (SNL March 1999a).

Water level data indicate that groundwater flow to the west of TA-V turns sharply to the north, moving toward Albuquerque Bernalillo County Water Utility Authority pumping centers located north of KAFB and KAFB water-supply wells. The sharp change in flow direction coincides with the location of coarse, uniformly sorted ARG sediments. These sediments are much more permeable than the fine-grained sediments of the alluvial-fan lithofacies at TA-V and allow for more rapid flow.

Vertical flow gradients in the regional aquifer within the TA-V Study Area are strongly downward. Upon visual inspection of the hydrographs, water levels in the TA-V monitoring wells have been declining at a rate of approximately 1 ft/yr (Attachment 5C, Figures 5C-1 through 5C-3).

5.1.7.4 Contaminant Sources

Contaminant migration in the subsurface at TA-V is controlled by local recharge to the Santa Fe Group aquifer and by the permeability of the sedimentary units in the vadose zone and aquifer. Possible sources of recharge include infiltration of wastewater disposed of at TA-V, precipitation, and ephemeral flows in nearby arroyos.

The majority of wastewater discharged at TA-V occurred at SWMUs 4, 5, and 275. Table 5-3 identifies the dates of disposal and estimated disposal volumes. After 1992, wastewater was diverted to the Albuquerque Bernalillo County Water Utility Authority sanitary sewer system.

Sampling and analysis have been conducted in the vadose zone to characterize the presence of COCs. Locations of investigations are based on possible sources (Table 5-3). Investigation results indicate that overall the presence of COCs in the vadose zone is minimal. Movement of water and contaminant transport through the vadose zone occurred rapidly, and vadose zone drainage occurred soon after cessation of wastewater disposal.

Within the LWDS drain field, trace quantities of TCE, tetrachloroethene, and benzene were detected in shallow borehole soil-vapor samples collected during 1994 (SNL March 1999a). The possibility of vadose zone contamination was further investigated with the installation of monitoring wells TAV-MW6, TAV-MW7, TAV-MW8, and TAV-MW9 in March and April 2001. The results for soil and soil-vapor samples show no significant volatile organic compounds (VOCs) residual soil contamination in the vadose zone. Also, no results have shown evidence of excessive moisture in the vadose zone sediments; therefore, no significant residual contaminated water is present in the vadose zone beneath the LWDS drain field (SNL October 2001).

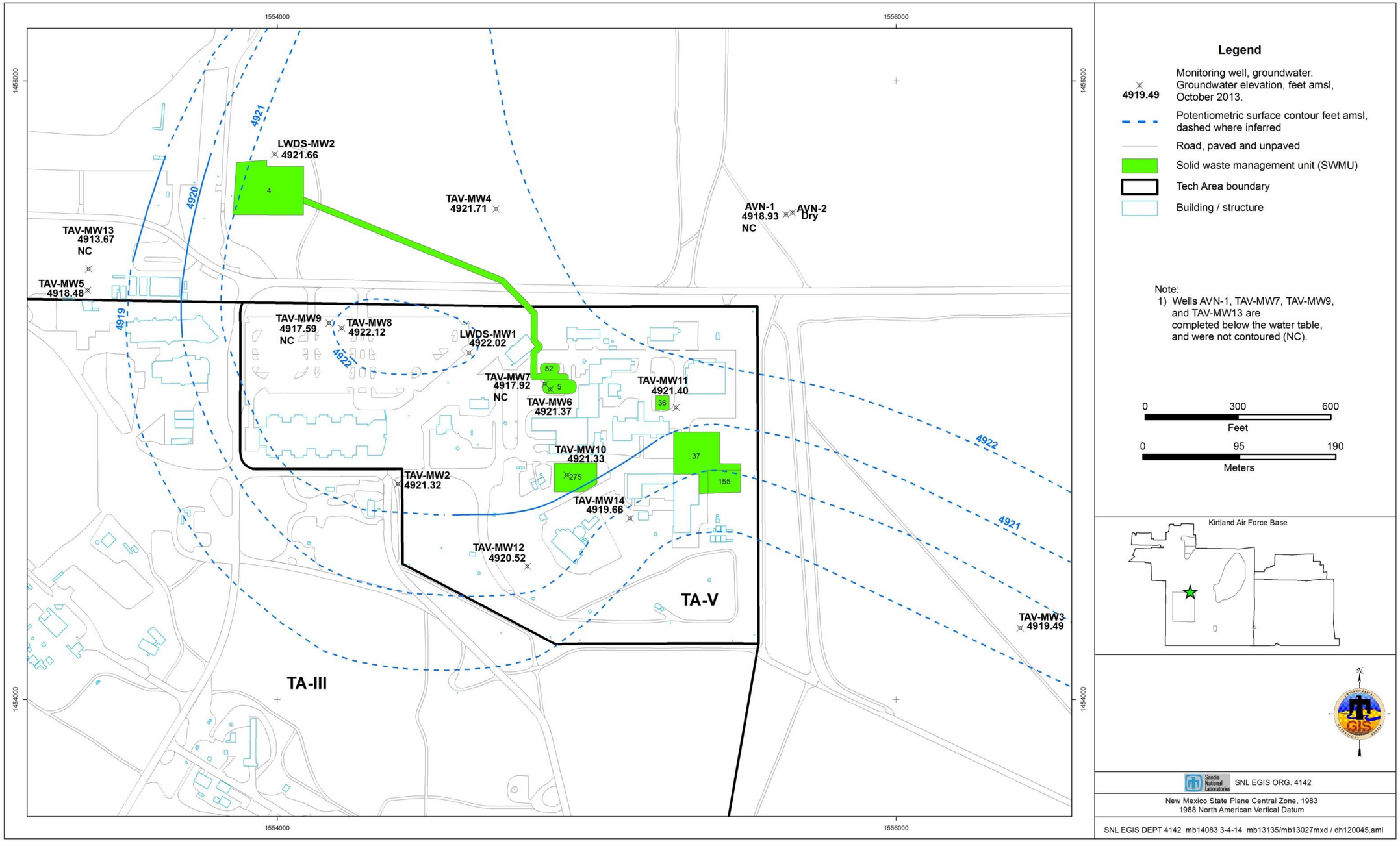


Figure 5-3. TA-V Study Area Potentiometric Surface Map (October 2013)

THIS PAGE IS BACK OF 11X17 FIGURE

Table 5-3. Wastewater Disposal History at TA-V

Disposal Site	Dates	Estimated Volume of Wastewater (gallons)
SWMU 275 – TA-V Seepage Pits	1960s–1992	30 to 50 million
SWMU 5 – LWDS Drain Field	1962–1967	6.5 million
SWMU 4 – LWDS Surface Impoundments	1967–1972	12 million

NOTES:
LWDS = Liquid Waste Disposal System.
SWMU = Solid Waste Management Unit.
TA-V = Technical Area V.

In the vicinity of the TA-V seepage pits, trace quantities of TCE, tetrachloroethene, benzene, toluene, and total xylene were detected in shallow and deep vadose-zone borehole soil-vapor samples collected during passive, surficial characterization studies conducted during 1994 and 1995. Vapor-phase TCE was detected at 44 parts per billion (by volume) at a depth of 80 ft below ground surface in TAV-BH-01 (SNL March 1999a). Solvent disposals to the seepage pits were most likely reduced in the early 1980s, but wastewater disposal continued. This likely flushed into the aquifer any residual COCs that may have been present in the aqueous phase in the vadose zone.

Other surface contamination sites have been investigated at TA-V. Investigations have included surface and subsurface passive and active vapor-phase sampling for VOCs. Sampling results have shown that these other sites probably have not contributed to groundwater contamination. For example, only trace quantities of TCE, methylene chloride, trichloroethane, benzene, and toluene were detected in shallow soil samples collected at SWMU 196 (Building 6597 cistern).

Because TCE is a volatile organic compound, vapor transport of TCE in the vadose zone is a possible mechanism. TCE is a hydrophobic compound with water solubility of 1,100 mg/L at 20 degrees Celsius (ºC). Some TCE will be retained in the vadose zone due to sorption onto fine-grained materials and dissolution into soil water.

Nitrate is present primarily in the aqueous phase in both the vadose zone and the aquifer. It is typically nonsorptive and, for the most part, does not sorb onto matrix surfaces in the vadose zone or groundwater. Therefore, any locally derived nitrate most likely was transported through the vadose zone with the initial discharges of wastewater.

5.1.7.5 Contaminant Distribution and Transport in Groundwater

Distribution and transport of COCs are discussed in this section. TCE is present in low concentrations in the Santa Fe Group aquifer beneath TA-V. The highest TCE concentrations are located at three groundwater monitoring wells, LWDS-MW1, TAV-MW6, and TAV-MW10 (Figure 5-4), with TAV-MW6 and TAV-MW10 located at the SWMU 5 drain field and the SWMU 275 seepage pits, respectively. Even though LWDS-MW1 is not located at a potential source, maximum concentrations of TCE have occurred in LWDS-MW1, suggesting TCE contamination has migrated in the localized direction of groundwater flow.

This page intentionally left blank.

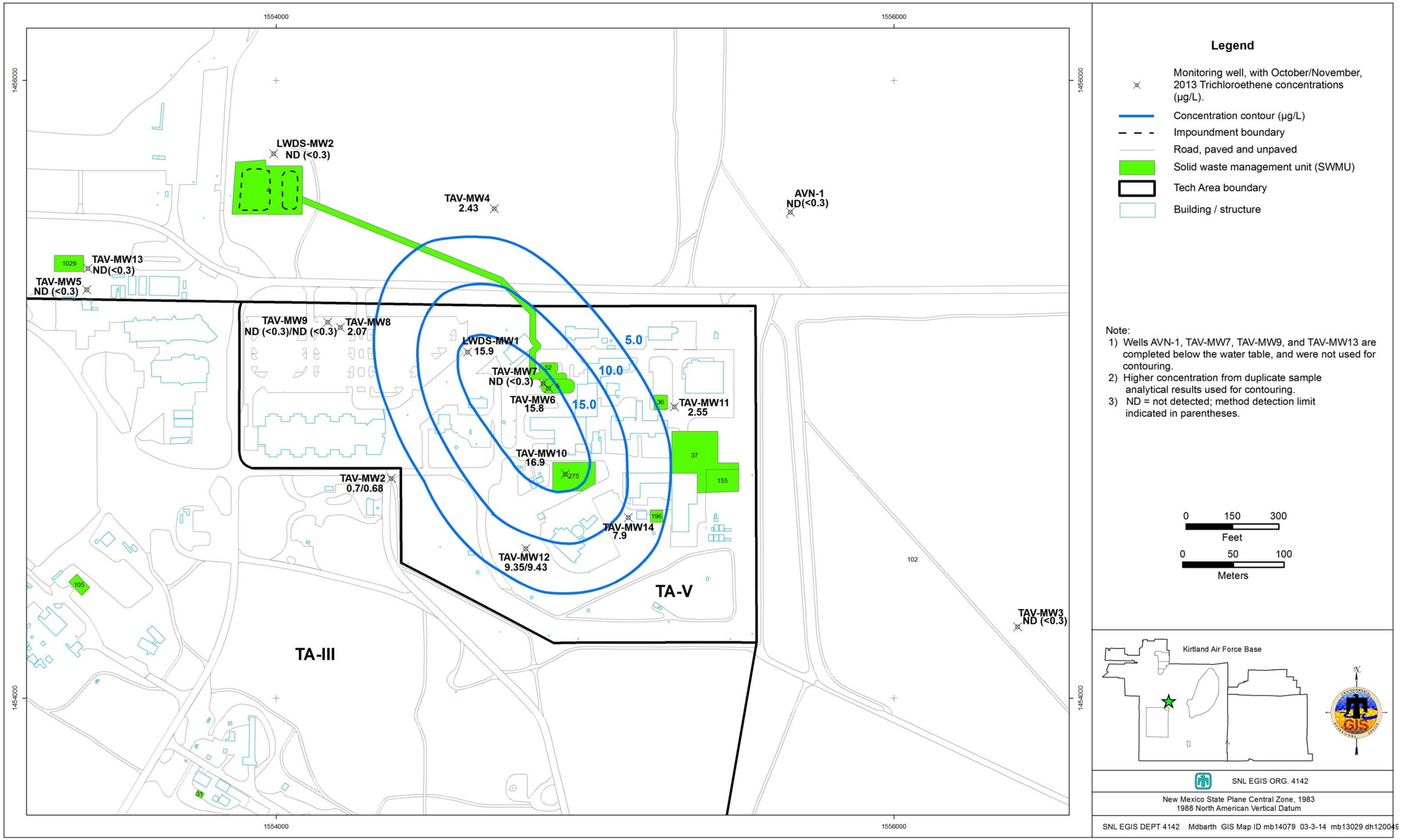


Figure 5-4. Distribution of TCE in Groundwater at SNL/NM TA-V, October/November 2013

THIS PAGE IS BACK OF 11X17 FIGURE

Maximum historical TCE concentrations reported at TA-V was 21.2 µg/L in the environmental sample for monitoring well LWDS-MW1 in May 2003. TCE has consistently exceeded the MCL at monitoring well LWDS-MW1 since 1993, and concentrations at monitoring wells TAV-MW6, TAV-MW10, TAV-MW12, and TAV-MW14 have exceeded the MCL during recent sampling events (Section 5.6). TCE has been found only in water table completion wells and has not been detected 90 ft below the water table based on data collected from deep monitoring wells TAV-MW7, TAV-MW9, and TAV-MW13.

Nitrate is present in groundwater in all monitoring wells at TA-V, generally at concentrations ranging from less than 5 to more than 10 mg/L (Figure 5-5). Nitrate concentrations have exceeded the MCL in samples from monitoring wells AVN-1, AVN-2, LWDS-MW1, TAV-MW5, and TAV-MW10, although the concentrations do not appear to be increasing over time. The highest reported concentrations for TA-V monitoring wells include the following:

- 13 mg/L for AVN-1 on May 14, 2001
- 16 mg/L for AVN-2 on October 27, 1999
- 19 mg/L for LWDS-MW1 on November 13, 2000, and February 16, 2001
- 13 mg/L for TAV-MW5 on August 18, 1999
- 13.7 mg/L for TAV-MW10 on October 20, 2010

Upgradient wells AVN-1 and AVN-2 were completed at different depths and show relatively consistent nitrate concentrations with depth and over time. AVN-2 is currently dry.

The source of nitrate in water from TA-V wells is unknown. Some nitrate may have been disposed of to the subsurface in TA-V sanitary wastes; however, nitrate concentrations exceeding the MCL in the AVN wells suggests that the source of nitrate is regionally upgradient and to the northeast of TA-V. The NMED-specified background concentration for nitrate in groundwater is 4 mg/L (Dinwiddie 1997).

5.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM ER Operations, as well as implements and enforces federal regulations mandated by the Resource Conservation and Recovery Act (RCRA). All ER SWMUs and Areas of Concern are listed in *Module IV: Hazardous and Solid Waste Amendment (HSWA) Portion for Solid Waste Management Units (Module IV to the RCRA Part B Permit, NM5890110518)* (NMED 1993).

Groundwater characterization for TA-V was initiated to satisfy the requirements of the SNL/NM RCRA Permit for characterization of SWMUs (NMED 1993). The groundwater monitoring activities for the TA-V Study Area are not associated with a single SWMU, but are more regional in nature and have historically been voluntarily conducted by SNL/NM ER Operations.

The Order, which became effective in April 2004, transferred regulatory authority for corrective action requirements from the HSWA Module of the SNL/NM RCRA permit to the Order (NMED April 2004). All corrective action requirements pertaining to the TA-V Study Area are contained in the Order (NMED April 2004). The TA-V investigations must comply with requirements set forth in the Order for site characterization and development of a CME. The Order also contains schedules that define dates for the delivery of plans and reports related to TA-V.

This page intentionally left blank.

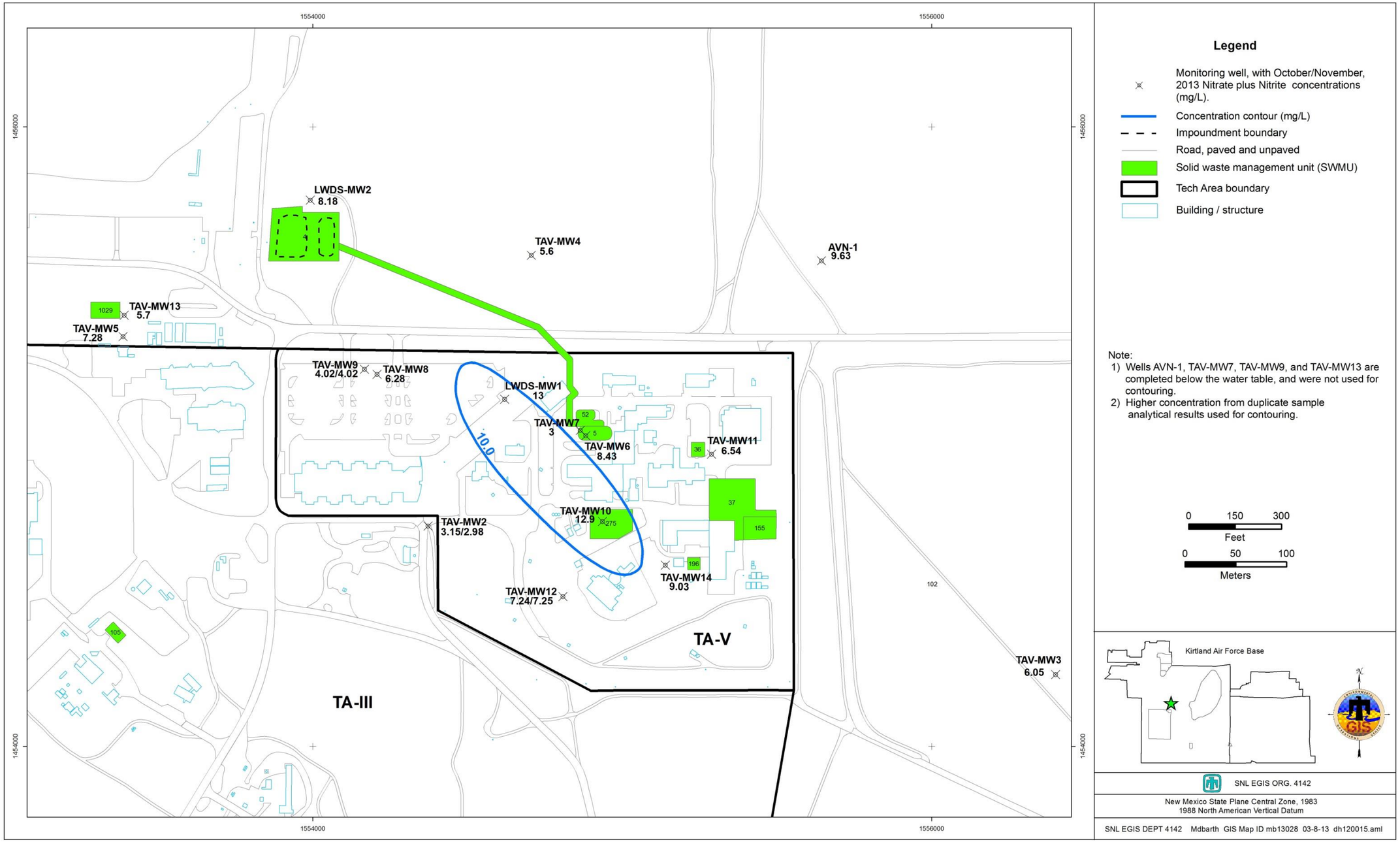


Figure 5-5. Distribution of Nitrate plus Nitrite in Groundwater at SNL/NM TA-V, October/November 2013

THIS PAGE IS BACK OF 11X17 FIGURE

Although the Order requires that the DOE/NNSA and Sandia evaluate the nature and extent of contamination in the TA-V Study Area in general terms, no specific reporting requirements are prescribed in the Order (NMED April 2004). DOE/NNSA and Sandia continue to present the TA-V data, along with the data from other groundwater sites, in this SNL/NM Annual Groundwater Monitoring Report. The outline of this report is based on the required elements of a "Periodic Monitoring Report" described in Section X.D. of the Order.

In this report TA-V groundwater monitoring data are presented for both hazardous and radioactive constituents; however, the analytical data for radionuclides (gamma spectroscopy, gross alpha/beta activity, and tritium) are provided voluntarily by the DOE/NNSA and Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Order. Additional information on radionuclides and the scope of the Order is available in Section III.A of the Order (NMED April 2004).

5.3 Scope of Activities

The activities for the TA-V investigation for CY 2013, including plans and reports, are listed in Section 5.1.5. The field activities completed in the study area include groundwater level measurements, soil-vapor monitoring, and groundwater monitoring. The CY 2013 groundwater sampling events (four quarterly events) are summarized in Table 5-4, and the analytical parameters for each well for each sampling event are listed in Table 5-5.

Table 5-4. Groundwater Monitoring Well Network and Sampling Dates for the TA-V Study Area, Calendar Year 2013

Date of Sampling Event	Wells Sampled	SAP
February/March 2013	AVN-1, LWDS-MW1, LWDS-MW2, TAV-MW2, TAV-MW4, TAV-MW6, TAV-MW8, TAV-MW10, TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14	*TA-V Groundwater Monitoring Mini-SAP for Second Quarter, Fiscal Year 2013* (SNL January 2013)
May/June 2013	AVN-1, LWDS-MW1, LWDS-MW2, TAV-MW2, TAV-MW3, TAV-MW4, TAV-MW5, TAV-MW6, TAV-MW7, TAV-MW8, TAV-MW9, TAV-MW10, TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14	*TA-V Groundwater Monitoring Mini-SAP for Third Quarter, Fiscal Year 2013* (SNL April 2013)
July/August 2013	AVN-1, LWDS-MW1, LWDS-MW2, TAV-MW2, TAV-MW4, TAV-MW6, TAV-MW8, TAV-MW10, TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14	*TA-V Groundwater Monitoring Mini-SAP for Fourth Quarter, Fiscal Year 2013* (SNL July 2013)
October/November 2013	AVN-1, LWDS-MW1, LWDS-MW2, TAV-MW2, TAV-MW3, TAV-MW4, TAV-MW5, TAV-MW6, TAV-MW7, TAV-MW8, TAV-MW9, TAV-MW10, TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14	*TA-V Groundwater Monitoring Mini-SAP for First Quarter, Fiscal Year 2014* (SNL September 2013)

NOTES:
AVN = Area V (North).
LWDS = Liquid Waste Disposal System.
MW = monitoring well.
SAP = Sampling and Analysis Plan.
TAV = Technical Area V (monitoring well designation only)
TA-V = Technical Area V.

Table 5-5. Parameters Sampled at TA-V Wells for Each Sampling Event, Calendar Year 2013

Parameter	February/March 2013	Parameter	May/June 2013
Alkalinity Calcium, total Chloride Iron, dissolved Magnesium, total Manganese, dissolved NPN Potassium, total Sodium, total Sulfate Sulfides Total Organic Carbon VOCs	AVN-1 LWDS-MW1 LWDS-MW1 (dup) LWDS-MW2 TAV-MW2 TAV-MW4 TAV-MW6 TAV-MW8 TAV-MW8 TAV-MW10 TAV-MW11 TAV-MW12 TAV-MW13 TAV-MW14 TAV-MW14 (dup)	Alkalinity Calcium, total Chloride Iron, dissolved Magnesium, total Manganese, dissolved NPN Potassium, total Sodium, total Sulfate Sulfides Total Organic Carbon VOCs	AVN-1 LWDS-MW1 LWDS-MW2 LWDS-MW2 (dup) TAV-MW2 TAV-MW3 TAV-MW4 TAV-MW5 TAV-MW6 TAV-MW7 TAV-MW7 (dup) TAV-MW8 TAV-MW9 TAV-MW10 TAV-MW11 TAV-MW12 TAV-MW13 TAV-MW13 (dup) TAV-MW14
Parameter	**July/August 2013**	**Parameter**	**October/November 2013**
Alkalinity Anions Gamma Spec* Gross Alpha Gross Beta NPN Sulfides TAL Metals, plus Total Uranium Total Organic Carbon Tritium VOCs	AVN-1 LWDS-MW1 LWDS-MW2 TAV-MW2 TAV-MW4 TAV-MW6 TAV-MW6 (dup) TAV-MW8 TAV-MW10 TAV-MW11 TAV-MW11 (dup) TAV-MW12 TAV-MW13 TAV-MW14	Alkalinity Calcium, total Chloride Iron, dissolved Magnesium, total Manganese, dissolved NPN Potassium, total Sodium, total Sulfate Total Organic Carbon VOCs	AVN-1 LWDS-MW1 LWDS-MW2 TAV-MW2 TAV-MW2 (dup) TAV-MW3 TAV-MW4 TAV-MW5 TAV-MW6 TAV-MW7 TAV-MW8 TAV-MW9 TAV-MW9 (dup) TAV-MW10 TAV-MW11 TAV-MW12 TAV-MW12 (dup) TAV-MW13 TAV-MW14

NOTES:

AVN = Area V (North).
dup = Duplicate sample.
Gamma Spec* = Gamma spectroscopy short list (Americium-241, Cesium-137, Cobalt-60, and Potassium-40).
LWDS = Liquid Waste Disposal System.
MW = monitoring well.
NPN = Nitrate plus nitrite (reported as nitrogen).
TAL = Target Analyte List.
TAV = Technical Area V (monitoring well designation only)
TA-V = Technical Area V.
VOC = Volatile organic compound.

Quality control (QC) samples are collected in the field at the time of environmental sample collection. Field QC samples include duplicate environmental, equipment blank (EB), field blank (FB), and trip blank (TB) samples. Field QC samples are used to monitor the sampling process. Duplicate environmental samples are used to measure the precision of the sampling process. EB samples are used to verify the effectiveness of sampling equipment decontamination procedures. FB samples are collected for VOCs to assess whether contamination of the samples had resulted from ambient field conditions. The FB sample was prepared by pouring deionized water into sample containers at the sample point to simulate the transfer of environmental samples from the sampling system to the sample container. TB samples are used to determine whether VOCs contaminated the sample during preparation, transportation, or handling prior to receipt by the analytical laboratory. In addition, split samples are used to verify the performance of the analytical laboratory.

5.4 Field Methods and Measurements

The monitoring procedures conducted for TA-V groundwater monitoring are described in detail in Section 1.3. The water level information obtained in 2013 was used to develop the potentiometric surface map presented in Figure 5-3 and the hydrographs presented in Figures 5C-1 through 5C-3 (Attachment 5C).

5.5 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using EPA-specified protocols described in Section 1.3.2 (Tables 1-5 and 1-6).

5.6 Summary of Analytical Results

This section discusses monitoring results, exceedances of standards, and pertinent trends in concentrations for COCs in the TA-V Study Area that exceed regulatory standards. The analytical results and field measurements for all TA-V sampling events are presented in Attachment 5A, Tables 5A-1 through 5A-9; concentration trend plots for COCs that exceed the MCLs are presented in Attachment 5B, Figures 5B-1 through 5B-8. A summary of detected VOC results are presented in Table 5A-1. The method detection limits (MDLs) for all analyzed VOCs are listed in Table 5A-2.

The VOCs detected at concentrations above the MDL in groundwater samples from TA-V Study Area monitoring wells include the following:

- Chloroform
- cis-1,2-Dichloroethene
- TCE
- Toluene

Four VOCs were detected during CY 2013. Three of these VOCs have promulgated MCLs. Only TCE exceeds its corresponding MCL, which is 5 μg/L (Table 5A-1). TCE was detected above the MCL in samples from five monitoring wells: LWDS-MW1, TAV-MW6, TAV-MW10, TAV-MW12, and TAV-MW14. The maximum concentration of TCE detected during this reporting period is 18.4 μg/L in the sample collected from monitoring well LWDS-MW1 in March 2013. Figures 5B-1, 5B-2, 5B-3, 5B-4, and 5B-5 (Attachment 5B) demonstrate that, over the lifetime of the wells, the TCE concentrations are decreasing over time in monitoring well LWDS-MW1, increasing over time in monitoring wells TAV-MW6, TAV-MW10, and TAV-MW12, and remain relatively steady in TAV-MW14. Concentrations in TAV-MW6 have become relatively steady since 2011.

The analytical results for nitrate plus nitrite (NPN) (reported as nitrogen) are presented in Table 5A-3 (Attachment 5A). During this reporting period, NPN results exceed the MCL of 10 mg/L in samples from monitoring wells LWDS-MW1, TAV-MW10, and AVN-1. The maximum concentration of NPN detected during this reporting period is 13.0 mg/L in the sample collected from monitoring well LWDS-MW1 in November 2013. SNL/NM personnel requested a reanalysis of the TAV-MW6 environmental sample and environmental duplicate from the July/August sampling event because initial results were much greater than historical values. The initial analysis reported NPN at 79.6 mg/L in the environmental sample and 76.7 mg/L in the environmental duplicate sample. The reanalysis reported respective values at 8.48 mg/L and 8.65 mg/L. The original results were qualified as unusable during data validation because results were inconsistent with reanalysis and a dilution recording error was suspected.

Figure 5B-6 (Attachment 5B) demonstrates that the NPN concentrations in monitoring well LWDS-MW1 typically have exceeded the MCL and remained relatively stable over time. Figure 5B-7 (Attachment 5B) demonstrates that NPN concentrations in monitoring well TAV-MW10 have slightly exceeded the MCL with the trend increasing over time. Figure 5B-8 demonstrates that the NPN concentration in monitoring well AVN-1 occasionally exceeds the MCL.

The analytical results for anions (bromide, chloride, fluoride, and sulfate), alkalinity, and sulfides are presented in Table 5A-4 (Attachment 5A). Only fluoride has a promulgated MCL, and none of the results exceed the MCL.

Total organic carbon (TOC) results are presented in Table 5A-5 (Attachment 5A); no MCL is established for TOC.

Total metal results are presented in Table 5A-6, and filtered total metal results are presented in Table 5A-7; no metal results exceed established MCLs (Attachment 5A).

Gross alpha activity is measured as a screening tool and in accordance with 40 Code of Federal Regulations, Parts 9, 141, and 142, Table I-4 does not include uranium, which is measured independently. Therefore, gross alpha activity measurements were corrected by subtracting the total uranium activity. Radiological results are further reviewed by an SNL/NM Certified Health Physicist to assure that the samples are nonradioactive. Tritium, gross alpha/beta activity, and gamma spectroscopy results are presented in Table 5A-8; all radionuclide results are below established MCLs (Attachment 5A).

Field water quality parameters were measured during purging of each well prior to sampling and included temperature, specific conductivity, oxidation-reduction potential, potential of hydrogen (pH), turbidity, and dissolved oxygen. The parameter measurements obtained immediately before sample collection are presented in Table 5A-9 (Attachment 5A).

5.7 Quality Control Results

Field and laboratory QC samples were collected and prepared as described in Section 1.3. Data validation qualifiers are presented with the analytical results in Tables 5A-1 through 5A-8 (Attachment 5A). The results of QC samples and the impact on data quality for the TA-V quarterly sampling events are discussed in the following sections.

Duplicate sampling results for all wells and all sampling periods show good correlation (relative percent difference [RPD] values of less than 20 for VOCs and less than 35 for inorganic constituents) for all calculated parameters except for aluminum in monitoring well LWDS-MW2 sample and manganese in monitoring sample TAV-MW13 during the May/June 2013 sampling event. The RPD for aluminum was calculated at 37, but is considered an estimated value because the result for the environmental sample is below the practical quantitation limit. The RPD for manganese was calculated at 61.

The results for the EB analyses are as follows:

- **February/March 2013 Sampling Event—**EB samples were collected prior to sampling monitoring wells LWDS-MW1 and TAV-MW14 and submitted for all analyses. Alkalinity, bromodichloromethane, bromoform, calcium, chloride, chloroform, dibromochloromethane, sodium, sulfate, and TCE were detected in EB samples. No correction was required, because these parameters were not detected in environmental samples nor were reported values in environmental samples greater than five times the EB concentration.

- **May/June 2013 Sampling Event—**EB samples were collected prior to sampling monitoring wells LWDS-MW2, TAV-MW7, and TAV-MW13 and submitted for all analyses. Various VOCs, metals, chloride, and TOC were detected in EB samples. No correction was necessary for analytes not detected in environmental samples, or parameters detected in environmental samples at concentrations greater than five times the EB result. Copper and TOC in LWDS-MW2, TAV-MW7, and TAV-MW13 samples were qualified as not detected during data validation, because detected values were less than five times the EB concentrations. Iron in TAV-MW13 samples was qualified as not detected during data validation, because detected values are less than five times the EB concentration. Cobalt and zinc in LWDS-MW2 samples were qualified as not detected during data validation, because detected values are less than five times the EB concentration.

- **July/August 2013 Sampling Event**— EB samples were collected prior to sampling monitoring wells TAV-MW6 and TAV-MW11 and submitted for all analyses. Alkalinity, calcium, chloroform, methylene chloride, and TOC were detected in EB samples. No correction was required for alkalinity, calcium, and chloroform, because these parameters were not detected in environmental samples, nor were reported values in environmental samples greater than five times the equipment blank concentration. The EB sample associated with TAV-MW11 detected methylene chloride and TOC #2 at concentrations less than five times the environmental samples. Both methylene chloride and TOC #2 were qualified as not detected during data validation due to blank contamination.

- **October/November 2013 Sampling Event—**EB samples were collected prior to sampling monitoring wells TAV-MW2, TAV-MW9, and TAV-MW12 and submitted for all analyses. Acetone, alkalinity, bromodichloromethane, bromoform, calcium, chloride, chloroform, dibromochloromethane, and TOC were detected in EB samples. No correction was required for acetone, bromodichloromethane, bromoform, chloride, calcium, chloroform, dibromochloromethane, because these parameters were not detected in environmental samples, nor were reported values in environmental samples greater than five times the equipment blank concentration. The EB sample associated with TAV-MW2 detected acetone at a concentration less than ten times the environmental sample. TOC was detected in all EB samples at concentrations less than five times the associated environmental samples. Acetone in TAV-MW2 and TOC in TAV-MW2, TAV-MW9, and TAV-MW12 were qualified as not detected during data validation due to blank contamination.

The results for the FB analyses are as follows:

- **February/March 2013 Sampling Event—**FB samples were collected at monitoring wells TAV-MW2 and TAV-MW6. The compounds detected in FB samples included bromodichloromethane, bromoform, chloroform, and dibromochloromethane. No correction was required because these compounds were not detected in associated environmental samples, except for bromodichloromethane. Bromodichloromethane was detected in the field blank sample at a concentration greater than the environmental sample result from TAV-MW6. As a result, this compound was qualified as not detected during data validation for the TAV-MW6 environmental sample.

- **May/June 2013 Sampling Event—**FB samples were collected at monitoring wells LWDS-MW1, TAV-MW8, TAV-MW9, and TAV-MW14. The compounds detected in FB samples included acetone, bromodichloromethane, bromoform, chloroform, and dibromochloromethane. No correction was required because these compounds were not detected in associated environmental samples.

- **July/August 2013 Sampling Event—**FB samples were collected at monitoring wells AVN-1, LWDS-MW2, and TAV-MW10. The compounds detected in FB samples included bromodichloromethane, chloroform, dibromochloromethane, methylene chloride, and TCE. No correction was required because these compounds were not detected in associated environmental samples, except for methylene chloride and TCE. Both methylene chloride and TCE were detected in the FB sample at concentrations less than five times the environmental sample result from TAV-MW10. These compounds were qualified as not detected during data validation for the TAV-MW10 environmental sample, although the TCE concentration (16.4 µg/L) is similar to historical values.

- **October/November 2013 Sampling Event—**FB samples were collected at AVN-1, TAV-MW6, TAV-MW8, and TAV-MW10. The compounds detected in FB samples included acetone, bromodichloromethane, bromoform, chloroform, dibromochloromethane, and TCE. No correction was required because these compounds were not detected in associated environmental samples, except for TCE. TCE was reported in the FB sample associated with TAV-MW8, at a concentration less than five times the environmental sample. This result should be qualified as not detected; however, historical data reviewed during data validation indicates evidence of TCE in the environmental sample. The TCE result in the environmental sample is retained based on historical concentrations.

The results for the TB analyses are as follows:

- **February/March 2013 Sampling Event—** TBs were brought to the field and accompanied each sample shipment. A total of 14 VOC TB samples were submitted with February and March 2013 samples. No VOCs were detected above associated laboratory MDLs.

- **May/June 2013 Sampling Event—** TBs were brought to the field and accompanied each sample shipment. A total of 19 VOC TB samples were submitted with May and June 2013 samples. No VOCs were detected above associated laboratory MDLs.

- **July/August 2013 Sampling Event—** TBs were brought to the field and accompanied each sample shipment. A total of 14 VOC TB samples were submitted with July and August 2013 samples. No VOCs were detected above associated laboratory MDLs, except

methylene chloride. Methylene chloride was detected in TB samples associated with LWDS-MW2, TAV-MW2, TAV-MW11, and TAV-MW13 samples. Methylene chloride is reported at similar concentrations as the associated environmental samples. As a result, the affected environmental samples were qualified as not detected during data validation.

- **October/November 2013 Sampling Event—**TBs were brought to the field and accompanied each sample shipment. A total of 19 VOC TB samples were submitted with October and November 2013 samples. No VOCs were detected above associated laboratory MDLs.

5.8 Variances and Nonconformances

No variances or nonconformances from requirements specified in the TA-V Mini- SAPs (SNL January 2013, SNL April 2013, SNL July 2013, and SNL September 2013) were identified during CY 2013 sampling activities. However, the following project-specific issues associated with these sampling events were noted:

- **All Sampling Events—**Monitoring well LWDS-MW1 was purged dry prior to minimum volume and stability requirements. Given the low yield of this well, it was allowed to recover and then sampled to collect a representative groundwater sample.

- **February/March 2013 Sampling Event—**The TA-V parking lot was repaved during TA-V monitoring activities. Sampling at monitoring wells TAV-MW8 and LWDS-MW1 were performed upon completion of the parking lot.

- **May/June 2013 Sampling Event—**A new groundwater sample truck was operated from May 26 to June 12, 2013. On June 6, 2013 field team personnel indicated heavy exhaust fumes inside the sample truck. As a result, an extra FB sample was collected on June 10, 2013. No abnormal samples results were discovered from environmental or field QC samples. Field team personnel have requested repairs or modifications to the exhaust system.

- **July/August 2013 Sampling Event—**There was limited access to monitoring wells TAV-MW6, TAV-MW10, and LWDS-MW1 due to field activities associated with SWMU 52. The sampling schedule was adjusted around the SWMU 52 activities. Heavy vehicle traffic from SWMU 52 activities, such as cement trucks and heavy equipment, occurred during the July 2013 sampling event.

- **October/November 2013 Sampling Event—**The color of groundwater from TAV-MW9 had a yellow tint, and groundwater odor was sulfur-like. All analytical results from TAV-MW9 are comparable to historical values. TCE was detected in the FB sample associated with TAV-MW8. SNL/NM personnel are collecting additional field QC samples to evaluate these anomalies. The NMED DOE Oversight Bureau (OB) collected split samples with DOE/NNSA and Sandia during the October/November 2013 sampling event at monitoring wells TAV-MW3, TAV-MW4, TAV-MW7, TAV-MW9, TAV-MW10, and TAV-MW12. The NMED DOE OB analytical results are not reported in this document, but are available through DOE/NNSA Sandia Field Office.

5.9 Summary and Conclusions

The conceptual site model of contaminant transport at TA-V includes release from the two primary sources, migration through the vadose zone, and movement into and along with groundwater. TCE and other organic chemicals were present in wastewater that was discharged to the underground LWDS drain field during the period from 1962 to 1967, and to the TA-V seepage pits from the 1960s until the early 1980s. Wastewater discharged to the seepage pits from the early 1980s until 1992 contained no TCE.

Wastewater containing dissolved concentrations of TCE and other organic chemicals moved rapidly downward through the alluvial-fan lithofacies and into the regional aquifer. Upon cessation of wastewater disposal, vertical pathways through the vadose zone drained rapidly. Continued flushing of the vadose zone beneath the seepage pits that occurred until 1992 removed a significant portion of residual COCs present in the vadose zone. Rapid drainage and continued flushing removed significant secondary contaminant sources. Low concentrations of TCE present in the regional aquifer today represent these initial wastewater releases. The combined effect of low groundwater velocities, dispersion, and dilution are responsible for the current distribution of TCE in the regional aquifer.

TCE results exceed the MCL of 5 μg/L in samples from monitoring wells LWDS-MW1, TAV-MW6, TAV-MW10, TAV-MW12, and TAV-MW14. The maximum concentration of TCE detected during this reporting period is 18.4 μg/L in the sample collected from monitoring well LWDS-MW1 in March 2013.

Nitrate concentrations in groundwater at TA-V are primarily derived from unknown upgradient sources. During this reporting period, NPN results exceed the MCL of 10 mg/L in samples from monitoring wells LWDS-MW1, TAV-MW10, and AVN-1. The maximum concentration of NPN detected during this reporting period is 13.0 mg/L in the sample collected from monitoring well LWDS-MW1 in November 2013.

The analytical results for this reporting period are consistent with historical detections. The following conclusions are based on a comprehensive review of available information for current groundwater contamination conditions in the TA-V Study Area:

- The primary COCs for the TA-V Study Area are TCE and nitrate.
- The primary sources of TCE and possibly nitrate in the TA-V Study Area consist of two wastewater disposal systems (SWMUs 5 and 275). An upgradient source of nitrate may be present.
- Based on the historical use and disposal of chlorinated solvents, the extent of TCE in groundwater is associated with multiple TA-V wastewater releases containing VOCs and the subsequent transport of these VOCs through the vadose zone to the water table.
- The distribution of low concentrations of TCE in the regional aquifer is principally attributed to the combined effect of low groundwater velocities, dispersion, and dilution.
- The distribution of nitrate above the background level is laterally widespread in the study area, but the lateral extent of nitrate above the MCL is limited. The extent of the 10 mg/L concentration contour in 2013, which accounts for the nitrate contamination in the center of TA-V, has remained relatively stable. An unknown upgradient source probably contributes to the nitrate in the two AVN wells.

Ongoing environmental studies of the TA-V Study Area include the following:

- Continue obtaining periodic measurements of groundwater elevations in all TA-V monitoring wells.
- Continue collecting groundwater samples at the 16 TA-V groundwater monitoring wells. At a minimum, the analytes for groundwater sampling will consist of VOCs and NPN.
- Continue reporting TA-V monitoring results in future SNL/NM Annual Groundwater Monitoring Reports.
- Update the Current Conceptual Model (SNL April 2004a) and the CME Report (SNL July 2005).

5.10 References

Bartolino and Cole 2002 Bartolino, J.R., and J.C. Cole, 2002. *Groundwater Resources of the Middle Rio Grande Basin*, U.S. Geological Survey, Circular 1222, http://water.usgs.gov/pubs/circ/2002/circ1222/.

Dinwiddie 1997 Dinwiddie, R.S., 1997. Request for Supplemental Information: Background Concentrations Report, SNL/KAFB. Letter from R.S. Dinwiddie, New Mexico Environment Department, Hazardous & Radioactive Materials Bureau, to M.J. Zamorski, U.S. Department of Energy, Kirtland Area Office, September 24, 1997.

DOE March 2006 U.S. Department of Energy (DOE), March 2006. Letter to the New Mexico Environment Department requesting permission to remove well AVN-2 from the TA-V monitoring well network, U.S. Department of Energy, National Nuclear Security Administration, Sandia Site Office, Albuquerque, New Mexico, March 26, 2006.

DOE October 2005 U.S. Department of Energy (DOE), October 2005. Letter to the New Mexico Environment Department requesting change of sampling frequency for TA-V groundwater monitoring wells, U.S. Department of Energy, National Nuclear Security Administration, Sandia Site Office, Albuquerque, New Mexico, October 28, 2005.

DOE October 1998 U.S. Department of Energy (DOE), October 1998. *Liquid Waste Disposal System Cross Sections in Response to the NMED September 1997 LWDS Request for Supplemental Information*, U.S. Department of Energy, Albuquerque Operations Office, Kirtland Area Office, Albuquerque, New Mexico.

DOE March 1996 U.S. Department of Energy (DOE), March 1996. Notification letter from DOE to the New Mexico Environment Department (NMED) regarding detection of nitrate in well LWDS-MW1, U.S. Department of Energy, Albuquerque Operations Office, Kirtland Area Office, Albuquerque, New Mexico.

DOE June 1994 U.S. Department of Energy (DOE), June 1994. Notification letter from DOE to the U.S. Environmental Protection Agency regarding detection of trichloroethylene in well LWDS-MW1, U.S. Department of Energy, Albuquerque Operations Office, Kirtland Area Office, Albuquerque, New Mexico, June 10, 1994.

IT June 1995 IT Corporation (IT), June 1995. *1994 Water Quality Study for Technical Area V, Sandia National Laboratories/New Mexico*, prepared by IT Corporation, Albuquerque, New Mexico.

NMED December 2010 New Mexico Environment Department (NMED), December 2010. *Modification of Soil-Vapor Monitoring Well Design, TA-V Groundwater Investigation Work Plan, February 2010, Sandia National Laboratories EPA ID# NM5890110518, HWB-SNL-05-027*, New Mexico Environment Department, Santa Fe, New Mexico, December 23, 2010.

NMED May 2010 New Mexico Environment Department (NMED), May 2010. *Notice of Conditional Approval, SNL Responses to NMED December 2009 NOD issued for TA-V Groundwater Investigation Work Plan Associated with TA-V Groundwater CME Report, July 2005, Sandia National Laboratories EPA ID# NM5890110518, HWB-SNL-05-027*, New Mexico Environment Department, Santa Fe, New Mexico.

NMED December 2009 New Mexico Environment Department (NMED), December 2009. *Notice of Disapproval: Corrective Measures Evaluation Report for Technical Area V Groundwater, July 2005–November 2009 Response to Notice of Deficiency, Sandia National Laboratories EPA ID# NM5890110518, HWB-SNL-05-027*, New Mexico Environment Department, Santa Fe, New Mexico, December 22, 2009.

NMED August 2009 New Mexico Environment Department (NMED), August 2009. *Notice of Disapproval: DOE/Sandia Responses to NMED's Notice of Disapproval for Corrective Measures Evaluation Report for Technical Area V Groundwater, July 2005, Sandia National Laboratories EPA ID# NM5890110518, HWB-SNL-05-027*, New Mexico Environment Department, Santa Fe, New Mexico, August 12, 2009.

NMED April 2009 New Mexico Environment Department (NMED), April 2009. *RE: Perchlorate Contamination in Groundwater, Sandia National Laboratories, EPA ID#NM5890110518*, New Mexico Environment Department, Santa Fe, New Mexico. April 30, 2009.

NMED July 2008 New Mexico Environment Department (NMED), July 2008. *Notice of Disapproval: Corrective Measures Evaluation Report for Technical Area V Groundwater, July 2005, Sandia National Laboratories NM5890110518, HWB-SNL-05-027*, New Mexico Environment Department, Santa Fe, New Mexico, July 28, 2008.

NMED October 2004 New Mexico Environment Department (NMED), October 2004. *Approval With Modifications: Corrective Measures Evaluation Work Plan, Technical Area V Groundwater, April 2004; and Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Technical Area-V, April 2004, Sandia National Laboratories NM5890110518, HWB-SNL-03-009*, New Mexico Environment Department, Santa Fe, New Mexico, October 22, 2004.

NMED April 2004 New Mexico Environment Department (NMED), April 2004. *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order*, New Mexico Environment Department, Santa Fe, New Mexico, April 29, 2004.

NMED September 1997 New Mexico Environment Department (NMED), September 1997. *Request For Supplemental Information, Liquid Waste Disposal System RFI Report, Sandia National Laboratories, March 1996*, New Mexico Environment Department, Santa Fe, New Mexico.

NMED 1993 New Mexico Environment Department (NMED), 1993. *Module IV: Hazardous and Solid Waste Amendment (HSWA) Portion for Solid Waste Management Units (Module IV to the RCRA Part B Permit, NM5890110518)*, New Mexico Environment Department, Santa Fe, New Mexico.

NMOSE May 1959 New Mexico Office of the State Engineer (NMOSE), May 1959. State Engineer Office Well Record for Well KAFB-10, drilled for the U.S. Atomic Energy Commission at Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2013 Sandia National Laboratories, New Mexico (SNL/NM), September 2013. *TA-V Groundwater Monitoring Mini-SAP for First Quarter, Fiscal Year 2014*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, September 12, 2013.

SNL July 2013 Sandia National Laboratories, New Mexico (SNL/NM), July 2013. *TA-V Groundwater Monitoring Mini-SAP for Fourth Quarter, Fiscal Year 2013*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, July 1, 2013.

SNL June 2013 Sandia National Laboratories, New Mexico (SNL/NM), June 2013. *Annual Groundwater Monitoring Report, Calendar Year 2012, Long-Term Stewardship Consolidated Groundwater Monitoring Program*, Long-Term Stewardship and Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL April 2013 Sandia National Laboratories, New Mexico (SNL/NM), April 2013. *TA-V Groundwater Monitoring Mini-SAP for Third Quarter, Fiscal Year 2013*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, April 29, 2013.

SNL January 2013 Sandia National Laboratories, New Mexico (SNL/NM), January 2013. *TA-V Groundwater Monitoring Mini-SAP for Second Quarter, Fiscal Year 2013*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, January 25, 2013.

SNL September 2012 Sandia National Laboratories, New Mexico (SNL/NM), September 2012. *Annual Groundwater Monitoring Report, Calendar Year 2011 Groundwater Protection Program*, Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2011 Sandia National Laboratories, New Mexico (SNL/NM), September 2011. *Annual Groundwater Monitoring Report, Calendar Year 2010 Groundwater Protection Program*, Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL July 2011 Sandia National Laboratories, New Mexico (SNL/NM), July 2011. *Meeting Notes from Technical Discussions with the New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB), July 6, 2011, 9:00 – 10:30 at NMED Region 1 Office*. Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, July 6, 2011.

SNL June 2011 Sandia National Laboratories, New Mexico (SNL/NM), June 2011. *Summary Report for Technical Area-V Groundwater and Soil-Vapor Monitoring Well Installation*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, June 30, 2011.

SNL November 2010 Sandia National Laboratories, New Mexico (SNL/NM), November 2010. *Slug Test Results and Geophysical Logs for the Four New Technical Area V (TA-V) Ground Water Monitoring Wells*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, November 24, 2010.

SNL October 2010 Sandia National Laboratories, New Mexico (SNL/NM), October 2010. *Annual Groundwater Monitoring Report, Calendar Year 2009 Groundwater Protection Program*, Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL February 2010 Sandia National Laboratories, New Mexico (SNL/NM), February 2010. *DOE/Sandia Responses to NMED's comments in Notice of Disapproval: Corrective Measures Evaluation Report for Technical Area V Groundwater, July 2005—November 2009 Response to Notice of Deficiency, Sandia National Laboratories, EPA ID# NM5890110518 HWB-SNL-05-027*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, February 22, 2010.

SNL November 2009 Sandia National Laboratories, New Mexico (SNL/NM), November 2009. *DOE/Sandia Responses to NMED's Notice of Disapproval: DOE/Sandia Responses to NMED's Notice of Disapproval for Corrective Measures Evaluation Report for Technical Area V Groundwater, July 2005 Sandia National Laboratories, EPA ID# NM5890110518 HWB-SNL-05-027*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, November 16, 2009.

SNL June 2009 Sandia National Laboratories, New Mexico (SNL/NM), June 2009. *Annual Groundwater Monitoring Report Calendar Year 2008, Groundwater Protection Program*, Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL April 2009 Sandia National Laboratories, New Mexico (SNL/NM), April 2009. *DOE/Sandia Responses to NMED's Notice of Disapproval for Corrective Measures Evaluation Report for Technical Area V Groundwater, July 2005 Sandia National Laboratories, EPA ID# NM5890110518 HWB-SNL-05-027*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico, April 14, 2009.

SNL October 2008 Sandia National Laboratories, New Mexico (SNL/NM), October 2008. Memo from M. Sanders (GRAM, Inc.) to T. Jackson and S. Ricketson (GRAM, Inc.), *Subject: TA-V Groundwater Monitor Well Re-Survey*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico, October 22, 2008.

SNL June 2008 Sandia National Laboratories, New Mexico (SNL/NM), June 2008. *Summary Report for Technical Area V Monitoring Well Plug and Abandonment and Installation, Decommissioning Monitoring Well TAV-MW1, Installation of Groundwater Monitoring Well TAV-MW10,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 2008 Sandia National Laboratories, New Mexico (SNL/NM), March 2008. *Annual Groundwater Monitoring Report, Fiscal Year 2007*, Groundwater Protection Program, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 2007 Sandia National Laboratories, New Mexico (SNL/NM), March 2007. *Annual Groundwater Monitoring Report, Fiscal Year 2006*, Groundwater Protection Program, Sandia National Laboratories, Albuquerque, New Mexico.

SNL November 2006 Sandia National Laboratories, New Mexico (SNL/NM), November 2006. *Annual Groundwater Monitoring Report, Burn Site Groundwater, Tijeras Arroyo Groundwater, and Technical Area V Groundwater Areas of Concern, Fiscal Year 2005*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL October 2005 Sandia National Laboratories, New Mexico (SNL/NM), October 2005. *Annual Groundwater Monitoring Report, Fiscal Year 2004*, Groundwater Protection Program, Sandia National Laboratories, Albuquerque, New Mexico.

SNL July 2005 Sandia National Laboratories, New Mexico (SNL/NM), July 2005. *Corrective Measures Evaluation Report for Technical Area V Groundwater*, SAND Report SAND2005-4492, Sandia National Laboratories, Albuquerque, New Mexico.

SNL December 2004 Sandia National Laboratories, New Mexico (SNL/NM), December 2004. *Corrective Measures Evaluation Work Plan, Technical Area V Groundwater, Revision 0*, SAND Report SAND2004-6113, Sandia National Laboratories, Albuquerque, New Mexico.

SNL April 2004a Sandia National Laboratories, New Mexico (SNL/NM), April 2004. *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Technical Area-V*, SAND Report SAND2004-1470, Sandia National Laboratories, Albuquerque, New Mexico.

SNL April 2004b Sandia National Laboratories, New Mexico (SNL/NM), April 2004. *Corrective Measures Evaluation Work Plan, Technical Area V Groundwater*, SAND Report SAND2004-1471, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 2004 Sandia National Laboratories, New Mexico (SNL/NM), March 2004. *Annual Groundwater Monitoring Report, Fiscal Year 2003*, Groundwater Protection Program, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 2003 Sandia National Laboratories, New Mexico (SNL/NM), March 2003. *Annual Groundwater Monitoring Report, Fiscal Year 2002*, Groundwater Protection Program, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 2002 Sandia National Laboratories, New Mexico (SNL/NM), March 2002. *Annual Groundwater Monitoring Report, Fiscal Year 2001*, Groundwater Protection Program, Sandia National Laboratories, Albuquerque, New Mexico.

SNL November 2001 Sandia National Laboratories, New Mexico (SNL/NM), November 2001. *TA-V Groundwater Investigation, Fiscal Years 1999 and 2000*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL October 2001 Sandia National Laboratories, New Mexico (SNL/NM), October 2001. *Summary of Monitoring Well Drilling Activities, TA-V Groundwater Investigation*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL April 2001 Sandia National Laboratories, New Mexico (SNL/NM), April 2001. *Annual Groundwater Monitoring Report, Fiscal Year 2000*, Groundwater Protection Program, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 2000 Sandia National Laboratories, New Mexico (SNL/NM), March 2000, *Annual Groundwater Monitoring Report, Fiscal Year 1999*, Groundwater Protection Program, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 1999a Sandia National Laboratories, New Mexico (SNL/NM), March 1999. *Summary Report of Groundwater Investigations at Technical Area V Operable Units 1306 and 1307 (2 Volumes)*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 1999b Sandia National Laboratories, New Mexico (SNL/NM), March 1999. *Groundwater Protection Program, Fiscal Year 1998, Annual Groundwater Monitoring Report*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 1998 Sandia National Laboratories, New Mexico (SNL/NM), March 1998. *Groundwater Protection Program, Calendar Year 1997 Annual Groundwater Monitoring Report*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL February 1998 Sandia National Laboratories, New Mexico (SNL/NM), February 1998. *Revised Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL January 1998 Sandia National Laboratories, New Mexico (SNL/NM), January 1998. *Response to the NMED "Request For Supplemental Information Liquid Waste Disposal System RFI Report, Sandia National Laboratories March 1996*, Sandia National Laboratories, Environmental Restoration Project, Albuquerque, New Mexico, January 15, 1998.

SNL March 1997 Sandia National Laboratories, New Mexico (SNL/NM), March 1997. *Groundwater Protection Program, Calendar Year 1996 Annual Groundwater Monitoring Report*, Sandia National Laboratories, Environmental Restoration Project, Albuquerque, New Mexico.

SNL April 1996 Sandia National Laboratories, New Mexico (SNL/NM), April 1996. *Site-Wide Hydrogeologic Characterization Project, KAFB-10 Well Abandonment Plan*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 1996 Sandia National Laboratories, New Mexico (SNL/NM), March 1996. *Groundwater Protection Program, Calendar Year 1995 Annual Groundwater Monitoring Report*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 1995 Sandia National Laboratories, New Mexico (SNL/NM), September 1995. *Results of The Liquid Waste Disposal System RCRA Facility Investigation, Sandia National Laboratories Albuquerque New Mexico*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 1995 Sandia National Laboratories, New Mexico (SNL/NM), March 1995. *Groundwater Protection Program, Calendar Year 1994 Annual Groundwater Monitoring Report*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL 1995 Sandia National Laboratories, New Mexico (SNL/NM), 1995. *Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 1993 Sandia National Laboratories, New Mexico (SNL/NM), March 1993. *RCRA Facility Investigation Work Plan For The Liquid Waste Disposal System (LWDS), ER Program Sites 4, 5 and 52*, Environmental Impact and Restoration Division, Sandia National Laboratories, Albuquerque, New Mexico.

SRNL December 2008 Savannah River National Laboratory (SRNL), December 2008. *Course Agenda for "Natural and Enhanced Attenuation for Chlorinated Solvents: New Developments and Tools," Agenda and Speakers,* Seminar held in Albuquerque, New Mexico, from December 11 to December 12, 2008.

Van Hart June 2003 Van Hart, D., June 2003. *Geologic Investigation: An Update of Subsurface Geology on Kirtland Air Force Base, New Mexico*, SAND Report SAND2003-1869, Sandia National Laboratories, Albuquerque, New Mexico.

Attachment 5A
Technical Area V
Analytical Results Tables

This page intentionally left blank.

Attachment 5A Tables

5A-1 Summary of Detected Volatile Organic Compounds, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 5A-5

5A-2 Method Detection Limits for Volatile Organic Compounds (EPA Method[g] 8260), Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 5A-8

5A-3 Summary of Nitrate Plus Nitrite Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 5A-9

5A-4 Summary of Anions, Alkalinity, and Sulfide Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 5A-13

5A-5 Summary of Total Organic Carbon Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 5A-24

5A-6 Summary of Unfiltered Metal Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 5A-34

5A-7 Summary of Filtered Metal Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2012 ..... 5A-59

5A-8 Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 5A-82

5A-9 Summary of Field Water Quality Measurements[h], Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 5A-86

Footnotes for Technical Area V Analytical Results Tables 5A-89

This page intentionally left blank.

Table 5A-1
Summary of Detected Volatile Organic Compounds,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
AVN-1 18-Feb-13	1,2,3-Trichlorobenzene	0.380	0.300	1.00	NE	B, J	1.00U	093517-001	SW846 8260B
LWDS-MW1 11-Mar-13	Toluene	0.320	0.300	1.00	1000	J		093525-001	SW846 8260B
	Trichloroethene	**18.1**	0.300	1.00	5.00			093525-001	SW846 8260B
	cis-1,2-Dichloroethene	3.52	0.300	1.00	70.0			093525-001	SW846 8260B
LWDS-MW1 (Duplicate) 11-Mar-13	Toluene	0.360	0.300	1.00	1000	J		093526-001	SW846 8260B
	Trichloroethene	**18.4**	0.300	1.00	5.00			093526-001	SW846 8260B
	cis-1,2-Dichloroethene	3.54	0.300	1.00	70.0			093526-001	SW846 8260B
TAV-MW2 12-Feb-13	Trichloroethene	0.740	0.300	1.00	5.00	J		093508-001	SW846 8260B
TAV-MW4 20-Feb-13	Chloroform	0.720	0.300	1.00	NE	J		093521-001	SW846 8260B
	Trichloroethene	2.77	0.300	1.00	5.00			093521-001	SW846 8260B
TAV-MW6 25-Feb-13	Bromodichloromethane	0.730	0.300	1.00	NE	J	1.00UJ	093533-001	SW846 8260B
	Trichloroethene	**13.3**	0.300	1.00	5.00			093533-001	SW846 8260B
	cis-1,2-Dichloroethene	2.28	0.300	1.00	70.0			093533-001	SW846 8260B
TAV-MW8 15-Feb-13	Trichloroethene	2.15	0.300	1.00	5.00			093511-001	SW846 8260B
TAV-MW10 27-Feb-13	Trichloroethene	**13.6**	0.300	1.00	5.00			093536-001	SW846 8260B
	cis-1,2-Dichloroethene	2.45	0.300	1.00	70.0			093536-001	SW846 8260B
TAV-MW11 14-Feb-13	Trichloroethene	2.75	0.300	1.00	5.00			093515-001	SW846 8260B
	cis-1,2-Dichloroethene	0.340	0.300	1.00	70.0	J		093515-001	SW846 8260B
TAV-MW12 19-Feb-13	Trichloroethene	**7.85**	0.300	1.00	5.00			093519-001	SW846 8260B
	cis-1,2-Dichloroethene	0.450	0.300	1.00	70.0	J		093519-001	SW846 8260B
TAV-MW14 21-Feb-13	Trichloroethene	**6.54**	0.300	1.00	5.00			093530-001	SW846 8260B
	cis-1,2-Dichloroethene	0.820	0.300	1.00	70.0	J		093530-001	SW846 8260B
TAV-MW14 (Duplicate) 21-Feb-13	Trichloroethene	**6.65**	0.300	1.00	5.00			093531-001	SW846 8260B
	cis-1,2-Dichloroethene	0.840	0.300	1.00	70.0	J		093531-001	SW846 8260B
LWDS-MW1 10-Jun-13	Trichloroethene	**18.1**	0.300	1.00	5.00			093986-001	SW846 8260B
	cis-1,2-Dichloroethene	2.99	0.300	1.00	70.0			093986-001	SW846 8260B
TAV-MW2 28-May-13	Trichloroethene	0.760	0.300	1.00	5.00	J		093950-001	SW846 8260B
TAV-MW4 05-Jun-13	Chloroform	0.670	0.300	1.00	NE	J		093976-001	SW846 8260B
	Trichloroethene	2.82	0.300	1.00	5.00			093976-001	SW846 8260B
TAV-MW6 11-Jun-13	Trichloroethene	**15.8**	0.300	1.00	5.00			093990-001	SW846 8260B
	cis-1,2-Dichloroethene	2.45	0.300	1.00	70.0			093990-001	SW846 8260B

Refer to footnotes on page 5A-89.

Table 5A-1 *(Continued)*
Summary of Detected Volatile Organic Compounds,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW6	Trichloroethene	**15.8**	0.300	1.00	5.00			093990-001	SW846 8260B
11-Jun-13	cis-1,2-Dichloroethene	2.45	0.300	1.00	70.0			093990-001	SW846 8260B
TAV-MW8 23-May-13	Trichloroethene	1.86	0.300	1.00	5.00			093983-001	SW846 8260B
TAV-MW10	Trichloroethene	**15.8**	0.300	1.00	5.00			093994-001	SW846 8260B
12-Jun-13	cis-1,2-Dichloroethene	2.65	0.300	1.00	70.0			093994-001	SW846 8260B
TAV-MW11 03-Jun-13	Trichloroethene	2.70	0.300	1.00	5.00			093968-001	SW846 8260B
TAV-MW12	Trichloroethene	**7.14**	0.300	1.00	5.00			093972-001	SW846 8260B
04-Jun-13	cis-1,2-Dichloroethene	0.390	0.300	1.00	70.0	J		093972-001	SW846 8260B
TAV-MW14	Trichloroethene	**6.47**	0.300	1.00	5.00			093980-001	SW846 8260B
06-Jun-13	cis-1,2-Dichloroethene	0.770	0.300	1.00	70.0	J		093980-001	SW846 8260B
LWDS-MW1	Trichloroethene	**17.6**	0.300	1.00	5.00			094420-001	SW846 8260B
29-Jul-13	cis-1,2-Dichloroethene	4.40	0.300	1.00	70.0			094420-001	SW846 8260B
LWDS-MW2 17-Jul-13	Methylene chloride	**10.9**	3.00	10.0	5.00		11U	094396-001	SW846 8260B
TAV-MW2	Methylene chloride	**10.7**	3.00	10.0	5.00		11U	094394-001	SW846 8260B
16-Jul-13	Trichloroethene	0.600	0.300	1.00	5.00	J		094394-001	SW846 8260B
TAV-MW4	Chloroform	0.710	0.300	1.00	NE	J		094413-001	SW846 8260B
24-Jul-13	Trichloroethene	2.40	0.300	1.00	5.00			094413-001	SW846 8260B
TAV-MW6	Trichloroethene	**16.1**	0.300	1.00	5.00			094417-001	SW846 8260B
31-Jul-13	cis-1,2-Dichloroethene	3.29	0.300	1.00	70.0			094417-001	SW846 8260B
TAV-MW6 (Duplicate)	Trichloroethene	**15.2**	0.300	1.00	5.00			094418-001	SW846 8260B
31-Jul-13	cis-1,2-Dichloroethene	3.05	0.300	1.00	70.0			094418-001	SW846 8260B
TAV-MW8 22-Jul-13	Trichloroethene	2.04	0.300	1.00	5.00			094404-001	SW846 8260B
TAV-MW10	Trichloroethene	**16.4**	0.300	1.00	5.00		16.4U	094422-001	SW846 8260B
30-Jul-13	cis-1,2-Dichloroethene	3.62	0.300	1.00	70.0			094422-001	SW846 8260B
TAV-MW11	Methylene chloride	**11.2**	3.00	10.0	5.00		11U	094401-001	SW846 8260B
18-Jul-13	Trichloroethene	2.43	0.300	1.00	5.00			094401-001	SW846 8260B
TAV-MW11 (Duplicate)	Methylene chloride	**11.1**	3.00	10.0	5.00		11U	094402-001	SW846 8260B
18-Jul-13	Trichloroethene	2.53	0.300	1.00	5.00			094402-001	SW846 8260B
TAV-MW12	Trichloroethene	**8.36**	0.300	1.00	5.00			094406-001	SW846 8260B
23-Jul-13	cis-1,2-Dichloroethene	0.490	0.300	1.00	70.0	J		094406-001	SW846 8260B
TAV-MW13 15-Jul-13	Methylene chloride	**7.60**	3.00	10.0	5.00	J	10U	094392-001	SW846 8260B

Refer to footnotes on page 5A-89.

Table 5A-1 *(Concluded)*
Summary of Detected Volatile Organic Compounds,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW14	Trichloroethene	**6.22**	0.300	1.00	5.00			094411-001	SW846 8260B
24-Jul-13	cis-1,2-Dichloroethene	0.870	0.300	1.00	70.0	J		094411-001	SW846 8260B
LWDS-MW1	Trichloroethene	**15.9**	0.300	1.00	5.00			094838-001	SW846 8260B
11-Nov-13	cis-1,2-Dichloroethene	3.53	0.300	1.00	70.0			094838-001	SW846 8260B
TAV-MW2 28-Oct-13	Trichloroethene	0.700	0.300	1.00	5.00	J		094815-001	SW846 8260B
TAV-MW2 (Duplicate)	Acetone	6.32	3.00	10.0	NE	J	10UJ	094816-001	SW846 8260B
28-Oct-13	Trichloroethene	0.680	0.300	1.00	5.00	J		094816-001	SW846 8260B
TAV-MW4	Chloroform	0.660	0.300	1.00	NE	J		094821-001	SW846 8260B
30-Oct-13	Trichloroethene	2.43	0.300	1.00	5.00			094821-001	SW846 8260B
TAV-MW6	Trichloroethene	**15.8**	0.300	1.00	5.00			094834-001	SW846 8260B
06-Nov-13	cis-1,2-Dichloroethene	2.98	0.300	1.00	70.0			094834-001	SW846 8260B
TAV-MW8 29-Oct-13	Trichloroethene	2.07	0.300	1.00	5.00		NJ	094819-001	SW846 8260B
TAV-MW10	Trichloroethene	**16.9**	0.300	1.00	5.00			094836-001	SW846 8260B
07-Nov-13	cis-1,2-Dichloroethene	3.28	0.300	1.00	70.0			094836-001	SW846 8260B
TAV-MW11 31-Oct-13	Trichloroethene	2.55	0.300	1.00	5.00			094823-001	SW846 8260B
TAV-MW12	Trichloroethene	**9.35**	0.300	1.00	5.00			094830-001	SW846 8260B
05-Nov-13	cis-1,2-Dichloroethene	0.620	0.300	1.00	70.0	J		094830-001	SW846 8260B
TAV-MW12 (Duplicate)	Trichloroethene	**9.43**	0.300	1.00	5.00			094831-001	SW846 8260B
05-Nov-13	cis-1,2-Dichloroethene	0.620	0.300	1.00	70.0	J		094831-001	SW846 8260B
TAV-MW14	Trichloroethene	**7.90**	0.300	1.00	5.00			094825-001	SW846 8260B
04-Nov-13	cis-1,2-Dichloroethene	1.11	0.300	1.00	70.0			094825-001	SW846 8260B

Refer to footnotes on page 5A-89.

Table 5A-2
Method Detection Limits for Volatile Organic Compounds (EPA Method[g] 8260), Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Analyte	MDL[b] (µg/L)	Analyte	MDL[b] (µg/L)
1,1,1-Trichloroethane	0.300	Chlorobenzene	0.300
1,1,2,2-Tetrachloroethane	0.300	Chloroethane	0.300
1,1,2-Trichloroethane	0.300	Chloroform	0.300
1,1-Dichloroethane	0.300	Chloromethane	0.300
1,1-Dichloroethene	0.300	Cyclohexane	0.300
1,2,3-Trichlorobenzene	0.300	Dibromochloromethane	0.300
1,2,4-Trichlorobenzene	0.300	Dichlorodifluoromethane	0.300
1,2-Dibromo-3-chloropropane	0.300	Ethyl benzene	0.300
1,2-Dibromoethane	0.300	Isopropylbenzene	0.300
1,2-Dichlorobenzene	0.300	Methyl acetate	1.50
1,2-Dichloroethane	0.300	Methylcyclohexane	3.00
1,2-Dichloropropane	0.300	Methylene chloride	3.00
1,3-Dichlorobenzene	0.300	Styrene	0.300
1,4-Dichlorobenzene	0.300	Tert-butyl methyl ether	0.300
2,2-trifluoroethane, 1,1,2-Trichloro-1	1.50	Tetrachloroethene	0.300
2-Butanone	2.00	Toluene	0.300
2-Hexanone	2.20	Trichloroethene	0.300
4-methyl-, 2-Pentanone	1.50	Trichlorofluoromethane	0.300
Acetone	3.00	Vinyl chloride	0.300
Benzene	0.300	Xylene	0.300
Bromochloromethane	0.300	cis-1,2-Dichloroethene	0.300
Bromodichloromethane	0.300	cis-1,3-Dichloropropene	0.300
Bromoform	0.300	m-, p-Xylene	0.300
Bromomethane	0.300	o-Xylene	0.300
Carbon disulfide	1.50	trans-1,2-Dichloroethene	0.300
Carbon tetrachloride	0.300	trans-1,3-Dichloropropene	0.300

Refer to footnotes on page 5A-89.

Table 5A-3
Summary of Nitrate Plus Nitrite Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
AVN-1 18-Feb-13	Nitrate plus nitrite	9.14	0.170	0.500	10.0			093517-018	EPA 353.2
LWDS-MW1 11-Mar-13	Nitrate plus nitrite	**12.0**	0.170	0.500	10.0			093525-018	EPA 353.2
LWDS-MW1 (Duplicate) 11-Mar-13	Nitrate plus nitrite	**12.4**	0.170	0.500	10.0			093526-018	EPA 353.2
LWDS-MW2 13-Feb-13	Nitrate plus nitrite	7.75	0.170	0.500	10.0			093513-018	EPA 353.2
TAV-MW2 12-Feb-13	Nitrate plus nitrite	2.91	0.085	0.250	10.0			093508-018	EPA 353.2
TAV-MW4 20-Feb-13	Nitrate plus nitrite	5.54	0.170	0.500	10.0			093521-018	EPA 353.2
TAV-MW6 25-Feb-13	Nitrate plus nitrite	8.40	0.170	0.500	10.0			093533-018	EPA 353.2
TAV-MW8 15-Feb-13	Nitrate plus nitrite	5.74	0.170	0.500	10.0			093511-018	EPA 353.2
TAV-MW10 27-Feb-13	Nitrate plus nitrite	**12.4**	0.850	2.50	10.0			093536-018	EPA 353.2
TAV-MW11 14-Feb-13	Nitrate plus nitrite	6.62	0.170	0.500	10.0			093515-018	EPA 353.2
TAV-MW12 19-Feb-13	Nitrate plus nitrite	5.97	0.170	0.500	10.0			093519-018	EPA 353.2
TAV-MW13 26-Feb-13	Nitrate plus nitrite	5.49	0.170	0.500	10.0			093574-018	EPA 353.2
TAV-MW14 21-Feb-13	Nitrate plus nitrite	8.71	0.170	0.500	10.0			093530-018	EPA 353.2
TAV-MW14 (Duplicate) 21-Feb-13	Nitrate plus nitrite	8.30	0.170	0.500	10.0			093531-018	EPA 353.2
AVN-1 30-May-13	Nitrate plus nitrite	7.75	0.170	0.500	10.0			093964-018	EPA 353.2
LWDS-MW1 10-Jun-13	Nitrate plus nitrite	**11.7**	0.170	0.500	10.0			093986-018	EPA 353.2
LWDS-MW2 29-May-13	Nitrate plus nitrite	7.03	0.170	0.500	10.0			093958-018	EPA 353.2
LWDS-MW2 (Duplicate) 29-May-13	Nitrate plus nitrite	6.87	0.170	0.500	10.0			093960-018	EPA 353.2

Refer to footnotes on page 5A-89.

Table 5A-3 *(Continued)*
Summary of Nitrate Plus Nitrite Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW2 28-May-13	Nitrate plus nitrite	2.69	0.085	0.250	10.0			093950-018	EPA 353.2
TAV-MW3 21-May-13	Nitrate plus nitrite	4.79	0.085	0.250	10.0			093969-018	EPA 353.2
TAV-MW4 05-Jun-13	Nitrate plus nitrite	5.39	0.170	0.500	10.0			093976-018	EPA 353.2
TAV-MW5 15-May-13	Nitrate plus nitrite	7.20	0.170	0.500	10.0			093949-018	EPA 353.2
TAV-MW6 11-Jun-13	Nitrate plus nitrite	8.01	0.170	0.500	10.0			093990-018	EPA 353.2
TAV-MW7 22-May-13	Nitrate plus nitrite	3.62	0.085	0.250	10.0			093977-018	EPA 353.2
TAV-MW7 (Duplicate) 22-May-13	Nitrate plus nitrite	3.63	0.085	0.250	10.0			093979-018	EPA 353.2
TAV-MW8 23-May-13	Nitrate plus nitrite	5.50	0.085	0.250	10.0			093983-018	EPA 353.2
TAV-MW9 20-May-13	Nitrate plus nitrite	3.17	0.085	0.250	10.0			093963-018	EPA 353.2
TAV-MW10 12-Jun-13	Nitrate plus nitrite	**12.2**	0.170	0.500	10.0			093994-018	EPA 353.2
TAV-MW11 03-Jun-13	Nitrate plus nitrite	5.73	0.170	0.500	10.0			093968-018	EPA 353.2
TAV-MW12 04-Jun-13	Nitrate plus nitrite	6.54	0.170	0.500	10.0			093972-018	EPA 353.2
TAV-MW13 16-May-13	Nitrate plus nitrite	5.71	0.170	0.500	10.0			093957-018	EPA 353.2
TAV-MW13 (Duplicate) 16-May-13	Nitrate plus nitrite	5.58	0.170	0.500	10.0			093959-018	EPA 353.2
TAV-MW14 06-Jun-13	Nitrate plus nitrite	8.40	0.170	0.500	10.0			093980-018	EPA 353.2
AVN-1 23-Jul-13	Nitrate plus nitrite	**10.1**	0.425	1.25	10.0			094408-018	EPA 353.2
LWDS-MW1 29-Jul-13	Nitrate plus nitrite	**11.5**	0.170	0.500	10.0			094420-018	EPA 353.2
LWDS-MW2 17-Jul-13	Nitrate plus nitrite	7.36	0.170	0.500	10.0			094396-018	EPA 353.2

Refer to footnotes on page 5A-89.

Table 5A-3 *(Continued)*
Summary of Nitrate Plus Nitrite Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW2 16-Jul-13	Nitrate plus nitrite	2.84	0.170	0.500	10.0			094394-018	EPA 353.2
TAV-MW4 24-Jul-13	Nitrate plus nitrite	6.05	0.085	0.250	10.0			094413-018	EPA 353.2
TAV-MW6 31-Jul-13	Nitrate plus nitrite	**79.6**	1.70	5.00	10.0		R	094417-018	EPA 353.2
TAV-MW6 (Reanalysis) 31-Jul-13	Nitrate plus nitrite	8.48	0.170	0.500	10.0	H	J	094417-R18	EPA 353.2
TAV-MW6 (Duplicate) **3**1-Jul-13	Nitrate plus nitrite	**76.7**	1.70	5.00	10.0		R	094418-018	EPA 353.2
TAV-MW6 (Duplicate Reanalysis) 31-Jul-13	Nitrate plus nitrite	8.65	0.170	0.500	10.0	H	J	094418-R18	EPA 353.2
TAV-MW8 22-Jul-13	Nitrate plus nitrite	6.10	0.085	0.250	10.0			094404-018	EPA 353.2
TAV-MW10 30-Jul-13	Nitrate plus nitrite	**11.2**	0.170	0.500	10.0			094422-018	EPA 353.2
TAV-MW11 18-Jul-13	Nitrate plus nitrite	6.03	0.170	0.500	10.0			094401-018	EPA 353.2
TAV-MW11 (Duplicate) 18-Jul-13	Nitrate plus nitrite	6.15	0.170	0.500	10.0			094402-018	EPA 353.2
TAV-MW12 23-Jul-13	Nitrate plus nitrite	6.95	0.085	0.250	10.0			094406-018	EPA 353.2
TAV-MW13 15-Jul-13	Nitrate plus nitrite	5.24	0.170	0.500	10.0			094392-018	EPA 353.2
TAV-MW14 24-Jul-13	Nitrate plus nitrite	8.90	0.425	1.25	10.0			094411-018	EPA 353.2
AVN-1 23-Oct-13	Nitrate plus nitrite	9.63	0.170	0.500	10.0			094808-018	EPA 353.2
LWDS-MW1 11-Nov-13	Nitrate plus nitrite	**13.0**	0.170	0.500	10.0			094838-018	EPA 353.2
LWDS-MW2 24-Oct-13	Nitrate plus nitrite	8.18	0.170	0.500	10.0			094810-018	EPA 353.2
TAV-MW2 28-Oct-13	Nitrate plus nitrite	3.15	0.170	0.500	10.0			094815-018	EPA 353.2
TAV-MW2 (Duplicate) 28-Oct-13	Nitrate plus nitrite	2.98	0.170	0.500	10.0			094816-018	EPA 353.2

Refer to footnotes on page 5A-89.

Table 5A-3 *(Concluded)*
Summary of Nitrate Plus Nitrite Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW3 17-Oct-13	Nitrate plus nitrite	6.05	0.170	0.500	10.0			094797-018	EPA 353.2
TAV-MW4 30-Oct-13	Nitrate plus nitrite	5.60	0.170	0.500	10.0			094821-018	EPA 353.2
TAV-MW5 15-Oct-13	Nitrate plus nitrite	7.28	0.170	0.500	10.0			094793-018	EPA 353.2
TAV-MW6 06-Nov-13	Nitrate plus nitrite	8.43	0.170	0.500	10.0			094834-018	EPA 353.2
TAV-MW7 21-Oct-13	Nitrate plus nitrite	3.00	0.170	0.500	10.0			094799-018	EPA 353.2
TAV-MW8 29-Oct-13	Nitrate plus nitrite	6.28	0.170	0.500	10.0			094819-018	EPA 353.2
TAV-MW9 22-Oct-13	Nitrate plus nitrite	4.02	0.170	0.500	10.0			094804-018	EPA 353.2
TAV-MW9 (Duplicate) 22-Oct-13	Nitrate plus nitrite	4.02	0.170	0.500	10.0			094805-018	EPA 353.2
TAV-MW10 07-Nov-13	Nitrate plus nitrite	**12.9**	0.170	0.500	10.0			094836-018	EPA 353.2
TAV-MW11 31-Oct-13	Nitrate plus nitrite	6.54	0.170	0.500	10.0			094823-018	EPA 353.2
TAV-MW12 05-Nov-13	Nitrate plus nitrite	7.24	0.170	0.500	10.0			094830-018	EPA 353.2
TAV-MW12 (Duplicate) 05-Nov-13	Nitrate plus nitrite	7.25	0.170	0.500	10.0			094831-018	EPA 353.2
TAV-MW13 16-Oct-13	Nitrate plus nitrite	5.70	0.170	0.500	10.0			094795-018	EPA 353.2
TAV-MW14 04-Nov-13	Nitrate plus nitrite	9.03	0.170	0.500	10.0			094825-018	EPA 353.2

Refer to footnotes on page 5A-89.

Table 5A-4
Summary of Anions, Alkalinity, and Sulfide Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
AVN-1	Chloride	9.28	0.067	0.200	NE			093517-016	SW846 9056
18-Feb-13	Sulfate	31.5	0.133	0.400	NE			093517-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093517-029	SW846 9034
	Bicarbonate Alkalinity	157	0.725	1.00	NE			093517-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093517-022	SM 2320B
LWDS-MW1	Chloride	68.7	0.670	2.00	NE			093525-016	SW846 9056
11-Mar-13	Sulfate	38.3	1.33	4.00	NE			093525-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093525-029	SW846 9034
	Bicarbonate Alkalinity	196	0.725	1.00	NE			093525-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093525-022	SM 2320B
LWDS-MW1 (Duplicate)	Chloride	72.1	0.670	2.00	NE			093526-016	SW846 9056
11-Mar-13	Sulfate	40.9	1.33	4.00	NE			093526-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093526-029	SW846 9034
	Bicarbonate Alkalinity	196	0.725	1.00	NE			093526-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093526-022	SM 2320B
LWDS-MW2	Chloride	13.1	0.067	0.200	NE			093513-016	SW846 9056
13-Feb-13	Sulfate	39.4	0.266	0.800	NE			093513-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093513-029	SW846 9034
	Bicarbonate Alkalinity	179	0.725	1.00	NE			093513-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093513-022	SM 2320B
TAV-MW2	Chloride	56.1	0.670	2.00	NE			093508-016	SW846 9056
12-Feb-13	Sulfate	52.4	1.33	4.00	NE			093508-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093508-029	SW846 9034
	Bicarbonate Alkalinity	256	0.725	1.00	NE			093508-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093508-022	SM 2320B
TAV-MW4	Chloride	36.5	0.335	1.00	NE			093521-016	SW846 9056
20-Feb-13	Sulfate	35.5	1.33	4.00	NE			093521-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093521-029	SW846 9034
	Bicarbonate Alkalinity	179	0.725	1.00	NE			093521-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093521-022	SM 2320B
TAV-MW6	Chloride	59.8	0.670	2.00	NE			093533-016	SW846 9056
25-Feb-13	Sulfate	37.5	1.33	4.00	NE			093533-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093533-029	SW846 9034
	Bicarbonate Alkalinity	195	0.725	1.00	NE	B		093533-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093533-022	SM 2320B

Refer to footnotes on page 5A-89.

Table 5A-4 *(Continued)*
Summary of Anions, Alkalinity, and Sulfide Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW8	Chloride	34.8	0.670	2.00	NE			093511-016	SW846 9056
15-Feb-13	Sulfate	50.8	1.33	4.00	NE			093511-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093511-029	SW846 9034
	Bicarbonate Alkalinity	198	0.725	1.00	NE			093511-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093511-022	SM 2320B
TAV-MW10	Chloride	43.9	0.670	2.00	NE			093536-016	SW846 9056
27-Feb-13	Sulfate	44.5	1.33	4.00	NE			093536-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093536-029	SW846 9034
	Bicarbonate Alkalinity	192	0.725	1.00	NE	B		093536-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093536-022	SM 2320B
TAV-MW11	Chloride	37.0	0.670	2.00	NE			093515-016	SW846 9056
14-Feb-13	Sulfate	39.8	1.33	4.00	NE			093515-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093515-029	SW846 9034
	Bicarbonate Alkalinity	187	0.725	1.00	NE			093515-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093515-022	SM 2320B
TAV-MW12	Chloride	37.2	0.335	1.00	NE			093519-016	SW846 9056
19-Feb-13	Sulfate	44.2	0.665	2.00	NE			093519-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093519-029	SW846 9034
	Bicarbonate Alkalinity	221	0.725	1.00	NE			093519-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093519-022	SM 2320B
TAV-MW13	Chloride	16.8	0.335	1.00	NE			093574-016	SW846 9056
26-Feb-13	Sulfate	43.2	0.665	2.00	NE			093574-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093574-029	SW846 9034
	Bicarbonate Alkalinity	202	0.725	1.00	NE	B		093574-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093574-022	SM 2320B
TAV-MW14	Chloride	49.6	0.335	1.00	NE			093530-016	SW846 9056
21-Feb-13	Sulfate	51.7	0.665	2.00	NE			093530-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093530-029	SW846 9034
	Bicarbonate Alkalinity	210	0.725	1.00	NE			093530-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093530-022	SM 2320B
TAV-MW14 (Duplicate)	Chloride	38.8	0.335	1.00	NE			093531-016	SW846 9056
21-Feb-13	Sulfate	41.0	0.665	2.00	NE			093531-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093531-029	SW846 9034
	Bicarbonate Alkalinity	213	0.725	1.00	NE			093531-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093531-022	SM 2320B

Refer to footnotes on page 5A-89.

Table 5A-4 *(Continued)*
Summary of Anions, Alkalinity, and Sulfide Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
AVN-1	Bromide	0.136	0.067	0.200	NE	J		093964-016	SW846 9056
30-May-13	Chloride	9.91	0.134	0.400	NE			093964-016	SW846 9056
	Fluoride	1.32	0.033	0.100	4.0			093964-016	SW846 9056
	Sulfate	33.4	0.266	0.800	NE	N		093964-016	SW846 9056
	Bicarbonate Alkalinity	153	0.725	1.00	NE			093964-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093964-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093964-029	SW846 9034
LWDS-MW1	Bromide	0.821	0.067	0.200	NE			093986-016	SW846 9056
10-Jun-13	Chloride	75.1	1.34	4.00	NE			093986-016	SW846 9056
	Fluoride	0.618	0.033	0.100	4.0			093986-016	SW846 9056
	Sulfate	38.3	2.66	8.00	NE			093986-016	SW846 9056
	Bicarbonate Alkalinity	201	0.725	1.00	NE			093986-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093986-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093986-029	SW846 9034
LWDS-MW2	Bromide	0.172	0.067	0.200	NE	J		093958-016	SW846 9056
29-May-13	Chloride	12.9	0.335	0.100	NE			093958-016	SW846 9056
	Fluoride	1.36	0.033	0.100	4.0			093958-016	SW846 9056
	Sulfate	42.0	0.665	2.00	NE	N		093958-016	SW846 9056
	Bicarbonate Alkalinity	174	0.725	1.00	NE			093958-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093958-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093958-029	SW846 9034
LWDS-MW2 (Duplicate)	Bromide	0.137	0.067	0.200	NE	J		093960-016	SW846 9056
29-May-13	Chloride	12.7	0.335	1.00	NE			093960-016	SW846 9056
	Fluoride	1.32	0.033	0.100	4.0			093960-016	SW846 9056
	Sulfate	41.5	0.665	2.00	NE	N		093960-016	SW846 9056
	Bicarbonate Alkalinity	180	0.725	1.00	NE			093960-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093960-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093960-029	SW846 9034
TAV-MW2	Bromide	0.415	0.067	0.200	NE			093950-016	SW846 9056
28-May-13	Chloride	66.8	0.670	2.00	NE			093950-016	SW846 9056
	Fluoride	1.03	0.033	0.100	4.0			093950-016	SW846 9056
	Sulfate	61.8	1.33	4.00	NE	N		093950-016	SW846 9056
	Bicarbonate Alkalinity	247	0.725	1.00	NE			093950-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093950-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093950-029	SW846 9034

Refer to footnotes on page 5A-89.

Table 5A-4 *(Continued)*
Summary of Anions, Alkalinity, and Sulfide Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW3	Bromide	0.204	0.067	0.200	NE			093969-016	SW846 9056
21-May-13	Chloride	19.0	0.670	2.00	NE			093969-016	SW846 9056
	Fluoride	1.60	0.033	0.100	4.0			093969-016	SW846 9056
	Sulfate	60.2	1.33	4.00	NE			093969-016	SW846 9056
	Bicarbonate Alkalinity	193	0.725	1.00	NE			093969-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093969-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093969-029	SW846 9034
TAV-MW4	Bromide	0.448	0.067	0.200	NE			093976-016	SW846 9056
05-Jun-13	Chloride	39.0	0.670	2.00	NE			093976-016	SW846 9056
	Fluoride	1.17	0.033	0.100	4.0			093976-016	SW846 9056
	Sulfate	33.9	0.133	0.400	NE			093976-016	SW846 9056
	Bicarbonate Alkalinity	175	0.725	1.00	NE			093976-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093976-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093976-029	SW846 9034
TAV-MW5	Bromide	0.165	0.067	0.200	NE	J		093949-016	SW846 9056
15-May-13	Chloride	17.8	0.335	1.00	NE			093949-016	SW846 9056
	Fluoride	1.35	0.033	0.100	4.0			093949-016	SW846 9056
	Sulfate	43.7	0.665	2.00	NE	N		093949-016	SW846 9056
	Bicarbonate Alkalinity	185	0.725	1.00	NE			093949-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093949-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093949-029	SW846 9034
TAV-MW6	Bromide	0.906	0.067	0.200	NE			093990-016	SW846 9056
11-Jun-13	Chloride	71.5	1.34	4.00	NE			093990-016	SW846 9056
	Fluoride	1.17	0.033	0.100	4.0			093990-016	SW846 9056
	Sulfate	43.0	2.66	8.00	NE			093990-016	SW846 9056
	Bicarbonate Alkalinity	202	0.725	1.00	NE			093990-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093990-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093990-029	SW846 9034
TAV-MW7	Bromide	0.253	0.067	0.200	NE			093977-016	SW846 9056
22-May-13	Chloride	25.4	0.670	2.00	NE			093977-016	SW846 9056
	Fluoride	1.12	0.033	0.100	4.0			093977-016	SW846 9056
	Sulfate	60.2	1.33	4.00	NE			093977-016	SW846 9056
	Bicarbonate Alkalinity	223	0.725	1.00	NE			093977-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093977-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093977-029	SW846 9034

Refer to footnotes on page 5A-89.

Table 5A-4 *(Continued)*
Summary of Anions, Alkalinity, and Sulfide Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW7 (Duplicate)	Bromide	0.252	0.067	0.200	NE			093979-016	SW846 9056
22-May-13	Chloride	25.5	0.670	2.00	NE			093979-016	SW846 9056
	Fluoride	1.10	0.033	0.100	4.0			093979-016	SW846 9056
	Sulfate	60.7	1.33	4.00	NE			093979-016	SW846 9056
	Bicarbonate Alkalinity	220	0.725	1.00	NE			093979-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093979-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093979-029	SW846 9034
TAV-MW8	Bromide	0.318	0.067	0.200	NE			093983-016	SW846 9056
23-May-13	Chloride	40.6	0.670	2.00	NE			093983-016	SW846 9056
	Fluoride	1.44	0.033	0.100	4.0			093983-016	SW846 9056
	Sulfate	64.0	1.33	4.00	NE			093983-016	SW846 9056
	Bicarbonate Alkalinity	201	0.725	1.00	NE			093983-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093983-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093983-029	SW846 9034
TAV-MW9	Bromide	0.246	0.067	0.200	NE			092663-016	SW846 9056
20-May-13	Chloride	31.4	0.670	2.00	NE			092663-016	SW846 9056
	Fluoride	0.945	0.033	0.100	4.0			092663-016	SW846 9056
	Sulfate	56.9	1.33	4.00	NE			092663-016	SW846 9056
	Bicarbonate Alkalinity	223	0.725	1.00	NE			092663-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		092663-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093963-029	SW846 9034
T**AV-MW10**	Bromide	0.322	0.067	0.200	NE			093994-016	SW846 9056
12-Jun-13	Chloride	47.8	0.670	2.00	NE			093994-016	SW846 9056
	Fluoride	1.45	0.033	0.100	4.0			093994-016	SW846 9056
	Sulfate	45.4	1.33	4.00	NE			093994-016	SW846 9056
	Bicarbonate Alkalinity	196	0.725	1.00	NE	B		093994-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093994-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093994-029	SW846 9034
TAV-MW11	Bromide	0.476	0.067	0.200	NE			093968-016	SW846 9056
03-Jun-13	Chloride	42.5	0.670	2.00	NE			093968-016	SW846 9056
	Fluoride	1.30	0.033	0.100	4.0			093968-016	SW846 9056
	Sulfate	43.5	1.33	4.00	NE			093968-016	SW846 9056
	Bicarbonate Alkalinity	184	0.725	1.00	NE			093968-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093968-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093968-029	SW846 9034

Refer to footnotes on page 5A-89.

Table 5A-4 *(Continued)*
Summary of Anions, Alkalinity, and Sulfide Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW12	Bromide	0.342	0.067	0.200	NE			093972-016	SW846 9056
04-Jun-13	Chloride	38.8	0.670	2.00	NE			093972-016	SW846 9056
	Fluoride	1.26	0.033	0.100	4.0			093972-016	SW846 9056
	Sulfate	45.9	1.33	4.00	NE			093972-016	SW846 9056
	Bicarbonate Alkalinity	212	0.725	1.00	NE			093972-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093972-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093972-029	SW846 9034
TAV-MW13	Bromide	0.234	0.067	0.200	NE			093957-016	SW846 9056
16-May-13	Chloride	20.0	0.335	1.00	NE			093957-016	SW846 9056
	Fluoride	1.20	0.033	0.100	4.0			093957-016	SW846 9056
	Sulfate	63.3	0.665	2.00	NE	N		093957-016	SW846 9056
	Bicarbonate Alkalinity	199	0.725	1.00	NE			093957-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093957-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093957-029	SW846 9034
TAV-MW13 (Duplicate)	Bromide	0.194	0.067	0.200	NE	J		093959-016	SW846 9056
16-May-13	Chloride	20.0	0.335	1.00	NE			093959-016	SW846 9056
	Fluoride	1.23	0.033	0.100	4.0			093959-016	SW846 9056
	Sulfate	56.7	0.665	2.00	NE	N		093959-016	SW846 9056
	Bicarbonate Alkalinity	199	0.725	1.00	NE			093959-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093959-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093959-029	SW846 9034
TAV-MW14	Bromide	0.377	0.067	0.200	NE			093980-016	SW846 9056
06-Jun-13	Chloride	52.6	0.670	2.00	NE			093980-016	SW846 9056
	Fluoride	1.35	0.033	0.100	4.0			093980-016	SW846 9056
	Sulfate	53.9	1.33	4.00	NE			093980-016	SW846 9056
	Bicarbonate Alkalinity	205	0.725	1.00	NE			093980-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093980-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		093980-029	SW846 9034

Refer to footnotes on page 5A-89.

Table 5A-4 *(Continued)*
Summary of Anions, Alkalinity, and Sulfide Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
AVN-1	Chloride	9.25	0.335	1.00	NE			094408-016	SW846 9056
23-Jul-13	Sulfate	31.6	0.665	2.00	NE			094408-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094408-029	SW846 9034
	Bicarbonate Alkalinity	155	0.725	1.00	NE			094408-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094408-022	SM 2320B
LWDS-MW1	Chloride	75.6	1.34	4.00	NE			094420-016	SW846 9056
29-Jul-13	Sulfate	38.9	2.66	8.00	NE			094420-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094420-029	SW846 9034
	Bicarbonate Alkalinity	196	0.725	1.00	NE			094420-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094420-022	SM 2320B
LWDS-MW2	Chloride	10.9	0.335	1.00	NE			094396-016	SW846 9056
17-Jul-13	Sulfate	34.8	0.665	2.00	NE			094396-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094396-029	SW846 9034
	Bicarbonate Alkalinity	180	0.725	1.00	NE			094396-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094396-022	SM 2320B
TAV-MW2	Chloride	63.7	0.670	2.00	NE			094394-016	SW846 9056
16-Jul-13	Sulfate	56.0	1.33	4.00	NE			094394-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094394-029	SW846 9034
	Bicarbonate Alkalinity	253	0.725	1.00	NE			094394-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094394-022	SM 2320B
TAV-MW4	Chloride	33.6	0.670	2.00	NE			094413-016	SW846 9056
24-Jul-13	Sulfate	31.1	1.33	4.00	NE			094413-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094413-029	SW846 9034
	Bicarbonate Alkalinity	171	0.725	1.00	NE			094413-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094413-022	SM 2320B
TAV-MW6	Chloride	72.0	1.34	4.00	NE			094417-016	SW846 9056
31-Jul-13	Sulfate	42.5	2.66	8.00	NE			094417-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094417-029	SW846 9034
	Bicarbonate Alkalinity	203	0.725	1.00	NE			094417-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094417-022	SM 2320B
TAV-MW6 (Duplicate)	Chloride	71.5	1.34	4.00	NE			094418-016	SW846 9056
31-Jul-13	Sulfate	42.2	2.66	8.00	NE			094418-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094418-029	SW846 9034
	Bicarbonate Alkalinity	203	0.725	1.00	NE			094418-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094418-022	SM 2320B

Refer to footnotes on page 5A-89.

Table 5A-4 *(Continued)*
Summary of Anions, Alkalinity, and Sulfide Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW8	Chloride	28.6	0.670	2.00	NE		R	094404-016	SW846 9056
22-Jul-13	Chloride (Reanalysis)	39.3	0.670	2.00	NE	H	J	094404-R16	SW846 9056
	Sulfate	39.9	1.33	4.00	NE		R	094404-016	SW846 9056
	Sulfate (Reanalysis)	52.6	1.33	4.00	NE	H	J	094404-R16	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094404-029	SW846 9034
	Bicarbonate Alkalinity	190	0.725	1.00	NE			094404-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094404-022	SM 2320B
TAV-MW10	Chloride	48.9	0.670	2.00	NE			094422-016	SW846 9056
30-Jul-13	Sulfate	45.1	1.33	4.00	NE			094422-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094422-029	SW846 9034
	Bicarbonate Alkalinity	200	0.725	1.00	NE			094422-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094422-022	SM 2320B
TAV-MW11	Chloride	43.2	0.670	2.00	NE			094401-016	SW846 9056
18-Jul-13	Sulfate	43.1	1.33	4.00	NE			094401-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094401-029	SW846 9034
	Bicarbonate Alkalinity	186	0.725	1.00	NE			094401-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094401-022	SM 2320B
TAV-MW11 (Duplicate)	Chloride	41.4	0.670	2.00	NE			094402-016	SW846 9056
18-Jul-13	Sulfate	41.3	1.33	4.00	NE			094402-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094402-029	SW846 9034
	Bicarbonate Alkalinity	187	0.725	1.00	NE			094402-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094402-022	SM 2320B
TAV-MW12	Chloride	39.7	0.670	2.00	NE			094406-016	SW846 9056
23-Jul-13	Sulfate	46.4	1.33	4.00	NE			094406-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094406-029	SW846 9034
	Bicarbonate Alkalinity	218	0.725	1.00	NE			094406-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094406-022	SM 2320B
TAV-MW13	Chloride	19.0	0.335	1.00	NE			094392-016	SW846 9056
15-Jul-13	Sulfate	51.9	0.665	2.00	NE			094392-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094392-029	SW846 9034
	Bicarbonate Alkalinity	204	0.725	1.00	NE			094392-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094392-022	SM 2320B
TAV-MW14	Chloride	49.5	0.670	2.00	NE			094411-016	SW846 9056
24-Jul-13	Sulfate	51.8	1.33	4.00	NE			094411-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094411-029	SW846 9034
	Bicarbonate Alkalinity	203	0.725	1.00	NE			094411-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094411-022	SM 2320B

Refer to footnotes on page 5A-89.

Table 5A-4 *(Continued)*
Summary of Anions, Alkalinity, and Sulfide Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
AVN-1	Chloride	9.61	0.134	0.400	NE			094808-016	SW846 9056
23-Oct-13	Sulfate	32.1	0.266	0.800	NE			094808-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094808-029	SW846 9034
	Bicarbonate Alkalinity	117	0.725	1.00	NE	B	R	094808-022	SM 2320B
	Bicarbonate Alkalinity (reanalysis)	148	0.725	1.00	NE	H	J	094808-R22	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094808-022	SM 2320B
LWDS-MW1	Chloride	77.0	1.34	4.00	NE			094838-016	SW846 9056
11-Nov-13	Sulfate	39.7	2.66	8.00	NE			094838-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094838-029	SW846 9034
	Bicarbonate Alkalinity	202	0.725	1.00	NE			094838-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094838-022	SM 2320B
LWDS-MW2	Chloride	12.4	0.335	1.00	NE			094810-016	SW846 9056
24-Oct-13	Sulfate	40.1	0.665	2.00	NE			094810-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094810-029	SW846 9034
	Bicarbonate Alkalinity	47.1	0.725	1.00	NE	B	R	094810-022	SM 2320B
	Bicarbonate Alkalinity (reanalysis)	174	0.725	1.00	NE	H	J	094810-R22	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094810-022	SM 2320B
TAV-MW2	Chloride	65.6	0.670	2.00	NE			094815-016	SW846 9056
28-Oct-13	Sulfate	58.6	1.33	4.00	NE			094815-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094815-029	SW846 9034
	Bicarbonate Alkalinity	247	0.725	1.00	NE			094815-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094815-022	SM 2320B
TAV-MW2 (Duplicate)	Chloride	66.0	0.670	2.00	NE			094816-016	SW846 9056
28-Oct-13	Sulfate	59.4	1.33	4.00	NE			094816-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094816-029	SW846 9034
	Bicarbonate Alkalinity	250	0.725	1.00	NE			094816-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094816-022	SM 2320B
TAV-MW3	Chloride	21.5	0.335	1.00	NE			094797-016	SW846 9056
17-Oct-13	Sulfate	68.1	0.665	2.00	NE			094797-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094797-029	SW846 9034
	Bicarbonate Alkalinity	194	0.725	1.00	NE	B		094797-022	SM 2320B
	Carbonate Alkalinity	U	0.725	1.00	NE	U		094797-022	SM 2320B

Refer to footnotes on page 5A-89.

Table 5A-4 *(Continued)*
Summary of Anions, Alkalinity, and Sulfide Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW4	Chloride	40.3	0.670	2.00	NE			094821-016	SW846 9056
30-Oct-13	Sulfate	35.3	1.33	4.00	NE			094821-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094821-029	SW846 9034
	Bicarbonate Alkalinity	177	0.725	1.00	NE			094821-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094821-022	SM 2320B
TAV-MW5	Chloride	18.2	0.335	1.00	NE			094793-016	SW846 9056
15-Oct-13	Sulfate	43.7	0.665	2.00	NE			094793-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094793-029	SW846 9034
	Bicarbonate Alkalinity	188	0.725	1.00	NE	B		094793-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094793-022	SM 2320B
TAV-MW6	Chloride	74.5	1.34	4.00	NE			094834-016	SW846 9056
06-Nov-13	Sulfate	44.2	2.66	8.00	NE			094834-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094834-029	SW846 9034
	Bicarbonate Alkalinity	198	0.725	1.00	NE			094834-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094834-022	SM 2320B
TAV-MW7	Chloride	27.7	0.670	2.00	NE			094799-016	SW846 9056
21-Oct-13	Sulfate	65.8	1.33	4.00	NE			094799-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094799-029	SW846 9034
	Bicarbonate Alkalinity	227	0.725	1.00	NE	B		094799-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094799-022	SM 2320B
TAV-MW8	Chloride	42.2	0.670	2.00	NE			094819-016	SW846 9056
29-Oct-13	Sulfate	55.5	1.33	4.00	NE			094819-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094819-029	SW846 9034
	Bicarbonate Alkalinity	188	0.725	1.00	NE			094819-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094819-022	SM 2320B
TAV-MW9	Chloride	35.2	0.670	2.00	NE			094804-016	SW846 9056
22-Oct-13	Sulfate	64.6	1.33	4.00	NE			094804-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094804-029	SW846 9034
	Bicarbonate Alkalinity	246	0.725	1.00	NE	B		094804-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094804-022	SM 2320B
TAV-MW9 (Duplicate)	Chloride	35.0	0.670	2.00	NE			094805-016	SW846 9056
22-Oct-13	Sulfate	64.4	1.33	4.00	NE			094805-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094805-029	SW846 9034
	Bicarbonate Alkalinity	244	0.725	1.00	NE	B		094805-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094805-022	SM 2320B

Refer to footnotes on page 5A-89.

Table 5A-4 *(Concluded)*
Summary of Anions, Alkalinity, and Sulfide Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW10	Chloride	49.4	0.670	2.00	NE			094836-016	SW846 9056
07-Nov-13	Sulfate	45.8	1.33	4.00	NE			094836-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094836-029	SW846 9034
	Bicarbonate Alkalinity	196	0.725	1.00	NE			094836-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094836-022	SM 2320B
TAV-MW11	Chloride	45.5	0.670	2.00	NE			094823-016	SW846 9056
31-Oct-13	Sulfate	44.8	1.33	4.00	NE			094823-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094823-029	SW846 9034
	Bicarbonate Alkalinity	184	0.725	1.00	NE			094823-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094823-022	SM 2320B
TAV-MW12	Chloride	41.0	0.670	2.00	NE			094830-016	SW846 9056
05-Nov-13	Sulfate	47.1	1.33	4.00	NE			094830-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094830-029	SW846 9034
	Bicarbonate Alkalinity	219	0.725	1.00	NE			094830-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094830-022	SM 2320B
TAV-MW12 (Duplicate)	Chloride	41.0	0.670	2.00	NE			094831-016	SW846 9056
05-Nov-13	Sulfate	47.0	1.33	4.00	NE			094831-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094831-029	SW846 9034
	Bicarbonate Alkalinity	218	0.725	1.00	NE			094831-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094831-022	SM 2320B
TAV-MW13	Chloride	19.6	0.335	1.00	NE			094795-016	SW846 9056
16-Oct-13	Sulfate	53.1	0.665	2.00	NE			094795-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094795-029	SW846 9034
	Bicarbonate Alkalinity	202	0.725	1.00	NE	B		094795-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094795-022	SM 2320B
TAV-MW14	Chloride	51.7	0.670	2.00	NE			094825-016	SW846 9056
04-Nov-13	Sulfate	53.3	1.33	4.00	NE			094825-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		094825-029	SW846 9034
	Bicarbonate Alkalinity	207	0.725	1.00	NE			094825-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094825-022	SM 2320B

Refer to footnotes on page 5A-89.

Table 5A-5
Summary of Total Organic Carbon Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
AVN-1	Total Organic Carbon #1	0.524	0.330	1.00	NE	J	1.79U	093517-004	SW846 9060
18-Feb-13	Total Organic Carbon #2	0.589	0.330	1.00	NE	J	1.79U	093517-004	SW846 9060
	Total Organic Carbon #3	0.485	0.330	1.00	NE	J	1.79U	093517-004	SW846 9060
	Total Organic Carbon #4	0.519	0.330	1.00	NE	J	1.79U	093517-004	SW846 9060
	Total Organic Carbon Average	0.529	0.330	1.00	NE	J	1.79U	093517-004	SW846 9060
LWDS-MW1	Total Organic Carbon #1	0.724	0.330	1.00	NE	J		093525-004	SW846 9060
11-Mar-13	Total Organic Carbon #2	0.937	0.330	1.00	NE	J		093525-004	SW846 9060
	Total Organic Carbon #3	0.819	0.330	1.00	NE	J		093525-004	SW846 9060
	Total Organic Carbon #4	0.891	0.330	1.00	NE	J		093525-004	SW846 9060
	Total Organic Carbon Average	0.843	0.330	1.00	NE	J		093525-004	SW846 9060
LWDS-MW1	Total Organic Carbon #1	0.729	0.330	1.00	NE	J		093526-004	SW846 9060
(Duplicate)	Total Organic Carbon #2	0.879	0.330	1.00	NE	J		093526-004	SW846 9060
11-Mar-13	Total Organic Carbon #3	0.766	0.330	1.00	NE	J		093526-004	SW846 9060
	Total Organic Carbon #4	0.715	0.330	1.00	NE	J		093526-004	SW846 9060
	Total Organic Carbon Average	0.772	0.330	1.00	NE	J		093526-004	SW846 9060
LWDS-MW2	Total Organic Carbon #1	0.892	0.330	1.00	NE	J		093513-004	SW846 9060
13-Feb-13	Total Organic Carbon #2	1.02	0.330	1.00	NE			093513-004	SW846 9060
	Total Organic Carbon #3	0.939	0.330	1.00	NE	J		093513-004	SW846 9060
	Total Organic Carbon #4	0.899	0.330	1.00	NE	J		093513-004	SW846 9060
	Total Organic Carbon Average	0.938	0.330	1.00	NE	J		093513-004	SW846 9060
TAV-MW2	Total Organic Carbon #1	1.08	0.330	1.00	NE			093508-004	SW846 9060
12-Feb-13	Total Organic Carbon #2	1.26	0.330	1.00	NE			093508-004	SW846 9060
	Total Organic Carbon #3	1.11	0.330	1.00	NE			093508-004	SW846 9060
	Total Organic Carbon #4	1.09	0.330	1.00	NE			093508-004	SW846 9060
	Total Organic Carbon Average	1.14	0.330	1.00	NE			093508-004	SW846 9060
TAV-MW4	Total Organic Carbon #1	0.646	0.330	1.00	NE	J	1.79U	093521-004	SW846 9060
20-Feb-13	Total Organic Carbon #2	0.663	0.330	1.00	NE	J	1.79U	093521-004	SW846 9060
	Total Organic Carbon #3	0.613	0.330	1.00	NE	J	1.79U	093521-004	SW846 9060
	Total Organic Carbon #4	0.689	0.330	1.00	NE	J	1.79U	093521-004	SW846 9060
	Total Organic Carbon Average	0.653	0.330	1.00	NE	J	1.79U	093521-004	SW846 9060
TAV-MW6	Total Organic Carbon #1	0.542	0.330	1.00	NE	J		093533-004	SW846 9060
25-Feb-13	Total Organic Carbon #2	0.669	0.330	1.00	NE	J		093533-004	SW846 9060
	Total Organic Carbon #3	0.542	0.330	1.00	NE	J		093533-004	SW846 9060
	Total Organic Carbon #4	0.589	0.330	1.00	NE	J		093533-004	SW846 9060
	Total Organic Carbon Average	0.586	0.330	1.00	NE	J		093533-004	SW846 9060

Refer to footnotes on page 5A-89.

Table 5A-5 *(Continued)*
Summary of Total Organic Carbon Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW8	Total Organic Carbon #1	0.874	0.330	1.00	NE	J		093511-004	SW846 9060
15-Feb-13	Total Organic Carbon #2	0.971	0.330	1.00	NE	J		093511-004	SW846 9060
	Total Organic Carbon #3	0.890	0.330	1.00	NE	J		093511-004	SW846 9060
	Total Organic Carbon #4	0.952	0.330	1.00	NE	J		093511-004	SW846 9060
	Total Organic Carbon Average	0.922	0.330	1.00	NE	J		093511-004	SW846 9060
TAV-MW10	Total Organic Carbon #1	0.720	0.330	1.00	NE	J		093536-004	SW846 9060
27-Feb-13	Total Organic Carbon #2	0.804	0.330	1.00	NE	J		093536-004	SW846 9060
	Total Organic Carbon #3	0.763	0.330	1.00	NE	J		093536-004	SW846 9060
	Total Organic Carbon #4	0.749	0.330	1.00	NE	J		093536-004	SW846 9060
	Total Organic Carbon Average	0.759	0.330	1.00	NE	J		093536-004	SW846 9060
TAV-MW11	Total Organic Carbon #1	0.774	0.330	1.00	NE	J		093515-004	SW846 9060
14-Feb-13	Total Organic Carbon #2	0.762	0.330	1.00	NE	J		093515-004	SW846 9060
	Total Organic Carbon #3	0.804	0.330	1.00	NE	J		093515-004	SW846 9060
	Total Organic Carbon #4	0.805	0.330	1.00	NE	J		093515-004	SW846 9060
	Total Organic Carbon Average	0.786	0.330	1.00	NE	J		093515-004	SW846 9060
TAV-MW12	Total Organic Carbon #1	0.725	0.330	1.00	NE	J	1.79U	093519-004	SW846 9060
19-Feb-13	Total Organic Carbon #2	0.966	0.330	1.00	NE	J	1.79U	093519-004	SW846 9060
	Total Organic Carbon #3	0.799	0.330	1.00	NE	J	1.79U	093519-004	SW846 9060
	Total Organic Carbon #4	0.771	0.330	1.00	NE	J	1.79U	093519-004	SW846 9060
	Total Organic Carbon Average	0.815	0.330	1.00	NE	J	1.79U	093519-004	SW846 9060
TAV-MW13	Total Organic Carbon #1	0.700	0.330	1.00	NE	J		093574-004	SW846 9060
26-Feb-13	Total Organic Carbon #2	0.870	0.330	1.00	NE	J		093574-004	SW846 9060
	Total Organic Carbon #3	0.771	0.330	1.00	NE	J		093574-004	SW846 9060
	Total Organic Carbon #4	0.844	0.330	1.00	NE	J		093574-004	SW846 9060
	Total Organic Carbon Average	0.796	0.330	1.00	NE	J		093574-004	SW846 9060
TAV-MW14	Total Organic Carbon #1	0.684	0.330	1.00	NE	J	1.79U	093530-004	SW846 9060
21-Feb-13	Total Organic Carbon #2	0.726	0.330	1.00	NE	J	1.79U	093530-004	SW846 9060
	Total Organic Carbon #3	0.745	0.330	1.00	NE	J	1.79U	093530-004	SW846 9060
	Total Organic Carbon #4	0.682	0.330	1.00	NE	J	1.79U	093530-004	SW846 9060
	Total Organic Carbon Average	0.709	0.330	1.00	NE	J	1.79U	093530-004	SW846 9060
TAV-MW14	Total Organic Carbon #1	0.665	0.330	1.00	NE	J	1.79U	093531-004	SW846 9060
(Duplicate)	Total Organic Carbon #2	0.839	0.330	1.00	NE	J	1.79U	093531-004	SW846 9060
21-Feb-13	Total Organic Carbon #3	0.706	0.330	1.00	NE	J	1.79U	093531-004	SW846 9060
	Total Organic Carbon #4	0.806	0.330	1.00	NE	J	1.79U	093531-004	SW846 9060
	Total Organic Carbon Average	0.754	0.330	1.00	NE	J	1.79U	093531-004	SW846 9060

Refer to footnotes on page 5A-89.

Table 5A-5 *(Continued)*
Summary of Total Organic Carbon Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
AVN-1	Total Organic Carbon #1	0.582	0.330	1.00	NE	J		093964-004	SW846 9060
30-May-13	Total Organic Carbon #2	0.754	0.330	1.00	NE	J		093964-004	SW846 9060
	Total Organic Carbon #3	0.681	0.330	1.00	NE	J		093964-004	SW846 9060
	Total Organic Carbon #4	0.644	0.330	1.00	NE	J		093964-004	SW846 9060
	Total Organic Carbon Average	0.665	0.330	1.00	NE	J		093964-004	SW846 9060
LWDS-MW1	Total Organic Carbon #1	1.06	0.330	1.00	NE			093986-004	SW846 9060
10-Jun-13	Total Organic Carbon #2	1.20	0.330	1.00	NE			093986-004	SW846 9060
	Total Organic Carbon #3	1.12	0.330	1.00	NE			093986-004	SW846 9060
	Total Organic Carbon #4	1.10	0.330	1.00	NE			093986-004	SW846 9060
	Total Organic Carbon Average	1.12	0.330	1.00	NE			093986-004	SW846 9060
LWDS-MW2	Total Organic Carbon #1	0.643	0.330	1.00	NE	J	2.6U	093958-004	SW846 9060
29-May-13	Total Organic Carbon #2	0.774	0.330	1.00	NE	J	2.5U	093958-004	SW846 9060
	Total Organic Carbon #3	0.728	0.330	1.00	NE	J	2.7U	093958-004	SW846 9060
	Total Organic Carbon #4	0.701	0.330	1.00	NE	J	2.6U	093958-004	SW846 9060
	Total Organic Carbon Average	0.712	0.330	1.00	NE	J	2.6U	093958-004	SW846 9060
LWDS-MW2	Total Organic Carbon #1	0.620	0.330	1.00	NE	J	2.6U	093960-004	SW846 9060
(Duplicate)	Total Organic Carbon #2	0.885	0.330	1.00	NE	J	2.5U	093960-004	SW846 9060
29-May-13	Total Organic Carbon #3	0.680	0.330	1.00	NE	J	2.7U	093960-004	SW846 9060
	Total Organic Carbon #4	0.750	0.330	1.00	NE	J	2.6U	093960-004	SW846 9060
	Total Organic Carbon Average	0.734	0.330	1.00	NE	J	2.6U	093960-004	SW846 9060
TAV-MW2	Total Organic Carbon #1	0.637	0.330	1.00	NE	J		093950-004	SW846 9060
28-May-13	Total Organic Carbon #2	1.02	0.330	1.00	NE			093950-004	SW846 9060
	Total Organic Carbon #3	0.720	0.330	1.00	NE	J		093950-004	SW846 9060
	Total Organic Carbon #4	0.846	0.330	1.00	NE	J		093950-004	SW846 9060
	Total Organic Carbon Average	0.807	0.330	1.00	NE	J		093950-004	SW846 9060
TAV-MW3	Total Organic Carbon #1	0.650	0.330	1.00	NE	J	J-	093969-004	SW846 9060
21-May-13	Total Organic Carbon #2	0.732	0.330	1.00	NE	J	J-	093969-004	SW846 9060
	Total Organic Carbon #3	0.664	0.330	1.00	NE	J	J-	093969-004	SW846 9060
	Total Organic Carbon #4	0.618	0.330	1.00	NE	J	J-	093969-004	SW846 9060
	Total Organic Carbon Average	0.666	0.330	1.00	NE	J	J-	093969-004	SW846 9060
TAV-MW4	Total Organic Carbon #1	0.632	0.330	1.00	NE	J	J-	093976-004	SW846 9060
05-Jun-13	Total Organic Carbon #2	0.766	0.330	1.00	NE	J	J-	093976-004	SW846 9060
	Total Organic Carbon #3	0.632	0.330	1.00	NE	J	J-	093976-004	SW846 9060
	Total Organic Carbon #4	0.715	0.330	1.00	NE	J	J-	093976-004	SW846 9060
	Total Organic Carbon Average	0.686	0.330	1.00	NE	J	J-	093976-004	SW846 9060

Refer to footnotes on page 5A-89.

Table 5A-5 *(Continued)*
Summary of Total Organic Carbon Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW5	Total Organic Carbon #1	0.579	0.330	1.00	NE	J		093949-004	SW846 9060
15-May-13	Total Organic Carbon #2	0.831	0.330	1.00	NE	J		093949-004	SW846 9060
	Total Organic Carbon #3	0.643	0.330	1.00	NE	J		093949-004	SW846 9060
	Total Organic Carbon #4	0.717	0.330	1.00	NE	J		093949-004	SW846 9060
	Total Organic Carbon Average	0.693	0.330	1.00	NE	J		093949-004	SW846 9060
TAV-MW6	Total Organic Carbon #1	0.937	0.330	1.00	NE	J		093990-004	SW846 9060
11-Jun-13	Total Organic Carbon #2	1.05	0.330	1.00	NE			093990-004	SW846 9060
	Total Organic Carbon #3	0.914	0.330	1.00	NE	J		093990-004	SW846 9060
	Total Organic Carbon #4	0.976	0.330	1.00	NE	J		093990-004	SW846 9060
	Total Organic Carbon Average	0.968	0.330	1.00	NE	J		093990-004	SW846 9060
TAV-MW7	Total Organic Carbon #1	0.654	0.330	1.00	NE	J	2.5UJ	093977-004	SW846 9060
22-May-13	Total Organic Carbon #2	0.887	0.330	1.00	NE	J	2.4UJ	093977-004	SW846 9060
	Total Organic Carbon #3	0.811	0.330	1.00	NE	J	2.3UJ	093977-004	SW846 9060
	Total Organic Carbon #4	0.787	0.330	1.00	NE	J	2.3UJ	093977-004	SW846 9060
	Total Organic Carbon Average	0.785	0.330	1.00	NE	J	2.4UJ	093977-004	SW846 9060
TAV-MW7	Total Organic Carbon #1	0.696	0.330	1.00	NE	J	2.5UJ	093979-004	SW846 9060
(Duplicate)	Total Organic Carbon #2	0.910	0.330	1.00	NE	J	2.4UJ	093979-004	SW846 9060
22-May-13	Total Organic Carbon #3	0.776	0.330	1.00	NE	J	2.3UJ	093979-004	SW846 9060
	Total Organic Carbon #4	0.824	0.330	1.00	NE	J	2.3UJ	093979-004	SW846 9060
	Total Organic Carbon Average	0.802	0.330	1.00	NE	J	2.4UJ	093979-004	SW846 9060
TAV-MW8	Total Organic Carbon #1	0.593	0.330	1.00	NE	J	J-	093983-004	SW846 9060
23-May-13	Total Organic Carbon #2	0.772	0.330	1.00	NE	J	J-	093983-004	SW846 9060
	Total Organic Carbon #3	0.680	0.330	1.00	NE	J	J-	093983-004	SW846 9060
	Total Organic Carbon #4	0.660	0.330	1.00	NE	J	J-	093983-004	SW846 9060
	Total Organic Carbon Average	0.676	0.330	1.00	NE	J	J-	093983-004	SW846 9060
TAV-MW9	Total Organic Carbon #1	1.58	0.330	1.00	NE			093963-004	SW846 9060
20-May-13	Total Organic Carbon #2	1.94	0.330	1.00	NE			093963-004	SW846 9060
	Total Organic Carbon #3	1.88	0.330	1.00	NE			093963-004	SW846 9060
	Total Organic Carbon #4	1.84	0.330	1.00	NE			093963-004	SW846 9060
	Total Organic Carbon Average	1.81	0.330	1.00	NE			093963-004	SW846 9060
TAV-MW10	Total Organic Carbon #1	0.976	0.330	1.00	NE	J		093994-004	SW846 9060
12-Jun-13	Total Organic Carbon #2	1.08	0.330	1.00	NE			093994-004	SW846 9060
	Total Organic Carbon #3	1.05	0.330	1.00	NE			093994-004	SW846 9060
	Total Organic Carbon #4	1.01	0.330	1.00	NE			093994-004	SW846 9060
	Total Organic Carbon Average	1.03	0.330	1.00	NE			093994-004	SW846 9060

Refer to footnotes on page 5A-89.

Table 5A-5 *(Continued)*
Summary of Total Organic Carbon Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW11	Total Organic Carbon #1	0.520	0.330	1.00	NE	J	J-	093968-004	SW846 9060
03-Jun-13	Total Organic Carbon #2	0.691	0.330	1.00	NE	J	J-	093968-004	SW846 9060
	Total Organic Carbon #3	0.551	0.330	1.00	NE	J	J-	093968-004	SW846 9060
	Total Organic Carbon #4	0.616	0.330	1.00	NE	J	J-	093968-004	SW846 9060
	Total Organic Carbon Average	0.594	0.330	1.00	NE	J	J-	093968-004	SW846 9060
TAV-MW12	Total Organic Carbon #1	0.561	0.330	1.00	NE	J	J-	093972-004	SW846 9060
04-Jun-13	Total Organic Carbon #2	0.759	0.330	1.00	NE	J	J-	093972-004	SW846 9060
	Total Organic Carbon #3	0.713	0.330	1.00	NE	J	J-	093972-004	SW846 9060
	Total Organic Carbon #4	0.755	0.330	1.00	NE	J	J-	093972-004	SW846 9060
	Total Organic Carbon Average	0.697	0.330	1.00	NE	J	J-	093972-004	SW846 9060
TAV-MW13	Total Organic Carbon #1	0.581	0.330	1.00	NE	J	2.9U	093957-004	SW846 9060
16-May-13	Total Organic Carbon #2	0.979	0.330	1.00	NE	J	3.1U	093957-004	SW846 9060
	Total Organic Carbon #3	0.734	0.330	1.00	NE	J	2.9U	093957-004	SW846 9060
	Total Organic Carbon #4	0.822	0.330	1.00	NE	J	3.1U	093957-004	SW846 9060
	Total Organic Carbon Average	0.779	0.330	1.00	NE	J	3.0U	093957-004	SW846 9060
TAV-MW13	Total Organic Carbon #1	0.768	0.330	1.00	NE	J	2.9U	093959-004	SW846 9060
(Duplicate)	Total Organic Carbon #2	1.03	0.330	1.00	NE		3.1U	093959-004	SW846 9060
16-May-13	Total Organic Carbon #3	0.795	0.330	1.00	NE	J	2.9U	093959-004	SW846 9060
	Total Organic Carbon #4	0.951	0.330	1.00	NE	J	3.1U	093959-004	SW846 9060
	Total Organic Carbon Average	0.886	0.330	1.00	NE	J	3.0U	093959-004	SW846 9060
TAV-MW14	Total Organic Carbon #1	0.685	0.330	1.00	NE	J	J-	093980-004	SW846 9060
06-Jun-13	Total Organic Carbon #2	0.804	0.330	1.00	NE	J	J-	093980-004	SW846 9060
	Total Organic Carbon #3	0.752	0.330	1.00	NE	J	J-	093980-004	SW846 9060
	Total Organic Carbon #4	0.850	0.330	1.00	NE	J	J-	093980-004	SW846 9060
	Total Organic Carbon Average	0.773	0.330	1.00	NE	J	J-	093980-004	SW846 9060

Refer to footnotes on page 5A-89.

Table 5A-5 *(Continued)*
Summary of Total Organic Carbon Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
AVN-1	Total Organic Carbon #1	0.418	0.330	1.00	NE	J		094408-004	SW846 9060
23-Jul-13	Total Organic Carbon #2	0.572	0.330	1.00	NE	J		094408-004	SW846 9060
	Total Organic Carbon #3	0.475	0.330	1.00	NE	J		094408-004	SW846 9060
	Total Organic Carbon #4	0.489	0.330	1.00	NE	J		094408-004	SW846 9060
	Total Organic Carbon Average	0.489	0.330	1.00	NE	J		094408-004	SW846 9060
LWDS-MW1	Total Organic Carbon #1	0.746	0.330	1.00	NE	J		094420-004	SW846 9060
29-Jul-13	Total Organic Carbon #2	0.840	0.330	1.00	NE	J		094420-004	SW846 9060
	Total Organic Carbon #3	0.832	0.330	1.00	NE	J		094420-004	SW846 9060
	Total Organic Carbon #4	0.803	0.330	1.00	NE	J		094420-004	SW846 9060
	Total Organic Carbon Average	0.805	0.330	1.00	NE	J		094420-004	SW846 9060
LWDS-MW2	Total Organic Carbon #1	0.490	0.330	1.00	NE	J		094396-004	SW846 9060
17-Jul-13	Total Organic Carbon #2	0.601	0.330	1.00	NE	J		094396-004	SW846 9060
	Total Organic Carbon #3	0.467	0.330	1.00	NE	J		094396-004	SW846 9060
	Total Organic Carbon #4	0.471	0.330	1.00	NE	J		094396-004	SW846 9060
	Total Organic Carbon Average	0.508	0.330	1.00	NE	J		094396-004	SW846 9060
TAV-MW2	Total Organic Carbon #1	0.499	0.330	1.00	NE	J		094394-004	SW846 9060
16-Jul-13	Total Organic Carbon #2	0.748	0.330	1.00	NE	J		094394-004	SW846 9060
	Total Organic Carbon #3	0.584	0.330	1.00	NE	J		094394-004	SW846 9060
	Total Organic Carbon #4	0.637	0.330	1.00	NE	J		094394-004	SW846 9060
	Total Organic Carbon Average	0.617	0.330	1.00	NE	J		094394-004	SW846 9060
TAV-MW4	Total Organic Carbon #1	0.474	0.330	1.00	NE	J		094413-004	SW846 9060
24-Jul-13	Total Organic Carbon #2	0.642	0.330	1.00	NE	J		094413-004	SW846 9060
	Total Organic Carbon #3	0.471	0.330	1.00	NE	J		094413-004	SW846 9060
	Total Organic Carbon #4	0.545	0.330	1.00	NE	J		094413-004	SW846 9060
	Total Organic Carbon Average	0.533	0.330	1.00	NE	J		094413-004	SW846 9060
TAV-MW6	Total Organic Carbon #1	0.647	0.330	1.00	NE	J		094417-004	SW846 9060
31-Jul-13	Total Organic Carbon #2	0.982	0.330	1.00	NE	J		094417-004	SW846 9060
	Total Organic Carbon #3	0.796	0.330	1.00	NE	J		094417-004	SW846 9060
	Total Organic Carbon #4	0.912	0.330	1.00	NE	J		094417-004	SW846 9060
	Total Organic Carbon Average	0.834	0.330	1.00	NE	J		094417-004	SW846 9060
TAV-MW6	Total Organic Carbon #1	0.634	0.330	1.00	NE	J		094418-004	SW846 9060
(Duplicate)	Total Organic Carbon #2	0.914	0.330	1.00	NE	J		094418-004	SW846 9060
31-Jul-13	Total Organic Carbon #3	0.709	0.330	1.00	NE	J		094418-004	SW846 9060
	Total Organic Carbon #4	0.842	0.330	1.00	NE	J		094418-004	SW846 9060
	Total Organic Carbon Average	0.775	0.330	1.00	NE	J		094418-004	SW846 9060

Refer to footnotes on page 5A-89.

Table 5A-5 *(Continued)*
Summary of Total Organic Carbon Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW8	Total Organic Carbon #1	0.416	0.330	1.00	NE	J		094404-004	SW846 9060
22-Jul-13	Total Organic Carbon #2	0.700	0.330	1.00	NE	J		094404-004	SW846 9060
	Total Organic Carbon #3	0.500	0.330	1.00	NE	J		094404-004	SW846 9060
	Total Organic Carbon #4	0.599	0.330	1.00	NE	J		094404-004	SW846 9060
	Total Organic Carbon Average	0.554	0.330	1.00	NE	J		094404-004	SW846 9060
TAV-MW10	Total Organic Carbon #1	0.584	0.330	1.00	NE	J		094422-004	SW846 9060
30-Jul-13	Total Organic Carbon #2	0.654	0.330	1.00	NE	J		094422-004	SW846 9060
	Total Organic Carbon #3	0.611	0.330	1.00	NE	J		094422-004	SW846 9060
	Total Organic Carbon #4	0.627	0.330	1.00	NE	J		094422-004	SW846 9060
	Total Organic Carbon Average	0.619	0.330	1.00	NE	J		094422-004	SW846 9060
TAV-MW11	Total Organic Carbon #1	0.438	0.330	1.00	NE	J		094401-004	SW846 9060
18-Jul-13	Total Organic Carbon #2	0.685	0.330	1.00	NE	J	1.8U	094401-004	SW846 9060
	Total Organic Carbon #3	0.495	0.330	1.00	NE	J		094401-004	SW846 9060
	Total Organic Carbon #4	0.596	0.330	1.00	NE	J		094401-004	SW846 9060
	Total Organic Carbon Average	0.554	0.330	1.00	NE	J		094401-004	SW846 9060
TAV-MW11	Total Organic Carbon #1	0.528	0.330	1.00	NE	J		094402-004	SW846 9060
(Duplicate)	Total Organic Carbon #2	0.641	0.330	1.00	NE	J	1.8U	094402-004	SW846 9060
18-Jul-13	Total Organic Carbon #3	0.564	0.330	1.00	NE	J		094402-004	SW846 9060
	Total Organic Carbon #4	0.574	0.330	1.00	NE	J		094402-004	SW846 9060
	Total Organic Carbon Average	0.577	0.330	1.00	NE	J		094402-004	SW846 9060
TAV-MW12	Total Organic Carbon #1	0.402	0.330	1.00	NE	J		094406-004	SW846 9060
23-Jul-13	Total Organic Carbon #2	0.725	0.330	1.00	NE	J		094406-004	SW846 9060
	Total Organic Carbon #3	0.459	0.330	1.00	NE	J		094406-004	SW846 9060
	Total Organic Carbon #4	0.575	0.330	1.00	NE	J		094406-004	SW846 9060
	Total Organic Carbon Average	0.540	0.330	1.00	NE	J		094406-004	SW846 9060
TAV-MW13	Total Organic Carbon #1	0.527	0.330	1.00	NE	J		094392-004	SW846 9060
15-Jul-13	Total Organic Carbon #2	0.660	0.330	1.00	NE	J		094392-004	SW846 9060
	Total Organic Carbon #3	0.616	0.330	1.00	NE	J		094392-004	SW846 9060
	Total Organic Carbon #4	0.574	0.330	1.00	NE	J		094392-004	SW846 9060
	Total Organic Carbon Average	0.594	0.330	1.00	NE	J		094392-004	SW846 9060
TAV-MW14	Total Organic Carbon #1	0.621	0.330	1.00	NE	J		094411-004	SW846 9060
24-Jul-13	Total Organic Carbon #2	0.831	0.330	1.00	NE	J		094411-004	SW846 9060
	Total Organic Carbon #3	0.697	0.330	1.00	NE	J		094411-004	SW846 9060
	Total Organic Carbon #4	0.699	0.330	1.00	NE	J		094411-004	SW846 9060
	Total Organic Carbon Average	0.712	0.330	1.00	NE	J		094411-004	SW846 9060

Refer to footnotes on page 5A-89.

Table 5A-5 *(Continued)*
Summary of Total Organic Carbon Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
AVN-1	Total Organic Carbon #1	0.562	0.330	1.00	NE	J		094808-004	SW846 9060
23-Oct-13	Total Organic Carbon #2	0.705	0.330	1.00	NE	J		094808-004	SW846 9060
	Total Organic Carbon #3	0.752	0.330	1.00	NE	J		094808-004	SW846 9060
	Total Organic Carbon #4	0.810	0.330	1.00	NE	J		094808-004	SW846 9060
	Total Organic Carbon Average	0.707	0.330	1.00	NE	J		094808-004	SW846 9060
LWDS-MW1	Total Organic Carbon #1	0.764	0.330	1.00	NE	J		094838-004	SW846 9060
11-Nov-13	Total Organic Carbon #2	0.913	0.330	1.00	NE	J		094838-004	SW846 9060
	Total Organic Carbon #3	0.813	0.330	1.00	NE	J		094838-004	SW846 9060
	Total Organic Carbon #4	0.841	0.330	1.00	NE	J		094838-004	SW846 9060
	Total Organic Carbon Average	0.833	0.330	1.00	NE	J		094838-004	SW846 9060
LWDS-MW2	Total Organic Carbon #1	0.669	0.330	1.00	NE	J		094810-004	SW846 9060
24-Oct-13	Total Organic Carbon #2	0.931	0.330	1.00	NE	J		094810-004	SW846 9060
	Total Organic Carbon #3	0.747	0.330	1.00	NE	J		094810-004	SW846 9060
	Total Organic Carbon #4	0.778	0.330	1.00	NE	J		094810-004	SW846 9060
	Total Organic Carbon Average	0.781	0.330	1.00	NE	J		094810-004	SW846 9060
TAV-MW2	Total Organic Carbon #1	0.735	0.330	1.00	NE	J	3.0UJ	094815-004	SW846 9060
28-Oct-13	Total Organic Carbon #2	1.07	0.330	1.00	NE		3.2UJ	094815-004	SW846 9060
	Total Organic Carbon #3	0.933	0.330	1.00	NE	J	3.4UJ	094815-004	SW846 9060
	Total Organic Carbon #4	0.887	0.330	1.00	NE	J	3.2UJ	094815-004	SW846 9060
	Total Organic Carbon Average	0.906	0.330	1.00	NE	J	3.2UJ	094815-004	SW846 9060
TAV-MW2	Total Organic Carbon #1	0.785	0.330	1.00	NE	J	3.0UJ	094816-004	SW846 9060
(Duplicate)	Total Organic Carbon #2	1.10	0.330	1.00	NE		3.2UJ	094816-004	SW846 9060
28-Oct-13	Total Organic Carbon #3	0.780	0.330	1.00	NE	J	3.4UJ	094816-004	SW846 9060
	Total Organic Carbon #4	0.944	0.330	1.00	NE	J	3.2UJ	094816-004	SW846 9060
	Total Organic Carbon Average	0.901	0.330	1.00	NE	J	3.2UJ	094816-004	SW846 9060
TAV-MW3	Total Organic Carbon #1	0.593	0.330	1.00	NE	J	J-	094797-004	SW846 9060
17-Oct-13	Total Organic Carbon #2	0.918	0.330	1.00	NE	J	J-	094797-004	SW846 9060
	Total Organic Carbon #3	0.752	0.330	1.00	NE	J	J-	094797-004	SW846 9060
	Total Organic Carbon #4	0.582	0.330	1.00	NE	J	J-	094797-004	SW846 9060
	Total Organic Carbon Average	0.711	0.330	1.00	NE	J	J-	094797-004	SW846 9060
TAV-MW4	Total Organic Carbon #1	0.665	0.330	1.00	NE	J	J-	094821-004	SW846 9060
30-Oct-13	Total Organic Carbon #2	0.815	0.330	1.00	NE	J	J-	094821-004	SW846 9060
	Total Organic Carbon #3	0.697	0.330	1.00	NE	J	J-	094821-004	SW846 9060
	Total Organic Carbon #4	0.727	0.330	1.00	NE	J	J-	094821-004	SW846 9060
	Total Organic Carbon Average	0.726	0.330	1.00	NE	J	J-	094821-004	SW846 9060

Refer to footnotes on page 5A-89.

Table 5A-5 *(Continued)*
Summary of Total Organic Carbon Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW5	Total Organic Carbon #1	0.584	0.330	1.00	NE	J	J-	094793-004	SW846 9060
15-Oct-13	Total Organic Carbon #2	0.760	0.330	1.00	NE	J	J-	094793-004	SW846 9060
	Total Organic Carbon #3	0.643	0.330	1.00	NE	J	J-	094793-004	SW846 9060
	Total Organic Carbon #4	0.747	0.330	1.00	NE	J	J-	094793-004	SW846 9060
	Total Organic Carbon Average	0.683	0.330	1.00	NE	J	J-	094793-004	SW846 9060
TAV-MW6	Total Organic Carbon #1	0.862	0.330	1.00	NE	J		094834-004	SW846 9060
06-Nov-13	Total Organic Carbon #2	1.10	0.330	1.00	NE			094834-004	SW846 9060
	Total Organic Carbon #3	0.908	0.330	1.00	NE	J		094834-004	SW846 9060
	Total Organic Carbon #4	0.900	0.330	1.00	NE	J		094834-004	SW846 9060
	Total Organic Carbon Average	0.942	0.330	1.00	NE	J		094834-004	SW846 9060
TAV-MW7	Total Organic Carbon #1	0.798	0.330	1.00	NE	J	J-	094799-004	SW846 9060
21-Oct-13	Total Organic Carbon #2	1.10	0.330	1.00	NE		J-	094799-004	SW846 9060
	Total Organic Carbon #3	0.869	0.330	1.00	NE	J	J-	094799-004	SW846 9060
	Total Organic Carbon #4	1.04	0.330	1.00	NE		J-	094799-004	SW846 9060
	Total Organic Carbon Average	0.950	0.330	1.00	NE	J	J-	094799-004	SW846 9060
TAV-MW8	Total Organic Carbon #1	0.733	0.330	1.00	NE	J	J-	094819-004	SW846 9060
29-Oct-13	Total Organic Carbon #2	1.02	0.330	1.00	NE		J-	094819-004	SW846 9060
	Total Organic Carbon #3	0.802	0.330	1.00	NE	J	J-	094819-004	SW846 9060
	Total Organic Carbon #4	0.875	0.330	1.00	NE	J	J-	094819-004	SW846 9060
	Total Organic Carbon Average	0.585	0.330	1.00	NE	J	J-	094819-004	SW846 9060
TAV-MW9	Total Organic Carbon #1	1.13	0.330	1.00	NE		2.32UJ	094804-004	SW846 9060
22-Oct-13	Total Organic Carbon #2	1.24	0.330	1.00	NE		2.74UJ	094804-004	SW846 9060
	Total Organic Carbon #3	1.14	0.330	1.00	NE		2.41UJ	094804-004	SW846 9060
	Total Organic Carbon #4	1.40	0.330	1.00	NE		2.49UJ	094804-004	SW846 9060
	Total Organic Carbon Average	1.23	0.330	1.00	NE		2.49UJ	094804-004	SW846 9060
TAV-MW9	Total Organic Carbon #1	1.14	0.330	1.00	NE		2.32UJ	094805-004	SW846 9060
(Duplicate)	Total Organic Carbon #2	1.57	0.330	1.00	NE		2.74UJ	094805-004	SW846 9060
22-Oct-13	Total Organic Carbon #3	1.19	0.330	1.00	NE		2.41UJ	094805-004	SW846 9060
	Total Organic Carbon #4	1.32	0.330	1.00	NE		2.49UJ	094805-004	SW846 9060
	Total Organic Carbon Average	1.30	0.330	1.00	NE		2.49UJ	094805-004	SW846 9060
TAV-MW10	Total Organic Carbon #1	0.831	0.330	1.00	NE	J		094836-004	SW846 9060
07-Nov-13	Total Organic Carbon #2	1.05	0.330	1.00	NE			094836-004	SW846 9060
	Total Organic Carbon #3	0.852	0.330	1.00	NE	J		094836-004	SW846 9060
	Total Organic Carbon #4	0.934	0.330	1.00	NE	J		094836-004	SW846 9060
	Total Organic Carbon Average	0.915	0.330	1.00	NE	J		094836-004	SW846 9060

Refer to footnotes on page 5A-89.

Table 5A-5 *(Concluded)*
Summary of Total Organic Carbon Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW11	Total Organic Carbon #1	0.640	0.330	1.00	NE	J	J-	094823-004	SW846 9060
31-Oct-13	Total Organic Carbon #2	0.746	0.330	1.00	NE	J	J-	094823-004	SW846 9060
	Total Organic Carbon #3	0.681	0.330	1.00	NE	J	J-	094823-004	SW846 9060
	Total Organic Carbon #4	0.634	0.330	1.00	NE	J	J-	094823-004	SW846 9060
	Total Organic Carbon Average	0.675	0.330	1.00	NE	J	J-	094823-004	SW846 9060
TAV-MW12	Total Organic Carbon #1	0.740	0.330	1.00	NE	J	3.1U	094830-004	SW846 9060
05-Nov-13	Total Organic Carbon #2	0.944	0.330	1.00	NE	J	2.9U	094830-004	SW846 9060
	Total Organic Carbon #3	0.872	0.330	1.00	NE	J	3.0U	094830-004	SW846 9060
	Total Organic Carbon #4	0.853	0.330	1.00	NE	J	2.9U	094830-004	SW846 9060
	Total Organic Carbon Average	0.852	0.330	1.00	NE	J	3.0U	094830-004	SW846 9060
TAV-MW12	Total Organic Carbon #1	0.810	0.330	1.00	NE	J	3.1U	094831-004	SW846 9060
(Duplicate)	Total Organic Carbon #2	0.874	0.330	1.00	NE	J	2.9U	094831-004	SW846 9060
05-Nov-13	Total Organic Carbon #3	0.839	0.330	1.00	NE	J	3.0U	094831-004	SW846 9060
	Total Organic Carbon #4	0.780	0.330	1.00	NE	J	2.9U	094831-004	SW846 9060
	Total Organic Carbon Average	0.826	0.330	1.00	NE	J	3.0U	094831-004	SW846 9060
TAV-MW13	Total Organic Carbon #1	0.760	0.330	1.00	NE	J	J-	094795-004	SW846 9060
16-Oct-13	Total Organic Carbon #2	1.15	0.330	1.00	NE		J-	094795-004	SW846 9060
	Total Organic Carbon #3	0.837	0.330	1.00	NE	J	J-	094795-004	SW846 9060
	Total Organic Carbon #4	0.731	0.330	1.00	NE	J	J-	094795-004	SW846 9060
	Total Organic Carbon Average	0.870	0.330	1.00	NE	J	J-	094795-004	SW846 9060
TAV-MW14	Total Organic Carbon #1	0.830	0.330	1.00	NE	J		094825-004	SW846 9060
04-Nov-13	Total Organic Carbon #2	1.09	0.330	1.00	NE			094825-004	SW846 9060
	Total Organic Carbon #3	0.958	0.330	1.00	NE	J		094825-004	SW846 9060
	Total Organic Carbon #4	0.893	0.330	1.00	NE	J		094825-004	SW846 9060
	Total Organic Carbon Average	0.944	0.330	1.00	NE	J		094825-004	SW846 9060

Refer to footnotes on page 5A-89.

Table 5A-6
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
AVN-1	Calcium	43.0	0.060	0.200	NE			093517-011	SW846 6020
18-Feb-13	Magnesium	9.44	0.010	0.030	NE			093517-011	SW846 6020
	Potassium	3.45	0.080	0.300	NE			093517-011	SW846 6020
	Sodium	37.2	0.080	0.250	NE			093517-011	SW846 6020
LWDS-MW1	Calcium	68.7	0.300	1.00	NE			093525-011	SW846 6020
11-Mar-13	Magnesium	20.4	0.010	0.030	NE			093525-011	SW846 6020
	Potassium	3.17	0.080	0.300	NE			093525-011	SW846 6020
	Sodium	64.5	0.400	1.25	NE			093525-011	SW846 6020
LWDS-MW1 (Duplicate)	Calcium	66.2	0.300	1.00	NE			093526-011	SW846 6020
11-Mar-13	Magnesium	18.5	0.010	0.030	NE			093526-011	SW846 6020
	Potassium	3.01	0.080	0.300	NE			093526-011	SW846 6020
	Sodium	66.9	0.400	1.25	NE			093526-011	SW846 6020
LWDS-MW2	Calcium	46.6	0.060	0.200	NE			093513-011	SW846 6020
13-Feb-13	Magnesium	13.0	0.010	0.030	NE			093513-011	SW846 6020
	Potassium	2.94	0.080	0.300	NE			093513-011	SW846 6020
	Sodium	48.1	0.080	0.250	NE		J	093513-011	SW846 6020
TAV-MW2	Calcium	75.6	0.300	1.00	NE			093508-011	SW846 6020
12-Feb-13	Magnesium	20.0	0.010	0.030	NE			093508-011	SW846 6020
	Potassium	3.86	0.080	0.300	NE			093508-011	SW846 6020
	Sodium	75.3	0.400	1.25	NE		J	093508-011	SW846 6020
TAV-MW4	Calcium	53.8	0.300	1.00	NE			093521-011	SW846 6020
20-Feb-13	Magnesium	13.9	0.010	0.030	NE			093521-011	SW846 6020
	Potassium	3.19	0.080	0.300	NE			093521-011	SW846 6020
	Sodium	43.4	0.080	0.250	NE			093521-011	SW846 6020
TAV-MW6	Calcium	63.1	0.300	1.00	NE			093533-011	SW846 6020
25-Feb-13	Magnesium	19.5	0.010	0.030	NE			093533-011	SW846 6020
	Potassium	3.83	0.080	0.300	NE			093533-011	SW846 6020
	Sodium	65.9	0.400	1.25	NE			093533-011	SW846 6020
TAV-MW8	Calcium	62.1	0.300	1.00	NE			093511-011	SW846 6020
15-Feb-13	Magnesium	16.5	0.010	0.030	NE			093511-011	SW846 6020
	Potassium	3.81	0.080	0.300	NE			093511-011	SW846 6020
	Sodium	92.4	0.400	1.25	NE		J	093511-011	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW10	Calcium	64.5	0.300	1.00	NE			093536-011	SW846 6020
27-Feb-13	Magnesium	18.1	0.010	0.030	NE			093536-011	SW846 6020
	Potassium	4.83	0.080	0.300	NE			093536-011	SW846 6020
	Sodium	62.0	0.400	1.25	NE			093536-011	SW846 6020
TAV-MW11	Calcium	61.3	0.300	1.00	NE			093515-011	SW846 6020
14-Feb-13	Magnesium	15.1	0.010	0.030	NE			093515-011	SW846 6020
	Potassium	3.86	0.080	0.300	NE			093515-011	SW846 6020
	Sodium	60.0	0.400	1.25	NE		J	093515-011	SW846 6020
TAV-MW12	Calcium	60.6	0.300	1.00	NE			093519-011	SW846 6020
19-Feb-13	Magnesium	17.8	0.010	0.030	NE			093519-011	SW846 6020
	Potassium	3.81	0.080	0.300	NE			093519-011	SW846 6020
	Sodium	60.8	0.400	1.25	NE			093519-011	SW846 6020
TAV-MW13	Calcium	50.0	0.060	0.200	NE			093574-011	SW846 6020
26-Feb-13	Magnesium	15.6	0.010	0.030	NE			093574-011	SW846 6020
	Potassium	3.57	0.080	0.300	NE			093574-011	SW846 6020
	Sodium	48.5	0.080	0.250	NE			093574-011	SW846 6020
TAV-MW14	Calcium	63.8	0.300	1.00	NE			093530-011	SW846 6020
21-Feb-13	Magnesium	17.9	0.010	0.030	NE			093530-011	SW846 6020
	Potassium	4.14	0.080	0.300	NE			093530-011	SW846 6020
	Sodium	58.7	0.400	1.25	NE			093530-011	SW846 6020
TAV-MW14 (Duplicate)	Calcium	62.1	0.300	1.00	NE			093531-011	SW846 6020
21-Feb-13	Magnesium	17.3	0.010	0.030	NE			093531-011	SW846 6020
	Potassium	3.91	0.080	0.300	NE			093531-011	SW846 6020
	Sodium	61.8	0.400	1.25	NE			093531-011	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
AVN-1	Aluminum	0.0154	0.015	0.050	NE	J		093964-009	SW846 6020
30-May-13	Antimony	ND	0.001	0.003	0.006	U		093964-009	SW846 6020
	Arsenic	0.00313	0.0017	0.005	0.010	J		093964-009	SW846 6020
	Barium	0.0775	0.0006	0.002	2.00			093964-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093964-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093964-009	SW846 6020
	Calcium	44.0	0.060	0.200	NE			093964-009	SW846 6020
	Chromium	0.0274	0.002	0.010	0.100			093964-009	SW846 6020
	Cobalt	0.000111	0.0001	0.001	NE	J		093964-009	SW846 6020
	Copper	0.00787	0.00035	0.001	NE			093964-009	SW846 6020
	Iron	0.200	0.033	0.100	NE			093964-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093964-009	SW846 6020
	Magnesium	10.3	0.010	0.030	NE			093964-009	SW846 6020
	Manganese	0.00149	0.001	0.005	NE	J		093964-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093964-009	SW846 7470
	Nickel	0.00372	0.0005	0.002	NE			093964-009	SW846 6020
	Potassium	3.59	0.080	0.300	NE			093964-009	SW846 6020
	Selenium	0.002	0.0015	0.005	0.050	J		093964-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093964-009	SW846 6020
	Sodium	40.5	0.080	0.250	NE			093964-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093964-009	SW846 6020
	Uranium	0.00223	0.000067	0.0002	0.030			093964-009	SW846 6020
	Vanadium	0.00872	0.001	0.005	NE			093964-009	SW846 6010
	Zinc	0.00702	0.0035	0.010	NE	J		093964-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
LWDS-MW1	Aluminum	ND	0.015	0.050	NE	U		093986-009	SW846 6020
10-Jun-13	Antimony	ND	0.001	0.003	0.006	U		093986-009	SW846 6020
	Arsenic	0.00303	0.0017	0.005	0.010	J		093986-009	SW846 6020
	Barium	0.0881	0.0006	0.002	2.00			093986-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093986-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093986-009	SW846 6020
	Calcium	73.1	0.300	1.00	NE			093986-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093986-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		093986-009	SW846 6020
	Copper	0.000685	0.00035	0.001	NE	J		093986-009	SW846 6020
	Iron	0.133	0.033	0.100	NE			093986-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093986-009	SW846 6020
	Magnesium	22.8	0.010	0.030	NE			093986-009	SW846 6020
	Manganese	0.00113	0.001	0.005	NE	J		093986-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093986-009	SW846 7470
	Nickel	0.00201	0.0005	0.002	NE			093986-009	SW846 6020
	Potassium	3.13	0.080	0.300	NE			093986-009	SW846 6020
	Selenium	0.00683	0.0015	0.005	0.050			093986-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093986-009	SW846 6020
	Sodium	71.6	0.400	1.25	NE			093986-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093986-009	SW846 6020
	Uranium	0.00346	0.000067	0.0002	0.030			093986-009	SW846 6020
	Vanadium	0.0051	0.001	0.005	NE			093986-009	SW846 6010
	Zinc	0.00496	0.0035	0.010	NE	J		093986-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
LWDS-MW2	Aluminum	0.038	0.015	0.050	NE	J		093958-009	SW846 6020
29-May-13	Antimony	ND	0.001	0.003	0.006	U		093958-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093958-009	SW846 6020
	Barium	0.0695	0.0006	0.002	2.00			093958-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093958-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093958-009	SW846 6020
	Calcium	47.2	0.060	0.200	NE			093958-009	SW846 6020
	Chromium	0.00344	0.002	0.010	0.100	J		093958-009	SW846 6020
	Cobalt	0.000137	0.0001	0.001	NE	J		093958-009	SW846 6020
	Copper	0.00745	0.00035	0.001	NE		0.013UJ	093958-009	SW846 6020
	Iron	0.123	0.033	0.100	NE			093958-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093958-009	SW846 6020
	Magnesium	13.7	0.010	0.030	NE			093958-009	SW846 6020
	Manganese	0.00222	0.001	0.005	NE	J	0.028UJ	093958-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093958-009	SW846 7470
	Nickel	0.00155	0.0005	0.002	NE	J		093958-009	SW846 6020
	Potassium	3.04	0.080	0.300	NE			093958-009	SW846 6020
	Selenium	0.00239	0.0015	0.005	0.050	J		093958-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093958-009	SW846 6020
	Sodium	44.7	0.080	0.250	NE			093958-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093958-009	SW846 6020
	Uranium	0.00307	0.000067	0.0002	0.030			093958-009	SW846 6020
	Vanadium	0.00715	0.001	0.005	NE			093958-009	SW846 6010
	Zinc	0.00658	0.0035	0.010	NE	J	0.041U	093958-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
LWDS-MW2 (Duplicate)	Aluminum	0.0554	0.015	0.050	NE			093960-009	SW846 6020
29-May-13	Antimony	ND	0.001	0.003	0.006	U		093960-009	SW846 6020
	Arsenic	0.00281	0.0017	0.005	0.010	J		093960-009	SW846 6020
	Barium	0.0671	0.0006	0.002	2.00			093960-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093960-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093960-009	SW846 6020
	Calcium	45.0	0.060	0.200	NE			093960-009	SW846 6020
	Chromium	0.0034	0.002	0.010	0.100	J		093960-009	SW846 6020
	Cobalt	0.000144	0.0001	0.001	NE	J		093960-009	SW846 6020
	Copper	0.00731	0.00035	0.001	NE		0.013UJ	093960-009	SW846 6020
	Iron	0.156	0.033	0.100	NE			093960-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093960-009	SW846 6020
	Magnesium	13.5	0.010	0.030	NE			093960-009	SW846 6020
	Manganese	0.00247	0.001	0.005	NE	J	0.028UJ	093960-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093960-009	SW846 7470
	Nickel	0.00173	0.0005	0.002	NE	J		093960-009	SW846 6020
	Potassium	2.82	0.080	0.300	NE			093960-009	SW846 6020
	Selenium	0.00253	0.0015	0.005	0.050	J		093960-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093960-009	SW846 6020
	Sodium	43.5	0.080	0.250	NE			093960-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093960-009	SW846 6020
	Uranium	0.00311	0.000067	0.0002	0.030			093960-009	SW846 6020
	Vanadium	0.00707	0.001	0.005	NE			093960-009	SW846 6010
	Zinc	0.00569	0.0035	0.010	NE	J	0.041U	093960-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW2	Aluminum	ND	0.015	0.050	NE	U		093950-009	SW846 6020
28-May-13	Antimony	ND	0.001	0.003	0.006	U		093950-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093950-009	SW846 6020
	Barium	0.0636	0.0006	0.002	2.00			093950-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093950-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093950-009	SW846 6020
	Calcium	72.3	0.300	1.00	NE			093950-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093950-009	SW846 6020
	Cobalt	0.00021	0.0001	0.001	NE	J		093950-009	SW846 6020
	Copper	0.00165	0.00035	0.001	NE			093950-009	SW846 6020
	Iron	0.150	0.033	0.100	NE			093950-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093950-009	SW846 6020
	Magnesium	22.8	0.010	0.030	NE			093950-009	SW846 6020
	Manganese	0.00147	0.001	0.005	NE	J		093950-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093950-009	SW846 7470
	Nickel	0.00228	0.0005	0.002	NE			093950-009	SW846 6020
	Potassium	3.86	0.080	0.300	NE			093950-009	SW846 6020
	Selenium	0.00287	0.0015	0.005	0.050	J		093950-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093950-009	SW846 6020
	Sodium	65.0	0.400	1.25	NE			093950-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093950-009	SW846 6020
	Uranium	0.00637	0.000067	0.0002	0.030			093950-009	SW846 6020
	Vanadium	0.00564	0.001	0.005	NE			093950-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093950-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW3	Aluminum	0.0172	0.015	0.050	NE	J		093969-009	SW846 6020
21-May-13	Antimony	ND	0.001	0.003	0.006	U		093969-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093969-009	SW846 6020
	Barium	0.0472	0.0006	0.002	2.00			093969-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093969-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093969-009	SW846 6020
	Calcium	55.7	0.300	1.00	NE	N		093969-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093969-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		093969-009	SW846 6020
	Copper	0.00066	0.00035	0.001	NE	J		093969-009	SW846 6020
	Iron	0.125	0.033	0.100	NE			093969-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093969-009	SW846 6020
	Magnesium	15.7	0.010	0.030	NE			093969-009	SW846 6020
	Manganese	0.00118	0.001	0.005	NE	J		093969-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093969-009	SW846 7470
	Nickel	0.00157	0.0005	0.002	NE	J		093969-009	SW846 6020
	Potassium	4.48	0.080	0.300	NE			093969-009	SW846 6020
	Selenium	0.00253	0.0015	0.005	0.050	J		093969-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093969-009	SW846 6020
	Sodium	54.6	0.400	1.25	NE	N		093969-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093969-009	SW846 6020
	Uranium	0.00332	0.000067	0.0002	0.030		J	093969-009	SW846 6020
	Vanadium	0.00558	0.001	0.005	NE			093969-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093969-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW4	Aluminum	0.0245	0.015	0.050	NE	J		093976-009	SW846 6020
05-Jun-13	Antimony	ND	0.001	0.003	0.006	U		093976-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093976-009	SW846 6020
	Barium	0.0828	0.0006	0.002	2.00	B		093976-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093976-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093976-009	SW846 6020
	Calcium	53.9	0.300	1.00	NE	B		093976-009	SW846 6020
	Chromium	0.0276	0.002	0.010	0.100			093976-009	SW846 6020
	Cobalt	0.000152	0.0001	0.001	NE	J		093976-009	SW846 6020
	Copper	0.00131	0.00035	0.001	NE	B	0.0022U	093976-009	SW846 6020
	Iron	0.153	0.033	0.100	NE			093976-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093976-009	SW846 6020
	Magnesium	15.6	0.010	0.030	NE			093976-009	SW846 6020
	Manganese	0.00171	0.001	0.005	NE	J		093976-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093976-009	SW846 7470
	Nickel	0.00215	0.0005	0.002	NE	B	0.0028U	093976-009	SW846 6020
	Potassium	2.98	0.080	0.300	NE			093976-009	SW846 6020
	Selenium	0.00367	0.0015	0.005	0.050	J		093976-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093976-009	SW846 6020
	Sodium	48.7	0.080	0.250	NE			093976-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093976-009	SW846 6020
	Uranium	0.00294	0.000067	0.0002	0.030			093976-009	SW846 6020
	Vanadium	0.00706	0.001	0.005	NE			093976-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093976-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW5	Aluminum	ND	0.015	0.050	NE	U		093949-009	SW846 6020
15-May-13	Antimony	ND	0.001	0.003	0.006	U		093949-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093949-009	SW846 6020
	Barium	0.0612	0.0006	0.002	2.00			093949-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093949-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093949-009	SW846 6020
	Calcium	48.3	0.060	0.200	NE	N		093949-009	SW846 6020
	Chromium	0.00333	0.002	0.010	0.100	J		093949-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		093949-009	SW846 6020
	Copper	0.00162	0.00035	0.001	NE			093949-009	SW846 6020
	Iron	0.109	0.033	0.100	NE			093949-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093949-009	SW846 6020
	Magnesium	14.6	0.010	0.030	NE			093949-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093949-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093949-009	SW846 7470
	Nickel	0.00272	0.0005	0.002	NE			093949-009	SW846 6020
	Potassium	2.94	0.080	0.300	NE			093949-009	SW846 6020
	Selenium	0.00288	0.0015	0.005	0.050	J		093949-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093949-009	SW846 6020
	Sodium	46.9	0.080	0.250	NE	N		093949-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093949-009	SW846 6020
	Uranium	0.00351	0.000067	0.0002	0.030			093949-009	SW846 6020
	Vanadium	0.00634	0.001	0.005	NE			093949-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093949-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW6	Aluminum	0.170	0.015	0.050	NE			093990-009	SW846 6020
11-Jun-13	Antimony	ND	0.001	0.003	0.006	U		093990-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093990-009	SW846 6020
	Barium	0.0724	0.0006	0.002	2.00			093990-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093990-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093990-009	SW846 6020
	Calcium	66.4	0.300	1.00	NE			093990-009	SW846 6020
	Chromium	0.00294	0.002	0.010	0.100	J		093990-009	SW846 6020
	Cobalt	0.000157	0.0001	0.001	NE	J		093990-009	SW846 6020
	Copper	0.000746	0.00035	0.001	NE	J		093990-009	SW846 6020
	Iron	0.317	0.033	0.100	NE			093990-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093990-009	SW846 6020
	Magnesium	20.4	0.010	0.030	NE			093990-009	SW846 6020
	Manganese	0.00478	0.001	0.005	NE	J		093990-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093990-009	SW846 7470
	Nickel	0.00205	0.0005	0.002	NE			093990-009	SW846 6020
	Potassium	3.94	0.080	0.300	NE			093990-009	SW846 6020
	Selenium	0.00553	0.0015	0.005	0.050			093990-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093990-009	SW846 6020
	Sodium	63.3	0.400	1.25	NE			093990-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093990-009	SW846 6020
	Uranium	0.00382	0.000067	0.0002	0.030			093990-009	SW846 6020
	Vanadium	0.00621	0.001	0.005	NE		0.0064U	093990-009	SW846 6010
	Zinc	0.00409	0.0035	0.010	NE	J		093990-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW7	Aluminum	0.034	0.015	0.050	NE	J		093977-009	SW846 6020
22-May-13	Antimony	ND	0.001	0.003	0.006	U		093977-009	SW846 6020
	Arsenic	0.00178	0.0017	0.005	0.010	J		093977-009	SW846 6020
	Barium	0.0572	0.0006	0.002	2.00			093977-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093977-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093977-009	SW846 6020
	Calcium	60.7	0.300	1.00	NE	N		093977-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093977-009	SW846 6020
	Cobalt	0.000152	0.0001	0.001	NE	J		093977-009	SW846 6020
	Copper	0.000747	0.00035	0.001	NE	J	0.0082UJ	093977-009	SW846 6020
	Iron	0.196	0.033	0.100	NE			093977-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093977-009	SW846 6020
	Magnesium	19.9	0.010	0.030	NE			093977-009	SW846 6020
	Manganese	0.00505	0.001	0.005	NE			093977-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093977-009	SW846 7470
	Nickel	0.00173	0.0005	0.002	NE	J		093977-009	SW846 6020
	Potassium	3.91	0.080	0.300	NE			093977-009	SW846 6020
	Selenium	0.00276	0.0015	0.005	0.050	J		093977-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093977-009	SW846 6020
	Sodium	62.3	0.400	1.25	NE	N		093977-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093977-009	SW846 6020
	Uranium	0.00464	0.000067	0.0002	0.030		J	093977-009	SW846 6020
	Vanadium	0.00702	0.001	0.005	NE			093977-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093977-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW7 (Duplicate)	Aluminum	0.0346	0.015	0.050	NE	J		093979-009	SW846 6020
22-May-13	Antimony	ND	0.001	0.003	0.006	U		093979-009	SW846 6020
	Arsenic	0.00181	0.0017	0.005	0.010	J		093979-009	SW846 6020
	Barium	0.0583	0.0006	0.002	2.00			093979-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093979-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093979-009	SW846 6020
	Calcium	61.5	0.300	1.00	NE	N		093979-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093979-009	SW846 6020
	Cobalt	0.000133	0.0001	0.001	NE	J		093979-009	SW846 6020
	Copper	0.0292	0.00035	0.001	NE			093979-009	SW846 6020
	Iron	0.178	0.033	0.100	NE			093979-009	SW846 6020
	Lead	0.00153	0.0005	0.002	NE	J		093979-009	SW846 6020
	Magnesium	20.8	0.010	0.030	NE			093979-009	SW846 6020
	Manganese	0.00508	0.001	0.005	NE			093979-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093979-009	SW846 7470
	Nickel	0.00178	0.0005	0.002	NE	J		093979-009	SW846 6020
	Potassium	3.86	0.080	0.300	NE			093979-009	SW846 6020
	Selenium	0.00319	0.0015	0.005	0.050	J		093979-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093979-009	SW846 6020
	Sodium	58.0	0.400	1.25	NE	N		093979-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093979-009	SW846 6020
	Uranium	0.00444	0.000067	0.0002	0.030		J	093979-009	SW846 6020
	Vanadium	0.00663	0.001	0.005	NE			093979-009	SW846 6010
	Zinc	0.0215	0.0035	0.010	NE			093979-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW8	Aluminum	0.126	0.015	0.050	NE			093983-009	SW846 6020
23-May-13	Antimony	ND	0.001	0.003	0.006	U		093983-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093983-009	SW846 6020
	Barium	0.0567	0.0006	0.002	2.00			093983-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093983-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093983-009	SW846 6020
	Calcium	59.0	0.300	1.00	NE	N		093983-009	SW846 6020
	Chromium	0.00295	0.002	0.010	0.100	J		093983-009	SW846 6020
	Cobalt	0.000125	0.0001	0.001	NE	J		093983-009	SW846 6020
	Copper	0.00116	0.00035	0.001	NE			093983-009	SW846 6020
	Iron	0.200	0.033	0.100	NE			093983-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093983-009	SW846 6020
	Magnesium	17.8	0.010	0.030	NE			093983-009	SW846 6020
	Manganese	0.00295	0.001	0.005	NE	J		093983-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093983-009	SW846 7470
	Nickel	0.0016	0.0005	0.002	NE	J		093983-009	SW846 6020
	Potassium	3.60	0.080	0.300	NE			093983-009	SW846 6020
	Selenium	0.00349	0.0015	0.005	0.050	J		093983-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093983-009	SW846 6020
	Sodium	57.1	0.400	1.25	NE	N		093983-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093983-009	SW846 6020
	Uranium	0.00318	0.000067	0.0002	0.030		J	093983-009	SW846 6020
	Vanadium	0.00615	0.001	0.005	NE			093983-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093983-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW9	Aluminum	0.0583	0.015	0.050	NE			093963-009	SW846 6020
20-May-13	Antimony	ND	0.001	0.003	0.006	U		093963-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093963-009	SW846 6020
	Barium	0.0653	0.0006	0.002	2.00			093963-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093963-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093963-009	SW846 6020
	Calcium	58.5	0.300	1.00	NE	N		093963-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093963-009	SW846 6020
	Cobalt	0.000147	0.0001	0.001	NE	J		093963-009	SW846 6020
	Copper	0.00169	0.00035	0.001	NE			093963-009	SW846 6020
	Iron	0.163	0.033	0.100	NE			093963-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093963-009	SW846 6020
	Magnesium	19.4	0.010	0.030	NE			093963-009	SW846 6020
	Manganese	0.00781	0.001	0.005	NE			093963-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093963-009	SW846 7470
	Nickel	0.00186	0.0005	0.002	NE	J		093963-009	SW846 6020
	Potassium	3.95	0.080	0.300	NE			093963-009	SW846 6020
	Selenium	0.00281	0.0015	0.005	0.050	J		093963-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093963-009	SW846 6020
	Sodium	56.3	0.400	1.25	NE	N		093963-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093963-009	SW846 6020
	Uranium	0.00482	0.000067	0.0002	0.030		J	093963-009	SW846 6020
	Vanadium	0.00597	0.001	0.005	NE			093963-009	SW846 6010
	Zinc	0.0155	0.0035	0.010	NE			093963-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW10	Aluminum	ND	0.015	0.050	NE	U		093994-009	SW846 6020
12-Jun-13	Antimony	ND	0.001	0.003	0.006	U		093994-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093994-009	SW846 6020
	Barium	0.0614	0.0006	0.002	2.00			093994-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093994-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093994-009	SW846 6020
	Calcium	65.5	0.300	1.00	NE			093994-009	SW846 6020
	Chromium	0.00274	0.002	0.010	0.100	J		093994-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		093994-009	SW846 6020
	Copper	0.00081	0.00035	0.001	NE	J		093994-009	SW846 6020
	Iron	0.125	0.033	0.100	NE			093994-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093994-009	SW846 6020
	Magnesium	17.2	0.010	0.030	NE			093994-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093994-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093994-009	SW846 7470
	Nickel	0.00172	0.0005	0.002	NE	J		093994-009	SW846 6020
	Potassium	4.44	0.080	0.300	NE			093994-009	SW846 6020
	Selenium	0.00337	0.0015	0.005	0.050	J		093994-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093994-009	SW846 6020
	Sodium	64.6	0.400	1.25	NE			093994-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093994-009	SW846 6020
	Uranium	0.00342	0.000067	0.0002	0.030			093994-009	SW846 6020
	Vanadium	0.00589	0.001	0.005	NE		0.0064U	093994-009	SW846 6010
	Zinc	0.00567	0.0035	0.010	NE	J		093994-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW11	Aluminum	ND	0.015	0.050	NE	U		093968-009	SW846 6020
03-Jun-13	Antimony	ND	0.001	0.003	0.006	U		093968-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093968-009	SW846 6020
	Barium	0.0645	0.0006	0.002	2.00	B		093968-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093968-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093968-009	SW846 6020
	Calcium	55.2	0.300	1.00	NE	B		093968-009	SW846 6020
	Chromium	0.00329	0.002	0.010	0.100	J		093968-009	SW846 6020
	Cobalt	0.000167	0.0001	0.001	NE	J		093968-009	SW846 6020
	Copper	0.0011	0.00035	0.001	NE	B	0.0022U	093968-009	SW846 6020
	Iron	0.127	0.033	0.100	NE			093968-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093968-009	SW846 6020
	Magnesium	15.9	0.010	0.030	NE			093968-009	SW846 6020
	Manganese	0.0062	0.001	0.005	NE			093968-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093968-009	SW846 7470
	Nickel	0.00221	0.0005	0.002	NE	B	0.0028U	093968-009	SW846 6020
	Potassium	3.57	0.080	0.300	NE			093968-009	SW846 6020
	Selenium	0.00378	0.0015	0.005	0.050	J		093968-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093968-009	SW846 6020
	Sodium	53.8	0.400	1.25	NE			093968-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093968-009	SW846 6020
	Uranium	0.00285	0.000067	0.0002	0.030			093968-009	SW846 6020
	Vanadium	0.0063	0.001	0.005	NE			093968-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093968-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW12	Aluminum	0.226	0.015	0.050	NE			093972-009	SW846 6020
04-Jun-13	Antimony	ND	0.001	0.003	0.006	U		093972-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093972-009	SW846 6020
	Barium	0.0646	0.0006	0.002	2.00	B		093972-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093972-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093972-009	SW846 6020
	Calcium	58.8	0.300	1.00	NE	B		093972-009	SW846 6020
	Chromium	0.0025	0.002	0.010	0.100	J		093972-009	SW846 6020
	Cobalt	0.000292	0.0001	0.001	NE	J		093972-009	SW846 6020
	Copper	0.00134	0.00035	0.001	NE	B	0.0022U	093972-009	SW846 6020
	Iron	0.349	0.033	0.100	NE			093972-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093972-009	SW846 6020
	Magnesium	19.2	0.010	0.030	NE			093972-009	SW846 6020
	Manganese	0.00735	0.001	0.005	NE			093972-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093972-009	SW846 7470
	Nickel	0.0025	0.0005	0.002	NE	B	0.0028U	093972-009	SW846 6020
	Potassium	3.59	0.080	0.300	NE			093972-009	SW846 6020
	Selenium	0.00264	0.0015	0.005	0.050	J		093972-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093972-009	SW846 6020
	Sodium	61.5	0.400	1.25	NE			093972-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093972-009	SW846 6020
	Uranium	0.00467	0.000067	0.0002	0.030			093972-009	SW846 6020
	Vanadium	0.00565	0.001	0.005	NE			093972-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093972-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW13	Aluminum	0.0256	0.015	0.050	NE	J		093957-009	SW846 6020
16-May-13	Antimony	ND	0.001	0.003	0.006	U		093957-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093957-009	SW846 6020
	Barium	0.0567	0.0006	0.002	2.00			093957-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093957-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093957-009	SW846 6020
	Calcium	52.8	0.300	1.00	NE	N		093957-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093957-009	SW846 6020
	Cobalt	0.000114	0.0001	0.001	NE	J		093957-009	SW846 6020
	Copper	0.00129	0.00035	0.001	NE		0.012UJ	093957-009	SW846 6020
	Iron	0.134	0.033	0.100	NE		0.18U	093957-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093957-009	SW846 6020
	Magnesium	15.3	0.010	0.030	NE			093957-009	SW846 6020
	Manganese	0.00943	0.001	0.005	NE			093957-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093957-009	SW846 7470
	Nickel	0.00148	0.0005	0.002	NE	J		093957-009	SW846 6020
	Potassium	3.49	0.080	0.300	NE			093957-009	SW846 6020
	Selenium	0.00248	0.0015	0.005	0.050	J		093957-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093957-009	SW846 6020
	Sodium	51.9	0.400	1.25	NE	N		093957-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093957-009	SW846 6020
	Uranium	0.0037	0.000067	0.0002	0.030			093957-009	SW846 6020
	Vanadium	0.00605	0.001	0.005	NE			093957-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093957-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW13 (Duplicate)	Aluminum	0.0285	0.015	0.050	NE	J		093959-009	SW846 6020
16-May-13	Antimony	ND	0.001	0.003	0.006	U		093959-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093959-009	SW846 6020
	Barium	0.0591	0.0006	0.002	2.00			093959-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093959-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093959-009	SW846 6020
	Calcium	51.9	0.300	1.00	NE	N		093959-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093959-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		093959-009	SW846 6020
	Copper	0.00126	0.00035	0.001	NE		0.012UJ	093959-009	SW846 6020
	Iron	0.190	0.033	0.100	NE			093959-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093959-009	SW846 6020
	Magnesium	15.5	0.010	0.030	NE			093959-009	SW846 6020
	Manganese	0.0177	0.001	0.005	NE			093959-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093959-009	SW846 7470
	Nickel	0.00143	0.0005	0.002	NE	J		093959-009	SW846 6020
	Potassium	3.42	0.080	0.300	NE			093959-009	SW846 6020
	Selenium	0.00284	0.0015	0.005	0.050	J		093959-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093959-009	SW846 6020
	Sodium	49.6	0.080	0.250	NE	N		093959-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093959-009	SW846 6020
	Uranium	0.00375	0.000067	0.0002	0.030			093959-009	SW846 6020
	Vanadium	0.00621	0.001	0.005	NE			093959-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093959-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW14	Aluminum	0.0324	0.015	0.050	NE	J		093980-009	SW846 6020
06-Jun-13	Antimony	ND	0.001	0.003	0.006	U		093980-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093980-009	SW846 6020
	Barium	0.0629	0.0006	0.002	2.00	B		093980-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093980-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093980-009	SW846 6020
	Calcium	63.8	0.300	1.00	NE	B		093980-009	SW846 6020
	Chromium	0.00216	0.002	0.010	0.100	J		093980-009	SW846 6020
	Cobalt	0.000223	0.0001	0.001	NE	J		093980-009	SW846 6020
	Copper	0.00102	0.00035	0.001	NE	B	0.0022U	093980-009	SW846 6020
	Iron	0.203	0.033	0.100	NE			093980-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093980-009	SW846 6020
	Magnesium	20.8	0.010	0.030	NE			093980-009	SW846 6020
	Manganese	0.00286	0.001	0.005	NE	J		093980-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093980-009	SW846 7470
	Nickel	0.00277	0.0005	0.002	NE	B	0.0028U	093980-009	SW846 6020
	Potassium	3.83	0.080	0.300	NE			093980-009	SW846 6020
	Selenium	0.00269	0.0015	0.005	0.050	J		093980-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093980-009	SW846 6020
	Sodium	67.4	0.400	1.25	NE			093980-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093980-009	SW846 6020
	Uranium	0.00428	0.000067	0.0002	0.030			093980-009	SW846 6020
	Vanadium	0.00456	0.001	0.005	NE	J		093980-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093980-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
AVN-1	Calcium	43.3	0.060	0.200	NE			094408-009	SW846 6020
23-Jul-13	Magnesium	10.3	0.010	0.030	NE		J	094408-009	SW846 6020
	Potassium	3.29	0.080	0.300	NE			094408-009	SW846 6020
	Sodium	38.4	0.080	0.250	NE		J	094408-009	SW846 6020
LWDS-MW1	Calcium	68.8	0.300	1.00	NE			094420-009	SW846 6020
29-Jul-13	Magnesium	18.8	0.010	0.030	NE		J	094420-009	SW846 6020
	Potassium	2.82	0.080	0.300	NE			094420-009	SW846 6020
	Sodium	67.7	0.400	1.25	NE		J	094420-009	SW846 6020
LWDS-MW2	Calcium	46.3	0.060	0.200	NE			094396-009	SW846 6020
17-Jul-13	Magnesium	13.2	0.010	0.030	NE			094396-009	SW846 6020
	Potassium	2.84	0.080	0.300	NE			094396-009	SW846 6020
	Sodium	42.3	0.080	0.250	NE			094396-009	SW846 6020
TAV-MW2	Calcium	68.5	1.20	4.00	NE			094394-009	SW846 6020
16-Jul-13	Magnesium	23.4	0.010	0.030	NE			094394-009	SW846 6020
	Potassium	4.07	0.080	0.300	NE			094394-009	SW846 6020
	Sodium	61.4	1.60	5.00	NE			094394-009	SW846 6020
TAV-MW4	Calcium	48.7	0.060	0.200	NE			094413-009	SW846 6020
24-Jul-13	Magnesium	14.3	0.010	0.030	NE		J	094413-009	SW846 6020
	Potassium	2.97	0.080	0.300	NE			094413-009	SW846 6020
	Sodium	43.9	0.080	0.250	NE		J	094413-009	SW846 6020
TAV-MW6	Calcium	66.2	0.300	1.00	NE			094417-009	SW846 6020
31-Jul-13	Magnesium	21.0	0.010	0.030	NE			094417-009	SW846 6020
	Potassium	4.37	0.080	0.300	NE			094417-009	SW846 6020
	Sodium	63.7	0.400	1.25	NE			094417-009	SW846 6020
TAV-MW6 (Duplicate)	Calcium	66.6	0.300	1.00	NE			094418-009	SW846 6020
31-Jul-13	Magnesium	19.5	0.010	0.030	NE			094418-009	SW846 6020
	Potassium	3.84	0.080	0.300	NE			094418-009	SW846 6020
	Sodium	60.7	0.400	1.25	NE			094418-009	SW846 6020
TAV-MW8	Calcium	58.1	0.300	1.00	NE			094404-009	SW846 6020
22-Jul-13	Magnesium	15.9	0.010	0.030	NE		J	094404-009	SW846 6020
	Potassium	3.50	0.080	0.300	NE			094404-009	SW846 6020
	Sodium	55.6	0.400	1.25	NE		J	094404-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW10	Calcium	62.9	0.600	2.00	NE			094422-009	SW846 6020
30-Jul-13	Magnesium	17.7	0.050	0.150	NE		J	094422-009	SW846 6020
	Potassium	4.25	0.400	1.50	NE			094422-009	SW846 6020
	Sodium	67.7	0.800	2.50	NE		J	094422-009	SW846 6020
TAV-MW11	Calcium	52.0	1.20	4.00	NE			094401-009	SW846 6020
18-Jul-13	Magnesium	15.3	0.010	0.030	NE			094401-009	SW846 6020
	Potassium	3.97	0.080	0.300	NE			094401-009	SW846 6020
	Sodium	48.7	1.60	5.00	NE			094401-009	SW846 6020
TAV-MW11 (Duplicate)	Calcium	53.2	1.20	4.00	NE			094402-009	SW846 6020
18-Jul-13	Magnesium	16.5	0.010	0.030	NE			094402-009	SW846 6020
	Potassium	4.18	0.080	0.300	NE			094402-009	SW846 6020
	Sodium	50.4	1.60	5.00	NE			094402-009	SW846 6020
TAV-MW12	Calcium	59.5	0.300	1.00	NE			094406-009	SW846 6020
23-Jul-13	Magnesium	17.7	0.010	0.030	NE		J	094406-009	SW846 6020
	Potassium	3.55	0.080	0.300	NE			094406-009	SW846 6020
	Sodium	61.7	0.400	1.25	NE		J	094406-009	SW846 6020
TAV-MW13	Calcium	51.4	1.20	4.00	NE			094392-009	SW846 6020
15-Jul-13	Magnesium	15.5	0.010	0.030	NE			094392-009	SW846 6020
	Potassium	3.64	0.080	0.300	NE			094392-009	SW846 6020
	Sodium	50.0	0.080	0.250	NE			094392-009	SW846 6020
TAV-MW14	Calcium	66.9	0.300	1.00	NE			094411-009	SW846 6020
24-Jul-13	Magnesium	19.3	0.010	0.030	NE		J	094411-009	SW846 6020
	Potassium	4.13	0.080	0.300	NE			094411-009	SW846 6020
	Sodium	62.4	0.400	1.25	NE		J	094411-009	SW846 6020
AVN-1	Calcium	39.9	0.060	0.200	NE			094808-017	SW846 6020
23-Oct-13	Magnesium	9.30	0.010	0.030	NE		J	094808-017	SW846 6020
	Potassium	3.20	0.080	0.300	NE	N		094808-017	SW846 6020
	Sodium	34.3	0.080	0.250	NE			094808-017	SW846 6020
LWDS-MW1	Calcium	68.2	0.300	1.00	NE			094838-017	SW846 6020
11-Nov-13	Magnesium	21.7	0.010	0.030	NE			094838-017	SW846 6020
	Potassium	3.15	0.080	0.300	NE			094838-017	SW846 6020
	Sodium	68.4	0.400	1.25	NE			094838-017	SW846 6020
LWDS-MW2	Calcium	43.3	0.060	0.200	NE			094810-017	SW846 6020
24-Oct-13	Magnesium	12.8	0.010	0.030	NE		J	094810-017	SW846 6020
	Potassium	2.63	0.080	0.300	NE	N		094810-017	SW846 6020
	Sodium	41.8	0.080	0.250	NE			094810-017	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW2	Calcium	74.3	0.300	1.00	NE			094815-017	SW846 6020
28-Oct-13	Magnesium	24.2	0.010	0.030	NE			094815-017	SW846 6020
	Potassium	3.94	0.080	0.300	NE			094815-017	SW846 6020
	Sodium	67.2	0.400	1.25	NE			094815-017	SW846 6020
TAV-MW2 (Duplicate)	Calcium	74.1	0.300	1.00	NE			094816-017	SW846 6020
28-Oct-13	Magnesium	23.2	0.010	0.030	NE			094816-017	SW846 6020
	Potassium	3.82	0.080	0.300	NE			094816-017	SW846 6020
	Sodium	67.7	0.400	1.25	NE			094816-017	SW846 6020
TAV-MW3	Calcium	56.8	0.300	1.00	NE			094797-017	SW846 6020
17-Oct-13	Magnesium	13.7	0.010	0.030	NE		J	094797-017	SW846 6020
	Potassium	4.40	0.080	0.300	NE			094797-017	SW846 6020
	Sodium	53.4	0.400	1.25	NE			094797-017	SW846 6020
TAV-MW4	Calcium	52.3	0.300	1.00	NE			094821-017	SW846 6020
30-Oct-13	Magnesium	15.5	0.010	0.030	NE			094821-017	SW846 6020
	Potassium	3.26	0.080	0.300	NE			094821-017	SW846 6020
	Sodium	46.4	0.400	1.25	NE			094821-017	SW846 6020
TAV-MW5	Calcium	47.4	0.060	0.200	NE			094793-017	SW846 6020
15-Oct-13	Magnesium	14.5	0.010	0.030	NE		J	094793-017	SW846 6020
	Potassium	2.87	0.080	0.300	NE			094793-017	SW846 6020
	Sodium	46.7	0.080	0.250	NE			094793-017	SW846 6020
TAV-MW6	Calcium	70.0	0.300	1.00	NE			094834-017	SW846 6020
06-Nov-13	Magnesium	19.2	0.010	0.030	NE			094834-017	SW846 6020
	Potassium	4.02	0.080	0.300	NE			094834-017	SW846 6020
	Sodium	63.6	0.400	1.25	NE			094834-017	SW846 6020
TAV-MW7	Calcium	62.4	0.600	2.00	NE			094799-017	SW846 6020
21-Oct-13	Magnesium	18.7	0.010	0.030	NE		J	094799-017	SW846 6020
	Potassium	4.33	0.080	0.300	NE	N		094799-017	SW846 6020
	Sodium	58.1	0.800	2.50	NE			094799-017	SW846 6020
TAV-MW8	Calcium	57.3	0.300	1.00	NE			094819-017	SW846 6020
29-Oct-13	Magnesium	17.6	0.010	0.030	NE			094819-017	SW846 6020
	Potassium	3.94	0.080	0.300	NE			094819-017	SW846 6020
	Sodium	58.2	0.400	1.25	NE			094819-017	SW846 6020
TAV-MW9	Calcium	63.3	0.600	2.00	NE			094804-017	SW846 6020
22-Oct-13	Magnesium	19.4	0.010	0.030	NE		J	094804-017	SW846 6020
	Potassium	3.95	0.080	0.300	NE	N		094804-017	SW846 6020
	Sodium	61.2	0.800	2.50	NE			094804-017	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Concluded)*
Summary of Unfiltered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW9 (Duplicate)	Calcium	64.9	0.600	2.00	NE			094805-017	SW846 6020
22-Oct-13	Magnesium	20.0	0.010	0.030	NE		J	094805-017	SW846 6020
	Potassium	4.10	0.080	0.300	NE	N		094805-017	SW846 6020
	Sodium	58.9	0.800	2.50	NE			094805-017	SW846 6020
TAV-MW10	Calcium	58.6	0.300	1.00	NE			094836-017	SW846 6020
07-Nov-13	Magnesium	16.5	0.010	0.030	NE			094836-017	SW846 6020
	Potassium	4.30	0.080	0.300	NE			094836-017	SW846 6020
	Sodium	53.4	0.400	1.25	NE			094836-017	SW846 6020
TAV-MW11	Calcium	54.6	0.300	1.00	NE			094823-017	SW846 6020
31-Oct-13	Magnesium	17.2	0.010	0.030	NE			094823-017	SW846 6020
	Potassium	4.13	0.080	0.300	NE			094823-017	SW846 6020
	Sodium	53.6	0.400	1.25	NE			094823-017	SW846 6020
TAV-MW12	Calcium	58.2	0.300	1.00	NE			094830-017	SW846 6020
05-Nov-13	Magnesium	17.6	0.010	0.030	NE			094830-017	SW846 6020
	Potassium	3.55	0.080	0.300	NE			094830-017	SW846 6020
	Sodium	57.9	0.400	1.25	NE			094830-017	SW846 6020
TAV-MW12 (Duplicate)	Calcium	66.3	0.600	2.00	NE	B		094831-017	SW846 6020
05-Nov-13	Magnesium	21.8	0.100	0.300	NE			094831-017	SW846 6020
	Potassium	3.89	0.080	0.300	NE			094831-017	SW846 6020
	Sodium	66.7	0.800	2.50	NE			094831-017	SW846 6020
TAV-MW13	Calcium	50.0	0.060	0.200	NE			094795-017	SW846 6020
16-Oct-13	Magnesium	14.2	0.010	0.030	NE		J	094795-017	SW846 6020
	Potassium	3.33	0.080	0.300	NE			094795-017	SW846 6020
	Sodium	49.3	0.080	0.250	NE			094795-017	SW846 6020
TAV-MW14	Calcium	62.2	0.300	1.00	NE			094825-017	SW846 6020
04-Nov-13	Magnesium	17.1	0.010	0.030	NE			094825-017	SW846 6020
	Potassium	4.09	0.080	0.300	NE			094825-017	SW846 6020
	Sodium	58.2	0.400	1.25	NE			094825-017	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
AVN-1	Iron	0.069	0.033	0.100	NE	J		093517-012	SW846 6020
18-Feb-13	Manganese	ND	0.001	0.005	NE	U		093517-012	SW846 6020
LWDS-MW1	Iron	0.137	0.033	0.100	NE			093525-012	SW846 6020
11-Mar-13	Manganese	ND	0.001	0.005	NE	U		093525-012	SW846 6020
LWDS-MW1 (Duplicate)	Iron	0.138	0.033	0.100	NE			093526-012	SW846 6020
11-Mar-13	Manganese	ND	0.001	0.005	NE	U		093526-012	SW846 6020
LWDS-MW2	Iron	0.0917	0.033	0.100	NE	J		093513-012	SW846 6020
13-Feb-13	Manganese	ND	0.001	0.005	NE	U		093513-012	SW846 6020
TAV-MW2	Iron	0.131	0.033	0.100	NE			093508-012	SW846 6020
12-Feb-13	Manganese	ND	0.001	0.005	NE	U		093508-012	SW846 6020
TAV-MW4	Iron	0.0831	0.033	0.100	NE	J		093521-012	SW846 6020
20-Feb-13	Manganese	ND	0.001	0.005	NE	U		093521-012	SW846 6020
TAV-MW6	Iron	0.103	0.033	0.100	NE			093533-012	SW846 6020
25-Feb-13	Manganese	ND	0.001	0.005	NE	U		093533-012	SW846 6020
TAV-MW8	Iron	0.102	0.033	0.100	NE			093511-012	SW846 6020
15-Feb-13	Manganese	ND	0.001	0.005	NE	U		093511-012	SW846 6020
TAV-MW10	Iron	0.117	0.033	0.100	NE			093536-012	SW846 6020
27-Feb-13	Manganese	ND	0.001	0.005	NE	U		093536-012	SW846 6020
TAV-MW11	Iron	0.102	0.033	0.100	NE			093515-012	SW846 6020
14-Feb-13	Manganese	ND	0.001	0.005	NE	U		093515-012	SW846 6020
TAV-MW12	Iron	0.0972	0.033	0.100	NE	J		093519-012	SW846 6020
19-Feb-13	Manganese	ND	0.001	0.005	NE	U		093519-012	SW846 6020
TAV-MW13	Iron	0.0929	0.033	0.100	NE	J		093574-012	SW846 6020
26-Feb-13	Manganese	ND	0.001	0.005	NE	U		093574-012	SW846 6020
TAV-MW14	Iron	0.102	0.033	0.100	NE			093530-012	SW846 6020
21-Feb-13	Manganese	ND	0.001	0.005	NE	U		093530-012	SW846 6020
TAV-MW14 (Duplicate)	Iron	0.106	0.033	0.100	NE			093531-012	SW846 6020
21-Feb-13	Manganese	ND	0.001	0.005	NE	U		093531-012	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
AVN-1	Aluminum	ND	0.015	0.050	NE	U		093964-010	SW846 6020
30-May-13	Antimony	ND	0.001	0.003	0.006	U		093964-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093964-010	SW846 6020
	Barium	0.074	0.0006	0.002	2.00			093964-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093964-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093964-010	SW846 6020
	Calcium	44.1	0.060	0.200	NE			093964-010	SW846 6020
	Chromium	0.00231	0.002	0.010	0.100	J		093964-010	SW846 6020
	Cobalt	0.000108	0.0001	0.001	NE	J		093964-010	SW846 6020
	Copper	0.00672	0.00035	0.001	NE			093964-010	SW846 6020
	Iron	0.0762	0.033	0.100	NE	J		093964-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093964-010	SW846 6020
	Magnesium	10.8	0.010	0.030	NE			093964-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093964-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093964-010	SW846 7470
	Nickel	0.00226	0.0005	0.002	NE			093964-010	SW846 6020
	Potassium	3.42	0.080	0.300	NE			093964-010	SW846 6020
	Selenium	0.00255	0.0015	0.005	0.050	J		093964-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093964-010	SW846 6020
	Sodium	41.4	0.080	0.250	NE			093964-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093964-010	SW846 6020
	Uranium	0.00218	0.000067	0.0002	0.030			093964-010	SW846 6020
	Vanadium	0.00699	0.001	0.005	NE			093964-010	SW846 6010
	Zinc	0.00552	0.0035	0.010	NE	J		093964-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
LWDS-MW1	Aluminum	ND	0.015	0.050	NE	U		093986-010	SW846 6020
10-Jun-13	Antimony	ND	0.001	0.003	0.006	U		093986-010	SW846 6020
	Arsenic	0.00293	0.0017	0.005	0.010	J		093986-010	SW846 6020
	Barium	0.0936	0.0006	0.002	2.00			093986-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093986-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093986-010	SW846 6020
	Calcium	69.6	0.300	1.00	NE			093986-010	SW846 6020
	Chromium	0.0025	0.002	0.010	0.100	J		093986-010	SW846 6020
	Cobalt	0.000158	0.0001	0.001	NE	J		093986-010	SW846 6020
	Copper	0.000684	0.00035	0.001	NE	J		093986-010	SW846 6020
	Iron	0.134	0.033	0.100	NE			093986-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093986-010	SW846 6020
	Magnesium	20.9	0.010	0.030	NE			093986-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093986-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093986-010	SW846 7470
	Nickel	0.00194	0.0005	0.002	NE	J		093986-010	SW846 6020
	Potassium	3.10	0.080	0.300	NE			093986-010	SW846 6020
	Selenium	0.00658	0.0015	0.005	0.050			093986-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093986-010	SW846 6020
	Sodium	75.1	0.400	1.25	NE			093986-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093986-010	SW846 6020
	Uranium	0.0033	0.000067	0.0002	0.030			093986-010	SW846 6020
	Vanadium	0.00523	0.001	0.005	NE		0.0064U	093986-010	SW846 6010
	Zinc	0.010	0.0035	0.010	NE			093986-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
LWDS-MW2	Aluminum	ND	0.015	0.050	NE	U		093958-010	SW846 6020
29-May-13	Antimony	ND	0.001	0.003	0.006	U		093958-010	SW846 6020
	Arsenic	0.00231	0.0017	0.005	0.010	J		093958-010	SW846 6020
	Barium	0.0676	0.0006	0.002	2.00			093958-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093958-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093958-010	SW846 6020
	Calcium	46.3	0.060	0.200	NE			093958-010	SW846 6020
	Chromium	0.00292	0.002	0.010	0.100	J		093958-010	SW846 6020
	Cobalt	0.000138	0.0001	0.001	NE	J	0.00096U	093958-010	SW846 6020
	Copper	0.00744	0.00035	0.001	NE		0.012UJ	093958-010	SW846 6020
	Iron	0.0791	0.033	0.100	NE	J		093958-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093958-010	SW846 6020
	Magnesium	14.5	0.010	0.030	NE			093958-010	SW846 6020
	Manganese	0.00149	0.001	0.005	NE	J	0.029UJ	093958-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093958-010	SW846 7470
	Nickel	0.0014	0.0005	0.002	NE	J		093958-010	SW846 6020
	Potassium	2.92	0.080	0.300	NE			093958-010	SW846 6020
	Selenium	0.00251	0.0015	0.005	0.050	J		093958-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093958-010	SW846 6020
	Sodium	47.7	0.080	0.250	NE			093958-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093958-010	SW846 6020
	Uranium	0.00306	0.000067	0.0002	0.030			093958-010	SW846 6020
	Vanadium	0.00734	0.001	0.005	NE			093958-010	SW846 6010
	Zinc	0.00532	0.0035	0.010	NE	J	0.045U	093958-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
LWDS-MW2 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		093960-010	SW846 6020
29-May-13	Antimony	ND	0.001	0.003	0.006	U		093960-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093960-010	SW846 6020
	Barium	0.0657	0.0006	0.002	2.00			093960-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093960-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093960-010	SW846 6020
	Calcium	45.9	0.060	0.200	NE			093960-010	SW846 6020
	Chromium	0.00299	0.002	0.010	0.100	J		093960-010	SW846 6020
	Cobalt	0.000104	0.0001	0.001	NE	J	0.00096U	093960-010	SW846 6020
	Copper	0.00677	0.00035	0.001	NE		0.012UJ	093960-010	SW846 6020
	Iron	0.0788	0.033	0.100	NE	J		093960-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093960-010	SW846 6020
	Magnesium	14.1	0.010	0.030	NE			093960-010	SW846 6020
	Manganese	0.00141	0.001	0.005	NE	J	0.029UJ	093960-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093960-010	SW846 7470
	Nickel	0.00134	0.0005	0.002	NE	J		093960-010	SW846 6020
	Potassium	2.82	0.080	0.300	NE			093960-010	SW846 6020
	Selenium	0.00256	0.0015	0.005	0.050	J		093960-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093960-010	SW846 6020
	Sodium	42.3	0.080	0.250	NE			093960-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093960-010	SW846 6020
	Uranium	0.00308	0.000067	0.0002	0.030			093960-010	SW846 6020
	Vanadium	0.00711	0.001	0.005	NE			093960-010	SW846 6010
	Zinc	0.00505	0.0035	0.010	NE	J	0.045U	093960-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW2	Aluminum	ND	0.015	0.050	NE	U		093950-010	SW846 6020
28-May-13	Antimony	ND	0.001	0.003	0.006	U		093950-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093950-010	SW846 6020
	Barium	0.0608	0.0006	0.002	2.00			093950-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093950-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093950-010	SW846 6020
	Calcium	69.8	0.300	1.00	NE			093950-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093950-010	SW846 6020
	Cobalt	0.000204	0.0001	0.001	NE	J		093950-010	SW846 6020
	Copper	0.000827	0.00035	0.001	NE	J		093950-010	SW846 6020
	Iron	0.130	0.033	0.100	NE			093950-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093950-010	SW846 6020
	Magnesium	24.1	0.010	0.030	NE			093950-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093950-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093950-010	SW846 7470
	Nickel	0.00137	0.0005	0.002	NE	J		093950-010	SW846 6020
	Potassium	4.05	0.080	0.300	NE			093950-010	SW846 6020
	Selenium	0.00278	0.0015	0.005	0.050	J		093950-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093950-010	SW846 6020
	Sodium	68.1	0.400	1.25	NE			093950-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093950-010	SW846 6020
	Uranium	0.00615	0.000067	0.0002	0.030			093950-010	SW846 6020
	Vanadium	0.00559	0.001	0.005	NE			093950-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093950-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW3	Aluminum	ND	0.015	0.050	NE	U		093969-010	SW846 6020
21-May-13	Antimony	ND	0.001	0.003	0.006	U		093969-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093969-010	SW846 6020
	Barium	0.0444	0.0006	0.002	2.00			093969-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093969-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093969-010	SW846 6020
	Calcium	56.1	0.300	1.00	NE			093969-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093969-010	SW846 6020
	Cobalt	0.000102	0.0001	0.001	NE	J		093969-010	SW846 6020
	Copper	0.000468	0.00035	0.001	NE	J		093969-010	SW846 6020
	Iron	0.0961	0.033	0.100	NE	J		093969-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093969-010	SW846 6020
	Magnesium	15.0	0.010	0.030	NE			093969-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093969-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093969-010	SW846 7470
	Nickel	0.00132	0.0005	0.002	NE	J		093969-010	SW846 6020
	Potassium	4.28	0.080	0.300	NE			093969-010	SW846 6020
	Selenium	0.00291	0.0015	0.005	0.050	J		093969-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093969-010	SW846 6020
	Sodium	53.7	0.800	2.50	NE			093969-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093969-010	SW846 6020
	Uranium	0.00315	0.000067	0.0002	0.030			093969-010	SW846 6020
	Vanadium	0.00579	0.001	0.005	NE			093969-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093969-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW4	Aluminum	ND	0.015	0.050	NE	U		093976-010	SW846 6020
05-Jun-13	Antimony	ND	0.001	0.003	0.006	U		093976-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093976-010	SW846 6020
	Barium	0.0839	0.0006	0.002	2.00	B		093976-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093976-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093976-010	SW846 6020
	Calcium	52.1	0.300	1.00	NE	B		093976-010	SW846 6020
	Chromium	0.0275	0.002	0.010	0.100			093976-010	SW846 6020
	Cobalt	0.000168	0.0001	0.001	NE	J		093976-010	SW846 6020
	Copper	0.000879	0.00035	0.001	NE	B, J	0.0022U	093976-010	SW846 6020
	Iron	0.107	0.033	0.100	NE			093976-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093976-010	SW846 6020
	Magnesium	15.8	0.010	0.030	NE			093976-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093976-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093976-010	SW846 7470
	Nickel	0.00214	0.0005	0.002	NE	B	0.0028U	093976-010	SW846 6020
	Potassium	2.99	0.080	0.300	NE			093976-010	SW846 6020
	Selenium	0.00373	0.0015	0.005	0.050	J		093976-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093976-010	SW846 6020
	Sodium	48.8	0.080	0.250	NE			093976-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093976-010	SW846 6020
	Uranium	0.00307	0.000067	0.0002	0.030			093976-010	SW846 6020
	Vanadium	0.00699	0.001	0.005	NE			093976-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093976-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW5	Aluminum	ND	0.015	0.050	NE	U		093949-010	SW846 6020
15-Jun-13	Antimony	ND	0.001	0.003	0.006	U		093949-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093949-010	SW846 6020
	Barium	0.0617	0.0006	0.002	2.00			093949-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093949-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093949-010	SW846 6020
	Calcium	48.3	0.060	0.200	NE	N		093949-010	SW846 6020
	Chromium	0.00339	0.002	0.010	0.100	J		093949-010	SW846 6020
	Cobalt	0.000134	0.0001	0.001	NE	J		093949-010	SW846 6020
	Copper	0.00101	0.00035	0.001	NE			093949-010	SW846 6020
	Iron	0.100	0.033	0.100	NE			093949-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093949-010	SW846 6020
	Magnesium	14.3	0.010	0.030	NE			093949-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093949-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093949-010	SW846 7470
	Nickel	0.00131	0.0005	0.002	NE	J		093949-010	SW846 6020
	Potassium	2.72	0.080	0.300	NE			093949-010	SW846 6020
	Selenium	0.00281	0.0015	0.005	0.050	J		093949-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093949-010	SW846 6020
	Sodium	49.8	0.080	0.250	NE	N		093949-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093949-010	SW846 6020
	Uranium	0.00339	0.000067	0.0002	0.030			093949-010	SW846 6020
	Vanadium	0.00692	0.001	0.005	NE			093949-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093949-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW6	Aluminum	ND	0.015	0.050	NE	U		093990-010	SW846 6020
11-Jun-13	Antimony	ND	0.001	0.003	0.006	U		093990-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093990-010	SW846 6020
	Barium	0.0676	0.0006	0.002	2.00			093990-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093990-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093990-010	SW846 6020
	Calcium	70.1	0.300	1.00	NE			093990-010	SW846 6020
	Chromium	0.00309	0.002	0.010	0.100	J		093990-010	SW846 6020
	Cobalt	0.00011	0.0001	0.001	NE	J		093990-010	SW846 6020
	Copper	0.000612	0.00035	0.001	NE	J		093990-010	SW846 6020
	Iron	0.139	0.033	0.100	NE			093990-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093990-010	SW846 6020
	Magnesium	19.7	0.010	0.030	NE			093990-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093990-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093990-010	SW846 7470
	Nickel	0.00281	0.0005	0.002	NE			093990-010	SW846 6020
	Potassium	3.53	0.080	0.300	NE			093990-010	SW846 6020
	Selenium	0.00503	0.0015	0.005	0.050			093990-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093990-010	SW846 6020
	Sodium	71.4	0.400	1.25	NE			093990-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093990-010	SW846 6020
	Uranium	0.00376	0.000067	0.0002	0.030			093990-010	SW846 6020
	Vanadium	0.00638	0.001	0.005	NE		0.0064U	093990-010	SW846 6010
	Zinc	0.00441	0.0035	0.010	NE	J		093990-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW7	Aluminum	ND	0.015	0.050	NE	U		093977-010	SW846 6020
22-May-13	Antimony	ND	0.001	0.003	0.006	U		093977-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093977-010	SW846 6020
	Barium	0.0537	0.0006	0.002	2.00			093977-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093977-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093977-010	SW846 6020
	Calcium	62.2	0.300	1.00	NE			093977-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093977-010	SW846 6020
	Cobalt	0.000112	0.0001	0.001	NE	J		093977-010	SW846 6020
	Copper	0.000436	0.00035	0.001	NE	J	0.0044U	093977-010	SW846 6020
	Iron	0.0977	0.033	0.100	NE	J		093977-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093977-010	SW846 6020
	Magnesium	18.8	0.010	0.030	NE			093977-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093977-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093977-010	SW846 7470
	Nickel	0.00136	0.0005	0.002	NE	J		093977-010	SW846 6020
	Potassium	4.26	0.080	0.300	NE			093977-010	SW846 6020
	Selenium	0.00289	0.0015	0.005	0.050	J		093977-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093977-010	SW846 6020
	Sodium	57.7	0.800	2.50	NE			093977-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093977-010	SW846 6020
	Uranium	0.00468	0.000067	0.0002	0.030			093977-010	SW846 6020
	Vanadium	0.007	0.001	0.005	NE			093977-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093977-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW7 (Continued)	Aluminum	ND	0.015	0.050	NE	U		093979-010	SW846 6020
22-May-13	Antimony	ND	0.001	0.003	0.006	U		093979-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093979-010	SW846 6020
	Barium	0.0536	0.0006	0.002	2.00			093979-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093979-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093979-010	SW846 6020
	Calcium	59.8	0.300	1.00	NE			093979-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093979-010	SW846 6020
	Cobalt	0.000124	0.0001	0.001	NE	J		093979-010	SW846 6020
	Copper	0.000421	0.00035	0.001	NE	J	0.0044U	093979-010	SW846 6020
	Iron	0.0961	0.033	0.100	NE	J		093979-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093979-010	SW846 6020
	Magnesium	19.8	0.010	0.030	NE			093979-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093979-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093979-010	SW846 7470
	Nickel	0.00119	0.0005	0.002	NE	J		093979-010	SW846 6020
	Potassium	4.10	0.080	0.300	NE			093979-010	SW846 6020
	Selenium	0.00274	0.0015	0.005	0.050	J		093979-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093979-010	SW846 6020
	Sodium	57.0	0.800	2.50	NE			093979-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093979-010	SW846 6020
	Uranium	0.00442	0.000067	0.0002	0.030			093979-010	SW846 6020
	Vanadium	0.00686	0.001	0.005	NE			093979-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093979-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW8	Aluminum	ND	0.015	0.050	NE	U		093983-010	SW846 6020
23-May-13	Antimony	ND	0.001	0.003	0.006	U		093983-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093983-010	SW846 6020
	Barium	0.052	0.0006	0.002	2.00			093983-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093983-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093983-010	SW846 6020
	Calcium	57.1	0.300	1.00	NE			093983-010	SW846 6020
	Chromium	0.00245	0.002	0.010	0.100	J		093983-010	SW846 6020
	Cobalt	0.0001	0.0001	0.001	NE	J		093983-010	SW846 6020
	Copper	0.000405	0.00035	0.001	NE	J		093983-010	SW846 6020
	Iron	0.0926	0.033	0.100	NE	J		093983-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093983-010	SW846 6020
	Magnesium	17.7	0.010	0.030	NE			093983-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093983-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093983-010	SW846 7470
	Nickel	0.00112	0.0005	0.002	NE	J		093983-010	SW846 6020
	Potassium	3.86	0.080	0.300	NE			093983-010	SW846 6020
	Selenium	0.00345	0.0015	0.005	0.050	J		093983-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093983-010	SW846 6020
	Sodium	55.0	0.800	2.50	NE			093983-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093983-010	SW846 6020
	Uranium	0.00327	0.000067	0.0002	0.030			093983-010	SW846 6020
	Vanadium	0.00677	0.001	0.005	NE			093983-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093983-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW9	Aluminum	ND	0.015	0.050	NE	U		093963-010	SW846 6020
20-May-13	Antimony	ND	0.001	0.003	0.006	U		093963-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093963-010	SW846 6020
	Barium	0.0602	0.0006	0.002	2.00			093963-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093963-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093963-010	SW846 6020
	Calcium	63.2	0.300	1.00	NE			093963-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093963-010	SW846 6020
	Cobalt	0.000161	0.0001	0.001	NE	J		093963-010	SW846 6020
	Copper	0.000797	0.00035	0.001	NE	J		093963-010	SW846 6020
	Iron	0.102	0.033	0.100	NE			093963-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093963-010	SW846 6020
	Magnesium	18.8	0.010	0.030	NE			093963-010	SW846 6020
	Manganese	0.00482	0.001	0.005	NE	J		093963-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093963-010	SW846 7470
	Nickel	0.00162	0.0005	0.002	NE	J		093963-010	SW846 6020
	Potassium	4.09	0.080	0.300	NE			093963-010	SW846 6020
	Selenium	0.00279	0.0015	0.005	0.050	J		093963-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093963-010	SW846 6020
	Sodium	53.2	0.800	2.50	NE			093963-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093963-010	SW846 6020
	Uranium	0.00488	0.000067	0.0002	0.030			093963-010	SW846 6020
	Vanadium	0.00602	0.001	0.005	NE			093963-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093963-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW10	Aluminum	ND	0.015	0.050	NE	U		093994-010	SW846 6020
12-Jun-13	Antimony	ND	0.001	0.003	0.006	U		093994-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093994-010	SW846 6020
	Barium	0.0623	0.0006	0.002	2.00			093994-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093994-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093994-010	SW846 6020
	Calcium	65.4	0.300	1.00	NE			093994-010	SW846 6020
	Chromium	0.00342	0.002	0.010	0.100	J		093994-010	SW846 6020
	Cobalt	0.000113	0.0001	0.001	NE	J		093994-010	SW846 6020
	Copper	0.00054	0.00035	0.001	NE	J		093994-010	SW846 6020
	Iron	0.123	0.033	0.100	NE			093994-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093994-010	SW846 6020
	Magnesium	17.1	0.010	0.030	NE			093994-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093994-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093994-010	SW846 7470
	Nickel	0.00175	0.0005	0.002	NE	J		093994-010	SW846 6020
	Potassium	4.30	0.080	0.300	NE			093994-010	SW846 6020
	Selenium	0.00405	0.0015	0.005	0.050	J		093994-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093994-010	SW846 6020
	Sodium	64.1	0.400	1.25	NE			093994-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093994-010	SW846 6020
	Uranium	0.0034	0.000067	0.0002	0.030			093994-010	SW846 6020
	Vanadium	0.00609	0.001	0.005	NE		0.0064U	093994-010	SW846 6010
	Zinc	0.00442	0.0035	0.010	NE	J		093994-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW11	Aluminum	ND	0.015	0.050	NE	U		093968-010	SW846 6020
03-Jun-13	Antimony	ND	0.001	0.003	0.006	U		093968-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093968-010	SW846 6020
	Barium	0.0667	0.0006	0.002	2.00	B		093968-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093968-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093968-010	SW846 6020
	Calcium	57.3	0.300	1.00	NE	B		093968-010	SW846 6020
	Chromium	0.00338	0.002	0.010	0.100	J		093968-010	SW846 6020
	Cobalt	0.000205	0.0001	0.001	NE	J		093968-010	SW846 6020
	Copper	0.00107	0.00035	0.001	NE	B	0.0022U	093968-010	SW846 6020
	Iron	0.115	0.033	0.100	NE			093968-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093968-010	SW846 6020
	Magnesium	16.9	0.010	0.030	NE			093968-010	SW846 6020
	Manganese	0.00129	0.001	0.005	NE	J		093968-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093968-010	SW846 7470
	Nickel	0.00239	0.0005	0.002	NE	B	0.0028U	093968-010	SW846 6020
	Potassium	3.63	0.080	0.300	NE			093968-010	SW846 6020
	Selenium	0.00379	0.0015	0.005	0.050	J		093968-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093968-010	SW846 6020
	Sodium	56.3	0.400	1.25	NE			093968-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093968-010	SW846 6020
	Uranium	0.003	0.000067	0.0002	0.030			093968-010	SW846 6020
	Vanadium	0.00601	0.001	0.005	NE			093968-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093968-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW12	Aluminum	ND	0.015	0.050	NE	U		093972-010	SW846 6020
04-Jun-13	Antimony	ND	0.001	0.003	0.006	U		093972-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093972-010	SW846 6020
	Barium	0.0615	0.0006	0.002	2.00	B		093972-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093972-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093972-010	SW846 6020
	Calcium	58.4	0.300	1.00	NE	B		093972-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093972-010	SW846 6020
	Cobalt	0.000286	0.0001	0.001	NE	J		093972-010	SW846 6020
	Copper	0.000913	0.00035	0.001	NE	B, J	0.0022U	093972-010	SW846 6020
	Iron	0.119	0.033	0.100	NE			093972-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093972-010	SW846 6020
	Magnesium	19.4	0.010	0.030	NE			093972-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093972-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093972-010	SW846 7470
	Nickel	0.00227	0.0005	0.002	NE	B	0.0028U	093972-010	SW846 6020
	Potassium	3.49	0.080	0.300	NE			093972-010	SW846 6020
	Selenium	0.00241	0.0015	0.005	0.050	J		093972-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093972-010	SW846 6020
	Sodium	62.1	0.400	1.25	NE			093972-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093972-010	SW846 6020
	Uranium	0.00438	0.000067	0.0002	0.030			093972-010	SW846 6020
	Vanadium	0.00542	0.001	0.005	NE			093972-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093972-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW13	Aluminum	ND	0.015	0.050	NE	U		093957-010	SW846 6020
16-May-13	Antimony	ND	0.001	0.003	0.006	U		093957-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093957-010	SW846 6020
	Barium	0.0592	0.0006	0.002	2.00			093957-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093957-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093957-010	SW846 6020
	Calcium	54.5	0.300	1.00	NE	N		093957-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093957-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		093957-010	SW846 6020
	Copper	0.000656	0.00035	0.001	NE	J	0.0059UJ	093957-010	SW846 6020
	Iron	0.0986	0.033	0.100	NE	J		093957-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093957-010	SW846 6020
	Magnesium	16.1	0.010	0.030	NE			093957-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093957-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093957-010	SW846 7470
	Nickel	0.00129	0.0005	0.002	NE	J		093957-010	SW846 6020
	Potassium	3.25	0.080	0.300	NE			093957-010	SW846 6020
	Selenium	0.0025	0.0015	0.005	0.050	J		093957-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093957-010	SW846 6020
	Sodium	53.1	0.400	1.25	NE	N		093957-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093957-010	SW846 6020
	Uranium	0.00373	0.000067	0.0002	0.030			093957-010	SW846 6020
	Vanadium	0.0061	0.001	0.005	NE			093957-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093957-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW13 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		093959-010	SW846 6020
16-May-13	Antimony	ND	0.001	0.003	0.006	U		093959-010	SW846 6020
	Arsenic	0.00229	0.0017	0.005	0.010	J		093959-010	SW846 6020
	Barium	0.0608	0.0006	0.002	2.00			093959-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093959-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093959-010	SW846 6020
	Calcium	53.3	0.300	1.00	NE	N		093959-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093959-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		093959-010	SW846 6020
	Copper	0.000724	0.00035	0.001	NE	J	0.0059UJ	093959-010	SW846 6020
	Iron	0.105	0.033	0.100	NE			093959-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093959-010	SW846 6020
	Magnesium	16.3	0.010	0.030	NE			093959-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093959-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093959-010	SW846 7470
	Nickel	0.00136	0.0005	0.002	NE	J		093959-010	SW846 6020
	Potassium	3.55	0.080	0.300	NE			093959-010	SW846 6020
	Selenium	0.00245	0.0015	0.005	0.050	J		093959-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093959-010	SW846 6020
	Sodium	54.2	0.400	1.25	NE	N		093959-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093959-010	SW846 6020
	Uranium	0.0038	0.000067	0.0002	0.030			093959-010	SW846 6020
	Vanadium	0.00618	0.001	0.005	NE			093959-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093959-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW14	Aluminum	ND	0.015	0.050	NE	U		093980-010	SW846 6020
06-Jun-13	Antimony	ND	0.001	0.003	0.006	U		093980-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093980-010	SW846 6020
	Barium	0.0561	0.0006	0.002	2.00	B		093980-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093980-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093980-010	SW846 6020
	Calcium	64.8	0.300	1.00	NE	B		093980-010	SW846 6020
	Chromium	0.00209	0.002	0.010	0.100	J		093980-010	SW846 6020
	Cobalt	0.000204	0.0001	0.001	NE	J		093980-010	SW846 6020
	Copper	0.00111	0.00035	0.001	NE	B	0.0022U	093980-010	SW846 6020
	Iron	0.127	0.033	0.100	NE			093980-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093980-010	SW846 6020
	Magnesium	21.2	0.010	0.030	NE			093980-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093980-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093980-010	SW846 7470
	Nickel	0.00247	0.0005	0.002	NE	B	0.0028U	093980-010	SW846 6020
	Potassium	3.93	0.080	0.300	NE			093980-010	SW846 6020
	Selenium	0.00227	0.0015	0.005	0.050	J		093980-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093980-010	SW846 6020
	Sodium	64.3	0.400	1.25	NE			093980-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093980-010	SW846 6020
	Uranium	0.00432	0.000067	0.0002	0.030			093980-010	SW846 6020
	Vanadium	0.00443	0.001	0.005	NE	J		093980-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093980-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
AVN-1	Iron	0.0956	0.033	0.100	NE	J		094408-010	SW846 6020
23-Jul-13	Manganese	ND	0.001	0.005	NE	U		094408-010	SW846 6020
LWDS-MW1	Iron	0.143	0.033	0.100	NE			094420-010	SW846 6020
29-Jul-13	Manganese	ND	0.001	0.005	NE	U		094420-010	SW846 6020
LWDS-MW2	Iron	0.0461	0.033	0.100	NE	J		094396-010	SW846 6020
17-Jul-13	Manganese	ND	0.001	0.005	NE	U		094396-010	SW846 6020
TAV-MW2	Iron	0.0774	0.033	0.100	NE	J		094394-010	SW846 6020
16-Jul-13	Manganese	ND	0.001	0.005	NE	U		094394-010	SW846 6020
TAV-MW4	Iron	0.108	0.033	0.100	NE			094413-010	SW846 6020
24-Jul-13	Manganese	ND	0.001	0.005	NE	U		094413-010	SW846 6020
TAV-MW6	Iron	0.120	0.033	0.100	NE			094417-010	SW846 6020
31-Jul-13	Manganese	ND	0.001	0.005	NE	U		094417-010	SW846 6020
TAV-MW6 (Duplicate)	Iron	0.125	0.033	0.100	NE			094418-010	SW846 6020
31-Jul-13	Manganese	ND	0.001	0.005	NE	U		094418-010	SW846 6020
TAV-MW8	Iron	0.105	0.033	0.100	NE			094404-010	SW846 6020
22-Jul-13	Manganese	ND	0.001	0.005	NE	U		094404-010	SW846 6020
TAV-MW10	Iron	0.147	0.033	0.100	NE			094422-010	SW846 6020
30-Jul-13	Manganese	ND	0.001	0.005	NE	U		094422-010	SW846 6020
TAV-MW11	Iron	0.0565	0.033	0.100	NE	J		094401-010	SW846 6020
18-Jul-13	Manganese	ND	0.001	0.005	NE	U		094401-010	SW846 6020
TAV-MW11 (Duplicate)	Iron	0.0612	0.033	0.100	NE	J		094402-010	SW846 6020
18-Jul-13	Manganese	ND	0.001	0.005	NE	U		094402-010	SW846 6020
TAV-MW12	Iron	0.105	0.033	0.100	NE			094406-010	SW846 6020
23-Jul-13	Manganese	ND	0.001	0.005	NE	U		094406-010	SW846 6020
TAV-MW13	Iron	0.0552	0.033	0.100	NE	J		094392-010	SW846 6020
15-Jul-13	Manganese	ND	0.001	0.005	NE	U		094392-010	SW846 6020
TAV-MW14	Iron	0.138	0.033	0.100	NE			094411-010	SW846 6020
24-Jul-13	Manganese	ND	0.001	0.005	NE	U		094411-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
AVN-1	Iron	0.0921	0.033	0.100	NE	J		094808-009	SW846 6020
23-Oct-13	Manganese	ND	0.001	0.005	NE	U		094808-009	SW846 6020
LWDS-MW1	Iron	0.154	0.033	0.100	NE			094838-009	SW846 6020
11-Nov-13	Manganese	ND	0.001	0.005	NE	U		094838-009	SW846 6020
LWDS-MW2	Iron	0.0926	0.033	0.100	NE	J		094810-009	SW846 6020
24-Oct-13	Manganese	ND	0.001	0.005	NE	U		094810-009	SW846 6020
TAV-MW2	Iron	0.126	0.033	0.100	NE			094815-009	SW846 6020
28-Oct-13	Manganese	ND	0.001	0.005	NE	U		094815-009	SW846 6020
TAV-MW2 (Duplicate)	Iron	0.141	0.033	0.100	NE			094816-009	SW846 6020
28-Oct-13	Manganese	ND	0.001	0.005	NE	U		094816-009	SW846 6020
TAV-MW3	Iron	0.124	0.033	0.100	NE			094797-009	SW846 6020
17-Oct-13	Manganese	ND	0.001	0.005	NE	U		094797-009	SW846 6020
TAV-MW4	Iron	0.0869	0.033	0.100	NE	J		094821-009	SW846 6020
30-Oct-13	Manganese	ND	0.001	0.005	NE	U		094821-009	SW846 6020
TAV-MW5	Iron	0.114	0.033	0.100	NE			094793-009	SW846 6020
15-Oct-13	Manganese	ND	0.001	0.005	NE	U		094793-009	SW846 6020
TAV-MW6	Iron	0.131	0.033	0.100	NE			094834-009	SW846 6020
06-Nov-13	Manganese	ND	0.001	0.005	NE	U		094834-009	SW846 6020
TAV-MW7	Iron	0.122	0.033	0.100	NE			094799-009	SW846 6020
21-Oct-13	Manganese	ND	0.001	0.005	NE	U		094799-009	SW846 6020
TAV-MW8	Iron	0.103	0.033	0.100	NE			094819-009	SW846 6020
29-Oct-13	Manganese	ND	0.001	0.005	NE	U		094819-009	SW846 6020
TAV-MW9	Iron	0.137	0.033	0.100	NE			094804-009	SW846 6020
22-Oct-13	Manganese	0.00125	0.001	0.005	NE	J		094804-009	SW846 6020
TAV-MW9 (Duplicate)	Iron	0.133	0.033	0.100	NE			094805-009	SW846 6020
22-Oct-13	Manganese	0.00139	0.001	0.005	NE	J		094805-009	SW846 6020
TAV-MW10	Iron	0.117	0.033	0.100	NE			094836-009	SW846 6020
07-Nov-13	Manganese	ND	0.001	0.005	NE	U		094836-009	SW846 6020
TAV-MW11	Iron	0.104	0.033	0.100	NE			094823-009	SW846 6020
31-Oct-13	Manganese	ND	0.001	0.005	NE	U		094823-009	SW846 6020
TAV-MW12	Iron	0.118	0.033	0.100	NE			094830-009	SW846 6020
05-Nov-13	Manganese	ND	0.001	0.005	NE	U		094830-009	SW846 6020
TAV-MW12 (Duplicate)	Iron	0.113	0.033	0.100	NE			094831-009	SW846 6020
05-Nov-13	Manganese	ND	0.001	0.005	NE	U		094831-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Concluded)*
Summary of Filtered Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW13	Iron	0.125	0.033	0.100	NE			094795-009	SW846 6020
16-Oct-13	Manganese	ND	0.001	0.005	NE	U		094795-009	SW846 6020
TAV-MW14	Iron	0.111	0.033	0.100	NE			094825-009	SW846 6020
04-Nov-13	Manganese	ND	0.001	0.005	NE	U		094825-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-8
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[b] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
AVN-1	Americium-241	0.469 ± 14.6	22.1	10.8	NE	U	BD	093964-033	EPA 901.1
30-May-13	Cesium-137	-0.821 ± 2.03	3.38	1.62	NE	U	BD	093964-033	EPA 901.1
	Cobalt-60	1.23 ± 2.15	3.81	1.79	NE	U	BD	093964-033	EPA 901.1
	Potassium-40	12.4 ± 49.4	32.5	15.1	NE	U	BD	093964-033	EPA 901.1
	Gross Alpha	1.71	NA	NA	15 pCi/L	NA	None	093964-034	EPA 900.0
	Gross Beta	3.57 ± 1.14	1.51	0.735	4mrem/yr		J	093964-034	EPA 900.0
	Tritium	-5.6 ± 82.9	157	70.2	NE	U	BD	093964-036	EPA 906.0 M
LWDS-MW1	Americium-241	2.35 ± 9.98	15.5	7.57	NE	U	BD	093986-033	EPA 901.1
10-Jun-13	Cesium-137	2.85 ± 3.32	2.57	1.23	NE	X	R	093986-033	EPA 901.1
	Cobalt-60	-0.769 ± 1.62	2.72	1.28	NE	U	BD	093986-033	EPA 901.1
	Potassium-40	8.77 ± 41.9	29.3	13.8	NE	U	BD	093986-033	EPA 901.1
	Gross Alpha	4.55	NA	NA	15 pCi/L	NA	None	093986-034	EPA 900.0
	Gross Beta	3.25 ± 1.47	2.13	1.03	4mrem/yr		J	093986-034	EPA 900.0
	Tritium	-35.7 ± 102	178	86.4	NE	U	BD	093986-036	EPA 906.0 M
LWDS-MW2	Americium-241	10.7 ± 15.5	23.2	11.3	NE	U	BD	093958-033	EPA 901.1
29-May-13	Cesium-137	1.61 ± 1.85	3.19	1.53	NE	U	BD	093958-033	EPA 901.1
	Cobalt-60	0.00996 ± 1.83	3.35	1.57	NE	U	BD	093958-033	EPA 901.1
	Potassium-40	18.4 ± 44.9	32.4	15.1	NE	U	BD	093958-033	EPA 901.1
	Gross Alpha	2.46	NA	NA	15 pCi/L	NA	None	093958-034	EPA 900.0
	Gross Beta	3.37 ± 1.26	1.79	0.872	4mrem/yr		J	093958-034	EPA 900.0
	Tritium	0.00 ± 84.4	159	70.8	NE	U	BD	093958-036	EPA 906.0 M
LWDS-MW2 (Duplicate)	Americium-241	3.21 ± 14.7	23.4	11.3	NE	U	BD	093960-033	EPA 901.1
29-May-13	Cesium-137	-0.517 ± 1.79	3.14	1.50	NE	U	BD	093960-033	EPA 901.1
	Cobalt-60	1.61 ± 2.11	3.82	1.79	NE	U	BD	093960-033	EPA 901.1
	Potassium-40	45.4 ± 29.9	45.4	20.9	NE	U	BD	093960-033	EPA 901.1
	Gross Alpha	2.62	NA	NA	15 pCi/L	NA	None	093960-034	EPA 900.0
	Gross Beta	3.76 ± 1.22	1.63	0.794	4mrem/yr		J	093960-034	EPA 900.0
	Tritium	-56.9 ± 77.2	160	71.3	NE	U	BD	093960-036	EPA 906.0 M
TAV-MW2	Americium-241	2.91 ± 11.3	17.6	8.61	NE	U	BD	093950-033	EPA 901.1
28-May-13	Cesium-137	0.896 ± 2.08	3.65	1.75	NE	U	BD	093950-033	EPA 901.1
	Cobalt-60	-1.37 ± 2.31	3.75	1.76	NE	U	BD	093950-033	EPA 901.1
	Potassium-40	68.0 ± 41.5	38.4	18.0	NE	X	R	093950-033	EPA 901.1
	Gross Alpha	4.08	NA	NA	15 pCi/L	NA	None	093950-034	EPA 900.0
	Gross Beta	5.78 ± 1.45	1.62	0.787	4mrem/yr		J	093950-034	EPA 900.0
	Tritium	17.1 ± 87.1	160	71.2	NE	U	BD	093950-036	EPA 906.0 M

Refer to footnotes on page 5A-89.

Table 5A-8 *(Continued)*
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[b] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW3	Americium-241	14.4 ± 15.6	25.6	12.5	NE	U	BD	093969-033	EPA 901.1
21-May-13	Cesium-137	-0.81 ± 1.84	3.17	1.51	NE	U	BD	093969-033	EPA 901.1
	Cobalt-60	-0.792 ± 1.87	3.25	1.51	NE	U	BD	093969-033	EPA 901.1
	Potassium-40	26.2 ± 25.2	43.1	20.4	NE	U	BD	093969-033	EPA 901.1
	Gross Alpha	4.42	NA	NA	15 pCi/L	NA	None	093969-034	EPA 900.0
	Gross Beta	7.18 ± 1.69	1.72	0.835	4mrem/yr		J	093969-034	EPA 900.0
	Tritium	-47.7 ± 102	180	87.3	NE	U	BD	093969-036	EPA 906.0 M
TAV-MW4	Americium-241	-13.7 ± 15.6	20.8	10.2	NE	U	BD	093976-033	EPA 901.1
05-Jun-13	Cesium-137	0.275 ± 2.01	3.50	1.68	NE	U	BD	093976-033	EPA 901.1
	Cobalt-60	0.586 ± 2.17	3.85	1.81	NE	U	BD	093976-033	EPA 901.1
	Potassium-40	-10.8 ± 42.5	49.9	23.8	NE	U	BD	093976-033	EPA 901.1
	Gross Alpha	3.41	NA	NA	15 pCi/L	NA	None	093976-034	EPA 900.0
	Gross Beta	3.87 ± 1.28	1.71	0.834	4mrem/yr		J	093976-034	EPA 900.0
	Tritium	82.0 ± 104	173	83.3	NE	U	BD	093976-036	EPA 906.0 M
TAV-MW5	Americium-241	9.33 ± 7.39	9.84	4.83	NE	U	BD	093949-033	EPA 901.1
15-May-13	Cesium-137	0.573 ± 1.74	3.10	1.50	NE	U	BD	093949-033	EPA 901.1
	Cobalt-60	0.102 ± 1.73	3.10	1.47	NE	U	BD	093949-033	EPA 901.1
	Potassium-40	-13.5 ± 37.3	43.1	20.7	NE	U	BD	093949-033	EPA 901.1
	Gross Alpha	4.66	NA	NA	15 pCi/L	NA	None	093949-034	EPA 900.0
	Gross Beta	3.35 ± 0.935	1.06	0.505	4mrem/yr		J	093949-034	EPA 900.0
	Tritium	3.47 ± 67.7	123	56.5	NE	U	BD	093949-036	EPA 906.0 M
TAV-MW6	Americium-241	0.698 ± 7.08	10.5	5.17	NE	U	BD	093990-033	EPA 901.1
11-Jun-13	Cesium-137	-0.678 ± 1.70	2.88	1.39	NE	U	BD	093990-033	EPA 901.1
	Cobalt-60	0.265 ± 1.99	3.11	1.47	NE	U	BD	093990-033	EPA 901.1
	Potassium-40	16.2 ± 37.4	27.4	12.9	NE	U	BD	093990-033	EPA 901.1
	Gross Alpha	6.86	NA	NA	15 pCi/L	NA	None	093990-034	EPA 900.0
	Gross Beta	5.49 ± 1.86	2.49	1.21	4mrem/yr		J	093990-034	EPA 900.0
	Tritium	-68.9 ± 100	177	85.8	NE	U	BD	093990-036	EPA 906.0 M
TAV-MW7	Americium-241	-2.76 ± 11.6	18.2	8.86	NE	U	BD	093977-033	EPA 901.1
22-May-13	Cesium-137	0.506 ± 1.74	3.01	1.43	NE	U	BD	093977-033	EPA 901.1
	Cobalt-60	1.16 ± 2.27	3.38	1.58	NE	U	BD	093977-033	EPA 901.1
	Potassium-40	-27.3 ± 33.7	45.2	21.5	NE	U	BD	093977-033	EPA 901.1
	Gross Alpha	3.77	NA	NA	15 pCi/L	NA	None	093977-034	EPA 900.0
	Gross Beta	6.83 ± 1.66	1.75	0.851	4mrem/yr		J	093977-034	EPA 900.0
	Tritium	38.5 ± 103	176	85.2	NE	U	BD	093977-036	EPA 906.0 M

Refer to footnotes on page 5A-89.

Table 5A-8 *(Continued)*
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[b] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW7 (Duplicate)	Americium-241	5.31 ± 7.99	12.4	6.00	NE	U	BD	093979-033	EPA 901.1
22-May-13	Cesium-137	-1.19 ± 3.55	4.46	2.11	NE	U	BD	093979-033	EPA 901.1
	Cobalt-60	1.50 ± 2.66	4.52	2.05	NE	U	BD	093979-033	EPA 901.1
	Potassium-40	52.4 ± 42.1	47.6	21.7	NE	X	R	093979-033	EPA 901.1
	Gross Alpha	5.08	NA	NA	15 pCi/L	NA	None	093979-034	EPA 900.0
	Gross Beta	5.49 ± 1.51	1.86	0.909	4mrem/yr		J	093979-034	EPA 900.0
	Tritium	-49.5 ± 97.7	172	83.3	NE	U	BD	093979-036	EPA 906.0 M
TAV-MW8	Americium-241	-1.46 ± 13.3	20.5	9.96	NE	U	BD	093983-033	EPA 901.1
23-May-13	Cesium-137	0.0394 ± 2.39	4.23	2.01	NE	U	BD	093983-033	EPA 901.1
	Cobalt-60	-0.013 ± 2.44	4.38	2.03	NE	U	BD	093983-033	EPA 901.1
	Potassium-40	-33.8 ± 49.9	57.9	27.3	NE	U	BD	093983-033	EPA 901.1
	Gross Alpha	4.44	NA	NA	15 pCi/L	NA	None	093983-034	EPA 900.0
	Gross Beta	4.57 ± 1.26	1.51	0.731	4mrem/yr		J	093983-034	EPA 900.0
	Tritium	-41.3 ± 102	179	86.8	NE	U	BD	093983-036	EPA 906.0 M
TAV-MW9	Americium-241	1.97 ± 10.8	16.9	8.26	NE	U	BD	093963-033	EPA 901.1
20-May-13	Cesium-137	0.272 ± 2.17	3.74	1.80	NE	U	BD	093963-033	EPA 901.1
	Cobalt-60	0.741 ± 1.92	3.43	1.61	NE	U	BD	093963-033	EPA 901.1
	Potassium-40	1.17 ± 42.7	27.1	12.5	NE	U	BD	093963-033	EPA 901.1
	Gross Alpha	2.76	NA	NA	15 pCi/L	NA	None	093963-034	EPA 900.0
	Gross Beta	7.55 ± 1.79	1.84	0.894	4mrem/yr		J	093963-034	EPA 900.0
	Tritium	0.00 ± 106	183	88.7	NE	U	BD	093963-036	EPA 906.0 M
TAV-MW10	Americium-241	-0.872 ± 9.95	15.1	7.39	NE	U	BD	093994-033	EPA 901.1
12-Jun-13	Cesium-137	-2.26 ± 2.36	2.92	1.41	NE	U	BD	093994-033	EPA 901.1
	Cobalt-60	1.58 ± 2.66	3.14	1.49	NE	U	BD	093994-033	EPA 901.1
	Potassium-40	-34.8 ± 35.9	39.4	18.9	NE	U	BD	093994-033	EPA 901.1
	Gross Alpha	4.51	NA	NA	15 pCi/L	NA	None	093994-034	EPA 900.0
	Gross Beta	5.24 ± 1.87	2.56	1.24	4mrem/yr		J	093994-034	EPA 900.0
	Tritium	-32.6 ± 98.7	173	83.7	NE	U	BD	093994-036	EPA 906.0 M
TAV-MW11	Americium-241	-16.8 ± 11.0	8.78	4.30	NE	U	BD	093968-033	EPA 901.1
03-Jun-13	Cesium-137	1.55 ± 1.59	2.70	1.30	NE	U	BD	093968-033	EPA 901.1
	Cobalt-60	1.70 ± 1.79	2.93	1.38	NE	U	BD	093968-033	EPA 901.1
	Potassium-40	20.4 ± 36.3	27.8	13.1	NE	U	BD	093968-033	EPA 901.1
	Gross Alpha	3.22	NA	NA	15 pCi/L	NA	None	093968-034	EPA 900.0
	Gross Beta	5.33 ± 1.35	1.51	0.733	4mrem/yr		J	093968-034	EPA 900.0
	Tritium	5.28 ± 99.3	173	83.2	NE	U	BD	093968-036	EPA 906.0 M

Refer to footnotes on page 5A-89.

Table 5A-8 *(Concluded)*
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[b] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW12	Americium-241	-2.73 ± 8.88	13.4	6.56	NE	U	BD	093972-033	EPA 901.1
04-Jun-13	Cesium-137	-1.98 ± 3.28	3.80	1.84	NE	U	BD	093972-033	EPA 901.1
	Cobalt-60	0.250 ± 1.75	3.12	1.47	NE	U	BD	093972-033	EPA 901.1
	Potassium-40	-15.7 ± 35.2	41.4	19.8	NE	U	BD	093972-033	EPA 901.1
	Gross Alpha	6.09	NA	NA	15 pCi/L	NA	None	093972-034	EPA 900.0
	Gross Beta	3.57 ± 1.25	1.73	0.845	4mrem/yr		J	093972-034	EPA 900.0
	Tritium	-81.3 ± 94.9	172	82.6	NE	U	BD	093972-036	EPA 906.0 M
TAV-MW13	Americium-241	-2.77 ± 9.77	14.9	7.25	NE	U	BD	093957-033	EPA 901.1
16-May-13	Cesium-137	2.22 ± 3.27	2.70	1.29	NE	U	BD	093957-033	EPA 901.1
	Cobalt-60	0.443 ± 1.63	2.95	1.39	NE	U	BD	093957-033	EPA 901.1
	Potassium-40	-22 ± 36.1	38.9	18.6	NE	U	BD	093957-033	EPA 901.1
	Gross Alpha	5.05	NA	NA	15 pCi/L	NA	None	093957-034	EPA 900.0
	Gross Beta	3.81 ± 1.18	1.50	0.727	4mrem/yr		NJ+	093957-034	EPA 900.0
	Tritium	16.9 ± 67.1	120	54.9	NE	U	BD	093957-036	EPA 906.0 M
TAV-MW13 (Duplicate)	Americium-241	-1.45 ± 7.01	10.4	5.07	NE	U	BD	093959-033	EPA 901.1
16-May-13	Cesium-137	0.401 ± 1.81	2.81	1.35	NE	U	BD	093959-033	EPA 901.1
	Cobalt-60	0.615 ± 2.57	2.96	1.39	NE	U	BD	093959-033	EPA 901.1
	Potassium-40	-34.8 ± 35.8	40.3	19.3	NE	U	BD	093959-033	EPA 901.1
	Gross Alpha	4.85	NA	NA	15 pCi/L	NA	None	093959-034	EPA 900.0
	Gross Beta	4.78 ± 1.26	1.45	0.700	4mrem/yr		NJ+	093959-034	EPA 900.0
	Tritium	-6.64 ± 63.7	118	54.0	NE	U	BD	093959-036	EPA 906.0 M
TAV-MW14	Americium-241	-28.1 ± 14.2	9.65	4.74	NE	U	R	093980-033	EPA 901.1
06-Jun-13	Cesium-137	0.850 ± 1.78	3.14	1.52	NE	U	BD	093980-033	EPA 901.1
	Cobalt-60	1.11 ± 2.05	3.17	1.51	NE	U	BD	093980-033	EPA 901.1
	Potassium-40	8.96 ± 43.6	28.1	13.3	NE	U	BD	093980-033	EPA 901.1
	Gross Alpha	2.66	NA	NA	15 pCi/L	NA	None	093980-034	EPA 900.0
	Gross Beta	5.54 ± 1.59	2.01	0.985	4mrem/yr		J	093980-034	EPA 900.0
	Tritium	42.3 ± 101	173	83.3	NE	U	BD	093980-036	EPA 906.0 M

Refer to footnotes on page 5A-89.

Table 5A-9
Summary of Field Water Quality Measurements[h],
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
AVN-1	18-Feb-13	18.95	386	210.8	7.30	2.14	41.4	3.85
LWDS-MW1	11-Mar-13	17.09	667	229.0	7.25	0.56	75.5	7.27
LWDS-MW2	13-Feb-13	17.34	430	204.9	7.23	2.01	44.9	4.30
TAV-MW2	12-Feb-13	16.16	667	217.9	7.01	1.00	46.2	4.53
TAV-MW4	20-Feb-13	17.19	476	201.1	7.25	0.43	66.2	6.36
TAV-MW6	25-Feb-13	16.63	635	223.1	7.14	2.86	68.8	6.70
TAV-MW8	15-Feb-13	19.16	544	225.2	7.14	13.3	64.8	5.97
TAV-MW10	27-Feb-13	17.48	596	225.8	7.13	0.26	68.9	6.58
TAV-MW11	14-Feb-13	17.18	525	219.9	7.12	0.54	70.8	6.80
TAV-MW12	19-Feb-13	19.01	561	197.4	7.11	0.62	64.5	5.97
TAV-MW13	26-Feb-13	17.71	492	215.2	7.16	0.78	24.8	2.36
TAV-MW14	21-Feb-13	17.31	608	218.9	7.15	1.56	68.2	6.55
AVN-1	30-May-13	21.20	388	259.1	7.41	0.95	45.2	4.01
LWDS-MW1	10-Jun-13	26.36	676	389.0	7.23	0.79	89.1	7.16
LWDS-MW2	29-May-13	20.68	433	207.3	7.33	1.41	51.8	4.64
TAV-MW2	28-May-13	22.36	673	176.5	7.06	0.70	50.1	4.35
TAV-MW3	21-May-13	21.21	509	163.4	7.27	0.68	61.3	5.42
TAV-MW4	05-Jun-13	21.47	484	372.7	7.32	0.70	74.2	6.52
TAV-MW5	15-May-13	20.61	464	171.1	7.27	0.44	51.1	4.58
TAV-MW6	11-Jun-13	21.91	640	394.6	7.26	6.86	79.9	6.99
TAV-MW7	22-May-13	22.40	564	157.9	7.12	1.84	5.1	0.44
TAV-MW8	23-May-13	22.23	548	162.7	7.23	4.35	59.6	5.18
TAV-MW9	20-May-13	20.04	544	67.1	7.04	1.74	14.8	1.34
TAV-MW10	12-Jun-13	23.85	600	390.3	7.24	0.25	83.4	7.03
TAV-MW11	03-Jun-13	21.63	531	370.2	7.30	0.68	79.0	6.95
TAV-MW12	04-Jun-13	22.96	567	380.6	7.18	6.23	72.4	6.21
TAV-MW13	16-May-13	22.26	496	170.3	7.20	0.98	26.0	2.25
TAV-MW14	06-Jun-13	21.76	612	378.9	7.19	1.35	78.8	6.91

Refer to footnotes on page 5A-89.

Table 5A-9 *(Concluded)*
Summary of Field Water Quality Measurements[h],
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
AVN-1	23-Jul-13	22.94	455	111.8	7.51	5.73	40.7	3.50
LWDS-MW1	29-Jul-13	21.51	783	121.4	7.55	0.85	73.2	6.45
LWDS-MW2	17-Jul-13	20.48	506	134.7	7.52	0.47	50.0	4.50
TAV-MW2	16-Jul-13	21.68	784	120.5	7.26	0.60	50.0	4.39
TAV-MW4	24-Jul-13	21.70	558	132.4	7.43	1.65	65.9	5.78
TAV-MW6	31-Jul-13	22.76	748	142.2	7.37	1.83	80.6	6.93
TAV-MW8	22-Jul-13	23.01	636	134.6	7.37	1.52	73.9	6.33
TAV-MW10	30-Jul-13	23.57	699	125.0	7.38	0.46	62.7	5.31
TAV-MW11	18-Jul-13	22.07	621	144.2	7.42	0.44	78.4	6.84
TAV-MW12	23-Jul-13	22.41	568	94.4	7.55	4.55	75.4	6.52
TAV-MW13	15-Jul-13	19.98	576	107.8	7.42	1.67	21.5	1.95
TAV-MW14	24-Jul-13	21.56	663	96.3	7.55	1.59	78.2	6.85
AVN-1	23-Oct-13	20.58	420	162.0	7.17	2.31	43.5	3.91
LWDS-MW1	11-Nov-13	18.97	723	192.5	7.13	0.57	78.6	7.28
LWDS-MW2	24-Oct-13	19.98	468	130.1	7.08	0.37	50.2	4.56
TAV-MW2	28-Oct-13	19.79	719	154.3	6.83	2.31	54.6	4.96
TAV-MW3	17-Oct-13	19.89	552	172.5	7.07	3.41	66.7	6.07
TAV-MW4	30-Oct-13	18.18	518	167.0	7.12	0.73	71.1	6.70
TAV-MW5	15-Oct-13	20.11	502	179.3	7.02	0.40	56.6	5.13
TAV-MW6	06-Nov-13	17.96	689	142.5	6.96	5.65	74.3	7.03
TAV-MW7	21-Oct-13	19.91	609	154.2	6.85	4.34	5.7	0.51
TAV-MW8	29-Oct-13	18.81	591	165.1	7.04	1.27	68.4	6.36
TAV-MW9	22-Oct-13	19.24	624	13.0	6.76	2.06	18.4	1.69
TAV-MW10	07-Nov-13	19.21	642	150.0	7.00	0.37	76.2	7.03
TAV-MW11	31-Oct-13	19.59	573	151.2	7.06	0.46	75.1	6.86
TAV-MW12	05-Nov-13	18.27	616	144.2	6.96	13.1	65.1	6.12
TAV-MW13	16-Oct-13	19.64	532	155.2	7.02	0.98	28.5	2.62
TAV-MW14	04-Nov-13	20.68	663	165.4	6.99	3.73	76.5	6.85

Refer to footnotes on page 5A-89.

This page left intentionally blank.

Footnotes for Technical Area V Analytical Results Tables

% = percent.
μg/L = micrograms per liter.
CFR = Code of Federal Regulations.
EPA = U.S. Environmental Protection Agency.
ID = Identifier.
mg/L = milligrams per liter.
mrem/yr = millirem per year.
No. = Number.
pCi/L = picocuries per liter.

[a]Result

Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 5A- 1-4).

Bold = Value exceeds the established MCL.
ND = Not detected (at MDL). Activities of zero or less are considered to be not detected.

[b]MDL or MDA

MDL applies to the data listed in Tables 5A-1 through 5A-7. MDA applies to radiological data in Table 5A-8.

MDA = The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.
MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA = Not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

[c]PQL or Critical Level

The PQL applies to Tables 5A-1 through 5A-7. Critical level applies to Table 5A-8.

Critical level = The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA = Not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

[d]MCL

MCL = Maximum contaminant level. MCLs were established by the U.S. EPA Office of Water, National Primary Water Regulations (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- Gross alpha particle activity, excluding total uranium = 15 pCi/L (40 CFR Parts 9, 141, and 142, Table 5A- 1-4).
- Any combination of Beta and/or Gamma emitting radionuclides = 4 mrem/yr (as dose rate).

NE = not established.

[e]Lab Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

B = Analyte is detected in associated laboratory method blank.
H = Analytical holding time was exceeded.
J = Amount detected is below the PQL.
N = Results associated with a spike analysis that was outside control limits.
NA = Not applicable.
U = Analyte is absent or below the MDL.
X = Data rejected due to peak not meeting identification criteria.

Footnotes for Technical Area V Analytical Results Tables (Concluded)

[f]Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = The associated value is an estimated quantity.
J- = The associated numerical value is an estimated quantity with a suspected negative bias.
None = No data validation for corrected gross alpha activity.
NJ = Presumptive evidence of the presence of the material at an estimated quantity.
NJ+ = Presumptive evidence of the presence of the material at an estimated quantity with a suspected positive bias.
U = The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
UJ = The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R = The data are unusable, and resampling or reanalysis are necessary for verification.

[g]Analytical Method

Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.

EPA, 1980, "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.

EPA, 1984, "Methods for Chemical Analysis of Water and Wastes." EPA 600-4-79-020.

EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.

[h]Field Water Quality Measurements

Field measurements collected prior to sampling.

°C = degrees Celsius.
% sat = percent saturation.
μmhos/cm = micromhos per centimeter.
mg/L = milligrams per liter.
mV = millivolts.
NTU = nephelometric turbidity units.
pH = potential of hydrogen (negative logarithm of the hydrogen ion concentration).

Attachment 5B
Technical Area V
Plots

This page intentionally left blank.

Attachment 5B Plots

5B-1 Trichloroethene Concentrations, LWDS-MW1 ..... 5B-5

5B-2 Trichloroethene Concentrations, TAV-MW6 ..... 5B-6

5B-3 Trichloroethene Concentrations, TAV-MW10 ..... 5B-7

5B-4 Trichloroethene Concentrations, TAV-MW12 ..... 5B-8

5B-5 Trichloroethene Concentrations, TAV-MW14 ..... 5B-9

5B-6 Nitrate Plus Nitrite Concentrations, LWDS-MW1 ..... 5B-10

5B-7 Nitrate Plus Nitrite Concentrations, TAV-MW10 ..... 5B-11

5B-8 Nitrate Plus Nitrite Concentrations, AVN-1 ..... 5B-12

This page intentionally left blank.

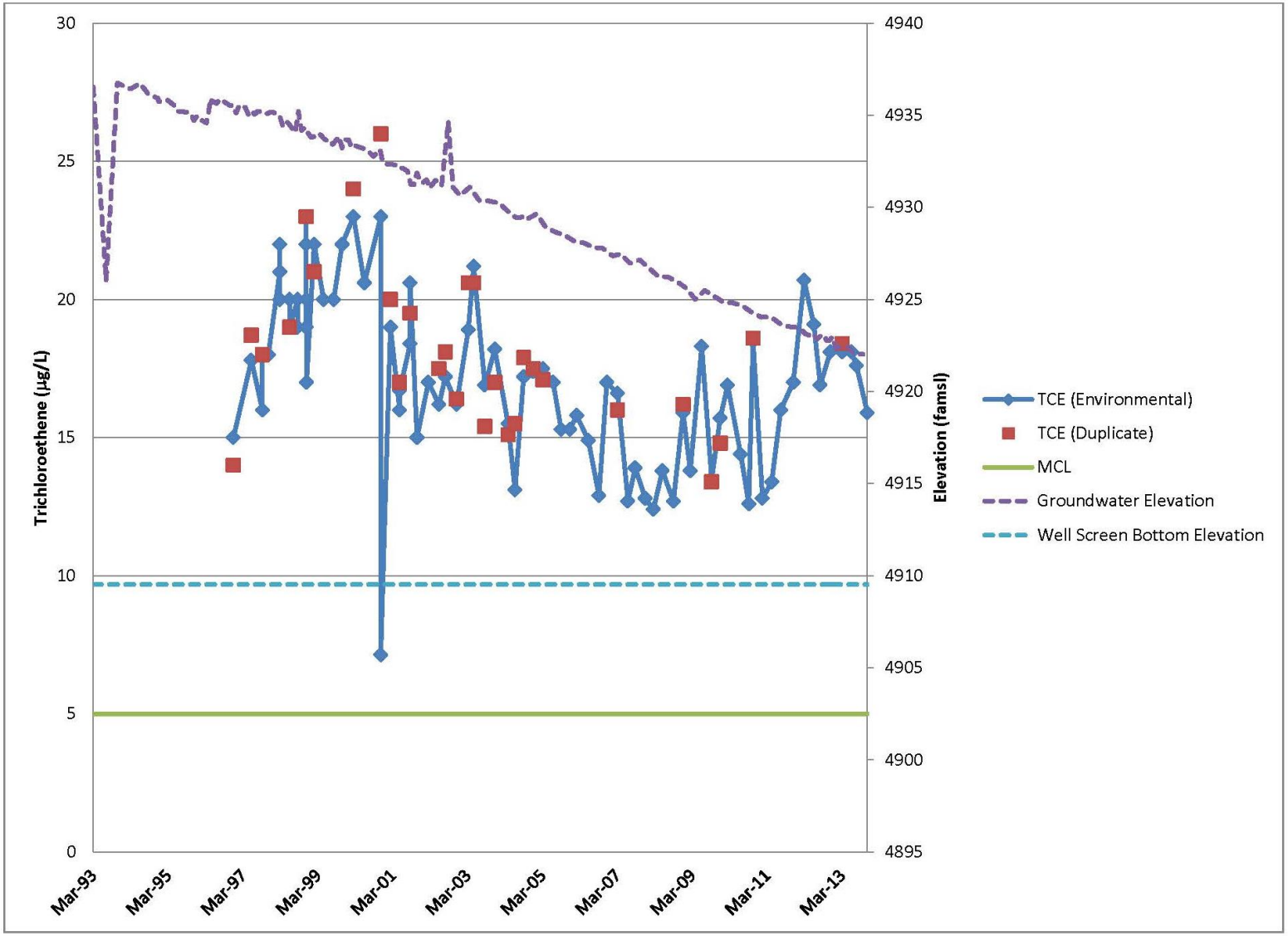


Figure 5B-1. Trichloroethene Concentrations, LWDS-MW1

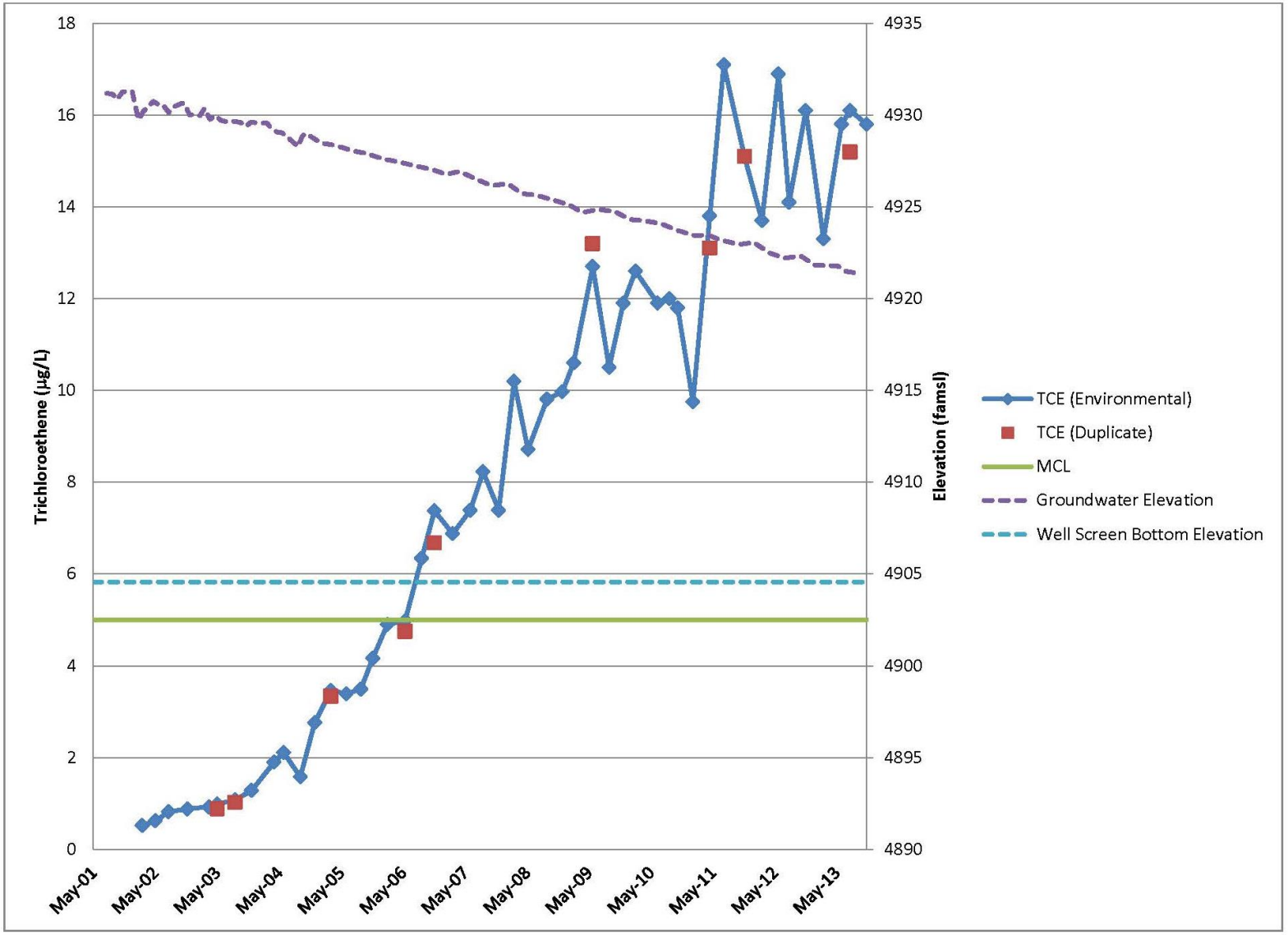


Figure 5B-2. Trichloroethene Concentrations, TAV-MW6

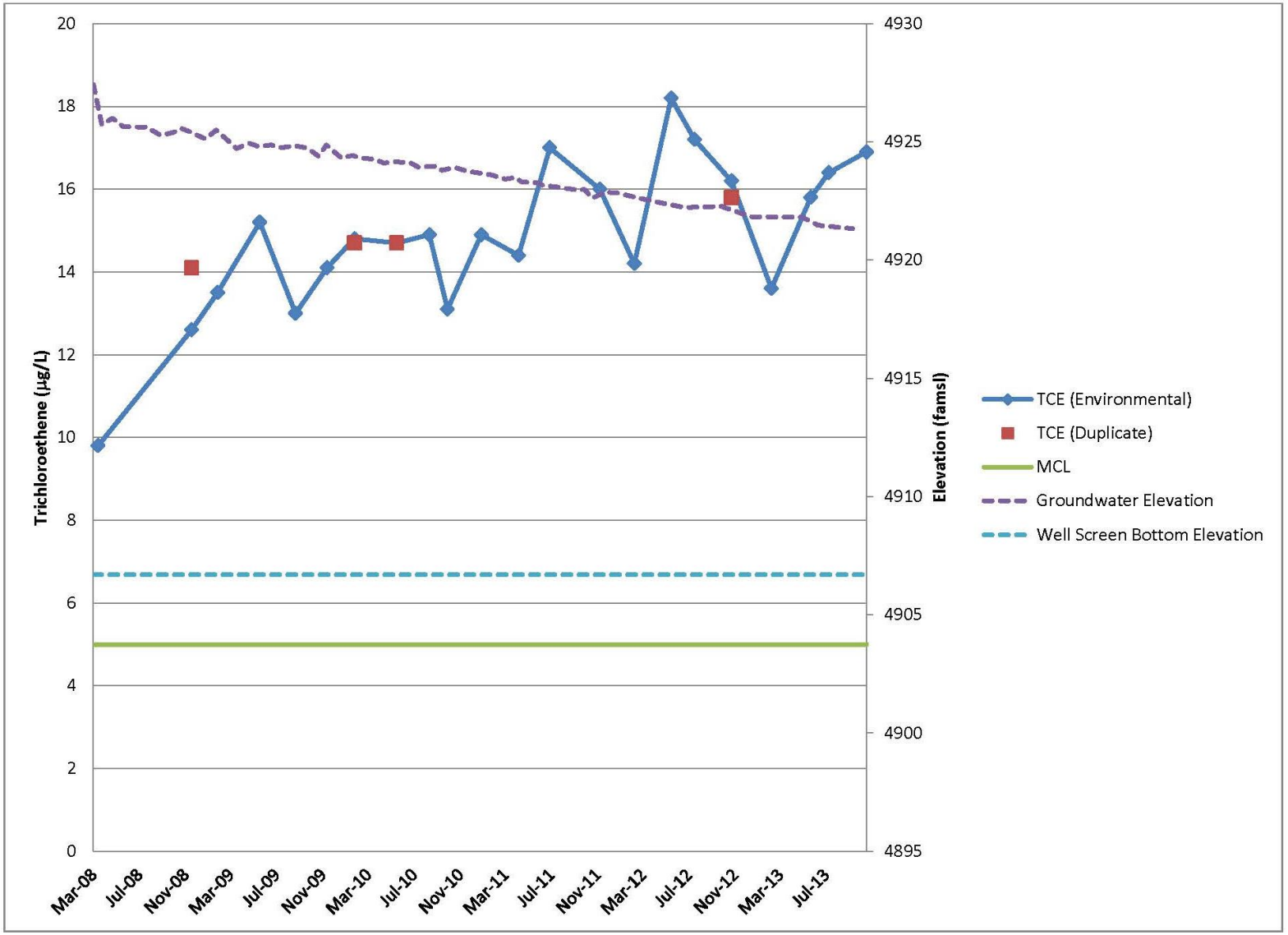


Figure 5B-3. Trichloroethene Concentrations, TAV-MW10

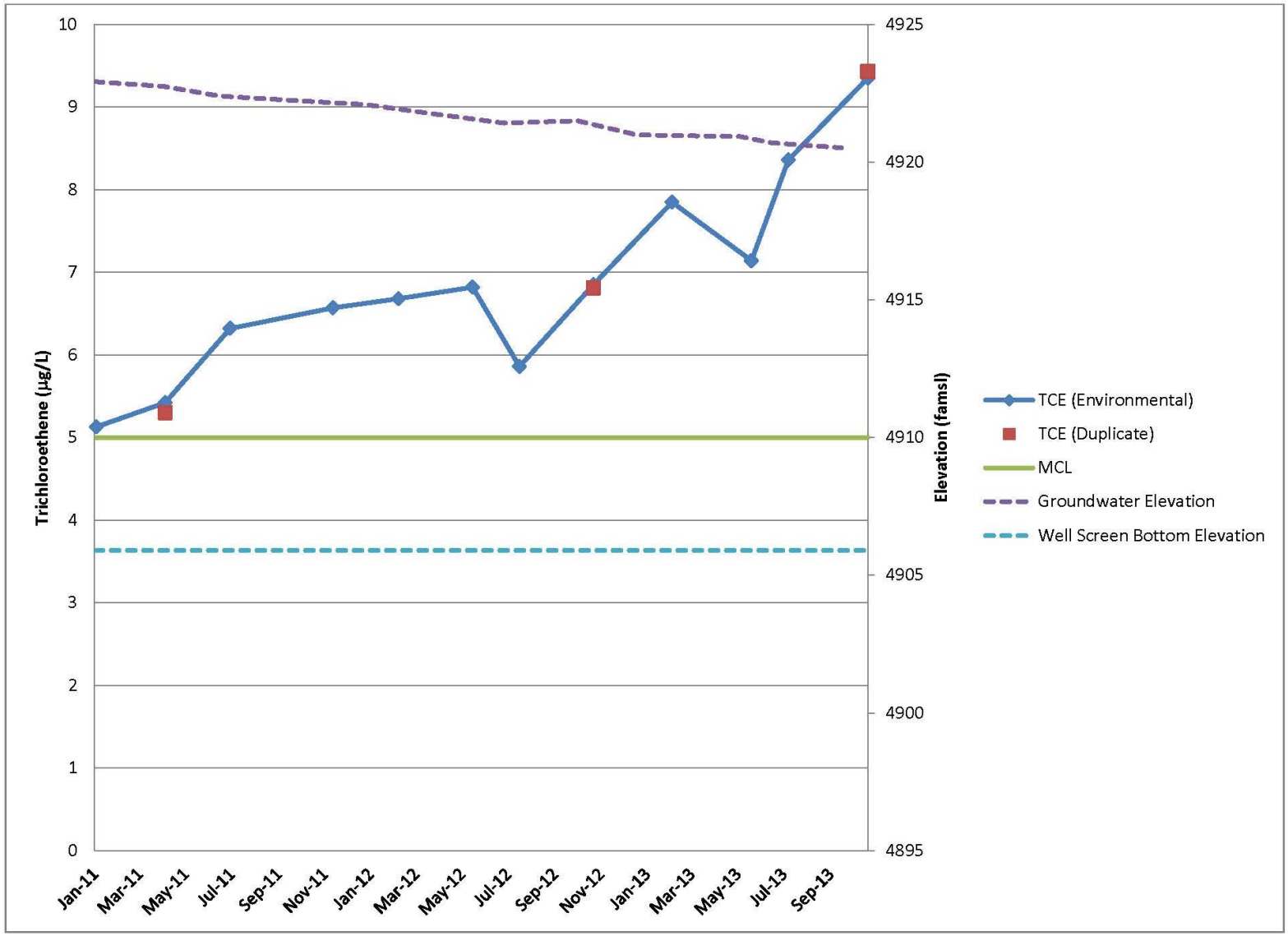


Figure 5B-4. Trichloroethene Concentrations, TAV-MW12

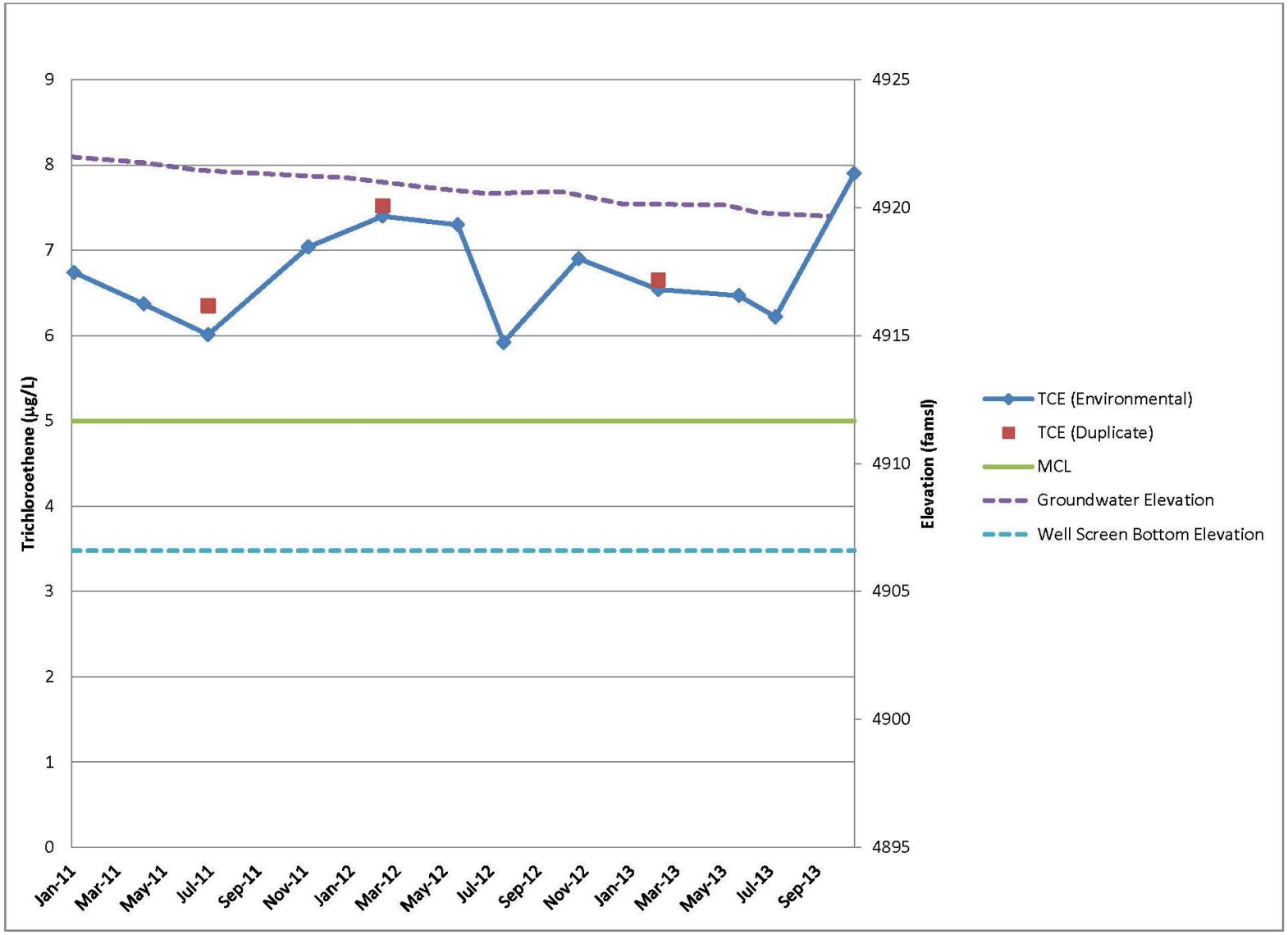


Figure 5B-5. Trichloroethene Concentrations, TAV-MW14

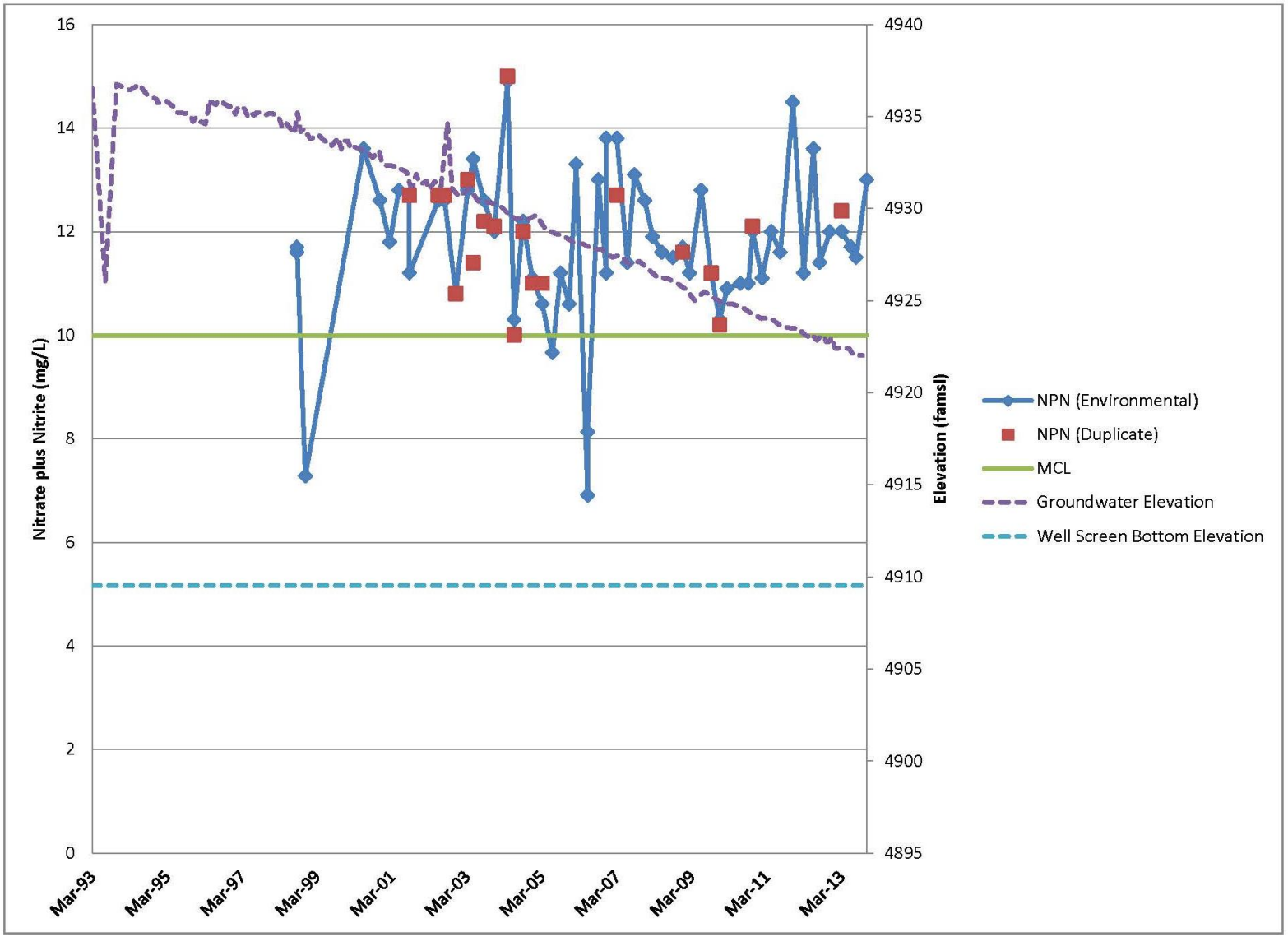


Figure 5B-6. Nitrate Plus Nitrite Concentrations, LWDS-MW1

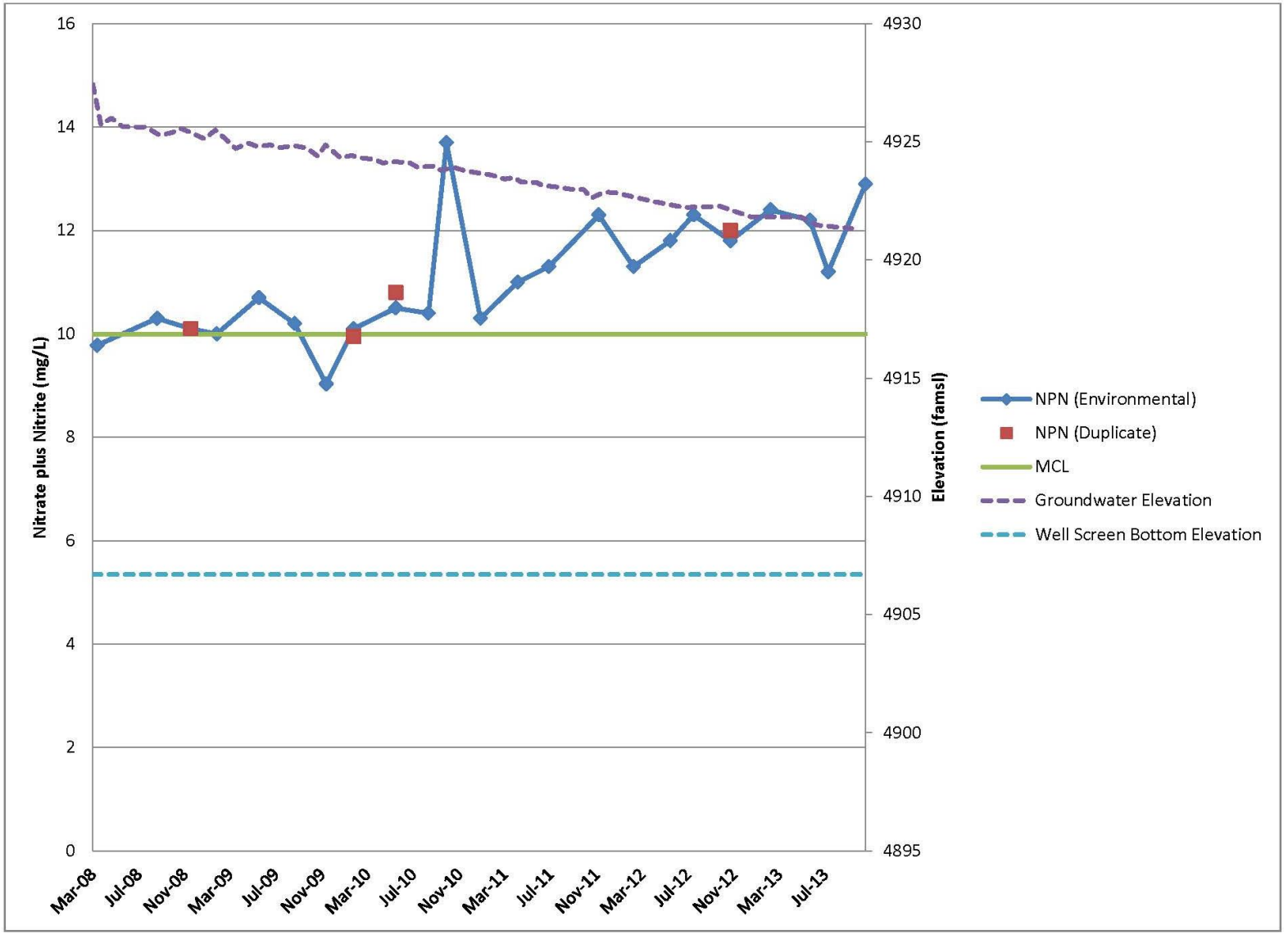


Figure 5B-7. Nitrate Plus Nitrite Concentrations, TAV-MW10

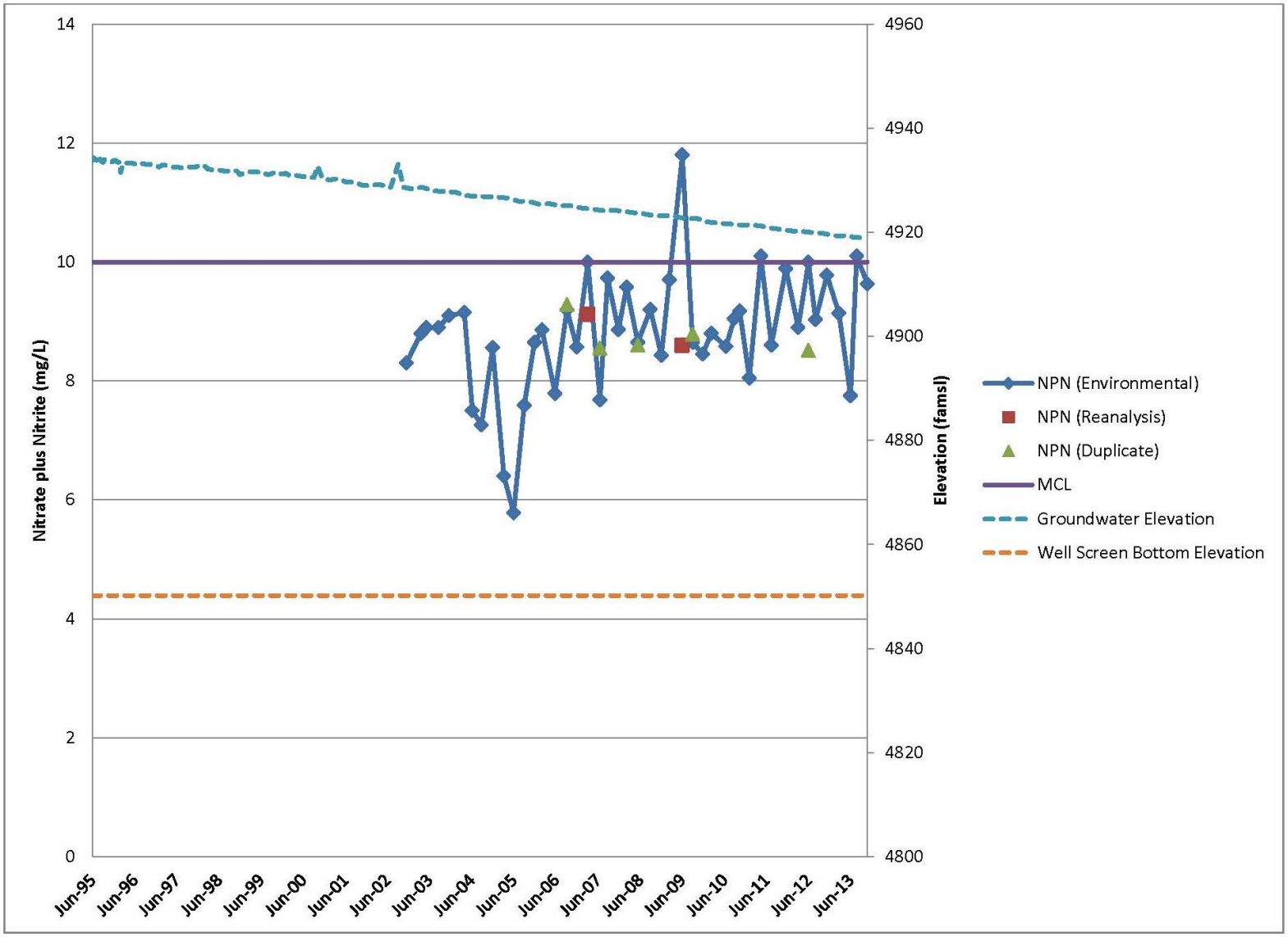


Figure 5B-8. Nitrate Plus Nitrite Concentrations, AVN-1

Attachment 5C
Technical Area V
Hydrographs

This page intentionally left blank.

Attachment 5C Hydrographs

5C-1 TA-V Study Area Wells (1 of 3)..... 5C-5

5C-2 TA-V Study Area Wells (2 of 3)..... 5C-6

5C-3 TA-V Study Area Wells (3 of 3)..... 5C-7

This page intentionally left blank.

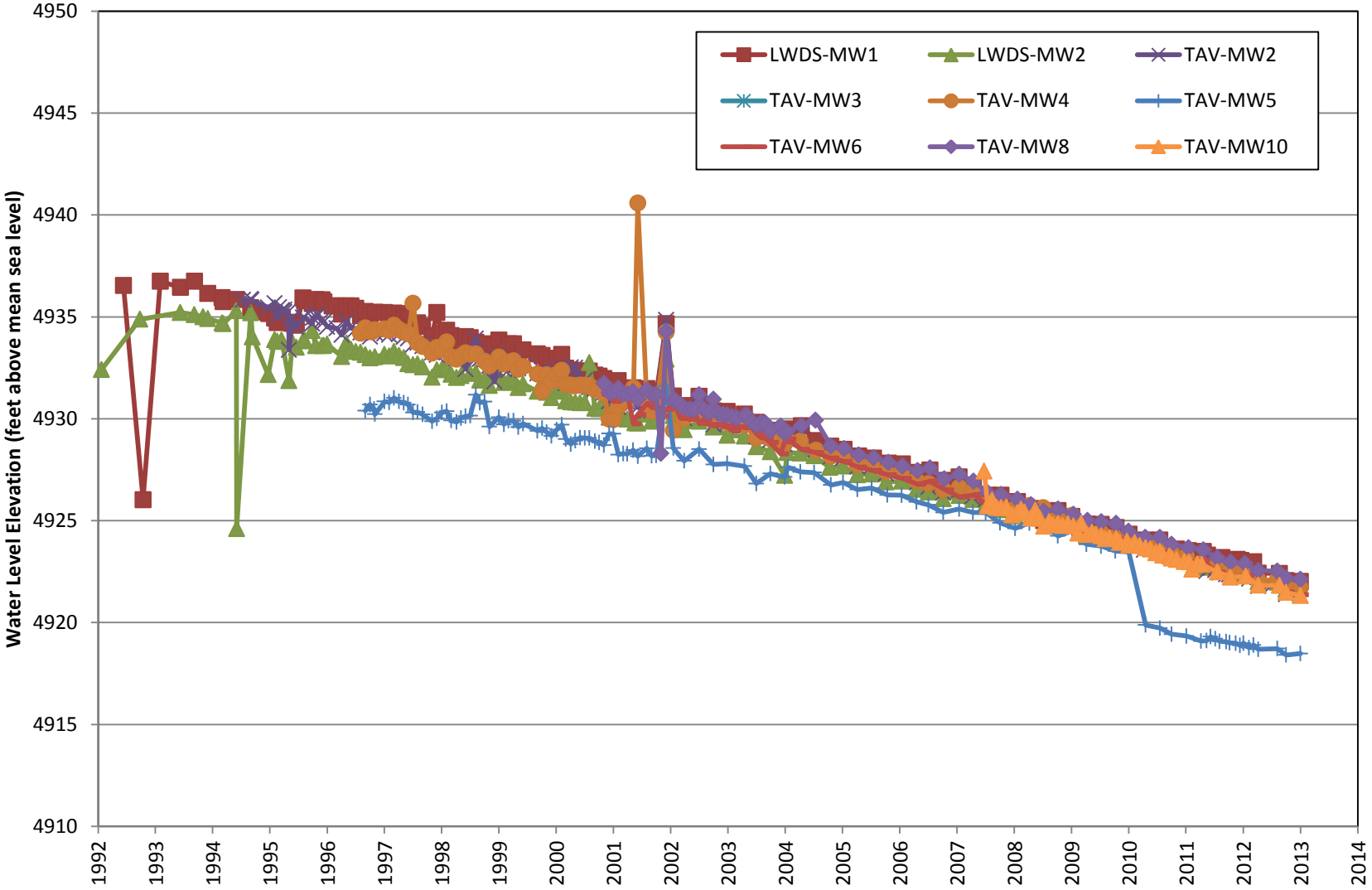


Figure 5C-1. TA-V Study Area Wells (1 of 3)

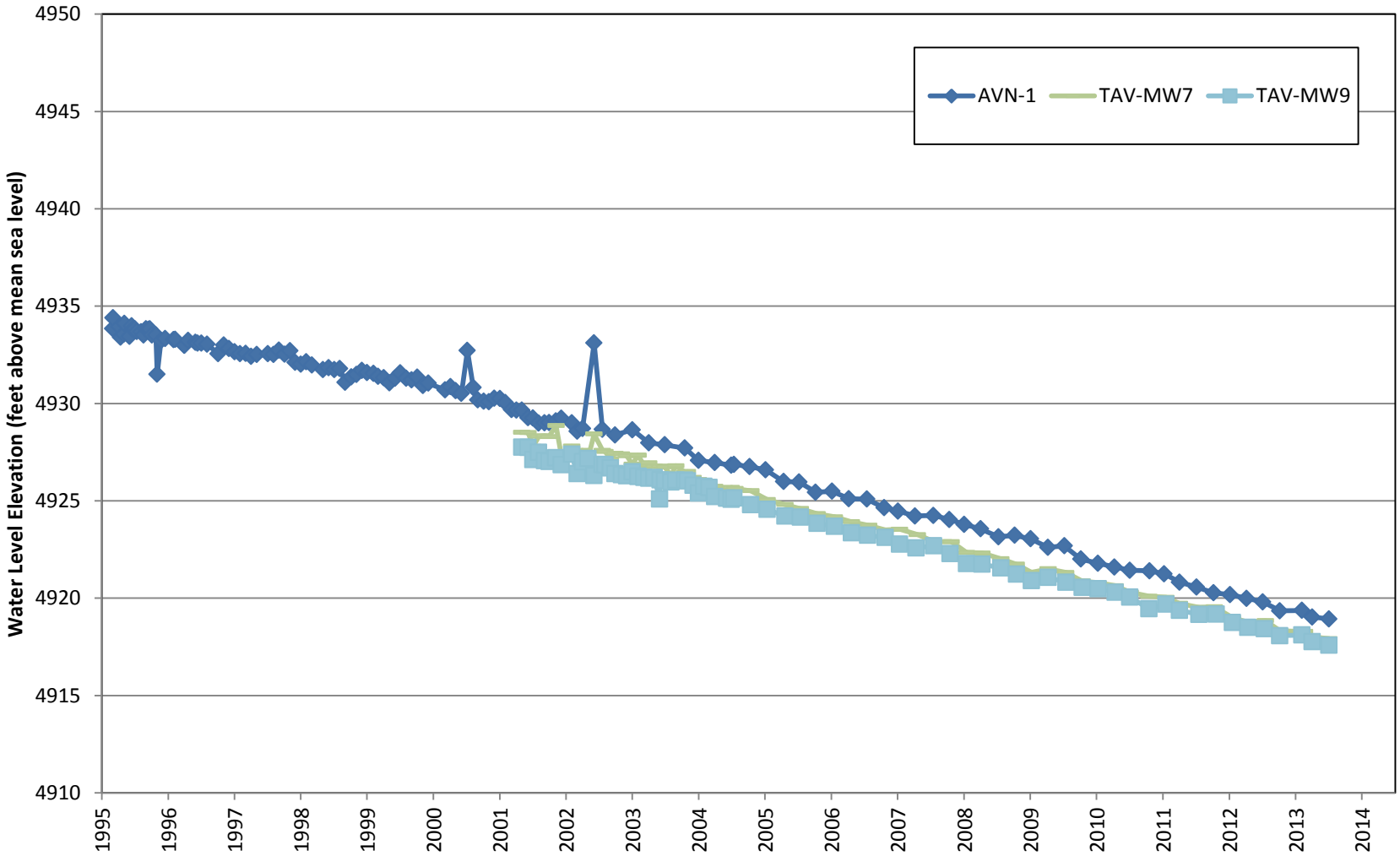


Figure 5C-2. TA-V Study Area Wells (2 of 3)

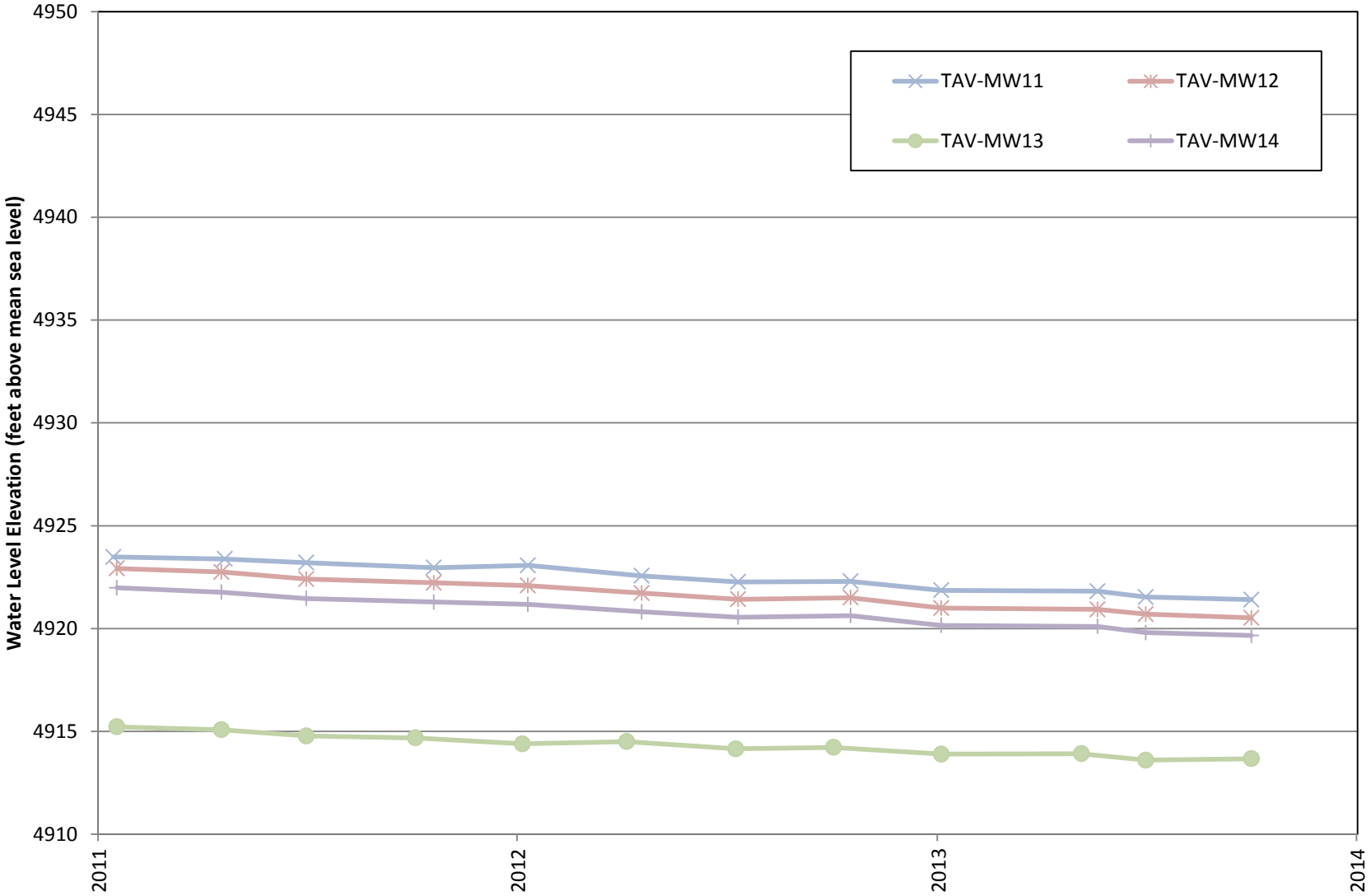


Figure 5C-3. TA-V Study Area Wells (3 of 3)

This page intentionally left blank.

Attachment 5D
Technical Area V
Soil-Vapor Monitoring
Calendar Year 2013 Activities

This page intentionally left blank.

Attachment 5D Tables

5D-1 Summary of Detected Volatile Organic Compounds, Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 5D-11

5D-2 Method Detection Limits for Volatile Organic Compounds (EPA Method[f] TO-15), Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 5D-22

5D-3 Summary of Photoionization Detector and Vacuum Pressure Field Measurements[g], Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 5D-23

5D-4 Summary of Detected Duplicate Compounds, Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 5D-24

Footnotes for Technical Area V Soil-Vapor Monitoring Tables 5D-25

Attachment 5D Figures

5D-1 TA-V Soil-Vapor Monitoring Well Locations 5D-29

5D-2 Soil-Vapor Monitoring Well Completion Information for TAV-SV01 ..... 5D-30

5D-3 Soil-Vapor Monitoring Well Completion Information for TAV-SV02 ..... 5D-31

5D-4 Soil-Vapor Monitoring Well Completion Information for TAV-SV03 ..... 5D-32

5D-5 TA-V Soil-Vapor Monitoring Total VOC Results (ppbv) at TAV-SV01 ..... 5D-33

5D-6 TA-V Soil-Vapor Monitoring Total VOC Results (ppbv) at TAV-SV02 ..... 5D-34

5D-7 TA-V Soil-Vapor Monitoring Total VOC Results (ppbv) at TAV-SV03 ..... 5D-35

5D-8 TA-V Soil-Vapor Monitoring TCE Results (ppbv) at TAV-SV01 ..... 5D-36

5D-9 TA-V Soil-Vapor Monitoring TCE Results (ppbv) at TAV-SV02 ..... 5D-37

5D-10 TA-V Soil-Vapor Monitoring TCE Results (ppbv) at TAV-SV03 ..... 5D-38

This page intentionally left blank.

Technical Area V Soil-Vapor Monitoring Calendar Year 2013

Sandia National Laboratories/New Mexico (SNL/NM) performed soil-vapor sampling inside Technical Area V (TA-V) on February 28 and March 8, 2013. Soil-vapor sampling activities were conducted to meet requirements established in the *Technical Area V Groundwater Investigation Work Plan, Revision 2,* which was submitted as Appendix A of the responses to the New Mexico Environment Department Notice of Disapproval (SNL February 2010), and in conformance with procedures outlined in the event-specific TA-V Soil-Vapor Monitoring, Mini-Sampling and Analysis Plans (SAP) for Second Quarter, Fiscal Year 2013 (SNL January 2013).

This summary describes sampling activities and presents analytical results from the February and March 2013 soil-vapor monitoring. Environmental samples were collected from monitoring wells TAV-SV01, TAV-SV02, and TAV-SV03, through soil-vapor sampling ports at depths of 50 feet (ft), 100 ft, 150 ft, 200 ft, 250 ft, 300 ft, 350 ft, 400 ft, 450 ft, and 500 ft below ground surface (bgs). The locations of the three soil-vapor monitoring wells are shown in Figure 5D-1, and the well completion diagrams are provided in Figures 5D-2 through 5D-4. Samples collected from all wells were analyzed for volatile organic compounds (VOCs) by analytical method U.S. Environmental Protection Agency (EPA) TO-15. A duplicate sample was collected at each monitoring well from a selected sample depth.

Well Evacuation

Purging removes stagnant air from each tube and draws representative soil-vapor from the soil pore space surrounding the sampling port in the subsurface. In accordance with the mini-SAP, the minimum purge requirement is three tubing volumes. If necessary, purging continued until organic vapor field parameters stabilized. Organic vapor was measured with a VOC monitoring instrument at the exhaust port of the vacuum pump.

The TA-V soil-vapor sampling equipment includes a vacuum pump, a sampling manifold assembly, and a multiport purging chamber. The multiport purging chamber is equipped with individual valves, fittings, and tubing that can be connected up to ten individual sample ports. The multiport purging chamber allows up to ten sampling locations to be purged at the same time. During February and March 2013, valves were connected to each sampling port and purged until minimum purge requirements were satisfied at all monitoring wells, and vapor samples were collected in SUMMA® canisters.

Analytical Results

Soil-vapor samples were submitted to Test America California (TACA) for VOC analyses by EPA Method TO-15. Analytical reports from TACA, including certificates of analyses, analytical methods, method detection limits (MDLs), reporting limits (RLs), dates of analyses, results of quality control (QC) analyses, and data validation findings are filed in the SNL/NM Customer Funded Records Program.

Table 5D-1 summarizes detected VOCs from soil-vapor samples. Table 5D-2 summarizes MDLs for associated VOCs. Detected VOCs included acetone; benzene; bromodichloromethane; bromoform; 2-butanone; carbon disulfide; carbon tetrachloride; chloroform; chloromethane; dibromochloromethane; dichlorodifluoromethane; 1,1-dichloroethane; 1,1-dichloroethene; cis-1,2-dichloroethene; 1,2-dichlorobenzene; 2-hexanone; hexachlorobutadiene; methylene chloride; tetrachloroethene; toluene; 1,1,2-trichloro-1,2,2-trifluoroethane; trichloroethene (TCE); and trichlorofluoromethane. TCE was detected in all wells, except at 50 and 100 ft bgs sample ports from monitoring well TAV-SV01. TCE concentrations ranged from 5.2 parts per billion by volume (ppb v/v) at TAV-SV03 (50 ft bgs sample port) to 2,100 ppb v/v at TAV-SV03 (350 ft bgs sample port). The

concentrations of TCE versus depth are plotted for all samples events for TAV-SV01, TAV-SV02, and TAV-SV03 in Figures 5D-5, 5D-6, and 5D-7, respectively. Those for Total VOCs are shown in Figures 5D-8 through 5D-10. The concentrations of VOCs appear to be stable over time.

Table 5D-3 summarizes field measurements collected prior to and after sample collection. Field measurements included organic vapor readings from each sample port, purge volumes, and starting and ending vacuum pressure readings for each sample container.

Field QC

Field QC samples included environmental duplicate and field blank samples. The field QC samples were submitted for analysis along with the environmental samples in accordance with QC procedures specified in the Mini-SAP.

Duplicate Environmental Samples

Duplicate environmental samples are collected in order to estimate the overall reproducibility of the sampling and analytical process. Duplicate samples were collected from the sample ports located at 400 ft bgs, 100 ft bgs, and 500 ft bgs at monitoring wells TAV-SV01, TAV-SV02, and TAV-SV03, respectively. The duplicate sample was collected immediately after the original environmental sample, in order to reduce variability caused by time and/or sampling mechanics. Duplicate samples were analyzed for all analytical parameters.

The relative percent difference (RPD) values are only calculated for compounds detected above the MDL in both samples. Table 5D-4 summarizes results of duplicate sample analyses and calculated RPD values. The RPD values for 2-hexanone in TAV-SV02 and for carbon disulfide, 1,1,2-trichloro-1,2,2-trifluoroethane, and TCE in TAV-SV03 were greater than 20 percent.

Field Blank Sample

A field blank sample is submitted whenever samples were collected for VOC analysis to assess whether contamination of the samples had occurred during shipment and storage. The sample is prepared in the field by collecting an ultra-pure nitrogen gas sample. A total of three field blank samples were submitted with February and March 2013 samples. If listed compounds were detected in associated environmental samples at concentrations less than five times the field blank concentrations, then the compounds were qualified as not detected during data validation.

Laboratory QC

Internal laboratory QC samples, including method blanks and duplicate laboratory control samples, were analyzed concurrently with all environmental samples. All chemical data was reviewed and qualified in accordance with AOP 00-03, "Data Validation Procedure for Chemical and Radiochemical Data." The data validation reports are filed in the SNL/NM Customer Funded Records Center.

All data are determined as acceptable and reported QC measures are adequate. Data which resulted in qualification are summarized below.

- Acetone, benzene, 2-butanone, methylene chloride, 4-methyl-2-pentanone, tetrachloroethene, toluene, TCE, m,p-xylene, and total xylenes were detected in the field blank associated with all samples. The associated sample results that were detects < 5X the field blank concentrations and > RL. These compounds were qualified as not detected during data validation.

Variances and Nonconformances

No variances or nonconformances from the requirements specified in the work plan or TA-V Mini-SAP were identified during February and March 2013 sampling activities.

Project Field Notes/Comments

Field observations and project concerns noted during February and March 2013 monitoring activities are summarized below.

- The TA-V parking lot was repaved during TA-V monitoring activities. Sampling at monitoring well TAV-SV01 was performed upon completion of the parking lot.

Summary

During February and March 2013, soil-vapor samples were collected at three TA-V monitoring wells for VOC analysis. TCE was detected in all wells, except at TAV-SV01 (50 and 100 ft bgs sample ports), at reported concentrations ranging from 5.2 to 2,100 ppb v/v.

References

SNL January 2013 Sandia National Laboratories/New Mexico (SNL/NM), January 2013. *TA-V Soil-Vapor Monitoring Mini-SAP for Second Quarter, Fiscal Year 2013*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, January 25, 2013.

SNL February 2010 Sandia National Laboratories/New Mexico (SNL/NM), February 2010. *DOE/Sandia Responses to NMED's Comments in Notice of Disapproval: Corrective Measures Evaluation Report for Technical Area V Groundwater, July 2005—November 2009 Response to Notice of Deficiency, Sandia National Laboratories, EPA ID# NM5890110518 HWB-SNL-05-027*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, February 22, 2010.

This page intentionally left blank.

Attachment 5D
Tables

This page intentionally left blank.

Table 5D-1
Summary of Detected Volatile Organic Compounds,
Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID/ Sample Port	Analyte	Result[a] (ppb v/v)	MDL[b] (ppb v/v)	RL[c] (ppb v/v)	Laboratory Qualifier[d]	Validation Qualifier[e]	Sample No.	Analytical Method[f]
TAV-SV01-50	Acetone	3.9	0.60	1.2		U	093538-001	EPA TO15
08-Mar-13	Benzene	0.38	0.20	0.40	J	0.4U	093538-001	EPA TO15
	2-Butanone	0.99	0.40	0.80			093538-001	EPA TO15
	Carbon disulfide	0.26	0.20	0.80	J		093538-001	EPA TO15
	Dichlorodifluoromethane	0.57	0.15	0.40			093538-001	EPA TO15
	Tetrachloroethene	0.49	0.15	0.40		U	093538-001	EPA TO15
	Toluene	1.2	0.15	0.40		U	093538-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.55	0.20	0.40			093538-001	EPA TO15
	Trichloroethene	1.4	0.15	0.40		U	093538-001	EPA TO15
	Trichlorofluoromethane	0.24	0.15	0.40	J		093538-001	EPA TO15
	m,p-Xylene	0.37	0.20	0.80	J	0.8U	093538-001	EPA TO15
	Xylene, Total	0.37	0.15	0.40	J	0.4U	093538-001	EPA TO15
	Total Organics	1.62	NA	NA	NA	NA	093538-001	EPA TO15
TAV-SV01-100	Acetone	7.7	0.60	1.2		U	093539-001	EPA TO15
08-Mar-13	Bromodichloromethane	0.35	0.15	0.30			093539-001	EPA TO15
	2-Butanone	2.3	0.40	0.80			093539-001	EPA TO15
	Carbon tetrachloride	0.35	0.20	0.80	J		093539-001	EPA TO15
	Chloroform	0.75	0.10	0.30			093539-001	EPA TO15
	Dibromochloromethane	0.24	0.10	0.40	J		093539-001	EPA TO15
	Dichlorodifluoromethane	0.54	0.15	0.40			093539-001	EPA TO15
	2-Hexanone	0.21	0.20	0.80	J		093539-001	EPA TO15
	Tetrachloroethene	0.91	0.15	0.40		U	093539-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	1.7	0.20	0.40			093539-001	EPA TO15
	Trichloroethene	6.5	0.15	0.40		U	093539-001	EPA TO15
	Trichlorofluoromethane	0.24	0.15	0.40	J		093539-001	EPA TO15
	Total Organics	6.68	NA	NA	NA	NA	093539-001	EPA TO15

Refer to footnotes on page 5D-25.

Table 5D-1 *(Continued)*
Summary of Detected Volatile Organic Compounds,
Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID/ Sample Port	Analyte	Result[a] (ppb v/v)	MDL[b] (ppb v/v)	RL[c] (ppb v/v)	Laboratory Qualifier[d]	Validation Qualifier[e]	Sample No.	Analytical Method[f]
TAV-SV01-150	Acetone	5.4	0.60	1.2		U	093540-001	EPA TO15
08-Mar-13	Benzene	0.22	0.20	0.40	J	0.4U	093540-001	EPA TO15
	Bromodichloromethane	3.5	0.15	0.30			093540-001	EPA TO15
	2-Butanone	1.5	0.40	0.80			093540-001	EPA TO15
	Carbon tetrachloride	0.68	0.20	0.80	J		093540-001	EPA TO15
	Chloroform	5.0	0.10	0.30			093540-001	EPA TO15
	Dibromochloromethane	1.6	0.10	0.40			093540-001	EPA TO15
	Dichlorodifluoromethane	0.46	0.15	0.40			093540-001	EPA TO15
	1,1-Dichloroethane	0.31	0.15	0.30			093540-001	EPA TO15
	2-Hexanone	0.26	0.20	0.80	J		093540-001	EPA TO15
	Tetrachloroethene	1.0	0.15	0.40		U	093540-001	EPA TO15
	Toluene	0.18	0.15	0.40	J	0.4U	093540-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	3.0	0.20	0.40			093540-001	EPA TO15
	Trichloroethene	27	0.15	0.40			093540-001	EPA TO15
	Trichlorofluoromethane	0.24	0.15	0.40	J		093540-001	EPA TO15
	Total Organics	43.55	NA	NA	NA	NA	093540-001	EPA TO15
TAV-SV01-200	Acetone	6.4	2.5	5.0		U	093541-001	EPA TO15
08-Mar-13	Bromodichloromethane	6.3	0.62	1.2			093541-001	EPA TO15
	Carbon tetrachloride	1.7	0.83	3.3	J		093541-001	EPA TO15
	Chloroform	10	0.41	1.2			093541-001	EPA TO15
	Dibromochloromethane	4.3	0.41	1.7			093541-001	EPA TO15
	1,1-Dichloroethane	1.7	0.62	1.2			093541-001	EPA TO15
	1,1-Dichloroethene	1.1	0.83	3.3	J		093541-001	EPA TO15
	cis-1,2-Dichloroethene	0.83	0.83	1.7	J		093541-001	EPA TO15
	Tetrachloroethene	1.3	0.62	1.7	J	1.7U	093541-001	EPA TO15
	Trichloroethene	5.7	0.83	1.7			093541-001	EPA TO15
	Trichlorofluoromethane	83	0.62	1.7			093541-001	EPA TO15
	Total Organics	114.63	NA	NA	NA	NA	093541-001	EPA TO15

Refer to footnotes on page 5D-25.

Table 5D-1 *(Continued)*
Summary of Detected Volatile Organic Compounds,
Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID/ Sample Port	Analyte	Result[a] (ppb v/v)	MDL[b] (ppb v/v)	RL[c] (ppb v/v)	Laboratory Qualifier[d]	Validation Qualifier[e]	Sample No.	Analytical Method[f]
TAV-SV01-250	Acetone	7.3	2.4	4.8		U	093542-001	EPA TO15
08-Mar-13	Benzene	0.86	0.81	1.6	J	1.6U	093542-001	EPA TO15
	Bromodichloromethane	5.5	0.61	1.2			093542-001	EPA TO15
	Carbon tetrachloride	2.4	0.81	3.2	J		093542-001	EPA TO15
	Chloroform	10	0.40	1.2			093542-001	EPA TO15
	Dibromochloromethane	4.5	0.40	1.6			093542-001	EPA TO15
	1,1-Dichloroethane	2.3	0.61	1.2			093542-001	EPA TO15
	1,1-Dichloroethene	2.0	0.81	3.2	J		093542-001	EPA TO15
	cis-1,2-Dichloroethene	2.1	0.81	1.6			093542-001	EPA TO15
	Hexachlorobutadiene	1.0	0.81	3.2	J		093542-001	EPA TO15
	Tetrachloroethene	1.7	0.61	1.6		U	093542-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	5.6	0.81	1.6			093542-001	EPA TO15
	Trichloroethene	130	0.61	1.6			093542-001	EPA TO15
	Total Organics	165.4	NA	NA	NA	NA	093542-001	EPA TO15
TAV-SV01-300	Acetone	4.5	2.5	4.9	J	4.9U	093543-001	EPA TO15
08-Mar-13	Bromodichloromethane	5.0	0.62	1.2			093543-001	EPA TO15
	Carbon tetrachloride	2.7	0.82	3.3	J		093543-001	EPA TO15
	Chloroform	9.7	0.41	1.2			093543-001	EPA TO15
	Dibromochloromethane	3.6	0.41	1.6			093543-001	EPA TO15
	1,1-Dichloroethane	1.9	0.62	1.2			093543-001	EPA TO15
	cis-1,2-Dichloroethene	2.6	0.82	1.6			093543-001	EPA TO15
	Methylene chloride	1.3	0.82	1.6	J		093543-001	EPA TO15
	Tetrachloroethene	1.7	0.62	1.6		U	093543-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	3.0	0.82	1.6			093543-001	EPA TO15
	Trichloroethene	130	0.62	1.6			093543-001	EPA TO15
	Total Organics	159.8	NA	NA	NA	NA	093543-001	EPA TO15

Refer to footnotes on page 5D-25.

Table 5D-1 *(Continued)*
Summary of Detected Volatile Organic Compounds,
Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID/ Sample Port	Analyte	Result[a] (ppb v/v)	MDL[b] (ppb v/v)	RL[c] (ppb v/v)	Laboratory Qualifier[d]	Validation Qualifier[e]	Sample No.	Analytical Method[f]
TAV-SV01-350	Acetone	8.7	2.4	4.8			093544-001	EPA TO15
08-Mar-13	Bromodichloromethane	5.3	0.61	1.2			093544-001	EPA TO15
	2-Butanone	1.8	1.6	3.2	J		093544-001	EPA TO15
	Carbon tetrachloride	2.3	0.81	3.2	J		093544-001	EPA TO15
	Chloroform	9.9	0.40	1.2			093544-001	EPA TO15
	Dibromochloromethane	4.1	0.40	1.6			093544-001	EPA TO15
	1,1-Dichloroethane	0.91	0.61	1.2	J		093544-001	EPA TO15
	1,1-Dichloroethene	1.3	0.81	3.2	J		093544-001	EPA TO15
	cis-1,2-Dichloroethene	5.3	0.81	1.6			093544-001	EPA TO15
	Methylene chloride	1.2	0.81	1.6	J		093544-001	EPA TO15
	Tetrachloroethene	1.5	0.61	1.6	J	1.6U	093544-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	3.1	0.81	1.6			093544-001	EPA TO15
	Trichloroethene	120	0.61	1.6			093544-001	EPA TO15
	Total Organics	163.91	NA	NA	NA	NA	093544-001	EPA TO15
TAV-SV01-400	Acetone	26	7.6	15			093545-001	EPA TO15
08-Mar-13	Bromodichloromethane	4.5	1.9	3.8			093545-001	EPA TO15
	Chloroform	9.3	1.3	3.8			093545-001	EPA TO15
	Dibromochloromethane	3.4	1.3	5.1	J		093545-001	EPA TO15
	1,1-Dichloroethane	2.3	1.9	3.8	J		093545-001	EPA TO15
	cis-1,2-Dichloroethene	45	2.5	5.1			093545-001	EPA TO15
	Tetrachloroethene	4.2	1.9	5.1	J	5.1U	093545-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	4.2	2.5	5.1	J		093545-001	EPA TO15
	Trichloroethene	470	1.4	5.1			093545-001	EPA TO15
	Total Organics	564.7	NA	NA	NA	NA	093545-001	EPA TO15
TAV-SV01-400	Acetone	8.2	7.8	16	J	16U	093546-001	EPA TO15
(Duplicate)	Bromodichloromethane	5.1	2.0	3.9			093546-001	EPA TO15
08-Mar-13	Chloroform	9.6	1.3	3.9			093546-001	EPA TO15
	Dibromochloromethane	3.9	1.3	5.2	J		093546-001	EPA TO15
	1,1-Dichloroethane	2.2	2.0	3.9	J		093546-001	EPA TO15
	cis-1,2-Dichloroethene	46	2.6	5.2			093546-001	EPA TO15
	Tetrachloroethene	4.6	2.0	5.2	J	5.2U	093546-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	2.6	5.2			093546-001	EPA TO15
	Trichloroethene	520	2.0	5.2			093546-001	EPA TO15
	Total Organics	591.8	NA	NA	NA	NA	093546-001	EPA TO15

Refer to footnotes on page 5D-25.

Table 5D-1 *(Continued)*
Summary of Detected Volatile Organic Compounds,
Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID/ Sample Port	Analyte	Result[a] (ppb v/v)	MDL[b] (ppb v/v)	RL[c] (ppb v/v)	Laboratory Qualifier[d]	Validation Qualifier[e]	Sample No.	Analytical Method[f]
TAV-SV01-450	Chloroform	7.0	6.0	18	J		093547-001	EPA TO15
08-Mar-13	cis-1,2-Dichloroethene	170	12	24			093547-001	EPA TO15
	Trichloroethene	1400	8.9	24			093547-001	EPA TO15
	Total Organics	1577	NA	NA	NA	NA	093547-001	EPA TO15
TAV-SV01-500	Chloroform	5.0	4.9	15	J		093548-001	EPA TO15
08-Mar-13	cis-1,2-Dichloroethene	57	9.9	20			093548-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	19	9.9	20	J		093548-001	EPA TO15
	Trichloroethene	1200	7.4	20			093548-001	EPA TO15
	Total Organics	1281	NA	NA	NA	NA	093548-001	EPA TO15
TAV-SV02-050	Acetone	22	0.60	1.2		U	093550-001	EPA TO15
28-Feb-13	Bromodichloromethane	5.5	0.15	0.30			093550-001	EPA TO15
	2-Butanone	5.6	0.40	0.80		U	093550-001	EPA TO15
	Chloroform	4.3	0.10	0.30			093550-001	EPA TO15
	Dibromochloromethane	0.25	0.10	0.40	J		093550-001	EPA TO15
	Dichlorodifluoromethane	0.63	0.15	0.40			093550-001	EPA TO15
	2-Hexanone	0.73	0.20	0.80	J		093550-001	EPA TO15
	Methylene chloride	0.42	0.20	0.40		U	093550-001	EPA TO15
	4-methyl-, 2-Pentanone	0.21	0.15	0.40	J	0.4U	093550-001	EPA TO15
	Tetrachloroethene	0.71	0.15	0.40			093550-001	EPA TO15
	Toluene	0.26	0.15	0.40	J	0.4U	093550-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	28	0.20	0.40			093550-001	EPA TO15
	Trichloroethene	7.8	0.15	0.40			093550-001	EPA TO15
	Trichlorofluoromethane	0.99	0.15	0.40			093550-001	EPA TO15
	Total Organics	48.91	NA	NA	NA	NA	093550-001	EPA TO15

Refer to footnotes on page 5D-25.

Table 5D-1 *(Continued)*
Summary of Detected Volatile Organic Compounds,
Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID/ Sample Port	Analyte	Result[a] (ppb v/v)	MDL[b] (ppb v/v)	RL[c] (ppb v/v)	Laboratory Qualifier[d]	Validation Qualifier[e]	Sample No.	Analytical Method[f]
TAV-SV02-100	Acetone	12	0.60	1.2		U	093551-001	EPA TO15
28-Feb-13	Bromodichloromethane	33	0.15	0.30			093551-001	EPA TO15
	2-Butanone	3.9	0.40	0.80		U	093551-001	EPA TO15
	Carbon tetrachloride	0.30	0.20	0.80	J		093551-001	EPA TO15
	Chloroform	27	0.10	0.30			093551-001	EPA TO15
	Dibromochloromethane	4.2	0.10	0.40			093551-001	EPA TO15
	Dichlorodifluoromethane	0.56	0.15	0.40			093551-001	EPA TO15
	2-Hexanone	0.63	0.20	0.80	J		093551-001	EPA TO15
	Methylene chloride	1.6	0.20	0.40		U	093551-001	EPA TO15
	4-methyl-, 2-Pentanone	0.21	0.15	0.40	J	0.4U	093551-001	EPA TO15
	Tetrachloroethene	2.8	0.15	0.40			093551-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	190	1.5	2.9			093551-001	EPA TO15
	Trichloroethene	36	0.15	0.40			093551-001	EPA TO15
	Total Organics	294.49	NA	NA	NA	NA	093551-001	EPA TO15
TAV-SV02-100	Acetone	12	0.60	1.2		U	093552-001	EPA TO15
(Duplicate)	Bromodichloromethane	32	0.15	0.30			093552-001	EPA TO15
28-Feb-13	2-Butanone	3.7	0.40	0.80		U	093552-001	EPA TO15
	Carbon tetrachloride	0.29	0.20	0.80	J		093552-001	EPA TO15
	Chloroform	26	0.10	0.30			093552-001	EPA TO15
	Dibromochloromethane	4.2	0.10	0.40			093552-001	EPA TO15
	Dichlorodifluoromethane	0.52	0.15	0.40			093552-001	EPA TO15
	1,1-Dichloroethene	0.48	0.20	0.80	J		093552-001	EPA TO15
	2-Hexanone	0.51	0.20	0.80	J		093552-001	EPA TO15
	Methylene chloride	1.7	0.20	0.40		U	093552-001	EPA TO15
	Tetrachloroethene	2.8	0.15	0.40			093552-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	190	1.4	2.8			093552-001	EPA TO15
	Trichloroethene	35	0.15	0.40			093552-001	EPA TO15
	Trichlorofluoromethane	2.2	0.15	0.40			093552-001	EPA TO15
	Total Organics	294	NA	NA	NA	NA	093552-001	EPA TO15

Refer to footnotes on page 5D-25.

Table 5D-1 *(Continued)*
Summary of Detected Volatile Organic Compounds,
Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID/ Sample Port	Analyte	Result[a] (ppb v/v)	MDL[b] (ppb v/v)	RL[c] (ppb v/v)	Laboratory Qualifier[d]	Validation Qualifier[e]	Sample No.	Analytical Method[f]
TAV-SV02-150	Acetone	2.1	0.60	1.2		U	093553-001	EPA TO15
28-Feb-13	Bromodichloromethane	42	0.15	0.30			093553-001	EPA TO15
	Bromoform	0.36	0.20	0.80	J		093553-001	EPA TO15
	2-Butanone	0.54	0.40	0.80	J	0.8U	093553-001	EPA TO15
	Carbon disulfide	0.40	0.20	0.80	J		093553-001	EPA TO15
	Carbon tetrachloride	0.57	0.20	0.80	J		093553-001	EPA TO15
	Chloroform	38	0.10	0.30			093553-001	EPA TO15
	Dibromochloromethane	11	0.10	0.40			093553-001	EPA TO15
	Dichlorodifluoromethane	0.56	0.15	0.40			093553-001	EPA TO15
	1,2-Dichlorobenzene	0.56	0.15	0.40			093553-001	EPA TO15
	1,1-Dichloroethane	0.18	0.15	0.30	J		093553-001	EPA TO15
	Methylene chloride	1.1	0.20	0.40		U	093553-001	EPA TO15
	Tetrachloroethene	4.7	0.15	0.40			093553-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	370	3.7	7.4			093553-001	EPA TO15
	Trichloroethene	72	1.1	2.9			093553-001	EPA TO15
	Trichlorofluoromethane	3.6	0.15	0.40			093553-001	EPA TO15
	Total Organics	543.93	NA	NA	NA	NA	093553-001	EPA TO15
TAV-SV02-200	Acetone	10	7.3	15	J	15U	093554-001	EPA TO15
28-Feb-13	Bromodichloromethane	37	1.8	3.7			093554-001	EPA TO15
	Chloroform	36	1.2	3.7			093554-001	EPA TO15
	Dibromochloromethane	14	1.2	4.9			093554-001	EPA TO15
	1,1-Dichloroethane	2.2	1.8	3.7	J		093554-001	EPA TO15
	cis-1,2-Dichloroethene	2.7	2.4	4.9	J		093554-001	EPA TO15
	Tetrachloroethene	5.1	1.8	4.9			093554-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	260	2.4	4.9			093554-001	EPA TO15
	Trichloroethene	290	1.8	4.9			093554-001	EPA TO15
	Total Organics	647	NA	NA	NA	NA	093554-001	EPA TO15

Refer to footnotes on page 5D-25.

Table 5D-1 *(Continued)*
Summary of Detected Volatile Organic Compounds,
Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID/ Sample Port	Analyte	Result[a] (ppb v/v)	MDL[b] (ppb v/v)	RL[c] (ppb v/v)	Laboratory Qualifier[d]	Validation Qualifier[e]	Sample No.	Analytical Method[f]
TAV-SV02-250	Acetone	23	8.8	18		U	093555-001	EPA TO15
28-Feb-13	Bromodichloromethane	13	2.2	4.4			093555-001	EPA TO15
	Chloroform	19	1.5	4.4			093555-001	EPA TO15
	Dibromochloromethane	4.3	1.5	5.9	J		093555-001	EPA TO15
	1,1-Dichloroethane	3.0	2.2	4.4	J		093555-001	EPA TO15
	cis-1,2-Dichloroethene	4.5	2.9	5.9	J		093555-001	EPA TO15
	Tetrachloroethene	5.0	2.2	5.9	J		093555-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	210	2.9	5.9			093555-001	EPA TO15
	Trichloroethene	390	2.2	5.9			093555-001	EPA TO15
	Total Organics	648.8	NA	NA	NA	NA	093555-001	EPA TO15
TAV-SV02-300	Bromodichloromethane	17	2.7	5.5			093556-001	EPA TO15
28-Feb-13	Chloroform	22	1.8	5.5			093556-001	EPA TO15
	Dibromochloromethane	6.0	1.8	7.3	J		093556-001	EPA TO15
	1,1-Dichloroethane	3.3	2.7	5.5	J		093556-001	EPA TO15
	cis-1,2-Dichloroethene	5.7	3.6	7.3	J		093556-001	EPA TO15
	Tetrachloroethene	5.1	2.7	7.3	J		093556-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	220	3.6	7.3			093556-001	EPA TO15
	Trichloroethene	400	2.7	7.3			093556-001	EPA TO15
	Trichlorofluoromethane	2.8	2.7	7.3	J		093556-001	EPA TO15
	Total Organics	681.9	NA	NA	NA	NA	093556-001	EPA TO15
TAV-SV02-350	Bromodichloromethane	19	2.1	4.3			093557-001	EPA TO15
28-Feb-13	Chloroform	22	1.4	4.3			093557-001	EPA TO15
	Dibromochloromethane	7.2	1.4	5.7			093557-001	EPA TO15
	1,1-Dichloroethane	2.9	2.1	4.3	J		093557-001	EPA TO15
	cis-1,2-Dichloroethene	4.8	2.9	5.7	J		093557-001	EPA TO15
	Tetrachloroethene	4.4	2.1	5.7	J		093557-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	200	2.9	5.7			093557-001	EPA TO15
	Trichloroethene	350	2.1	5.7			093557-001	EPA TO15
	Trichlorofluoromethane	2.7	2.1	5.7	J		093557-001	EPA TO15
	Total Organics	613	NA	NA	NA	NA	093557-001	EPA TO15

Refer to footnotes on page 5D-25.

Table 5D-1 *(Continued)*
Summary of Detected Volatile Organic Compounds,
Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID/ Sample Port	Analyte	Result[a] (ppb v/v)	MDL[b] (ppb v/v)	RL[c] (ppb v/v)	Laboratory Qualifier[d]	Validation Qualifier[e]	Sample No.	Analytical Method[f]
TAV-SV02-400	Bromodichloromethane	11	3.6	7.1			093558-001	EPA TO15
28-Feb-13	Chloroform	19	2.4	7.1			093558-001	EPA TO15
	Dibromochloromethane	4.8	2.4	9.5	J		093558-001	EPA TO15
	1,1-Dichloroethane	4.2	3.6	7.1	J		093558-001	EPA TO15
	cis-1,2-Dichloroethene	8.0	4.8	9.5	J		093558-001	EPA TO15
	Tetrachloroethene	5.0	3.6	9.5	J		093558-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	200	4.8	9.5			093558-001	EPA TO15
	Trichloroethene	460	3.6	9.5			093558-001	EPA TO15
	Total Organics	712	NA	NA	NA	NA	093558-001	EPA TO15
TAV-SV02-450	Bromodichloromethane	15	2.2	4.4			093559-001	EPA TO15
28-Feb-13	Chloroform	20	1.5	4.4			093559-001	EPA TO15
	Dibromochloromethane	5.6	1.5	5.8	J		093559-001	EPA TO15
	1,1-Dichloroethane	3.1	2.2	4.4	J		093559-001	EPA TO15
	cis-1,2-Dichloroethene	7.6	2.9	5.8			093559-001	EPA TO15
	Tetrachloroethene	4.9	2.2	5.8	J		093559-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	210	2.9	5.8			093559-001	EPA TO15
	Trichloroethene	370	2.2	5.8			093559-001	EPA TO15
	Trichlorofluoromethane	2.9	2.2	5.8	J		093559-001	EPA TO15
	Total Organics	639.1	NA	NA	NA	NA	093559-001	EPA TO15
TAV-SV02-500	Chloroform	12	3.7	11			093560-001	EPA TO15
28-Feb-13	cis-1,2-Dichloroethene	74	7.4	15			093560-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	160	7.4	15			093560-001	EPA TO15
	Trichloroethene	1400	5.5	15			093560-001	EPA TO15
	Total Organics	1646	NA	NA	NA	NA	093560-001	EPA TO15
TAV-SV03-050	Acetone	5.1	2.2	4.4			093562-001	EPA TO15
28-Feb-13	Dichlorodifluoromethane	0.94	0.55	1.5	J		093562-001	EPA TO15
	Tetrachloroethene	1.1	0.55	1.5	J		093562-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	130	0.74	1.5			093562-001	EPA TO15
	Trichloroethene	5.2	0.55	1.5			093562-001	EPA TO15
	Trichlorofluoromethane	0.59	0.55	1.5	J		093562-001	EPA TO15
	Total Organics	142.93	NA	NA	NA	NA	093562-001	EPA TO15
TAV-SV03-100	Tetrachloroethene	1.7	1.3	3.4	J		093563-001	EPA TO15
28-Feb-13	1,1,2-Trichloro-1,2,2-trifluoroethane	360	5.4	11			093563-001	EPA TO15
	Trichloroethene	38	1.3	3.4			093563-001	EPA TO15
	Total Organics	399.7	NA	NA	NA	NA	093563-001	EPA TO15

Refer to footnotes on page 5D-25.

Table 5D-1 *(Continued)*
Summary of Detected Volatile Organic Compounds,
Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID/ Sample Port	Analyte	Result[a] (ppb v/v)	MDL[b] (ppb v/v)	RL[c] (ppb v/v)	Laboratory Qualifier[d]	Validation Qualifier[e]	Sample No.	Analytical Method[f]
TAV-SV03-150	1,1,2-Trichloro-1,2,2-trifluoroethane	530	6.7	13			093564-001	EPA TO15
28-Feb-13	Trichloroethene	150	2.5	6.6			093564-001	EPA TO15
	Total Organics	680	NA	NA	NA	NA	093564-001	EPA TO15
TAV-SV03-200	Benzene	7.7	3.3	6.6			093565-001	EPA TO15
28-Feb-13	Chloroform	4.2	1.7	5.0	J		093565-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	470	6.7	13			093565-001	EPA TO15
	Trichloroethene	520	2.5	6.6			093565-001	EPA TO15
	Total Organics	1001.9	NA	NA	NA	NA	093565-001	EPA TO15
TAV-SV03-250	Benzene	30	5.3	11			093566-001	EPA TO15
28-Feb-13	Toluene	4.5	4.0	11	J		093566-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	660	5.3	11			093566-001	EPA TO15
	Trichloroethene	780	4.0	11			093566-001	EPA TO15
	Total Organics	1474.5	NA	NA	NA	NA	093566-001	EPA TO15
TAV-SV03-300	Benzene	18	8.9	18			093567-001	EPA TO15
28-Feb-13	Chloroform	4.9	4.4	13	J		093567-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	300	8.9	18			093567-001	EPA TO15
	Trichloroethene	1600	6.6	18			093567-001	EPA TO15
	Total Organics	1922.9	NA	NA	NA	NA	093567-001	EPA TO15
TAV-SV03-350	Benzene	17	12	24	J		093568-001	EPA TO15
28-Feb-13	1,1,2-Trichloro-1,2,2-trifluoroethane	460	12	24			093568-001	EPA TO15
	Trichloroethene	2100	9.0	24			093568-001	EPA TO15
	Total Organics	2577	NA	NA	NA	NA	093568-001	EPA TO15
TAV-SV03-400	1,1,2-Trichloro-1,2,2-trifluoroethane	330	12	24			093569-001	EPA TO15
28-Feb-13	Trichloroethene	1900	9.0	24			093569-001	EPA TO15
	Total Organics	2230	NA	NA	NA	NA	093569-001	EPA TO15
TAV-SV03-450	Benzene	7.1	6.7	13	J		093570-001	EPA TO15
28-Feb-13	1,1,2-Trichloro-1,2,2-trifluoroethane	270	6.7	13			093570-001	EPA TO15
	Trichloroethene	1100	5.0	13			093570-001	EPA TO15
	Total Organics	1377.1	NA	NA	NA	NA	093570-001	EPA TO15

Refer to footnotes on page 5D-25.

Table 5D-1 *(Concluded)*
Summary of Detected Volatile Organic Compounds,
Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID/ Sample Port	Analyte	Result[a] (ppb v/v)	MDL[b] (ppb v/v)	RL[c] (ppb v/v)	Laboratory Qualifier[d]	Validation Qualifier[e]	Sample No.	Analytical Method[f]
TAV-SV03-500	Benzene	0.24	0.20	0.40	J		093571-001	EPA TO15
28-Feb-13	2-Butanone	1.4	0.40	0.80			093571-001	EPA TO15
	Carbon disulfide	0.44	0.20	0.80	J		093571-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	3.0	0.20	0.40			093571-001	EPA TO15
	Trichloroethene	14	0.15	0.40			093571-001	EPA TO15
	Trichlorofluoromethane	0.23	0.15	0.40	J		093571-001	EPA TO15
	Total Organics	19.07	NA	NA	NA	NA	093571-001	EPA TO15
TAV-SV03-500	Acetone	5.0	0.60	1.2			093572-001	EPA TO15
(Duplicate)	Benzene	0.22	0.20	0.40	J		093572-001	EPA TO15
28-Feb-13	2-Butanone	1.7	0.40	0.80			093572-001	EPA TO15
	Carbon disulfide	0.34	0.20	0.80	J		093572-001	EPA TO15
	Chloromethane	0.46	0.40	0.80	J		093572-001	EPA TO15
	Dibromochloromethane	0.44	0.15	0.40			093572-001	EPA TO15
	1,1,2-Trichloro-1,2,2-trifluoroethane	0.57	0.20	0.40			093572-001	EPA TO15
	Trichloroethene	6.6	0.15	0.40			093572-001	EPA TO15
	Trichlorofluoromethane	0.22	0.15	0.40	J		093572-001	EPA TO15
	Total Organics	15.55	NA	NA	NA	NA	093572-001	EPA TO15

Refer to footnotes on page 5D-25.

Table 5D-2
Method Detection Limits for Volatile Organic Compounds (EPA Method[f] TO-15), Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Analyte	MDL[b] (ppb v/v)	Analyte	MDL[b] (ppb v/v)
1,1,1-Trichloroethane	0.15 – 9.0	Carbon disulfide	0.20 – 12.0
1,1,2,2-Tetrachloroethane	0.10 – 6.0	Carbon tetrachloride	0.20 – 12.0
1,1,2-Trichloroethane	0.15 – 9.0	Chlorobenzene	0.10 – 6.0
1,1-Dichloroethane	0.15 – 9.0	Chloroethane	0.70 – 42.0
1,1-Dichloroethene	0.20 – 12.0	Chloroform	0.10 – 6.0
1,2,2-tetrafluoroethane, 1,2-Dichloro-1	0.15 – 9.0	Chloromethane	0.40 – 24.0
1,2,4-Trichlorobenzene	0.70 – 42.0	Dibromochloromethane	0.10 – 6.0
1,2,4-Trimethylbenzene	0.20 – 12.0	Dichlorodifluoromethane	0.15 – 9.0
1,2-Dibromoethane	0.20 – 12.0	Ethyl benzene	0.15 – 9.0
1,2-Dichlorobenzene	0.15 – 9.0	Hexachlorobutadiene	0.20 – 12.0
1,2-Dichloroethane	0.20 – 12.0	Methylene chloride	0.20 – 12.0
1,2-Dichloropropane	0.15 – 9.0	Styrene	0.15 – 9.0
1,3,5-Trimethylbenzene	0.15 – 9.0	Tetrachloroethene	0.15 – 9.0
1,3-Dichlorobenzene	0.15 – 9.0	Toluene	0.15 – 9.0
1,4-Dichlorobenzene	0.15 – 9.0	Trichloroethene	0.15 – 9.0
2,2-trifluoroethane, 1,1,2-Trichloro-1	0.20 – 12.0	Trichlorofluoromethane	0.15 – 9.0
2-Butanone	0.40 – 24.0	Vinyl acetate	0.20 – 12.0
2-Hexanone	0.20 – 12.0	Vinyl chloride	0.15 – 9.0
4-Ethyltoluene	0.15 – 9.0	Xylene	0.15 – 21.0
4-methyl-, 2-Pentanone	0.15 – 9.0	cis-1,2-Dichloroethene	0.20 – 12.0
Acetone	0.60 – 36.0	cis-1,3-Dichloropropene	0.15 – 9.0
Benzene	0.20 – 12.0	m-, p-Xylene	0.20 – 12.0
Benzyl chloride	0.20 – 12.0	o-Xylene	0.15 – 9.0
Bromodichloromethane	0.15 – 9.0	trans-1,2-Dichloroethene	0.20 – 12.0
Bromoform	0.20 – 12.0	trans-1,3-Dichloropropene	0.15 – 9.0
Bromomethane	0.20 – 12.0		

Refer to footnotes on page 5D-25.

Table 5D-3
Summary of Photoionization Detector and Vacuum Pressure Field Measurements[g], Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID/ Sample Port	Sample Date	PID (ppm)	Purge Volume (cu-ft)	Canister Number	Starting Vacuum Pressure (in-Hg)	Ending Vacuum Pressure (in-Hg)
TAV-SV01-050	08-Mar-13	0.0	0.065	34001173	-27	-8
TAV-SV01-100		0.0	0.117	34001325	-27	-8
TAV-SV01-150		0.0	0.168	34001439	-27	-6
TAV-SV01-200		0.0	0.219	34000210	-27	-8
TAV-SV01-250		0.0	0.270	34000018	-27	-8
TAV-SV01-300		0.0	0.321	34001351	-27	-8
TAV-SV01-350		0.0	0.372	34000017	-27	-8
TAV-SV01-400		0.0	0.423	34000362	-27	-8
TAV-SV01-400 (Duplicate)				34000552	-27	-8
TAV-SV01-450		0.0	0.475	34000146	-27	-8
TAV-SV01-500		0.0	0.526	34000080	-27	-8
TAV-SV02-050	28-Feb-13	0.0	0.065	34000294	-25	-8
TAV-SV02-100		0.0	0.117	34000714	-26	-8
TAV-SV02-100 (Duplicate)				34001153	-25	-8
TAV-SV02-150		0.0	0.168	34000111	-26	-8
TAV-SV02-200		0.0	0.219	34000460	-26	-8
TAV-SV02-250		0.0	0.270	34001276	-26	-8
TAV-SV02-300		0.0	0.321	34001446	-26	-8
TAV-SV02-350		0.0	0.372	34000353	-26	-8
TAV-SV02-400		0.0	0.423	34000381	-26	-8
TAV-SV02-450		0.0	0.475	34000422	-26	-8
TAV-SV02-500		0.0	0.526	34000208	-26	-8
TAV-SV03-050	28-Feb-13	0.0	0.065	34000075	-26	-8
TAV-SV03-100		0.0	0.117	34001125	-26	-8
TAV-SV03-150		0.0	0.168	34000821	-26	-8
TAV-SV03-200		0.0	0.219	34000151	-26	-8
TAV-SV03-250		0.0	0.270	34000853	-26	-8
TAV-SV03-300		0.0	0.321	34001500	-25	-8
TAV-SV03-350		0.0	0.372	34001657	-26	-8
TAV-SV03-400		0.0	0.423	34000846	-25	-8
TAV-SV03-450		0.0	0.475	34000012	-26	-8
TAV-SV03-500		0.0	0.526	34001160	-25	-8
TAV-SV03-500 (Duplicate)				34001167	-26	-8

Refer to footnotes on page 5D-25.

Table 5D-4
Summary of Detected Duplicate Compounds,
Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID/Parameter	Environmental Sample (R1)	Duplicate Sample (R2)	RPD[h]
	ppb v/v unless otherwise noted		
TAV-SV01-400			
Bromodichloromethane	4.5	5.1	13
Chloroform	9.3	9.6	3
Dibromochloromethane	3.4	3.9	14
1,1-Dichloroethane	2.3	2.2	4
cis-1,2-Dichloroethene	45	46	2
1,1,2-Trichloro-1,2,2-trifluoroethane	4.2	5.0	17
Trichloroethene	470	520	10
TAV-SV02-100			
Bromodichloromethane	33	32	3
Carbon tetrachloride	0.30	0.29	3
Chloroform	27	26	4
Dibromochloromethane	4.2	4.2	< 1
Dichlorodifluoromethane	0.56	0.52	7
2-Hexanone	0.63	0.51	21
Tetrachloroethene	2.8	2.8	< 1
1,1,2-Trichloro-1,2,2-trifluoroethane	190	190	< 1
Trichloroethene	36	35	3
TAV-SV03-500			
Benzene	0.24	0.22	9
2-Butanone	1.4	1.7	19
Carbon disulfide	0.44	0.34	26
1,1,2-Trichloro-1,2,2-trifluoroethane	3.0	0.57	136
Trichloroethene	14	6.6	72
Trichlorofluoromethane	0.23	0.22	4

Refer to footnotes on page 5D-25.

Footnotes for Technical Area V Soil-Vapor Monitoring Tables

ID = Identifier.
No. = Number.

[a]Result
ppb v/v = Parts per billion by volume
Total Organics = Sum of validated detected organic compounds, where Xylene is the sum of m,p-Xylene and o-Xylene.

[b]MDL
MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

[c]RL
RL = Reporting limit. The minimum levels, concentrations, or quantities of a target variable that can be reported with a specified degree of confidence.

[d]Lab Qualifier
J = Result is less than the RL but greater than or equal to the MDL, and the concentration is an approximate value.
NA = Not applicable.

[e]Validation Qualifier
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
NA = Not applicable.
U = The analyte was analyzed for but not was not detected. The associated numerical value is the sample quantitation limit.

[f]Analytical Method
U.S. Environmental Protection Agency, 1999, "*Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition, Compendium Method TO-15"* Center for Environmental Research Information, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio.

[g]Field Measurements
Field measurements collected prior to and after sampling.
cu-ft = Cubic feet.
in-Hg = Inches of mercury.
PID = Photoionization detector.
ppm = Parts per million.

[h]RPD
RPD = Relative percent difference is calculated with the following equation and rounded to nearest whole number.

$$RPD = \frac{\left|R_1 - R_2\right|}{[(R_1 + R_2)/2]} \times 100$$

where: R1 = Analysis result.
R2 = Duplicate analysis result.

This page intentionally left blank.

Attachment 5D
Figures

This page intentionally left blank.

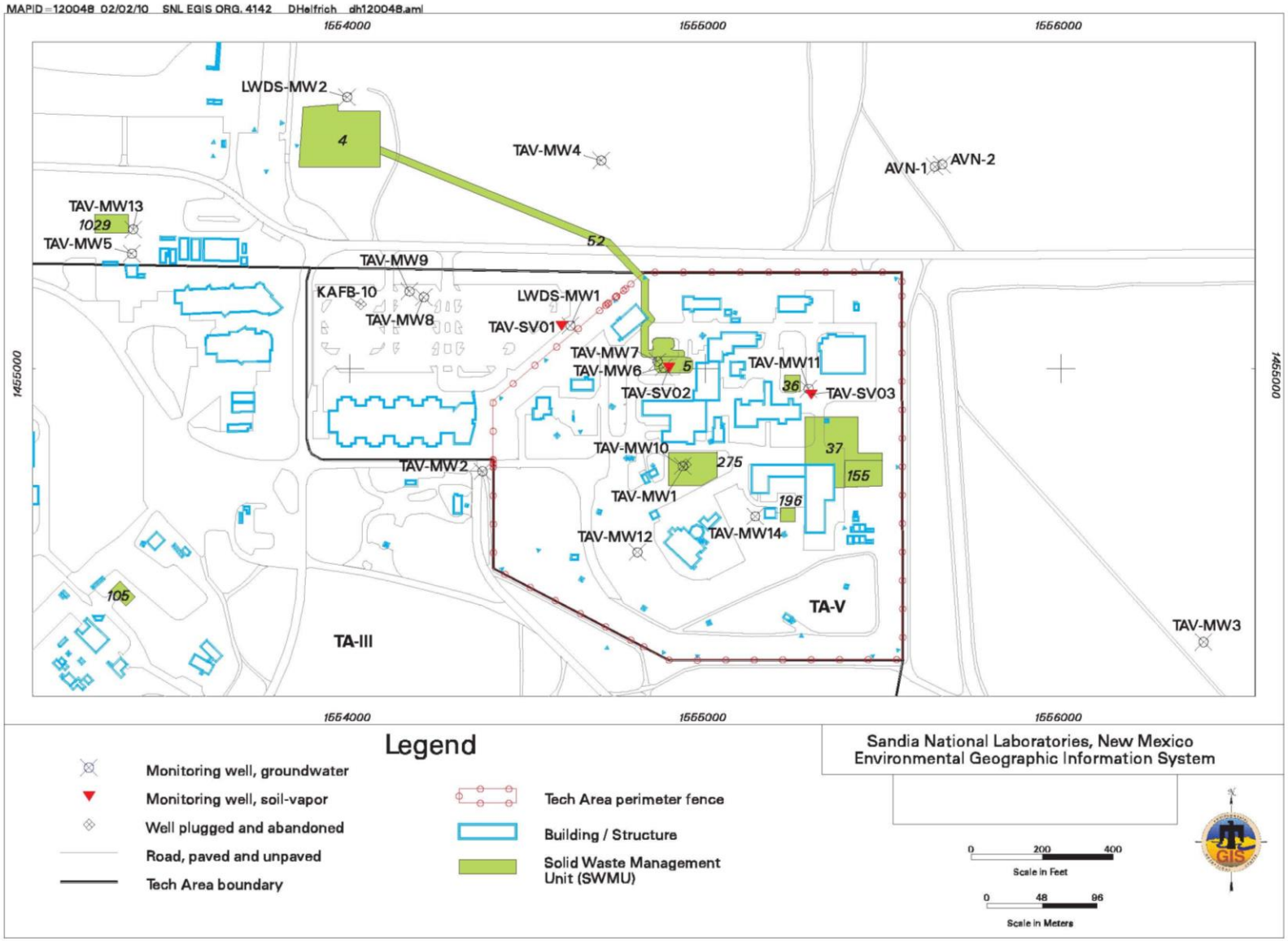


Figure 5D-1. TA-V Soil-Vapor Monitoring Well Locations

Well Name: TAV-SV01
Project Name: TAV SOIL VAPOR WELLS
NMOSE Well File Code: N/A
Owner Name: SNL/NM
Date Drilling Started: 1/27/2011
Date Well Dev. Completed: 3/17/2011

Drilling Contractor: WDC EXPLORATION & WELLS
Drilling Method: ARCH
Borehole Depth (FBGS): 506
Casing Depth (FBGS):
Geo Location: TA-V
Completion Zone: ALLUVIAL FAN FACIES
Completion Formation: SANTA FE

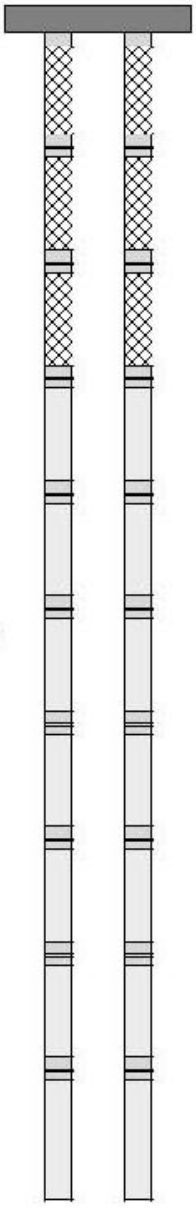
Survey Data
Survey Date: 3/29/2011
Surveyed By: SURVEYING CONTROL, INC.
State Plane Coordinates: NAD 83
(X) Easting: 1554596.11
(Y) Northing: 1455120.73

Surveyed Evaluations (FAMSL) NAVD 88
Protective Casing: 5423.48
Top of Inner Well Casing:
Concrete Pad: 5423.43
Ground Surface: 5423.4

Calculated Depths and Elevations
Initial Depth to Water (FBGS):
Date Initial Depth Measured:
Last Measured Water Elevation (FAMSL):
Date Last Measured:

Miscellaneous Information
Screen Slot Size (in.): n/a
Date Updated: 02-MAY-2011
Date Printed from EDMS: 4/17/2012 11:03:20 AM

Comments:
SV = SOIL VAPOR. SVSS=SOIL VAPOR SAMPLING SCREEN.



Completion Data Measured Depths (FBGS)

Casing Stickup:

Interval	Material	Start	Stop	Length	ID/OD (in.)
BOREHOLE		0	506	506	/9.625
VAULT		0	6	6	
SEAL	BENTONITE CHIPS	6	44	38	
SV SAMPLING ZONE	10/20 SILICA SAND	44	54	10	
SVSS 50	STAINLESS STEEL	49.5	50.5	1	/0.375
SEAL	BENTONITE CHIPS	54	94	40	
SV SAMPLING ZONE	10/20 SILICA SAND	94	104	10	
SVSS 100	STAINLESS STEEL	99.5	100.5	1	/0.375
SEAL	BENTONITE CHIPS	104	144	40	
SV SAMPLING ZONE	10/20 SILICA SAND	144	154	10	
SVSS 150	STAINLESS STEEL	149.5	150.5	1	/0.375
SEAL	BENTONITE CHIPS	154	194	40	
SV SAMPLING ZONE	10/20 SILICA SAND	194	204	10	
SVSS 200	STAINLESS STEEL	199.5	200.5	1	/0.375
SEAL	BENTONITE CHIPS	204	244	40	
SV SAMPLING ZONE	10/20 SILICA SAND	244	254	10	
SVSS 250	STAINLESS STEEL	249.5	250.5	1	/0.375
SEAL	BENTONITE CHIPS	254	294	40	
SV SAMPLING ZONE	10/20 SILICA SAND	294	304	10	
SVSS 300	STAINLESS STEEL	299.5	300.5	1	/0.375
SEAL	BENTONITE CHIPS	304	344	40	
SV SAMPLING ZONE	10/20 SILICA SAND	344	354	10	
SVSS 350	STAINLESS STEEL	349.5	350.5	1	/0.375
SEAL	BENTONITE CHIPS	354	394	40	
SV SAMPLING ZONE	10/20 SILICA SAND	394	404	10	
SVSS 400	STAINLESS STEEL	399.5	400.5	1	/0.375
SEAL	BENTONITE CHIPS	404	444	40	
SV SAMPLING ZONE	10/20 SILICA SAND	444	454	10	
SVSS 450	STAINLESS STEEL	449.5	450.5	1	/0.375
SEAL	BENTONITE CHIPS	454	494	40	
SV SAMPLING ZONE	10/20 SILICA SAND	494	506	12	
SVSS 500	STAINLESS STEEL	499.5	500.5	1	/0.375

Some well diagram info truncated due to numeric constraints.

Figure 5D-2. Soil-Vapor Monitoring Well Completion Information for TAV-SV01

Well Name: TAV-SV02
Project Name: TAV SOIL VAPOR WELLS
NMOSE Well File Code: N/A
Owner Name: SNL/NM
Date Drilling Started: 3/3/2011
Date Well Dev. Completed: 3/17/2011

Drilling Contractor: WDC EXPLORATION & WELLS
Drilling Method: ARCH
Borehole Depth (FBGS): 506
Casing Depth (FBGS):
Geo Location: TA-V
Completion Zone: ALLUVIAL FAN FACIES
Completion Formation: SANTA FE

Survey Data

Survey Date: 3/29/2011
Surveyed By: SURVEYING CONTROL, INC.

State Plane Coordinates: NAD 83
(X) Easting: 1554898.53
(Y) Northing: 1455002.42

Surveyed Evaluations (FAMSL) NAVD 88

Protective Casing: 5431.91
Top of Inner Well Casing:
Concrete Pad: 5431.88
Ground Surface: 5431.9

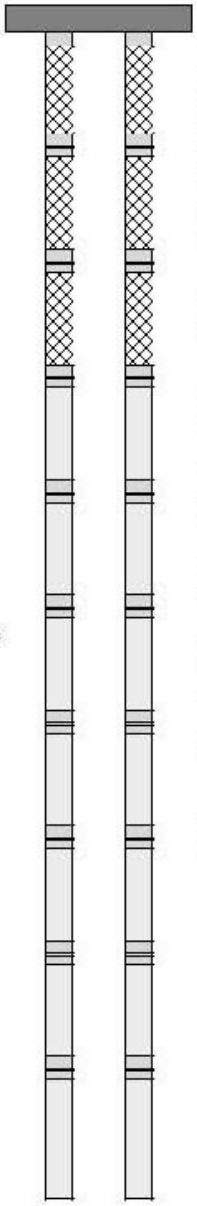
Calculated Depths and Elevations

Initial Depth to Water (FBGS):
Date Initial Depth Measured:
Last Measured Water Elevation (FAMSL):
Date Last Measured:

Miscellaneous Information

Screen Slot Size (in.): n/a
Date Updated: 02-MAY-2011
Date Printed from EDMS: 4/17/2012 11:04:53 AM

Comments:
SV = SOIL VAPOR. SVSS=SOIL VAPOR SAMPLING SCREEN.



Completion Data Measured Depths (FBGS)

Casing Stickup:

Interval	Material	Start	Stop	Length	ID/OD (in.)
BOREHOLE		0	506	506	/ 9.625
VAULT		0	6	6	
SEAL	BENTONITE CHIPS	6	44	38	
SV SAMPLING ZONE	10/20 SILICA SAND	44	54	10	
SVSS 50	STAINLESS STEEL	49.5	50.5	1	/ 0.375
SEAL	BENTONITE CHIPS	54	94	40	
SV SAMPLING ZONE	10/20 SILICA SAND	94	104	10	
SVSS 100	STAINLESS STEEL	99.5	100.5	1	/ 0.375
SEAL	BENTONITE CHIPS	104	144	40	
SV SAMPLING ZONE	10/20 SILICA SAND	144	154	10	
SVSS 150	STAINLESS STEEL	149.5	150.5	1	/ 0.375
SEAL	BENTONITE CHIPS	154	194	40	
SV SAMPLING ZONE	10/20 SILICA SAND	194	204	10	
SVSS 200	STAINLESS STEEL	199.5	200.5	1	/ 0.375
SEAL	BENTONITE CHIPS	204	244	40	
SV SAMPLING ZONE	10/20 SILICA SAND	244	254	10	
SVSS 250	STAINLESS STEEL	249.5	250.5	1	/ 0.375
SEAL	BENTONITE CHIPS	254	294	40	
SV SAMPLING ZONE	10/20 SILICA SAND	294	304	10	
SVSS 300	STAINLESS STEEL	299.5	300.5	1	/ 0.375
SEAL	BENTONITE CHIPS	304	344	40	
SV SAMPLING ZONE	10/20 SILICA SAND	344	354	10	
SVSS 350	STAINLESS STEEL	349.5	350.5	1	/ 0.375
SEAL	BENTONITE CHIPS	354	394	40	
SV SAMPLING ZONE	10/20 SILICA SAND	394	404	10	
SVSS 400	STAINLESS STEEL	399.5	400.5	1	/ 0.375
SEAL	BENTONITE CHIPS	404	444	40	
SV SAMPLING ZONE	10/20 SILICA SAND	444	454	10	
SVSS 450	STAINLESS STEEL	449.5	450.5	1	/ 0.375
SEAL	BENTONITE CHIPS	454	494	40	
SV SAMPLING ZONE	10/20 SILICA SAND	494	506	12	
SVSS 500	STAINLESS STEEL	499.5	500.5	1	/ 0.375

Some well diagram info truncated due to numeric constraints.

Figure 5D-3. Soil-Vapor Monitoring Well Completion Information for TAV-SV02

Well Name:	TAV-SV03	**Drilling Contractor:**	WDC EXPLORATION & WELLS
Project Name:	TAV SOIL VAPOR WELLS	**Drilling Method:**	ARCH
NMOSE Well File Code:	N/A	**Borehole Depth (FBGS):**	506
Owner Name:	SNL/NM	**Casing Depth (FBGS):**	
Date Drilling Started:	2/22/2011	**Geo Location:**	TA-V
Date Well Dev. Completed:	3/17/2011	**Completion Zone:**	ALLUVIAL FAN FACIES
		Completion Formation:	SANTA FE

Survey Data

Survey Date: 3/29/2011
Surveyed By: SURVEYING CONTROL, INC.

State Plane Coordinates: NAD 83
(X) Easting: 1555298.42
(Y) Northing: 1454927.34

Surveyed Evaluations (FAMSL) NAVD 88

Protective Casing: 5440.19
Top of Inner Well Casing:
Concrete Pad: 5440.20
Ground Surface: 5440.2

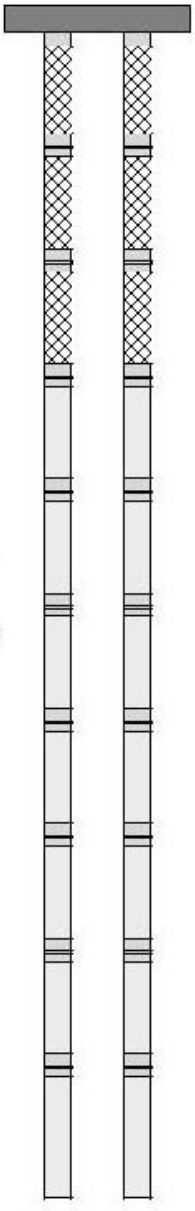
Calculated Depths and Elevations

Initial Depth to Water (FBGS):
Date Initial Depth Measured:
Last Measured Water Elevation (FAMSL):
Date Last Measured:

Miscellaneous Information

Screen Slot Size (in.): n/a
Date Updated: 02-MAY-2011
Date Printed from EDMS: 4/17/2012 11:06:11 AM

Comments:
SV = SOIL VAPOR. SVSS=SOIL VAPOR SAMPLING SCREEN.



Completion Data Measured Depths (FBGS)

Casing Stickup:

Interval	Material	Start	Stop	Length	ID/OD(in.)
BOREHOLE		0	100	100	/ 11.75
VAULT		0	6	6	
SEAL	BENTONITE CHIPS	6	44	38	
SV SAMPLING ZONE	10/20 SILICA SAND	44	54	10	
SVSS 50	STAINLESS STEEL	49.5	50.5	1	/ 0.375
SEAL	BENTONITE CHIPS	54	94	40	
SV SAMPLING ZONE	10/20 SILICA SAND	94	104	10	
SVSS 100	STAINLESS STEEL	99.5	100.5	1	/ 0.375
BOREHOLE		100	507	407	/ 9.625
SEAL	BENTONITE CHIPS	104	144	40	
SV SAMPLING ZONE	10/20 SILICA SAND	144	154	10	
SVSS 150	STAINLESS STEEL	149.5	150.5	1	/ 0.375
SEAL	BENTONITE CHIPS	154	194	40	
SV SAMPLING ZONE	10/20 SILICA SAND	194	204	10	
SVSS 200	STAINLESS STEEL	199.5	200.5	1	/ 0.375
SEAL	BENTONITE CHIPS	204	244	40	
SV SAMPLING ZONE	10/20 SILICA SAND	244	254	10	
SVSS 250	STAINLESS STEEL	249.5	250.5	1	/ 0.375
SEAL	BENTONITE CHIPS	254	294	40	
SV SAMPLING ZONE	10/20 SILICA SAND	294	304	10	
SVSS 300	STAINLESS STEEL	299.5	300.5	1	/ 0.375
SEAL	BENTONITE CHIPS	304	344	40	
SV SAMPLING ZONE	10/20 SILICA SAND	344	354	10	
SVSS 350	STAINLESS STEEL	349.5	350.5	1	/ 0.375
SEAL	BENTONITE CHIPS	354	394	40	
SV SAMPLING ZONE	10/20 SILICA SAND	394	404	10	
SVSS 400	STAINLESS STEEL	399.5	400.5	1	/ 0.375
SEAL	BENTONITE CHIPS	404	444	40	
SV SAMPLING ZONE	10/20 SILICA SAND	444	454	10	
SVSS 450	STAINLESS STEEL	449.5	450.5	1	/ 0.375
SEAL	BENTONITE CHIPS	454	494	40	
SV SAMPLING ZONE	10/20 SILICA SAND	494	507	13	
SVSS 500	STAINLESS STEEL	499.5	500.5	1	

Some well diagram info truncated due to numeric constraints.

Figure 5D-4. Soil-Vapor Monitoring Well Completion Information for TAV-SV03

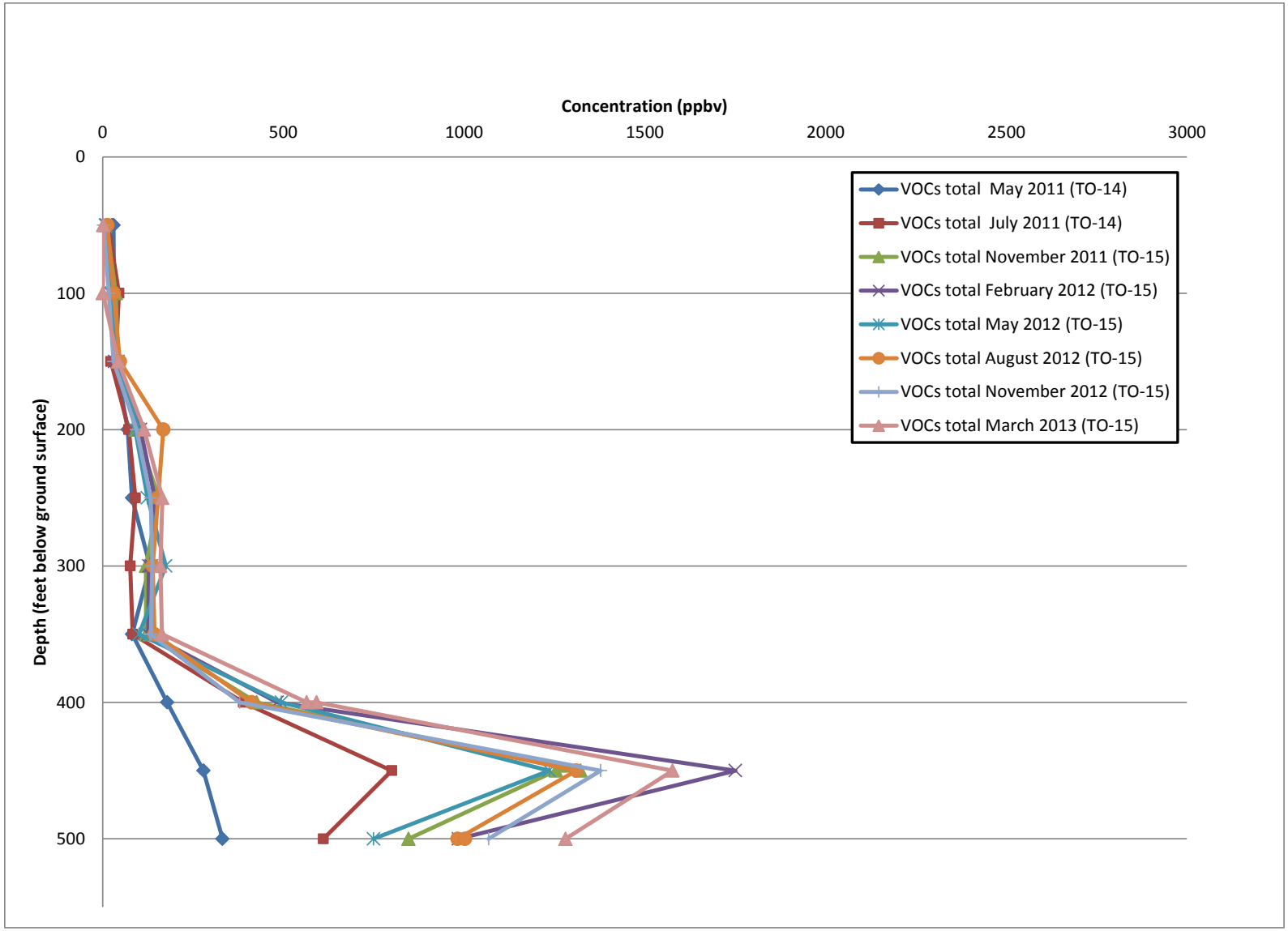


Figure 5D-5. TA-V Soil-Vapor Monitoring Total VOC Results (ppbv) at TAV-SV01

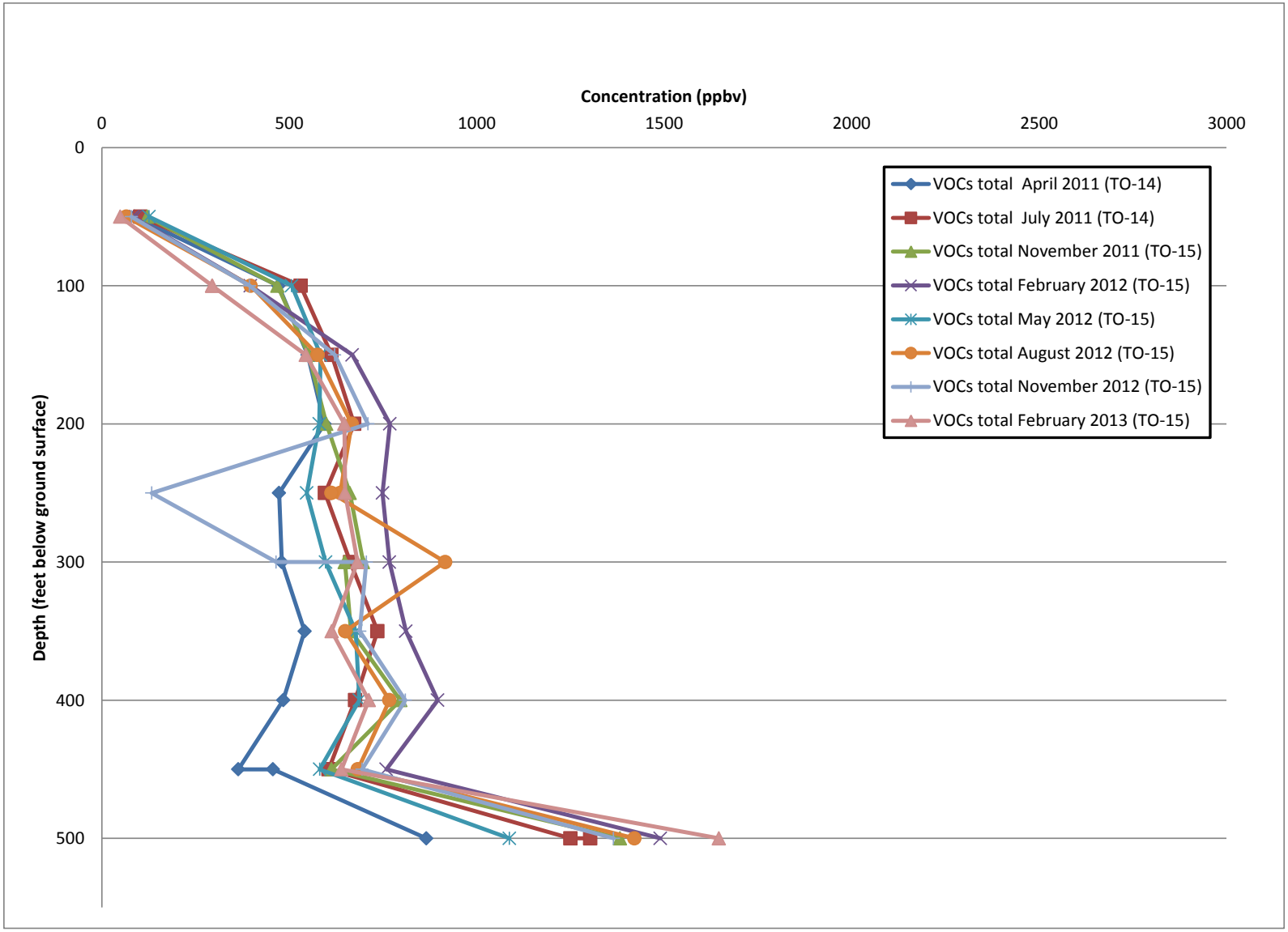


Figure 5D-6. TA-V Soil-Vapor Monitoring Total VOC Results (ppbv) at TAV-SV02

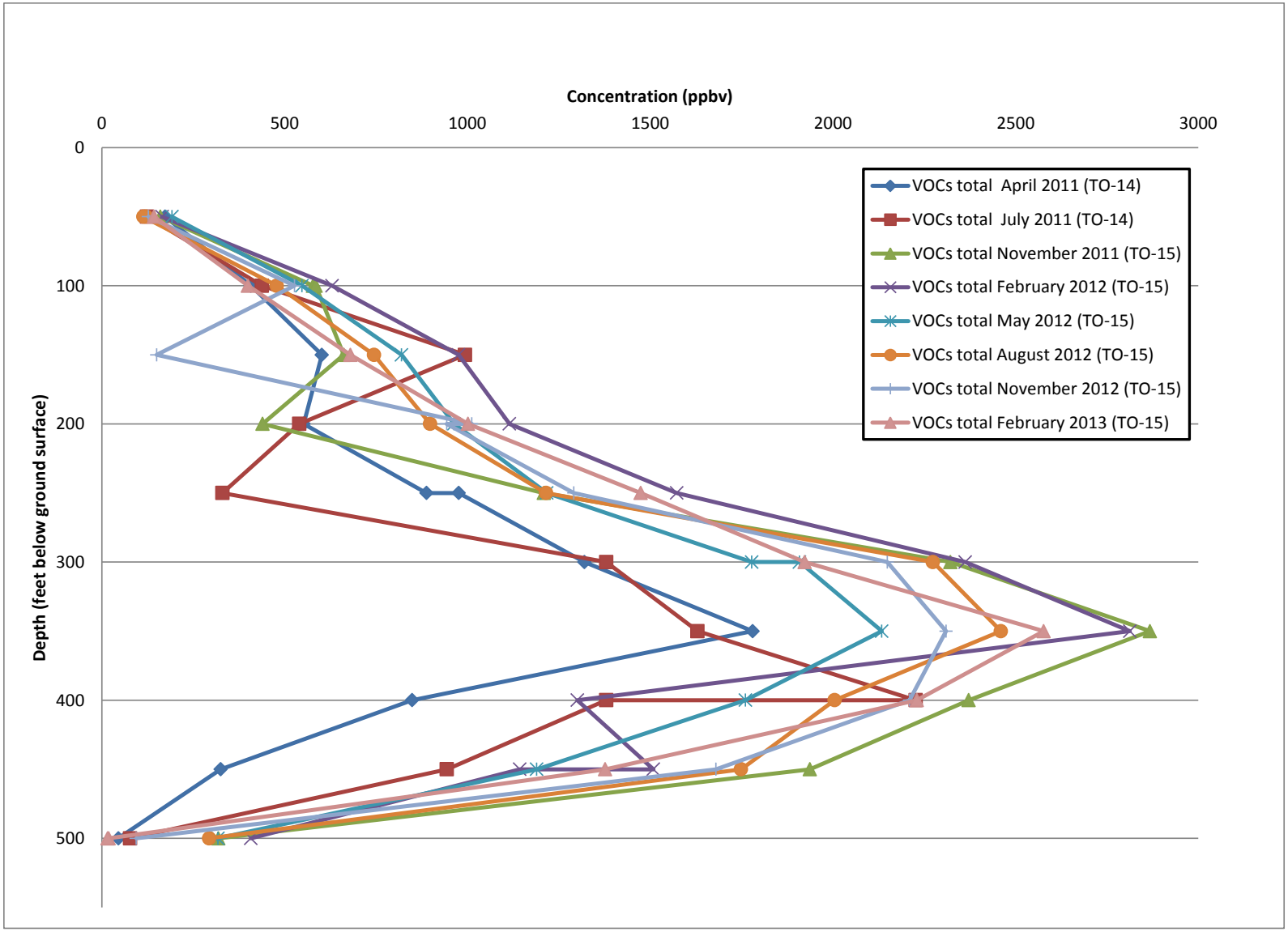


Figure 5D-7. TA-V Soil-Vapor Monitoring Total VOC Results (ppbv) at TAV-SV03

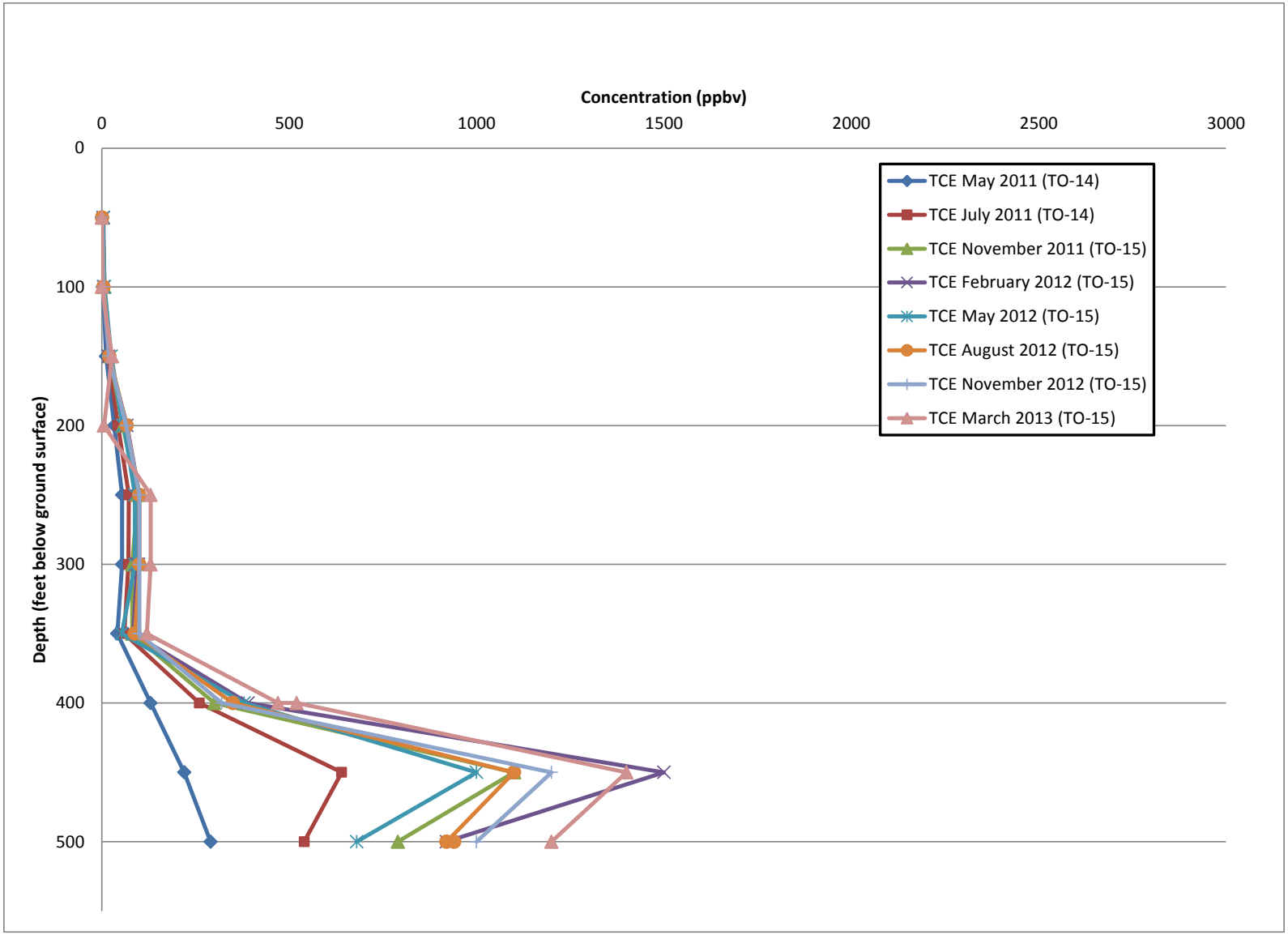


Figure 5D-8. TA-V Soil-Vapor Monitoring TCE Results (ppbv) at TAV-SV01

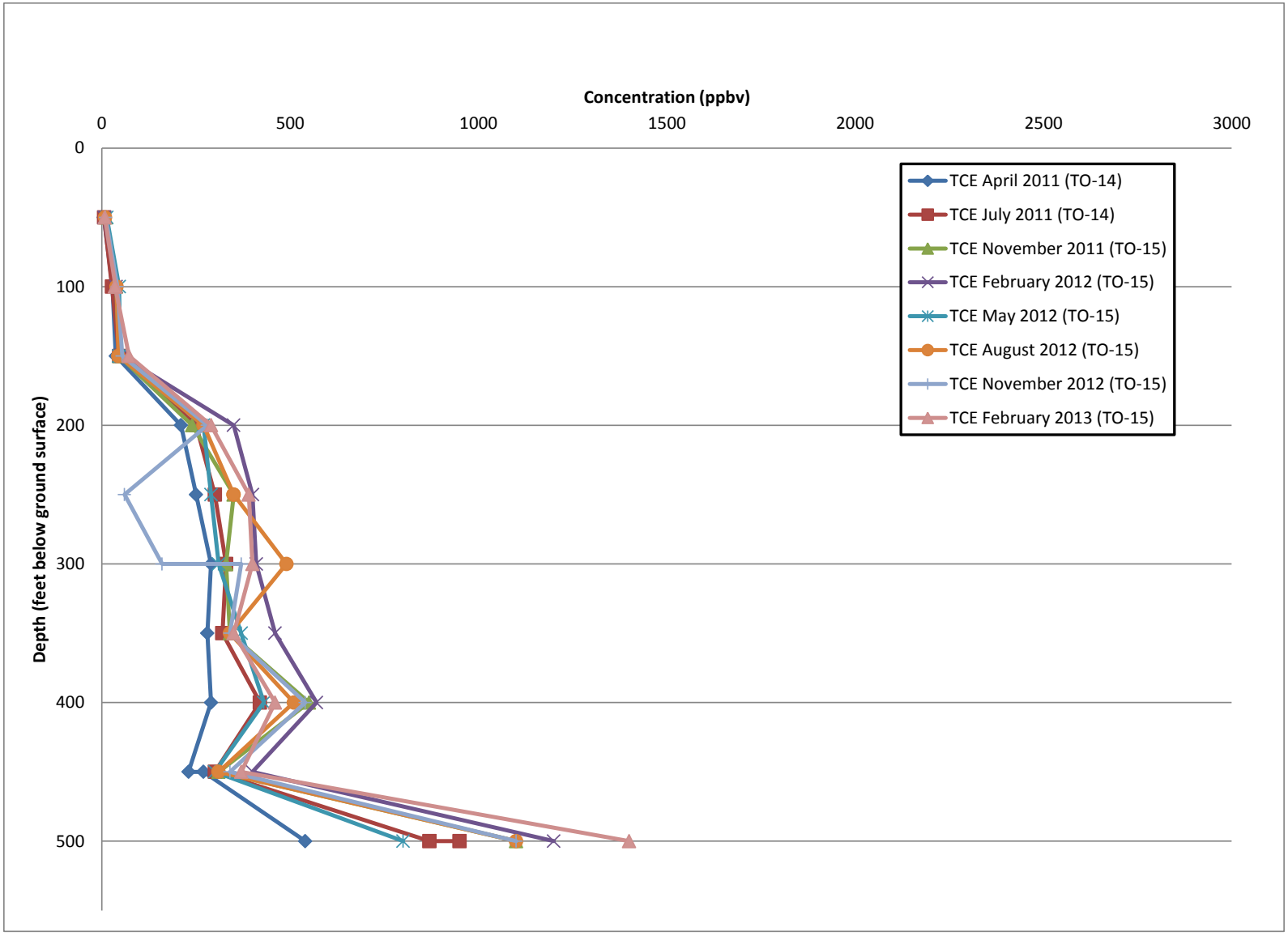


Figure 5D-9. TA-V Soil-Vapor Monitoring TCE Results (ppbv) at TAV-SV02

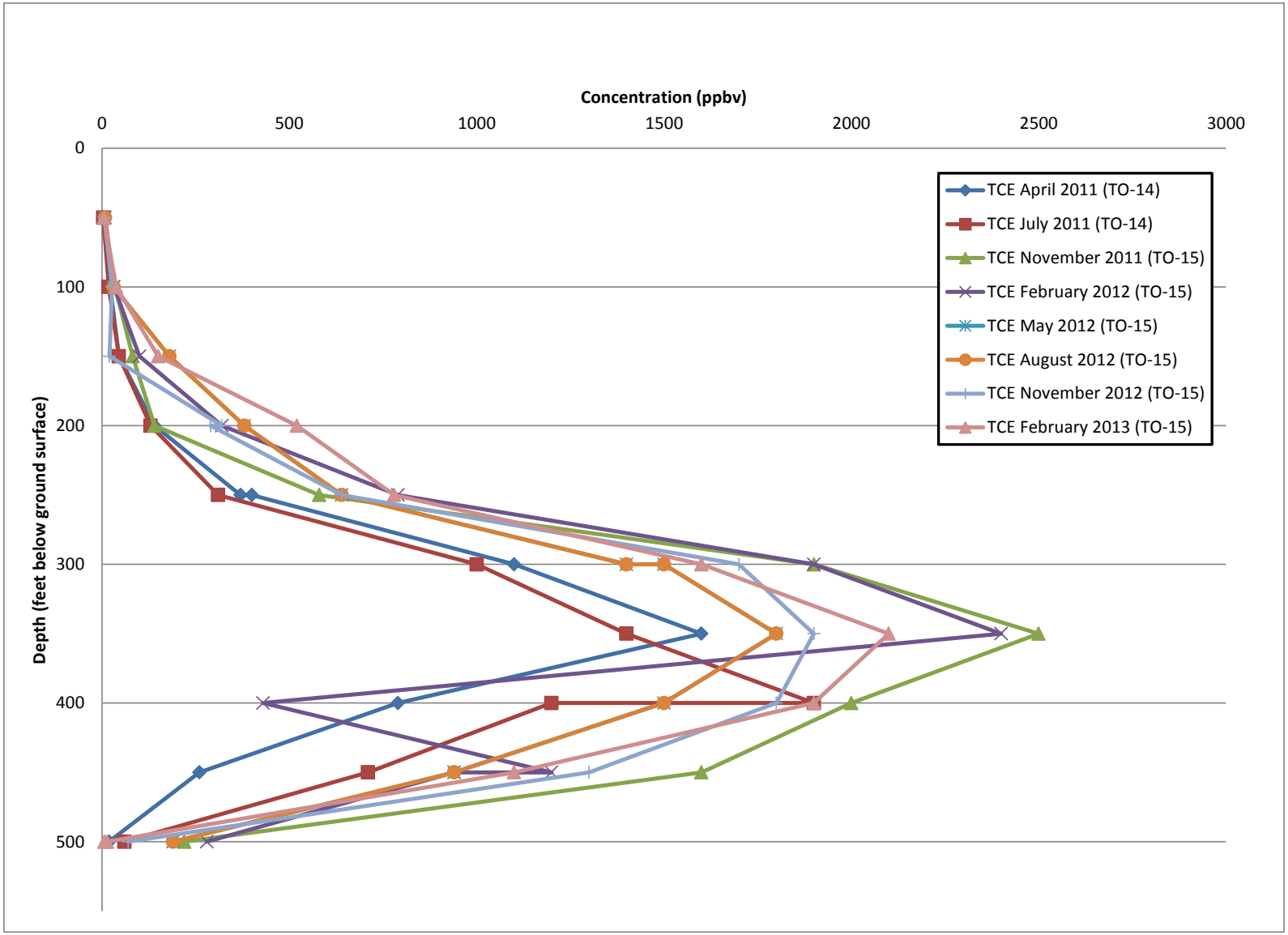


Figure 5D-10. TA-V Soil-Vapor Monitoring TCE Results (ppbv) at TAV-SV03

6.0 Tijeras Arroyo Groundwater Study Area

6.1 Introduction

Trichloroethene (TCE) and nitrate have been identified as constituents of concern (COCs) in groundwater at the Tijeras Arroyo Groundwater (TAG) Study Area (also referred to as "Tijeras Area Ground-Water Investigation Area of Concern") based on historical groundwater monitoring results. Detections of these two COCs exceed the U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) in groundwater samples collected from the TAG Study Area monitoring wells. Since August 1996, the historical maximum TCE concentration detected at the site has been 9.6 micrograms per liter (µg/L), and the maximum nitrate detection has been 49 milligrams per liter (mg/L). The EPA MCLs and State of New Mexico drinking water standards for TCE and nitrate are 5 µg/L and 10 mg/L (as nitrogen), respectively.

Characteristics of the TAG Study Area include concentrations of TCE below to just above the MCL at scattered locations in the perched groundwater system (PGWS) and concentrations of nitrate above the MCL at scattered locations in the PGWS and regional aquifer.

6.1.1 Location

The TAG Study Area encompasses approximately 40 square miles (sq mi) in the north-central portion of Kirtland Air Force Base (KAFB) (Figure 6-1). Three of the five Technical Areas (TAs) at Sandia National Laboratories, New Mexico (SNL/NM) are within the TAG Study Area. Together, the three TAs (TA-I, TA-II, and TA-IV) encompass approximately 641 acres. The SNL/NM facility is a government-owned, contractor-operated, multi-program laboratory overseen by the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) through the Sandia Field Office in Albuquerque, New Mexico. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM under Contract DE-AC04-94AL85000.

The parties identified as potentially responsible for groundwater contamination within the TAG area include the DOE/NNSA and its contractor Sandia, KAFB, the Albuquerque Bernalillo County Water Utility Authority (ABCWUA), and the City of Albuquerque (COA). KAFB controls facilities and properties with a variety of land uses along the north, west, south, and southeast boundaries of TA-I, TA-II, and TA-IV. The area located along the northern and western boundaries of the three TAs contains KAFB housing, office buildings, a fire station, training schools, machine workshops, storage yards, a detention facility, an electromagnetic research facility, and inactive sewage lagoons. Bordering the southern and southeastern edges of the three TAs are undeveloped open spaces, active landfills, closed landfills, emergency-response training areas, and the Tijeras Arroyo Golf Course. The COA residential areas are located along most of the northern boundary of KAFB and a major sanitary-waste line operated by ABCWUA trends along Tijeras Arroyo.

6.1.2 Site History

In early 1928, the first airport in Albuquerque was constructed where TA-I and TA-II are currently located. In the spring of 1946, during a dismantling operation, 2,250 military aircraft were dismantled adjacent to the taxiways. In July 1945, the "Z Division" of the Manhattan Engineers District, an extension of the original Los Alamos Laboratory, was established as the forerunner of SNL/NM. At that time, the primary mission of the Z Division was to provide engineering, production, stockpiling, and testing support for nuclear weapon components and systems. In the summer of 1949, the major weapons production was transferred to other manufacturing facilities and the early work at SNL/NM concentrated on prototype research and manufacturing of experimental devices. Since 1949, SNL/NM has grown from

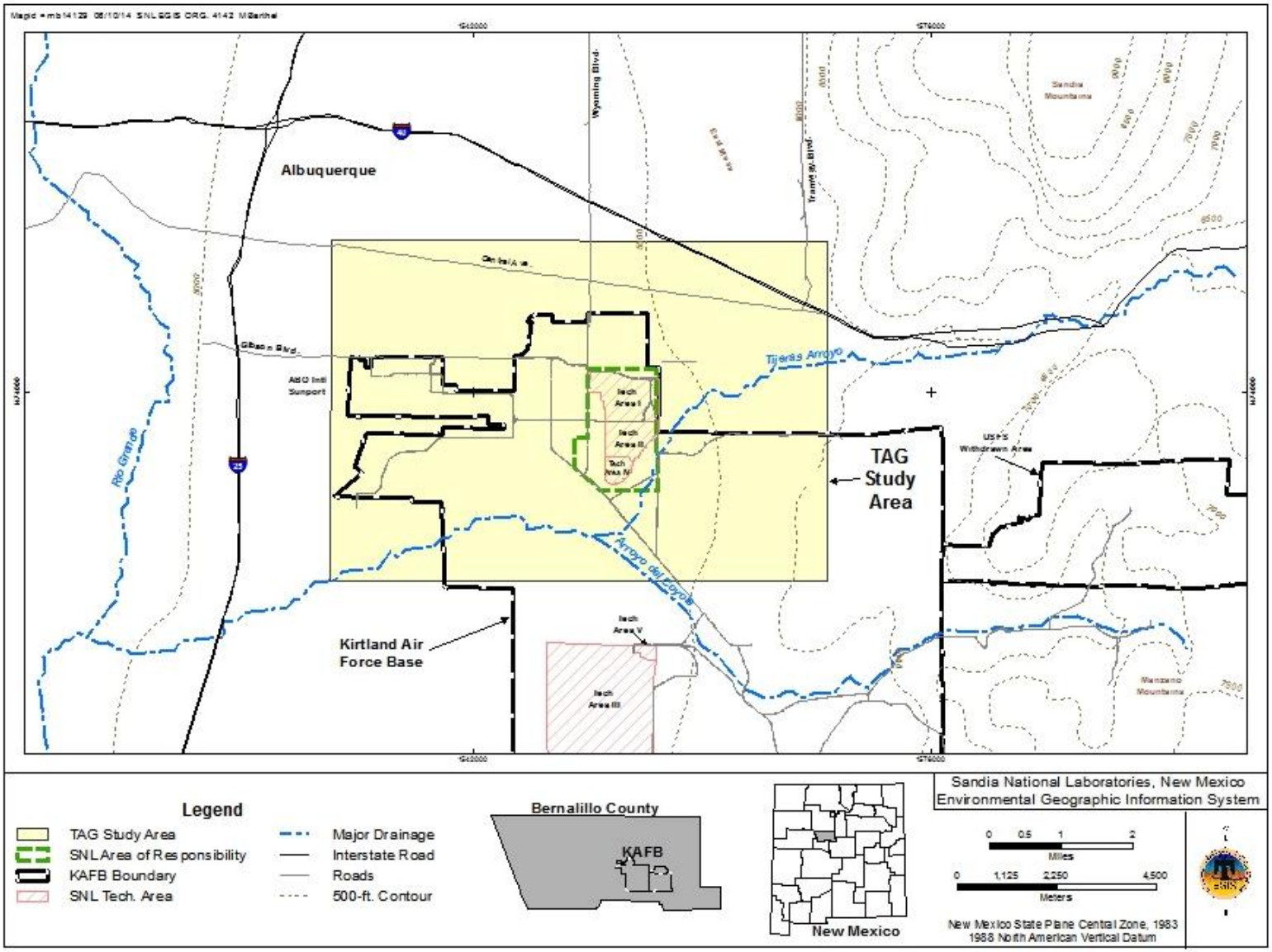


Figure 6-1. Location of the TAG Study Area

a factory-style ordnance facility to a national laboratory dedicated to research, development, and testing of both defense and nondefense components. The current work performed in TA-I, TA-II, and TA-IV can be divided into four main types: nuclear weapon, nonnuclear weapon, technical support, and special research and development. Numerous SNL/NM facilities may have potentially released hazardous materials to the soil and groundwater; however, the current research-oriented mission for most SNL/NM operations involves a diverse inventory of chemicals, which are generally stored and used indoors in small quantities.

SNL/NM Environmental Restoration (ER) Operations (formerly ER Project) has conducted numerous groundwater investigations in the TAG Study Area since 1992 (SNL November 2005) (Table 6-1). Many of these investigations were site-specific and conducted in support of various Solid Waste Management Unit (SWMU) assessments. Other investigations in the TAG Study Area were more regional studies conducted by the SNL/NM Site-Wide Hydrogeologic Characterization Project (SNL February 1998). Both KAFB and COA have also completed numerous groundwater investigations in the TAG Study Area, the results of which are presented in the *Tijeras Arroyo Groundwater Investigation Report* (SNL November 2005).

6.1.3 Monitoring History

Investigations of groundwater quality in the TAG Study Area have been conducted by SNL/NM personnel over the past 20 years (Table 6-1). In 1992, SNL/NM personnel began to investigate groundwater quality as part of the overall TA-II investigation of the regional aquifer with the installation of three groundwater monitoring wells. During this initial investigation, the PGWS was discovered at a depth of approximately 320 feet (ft) below ground surface (bgs). In October 1994, the analytical results for a groundwater sample from the PGWS showed TCE at a concentration of 1 µg/L, which prompted SNL/NM personnel to further investigate groundwater contamination in the study area.

Beginning in October 2000, meetings of the TAG High Performing Team (HPT) served as a forum for discussing TAG issues. During these meetings, members of the HPT (staff from SNL/NM, KAFB, COA, the New Mexico Environment Department [NMED], and EPA) debated the validity of using groundwater analytical results previously collected using low-flow sampling devices. Based on the perceived inadequacy of the sampling method, TAG quarterly groundwater sampling was temporarily suspended by SNL/NM personnel until an alternative sampling method could be implemented. In June 2003, DOE/NNSA and Sandia submitted the *Tijeras Arroyo Groundwater Investigation Work Plan* (SNL June 2003) to the NMED. The work plan presented a comprehensive scope of work for groundwater investigations that are being jointly conducted by SNL/NM personnel, KAFB, and COA. Based on the requirements of the work plan, SNL/NM personnel resumed quarterly groundwater sampling in July 2003 using conventional groundwater purging/sampling techniques. The NMED approved the TAG Investigation Work Plan in September 2003 (NMED September 2003).

Since initial discoveries of TCE and nitrate at the TAG Study Area, numerous characterization activities have been conducted (Table 6-1). Results of these characterization activities are summarized in the *Tijeras Arroyo Groundwater Investigation Report* (SNL November 2005). The November 2005 report presents a conceptual model that provides a comprehensive list of groundwater monitoring data sources used to support the investigations.

In April 2004, the Compliance Order on Consent (the Order) became effective between the DOE, Sandia, and the NMED, and the Order specifies TAG as an area of groundwater contamination (NMED April 2004). In response to the Order, DOE/Sandia submitted the *Tijeras Arroyo Groundwater Corrective Measures Evaluation Work Plan* to the NMED in July 2004 (SNL July 2004). After fulfilling the requirements of the Corrective Measures Evaluations (CME) Work Plan, DOE/Sandia submitted the CME Report to the NMED (SNL August 2005).

Table 6-1. Historical Timeline of the TAG Study Area

Month	Year	Event	Reference
November–July	1992–1993	SNL/NM personnel began investigation of TA-II groundwater. PGWS discovered as first wells were installed (TA2-SW1-320, TA2-NW1-325, and TA2-NW1-595).	SNL March 1995a
March	1994	Groundwater sampling analytical results for TA-II wells reported in the Calendar Year (CY) 1993 SNL/NM Annual Groundwater Monitoring Report.	SNL March 1994
March–July	1994	Installed monitoring wells TA2-W-01 and TJA-2.	SNL March 1995a
October	1994	Analytical results for groundwater sampling first detected TCE.	SNL March 1996a
March	1995	Groundwater sampling analytical results for TA-II wells reported in the CY 1994 SNL/NM Annual Groundwater Monitoring Report.	SNL March 1995b
August–September	1995	Installed monitoring wells WYO-1, WYO-2, and PGS-2.	SNL March 1996b
November	1995	Analytical results for groundwater sampling first detected TCE above the EPA MCL of 5 µg/L.	SNL March 1996b
November	1995	Installed monitoring well TA2-W-19.	SNL March 1996b
March	1996	Groundwater sampling analytical results for TA-II wells reported in the CY 1995 SNL/NM Annual Groundwater Monitoring Report.	SNL March 1996a
March	1996	Sandia North Groundwater Investigation Plan submitted to the NMED.	SNL March 1996b
September	1996	Shallow Water-Bearing Zone Hydrologic Evaluation prepared.	Wolford September 1996
November	1996	Pressure transducer program initiated for select monitoring wells.	SNL March 1998a
November–December	1996	Installed TA-II soil-vapor monitoring wells TA2-VW-20 and TA2-VW-21.	IT January 1997
March	1997	Groundwater sampling analytical results for Sandia North wells in TA-I and TA-II reported in the CY 1996 SNL/NM Annual Groundwater Monitoring Report.	SNL March 1997
March	1997	Sandia North Geological Investigation Project Report prepared.	Fritts and Van Hart March 1997
March–April	1997	Installed monitoring wells TAI-W-01 and TA2-W-25.	SNL March 1998a
August	1997	Borehole geophysical investigation (electromagnetic induction, neutron, and natural gamma) completed on 21 SNL/NM and KAFB monitoring wells.	SNL March 1998a
January–February	1998	Installed monitoring wells TAI-W-02, TAI-W-03, TAI-W-06, TA2-W-24, TA2-W-26, and TA2-W-27.	SNL June 2000
March	1998	Groundwater sampling analytical results for Sandia North wells in TA-I and TA-II reported in the CY 1997 SNL/NM Annual Groundwater Monitoring Report.	SNL March 1998b
March	1998	Fiscal Year (FY) 1997 Sandia North Groundwater Investigation Annual Report submitted to the NMED.	SNL March 1998a
August–December	1998	Installed monitoring wells TAI-W-04, TAI-W-05, TAI-W-07, TJA-3, TJA-4, and TJA-5.	SNL June 2000
March	1999	Groundwater sampling analytical results for Sandia North wells in TA-I and TA-II reported in the FY 1998 SNL/NM Annual Groundwater Monitoring Report.	SNL March 1999
May–June	1999	Colloidal borescope investigation performed on 18 SNL/NM and KAFB monitoring wells.	AquaVISION July 1999
October	1999	Analysis of the USGS aeromagnetic survey performed to revise the interpretation of the SNL/NM and KAFB area geologic structure.	Van Hart et al. October 1999
March	2000	Groundwater sampling analytical results for Sandia North wells in TA-I and TA-II reported in the FY 1999 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2000
June	2000	FY 1998 Sandia North Groundwater Investigation Annual Report submitted to the NMED.	SNL June 2000

Table 6-1. Historical Timeline of the TAG Study Area *(Continued)*

Month	Year	Event	Reference
October	2000	TAG High Performing Team convened for the first time.	SNL June 2003
December	2000	Project name changed from the Sandia North to the Tijeras Arroyo Groundwater Investigation.	Collins December 2000
January–March	2001	Installed groundwater monitoring wells TJA-6 and TJA-7, and soil-vapor monitoring wells 46-VW-01, 46-VW-02, and 227-VW-01.	SNL November 2002
February	2001	Preliminary model of the PGWS updated.	BGW February 2001
April	2001	Groundwater sampling analytical results for TAG wells reported in the FY 2000 SNL/NM Annual Groundwater Monitoring Report.	SNL April 2001
June	2001	Geologic model of the PGWS updated.	Van Hart June 2001
July	2001	Monitoring wells WYO-1 and WYO-2 plugged and abandoned, replaced by WYO-3 and WYO-4.	SNL June 2003
October	2001	Monitoring well TA1-W-08 installed.	SNL November 2002
March	2002	Groundwater sampling analytical results for TAG wells reported in the FY 2001 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2002
November	2002	TAG Continuing Investigation Report submitted to the NMED.	SNL November 2002
March	2003	Groundwater sampling analytical results for TAG wells reported in the FY 2002 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2003
June	2003	Subsurface geology at KAFB, including the TAG area, updated.	Van Hart June 2003
June	2003	TAG Investigation Work Plan submitted to the NMED.	SNL June 2003
September	2003	TAG Investigation Work Plan approved by the NMED.	NMED September 2003
December–January	2003–2004	Slug (hydraulic conductivity) tests at groundwater monitoring wells were performed.	Collins May 2004
March	2004	Groundwater sampling analytical results for TAG wells reported in the FY 2003 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2004
April	2004	The Compliance Order on Consent (the Order) identified TAG as an area with groundwater contamination requiring a CME.	NMED April 2004
July	2004	TAG CME Work Plan submitted to the NMED.	SNL July 2004
July-August	2004	Soil-vapor monitoring wells TAG-SV-01 through TAG-SV-05 installed.	SNL November 2005
October	2004	TAG CME Work Plan for the SNL/NM Area of Responsibility approved by the NMED.	NMED October 2004
September	2005	CME Report for TAG submitted to NMED.	SNL August 2005
October	2005	Groundwater sampling analytical results for TAG wells reported in the FY 2004 SNL/NM Annual Groundwater Monitoring Report.	SNL October 2005
November	2005	TAG Investigation Report submitted to the NMED.	SNL November 2005
November	2006	Groundwater sampling analytical results for TAG wells reported in the FY 2005 SNL/NM Annual Groundwater Monitoring Report.	SNL November 2006
March	2007	Groundwater sampling analytical results for TAG wells reported in the FY 2006 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2007
March	2008	Groundwater sampling analytical results for TAG wells reported in the FY 2007 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2008
August	2008	NMED issues Notice of Disapproval on November 2005 TAG Investigation Report.	NMED August 2008
February	2009	DOE/NNSA and Sandia submit Response to NMED's August 2008 Notice of Disapproval on November 2005 TAG Investigation Report.	SNL February 2009

Table 6-1. Historical Timeline of the TAG Study Area *(Concluded)*

Month	Year	Event	Reference
June	2009	Groundwater sampling analytical results for TAG wells reported in the CY 2008 SNL/NM Annual Groundwater Monitoring Report.	SNL June 2009
April	2009	NMED requires characterization of perchlorate in groundwater in five wells in the TAG Study Area.	NMED April 2009
August	2009	NMED issues Second Notice of Disapproval on November 2005 TAG Investigation Report.	NMED August 2009
January	2010	DOE/NNSA and Sandia submit Response to NMED's August 2009 Second Notice of Disapproval on November 2005 TAG Investigation Report	SNL January 2010
February	2010	NMED issues Notice of Approval for the November 2005 TAG Investigation Report.	NMED February 2010
October	2010	Groundwater sampling analytical results for TAG wells reported in the CY 2009 SNL/NM Annual Groundwater Monitoring Report.	SNL October 2010
September	2011	Groundwater sampling analytical results for TAG wells reported in the CY 2010 SNL/NM Annual Groundwater Monitoring Report.	SNL September 2011
September	2012	Groundwater sampling analytical results for TAG wells reported in the CY 2011 SNL/NM Annual Groundwater Monitoring Report.	SNL September 2012
September	2013	Groundwater sampling analytical results for TAG wells reported in the CY 2012 SNL/NM Annual Groundwater Monitoring Report.	SNL September 2013

NOTES:
µg/L = Microgram(s) per liter.
BGW = Balleau Groundwater, Inc.
CME = Corrective Measures Evaluation.
CY = Calendar Year.
DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
FY = Fiscal Year.
IT = IT Corporation.
KAFB = Kirtland Air Force Base.
MCL = Maximum Contaminant Level.
NMED = New Mexico Environment Department.
NNSA = National Nuclear Security Administration.
PGWS = Perched Groundwater System.
Sandia = Sandia Corporation.
SNL = Sandia National Laboratories.
SNL/NM = Sandia National Laboratories, New Mexico.
TA = Technical Area.
TAG = Tijeras Arroyo Groundwater.
TCE = Trichloroethene.
USGS = U.S. Geological Survey.

Table XI-1 of the Order (NMED April 2004) specifies the minimum sampling frequency for the groundwater monitoring and sampling schedule for TAG as: "Six events – after the TAG HPT Characterization Plans approved by the Department and starting no later than first quarter of Calendar Year 2004 . . . ." The six quarterly sampling events required by the work plan were completed at the end of Fiscal Year 2005. Having fulfilled these requirements, DOE/NNSA and Sandia have continued groundwater monitoring and TAG wells have been sampled quarterly, semiannually, or annually. All sampling continues to follow the procedures outlined in the NMED-approved work plan (SNL June 2003).

6.1.4 Current Monitoring Network

Currently, 21 wells in the TAG Study Area are monitored for water quality, and 30 wells are monitored for water levels (Figure 6-2; Table 6-2). Two groundwater systems are present in the TAG Study Area: the PGWS at approximately 220 to 330 ft bgs, and the regional aquifer at approximately 440 to 570 ft bgs. Groundwater monitoring wells are completed in either the PGWS or the regional aquifer (Table 6-2).

6.1.5 Summary of Calendar Year 2013 Activities

The following activities took place for the TAG investigation during Calendar Year (CY) 2013:

- Quarterly or annual water level measurements were obtained from TAG wells.
- Quarterly groundwater sampling events were conducted at seven wells (TA2-SW1-320, TA2-W-19, TA2-W-26, TJA-2, TJA-4, TJA-7, and WYO-4) in March, June, August/September, and November 2013 (SNL February 2013, May 2013, July 2013, and October 2013). The sampling frequency for monitoring well TJA-3 was modified to quarterly sampling in November 2013.
- Semiannual groundwater sampling was conducted at four wells (TA2-W-01, TA2-W-27, TJA-3, and TJA-6) in March 2013 and August/September 2013 (SNL February 2013 and July 2013).
- Annual groundwater sampling was conducted at 10 wells (PGS-2, TA1-W-01, TA1-W-02, TA1-W-03, TA1-W-04, TA1-W-05, TA1-W-06, TA1-W-08, TA2-NW1-595, and WYO-3) in August/September 2013 (SNL July 2013).
- Tables of analytical results (Attachment 6A), concentration versus time graphs (Attachment 6B), and hydrographs (Attachment 6C) were prepared in support of this report.

6.1.6 Summary of Future Activities

The following activities are anticipated for the TAG investigation during the next reporting period (CY 2014):

- Quarterly or annual water level measurements for TAG wells.
- Quarterly groundwater sampling at eight wells: TA2-SW1-320, TA2-W-19, TA2-W-26, TJA-2, TJA-4, TJA-3, TJA-7, and WYO-4.
- Semiannual groundwater sampling at four wells: TA1-W-06, TA2-W-01, TA2-W-27, and TJA-6.
- Annual groundwater sampling at nine wells: PGS-2, TA1-W-01, TA1-W-02, TA1-W-03, TA1-W-04, TA1-W-05, TA1-W-08, TA2-NW1-595, and WYO-3.

6.1.7 Conceptual Model

Two groundwater systems are present in the TAG Study Area: the PGWS at approximately 220 to 330 ft bgs, and the regional aquifer at approximately 440 to 570 ft bgs. The uppermost saturated interval of the PGWS is between 10 and 30 ft in thickness. Groundwater in the PGWS moves toward the southeast and is assumed to merge with the underlying regional aquifer southeast of Tijeras Arroyo. Figure 6-3 presents a diagram of the TAG conceptual model.

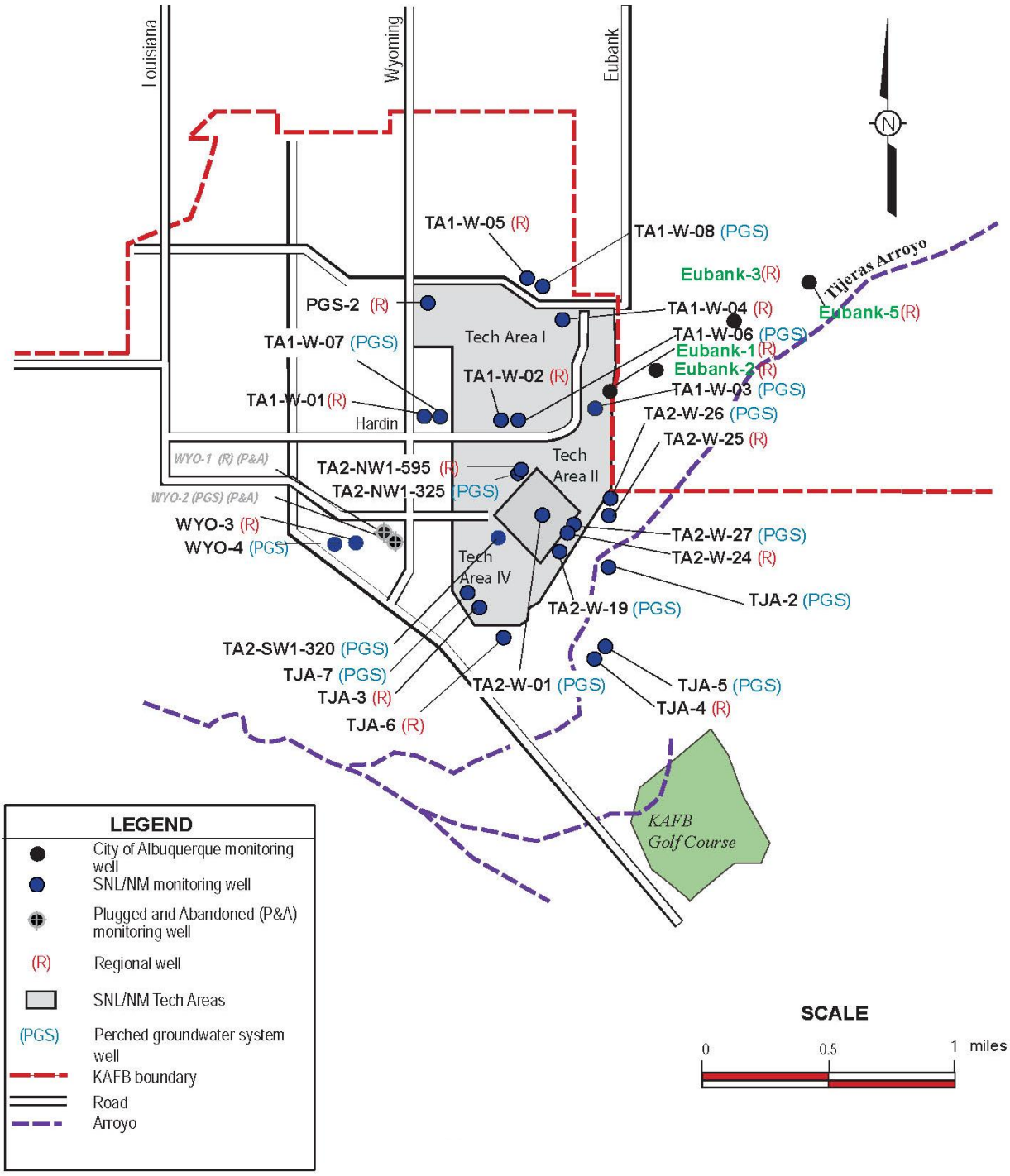


Figure 6-2. Tijeras Arroyo Groundwater (TAG) Investigation Monitoring Well Locations

Table 6-2. Groundwater Monitoring Wells in the TAG Study Area

Well	Installation Year	WQ	WL	Comments
Eubank-1	1988		✓	Regional aquifer (COA well)[a]
Eubank-2	1997		✓	Regional aquifer (COA well)[a]
Eubank-3	1997		✓	Regional aquifer (COA well)[a]
Eubank-5	1997		✓	Regional aquifer (COA well)[a]
PGS-2	1995	✓	✓	Regional aquifer
TA1-W-01	1997	✓	✓	Regional aquifer
TA1-W-02	1998	✓	✓	Regional aquifer
TA1-W-03	1998	✓	✓	PGWS
TA1-W-04	1998	✓	✓	Regional aquifer
TA1-W-05	1998	✓	✓	Regional aquifer
TA1-W-06	1998	✓	✓	PGWS
TA1-W-07	1998		✓	PGWS
TA1-W-08	2001	✓	✓	PGWS
TA2-NW1-595	1993	✓	✓	Regional aquifer
TA2-NW1-325	1993		✓	PGWS
TA2-SW1-320	1992	✓	✓	PGWS
TA2-W-01	1994	✓	✓	PGWS
TA2-W-19	1995	✓	✓	PGWS
TA2-W-24	1998		✓	Regional aquifer
TA2-W-25	1997		✓	Regional aquifer
TA2-W-26	1998	✓	✓	PGWS
TA2-W-27	1998	✓	✓	PGWS
TJA-2	1994	✓	✓	PGWS
TJA-3	1998	✓	✓	Regional aquifer
TJA-4	1998	✓	✓	Regional aquifer
TJA-5	1998		✓	PGWS
TJA-6	2001	✓	✓	Regional aquifer
TJA-7	2001	✓	✓	PGWS
WYO-3	2001	✓	✓	Regional aquifer
WYO-4	2001	✓	✓	PGWS

NOTES: Check marks in the WQ and WL columns indicate WQ sampling and WL measurements were obtained during this reporting period.

[a]WL data for Eubank-2, Eubank-3, and Eubank- 5 provided by Environmental Service Division of the City of Albuquerque Environmental Health Department.

COA = City of Albuquerque.
PGWS = Perched Groundwater System.
TAG = Tijeras Arroyo Groundwater.
WL = Water level.
WQ = Water quality.

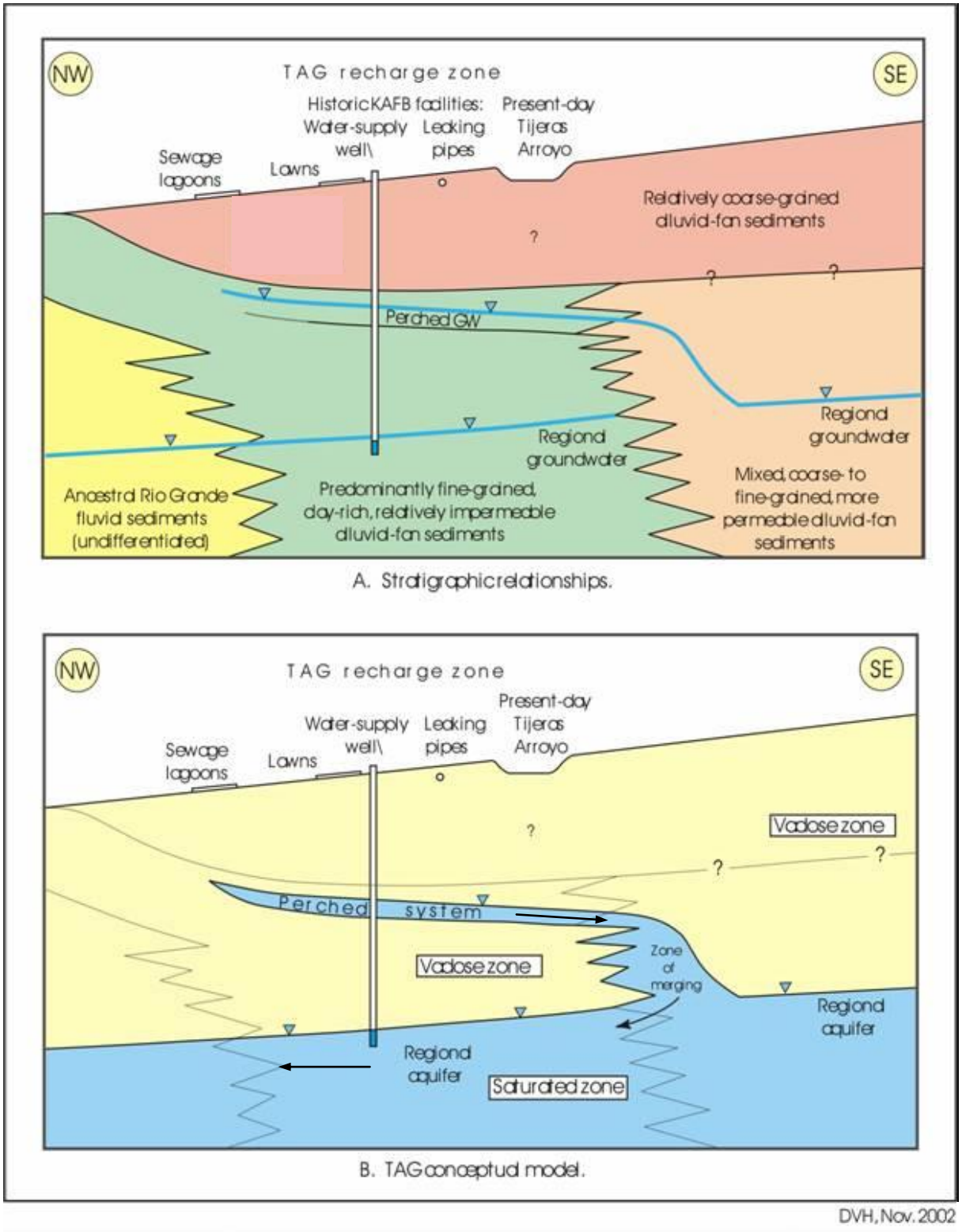


Figure 6-3. TAG Conceptual Model Illustration (Van Hart June 2003)

Data pertaining to the hydrogeologic setting have been synthesized into the TAG conceptual model. The hydrogeologic setting for the TAG Study Area is well understood and based on a significant number of monitoring wells. Groundwater occurs in both the PGWS and regional aquifer. However, the PGWS has a limited lateral extent that encompasses approximately 3.8 sq mi of north-central KAFB. The PGWS may extend northward across the KAFB boundary. In the TAG Study Area, the depth to groundwater for the PGWS ranges from 220 to 330 ft bgs. The uppermost saturated zone in the PGWS varies from approximately 10 to 30 ft in thickness, depending on the well location. Borehole geophysical surveys indicate that a few relatively damp intervals are present below the uppermost saturated zone, but borehole-yield testing has revealed that most of these deeper intervals are too thin or permeable to yield sufficient volumes of water for the construction of monitoring wells. The PGWS is not used as a potable water supply source.

The direction of groundwater flow in the PGWS is to the southeast. Groundwater flows through low-yield, alluvial-fan sediments with an average hydraulic gradient of approximately 0.007 feet per foot (ft/ft). Groundwater elevations in the PGWS are decreasing in the northwestern portion of the study area, but are increasing in the southeastern area. The PGWS is recharged by both artificial (leaking water supply/sewer lines and previously by the former KAFB sewage lagoons) and natural sources (Tijeras Arroyo and possibly ancestral Tijeras Creek). Principal hydrogeologic controls on the PGWS include eastward bedding-plane dip attributed to the western limb of an inferred syncline; stratigraphic variations (i.e., braided paleochannels); and multiple recharge locations in the northwestern portion of the TAG Study Area.

Multiple overlapping lenses and layers of low conductivity, mostly unsaturated sediments, serve as a perching horizon beneath the PGWS. Beneath the central TAG Study Area, a layer of approximately 180 to 280 ft of these unsaturated sediments separates the PGWS from the regional aquifer. Groundwater in the PGWS merges with the regional aquifer southeast of Tijeras Arroyo where the alluvial-fan sediments are slightly more permeable.

The regional aquifer is more laterally extensive than the PGWS, underlying the entire TAG Study Area as well as the Albuquerque Basin. Across the TAG Study Area, the depth to the regional aquifer ranges from approximately 440 to 570 ft bgs. The regional aquifer is composed of both the Ancestral Rio Grande (ARG) fluvial lithofacies and the alluvial-fan lithofacies. Locally, groundwater in the regional aquifer flows to the northwest, in a nearly opposite direction to that of the PGWS. The gradient in the regional aquifer averages approximately 0.018 ft/ft across the TAG Study Area, but is steeper near water-supply wells operated by KAFB, the ABCWUA, and the Veterans Administration (VA). The regional aquifer is recharged on the eastern side of the study area by natural sources including mountain-front flow, Tijeras Arroyo, and the PGWS. The mounding shown on the base-wide potentiometric surface map (Plate 1), approximately 1 mile east of TA-II, indicates that underflow along Tijeras Arroyo is most likely recharging the regional aquifer to some degree. Groundwater elevations in the regional aquifer are influenced by water-supply pumping. Seasonal pumping variations cause sporadic water-level fluctuations in some monitoring wells near the water-supply wells. The principal hydrogeologic control upon groundwater flow direction in the regional aquifer is the combined drawdown effect of the KAFB, ABCWUA, and VA water-supply wells.

The aqueous geochemical signatures of the PGWS and the regional aquifer are distinctive. The geochemical signature of the PGWS varies slightly between well locations, but tends to exhibit higher concentrations of calcium, sulfate, and chloride than those for the regional aquifer. Groundwater in the regional aquifer exhibits higher bicarbonate/alkalinity concentrations.

6.1.7.1 Regional Hydrogeologic Conditions

Tijeras Arroyo is the most significant surface-water drainage feature on KAFB and trends southwest across KAFB and eventually drains into the Rio Grande, approximately 3 miles west of KAFB. Surface water flows in the arroyo several times per year as a result of significant thunderstorms. The average annual precipitation for the area, as measured at Albuquerque International Sunport, is 8.2 inches (SNL February 2001). During most rainfall events, rainfall quickly infiltrates into the soil in the study area. However, virtually all of the moisture subsequently undergoes evapotranspiration. Estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL February 1998).

The TAG Study Area overlies the eastern margin of the Albuquerque Basin where the basin-bounding faults mostly trend parallel to the Sandia-Manzanita-Manzano mountain front. The stratigraphic unit of greatest interest is the Upper Santa Fe Group, which is primarily composed of two interfingering lithofacies: an alluvial-fan lithofacies and the ARG fluvial lithofacies. Both lithofacies are less than 5 Mega Annum (Ma) and are composed of unconsolidated to poorly cemented gravel, sand, silt, and clay (Stone et al. February 2000). The alluvial-fan lithofacies consists of poorly sorted piedmont-slope deposits derived from the Sandia, Manzanita, and Manzano Mountains east of the study area. Fine-grained units within the alluvial-fan lithofacies produce low-permeability zones that are capable of perching groundwater. The ARG fluvial lithofacies is derived from northern sources and is typically well sorted and medium- to coarse-grained.

6.1.7.2 Hydrologic Conditions at the TAG Study Area

The thickness of the vadose zone is reduced in the central portion of the TAG Study Area where the PGWS is present. Discontinuous, yet overlapping multiple lenses of unsaturated alluvial-fan sediments serve as a perching horizon beneath the PGWS in that area. The PGWS is present at approximately 220 to 330 ft bgs, and the regional aquifer system is present at approximately 440 to 570 ft bgs. Groundwater in the PGWS most likely merges with the regional aquifer southeast of Tijeras Arroyo where the alluvial-fan sediments are slightly more permeable.

A comparison of aquifer characteristics for the PGWS and the regional aquifer in the TAG Study Area is provided in Table 6-3. The PGWS covers approximately 3.8 sq mi. Monitoring wells bound the PGWS on the western and southern margins. The northern margin of the PGWS has not been fully defined and may extend across the northern KAFB boundary (Figure 6-1). A southeastern margin is not discernible because the PGWS merges with the regional aquifer. The direction of groundwater flow in the PGWS is inferred to be principally to the southeast, with an average horizontal gradient of approximately 0.007 ft/ft. The horizontal gradient of the PGWS is variable across the TAG Study Area (Figure 6-4). Beneath TA-I, TA-II, and TA-VI, the horizontal gradient varies from 0.005 to 0.017 ft/ft. The horizontal gradient is steeper east of TA-II at 0.04 ft/ft. The vertical gradient is approximately 0.95 ft/ft over most of the PGWS, and continuous vertical flow is suggested by the merging of the two groundwater systems to the southeast.

6.1.7.3 Local Direction of Flow

Figure 6-4 presents the October 2013 potentiometric surface for the PGWS. The direction of groundwater flow in the PGWS is toward the southeast. The average horizontal gradient of the PGWS is approximately 0.007 ft/ft. Historically, water levels in the PGWS have fluctuated across the study area (SNL November 2005). In the vicinity of the former sewage lagoons, water levels have been declining since 1987, apparently in response to the lagoons being removed from service. Conversely, water levels have increased southeast of Tijeras Arroyo in some regional aquifer monitoring wells in response to ongoing water operations (BGW February 2001) (Attachment 6C, Figures 6C-6).

Table 6-3. Comparison of the Perched Groundwater System and the Regional Aquifer in the Tijeras Arroyo Groundwater Study Area (SNL November 2005)

Characteristic	PGWS	Regional Aquifer
Pressure Head	Unconfined (water table) conditions.	Unconfined to semi-confined conditions.
Lithofacies Distribution	Restricted to the alluvial-fan lithofacies.	Contained within both the alluvial-fan lithofacies and the ARG fluvial lithofacies.
Flow Direction	Primarily to the southeast.	Primarily to the northwest.
Horizontal Gradient	Approximate average of 0.007 ft/ft.	Approximate average of 0.018 ft/ft, but steeper near water-supply wells.
Flow velocities	4 to 10 ft/yr, laterally.	4 to 10 ft/yr, laterally.
Usage	Not used for water supply purposes.	Utilized for water supply by KAFB, ABCWUA, and VA.
Lateral extent	Limited lateral extent across north-central KAFB.	Laterally extensive across the Albuquerque Basin.
Saturated Thickness	Uppermost saturated interval only about 10 to 30 ft in thickness.	In excess of 1,000 ft in thickness across much of the study area.
Geochemical Variability	Geochemical signatures variable between monitoring wells.	Geochemical signatures consistent between monitoring wells.
Geochemical Uniqueness	High chloride, nitrate, and sulfate concentrations.	Low calcium concentrations, but high bicarbonate/alkalinity concentrations.
Water levels	Steadily declining water levels in the northwest, but increasing in the southeast part of the TAG Study Area.	Increasing water levels in the north, declining water levels in the center, and increasing in the southeastern part of the TAG Study Area.
Recharge	Recharged by both anthropogenic (leaking water supply/sewer lines, irrigated lawns, Tijeras Arroyo Golf Course), and natural sources, such as Tijeras Arroyo.	Recharged by natural sources including mountain front flow, the PGWS, and Tijeras Arroyo.
Principal Hydrologic Controls	Stratigraphic variations such as multiple overlapping lenses; several recharge locations; stratigraphic dip of the alluvial-fan sediments.	Combined drawdown of KAFB, ABCWUA, and VA water-supply wells.

NOTES:
ABCWUA = Albuquerque Bernalillo County Water Utility Authority.
ARG = Ancestral Rio Grande (lithofacies).
ft = Foot (feet).
ft/ft = Feet per foot.
ft/yr = Feet per year.
KAFB = Kirtland Air Force Base.
PGWS = Perched Groundwater System.
SNL = Sandia National Laboratories.
TAG = Tijeras Arroyo Groundwater.
VA = Veterans Administration.

This page intentionally left blank.

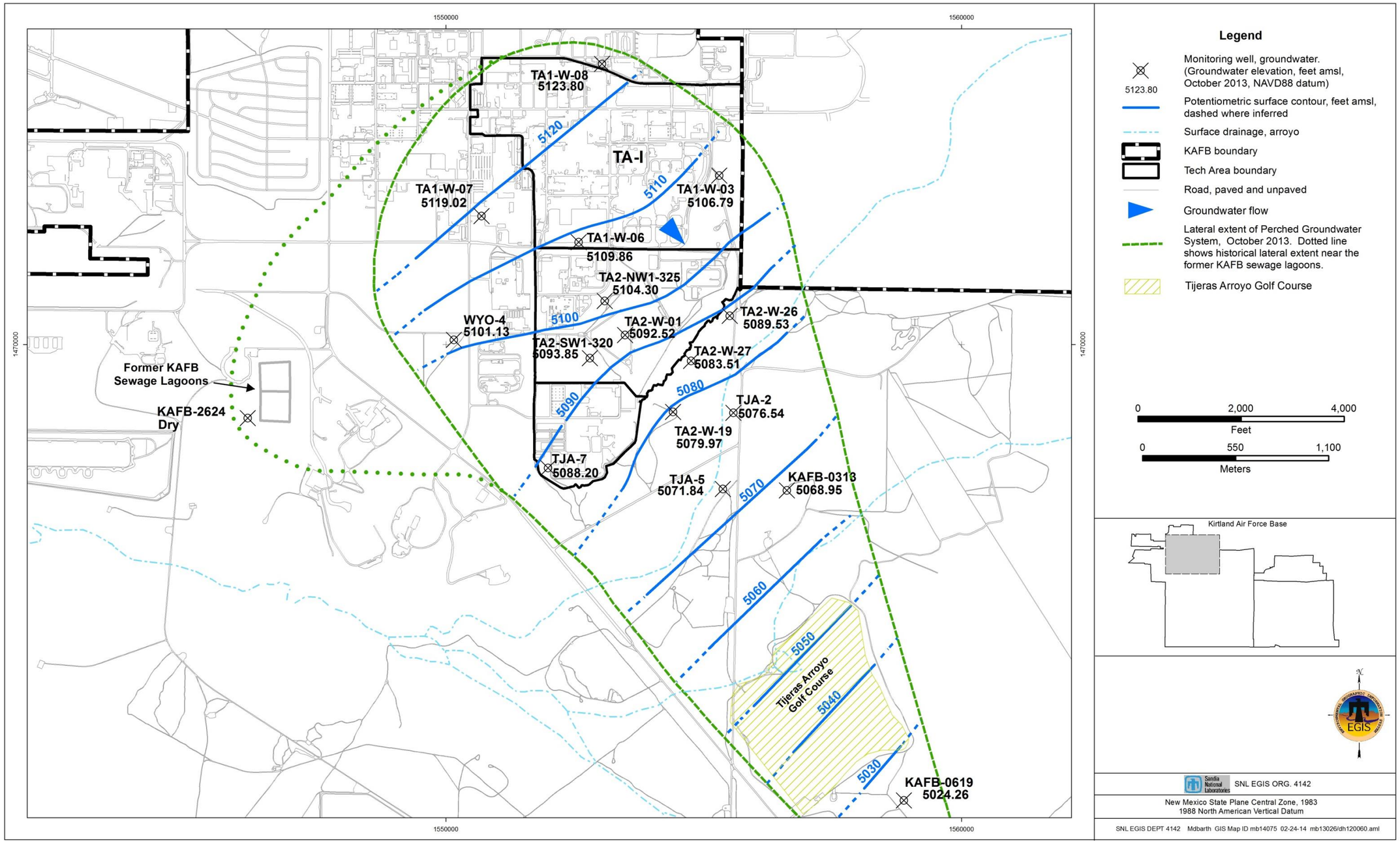


Figure 6-4. Tijeras Arroyo Groundwater Investigation Potentiometric Surface Map for the Perched Groundwater System (October 2013)

THIS PAGE IS BACK OF 11X17 FIGURE

Figure 6-5 presents the October 2013 potentiometric surface for the regional aquifer. The direction of groundwater flow in the regional aquifer is to the northwest toward the KAFB, ABCWUA, and VA water-supply wells. The horizontal gradient of the regional aquifer across the central portion of the study area is approximately 0.018 ft/ft. Vertical flow gradients within the TAG Study Area have not been measured, but are inferred to be downward, consistent with other SNL/NM groundwater study areas.

Historically, water levels in the regional aquifer have fluctuated across the study area (SNL November 2005) (Attachment 6C, Figures 6C-1 through 6C-7). A line of demarcation between increasing and declining water levels is evident along the eastern extent of the ARG-fluvial lithofacies. Increases in groundwater elevations of up to 1.8 feet per year (ft/yr) in the southeast portion of the study area reflect recharge of the regional aquifer from the PGWS, Tijeras Arroyo, the golf course, and the mountain front. Until recently, declining water levels approaching 1.5 ft/yr were associated with long-term pumping of KAFB, ABCWUA, and VA water-supply wells. However, since late 2008, hydrographs for regional aquifer wells in the northern part of the TAG Study Area show an increasing trend in groundwater elevations. For example, hydrographs for monitoring wells TA1-W-01, TA1-W-02, TA1-W-04, and WYO-3 show recent increases in groundwater elevations (Attachment 6C, Figures 6C-1 and 6C-2). Presumably, this is in response to the ABCWUA transitioning to surface water withdrawals for potable water supplies and decreasing dependence on water-supply wells immediately north of KAFB.

6.1.7.4 Contaminant Sources

Personnel from the DOE/NNSA and Sandia, the KAFB Environmental Compliance Program, and the COA have evaluated a variety of potentially contaminated sites. The TAG Investigation Report (SNL November 2005) presents a comprehensive summary of the environmental investigations that have been conducted by these three parties. As described in the TAG Investigation Report, two potential TCE and three potential nitrate sources are believed to be the responsibility of DOE/NNSA and Sandia. A brief description of each potential release site is provided as follows.

SWMU 46 (Old Acid Waste Line Outfall)—TCE and Nitrate: An estimated 1.3 billion gallons of wastewater from six TA-I research/office buildings (839, 840, 841, 860, 863, and 892) discharged into the three outfall ditches at the south end of SWMU 226 where SWMU 46 is located. TCE and nitrate were possibly present in the wastewater. Septic water from possible cross connects between the SWMU 226 waste line and sewer lines may have discharged at SWMU 46. In 2000, two soil-vapor monitoring wells were installed at SWMU 46, and soil-vapor sampling was conducted quarterly. Monitoring well 46-VW-01 is located near the waste-line outfall, and soil-vapor sampling ports are set at 50-ft intervals from 15 to 265 ft bgs. The maximum TCE concentration to date is 46,000 parts per billion by volume (ppbv) from the port set at 115 ft bgs. Monitoring well 46-VW-02, located 900 ft farther southeast, has soil-vapor sampling ports set at 50-ft intervals from 46 to 296 ft bgs. The maximum TCE concentration to date at this well is 650 ppbv from the port set at 96 ft bgs.

SWMU 165 (Building 901 Septic System)—TCE and Nitrate: The TA-II septic system leach field was connected to a personnel shower/laundry facility (Building 901) and small research/machine shop (Building 902). Nitrate was most likely present in the septic waste water. Possible TCE and high explosive compounds were present in the wastewater. No significant contamination has been detected in soil samples. Groundwater samples from PGWS monitoring well TA2-SW1-320 have contained a maximum nitrate concentration of 44 mg/L.

SWMU 187 (TA-I Sanitary Sewer System)—Nitrate: The sanitary sewer system has sewer lines that possibly leaked in the past and possibly had several cross connects with wastewater lines. The system is connected to numerous research/office buildings in TA-I. No significant contamination has been detected in soil samples.

This page intentionally left blank.

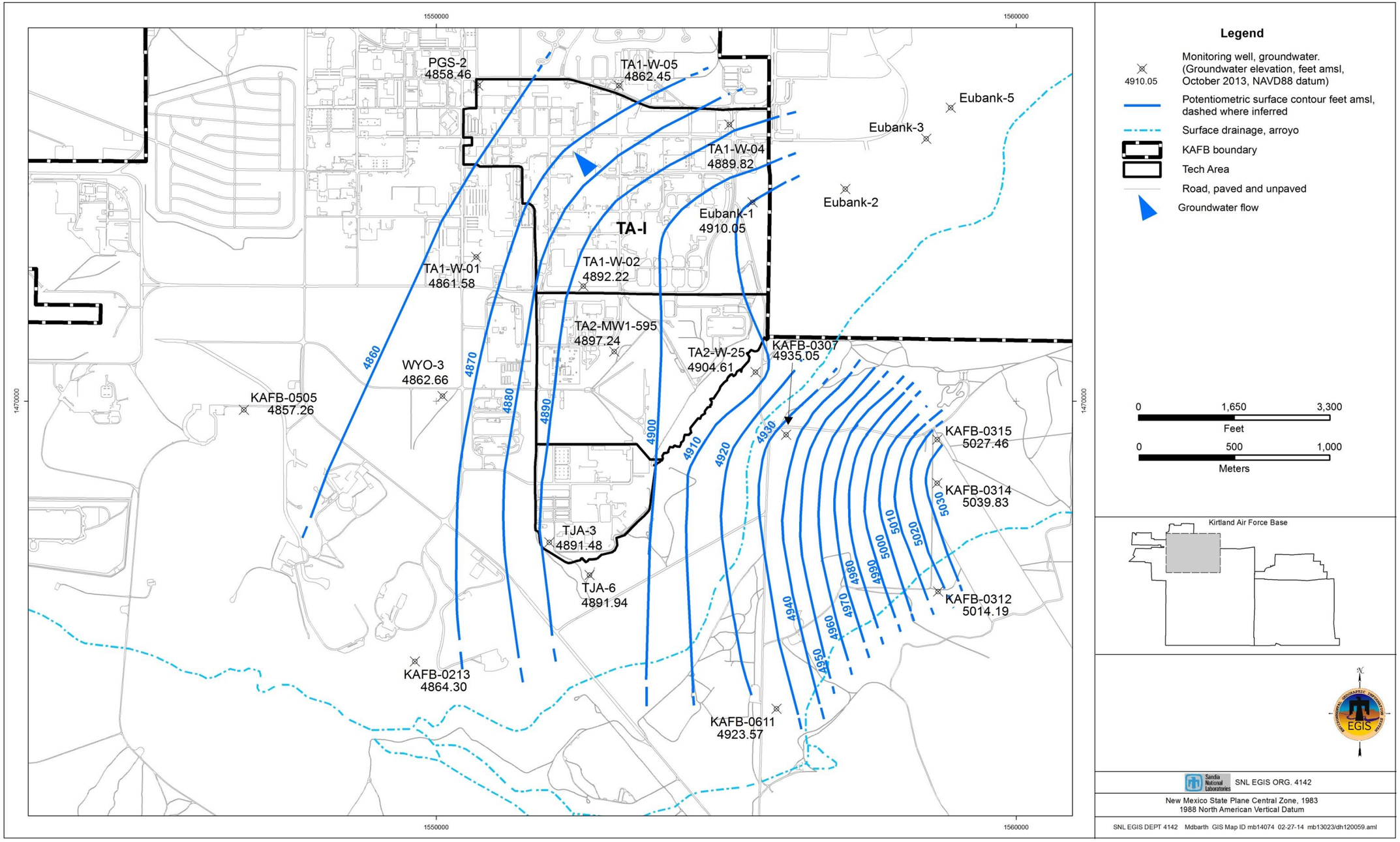


Figure 6-5. Tijeras Arroyo Groundwater Investigation Potentiometric Surface Map for the Regional Aquifer (October 2013)

THIS PAGE IS BACK OF 11X17 FIGURE

Soil-vapor and soil samples collected from the vadose zone (land surface to the water table) during drilling operations and from the soil-vapor monitoring network have indicated evidence of vapor-phase volatile organic compounds (VOCs). However, no free phase TCE and no water-saturated core samples have been encountered in any of the soil samples collected from the boreholes. The original source of the TCE was the aqueous phase (i.e., wastewater), and the current vapor phase contaminants have partitioned from the aqueous phase. All anthropogenic sources of recharge (i.e., wastewater) have been removed from service and no longer contribute water to the vadose zone at TA-I.

Based on soil-vapor data (SNL November 2005), the mass of TCE that the vapor phase is contributing to the regional aquifer is minimal. In addition, the consistency of soil-vapor concentrations over time indicates that this TCE soil-vapor plume is immobile. Therefore, the only potential mechanism for transporting these contaminants to the aquifer would be through partitioning back into the aqueous phase and additional recharge that might move through the system. Given that both current anthropogenic and natural recharge to the PGWS is minimal, it is extremely unlikely that significant transport of the vadose zone TCE into the aquifer will occur. Therefore, the vapor phase TCE in the vadose zone is not considered to be a continuing source of contamination to the groundwater that needs to be addressed under the source control criteria defined in the *RCRA Corrective Action Plan (Final)* (EPA May 1994).

Nitrate was present in sewage wastewater discharged to SNL/NM, KAFB, and ABCWUA septic systems and sanitary sewer lines in the area. The nitrate was transported to the PGWS water table by high volumes of wastewater disposed of at various locations. Because nitrate is extremely soluble and cannot exist as a separate phase (i.e., vapor or nonaqueous phase liquid), and because no water-saturated core samples have been encountered in any of the soil samples collected from boreholes, a secondary source of anthropogenic nitrate contamination in the vadose zone does not exist.

6.1.7.5 Contaminant Distribution and Transport in Groundwater

Perched Groundwater System

The distribution of TCE in groundwater is discontinuous across the PGWS and does not indicate a single release site. Based on the historic use of chlorinated solvents across SNL/NM and KAFB, the known extent of TCE in the PGWS is associated with multiple releases of aqueous-phase solvents and subsequent transport through the vadose zone.

The maximum historical concentration of TCE in the PGWS is 9.6 µg/L, which was collected from monitoring well TA2-W-26 in March 1998. The results for groundwater samples from only three TAG Study Area monitoring wells (TA2-W-19, TA2-W-26, and WYO-4) have exceeded the MCL for TCE (5 µg/L).

The maximum historical concentration of nitrate in the PGWS within the TAG Study Area is 44 mg/L for monitoring well TA2-SW1-320. Concentrations of nitrate in the PGWS exceeding the MCL for nitrate (10 mg/L) are scattered across the TAG Study Area. Historically, two plumes have been identified in the PGWS, consisting of Plume 3 beneath SNL/NM TA-II and Plume 4 beneath the Tijeras Arroyo Golf Course (MWH Americas, Inc. July 2003). However, the subsequent installation and sampling of several monitoring wells failed to identify a boundary between Plumes 3 and 4. Therefore, the PGWS nitrate plume is now shown as one contiguous plume and is referred to as Plume 4 (CH2M HILL, Inc. June 2009).

Plume 4, which originates near monitoring well TA2-SW1-320, is located beneath the southwest portion of TA-II and extends southward to the Tijeras Arroyo Golf Course. The plume is 2 miles long and 0.8 miles wide (CH2M HILL, Inc. June 2009), and the upgradient portion is considered to emanate from SWMU 165, the Building 901 Septic System.

Regional Aquifer

The regional aquifer monitoring wells have generally yielded no groundwater samples with detectable TCE concentrations except for low-level detections in samples from monitoring well TJA-3. No sample results for the SNL/NM TAG Study Area regional aquifer monitoring wells exceed the MCL of 5 µg/L for TCE.

For the regional aquifer, groundwater samples from nine SNL/NM TAG Study Area monitoring wells have exceeded the MCL for nitrate during at least one sampling event. The maximum historical concentration of nitrate for monitoring wells completed in the regional aquifer is 49 mg/L for monitoring well TJA-4. The nitrate contamination in the regional aquifer southeast of TA-II forms what is referred to as Plume 2 (CH2M HILL, Inc. June 2009). Plume 2 is most likely responsible for the nitrate concentrations in samples from monitoring well TJA-4, a well near where the PGWS and regional aquifer merge. Plume 2 is 3 miles long and 1.5 miles wide and the potential sources of nitrate contamination are not completely defined.

Potential downgradient receptors for the TAG nitrate and TCE plumes are the ABCWUA, KAFB, and VA production wells located to the north and northwest of TA-I. Numerical simulations suggest that nitrate and TCE in the PGWS would migrate to the southeast, merge with the regional aquifer, and then travel back to the north and northwest. Additionally, downgradient concentrations of nitrate and TCE are decreasing in groundwater to below levels of concern through dispersion and dilution as the plume moves into the more hydraulically conductive deposits near the production wells.

6.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM ER Operations, as well as implements and enforces federal regulations mandated by Resource Conservation and Recovery Act (RCRA). All ER SWMUs and Areas of Concern are listed in Module IV of the SNL/NM RCRA Permit, *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518* (NMED 1993).

All corrective action requirements pertaining to the TAG Study Area are contained in the Order (NMED April 2004). The groundwater monitoring activities for the TAG investigation are not associated with a single SWMU, but have a broader scope. Groundwater characterization activities for TAG were originally conducted voluntarily as proposed in the Groundwater Investigation Plan (SNL March 1996b). Recently, TAG activities have been conducted as required by the NMED-approved TAG Investigation Work Plan (SNL June 2003).

The Order, effective in April 2004, transferred regulatory authority for corrective action requirements from the Hazardous and Solid Waste Amendments module of the SNL/NM RCRA Permit to the Order (NMED April 2004). The TAG investigation must comply with requirements set forth in the Order for site characterization and the development of a CME for the SNL Area of Responsibility (Figure 6-1). The Order also contains schedules that define dates for the delivery of plans and reports related to TAG. The NMED is the regulatory agency responsible for enforcing the CME requirements identified in the Order.

Although the Order requires that DOE/NNSA and Sandia evaluate the nature and extent of contamination in the TAG Study Area, no specific reporting requirements are prescribed in the Order (NMED April 2004). However, the TAG Investigation Report (SNL November 2005) specifies that data would continue to be presented in annual reports, such as this Annual Groundwater Monitoring Report. The outline of this report is based on the required elements of a "Periodic Monitoring Report" as described in Section X.D. of the Order (NMED April 2004).

In this Annual Groundwater Monitoring Report, TAG monitoring data are presented for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (i.e., gamma spectroscopy, gross alpha/beta activity, and tritium) are provided voluntarily by the DOE/NNSA and Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Order (NMED April 2004). Additional information on radionuclides, and the scope of the Order, is available in Section III.A of the Order.

6.3 Scope of Activities

The CY 2013 activities for the TAG investigation, including plans and reports, are listed in Section 6.1.5. However, the recent field activity completed in the study area was solely groundwater monitoring. The four groundwater sampling events are summarized in Table 6-4, and the analytical parameters for each well and each sampling event are listed in Table 6-5.

Quality control (QC) samples are collected in the field at the time of environmental sample collection. Field QC samples include duplicate environmental, equipment blank (EB), field blank (FB), split, and trip blank (TB) samples. Field QC samples are used to monitor the sampling process. Duplicate environmental samples are used to measure the precision of the sampling process. EB samples are used to verify the effectiveness of sampling equipment decontamination procedures. Split samples are used to verify the performance of the analytical laboratory. TB samples are used to determine whether VOCs contaminated the sample during preparation, transportation, and handling prior to receipt by the analytical laboratory.

6.4 Field Methods and Measurements

The monitoring procedures conducted for TAG groundwater monitoring are described in detail in Section 1.3. The water level information was used to create the potentiometric surface maps presented in Figures 6-4 and 6-5 and the hydrographs presented in Attachment 6C.

6.5 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using EPA-specified protocols described in Section 1.3.2 (Tables 1-5 and 1-6).

6.6 Summary of Analytical Results

This section discusses monitoring results, exceedances of standards, and pertinent trends in concentrations for COCs in the TAG Study Area that exceeded standards. The analytical results and field measurements for all TAG sampling events are presented in Attachment 6A, Tables 6A-1 through 6A-7; concentration trend plots for COCs that exceed the MCLs are presented in Attachment 6B, Figures 6B-1 through 6B-6. A summary of detected VOC results is presented in Table 6A-1. The method detection limits (MDLs) for all analyzed VOCs are listed in Table 6A-2.

The VOCs detected at low concentrations in groundwater samples from TAG Study Area monitoring wells include the following:

- 1,1-Dichloroethane
- 1,1-Dichloroethene
- Bromodichloromethane
- Chloroform
- cis-1,2-Dichloroethene
- Tetrachloroethene
- TCE
- Toluene

Table 6-4. Groundwater Monitoring Well Network and Sampling Dates for the TAG Study Area, Calendar Year 2013

Date of Sampling Event	Wells Sampled		SAP
March 2013	TA2-SW1-320 TA2-W-01 TA2-W-19 TA2-W-26 TA2-W-27 TJA-2	TJA-3 TJA-4 TJA-6 TJA-7 WYO-4	*Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY13, 2nd Quarter Sampling* (SNL February 2013)
June 2013	TA2-SW1-320 TA2-W-19 TA2-W-26 TJA-2	TJA-4 TJA-7 WYO-4	*Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY13, 3rd Quarter Sampling* (SNL May 2013)
August/September 2013	PGS-2 TA1-W-01 TA1-W-02 TA1-W-03 TA1-W-04 TA1-W-05 TA1-W-06 TA1-W-08 TA2-NW1-595 TA2-SW1-320 TA2-W-01	TA2-W-19 TA2-W-26 TA2-W-27 TJA-2 TJA-3 TJA-4 TJA-6 TJA-7 WYO-3 WYO-4	*Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY13, 4th Quarter Sampling* (SNL July 2013)
November 2013	TA2-SW1-320 TA2-W-19 TA2-W-26 TJA-2	TJA-3 TJA-4 TJA-7 WYO-4	*Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY14, 1st Quarter Sampling* (SNL October 2013)

NOTES:
FY = Fiscal Year.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories.
TAG = Tijeras Arroyo Groundwater.

Table 6-5. Parameters Sampled at TAG Wells for Each Sampling Event, Calendar Year 2013

Parameter	March 2013		
NPN VOCs	TA2-SW1-320 (low-flow) TA2-W-01 TA2-W-19 TA2-W-26 TA2-W-27	TA2-W-27 (dup) TJA-2 TJA-3 TJA-4 TJA-6	TJA-7 TJA-7 (dup) WYO-4
Parameter	**June 2013**		
NPN VOCs	TA2-SW1-320 (low-flow) TA2-W-19 TA2-W-26 TA2-W-26 (dup)	TJA-2 TJA-4 TJA-7 WYO-4	
Parameter	**August/September 2013**		
Alkalinity Anions Gamma Spec* Gross alpha/beta activity NPN TAL Metals, plus Total Uranium Tritium VOCs	PGS-2 (low-flow) TA1-W-01 TA1-W-02 TA1-W-02 (dup) TA1-W-03 TA1-W-04 TA1-W-05 TA1-W-06	TA1-W-08 TA2-NW1-595 TA2-SW1-320 (low-flow) TA2-W-01 TA2-W-19 TA2-W-26 TA2-W-27 TJA-2	TJA-2 (dup) TJA-3 TJA-4 TJA-6 TJA-7 WYO-3 WYO-3 (dup) WYO-4
Parameter	**November 2013**		
NPN VOCs	TA2-SW1-320 (low flow) TA2-W-19 TA2-W-26 TJA-2 TJA-3	TJA-3 (dup) TJA-4 TJA-4 (dup) TJA-7 WYO-4	

NOTES:

dup = Duplicate sample.
Gamma Spec* = Gamma spectroscopy short list (americium-241, cesium-137, cobalt-60, and potassium-40).
NPN = Nitrate plus nitrite (reported as nitrogen).
Low-flow = QED™ Environmental Systems or Geotech Environmental Equipment, Inc. (low-flow sampling system).
TAG = Tijeras Arroyo Groundwater.
TAL = Target Analyte List.
VOC = Volatile organic compound.

Eight VOCs were detected during CY 2013. Five of these VOCs have promulgated MCLs. Only TCE exceeds its MCL of 5 µg/L (Table 6A-1). TCE was detected above the MCL in the sample from one PGWS monitoring well, WYO-4. The maximum concentration of TCE reported for monitoring well WYO-4 during this reporting period is 9.23 µg/L in the sample collected during the August 2013 sampling event. Figure 6B-1 (Attachment 6B) shows that the TCE concentrations in samples from monitoring well WYO-4 slightly exceed the MCL, and the trend ranges from stable to slightly increasing over time.

The analytical results for nitrate plus nitrite (NPN) (reported as nitrogen) are presented in Table 6A-3 (Attachment 6A). The NPN results exceed the MCL of 10 mg/L in samples from monitoring wells TA2-SW1-320, TA2-W-19, TJA-2, TJA-4, and TJA-7. The maximum concentration of NPN detected during this reporting period is 38.5 mg/L in the duplicate sample from monitoring well TJA-4 collected during the November 2013 sampling event. Figures 6B-2 through 6B-6 (Attachment 6B) show that the NPN concentrations in monitoring wells TA2-SW1-320, TJA-4, and TJA-7 have generally

exceeded the MCL for the duration of the wells, and trends range from slightly increasing to slightly decreasing over time. In contrast, NPN concentrations in monitoring wells TA2-W-19 and TJA-2 only occasionally exceeded the MCL, and trends are slightly increasing over time.

Analytical results for anions and alkalinity are presented in Table 6A-4; no anion concentrations exceed established MCLs. Total metal analytical results are presented in Table 6A-5; no metal results exceed established MCLs.

Gross alpha activity is measured as a screening tool and in accordance with 40 Code of Federal Regulations, Parts 9, 141, and 142, Table I-4 does not include uranium, which is measured independently. Therefore, gross alpha activity measurements were corrected by subtracting the total uranium activity. Radiological results are further reviewed by an SNL/NM Certified Health Physicist to assure that the samples are nonradioactive. Groundwater samples were analyzed for tritium, gross alpha/beta activity, and gamma-emitting radionuclides. The results are presented in Table 6A-6. All radionuclide activities are below MCLs, where established.

Field water quality parameters are measured during purging of each well prior to sampling and include temperature, specific conductance, oxidation-reduction potential, pH, turbidity, and dissolved oxygen. The parameter measurements obtained immediately before collecting the samples are presented in Table 6A-7.

6.7 Quality Control Results

Field and laboratory QC samples were collected and prepared as described in Section 1.3. Data validation qualifiers are provided with the analytical results in Tables 6A-1 through 6A-6 (Attachment 6A). The results of QC samples and the impact on data quality for the TAG quarterly sampling events are discussed in the following paragraphs.

Duplicate sample results for all wells and all sampling periods show good correlation for all calculated parameters (relative percent difference values less than 20 for organic compounds and less than 35 for inorganic analyses).

The results for the EB analyses are as follows:

- **March 2013 Sampling Event—**The EB sample was collected prior to sampling monitoring wells TA2-W-27 and TJA-7 and submitted for analysis of VOCs and NPN. The organic compounds bromodichloromethane, chloroform, and dibromochloromethane were detected in the EB samples. No corrective action was required, because these compounds were not detected in the associated environmental samples.

- **June 2013 Sampling Event—**An EB sample was collected prior to sampling monitoring well TA2-W-26 and submitted for analysis of VOCs and NPN. Bromodichloromethane and chloroform were detected in the EB sample. No corrective action was required for bromodichloromethane because this compound was not detected in the associated environmental sample. Chloroform results in associated environmental samples were qualified as not detected during data validation because sample results are less than 5 times the EB value.

- **August/September 2013 Sampling Event—**EB samples were collected prior to sampling monitoring wells TA1-W-02, TJA-2, and WYO-3 and submitted for VOC, NPN, anions, alkalinity, metals, gamma spectroscopy, gross alpha, gross beta, and tritium analyses. Acetone, bromodichloromethane, chloroform, chloride, copper, dibromochloromethane, and NPN were detected above laboratory MDLs. No corrective action was necessary for

acetone, bromodichloromethane, chloroform, chloride, dibromochloromethane, or NPN because these analytes were not detected in environmental samples, nor were detected in environmental samples at concentrations greater than five times the blank result. Copper was detected in environmental samples at concentrations less than five times the associated EB results, the reported concentrations for copper was qualified as not detected during data validation.

- **November 2013 Sampling Event—**EB samples were collected prior to sampling monitoring wells TJA-3 and TJA-4 and submitted for analysis of VOCs and NPN. Bromodichloromethane, bromoform, chloroform, and dibromochloromethane were detected in the EB samples. No corrective action was required because these compounds were not detected in the associated environmental samples.

The results for the TB analyses are as follows:

- **March 2013 Sampling Event—**No VOCs were detected above laboratory MDLs in any TB sample.

- **June 2013 Sampling Event—**No VOCs were detected above laboratory MDLs in any TB sample.

- **August/September 2013 Sampling Event—**No VOCs were detected above laboratory MDLs in any TB sample.

- **November 2013 Sampling Event—**No VOCs were detected above laboratory MDLs in any TB sample.

The results for the FB analyses are as follows:

- **March 2013 Sampling Event—**FB samples were collected at monitoring wells TJA-4 and TJA-6. The compounds detected included bromodichloromethane, bromoform, chloroform, and dibromochloromethane. No corrective action was required, because these compounds were not detected in the associated environmental samples.

- **June 2013 Sampling Event—**A FB sample was collected at monitoring well TJA-2. The compounds detected included acetone, bromodichloromethane, chloroform, and dibromochloromethane. No corrective action was required, because these compounds were not detected in the associated environmental samples.

- **August/September 2013 Sampling Event—**FB samples were collected at monitoring wells TA1-W-03, TA2-NW1-595, and TJA-3. The compounds detected in FB samples included bromodichloromethane and chloroform. No corrective action was required for bromodichloromethane, because this compound was not detected in the associated environmental samples. Chloroform in monitoring well TA1-W-03 was qualified as not detected during data validation, because the compound was reported in the FB at a concentration greater than the environmental sample result.

- **November 2013 Sampling Event—**A FB sample was collected at monitoring well TJA-2. The compounds detected included bromodichloromethane, bromoform, chloroform, and dibromochloromethane. No corrective action was required, because these compounds were not detected in the associated environmental sample.

Laboratory data qualifiers are provided with the analytical results in Tables 6A-1 through 6A-6 (Attachment 6A).

6.8 Variances and Nonconformances

No variances or nonconformances from field or sampling requirements specified in the TAG Investigation Mini-Sampling and Analysis Plans (SAPs) (SNL February 2013, May 2013, July 2013, and October 2013) were noted during sampling activities. However, project-specific issues associated with these sampling events are noted as follows:

- **All Sampling Events—**(1) Monitoring well WYO-4 was purged dry prior to sampling. This well was allowed to recover to a minimum of 80 percent of the original water level and then samples were collected. (2) A QED Environmental Systems, Inc. (QED™) (MicroPurge® low-flow sampling method) sampling system was used to collect a groundwater sample from monitoring well PGS-2. (3) A Geotech Environmental Equipment, Inc. bladder pump sampling system was used to collect a groundwater sample from monitoring well TA2-SW1-320. Conventional sampling equipment cannot be lowered to the proper sampling depth in either of these two wells due to well construction issues.

- **March 2013 Sampling Event—**A new dedicated low flow sampling system manufactured by Geotech Environmental Equipment, Inc. was installed in monitoring well TA2-SW1-320.

- **June 2013 Sampling Event—**No variances, nonconformances, or project-specific issues relevant to requirements in the TAG Investigation mini-SAP (SNL May 2013) were identified during June 2013 sampling activities.

- **August/September 2013 Sampling Event—** No variances, nonconformances, or project-specific issues relevant to requirements in the TAG Investigation mini-SAP (SNL July 2013) were identified during August and September 2013 sampling activities.

- **November 2013 Sampling Event**—A VOC sample was collected from the source deionized water used during the equipment decontamination process. The compounds bromodichloromethane, bromoform, chloroform, and dibromochloromethane were detected at concentrations of 4.64 µg/L, 0.590 µg/L, 5.47 µg/L, and 3.46 µg/L, respectively.

6.9 Summary and Conclusions

This section provides a brief summary of activities, discussion of COCs that exceed standards, trends of concentrations versus time, the conceptual model, and plans for studies to be completed during CY 2014 at the TAG Study Area.

The TAG Study Area encompasses an area of approximately 40 sq mi in the north-central portion of KAFB. Groundwater investigations were initiated in 1992, and the current monitoring network consists of 21 monitoring wells for water quality analysis and 30 wells for water level measurements. For this reporting period, monitoring wells were sampled in March, June, August/September, and November 2013. The groundwater samples were analyzed for VOCs, NPN, anions, alkalinity, Target Analyte List metals (plus uranium), gross alpha/beta activity, tritium, and radionuclides by gamma spectroscopy. Depending on their locations and historical concentrations of COCs, the monitoring wells were sampled quarterly, semiannually, or annually during this reporting period.

Only NPN and TCE were detected above MCLs in groundwater samples from TAG Study Area wells. NPN concentrations exceed the MCL of 10 mg/L in samples from monitoring wells TA2-SW1-320, TA2-W-19, TJA-2, TJA-4, and TJA-7, with a maximum concentration of 38.5 mg/L in the sample from monitoring well TJA-4 collected during the November 2013 sampling event.

TCE concentrations exceed the MCL of 5 µg/L in samples from monitoring well WYO-4, which is screened in the PGWS. The maximum concentration of TCE detected for monitoring well WYO-4 during this reporting period is 9.23 µg/L in the sample collected during the August 2013 sampling event. TCE concentrations in monitoring well WYO-4 have slightly exceeded the MCL for the duration of the well, and the trend ranges from stable to slightly increasing over time.

The analytical results for this reporting period are consistent with historical concentrations. The following conclusions are based on a comprehensive review of available information for current groundwater contamination conditions in the TAG Study Area:

- The distribution of TCE in the PGWS is sporadic across the study area and reflects multiple release sites and the effect of stratigraphic heterogeneity.
- Based on the historical use and disposal of chlorinated solvents, the extent of TCE in groundwater is probably associated with multiple aqueous releases of solvents and subsequent vapor-phase transport through the vadose zone.
- The distribution of nitrate above the background level is laterally widespread in the PGWS.
- In the regional aquifer, concentrations of nitrate above the MCL occur in the western and southeastern portions of the TAG Study Area.
- The potential sources of TCE and/or nitrate in the TAG Study Area include the former sewage lagoons, wastewater outfalls, septic systems, landfills, sewer lines, and the golf course.
- The conceptual model described in Section 6.1.7 does not require modification based on the water level and analytical data for this reporting period.

Ongoing environmental studies of the TAG Study Area include the following:

- Continue collection of groundwater samples at the 21 TAG groundwater monitoring wells on a quarterly, semiannual, or annual basis. At a minimum, the analytes for groundwater sampling will consist of VOCs and nitrate.
- Continue periodic measurements of groundwater elevations in all TAG monitoring wells.
- Maintain contact with the KAFB Environmental Compliance Program personnel with respect to the results of TCE and nitrate abatement studies.
- As available, obtain groundwater results from KAFB, USGS, and the COA.
- Continue to integrate SNL/NM, KAFB, and COA data into the CME process currently underway for the SNL/NM area of responsibility.

- Continue to report future TAG investigation results in this SNL/NM Annual Groundwater Monitoring Report.

- Upon NMED approval of the TAG CME Report (SNL August 2005), prepare a Corrective Measures Implementation Plan.

6.10 References

AquaVISION July 1999 AquaVISION, July 1999. *Colloidal Borescope Investigation of the Sandia North Site*, Albuquerque, New Mexico, July 21, 1999.

BGW February 2001 Balleau Groundwater, Inc. (BGW), February 2001. *A Preliminary Three-Dimensional Variably Saturated Model of a Perched Aquifer at Sandia National Laboratories, New Mexico*, Balleau Groundwater, Inc., Albuquerque, New Mexico.

CH2M HILL, Inc. June 2009 CH2M HILL, Inc., June 2009. *Stage 2 Abatement Program for Nitrate-Contaminated Groundwater (Site ST-105), Second Annual Groundwater Monitoring Report, Kirtland Air Force Base, New Mexico*, prepared for HQ AFCEE/ Environmental Restoration Division, Brooks City-Base, Texas.

Collins May 2004 Collins, S., May 2004. *Technical Memorandum: Field Report on the Slug Tests at Tijeras Arroyo Groundwater Investigation Wells*, Sandia National Laboratories, Albuquerque, New Mexico, May 18, 2004.

Collins December 2000 Collins, S., December 2000. *Memo to: All ER Personnel Re: Project Name Change from the "Sandia North Groundwater Investigation" to the "Tijeras Arroyo Groundwater Investigation*," Sandia National Laboratories, Albuquerque, New Mexico.

EPA May 1994 U.S. Environmental Protection Agency (EPA), May 1994. *RCRA Corrective Action Plan (Final)*, OSWER 9902.3-2A, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, May 1994.

Fritts and Van Hart March 1997 Fritts, J.E., and D. Van Hart, March 1997. *Sandia North Geologic Investigation Project Report*, Prepared for Sandia National Laboratories Environmental Restoration Project by GRAM, Inc. under Contract AS-4959. GRAM, Inc., Albuquerque, New Mexico.

IT January 1997 IT Corporation (IT), January 1997. Letter Report to R. Arnold, AFCEE/ERDM. *Soil Vapor Sampling in Technical Area 2, Boreholes 21, 23, and 20, November – December 1996*, IT Corporation, Albuquerque, New Mexico.

MWH Americas, Inc. July 2003 MWH Americas, Inc., July 2003. *Stage 1 Abatement Report for Nitrate-Impacted Groundwater at Kirtland Air Force Base, New Mexico*, prepared for Environmental Compliance Program, Kirtland Air Force Base, Albuquerque, New Mexico.

NMED February 2010 New Mexico Environment Department (NMED), February 2010. *Notice of Approval: Tijeras Arroyo Groundwater Investigation Report, November 2005, Sandia National Laboratories EPA ID# NM5890110518, SNL-05-028*, New Mexico Environment Department, Santa Fe, New Mexico, February 22, 2010.

NMED August 2009 New Mexico Environment Department (NMED), August 2009. *Notice of Disapproval: Response to the Notice of Disapproval for the Tijeras Arroyo Groundwater Investigation Report, February 2009, Sandia National Laboratories EPA ID# NM5890110518, SNL-05-028*, New Mexico Environment Department, Santa Fe, New Mexico, August 12, 2009.

NMED April 2009 New Mexico Environment Department (NMED), April 2009. *RE: Perchlorate Contamination in Groundwater, Sandia National Laboratories, EPA ID#NM5890110518,* New Mexico Environment Department, Santa Fe, New Mexico, April 30, 2009.

NMED August 2008 New Mexico Environment Department (NMED), August 2008. *Notice of Disapproval: Tijeras Arroyo Groundwater Investigation Report, November 2005, Sandia National Laboratories EPA ID# NM5890110518, SNL-05-028*, New Mexico Environment Department, Santa Fe, New Mexico.

NMED October 2004 New Mexico Environment Department (NMED), October 2004. *Approval with Modifications: Corrective Measures Evaluation Work Plan for Tijeras Arroyo Groundwater, July 2004, Sandia National Laboratories NM5890110518, HWB-SNL-04-036,* New Mexico Environment Department, Santa Fe, New Mexico.

NMED April 2004 New Mexico Environment Department (NMED), 2004. *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order*, New Mexico Environment Department, Santa Fe, New Mexico, April 29, 2004.

NMED September 2003 New Mexico Environment Department (NMED), 2003. J.E. Kieling, Manager – Management Program, correspondence: *Tijeras Arroyo Groundwater Investigation Work Plan, June 2003, Sandia National Laboratories, NM5890110518-1, HWB-SNL-03-006*, to K. Boardman, Manager, Sandia Site Office NNSA, U.S. Department of Energy, New Mexico Environment Department, Santa Fe, New Mexico, September 3, 2003.

NMED 1993 New Mexico Environment Department (NMED), 1993. *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518*, New Mexico Environment Department, Santa Fe, New Mexico.

SNL October 2013 Sandia National Laboratories, New Mexico (SNL/NM), November 2013. *Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY14, 1st Quarter Sampling*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, October 17, 2013.

SNL September 2013 Sandia National Laboratories, New Mexico (SNL/NM), September 2013. *Annual Groundwater Monitoring Report Calendar Year 2012, Long-Term Stewardship Consolidated Groundwater Monitoring Program*, Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL July 2013 Sandia National Laboratories, New Mexico (SNL/NM), July 2013. *Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY13, 4th Quarter Sampling*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, July 24, 2013.

SNL May 2013 Sandia National Laboratories, New Mexico (SNL/NM), May 2013. *Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY13, 3rd Quarter Sampling*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, May 14, 2013.

SNL February 2013 Sandia National Laboratories, New Mexico (SNL/NM), February 2013. *Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY13, 2nd Quarter Sampling*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, February 7, 2013.

SNL September 2012 Sandia National Laboratories, New Mexico (SNL/NM), September 2012. *Annual Groundwater Monitoring Report Calendar Year 2011, Groundwater Protection Program*, Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2011 Sandia National Laboratories, New Mexico (SNL/NM), September 2011. *Annual Groundwater Monitoring Report Calendar Year 2010, Groundwater Protection Program*, Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL October 2010 Sandia National Laboratories, New Mexico (SNL/NM), October 2010. *Annual Groundwater Monitoring Report Calendar Year 2009, Groundwater Protection Program*, Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL January 2010 Sandia National Laboratories, New Mexico (SNL/NM), January 2010. *Response to NMED's "Notice of Disapproval: Tijeras Arroyo Groundwater Investigation Report, November 2005" Dated February 2009*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, January 19, 2010.

SNL June 2009 Sandia National Laboratories, New Mexico (SNL/NM), June 2009. *Annual Groundwater Monitoring Report Calendar Year 2008, Groundwater Protection Program*, Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL February 2009 Sandia National Laboratories, New Mexico (SNL/NM), February 2009. *Response to NMED's "Notice of Disapproval: Tijeras Arroyo Groundwater Investigation Report, November 2005" Dated August 2008*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico, February 26, 2009.

SNL March 2008 Sandia National Laboratories, New Mexico (SNL/NM), March 2008. *Annual Groundwater Monitoring Report, Fiscal Year 2007*, Groundwater Protection Program, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 2007 Sandia National Laboratories, New Mexico (SNL/NM), March 2007. *Annual Groundwater Monitoring Report, Fiscal Year 2006*, Groundwater Protection Program Sandia National Laboratories, Albuquerque, New Mexico.

SNL November 2006 Sandia National Laboratories, New Mexico (SNL/NM), November 2006. *Annual Groundwater Monitoring Report, Burn Site Groundwater, Tijeras Arroyo Groundwater, and Technical Area V Groundwater Areas of Concern, Fiscal Year 2005*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL November 2005 Sandia National Laboratories, New Mexico (SNL/NM), November 2005. *Tijeras Arroyo Groundwater Investigation Report*, Environmental Restoration Project, Sandia National Laboratories, for U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico.

SNL October 2005 Sandia National Laboratories, New Mexico (SNL/NM), October 2005. *Annual Groundwater Monitoring Report, Fiscal Year 2004*, Groundwater Protection Program, Sandia National Laboratories, Albuquerque, New Mexico.

SNL August 2005 Sandia National Laboratories, New Mexico (SNL/NM), August 2005. *Corrective Measures Evaluation Report for Tijeras Arroyo Groundwater*, Sandia Report SAND2005-5297, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL July 2004 Sandia National Laboratories, New Mexico (SNL/NM), July 2004. *Corrective Measures Evaluation Work Plan, Tijeras Arroyo Groundwater*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 2004 Sandia National Laboratories, New Mexico (SNL/NM), March 2004. *Annual Groundwater Monitoring Report, Fiscal Year 2003*, Groundwater Protection Program Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2003 Sandia National Laboratories, New Mexico (SNL/NM), June 2003. *Tijeras Arroyo Groundwater Investigation Work Plan (Final Version)*, Sandia National Laboratories Environmental Restoration Project for U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico.

SNL March 2003 Sandia National Laboratories, New Mexico (SNL/NM), March 2003. *Annual Groundwater Monitoring Report, Fiscal Year 2002*, Groundwater Protection Program Sandia National Laboratories, Albuquerque, New Mexico.

SNL November 2002 Sandia National Laboratories, New Mexico (SNL/NM), November 2002. *Tijeras Arroyo Groundwater Continuing Investigation Report*, Environmental Restoration Project, Sandia National Laboratories, for U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico.

SNL March 2002 Sandia National Laboratories, New Mexico (SNL/NM), March 2002. *Annual Groundwater Monitoring Report, Fiscal Year 2001*, Groundwater Protection Program Sandia National Laboratories, Albuquerque, New Mexico.

SNL April 2001 Sandia National Laboratories, New Mexico (SNL/NM), April 2001. *Annual Groundwater Monitoring Report, Fiscal Year 2000*, Groundwater Protection Program, Sandia National Laboratories, Albuquerque, New Mexico.

SNL February 2001 Sandia National Laboratories, New Mexico (SNL/NM), February 2001. *Environmental Restoration Project Long-Term Monitoring Strategy for Groundwater*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2000 Sandia National Laboratories, New Mexico (SNL/NM), June 2000. *Sandia North Groundwater Investigation, Annual Report, Fiscal Year 1998*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 2000 Sandia National Laboratories, New Mexico (SNL/NM), March 2000. *Annual Groundwater Monitoring Report, Fiscal Year 1999*, Groundwater Protection Program Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 1999 Sandia National Laboratories, New Mexico (SNL/NM), March 1999. *Groundwater Protection Program, Fiscal Year 1998, Annual Groundwater Monitoring Report*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 1998a Sandia National Laboratories, New Mexico (SNL/NM), March 1998. *Sandia North Groundwater Investigation, Annual Report, Fiscal Year 1997*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 1998b Sandia National Laboratories, New Mexico (SNL/NM), March 1998. *Groundwater Protection Program, Calendar Year 1997 Annual Groundwater Monitoring Report*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL February 1998 Sandia National Laboratories, New Mexico (SNL/NM), February 1998. *Revised Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 1997 Sandia National Laboratories, New Mexico (SNL/NM), March 1997. *Groundwater Protection Program, Calendar Year 1996 Annual Groundwater Monitoring Report*, Sandia National Laboratories, Environmental Restoration Project, Albuquerque, New Mexico.

SNL March 1996a Sandia National Laboratories, New Mexico (SNL/NM), March 1996. *Groundwater Protection Program, Calendar Year 1995 Annual Groundwater Monitoring Report*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 1996b Sandia National Laboratories, New Mexico (SNL/NM), March 1996. *Sandia North Groundwater Investigation Plan*, Sandia National Laboratories, Environmental Restoration Project, for U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico.

SNL March 1995a Sandia National Laboratories, New Mexico (SNL/NM), March 1995. *Site-Wide Hydrogeologic Characterization Project, Calendar Year 1994 Annual Report*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 1995b Sandia National Laboratories, New Mexico (SNL/NM), March 1995. *Groundwater Protection Program, Calendar Year 1994 Annual Groundwater Monitoring Report*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 1994 Sandia National Laboratories, New Mexico (SNL/NM), March 1994. *Groundwater Protection Program, Calendar Year 1993 Annual Groundwater Monitoring Report*, Sandia National Laboratories, Albuquerque, New Mexico.

Stone et al. February 2000 Stone, B.D., J.C. Cole, and D.A. Sawyer, February 2000. "Regional Stratigraphic Framework for an Integrated Three-Dimensional Geologic Model of the Rio Grande Rift," in *U.S. Geological Survey, Middle Rio Grande Basin Study—Proceedings of the Fourth Annual Workshop, Albuquerque, New Mexico*, February 15-16, 2000, Open File Report 00-488. U.S. Geological Survey, Albuquerque, New Mexico.

Van Hart June 2003 Van Hart, D., June 2003. *Geologic Investigation: An Update of Subsurface Geology on Kirtland Air Force Base, New Mexico*, SAND Report SAND2003-1869, Sandia National Laboratories, Albuquerque, New Mexico.

Van Hart June 2001 Van Hart, D., June 2001. *Shallow Groundwater System Investigation: Tijeras Arroyo and Vicinity*, prepared for the Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Van Hart et al. October 1999 Van Hart, D., D.A. Hyndman, and S.S. Brandwein, October 1999. *Analysis of the USGS Isleta/Kirtland Air Force Base Aeromagnetic Survey for Application to SNL/KAFB Area Geologic Structure*, prepared for the Groundwater Protection Program/Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico, October 15, 1999.

Wolford
September 1996

Wolford R., September 1996. *Hydrologic Evaluation of a Perched Aquifer near TA-II Tijeras Arroyo: Estimating Aquifer Parameters, Water Travel Times, and Possible Sources of Recharge in the Perched Zone. Site-Wide Hydrogeologic Characterization Project, Environmental Restoration Program, SNL/NM*, Consultants Report—GRAM, Inc., prepared for Sandia National Laboratories, Albuquerque, New Mexico.

Attachment 6A
Tijeras Arroyo Groundwater
Analytical Results Tables

This page intentionally left blank.

Attachment 6A Tables

6A-1 Summary of Detected Volatile Organic Compounds, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 6A-5

6A-2 Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B), Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 6A-8

6A-3 Summary of Nitrate plus Nitrite Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 6A-9

6A-4 Summary of Anions and Alkalinity Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 6A-13

6A-5 Summary of Target Analyte List Metals plus Uranium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 6A-17

6A-6 Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 6A-41

6A-7 Summary of Field Water Quality Measurements[h], Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 6A-46

Footnotes for Tijeras Arroyo Groundwater Analytical Results Tables 6A-49

This page intentionally left blank.

Table 6A-1
Summary of Detected Volatile Organic Compounds,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-W-01	Tetrachloroethene	0.320	0.300	1.00	5.00	J		093663-001	SW846 8260B
06-Mar-13	Trichloroethene	1.48	0.300	1.00	5.00			093663-001	SW846 8260B
TA2-W-19	1,1-Dichloroethane	0.460	0.300	1.00	NE	J		093672-001	SW846 8260B
13-Mar-13	Trichloroethene	3.77	0.300	1.00	5.00			093672-001	SW846 8260B
	cis-1,2-Dichloroethene	0.480	0.300	1.00	70.0	J		093672-001	SW846 8260B
TA2-W-26	Chloroform	0.340	0.300	1.00	NE	J		093670-001	SW846 8260B
12-Mar-13	Tetrachloroethene	1.08	0.300	1.00	5.00			093670-001	SW846 8260B
	Trichloroethene	1.46	0.300	1.00	5.00			093670-001	SW846 8260B
	cis-1,2-Dichloroethene	0.380	0.300	1.00	70.0	J		093670-001	SW846 8260B
TA2-W-27	Tetrachloroethene	1.17	0.300	1.00	5.00			093667-001	SW846 8260B
07-Mar-13	Trichloroethene	1.10	0.300	1.00	5.00			093667-001	SW846 8260B
TA2-W-27 (Duplicate)	Tetrachloroethene	1.09	0.300	1.00	5.00			093668-001	SW846 8260B
07-Mar-13	Trichloroethene	1.06	0.300	1.00	5.00			093668-001	SW846 8260B
TJA-2	1,1-Dichloroethane	0.430	0.300	1.00	NE	J		093674-001	SW846 8260B
14-Mar-13	Trichloroethene	4.06	0.300	1.00	5.00			093674-001	SW846 8260B
	cis-1,2-Dichloroethene	0.420	0.300	1.00	70.0	J		093674-001	SW846 8260B
TJA-7 20-Mar-13	Trichloroethene	0.820	0.300	1.00	5.00	J		093683-001	SW846 8260B
TJA-7 (Duplicate) 20-Mar-13	Trichloroethene	0.820	0.300	1.00	5.00	J		093684-001	SW846 8260B
WYO-4	1,1-Dichloroethane	1.07	0.300	1.00	NE			093676-001	SW846 8260B
18-Mar-13	Bromodichloromethane	0.760	0.300	1.00	NE	J	J+	093676-001	SW846 8260B
	Toluene	0.450	0.300	1.00	1000	J		093676-001	SW846 8260B
	Trichloroethene	**8.40**	0.300	1.00	5.00			093676-001	SW846 8260B
	cis-1,2-Dichloroethene	1.99	0.300	1.00	70.0			093676-001	SW846 8260B
TA2-W-19	1,1-Dichloroethane	0.330	0.300	1.00	NE	J		094033-001	SW846 8260B
19-Jun-13	Trichloroethene	2.35	0.300	1.00	5.00			094033-001	SW846 8260B
TA2-W-26	Chloroform	0.320	0.300	1.00	NE	J	1.0U	094037-001	SW846 8260B
20-Jun-13	Tetrachloroethene	0.880	0.300	1.00	5.00	J		094037-001	SW846 8260B
	Trichloroethene	0.950	0.300	1.00	5.00	J		094037-001	SW846 8260B
	cis-1,2-Dichloroethene	0.370	0.300	1.00	70.0	J		094037-001	SW846 8260B
TA2-W-26 (Duplicate)	Chloroform	0.310	0.300	1.00	NE	J	1.0U	094038-001	SW846 8260B
20-Jun-13	Tetrachloroethene	0.830	0.300	1.00	5.00	J		094038-001	SW846 8260B
	Trichloroethene	0.960	0.300	1.00	5.00	J		094038-001	SW846 8260B
	cis-1,2-Dichloroethene	0.320	0.300	1.00	70.0	J		094038-001	SW846 8260B

Refer to footnotes on page 6A-49.

Table 6A-1 *(Continued)*
Summary of Detected Volatile Organic Compounds,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-2 18-Jun-13	1,1-Dichloroethane	0.410	0.300	1.00	NE	J		094030-001	SW846 8260B
	Trichloroethene	3.54	0.300	1.00	5.00			094030-001	SW846 8260B
	cis-1,2-Dichloroethene	0.370	0.300	1.00	70.0	J		094030-001	SW846 8260B
TJA-7 17-Jun-13	Trichloroethene	0.860	0.300	1.00	5.00	J		094028-001	SW846 8260B
WYO-4 24-Jun-13	1,1-Dichloroethane	1.05	0.300	1.00	NE			094040-001	SW846 8260B
	Trichloroethene	**8.40**	0.300	1.00	5.00			094040-001	SW846 8260B
	cis-1,2-Dichloroethene	2.03	0.300	1.00	70.0			094040-001	SW846 8260B
TA1-W-03 08-Aug-13	Chloroform	0.400	0.300	1.00	NE	J	1.0U	094520-001	SW846 8260B
TA1-W-06 14-Aug-13	1,1-Dichloroethene	0.940	0.300	1.00	7.00	J, N		094527-001	SW846 8260B
	Chloroform	0.320	0.300	1.00	NE	J		094527-001	SW846 8260B
	Trichloroethene	0.410	0.300	1.00	5.00	J		094527-001	SW846 8260B
TA2-W-01 27-Aug-13	Tetrachloroethene	0.450	0.300	1.00	5.00	J		094545-001	SW846 8260B
	Trichloroethene	1.76	0.300	1.00	5.00			094545-001	SW846 8260B
TA2-W-19 03-Sep-13	1,1-Dichloroethane	0.520	0.300	1.00	NE	J		094551-001	SW846 8260B
	Trichloroethene	3.85	0.300	1.00	5.00			094551-001	SW846 8260B
	cis-1,2-Dichloroethene	0.590	0.300	1.00	70.0	J		094551-001	SW846 8260B
TA2-W-26 29-Aug-13	Chloroform	0.390	0.300	1.00	NE	J		094549-001	SW846 8260B
	Tetrachloroethene	1.14	0.300	1.00	5.00			094549-001	SW846 8260B
	Trichloroethene	1.33	0.300	1.00	5.00			094549-001	SW846 8260B
	cis-1,2-Dichloroethene	0.500	0.300	1.00	70.0	J		094549-001	SW846 8260B
TA2-W-27 28-Aug-13	Tetrachloroethene	1.62	0.300	1.00	5.00			094547-001	SW846 8260B
	Trichloroethene	1.28	0.300	1.00	5.00			094547-001	SW846 8260B
TJA-2 05-Sep-13	1,1-Dichloroethane	0.540	0.300	1.00	NE	J		094555-001	SW846 8260B
	Trichloroethene	4.05	0.300	1.00	5.00			094555-001	SW846 8260B
	cis-1,2-Dichloroethene	0.580	0.300	1.00	70.0	J		094555-001	SW846 8260B
TJA-2 (Duplicate) 05-Sep-13	1,1-Dichloroethane	0.530	0.300	1.00	NE	J		094556-001	SW846 8260B
	Trichloroethene	4.25	0.300	1.00	5.00			094556-001	SW846 8260B
	cis-1,2-Dichloroethene	0.580	0.300	1.00	70.0	J		094556-001	SW846 8260B
TJA-3 21-Aug-13	Trichloroethene	4.27	0.300	1.00	5.00			094539-001	SW846 8260B

Refer to footnotes on page 6A-49.

Table 6A-1 *(Concluded)*
Summary of Detected Volatile Organic Compounds,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-7 10-Sep-13	Trichloroethene	0.900	0.300	1.00	5.00	J		094561-001	SW846 8260B
WYO-4 26-Aug-13	1,1-Dichloroethane	1.27	0.300	1.00	NE			094543-001	SW846 8260B
	Trichloroethene	**9.23**	0.300	1.00	5.00			094543-001	SW846 8260B
	cis-1,2-Dichloroethene	2.77	0.300	1.00	70.0			094543-001	SW846 8260B
TA2-W-19 14-Nov-13	1,1-Dichloroethane	0.390	0.300	1.00	NE	J		094881-001	SW846 8260B
	Trichloroethene	2.75	0.300	1.00	5.00			094881-001	SW846 8260B
	cis-1,2-Dichloroethene	0.430	0.300	1.00	70.0	J		094881-001	SW846 8260B
TA2-W-26 12-Nov-13	Chloroform	0.330	0.300	1.00	NE	J		094874-001	SW846 8260B
	Tetrachloroethene	0.900	0.300	1.00	5.00	J		094874-001	SW846 8260B
	Trichloroethene	1.28	0.300	1.00	5.00			094874-001	SW846 8260B
	cis-1,2-Dichloroethene	0.370	0.300	1.00	70.0	J		094874-001	SW846 8260B
TJA-2 19-Nov-13	1,1-Dichloroethane	0.470	0.300	1.00	NE	J		094886-001	SW846 8260B
	Trichloroethene	3.51	0.300	1.00	5.00			094886-001	SW846 8260B
	cis-1,2-Dichloroethene	0.410	0.300	1.00	70.0	J		094886-001	SW846 8260B
TJA-3 13-Nov-13	Trichloroethene	0.330	0.300	1.00	5.00	J		094878-001	SW846 8260B
TJA-3 (Duplicate) 13-Nov-13	Trichloroethene	0.400	0.300	1.00	5.00	J		094879-001	SW846 8260B
TJA-7 21-Nov-13	Trichloroethene	0.980	0.300	1.00	5.00	J		094894-001	SW846 8260B
WYO-4 18-Nov-13	1,1-Dichloroethane	1.06	0.300	1.00	NE			094883-001	SW846 8260B
	Trichloroethene	**8.49**	0.300	1.00	5.00			094883-001	SW846 8260B
	cis-1,2-Dichloroethene	1.93	0.300	1.00	70.0			094883-001	SW846 8260B

Refer to footnotes on page 6A-49.

Table 6A-2
Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846 8260B), Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Analyte	MDL[b] (µg/L)	Analyte	MDL[b] (µg/L)
1,1,1-Trichloroethane	0.300	Chlorobenzene	0.300
1,1,2,2-Tetrachloroethane	0.300	Chloroethane	0.300
1,1,2-Trichloroethane	0.300	Chloroform	0.300
1,1-Dichloroethane	0.300	Chloromethane	0.300
1,1-Dichloroethene	0.300	Cyclohexane	0.300
1,2,3-Trichlorobenzene	0.300	Dibromochloromethane	0.300
1,2,4-Trichlorobenzene	0.300	Dichlorodifluoromethane	0.300
1,2-Dibromo-3-chloropropane	0.300	Ethyl benzene	0.300
1,2-Dibromoethane	0.300	Isopropylbenzene	0.300
1,2-Dichlorobenzene	0.300	Methyl acetate	1.50
1,2-Dichloroethane	0.300	Methylcyclohexane	3.00
1,2-Dichloropropane	0.300	Methylene chloride	3.00
1,3-Dichlorobenzene	0.300	Styrene	0.300
1,4-Dichlorobenzene	0.300	Tert-butyl methyl ether	0.300
2,2-trifluoroethane, 1,1,2-Trichloro-1	1.50	Tetrachloroethene	0.300
2-Butanone	2.00	Toluene	0.300
2-Hexanone	2.20	Trichloroethene	0.300
4-methyl-, 2-Pentanone	1.50	Trichlorofluoromethane	0.300
Acetone	3.00	Vinyl chloride	0.300
Benzene	0.300	Xylene	0.300
Bromochloromethane	0.300	cis-1,2-Dichloroethene	0.300
Bromodichloromethane	0.300	cis-1,3-Dichloropropene	0.300
Bromoform	0.300	m-, p-Xylene	0.300
Bromomethane	0.300	o-Xylene	0.300
Carbon disulfide	1.50	trans-1,2-Dichloroethene	0.300
Carbon tetrachloride	0.300	trans-1,3-Dichloropropene	0.300

Refer to footnotes on page 6A-49.

Table 6A-3
Summary of Nitrate plus Nitrite Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-SW1-320 21-Mar-13	Nitrate plus nitrite	**21.4**	0.850	2.50	10.0			093686-018	EPA 353.2
TA2-W-01 06-Mar-13	Nitrate plus nitrite	4.79	0.170	0.500	10.0			093663-018	EPA 353.2
TA2-W-19 13-Mar-13	Nitrate plus nitrite	**10.2**	0.170	0.500	10.0			093672-018	EPA 353.2
TA2-W-26 12-Mar-13	Nitrate plus nitrite	5.90	0.170	0.500	10.0			093670-018	EPA 353.2
TA2-W-27 07-Mar-13	Nitrate plus nitrite	4.33	0.170	0.500	10.0			093667-018	EPA 353.2
TA2-W-27 (Duplicate) 07-Mar-13	Nitrate plus nitrite	4.29	0.170	0.500	10.0			093668-018	EPA 353.2
TJA-2 14-Mar-13	Nitrate plus nitrite	**12.5**	0.170	0.500	10.0			093674-018	EPA 353.2
TJA-3 04-Mar-13	Nitrate plus nitrite	2.60	0.170	0.500	10.0			093658-018	EPA 353.2
TJA-4 19-Mar-13	Nitrate plus nitrite	**29.6**	0.850	2.50	10.0			093678-018	EPA 353.2
TJA-6 05-Mar-13	Nitrate plus nitrite	2.57	0.170	0.500	10.0			093660-018	EPA 353.2
TJA-7 20-Mar-13	Nitrate plus nitrite	**23.0**	0.850	2.50	10.0			093683-018	EPA 353.2
TJA-7 (Duplicate) 20-Mar-13	Nitrate plus nitrite	**22.1**	0.850	2.50	10.0			093684-018	EPA 353.2
WYO-4 18-Mar-13	Nitrate plus nitrite	3.81	0.170	0.500	10.0			093676-018	EPA 353.2
TA2-SW1-320 13-Jun-13	Nitrate plus nitrite	**25.4**	0.850	2.50	10.0			094024-018	EPA 353.2
TA2-W-19 19-Jun-13	Nitrate plus nitrite	**12.4**	0.850	2.50	10.0			094033-018	EPA 353.2
TA2-W-26 20-Jun-13	Nitrate plus nitrite	5.88	0.170	0.500	10.0			094037-018	EPA 353.2
TA2-W-26 (Duplicate) 20-Jun-13	Nitrate plus nitrite	5.98	0.170	0.500	10.0			094038-018	EPA 353.2
TJA-2 18-Jun-13	Nitrate plus nitrite	**12.8**	0.850	2.50	10.0			094030-018	EPA 353.2

Refer to footnotes on page 6A-49.

Table 6A-3 *(Continued)*
Summary of Nitrate plus Nitrite Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-4 14-Jun-13	Nitrate plus nitrite	**33.2**	0.850	2.50	10.0			094026-018	EPA 353.2
TJA-7 17-Jun-13	Nitrate plus nitrite	**27.2**	0.850	2.50	10.0			094028-018	EPA 353.2
WYO-4 24-Jun-13	Nitrate plus nitrite	3.02	0.170	0.500	10.0			094040-018	EPA 353.2
PGS-2 05-Aug-13	Nitrate plus nitrite	1.48	0.085	0.250	10.0			094511-018	EPA 353.2
TA1-W-01 06-Aug-13	Nitrate plus nitrite	2.95	0.170	0.500	10.0			094513-018	EPA 353.2
TA1-W-02 07-Aug-13	Nitrate plus nitrite	1.18	0.085	0.250	10.0			094517-018	EPA 353.2
TA1-W-02 (Duplicate) 07-Aug-13	Nitrate plus nitrite	1.17	0.085	0.250	10.0			094518-018	EPA 353.2
TA1-W-03 08-Aug-13	Nitrate plus nitrite	7.67	0.170	0.500	10.0			094520-018	EPA 353.2
TA1-W-04 12-Aug-13	Nitrate plus nitrite	1.71	0.085	0.250	10.0			094523-018	EPA 353.2
TA1-W-05 13-Aug-13	Nitrate plus nitrite	1.19	0.085	0.250	10.0			094525-018	EPA 353.2
TA1-W-06 14-Aug-13	Nitrate plus nitrite	3.33	0.170	0.500	10.0			094527-018	EPA 353.2
TA1-W-08 15-Aug-13	Nitrate plus nitrite	7.82	0.170	0.500	10.0			094529-018	EPA 353.2
TA2-SW1-320 11-Sep-13	Nitrate plus nitrite	**21.9**	0.850	2.50	10.0			094563-018	EPA 353.2
TA2-NW1-595 20-Aug-13	Nitrate plus nitrite	3.85	0.085	0.250	10.0			094536-018	EPA 353.2
TA2-W-01 27-Aug-13	Nitrate plus nitrite	4.64	0.170	0.500	10.0			094545-018	EPA 353.2
TA2-W-19 03-Sep-13	Nitrate plus nitrite	**10.7**	0.170	0.500	10.0			094551-018	EPA 353.2
TA2-W-26 29-Aug-13	Nitrate plus nitrite	5.98	0.170	0.500	10.0			094549-018	EPA 353.2
TA2-W-27 28-Aug-13	Nitrate plus nitrite	4.26	0.170	0.500	10.0			094547-018	EPA 353.2

Refer to footnotes on page 6A-49.

Table 6A-3 *(Continued)*
Summary of Nitrate plus Nitrite Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-2 05-Sep-13	Nitrate plus nitrite	**11.8**	0.170	0.500	10.0			094555-018	EPA 353.2
TJA-2 (Duplicate) 05-Sep-13	Nitrate plus nitrite	**11.4**	0.170	0.500	10.0			094556-018	EPA 353.2
TJA-3 21-Aug-13	Nitrate plus nitrite	1.00	0.017	0.050	10.0			094539-018	EPA 353.2
TJA-4 09-Sep-13	Nitrate plus nitrite	**29.2**	0.850	2.50	10.0			094558-018	EPA 353.2
TJA-6 12-Sep-13	Nitrate plus nitrite	2.47	0.170	0.500	10.0			094541-018	EPA 353.2
TJA-7 10-Sep-13	Nitrate plus nitrite	**23.7**	0.850	2.50	10.0			094561-018	EPA 353.2
WYO-3 19-Aug-13	Nitrate plus nitrite	2.06	0.085	0.250	10.0			094533-018	EPA 353.2
WYO-3 (Duplicate) 19-Aug-13	Nitrate plus nitrite	1.97	0.085	0.250	10.0			094534-018	EPA 353.2
WYO-4 26-Aug-13	Nitrate plus nitrite	2.99	0.170	0.500	10.0			094543-018	EPA 353.2
TA2-SW1-320 22-Nov-13	Nitrate plus nitrite	**27.0**	0.850	2.50	10.0			094896-018	EPA 353.2
TA2-W-19 14-Nov-13	Nitrate plus nitrite	**12.7**	0.170	0.500	10.0			094881-018	EPA 353.2
TA2-W-26 12-Nov-13	Nitrate plus nitrite	6.57	0.170	0.500	10.0			094874-018	EPA 353.2
TJA-2 19-Nov-13	Nitrate plus nitrite	**11.9**	0.170	0.500	10.0			094886-018	EPA 353.2
TJA-3 13-Nov-13	Nitrate plus nitrite	3.10	0.170	0.500	10.0			094878-018	EPA 353.2
TJA-3 (Duplicate) 13-Nov-13	Nitrate plus nitrite	2.91	0.170	0.500	10.0			094879-018	EPA 353.2
TJA-4 20-Nov-13	Nitrate plus nitrite	**36.9**	0.850	2.50	10.0			094891-018	EPA 353.2
TJA-4 (Duplicate) 20-Nov-13	Nitrate plus nitrite	**38.5**	0.850	2.50	10.0			094892-018	EPA 353.2

Refer to footnotes on page 6A-49.

Table 6A-3 *(Concluded)*
Summary of Nitrate plus Nitrite Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-7 21-Nov-13	Nitrate plus nitrite	**27.2**	0.850	2.50	10.0			094894-018	EPA 353.2
WYO-4 18-Nov-13	Nitrate plus nitrite	3.22	0.170	0.500	10.0			094883-018	EPA 353.2

Refer to footnotes on page 6A-49.

Table 6A-4
Summary of Anions and Alkalinity Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
PGS-2	Bromide	0.276	0.067	0.200	NE			094511-016	SW846 9056
05-Aug-13	Chloride	17.3	0.670	2.00	NE			094511-016	SW846 9056
	Fluoride	ND	0.033	0.100	4.0	U		094511-016	SW846 9056
	Sulfate	73.9	1.33	4.00	NE			094511-016	SW846 9056
	Bicarbonate Alkalinity	242	0.725	1.00	NE			094511-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094511-022	SM 2320B
TA1-W-01	Bromide	0.199	0.067	0.200	NE	J		094513-016	SW846 9056
06-Aug-13	Chloride	14.0	0.670	2.00	NE			094513-016	SW846 9056
	Fluoride	0.402	0.033	0.100	4.0			094513-016	SW846 9056
	Sulfate	75.9	1.33	4.00	NE			094513-016	SW846 9056
	Bicarbonate Alkalinity	174	0.725	1.00	NE			094513-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094513-022	SM 2320B
TA1-W-02	Bromide	0.180	0.067	0.200	NE	J		094517-016	SW846 9056
07-Aug-13	Chloride	13.8	0.670	2.00	NE			094517-016	SW846 9056
	Fluoride	0.380	0.033	0.100	4.0			094517-016	SW846 9056
	Sulfate	78.5	1.33	4.00	NE			094517-016	SW846 9056
	Bicarbonate Alkalinity	176	0.725	1.00	NE			094517-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094517-022	SM 2320B
TA1-W-02 (Duplicate)	Bromide	0.184	0.067	0.200	NE	J		094518-016	SW846 9056
07-Aug-13	Chloride	13.5	0.670	2.00	NE			094518-016	SW846 9056
	Fluoride	0.380	0.033	0.100	4.0			094518-016	SW846 9056
	Sulfate	76.7	1.33	4.00	NE			094518-016	SW846 9056
	Bicarbonate Alkalinity	175	0.725	1.00	NE			094518-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094518-022	SM 2320B
TA1-W-03	Bromide	3.23	0.067	0.200	NE			094520-016	SW846 9056
08-Aug-13	Chloride	233	6.70	20.0	NE			094520-016	SW846 9056
	Fluoride	0.231	0.033	0.100	4.0			094520-016	SW846 9056
	Sulfate	485	13.3	40.0	NE			094520-016	SW846 9056
	Bicarbonate Alkalinity	73.8	0.725	1.00	NE			094520-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094520-022	SM 2320B
TA1-W-04	Bromide	0.178	0.067	0.200	NE	J		094523-016	SW846 9056
12-Aug-13	Chloride	14.3	0.335	1.00	NE			094523-016	SW846 9056
	Fluoride	0.442	0.033	0.100	4.0			094523-016	SW846 9056
	Sulfate	62.8	0.665	2.00	NE			094523-016	SW846 9056
	Bicarbonate Alkalinity	176	0.725	1.00	NE			094523-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094523-022	SM 2320B

Refer to footnotes on page 6A-49.

Table 6A-4 *(Continued)*
Summary of Anions and Alkalinity Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-05	Bromide	0.144	0.067	0.200	NE	J		094525-016	SW846 9056
13-Aug-13	Chloride	11.2	0.670	2.00	NE			094525-016	SW846 9056
	Fluoride	0.305	0.033	0.100	4.0			094525-016	SW846 9056
	Sulfate	104	1.33	4.00	NE			094525-016	SW846 9056
	Bicarbonate Alkalinity	213	0.725	1.00	NE			094525-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094525-022	SM 2320B
TA1-W-06	Bromide	1.27	0.067	0.200	NE			094527-016	SW846 9056
14-Aug-13	Chloride	106	1.34	4.00	NE			094527-016	SW846 9056
	Fluoride	0.330	0.033	0.100	4.0			094527-016	SW846 9056
	Sulfate	217	2.66	8.00	NE			094527-016	SW846 9056
	Bicarbonate Alkalinity	90.8	0.725	1.00	NE			094527-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094527-022	SM 2320B
TA1-W-08	Bromide	2.69	0.067	0.200	NE			094529-016	SW846 9056
15-Aug-13	Chloride	218	6.70	20.0	NE			094529-016	SW846 9056
	Fluoride	0.240	0.033	0.100	4.0			094529-016	SW846 9056
	Sulfate	771	13.3	40.0	NE			094529-016	SW846 9056
	Bicarbonate Alkalinity	84.5	0.725	1.00	NE			094529-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094529-022	SM 2320B
TA2-SW1-320	Bromide	0.571	0.067	0.200	NE			094563-016	SW846 9056
11-Sep-13	Chloride	35.7	0.670	2.00	NE			094563-016	SW846 9056
	Fluoride	0.400	0.033	0.100	4.0			094563-016	SW846 9056
	Sulfate	15.1	0.133	0.400	NE			094563-016	SW846 9056
	Bicarbonate Alkalinity	109	0.725	1.00	NE			094563-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094563-022	SM 2320B
TA2-NW1-595	Bromide	1.38	0.067	0.200	NE			094536-016	SW846 9056
20-Aug-13	Chloride	109	1.34	4.00	NE			094536-016	SW846 9056
	Fluoride	0.352	0.033	0.100	4.0			094536-016	SW846 9056
	Sulfate	115	2.66	8.00	NE			094536-016	SW846 9056
	Bicarbonate Alkalinity	134	0.725	1.00	NE			094536-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094536-022	SM 2320B
TA2-W-01	Bromide	1.44	0.067	0.200	NE			094545-016	SW846 9056
27-Aug-13	Chloride	102	1.34	4.00	NE			094545-016	SW846 9056
	Fluoride	0.353	0.033	0.100	4.0			094545-016	SW846 9056
	Sulfate	57.3	2.66	8.00	NE			094545-016	SW846 9056
	Bicarbonate Alkalinity	99.3	0.725	1.00	NE	B		094545-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094545-022	SM 2320B

Refer to footnotes on page 6A-49.

Table 6A-4 *(Continued)*
Summary of Anions and Alkalinity Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-W-19	Bromide	0.807	0.067	0.200	NE			094551-016	SW846 9056
03-Sep-13	Chloride	63.3	0.670	2.00	NE			094551-016	SW846 9056
	Fluoride	0.376	0.033	0.100	4.0			094551-016	SW846 9056
	Sulfate	54.8	1.33	4.00	NE			094551-016	SW846 9056
	Bicarbonate Alkalinity	107	0.725	1.00	NE			094551-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094551-022	SM 2320B
TA2-W-26	Bromide	2.41	0.067	0.200	NE			094549-016	SW846 9056
29-Aug-13	Chloride	187	3.35	10.0	NE			094549-016	SW846 9056
	Fluoride	0.265	0.033	0.100	4.0			094549-016	SW846 9056
	Sulfate	391	6.65	20.0	NE			094549-016	SW846 9056
	Bicarbonate Alkalinity	83.4	0.725	1.00	NE	B		094549-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094549-022	SM 2320B
TA2-W-27	Bromide	1.54	0.067	0.200	NE			094547-016	SW846 9056
28-Aug-13	Chloride	114	1.34	4.00	NE			094547-016	SW846 9056
	Fluoride	0.336	0.033	0.100	4.0			094547-016	SW846 9056
	Sulfate	151	2.66	8.00	NE			094547-016	SW846 9056
	Bicarbonate Alkalinity	99.9	0.725	1.00	NE	B		094547-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094547-022	SM 2320B
TJA-2	Bromide	0.856	0.067	0.200	NE			094555-016	SW846 9056
05-Sep-13	Chloride	63.5	0.670	2.00	NE			094555-016	SW846 9056
	Fluoride	0.307	0.033	0.100	4.0			094555-016	SW846 9056
	Sulfate	52.2	1.33	4.00	NE			094555-016	SW846 9056
	Bicarbonate Alkalinity	107	0.725	1.00	NE			094555-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094555-022	SM 2320B
TJA-2 (Duplicate)	Bromide	0.864	0.067	0.200	NE			094556-016	SW846 9056
05-Sep-13	Chloride	64.4	0.670	2.00	NE			094556-016	SW846 9056
	Fluoride	0.308	0.033	0.100	4.0			094556-016	SW846 9056
	Sulfate	52.8	1.33	4.00	NE			094556-016	SW846 9056
	Bicarbonate Alkalinity	106	0.725	1.00	NE			094556-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094556-022	SM 2320B
TJA-3	Bromide	0.161	0.067	0.200	NE	J		094539-016	SW846 9056
21-Aug-13	Chloride	12.8	0.670	2.00	NE			094539-016	SW846 9056
	Fluoride	0.392	0.033	0.100	4.0			094539-016	SW846 9056
	Sulfate	81.4	1.33	4.00	NE			094539-016	SW846 9056
	Bicarbonate Alkalinity	171	0.725	1.00	NE			094539-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094539-022	SM 2320B

Refer to footnotes on page 6A-49.

Table 6A-4 *(Concluded)*
Summary of Anions and Alkalinity Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-4	Bromide	0.343	0.067	0.200	NE			094558-016	SW846 9056
09-Sep-13	Chloride	20.4	0.335	1.00	NE			094558-016	SW846 9056
	Fluoride	0.345	0.033	0.100	4.0			094558-016	SW846 9056
	Sulfate	17.7	0.133	0.400	NE			094558-016	SW846 9056
	Bicarbonate Alkalinity	133	0.725	1.00	NE			094558-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094558-022	SM 2320B
TJA-6	Bromide	0.178	0.067	0.200	NE	J		094541-016	SW846 9056
12-Sep-13	Chloride	13.6	0.335	1.00	NE			094541-016	SW846 9056
	Fluoride	0.359	0.033	0.100	4.0			094541-016	SW846 9056
	Sulfate	64.2	0.665	2.00	NE			094541-016	SW846 9056
	Bicarbonate Alkalinity	159	0.725	1.00	NE			094541-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094541-022	SM 2320B
TJA-7	Bromide	0.404	0.067	0.200	NE			094561-016	SW846 9056
10-Sep-13	Chloride	23.7	0.335	1.00	NE			094561-016	SW846 9056
	Fluoride	0.336	0.033	0.100	4.0			094561-016	SW846 9056
	Sulfate	20.3	0.665	2.00	NE			094561-016	SW846 9056
	Bicarbonate Alkalinity	127	0.725	1.00	NE			094561-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094561-022	SM 2320B
WYO-3	Bromide	ND	0.670	2.00	NE	U		094533-016	SW846 9056
19-Aug-13	Chloride	14.5	0.670	2.00	NE			094533-016	SW846 9056
	Fluoride	0.606	0.330	1.00	4.0	J		094533-016	SW846 9056
	Sulfate	94.6	1.33	4.00	NE			094533-016	SW846 9056
	Bicarbonate Alkalinity	137	0.725	1.00	NE			094533-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094533-022	SM 2320B
WYO-3 (Duplicate)	Bromide	0.188	0.067	0.200	NE	J		094534-016	SW846 9056
19-Aug-13	Chloride	14.6	0.670	2.00	NE			094534-016	SW846 9056
	Fluoride	0.567	0.033	0.100	4.0			094534-016	SW846 9056
	Sulfate	95.6	1.33	4.00	NE			094534-016	SW846 9056
	Bicarbonate Alkalinity	138	0.725	1.00	NE			094534-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094534-022	SM 2320B
WYO-4	Bromide	1.28	0.067	0.200	NE			094543-016	SW846 9056
26-Aug-13	Chloride	116	1.34	4.00	NE			094543-016	SW846 9056
	Fluoride	0.381	0.033	0.100	4.0			094543-016	SW846 9056
	Sulfate	53.6	2.66	8.00	NE			094543-016	SW846 9056
	Bicarbonate Alkalinity	101	0.725	1.00	NE	B		094543-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094543-022	SM 2320B

Refer to footnotes on page 6A-49.

Table 6A-5
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
PGS-2	Aluminum	ND	0.015	0.050	NE	U		094511-009	SW846 6020
05-Aug-13	Antimony	ND	0.001	0.003	0.006	U		094511-009	SW846 6020
	Arsenic	0.00206	0.0017	0.005	0.010	J		094511-009	SW846 6020
	Barium	0.0732	0.0006	0.002	2.00			094511-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094511-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094511-009	SW846 6020
	Calcium	69.9	0.600	2.00	NE			094511-009	SW846 6020
	Chromium	0.0154	0.002	0.010	0.100			094511-009	SW846 6020
	Cobalt	0.000187	0.0001	0.001	NE	J		094511-009	SW846 6020
	Copper	0.00101	0.00035	0.001	NE			094511-009	SW846 6020
	Iron	0.253	0.033	0.100	NE			094511-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094511-009	SW846 6020
	Magnesium	15.3	0.010	0.030	NE			094511-009	SW846 6020
	Manganese	0.00242	0.001	0.005	NE	J		094511-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	094511-009	SW846 7470
	Nickel	0.0628	0.0005	0.002	NE			094511-009	SW846 6020
	Potassium	2.84	0.080	0.300	NE			094511-009	SW846 6020
	Selenium	0.00211	0.0015	0.005	0.050	J		094511-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094511-009	SW846 6020
	Sodium	46.2	0.800	2.50	NE			094511-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094511-009	SW846 6020
	Uranium	0.000523	0.000067	0.0002	0.030			094511-009	SW846 6020
	Vanadium	0.00497	0.001	0.005	NE	J		094511-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094511-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-01	Aluminum	ND	0.015	0.050	NE	U		094513-009	SW846 6020
06-Aug-13	Antimony	ND	0.001	0.003	0.006	U		094513-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094513-009	SW846 6020
	Barium	0.0474	0.0006	0.002	2.00			094513-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094513-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094513-009	SW846 6020
	Calcium	67.9	0.600	2.00	NE			094513-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094513-009	SW846 6020
	Cobalt	0.000132	0.0001	0.001	NE	J		094513-009	SW846 6020
	Copper	0.000737	0.00035	0.001	NE	J		094513-009	SW846 6020
	Iron	0.178	0.033	0.100	NE			094513-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094513-009	SW846 6020
	Magnesium	12.9	0.010	0.030	NE			094513-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		094513-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	094513-009	SW846 7470
	Nickel	0.00216	0.0005	0.002	NE			094513-009	SW846 6020
	Potassium	2.24	0.080	0.300	NE			094513-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		094513-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094513-009	SW846 6020
	Sodium	25.5	0.080	0.250	NE			094513-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094513-009	SW846 6020
	Uranium	0.00342	0.000067	0.0002	0.030			094513-009	SW846 6020
	Vanadium	0.00411	0.001	0.005	NE	J		094513-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094513-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-02	Aluminum	0.0505	0.015	0.050	NE			094517-009	SW846 6020
07-Aug-13	Antimony	ND	0.001	0.003	0.006	U		094517-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094517-009	SW846 6020
	Barium	0.047	0.0006	0.002	2.00			094517-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094517-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094517-009	SW846 6020
	Calcium	68.8	0.600	2.00	NE			094517-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094517-009	SW846 6020
	Cobalt	0.000137	0.0001	0.001	NE	J		094517-009	SW846 6020
	Copper	0.000806	0.00035	0.001	NE	J	0.0043U	094517-009	SW846 6020
	Iron	0.206	0.033	0.100	NE			094517-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094517-009	SW846 6020
	Magnesium	13.3	0.010	0.030	NE			094517-009	SW846 6020
	Manganese	0.00195	0.001	0.005	NE	J		094517-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	094517-009	SW846 7470
	Nickel	0.0022	0.0005	0.002	NE			094517-009	SW846 6020
	Potassium	2.07	0.080	0.300	NE			094517-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		094517-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094517-009	SW846 6020
	Sodium	23.5	0.080	0.250	NE			094517-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094517-009	SW846 6020
	Uranium	0.00346	0.000067	0.0002	0.030			094517-009	SW846 6020
	Vanadium	0.00543	0.001	0.005	NE			094517-009	SW846 6010
	Zinc	0.00474	0.0035	0.010	NE	J		094517-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-02 (Duplicate)	Aluminum	0.053	0.015	0.050	NE			094518-009	SW846 6020
07-Aug-13	Antimony	ND	0.001	0.003	0.006	U		094518-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094518-009	SW846 6020
	Barium	0.0473	0.0006	0.002	2.00			094518-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094518-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094518-009	SW846 6020
	Calcium	69.6	0.600	2.00	NE			094518-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094518-009	SW846 6020
	Cobalt	0.000133	0.0001	0.001	NE	J		094518-009	SW846 6020
	Copper	0.000847	0.00035	0.001	NE	J	0.0043U	094518-009	SW846 6020
	Iron	0.206	0.033	0.100	NE			094518-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094518-009	SW846 6020
	Magnesium	13.6	0.010	0.030	NE			094518-009	SW846 6020
	Manganese	0.00198	0.001	0.005	NE	J		094518-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	094518-009	SW846 7470
	Nickel	0.00212	0.0005	0.002	NE			094518-009	SW846 6020
	Potassium	2.06	0.080	0.300	NE			094518-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		094518-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094518-009	SW846 6020
	Sodium	24.0	0.080	0.250	NE			094518-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094518-009	SW846 6020
	Uranium	0.00337	0.000067	0.0002	0.030			094518-009	SW846 6020
	Vanadium	0.00493	0.001	0.005	NE	J		094518-009	SW846 6010
	Zinc	0.0061	0.0035	0.010	NE	J		094518-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-03	Aluminum	0.0276	0.015	0.050	NE	J		094520-009	SW846 6020
08-Aug-13	Antimony	ND	0.001	0.003	0.006	U		094520-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094520-009	SW846 6020
	Barium	0.0307	0.0006	0.002	2.00			094520-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094520-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094520-009	SW846 6020
	Calcium	292	0.600	2.00	NE			094520-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094520-009	SW846 6020
	Cobalt	0.000476	0.0001	0.001	NE	J		094520-009	SW846 6020
	Copper	0.00248	0.00035	0.001	NE			094520-009	SW846 6020
	Iron	0.758	0.033	0.100	NE			094520-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094520-009	SW846 6020
	Magnesium	32.8	0.010	0.030	NE			094520-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		094520-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	094520-009	SW846 7470
	Nickel	0.00741	0.0005	0.002	NE		J+	094520-009	SW846 6020
	Potassium	2.59	0.080	0.300	NE			094520-009	SW846 6020
	Selenium	0.0335	0.0015	0.005	0.050		J-	094520-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094520-009	SW846 6020
	Sodium	51.1	0.800	2.50	NE			094520-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094520-009	SW846 6020
	Uranium	0.00119	0.000067	0.0002	0.030			094520-009	SW846 6020
	Vanadium	0.00283	0.001	0.005	NE	J		094520-009	SW846 6010
	Zinc	0.00363	0.0035	0.010	NE	J		094520-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-04	Aluminum	0.0353	0.015	0.050	NE	J		094523-009	SW846 6020
12-Aug-13	Antimony	ND	0.001	0.003	0.006	U		094523-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094523-009	SW846 6020
	Barium	0.0559	0.0006	0.002	2.00			094523-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094523-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094523-009	SW846 6020
	Calcium	62.3	0.300	1.00	NE			094523-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094523-009	SW846 6020
	Cobalt	0.000101	0.0001	0.001	NE	J		094523-009	SW846 6020
	Copper	0.00106	0.00035	0.001	NE			094523-009	SW846 6020
	Iron	0.137	0.033	0.100	NE			094523-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094523-009	SW846 6020
	Magnesium	10.5	0.010	0.030	NE			094523-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		094523-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	094523-009	SW846 7470
	Nickel	0.00134	0.0005	0.002	NE	J		094523-009	SW846 6020
	Potassium	2.07	0.080	0.300	NE			094523-009	SW846 6020
	Selenium	0.00161	0.0015	0.005	0.050	J		094523-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094523-009	SW846 6020
	Sodium	23.7	0.400	1.25	NE			094523-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094523-009	SW846 6020
	Uranium	0.00295	0.000067	0.0002	0.030			094523-009	SW846 6020
	Vanadium	0.00545	0.001	0.005	NE			094523-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094523-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-05	Aluminum	ND	0.015	0.050	NE	U		094525-009	SW846 6020
13-Aug-13	Antimony	ND	0.001	0.003	0.006	U		094525-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094525-009	SW846 6020
	Barium	0.0378	0.0006	0.002	2.00			094525-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094525-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094525-009	SW846 6020
	Calcium	82.2	0.300	1.00	NE			094525-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094525-009	SW846 6020
	Cobalt	0.000115	0.0001	0.001	NE	J		094525-009	SW846 6020
	Copper	0.000643	0.00035	0.001	NE	J		094525-009	SW846 6020
	Iron	0.166	0.033	0.100	NE			094525-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094525-009	SW846 6020
	Magnesium	11.8	0.010	0.030	NE			094525-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		094525-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	094525-009	SW846 7470
	Nickel	0.00162	0.0005	0.002	NE	J		094525-009	SW846 6020
	Potassium	2.27	0.080	0.300	NE			094525-009	SW846 6020
	Selenium	0.00165	0.0015	0.005	0.050	J		094525-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094525-009	SW846 6020
	Sodium	31.5	0.400	1.25	NE			094525-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094525-009	SW846 6020
	Uranium	0.00343	0.000067	0.0002	0.030			094525-009	SW846 6020
	Vanadium	0.00358	0.001	0.005	NE	J		094525-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094525-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-06	Aluminum	0.152	0.015	0.050	NE			094527-009	SW846 6020
14-Aug-13	Antimony	ND	0.001	0.003	0.006	U		094527-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094527-009	SW846 6020
	Barium	0.0272	0.0006	0.002	2.00			094527-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094527-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094527-009	SW846 6020
	Calcium	124	0.300	1.00	NE			094527-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094527-009	SW846 6020
	Cobalt	0.000221	0.0001	0.001	NE	J		094527-009	SW846 6020
	Copper	0.00122	0.00035	0.001	NE		J-	094527-009	SW846 6020
	Iron	0.388	0.033	0.100	NE			094527-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094527-009	SW846 6020
	Magnesium	17.4	0.010	0.030	NE			094527-009	SW846 6020
	Manganese	0.00242	0.001	0.005	NE	J		094527-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	094527-009	SW846 7470
	Nickel	0.00255	0.0005	0.002	NE		J-	094527-009	SW846 6020
	Potassium	2.09	0.080	0.300	NE			094527-009	SW846 6020
	Selenium	0.00897	0.0015	0.005	0.050			094527-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094527-009	SW846 6020
	Sodium	29.0	0.400	1.25	NE			094527-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094527-009	SW846 6020
	Uranium	0.00114	0.000067	0.0002	0.030			094527-009	SW846 6020
	Vanadium	0.00493	0.001	0.005	NE	J		094527-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094527-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-08	Aluminum	ND	0.015	0.050	NE	U		094529-009	SW846 6020
15-Aug-13	Antimony	ND	0.001	0.003	0.006	U		094529-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094529-009	SW846 6020
	Barium	0.0211	0.0006	0.002	2.00			094529-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094529-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094529-009	SW846 6020
	Calcium	309	0.600	2.00	NE			094529-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094529-009	SW846 6020
	Cobalt	0.000494	0.0001	0.001	NE	J		094529-009	SW846 6020
	Copper	0.00323	0.00035	0.001	NE		J-	094529-009	SW846 6020
	Iron	0.773	0.033	0.100	NE			094529-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094529-009	SW846 6020
	Magnesium	40.4	0.010	0.030	NE			094529-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		094529-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	094529-009	SW846 7470
	Nickel	0.00695	0.0005	0.002	NE		J-	094529-009	SW846 6020
	Potassium	3.09	0.080	0.300	NE			094529-009	SW846 6020
	Selenium	0.0304	0.0015	0.005	0.050			094529-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094529-009	SW846 6020
	Sodium	82.1	0.800	2.50	NE			094529-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094529-009	SW846 6020
	Uranium	0.00164	0.000067	0.0002	0.030			094529-009	SW846 6020
	Vanadium	0.00369	0.001	0.005	NE	J		094529-009	SW846 6010
	Zinc	0.00365	0.0035	0.010	NE	J		094529-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-SW1-320	Aluminum	0.120	0.015	0.050	NE			094563-009	SW846 6020
11-Sep-13	Antimony	ND	0.001	0.003	0.006	U		094563-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094563-009	SW846 6020
	Barium	0.220	0.0006	0.002	2.00			094563-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094563-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094563-009	SW846 6020
	Calcium	68.6	0.300	1.00	NE	B		094563-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094563-009	SW846 6020
	Cobalt	0.000146	0.0001	0.001	NE	J		094563-009	SW846 6020
	Copper	0.000545	0.00035	0.001	NE	J		094563-009	SW846 6020
	Iron	0.195	0.033	0.100	NE			094563-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094563-009	SW846 6020
	Magnesium	12.8	0.010	0.030	NE			094563-009	SW846 6020
	Manganese	0.00418	0.001	0.005	NE	J		094563-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094563-009	SW846 7470
	Nickel	0.00181	0.0005	0.002	NE	J		094563-009	SW846 6020
	Potassium	2.08	0.080	0.300	NE			094563-009	SW846 6020
	Selenium	0.00416	0.0015	0.005	0.050	J		094563-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094563-009	SW846 6020
	Sodium	17.7	0.160	0.500	NE			094563-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094563-009	SW846 6020
	Uranium	0.00138	0.000067	0.0002	0.030	B		094563-009	SW846 6020
	Vanadium	0.00545	0.001	0.005	NE			094563-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094563-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-NW1-595	Aluminum	ND	0.015	0.050	NE	U		094536-009	SW846 6020
20-Aug-13	Antimony	ND	0.001	0.003	0.006	U		094536-009	SW846 6020
	Arsenic	0.00175	0.0017	0.005	0.010	J		094536-009	SW846 6020
	Barium	0.0472	0.0006	0.002	2.00			094536-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094536-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094536-009	SW846 6020
	Calcium	114	0.600	2.00	NE	B		094536-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094536-009	SW846 6020
	Cobalt	0.000108	0.0001	0.001	NE	J		094536-009	SW846 6020
	Copper	0.000626	0.00035	0.001	NE	J	J-	094536-009	SW846 6020
	Iron	0.168	0.033	0.100	NE			094536-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094536-009	SW846 6020
	Magnesium	18.9	0.010	0.030	NE			094536-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		094536-009	SW846 6020
	Mercury	ND	0.00067	0.0002	0.002	U		094536-009	SW846 7470
	Nickel	0.00186	0.0005	0.002	NE	J	J-	094536-009	SW846 6020
	Potassium	2.56	0.080	0.300	NE			094536-009	SW846 6020
	Selenium	0.00806	0.0015	0.005	0.050			094536-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094536-009	SW846 6020
	Sodium	33.0	0.800	0.250	NE			094536-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094536-009	SW846 6020
	Uranium	0.00238	0.000067	0.0002	0.030			094536-009	SW846 6020
	Vanadium	0.00349	0.001	0.005	NE	J		094536-009	SW846 6010
	Zinc	0.0067	0.0035	0.010	NE	J		094536-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-W-01	Aluminum	ND	0.015	0.050	NE	U		094545-009	SW846 6020
27-Aug-13	Antimony	ND	0.001	0.003	0.006	U		094545-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094545-009	SW846 6020
	Barium	0.0875	0.0006	0.002	2.00			094545-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094545-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094545-009	SW846 6020
	Calcium	88.2	0.300	1.00	NE			094545-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094545-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		094545-009	SW846 6020
	Copper	0.000555	0.00035	0.001	NE	J		094545-009	SW846 6020
	Iron	0.158	0.033	0.100	NE	B	0.19U	094545-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094545-009	SW846 6020
	Magnesium	10.9	0.010	0.030	NE			094545-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		094545-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094545-009	SW846 7470
	Nickel	0.00167	0.0005	0.002	NE	J		094545-009	SW846 6020
	Potassium	1.75	0.080	0.300	NE			094545-009	SW846 6020
	Selenium	0.00839	0.0015	0.005	0.050			094545-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094545-009	SW846 6020
	Sodium	21.7	0.080	0.250	NE			094545-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094545-009	SW846 6020
	Uranium	0.00104	0.000067	0.0002	0.030			094545-009	SW846 6020
	Vanadium	0.00405	0.001	0.005	NE	J		094545-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094545-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-W-19	Aluminum	ND	0.015	0.050	NE	U		094551-009	SW846 6020
03-Sep-13	Antimony	ND	0.001	0.003	0.006	U		094551-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094551-009	SW846 6020
	Barium	0.0467	0.0006	0.002	2.00			094551-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094551-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094551-009	SW846 6020
	Calcium	81.6	0.300	1.00	NE			094551-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094551-009	SW846 6020
	Cobalt	0.000102	0.0001	0.001	NE	J		094551-009	SW846 6020
	Copper	0.000522	0.00035	0.001	NE	J		094551-009	SW846 6020
	Iron	0.140	0.033	0.100	NE			094551-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094551-009	SW846 6020
	Magnesium	12.2	0.010	0.030	NE			094551-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		094551-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	094551-009	SW846 7470
	Nickel	0.00179	0.0005	0.002	NE	J		094551-009	SW846 6020
	Potassium	1.83	0.080	0.300	NE			094551-009	SW846 6020
	Selenium	0.00464	0.0015	0.005	0.050	J		094551-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094551-009	SW846 6020
	Sodium	23.4	0.080	0.250	NE			094551-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094551-009	SW846 6020
	Uranium	0.00142	0.000067	0.0002	0.030			094551-009	SW846 6020
	Vanadium	0.00441	0.001	0.005	NE	J	NJ-	094551-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094551-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-W-26	Aluminum	ND	0.015	0.050	NE	U		094549-009	SW846 6020
29-Aug-13	Antimony	ND	0.001	0.003	0.006	U		094549-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094549-009	SW846 6020
	Barium	0.0646	0.0006	0.002	2.00			094549-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094549-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094549-009	SW846 6020
	Calcium	216	0.300	1.00	NE			094549-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094549-009	SW846 6020
	Cobalt	0.000192	0.0001	0.001	NE	J		094549-009	SW846 6020
	Copper	0.0013	0.00035	0.001	NE		J-	094549-009	SW846 6020
	Iron	0.361	0.033	0.100	NE	B		094549-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094549-009	SW846 6020
	Magnesium	26.4	0.010	0.030	NE			094549-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		094549-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094549-009	SW846 7470
	Nickel	0.00362	0.0005	0.002	NE			094549-009	SW846 6020
	Potassium	2.65	0.080	0.300	NE			094549-009	SW846 6020
	Selenium	0.0242	0.0015	0.005	0.050			094549-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094549-009	SW846 6020
	Sodium	39.7	0.080	0.250	NE			094549-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094549-009	SW846 6020
	Uranium	0.00125	0.000067	0.0002	0.030			094549-009	SW846 6020
	Vanadium	0.00284	0.001	0.005	NE	J		094549-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094549-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-W-27	Aluminum	0.0164	0.015	0.050	NE	J		094547-009	SW846 6020
28-Aug-13	Antimony	ND	0.001	0.003	0.006	U		094547-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094547-009	SW846 6020
	Barium	0.0559	0.0006	0.002	2.00			094547-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094547-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094547-009	SW846 6020
	Calcium	116	0.300	1.00	NE			094547-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094547-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		094547-009	SW846 6020
	Copper	0.000492	0.00035	0.001	NE	J	J-	094547-009	SW846 6020
	Iron	0.198	0.033	0.100	NE	B		094547-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094547-009	SW846 6020
	Magnesium	16.1	0.010	0.030	NE			094547-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		094547-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094547-009	SW846 7470
	Nickel	0.0017	0.0005	0.002	NE	J		094547-009	SW846 6020
	Potassium	2.15	0.080	0.300	NE			094547-009	SW846 6020
	Selenium	0.0125	0.0015	0.005	0.050			094547-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094547-009	SW846 6020
	Sodium	28.1	0.080	0.250	NE			094547-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094547-009	SW846 6020
	Uranium	0.00106	0.000067	0.0002	0.030			094547-009	SW846 6020
	Vanadium	0.00371	0.001	0.005	NE	J		094547-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094547-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-2	Aluminum	ND	0.015	0.050	NE	U		094555-009	SW846 6020
05-Sep-13	Antimony	ND	0.001	0.003	0.006	U		094555-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094555-009	SW846 6020
	Barium	0.0437	0.0006	0.002	2.00			094555-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094555-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094555-009	SW846 6020
	Calcium	77.2	0.300	1.00	NE			094555-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094555-009	SW846 6020
	Cobalt	0.000127	0.0001	0.001	NE	J		094555-009	SW846 6020
	Copper	0.000612	0.00035	0.001	NE	J	0.0020U	094555-009	SW846 6020
	Iron	0.150	0.033	0.100	NE			094555-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094555-009	SW846 6020
	Magnesium	11.7	0.010	0.030	NE			094555-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		094555-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094555-009	SW846 7470
	Nickel	0.00236	0.0005	0.002	NE			094555-009	SW846 6020
	Potassium	1.82	0.080	0.300	NE			094555-009	SW846 6020
	Selenium	0.00555	0.0015	0.005	0.050			094555-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094555-009	SW846 6020
	Sodium	25.0	0.080	0.250	NE			094555-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094555-009	SW846 6020
	Uranium	0.00128	0.000067	0.0002	0.030			094555-009	SW846 6020
	Vanadium	0.00453	0.001	0.005	NE	J		094555-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094555-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-2 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		094556-009	SW846 6020
05-Sep-13	Antimony	ND	0.001	0.003	0.006	U		094556-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094556-009	SW846 6020
	Barium	0.0455	0.0006	0.002	2.00			094556-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094556-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094556-009	SW846 6020
	Calcium	85.5	0.300	1.00	NE			094556-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094556-009	SW846 6020
	Cobalt	0.000131	0.0001	0.001	NE	J		094556-009	SW846 6020
	Copper	0.000515	0.00035	0.001	NE	J	0.0020U	094556-009	SW846 6020
	Iron	0.136	0.033	0.100	NE			094556-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094556-009	SW846 6020
	Magnesium	11.5	0.010	0.030	NE			094556-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		094556-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094556-009	SW846 7470
	Nickel	0.00224	0.0005	0.002	NE			094556-009	SW846 6020
	Potassium	1.82	0.080	0.300	NE			094556-009	SW846 6020
	Selenium	0.00627	0.0015	0.005	0.050			094556-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094556-009	SW846 6020
	Sodium	23.8	0.080	0.250	NE			094556-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094556-009	SW846 6020
	Uranium	0.00132	0.000067	0.0002	0.030			094556-009	SW846 6020
	Vanadium	0.00477	0.001	0.005	NE	J		094556-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094556-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-3	Aluminum	ND	0.015	0.050	NE	U		094539-009	SW846 6020
21-Aug-13	Antimony	ND	0.001	0.003	0.006	U		094539-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094539-009	SW846 6020
	Barium	0.0449	0.0006	0.002	2.00			094539-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094539-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094539-009	SW846 6020
	Calcium	77.2	0.600	2.00	NE	B		094539-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094539-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		094539-009	SW846 6020
	Copper	0.000546	0.00035	0.001	NE	J		094539-009	SW846 6020
	Iron	0.117	0.033	0.100	NE			094539-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094539-009	SW846 6020
	Magnesium	12.4	0.010	0.030	NE			094539-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		094539-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094539-009	SW846 7470
	Nickel	0.00136	0.0005	0.002	NE	J		094539-009	SW846 6020
	Potassium	2.02	0.080	0.300	NE			094539-009	SW846 6020
	Selenium	0.00178	0.0015	0.005	0.050	J		094539-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094539-009	SW846 6020
	Sodium	26.7	0.080	0.250	NE			094539-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094539-009	SW846 6020
	Uranium	0.00271	0.000067	0.0002	0.030			094539-009	SW846 6020
	Vanadium	0.00413	0.001	0.005	NE	J		094539-009	SW846 6010
	Zinc	0.00351	0.0035	0.010	NE	J		094539-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-4	Aluminum	ND	0.015	0.050	NE	U		094558-009	SW846 6020
09-Sep-13	Antimony	ND	0.001	0.003	0.006	U		094558-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094558-009	SW846 6020
	Barium	0.171	0.0006	0.002	2.00			094558-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094558-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094558-009	SW846 6020
	Calcium	71.2	0.300	1.00	NE	B		094558-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094558-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		094558-009	SW846 6020
	Copper	0.000473	0.00035	0.001	NE	J		094558-009	SW846 6020
	Iron	0.115	0.033	0.100	NE			094558-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094558-009	SW846 6020
	Magnesium	14.3	0.010	0.030	NE			094558-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		094558-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094558-009	SW846 7470
	Nickel	0.00161	0.0005	0.002	NE	J		094558-009	SW846 6020
	Potassium	3.04	0.080	0.300	NE			094558-009	SW846 6020
	Selenium	0.00323	0.0015	0.005	0.050	J		094558-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094558-009	SW846 6020
	Sodium	23.1	0.400	1.25	NE			094558-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094558-009	SW846 6020
	Uranium	0.00292	0.000067	0.0002	0.030	B		094558-009	SW846 6020
	Vanadium	0.00539	0.001	0.005	NE			094558-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094558-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-6	Aluminum	0.304	0.015	0.050	NE			094541-009	SW846 6020
12-Sep-13	Antimony	ND	0.001	0.003	0.006	U		094541-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094541-009	SW846 6020
	Barium	0.0676	0.0006	0.002	2.00			094541-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094541-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094541-009	SW846 6020
	Calcium	63.3	0.300	1.00	NE	B		094541-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094541-009	SW846 6020
	Cobalt	0.00018	0.0001	0.001	NE	J		094541-009	SW846 6020
	Copper	0.000983	0.00035	0.001	NE	J		094541-009	SW846 6020
	Iron	0.367	0.033	0.100	NE			094541-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094541-009	SW846 6020
	Magnesium	12.5	0.100	0.300	NE			094541-009	SW846 6020
	Manganese	0.00808	0.001	0.005	NE			094541-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094541-009	SW846 7470
	Nickel	0.00186	0.0005	0.002	NE	J		094541-009	SW846 6020
	Potassium	2.33	0.080	0.300	NE			094541-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		094541-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094541-009	SW846 6020
	Sodium	22.4	0.400	1.25	NE			094541-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094541-009	SW846 6020
	Uranium	0.00296	0.000067	0.0002	0.030	B		094541-009	SW846 6020
	Vanadium	0.00577	0.001	0.005	NE			094541-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094541-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-7	Aluminum	0.202	0.015	0.050	NE			094561-009	SW846 6020
10-Sep-13	Antimony	ND	0.001	0.003	0.006	U		094561-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094561-009	SW846 6020
	Barium	0.228	0.0006	0.002	2.00			094561-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094561-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094561-009	SW846 6020
	Calcium	69.7	0.300	1.00	NE	B		094561-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094561-009	SW846 6020
	Cobalt	0.000901	0.0001	0.001	NE	J		094561-009	SW846 6020
	Copper	0.000747	0.00035	0.001	NE	J		094561-009	SW846 6020
	Iron	0.272	0.033	0.100	NE			094561-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094561-009	SW846 6020
	Magnesium	14.3	0.010	0.030	NE			094561-009	SW846 6020
	Manganese	0.00342	0.001	0.005	NE	J		094561-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094561-009	SW846 7470
	Nickel	0.00189	0.0005	0.002	NE	J		094561-009	SW846 6020
	Potassium	2.06	0.080	0.300	NE			094561-009	SW846 6020
	Selenium	0.00531	0.0015	0.005	0.050			094561-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094561-009	SW846 6020
	Sodium	18.3	0.160	0.500	NE			094561-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094561-009	SW846 6020
	Uranium	0.00176	0.000067	0.0002	0.030	B		094561-009	SW846 6020
	Vanadium	0.00475	0.001	0.005	NE	J		094561-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094561-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
WYO-3	Aluminum	0.0476	0.015	0.050	NE	J		094533-009	SW846 6020
19-Aug-13	Antimony	ND	0.001	0.003	0.006	U		094533-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094533-009	SW846 6020
	Barium	0.0416	0.0006	0.002	2.00			094533-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094533-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094533-009	SW846 6020
	Calcium	68.3	0.600	2.00	NE	B		094533-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094533-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		094533-009	SW846 6020
	Copper	0.000662	0.00035	0.001	NE	J	0.0037U	094533-009	SW846 6020
	Iron	0.131	0.033	0.100	NE			094533-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094533-009	SW846 6020
	Magnesium	12.8	0.010	0.030	NE			094533-009	SW846 6020
	Manganese	0.00159	0.001	0.005	NE	J		094533-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094533-009	SW846 7470
	Nickel	0.00133	0.0005	0.002	NE	J		094533-009	SW846 6020
	Potassium	2.33	0.080	0.300	NE			094533-009	SW846 6020
	Selenium	0.00172	0.0015	0.005	0.050	J		094533-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094533-009	SW846 6020
	Sodium	26.5	0.080	0.250	NE			094533-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094533-009	SW846 6020
	Uranium	0.0027	0.000067	0.0002	0.030			094533-009	SW846 6020
	Vanadium	0.00638	0.001	0.005	NE			094533-009	SW846 6010
	Zinc	0.00666	0.0035	0.010	NE	J		094533-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
WYO-3 (Duplicate)	Aluminum	0.0412	0.015	0.050	NE	J		094534-009	SW846 6020
19-Aug-13	Antimony	ND	0.001	0.003	0.006	U		094534-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094534-009	SW846 6020
	Barium	0.0404	0.0006	0.002	2.00			094534-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094534-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094534-009	SW846 6020
	Calcium	67.6	0.600	2.00	NE	B		094534-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094534-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		094534-009	SW846 6020
	Copper	0.000742	0.00035	0.001	NE	J	0.0037U	094534-009	SW846 6020
	Iron	0.136	0.033	0.100	NE			094534-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094534-009	SW846 6020
	Magnesium	13.0	0.010	0.030	NE			094534-009	SW846 6020
	Manganese	0.00169	0.001	0.005	NE	J		094534-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094534-009	SW846 7470
	Nickel	0.0014	0.0005	0.002	NE	J		094534-009	SW846 6020
	Potassium	2.37	0.080	0.300	NE			094534-009	SW846 6020
	Selenium	0.00166	0.0015	0.005	0.050	J		094534-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094534-009	SW846 6020
	Sodium	27.0	0.080	0.250	NE			094534-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094534-009	SW846 6020
	Uranium	0.00271	0.000067	0.0002	0.030			094534-009	SW846 6020
	Vanadium	0.00611	0.001	0.005	NE			094534-009	SW846 6010
	Zinc	0.00458	0.0035	0.010	NE	J		094534-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-5 *(Concluded)*
Summary of Target Analyte List Metals plus Uranium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
WYO-4	Aluminum	0.0382	0.015	0.050	NE	J		094543-009	SW846 6020
26-Aug-13	Antimony	ND	0.001	0.003	0.006	U		094543-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094543-009	SW846 6020
	Barium	0.159	0.0006	0.002	2.00			094543-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094543-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094543-009	SW846 6020
	Calcium	86.5	0.300	1.00	NE			094543-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094543-009	SW846 6020
	Cobalt	0.000115	0.0001	0.001	NE	J		094543-009	SW846 6020
	Copper	0.000964	0.00035	0.001	NE	J		094543-009	SW846 6020
	Iron	0.180	0.033	0.100	NE	B	0.19U	094543-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094543-009	SW846 6020
	Magnesium	14.0	0.010	0.030	NE			094543-009	SW846 6020
	Manganese	0.00154	0.001	0.005	NE	J		094543-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094543-009	SW846 7470
	Nickel	0.00197	0.0005	0.002	NE	J		094543-009	SW846 6020
	Potassium	1.98	0.080	0.300	NE			094543-009	SW846 6020
	Selenium	0.00615	0.0015	0.005	0.050			094543-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094543-009	SW846 6020
	Sodium	19.9	0.080	0.250	NE			094543-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094543-009	SW846 6020
	Uranium	0.00127	0.000067	0.0002	0.030			094543-009	SW846 6020
	Vanadium	0.00487	0.001	0.005	NE	J		094543-009	SW846 6010
	Zinc	0.00401	0.0035	0.010	NE	J		094543-009	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-6
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[b] (pCi/L)	MCL[d] (pCi/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
PGS-2	Americium-241	-2.4 ± 5.69	9.46	4.63	NE	U	BD	094511-033	EPA 901.1
05-Aug-13	Cesium-137	-0.26 ± 1.92	3.28	1.58	NE	U	BD	094511-033	EPA 901.1
	Cobalt-60	0.756 ± 1.99	3.61	1.71	NE	U	BD	094511-033	EPA 901.1
	Potassium-40	22.3 ± 46.1	31.0	14.5	NE	U	BD	094511-033	EPA 901.1
	Gross Alpha	1.04	NA	NA	15 pCi/L	NA	None	094511-034	EPA 900.0
	Gross Beta	2.83 ± 1.27	1.89	0.923	4mrem/yr		J	094511-034	EPA 900.0
	Tritium	-13.6 ± 110	190	92.3	NE	U	BD	094511-036	EPA 906.0 M
TA1-W-01	Americium-241	7.32 ± 9.79	11.9	5.82	NE	U	BD	094513-033	EPA 901.1
06-Aug-13	Cesium-137	-3.59 ± 4.17	3.83	1.86	NE	U	BD	094513-033	EPA 901.1
	Cobalt-60	1.04 ± 1.73	3.13	1.47	NE	U	BD	094513-033	EPA 901.1
	Potassium-40	-10 ± 33.6	37.4	17.8	NE	U	BD	094513-033	EPA 901.1
	Gross Alpha	0.22	NA	NA	15 pCi/L	NA	None	094513-034	EPA 900.0
	Gross Beta	4.03 ± 1.35	1.81	0.883	4mrem/yr		J	094513-034	EPA 900.0
	Tritium	13.6 ± 111	191	92.5	NE	U	BD	094513-036	EPA 906.0 M
TA1-W-02	Americium-241	-2.68 ± 6.23	8.94	4.37	NE	U	BD	094517-033	EPA 901.1
07-Aug-13	Cesium-137	0.749 ± 2.33	2.15	1.02	NE	U	BD	094517-033	EPA 901.1
	Cobalt-60	-2.48 ± 3.37	2.81	1.32	NE	U	BD	094517-033	EPA 901.1
	Potassium-40	-18.6 ± 29.0	36.2	17.3	NE	U	BD	094517-033	EPA 901.1
	Gross Alpha	1.24	NA	NA	15 pCi/L	NA	None	094517-034	EPA 900.0
	Gross Beta	3.35 ± 0.900	1.06	0.515	4mrem/yr			094517-034	EPA 900.0
	Tritium	6.77 ± 110	190	92.1	NE	U	BD	094517-036	EPA 906.0 M
TA1-W-02 (Duplicate)	Americium-241	-14.6 ± 17.0	18.3	8.94	NE	U	BD	094518-033	EPA 901.1
07-Aug-13	Cesium-137	-1.61 ± 3.22	3.88	1.87	NE	U	BD	094518-033	EPA 901.1
	Cobalt-60	-4.2 ± 5.01	4.59	2.19	NE	U	BD	094518-033	EPA 901.1
	Potassium-40	-23.2 ± 44.1	54.5	26.2	NE	U	BD	094518-033	EPA 901.1
	Gross Alpha	0.92	NA	NA	15 pCi/L	NA	None	094518-034	EPA 900.0
	Gross Beta	2.53 ± 1.14	1.71	0.830	4mrem/yr		J	094518-034	EPA 900.0
	Tritium	22.3 ± 110	188	91.2	NE	U	BD	094518-036	EPA 906.0 M
TA1-W-03	Americium-241	0.475 ± 14.7	22.8	11.1	NE	U	BD	094520-033	EPA 901.1
08-Aug-13	Cesium-137	-0.208 ± 1.78	3.15	1.51	NE	U	BD	094520-033	EPA 901.1
	Cobalt-60	-0.0918 ± 1.87	3.38	1.58	NE	U	BD	094520-033	EPA 901.1
	Potassium-40	-11.9 ± 37.8	43.0	20.4	NE	U	BD	094520-033	EPA 901.1
	Gross Alpha	-4.03	NA	NA	15 pCi/L	NA	None	094520-034	EPA 900.0
	Gross Beta	0.560 ± 2.80	4.80	2.33	4mrem/yr	U	BD	094520-034	EPA 900.0
	Tritium	25.0 ± 112	191	92.9	NE	U	BD	094520-036	EPA 906.0 M

Refer to footnotes on page 6A-49.

Table 6A-6 *(Continued)*
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[b] (pCi/L)	MCL[d] (pCi/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-04	Americium-241	0.896 ± 7.55	13.1	6.38	NE	U	BD	094523-033	EPA 901.1
12-Aug-13	Cesium-137	-1.38 ± 2.44	4.03	1.91	NE	U	BD	094523-033	EPA 901.1
	Cobalt-60	0.463 ± 2.58	4.73	2.19	NE	U	BD	094523-033	EPA 901.1
	Potassium-40	45.7 ± 52.3	45.2	20.8	NE	X	R	094523-033	EPA 901.1
	Gross Alpha	-0.01	NA	NA	15 pCi/L	NA	None	094523-034	EPA 900.0
	Gross Beta	0.870 ± 0.504	0.761	0.365	4mrem/yr		J	094523-034	EPA 900.0
	Tritium	-29.5 ± 93.2	180	81.1	NE	U	BD	094523-036	EPA 906.0 M
TA1-W-05	Americium-241	2.37 ± 13.5	23.8	11.6	NE	U	BD	094525-033	EPA 901.1
13-Aug-13	Cesium-137	1.64 ± 1.95	3.38	1.62	NE	U	BD	094525-033	EPA 901.1
	Cobalt-60	3.71 ± 3.88	3.71	1.53	NE	U	BD	094525-033	EPA 901.1
	Potassium-40	31.1 ± 38.7	31.6	14.6	NE	U	BD	094525-033	EPA 901.1
	Gross Alpha	-1.98	NA	NA	15 pCi/L	NA	None	094525-034	EPA 900.0
	Gross Beta	1.83 ± 1.02	1.56	0.756	4mrem/yr		J	094525-034	EPA 900.0
	Tritium	-5.77 ± 93.9	176	79.4	NE	U	BD	094525-036	EPA 906.0 M
TA1-W-06	Americium-241	-18.6 ± 20.7	17.8	8.67	NE	U	BD	094527-033	EPA 901.1
14-Aug-13	Cesium-137	-0.472 ± 2.01	3.47	1.66	NE	U	BD	094527-033	EPA 901.1
	Cobalt-60	1.77 ± 3.73	4.07	1.92	NE	U	BD	094527-033	EPA 901.1
	Potassium-40	7.25 ± 53.3	35.2	16.4	NE	U	BD	094527-033	EPA 901.1
	Gross Alpha	-1.70	NA	NA	15 pCi/L	NA	None	094527-034	EPA 900.0
	Gross Beta	1.54 ± 0.700	1.01	0.482	4mrem/yr		J	094527-034	EPA 900.0
	Tritium	43.9 ± 101	179	80.5	NE	U	BD	094527-036	EPA 906.0 M
TA1-W-08	Americium-241	6.34 ± 12.7	21.3	10.4	NE	U	BD	094529-033	EPA 901.1
15-Aug-13	Cesium-137	1.75 ± 2.18	3.66	1.76	NE	U	BD	094529-033	EPA 901.1
	Cobalt-60	-0.154 ± 2.15	3.75	1.76	NE	U	BD	094529-033	EPA 901.1
	Potassium-40	20.2 ± 45.3	32.9	15.3	NE	U	BD	094529-033	EPA 901.1
	Gross Alpha	-4.49	NA	NA	15 pCi/L	NA	None	094529-034	EPA 900.0
	Gross Beta	1.18 ± 2.24	3.81	1.82	4mrem/yr	U	BD	094529-034	EPA 900.0
	Tritium	-5.8 ± 81.2	155	68.8	NE	U	BD	094529-036	EPA 906.0 M

Refer to footnotes on page 6A-49.

Table 6A-6 *(Continued)*
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[b] (pCi/L)	MCL[d] (pCi/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-SW1-320	Americium-241	-19 ± 14.4	18.3	8.90	NE	U	BD	094563-033	EPA 901.1
11-Sep-13	Cesium-137	-1.12 ± 3.48	4.54	2.19	NE	U	BD	094563-033	EPA 901.1
	Cobalt-60	0.698 ± 2.05	3.70	1.73	NE	U	BD	094563-033	EPA 901.1
	Potassium-40	-11.5 ± 35.4	45.5	21.6	NE	U	BD	094563-033	EPA 901.1
	Gross Alpha	0.12	NA	NA	15 pCi/L	NA	None	094563-034	EPA 900.0
	Gross Beta	2.81 ± 1.23	1.78	0.855	4mrem/yr		J	094563-034	EPA 900.0
	Tritium	-10.5 ± 94.7	179	80.6	NE	U	BD	094563-036	EPA 906.0 M
TA2-NW1-595	Americium-241	5.51 ± 11.4	17.3	8.44	NE	U	BD	094536-033	EPA 901.1
20-Aug-13	Cesium-137	-0.327 ± 1.99	3.37	1.61	NE	U	BD	094536-033	EPA 901.1
	Cobalt-60	1.80 ± 2.23	3.89	1.83	NE	U	BD	094536-033	EPA 901.1
	Potassium-40	-25.3 ± 40.3	47.4	22.6	NE	U	BD	094536-033	EPA 901.1
	Gross Alpha	-1.20	NA	NA	15 pCi/L	NA	None	094536-034	EPA 900.0
	Gross Beta	1.34 ± 0.720	1.09	0.520	4mrem/yr		J	094536-034	EPA 900.0
	Tritium	-47 ± 90.6	179	80.8	NE	U	BD	094536-036	EPA 906.0 M
TA2-W-01	Americium-241	10.8 ± 13.0	20.0	9.71	NE	U	BD	094545-033	EPA 901.1
27-Aug-13	Cesium-137	1.24 ± 1.99	3.40	1.62	NE	U	BD	094545-033	EPA 901.1
	Cobalt-60	-0.254 ± 1.87	3.39	1.58	NE	U	BD	094545-033	EPA 901.1
	Potassium-40	0.0163 ± 46.5	30.6	14.1	NE	U	BD	094545-033	EPA 901.1
	Gross Alpha	-2.33	NA	NA	15 pCi/L	NA	None	094545-034	EPA 900.0
	Gross Beta	2.63 ± 1.07	1.56	0.756	4mrem/yr		J	094545-034	EPA 900.0
	Tritium	-4.6 ± 69.4	128	58.7	NE	U	BD	094545-036	EPA 906.0 M
TA2-W-19	Americium-241	1.19 ± 17.1	27.1	13.1	NE	U	BD	094551-033	EPA 901.1
03-Sep-13	Cesium-137	-0.639 ± 2.43	3.52	1.66	NE	U	BD	094551-033	EPA 901.1
	Cobalt-60	3.19 ± 2.18	3.82	1.76	NE	U	BD	094551-033	EPA 901.1
	Potassium-40	-6.53 ± 35.7	51.3	24.1	NE	U	BD	094551-033	EPA 901.1
	Gross Alpha	2.70	NA	NA	15 pCi/L	NA	None	094551-034	EPA 900.0
	Gross Beta	1.50 ± 1.05	1.68	0.819	4mrem/yr	U	BD	094551-034	EPA 900.0
	Tritium	-101 ± 109	194	94.3	NE	U	BD	094551-036	EPA 906.0 M
TA2-W-26	Americium-241	2.18 ± 15.5	27.3	13.3	NE	U	BD	094549-033	EPA 901.1
29-Aug-13	Cesium-137	-0.0407 ± 1.98	3.40	1.61	NE	U	BD	094549-033	EPA 901.1
	Cobalt-60	-1.09 ± 2.25	3.69	1.70	NE	U	BD	094549-033	EPA 901.1
	Potassium-40	-8.36 ± 40.6	49.3	23.2	NE	U	BD	094549-033	EPA 901.1
	Gross Alpha	-4.21	NA	NA	15 pCi/L	NA	None	094549-034	EPA 900.0
	Gross Beta	2.68 ± 1.99	3.21	1.56	4mrem/yr	U	BD	094549-034	EPA 900.0
	Tritium	-11.1 ± 67.5	126	57.6	NE	U	BD	094549-036	EPA 906.0 M

Refer to footnotes on page 6A-49.

Table 6A-6 *(Continued)*
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[b] (pCi/L)	MCL[d] (pCi/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-W-27	Americium-241	2.31 ± 6.96	10.7	5.23	NE	U	BD	094547-033	EPA 901.1
28-Aug-13	Cesium-137	3.24 ± 2.49	3.63	1.73	NE	U	BD	094547-033	EPA 901.1
	Cobalt-60	-0.0665 ± 2.28	4.11	1.93	NE	U	BD	094547-033	EPA 901.1
	Potassium-40	-31.9 ± 36.4	50.6	24.1	NE	U	BD	094547-033	EPA 901.1
	Gross Alpha	-0.91	NA	NA	15 pCi/L	NA	None	094547-034	EPA 900.0
	Gross Beta	1.88 ± 1.17	1.86	0.908	4mrem/yr		J	094547-034	EPA 900.0
	Tritium	17.3 ± 69.9	125	57.2	NE	U	BD	094547-036	EPA 906.0 M
TJA-2	Americium-241	-3.22 ± 13.1	20.0	9.79	NE	U	BD	094555-033	EPA 901.1
05-Sep-13	Cesium-137	1.49 ± 2.43	4.43	2.13	NE	U	BD	094555-033	EPA 901.1
	Cobalt-60	1.83 ± 2.25	4.00	1.87	NE	U	BD	094555-033	EPA 901.1
	Potassium-40	-21.1 ± 39.9	49.5	23.4	NE	U	BD	094555-033	EPA 901.1
	Gross Alpha	2.84	NA	NA	15 pCi/L	NA	None	094555-034	EPA 900.0
	Gross Beta	2.02 ± 1.11	1.73	0.843	4mrem/yr		J	094555-034	EPA 900.0
	Tritium	27.3 ± 94.9	171	76.7	NE	U	BD	094555-036	EPA 906.0 M
TJA-2 (Duplicate)	Americium-241	2.45 ± 7.92	11.9	5.79	NE	U	BD	094556-033	EPA 901.1
05-Sep-13	Cesium-137	0.969 ± 1.90	3.37	1.61	NE	U	BD	094556-033	EPA 901.1
	Cobalt-60	-0.584 ± 1.79	3.14	1.45	NE	U	BD	094556-033	EPA 901.1
	Potassium-40	-36.4 ± 40.5	43.6	20.6	NE	U	BD	094556-033	EPA 901.1
	Gross Alpha	0.56	NA	NA	15 pCi/L	NA	None	094556-034	EPA 900.0
	Gross Beta	1.15 ± 1.05	1.72	0.836	4mrem/yr	U	BD	094556-034	EPA 900.0
	Tritium	32.5 ± 95.5	171	76.7	NE	U	BD	094556-036	EPA 906.0 M
TJA-3	Americium-241	-10.5 ± 14.7	19.5	9.50	NE	U	BD	094539-033	EPA 901.1
21-Aug-13	Cesium-137	2.51 ± 2.78	4.56	2.19	NE	U	BD	094539-033	EPA 901.1
	Cobalt-60	-0.391 ± 2.97	4.32	2.03	NE	U	BD	094539-033	EPA 901.1
	Potassium-40	-25 ± 43.9	49.5	23.4	NE	U	BD	094539-033	EPA 901.1
	Gross Alpha	2.06	NA	NA	15 pCi/L	NA	None	094539-034	EPA 900.0
	Gross Beta	1.45 ± 0.707	1.05	0.501	4mrem/yr		J	094539-034	EPA 900.0
	Tritium	-17.6 ± 94.2	179	80.8	NE	U	BD	094539-036	EPA 906.0 M
TJA-4	Americium-241	0.763 ± 7.39	11.1	5.40	NE	U	BD	094558-033	EPA 901.1
09-Sep-13	Cesium-137	-1.6 ± 4.97	3.46	1.65	NE	U	BD	094558-033	EPA 901.1
	Cobalt-60	2.76 ± 2.35	3.38	1.57	NE	U	BD	094558-033	EPA 901.1
	Potassium-40	-31.9 ± 33.6	39.4	18.5	NE	U	BD	094558-033	EPA 901.1
	Gross Alpha	2.78	NA	NA	15 pCi/L	NA	None	094558-034	EPA 900.0
	Gross Beta	3.90 ± 1.39	1.76	0.842	4mrem/yr		J	094558-034	EPA 900.0
	Tritium	109 ± 97.9	155	68.8	NE	U	BD	094558-036	EPA 906.0 M

Refer to footnotes on page 6A-49.

Table 6A-6 *(Concluded)*
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[b] (pCi/L)	MCL[d] (pCi/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-6	Americium-241	8.06 ± 11.4	16.9	8.24	NE	U	BD	094541-033	EPA 901.1
12-Sep-13	Cesium-137	0.00772 ± 2.02	3.45	1.65	NE	U	BD	094541-033	EPA 901.1
	Cobalt-60	1.31 ± 2.13	3.77	1.78	NE	U	BD	094541-033	EPA 901.1
	Potassium-40	6.94 ± 46.2	30.0	13.9	NE	U	BD	094541-033	EPA 901.1
	Gross Alpha	1.95	NA	NA	15 pCi/L	NA	None	094541-034	EPA 900.0
	Gross Beta	2.49 ± 0.863	1.09	0.515	4mrem/yr		J	094541-034	EPA 900.0
	Tritium	86.6 ± 94.6	155	68.5	NE	U	BD	094541-036	EPA 906.0 M
TJA-7	Americium-241	0.616 ± 7.11	10.6	5.16	NE	U	BD	094561-033	EPA 901.1
10-Sep-13	Cesium-137	-0.565 ± 2.79	3.66	1.76	NE	U	BD	094561-033	EPA 901.1
	Cobalt-60	1.52 ± 1.98	3.56	1.67	NE	U	BD	094561-033	EPA 901.1
	Potassium-40	-7.8 ± 40.4	48.5	23.1	NE	U	BD	094561-033	EPA 901.1
	Gross Alpha	1.19	NA	NA	15 pCi/L	NA	None	094561-034	EPA 900.0
	Gross Beta	1.95 ± 1.02	1.52	0.725	4mrem/yr		J	094561-034	EPA 900.0
	Tritium	44.6 ± 88.2	155	68.5	NE	U	BD	094561-036	EPA 906.0 M
WYO-3	Americium-241	3.25 ± 7.49	11.2	5.46	NE	U	BD	094533-033	EPA 901.1
19-Aug-13	Cesium-137	0.753 ± 1.79	3.20	1.52	NE	U	BD	094533-033	EPA 901.1
	Cobalt-60	1.69 ± 2.17	3.89	1.83	NE	U	BD	094533-033	EPA 901.1
	Potassium-40	-17.1 ± 30.5	42.8	20.2	NE	U	BD	094533-033	EPA 901.1
	Gross Alpha	3.02	NA	NA	15 pCi/L	NA	None	094533-034	EPA 900.0
	Gross Beta	2.10 ± 0.816	1.14	0.548	4mrem/yr		J	094533-034	EPA 900.0
	Tritium	-35.5 ± 92.7	180	81.4	NE	U	BD	094533-036	EPA 906.0 M
WYO-3 (Duplicate)	Americium-241	-7.47 ± 12.0	19.3	9.37	NE	U	BD	094534-033	EPA 901.1
19-Aug-13	Cesium-137	2.63 ± 4.59	3.27	1.56	NE	U	BD	094534-033	EPA 901.1
	Cobalt-60	0.729 ± 2.09	3.78	1.77	NE	U	BD	094534-033	EPA 901.1
	Potassium-40	-27.4 ± 33.2	42.0	19.8	NE	U	BD	094534-033	EPA 901.1
	Gross Alpha	1.04	NA	NA	15 pCi/L	NA	None	094534-034	EPA 900.0
	Gross Beta	1.76 ± 0.698	0.961	0.459	4mrem/yr		J	094534-034	EPA 900.0
	Tritium	-47.4 ± 91.4	181	81.5	NE	U	BD	094534-036	EPA 906.0 M
WYO-4	Americium-241	14.5 ± 19.0	28.2	13.7	NE	U	BD	094543-033	EPA 901.1
26-Aug-13	Cesium-137	-0.622 ± 1.81	3.16	1.50	NE	U	BD	094543-033	EPA 901.1
	Cobalt-60	-0.0543 ± 1.93	3.41	1.58	NE	U	BD	094543-033	EPA 901.1
	Potassium-40	-14.1 ± 39.2	44.8	21.2	NE	U	BD	094543-033	EPA 901.1
	Gross Alpha	-1.67	NA	NA	15 pCi/L	NA	None	094543-034	EPA 900.0
	Gross Beta	3.84 ± 1.19	1.54	0.747	4mrem/yr		J	094543-034	EPA 900.0
	Tritium	-7.92 ± 63.9	119	54.3	NE	U	BD	094543-036	EPA 906.0 M

Refer to footnotes on page 6A-49.

Table 6A-7
Summary of Field Water Quality Measurements[h],
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
TA2-SW1-320	21-Mar-13	14.03	445	244.5	7.52	0.40	72.9	7.58
TA2-W-01	06-Mar-13	17.82	563	220.7	7.33	0.21	82.8	7.85
TA2-W-19	13-Mar-13	18.20	526	230.5	7.34	0.36	87.7	8.27
TA2-W-26	12-Mar-13	17.62	1189	228.4	7.30	0.42	81.3	7.71
TA2-W-27	07-Mar-13	19.85	720	222.6	7.30	0.33	91.2	8.29
TJA-2	14-Mar-13	17.69	521	233.7	7.35	0.28	88.1	8.33
TJA-3	04-Mar-13	17.96	445	222.3	7.18	0.88	73.6	6.96
TJA-4	19-Mar-13	16.93	500	230.5	7.29	0.24	59.5	5.70
TJA-6	05-Mar-13	17.89	415	212.3	7.19	2.32	61.5	5.82
TJA-7	20-Mar-13	17.40	460	228.9	7.27	0.93	79.5	7.53
WYO-4	18-Mar-13	14.98	572	242.1	7.49	0.39	78.7	7.90
TA2-SW1-320	13-Jun-13	23.72	451	379.9	7.58	0.70	88.5	7.50
TA2-W-19	19-Jun-13	22.45	524	180.7	7.24	0.36	101.5	8.77
TA2-W-26	20-Jun-13	19.61	1197	178.8	7.24	0.67	84.5	7.71
TJA-2	18-Jun-13	18.62	522	393.8	7.54	0.43	88.7	8.29
TJA-4	14-Jun-13	19.48	505	372.8	7.45	0.51	64.6	5.93
TJA-7	17-Jun-13	21.98	464	399.0	7.40	1.82	87.0	7.75
WYO-4	24-Jun-13	21.80	574	161.1	7.33	0.58	86.7	7.60
PGS-2	05-Aug-13	22.08	648	125.4	7.60	1.01	10.6	0.92
TA1-W-01	06-Aug-13	22.94	540	153.2	7.34	0.42	79.0	6.85
TA1-W-02	07-Aug-13	20.63	523	148.9	7.37	1.72	66.1	5.92
TA1-W-03	08-Aug-13	18.87	1754	140.6	7.54	0.95	83.2	7.70
TA1-W-04	12-Aug-13	19.48	493	144.8	7.47	0.55	69.7	6.38
TA1-W-05	13-Aug-13	20.54	610	159.7	7.26	0.47	81.8	7.34
TA1-W-06	14-Aug-13	19.33	892	143.6	7.62	4.74	83.9	7.70
TA1-W-08	15-Aug-13	20.66	2050	139.1	7.58	0.56	82.1	7.32
TA2-SW1-320	11-Sep-13	18.71	526	135.6	7.67	3.57	80.7	7.42
TA2-NW1-595	20-Aug-13	20.21	812	140.7	7.40	0.67	86.3	7.79
TA2-W-01	27-Aug-13	20.48	656	139.5	7.53	0.65	86.0	7.73
TA2-W-19	03-Sep-13	19.12	611	151.1	7.56	0.45	93.8	8.66
TA2-W-26	29-Aug-13	19.38	1403	141.1	7.51	0.65	83.4	7.64
TA2-W-27	28-Aug-13	21.32	841	139.7	7.49	0.84	95.5	8.44
TJA-2	05-Sep-13	19.59	610	138.1	7.54	0.65	90.9	8.30
TJA-3	21-Aug-13	21.63	523	148.0	7.40	0.44	77.9	6.86

Refer to footnotes on page 6A-49.

Table 6A-7 *(Concluded)*
Summary of Field Water Quality Measurements[h],
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
TJA-4	09-Sep-13	19.72	590	138.5	7.48	0.48	64.4	5.89
TJA-6	12-Sep-13	19.85	489	135.0	7.43	9.69	63.8	5.82
TJA-7	10-Sep-13	18.23	544	135.5	7.51	3.30	85.4	8.03
WYO-3	19-Aug-13	21.81	502	123.5	7.73	0.88	82.3	7.21
WYO-4	26-Aug-13	21.25	670	127.4	7.65	1.21	85.7	7.57
TA2-SW1-320	22-Nov-13	5.05	336.1	256.9	7.83	9.79	61.0	7.76
TA2-W-19	14-Nov-13	18.20	541.3	220.0	7.66	0.42	91.7	8.60
TA2-W-26	12-Nov-13	14.73	1172.5	194.5	7.48	0.86	77.4	7.81
TJA-2	19-Nov-13	15.54	511.9	264.2	7.67	0.55	84.7	8.45
TJA-3	13-Nov-13	19.23	477.0	210.3	7.53	0.41	76.2	7.00
TJA-4	20-Nov-13	16.48	505.6	282.7	7.63	0.66	61.5	6.00
TJA-7	21-Nov-13	16.57	462.4	270.6	7.69	1.84	81.8	7.96
WYO-4	18-Nov-13	13.95	539.4	224.0	7.77	0.72	78.1	8.05

Refer to footnotes on page 6A-49.

This page intentionally left blank.

Footnotes for Tijeras Arroyo Groundwater Analytical Results Tables

%	= percent.
μg/L	= micrograms per liter.
CFR	= Code of Federal Regulations.
EPA	= U.S. Environmental Protection Agency.
ID	= Identifier.
mg/L	= milligrams per liter.
mrem	= millirem per year.
No.	= Number.
pCi/L	= picocuries per liter.

[a]Result

Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 10A-1-4).

Bold	= Values in bold exceed the established MCL.
ND	= Not detected (at MDL). Activities of zero or less are considered to be not detected.

[b]MDL or MDA

MDL applies to the data listed in Tables 6A-1 through 6A-5. MDA applies to the radiological data in Table 6A-6.

MDA	= The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.
MDL	= Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA	= Not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

[c]PQL or Critical Level

PQL applies to the data listed in Tables 6A-1 through 6A-5. Critical Level applies to Table 6A-6.

Critical level	= The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA	= Not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.
PQL	= Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

[d]MCL

MCL = Maximum contaminant level. MCLs were established by the EPA Office of Water, National Primary Water Regulations (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- Gross Alpha particle activity, excluding total uranium = 15 pCi/L (40 CFR Parts 9, 141, and 142, Table 10A- 1-4).
- Any combination of Beta and/or Gamma emitting radionuclides = 4 mrem/yr (as dose rate).

NE = Not established.

[e]Lab Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

B	= Analyte is detected in associated laboratory method blank.
J	= Amount detected is below the PQL.
N	= Results associated with a spike analysis that was outside control limits.
NA	= Not applicable.
U	= Analyte is absent or below the MDL.
X	= Data rejected due to peak not meeting identification criteria.

Footnotes for Tijeras Arroyo Groundwater Analytical Results Tables (Concluded)

[f]Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = The associated value is an estimated quantity.
J+ = The associated numerical value is an estimated quantity with a suspected positive bias.
J- = The associated numerical value is an estimated quantity with a suspected negative bias.
None = No data validation for corrected gross alpha activity.
NJ- = Presumptive evidence of the presence of the material at an estimated quantity with a suspected negative bias.
R = The data are unusable, and resampling or reanalysis are necessary for verification.
U = The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
UJ = The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

[g]Analytical Method

Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.

DOE, 1990, "EML [Environmental Measurements Laboratory] Procedures Manual," 27th ed., Vol. 1, Rev. 1992, HASL-300.

EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.

EPA, 1984, "Methods for Chemical Analysis of Water and Wastes." EPA 600-4-79-020.

EPA, 1983, "The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0," EPA-600/4-84-017.

EPA, 1980, "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.

DOE = U.S. Department of Energy.
HASL = Health and Safety Laboratory.
SM = Standard Method.

[h]Field Water Quality Measurements

Field measurements collected prior to sampling.

°C = degrees Celsius.
% sat = percent saturation.
μmhos/cm = micromhos per centimeter.
mg/L = milligrams per liter.
mV = millivolts.
NTU = nephelometric turbidity units.
pH = potential of hydrogen (negative logarithm of the hydrogen ion concentration).

Attachment 6B
Tijeras Arroyo Groundwater
Plots

This page intentionally left blank.

Attachment 6B Plots

6B-1 Trichloroethene Concentrations, WYO-4 ..... 6B-5

6B-2 Nitrate plus Nitrite Concentrations, TA2-SW1-320 ..... 6B-6

6B-3 Nitrate plus Nitrite Concentrations, TA2-W-19 ..... 6B-7

6B-4 Nitrate plus Nitrite Concentrations, TJA-2 ..... 6B-8

6B-5 Nitrate plus Nitrite Concentrations, TJA-4 ..... 6B-9

6B-6 Nitrate plus Nitrite Concentrations, TJA-7 ..... 6B-10

This page intentionally left blank.

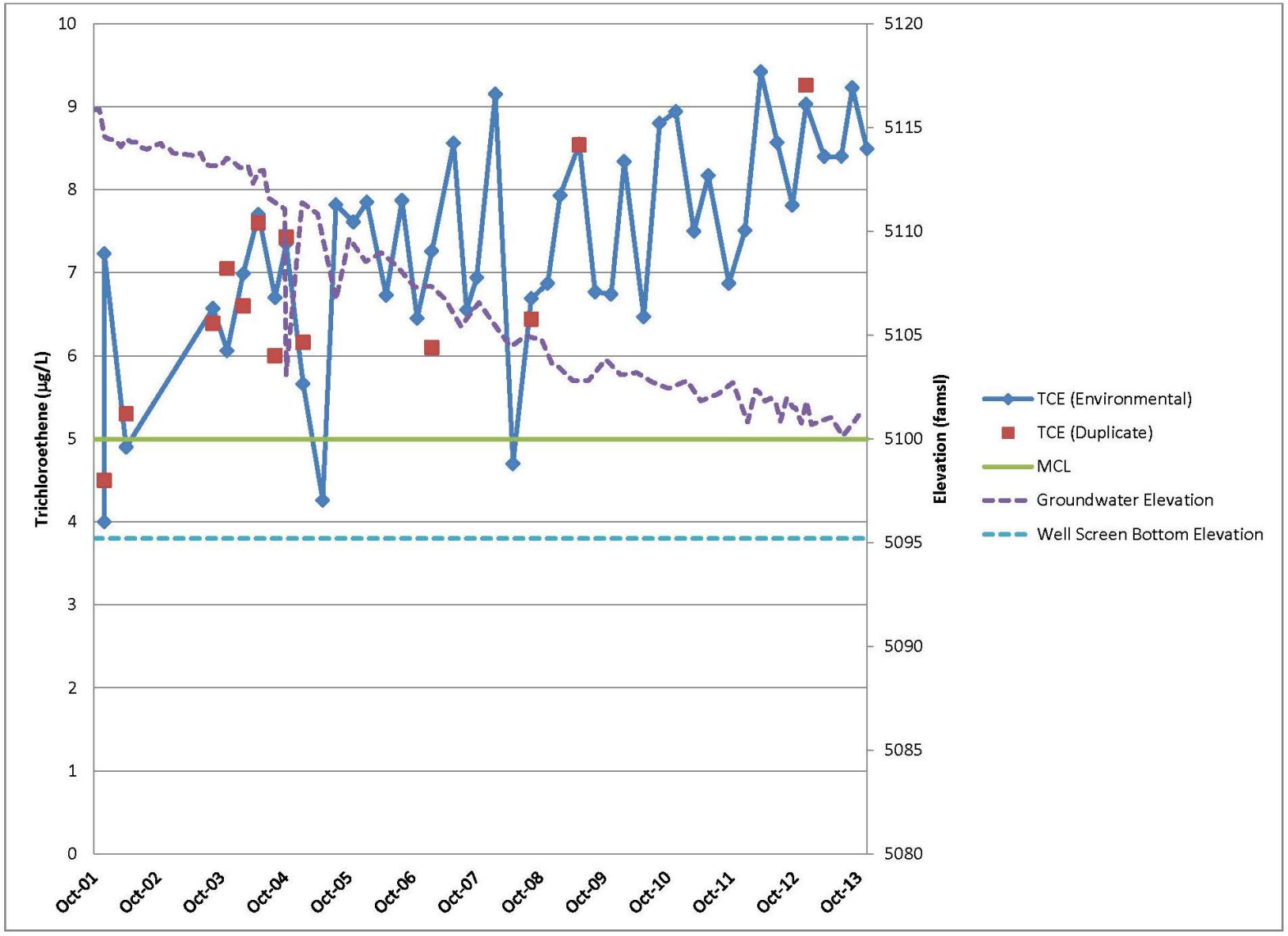


Figure 6B-1. Trichloroethene Concentrations, WYO-4

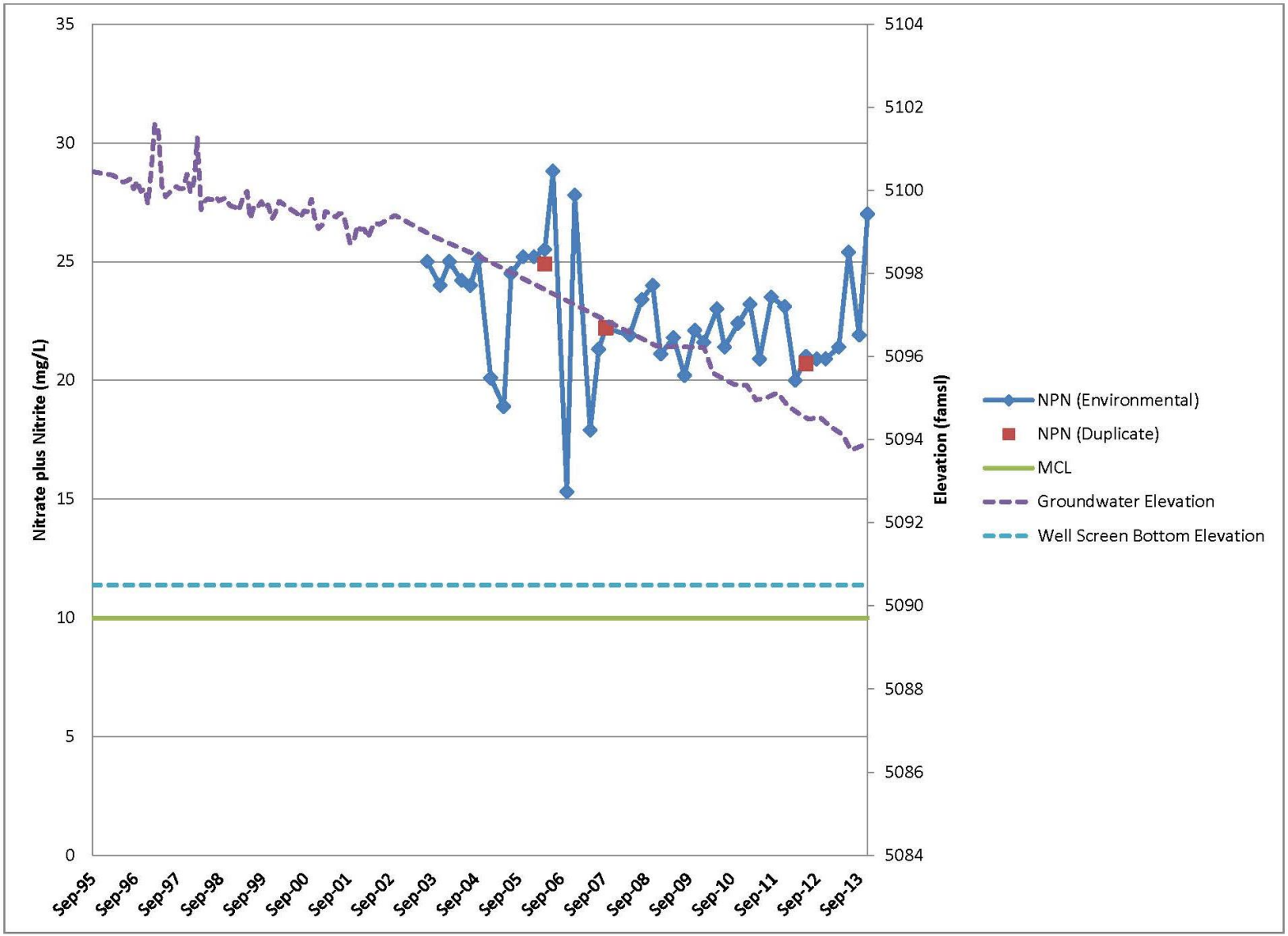


Figure 6B-2. Nitrate plus Nitrite Concentrations, TA2-SW1-320

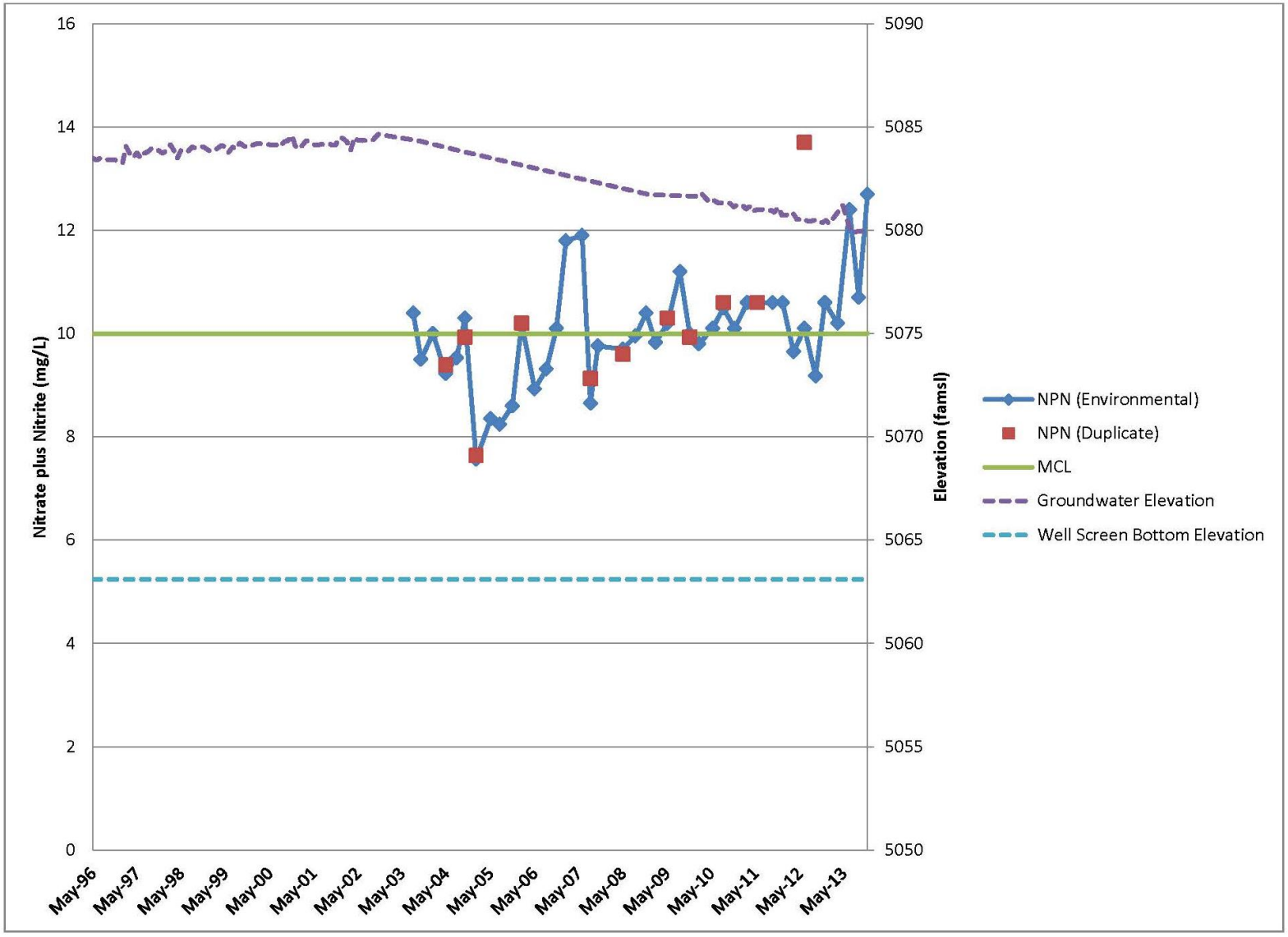


Figure 6B-3. Nitrate plus Nitrite Concentrations, TA2-W-19

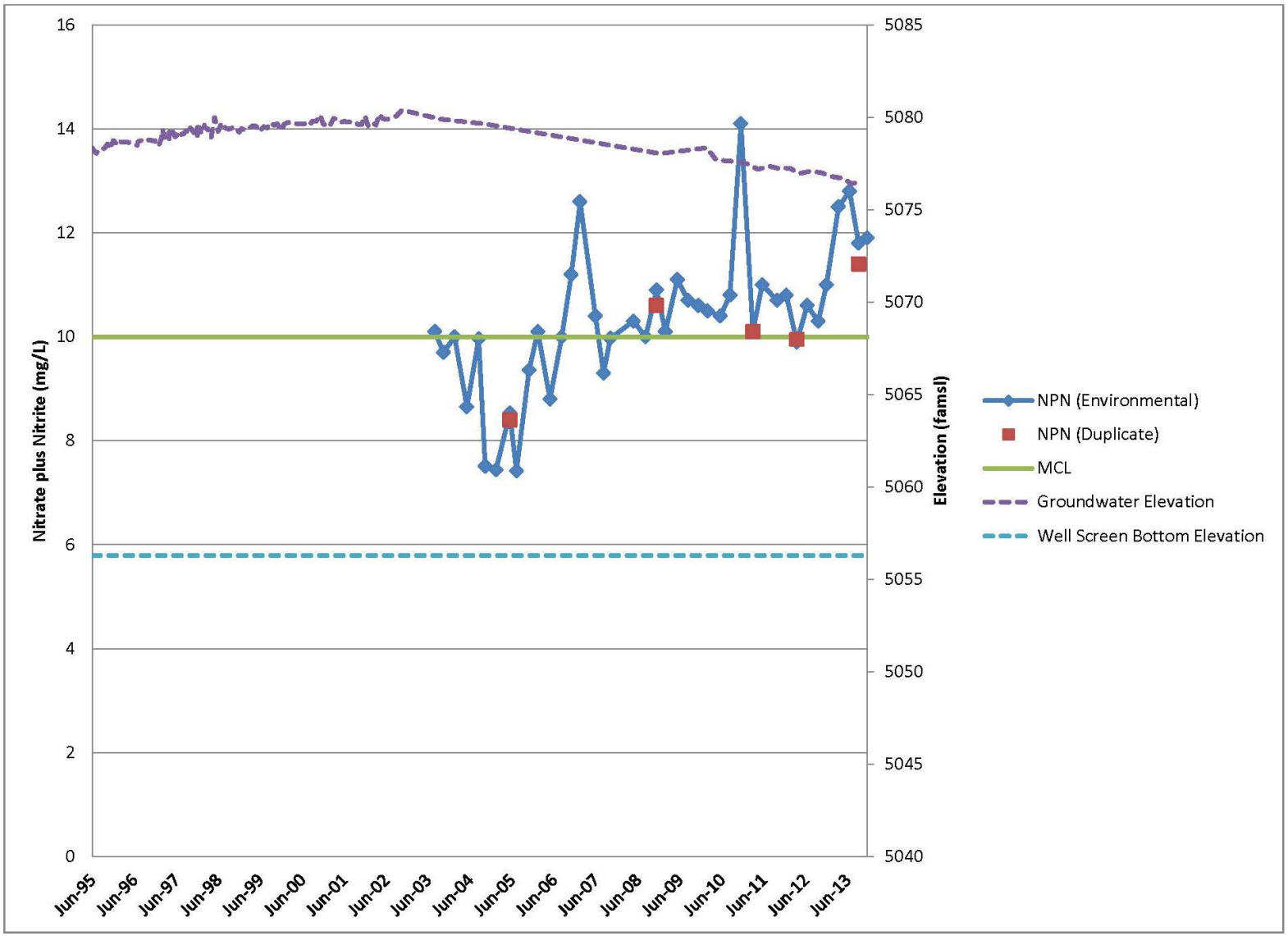


Figure 6B-4. Nitrate plus Nitrite Concentrations, TJA-2

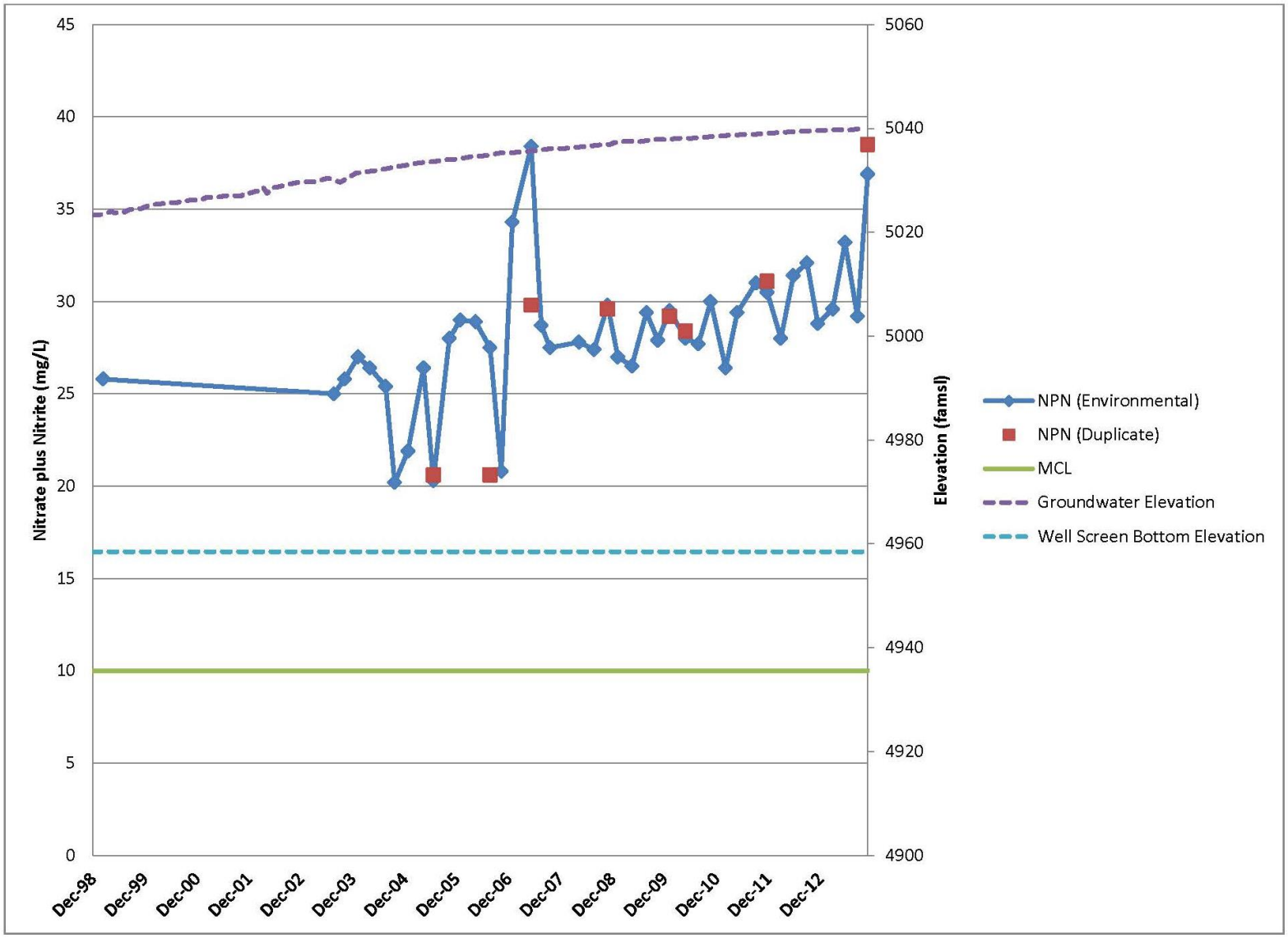


Figure 6B-5. Nitrate plus Nitrite Concentrations, TJA-4

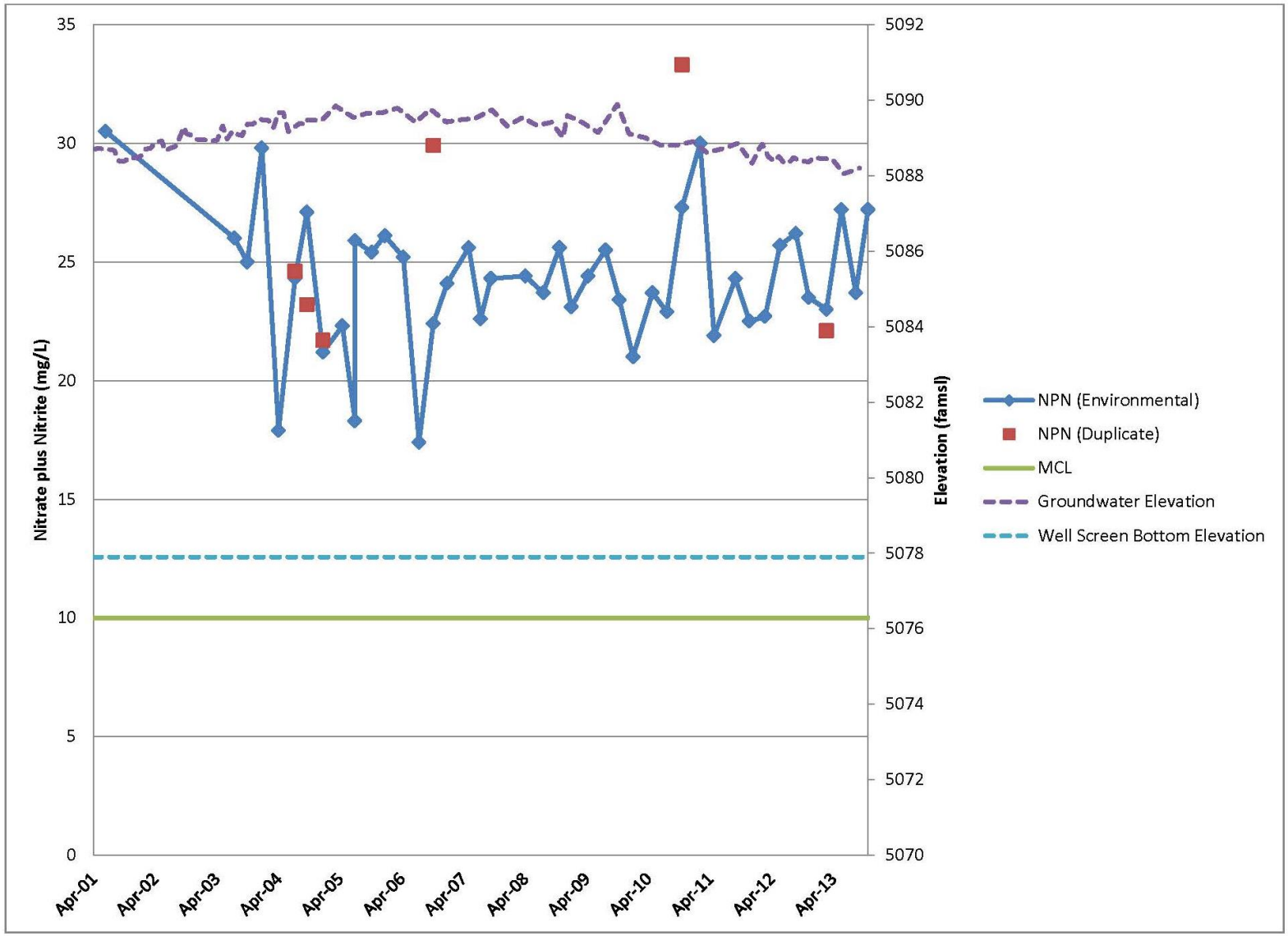


Figure 6B-6. Nitrate plus Nitrite Concentrations, TJA-7

Attachment 6C
Tijeras Arroyo Groundwater
Hydrographs

This page intentionally left blank.

Attachment 6C Hydrographs

6C-1 TAG Study Area Wells (1 of 7) 6C-5

6C-2 TAG Study Area Wells (2 of 7) 6C-6

6C-3 TAG Study Area Wells (3 of 7) 6C-7

6C-4 TAG Study Area Wells (4 of 7) 6C-8

6C-5 TAG Study Area Wells (5 of 7) 6C-9

6C-6 TAG Study Area Wells (6 of 7) 6C-10

6C-7 TAG Study Area Wells (7 of 7) 6C-11

This page intentionally left blank.

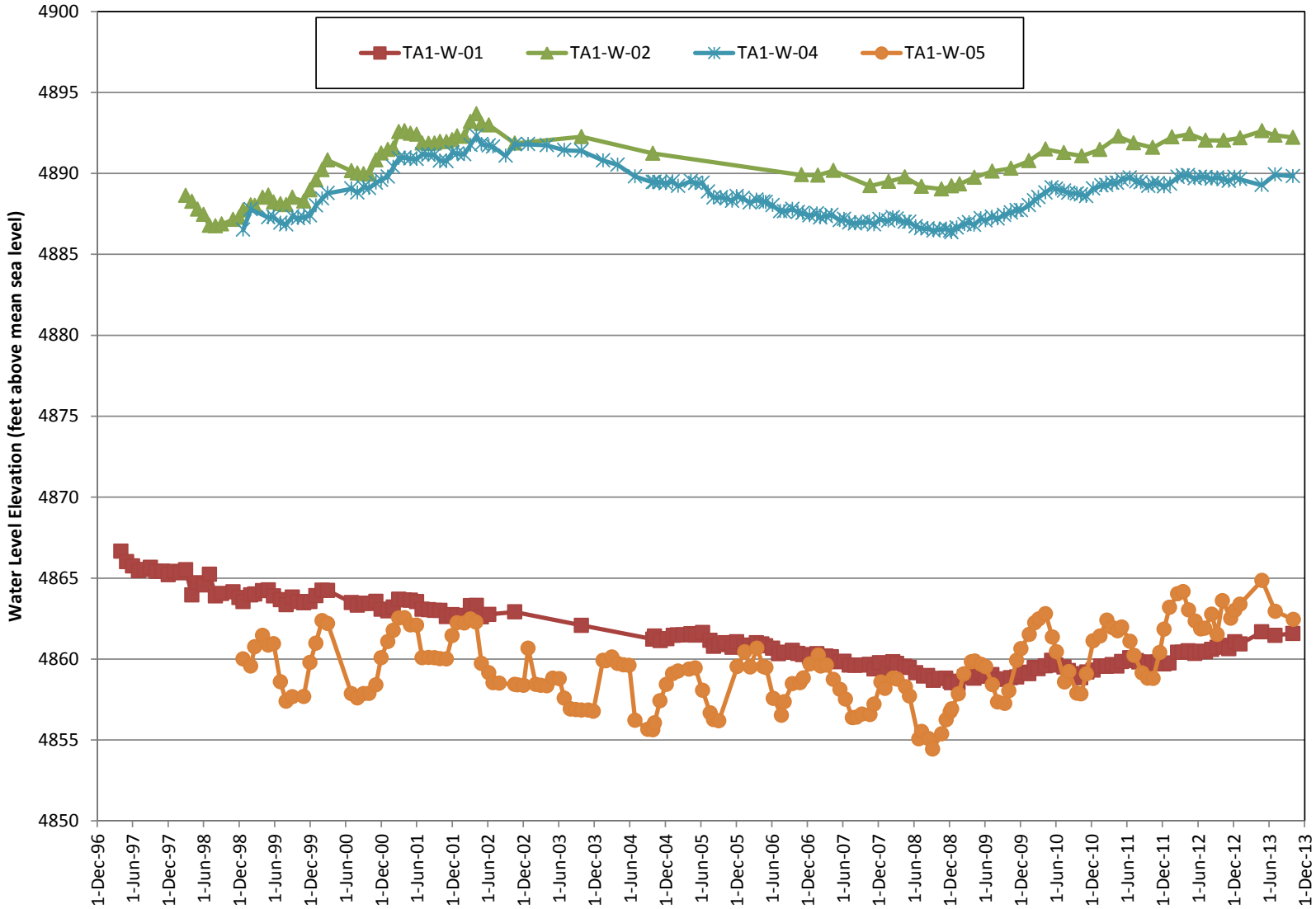


Figure 6C-1. TAG Study Area Wells (1 of 7)

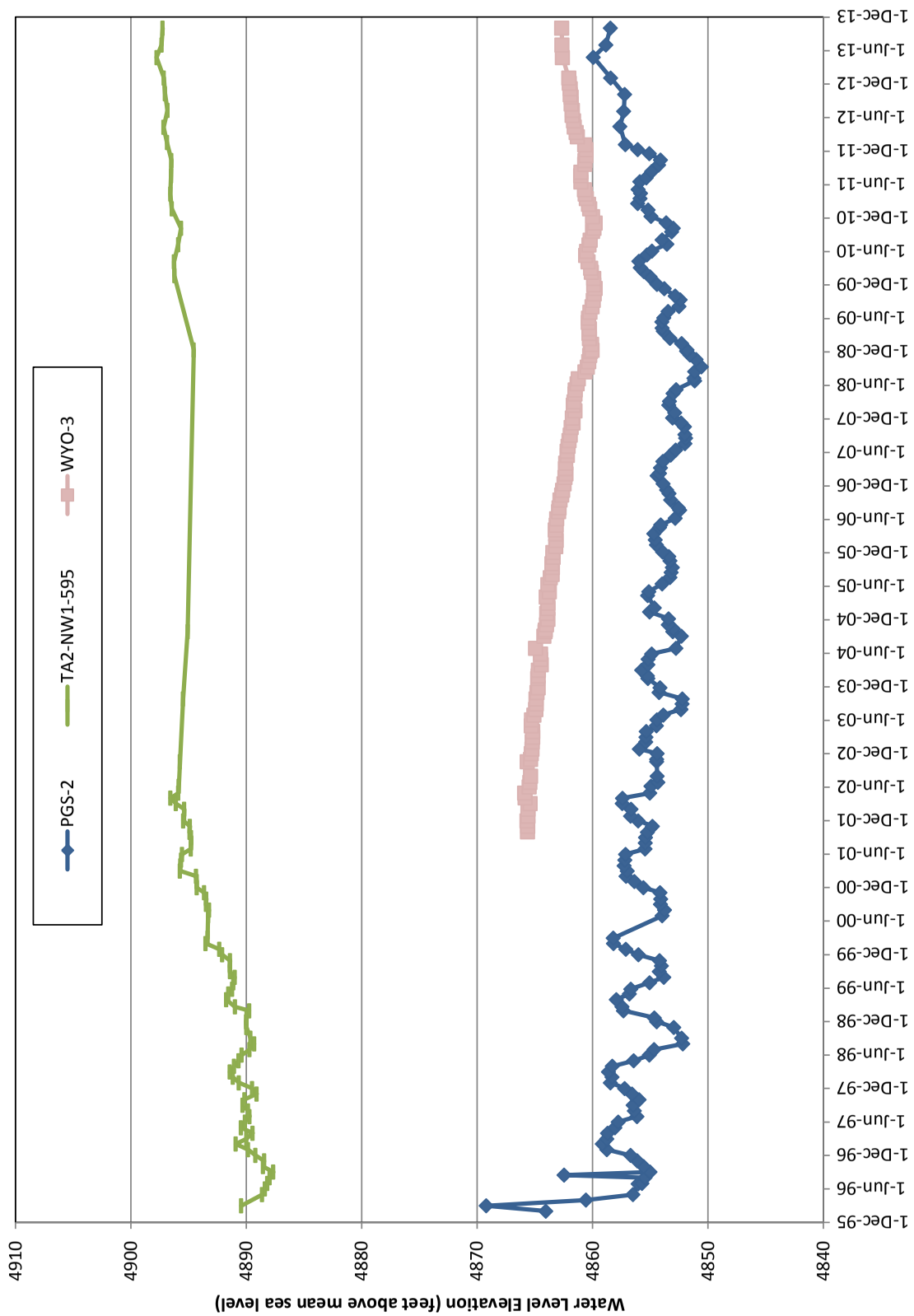


Figure 6C-2. TAG Study Area Wells (2 of 7)

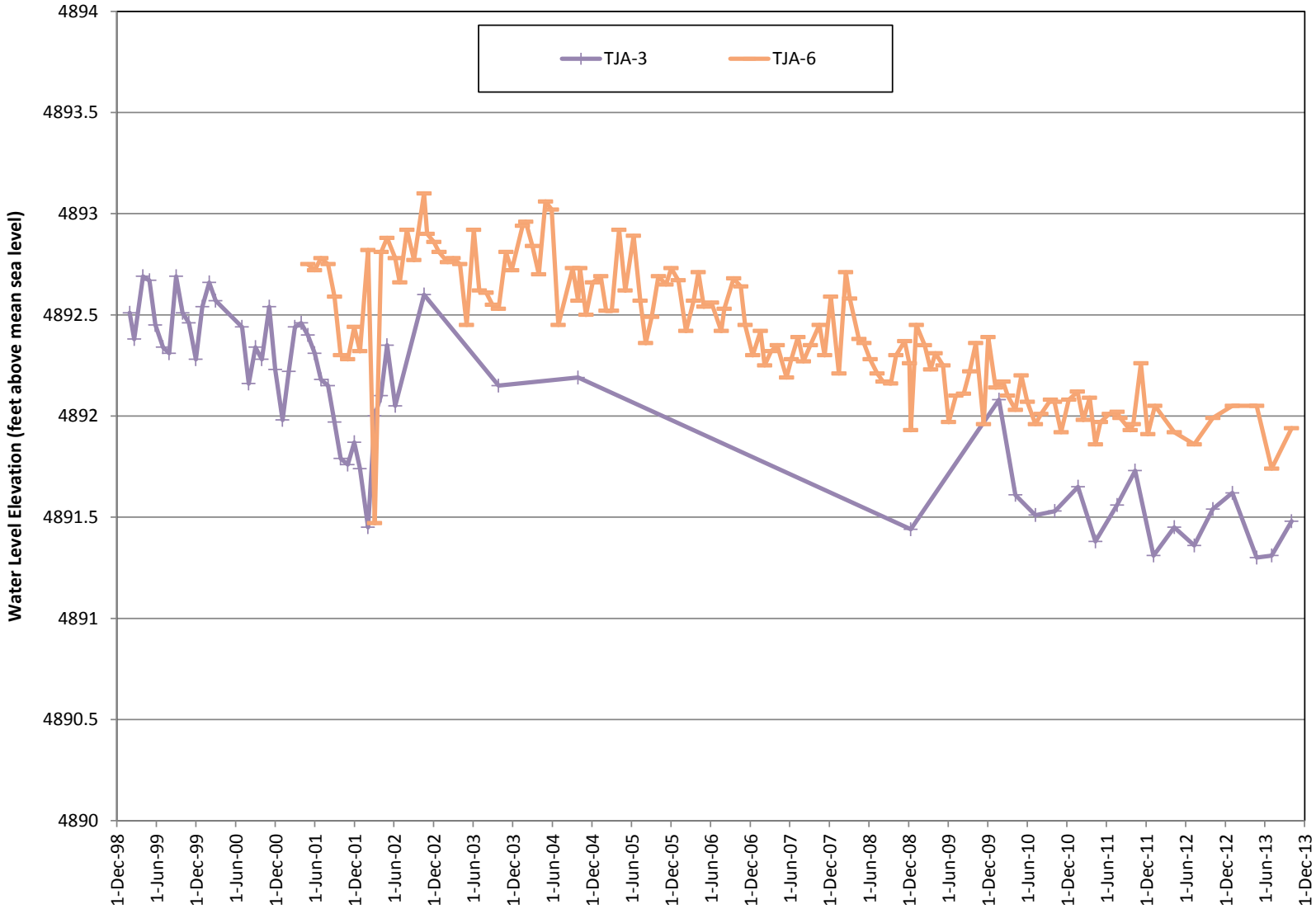


Figure 6C-3. TAG Study Area Wells (3 of 7)

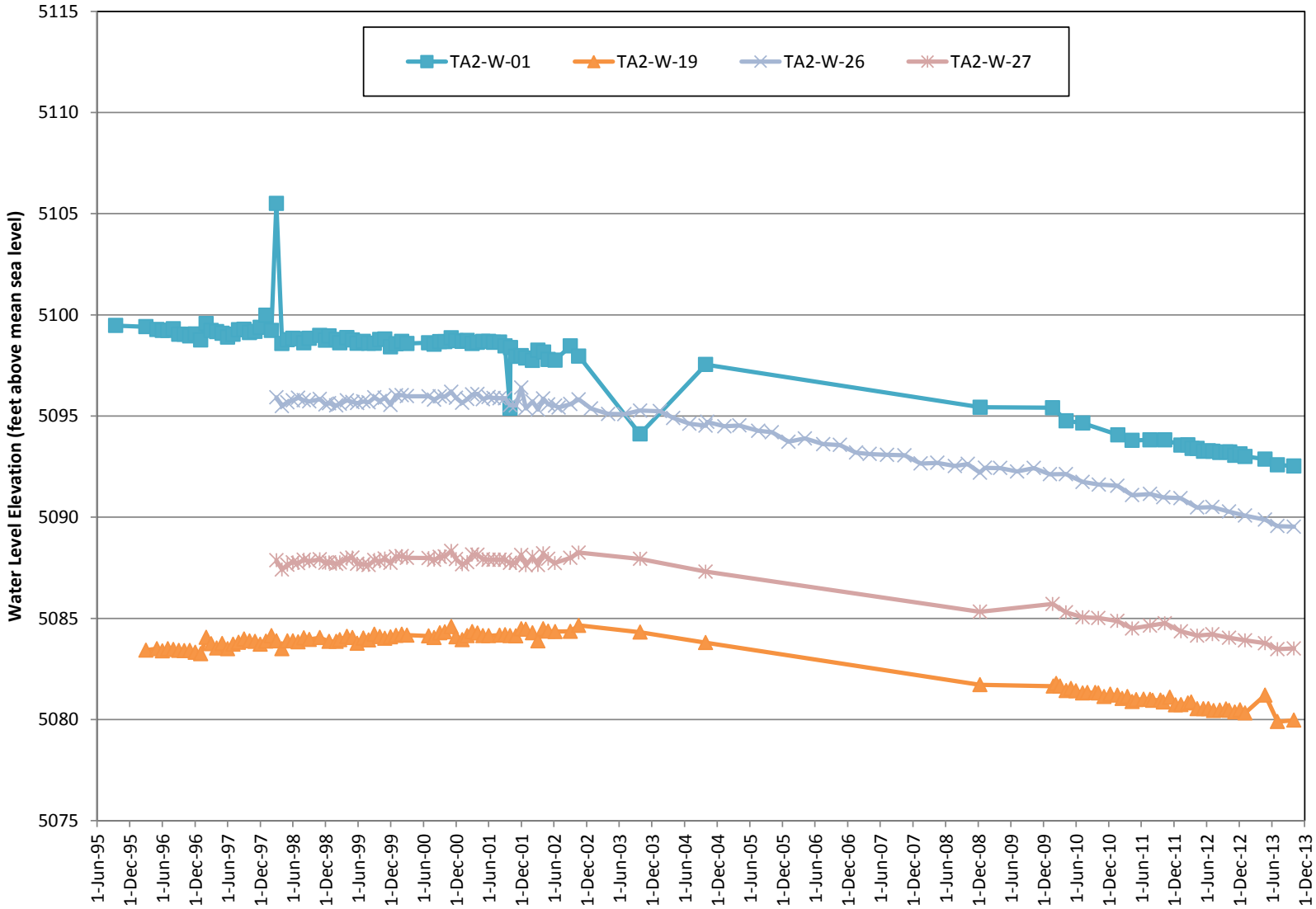


Figure 6C-4. TAG Study Area Wells (4 of 7)

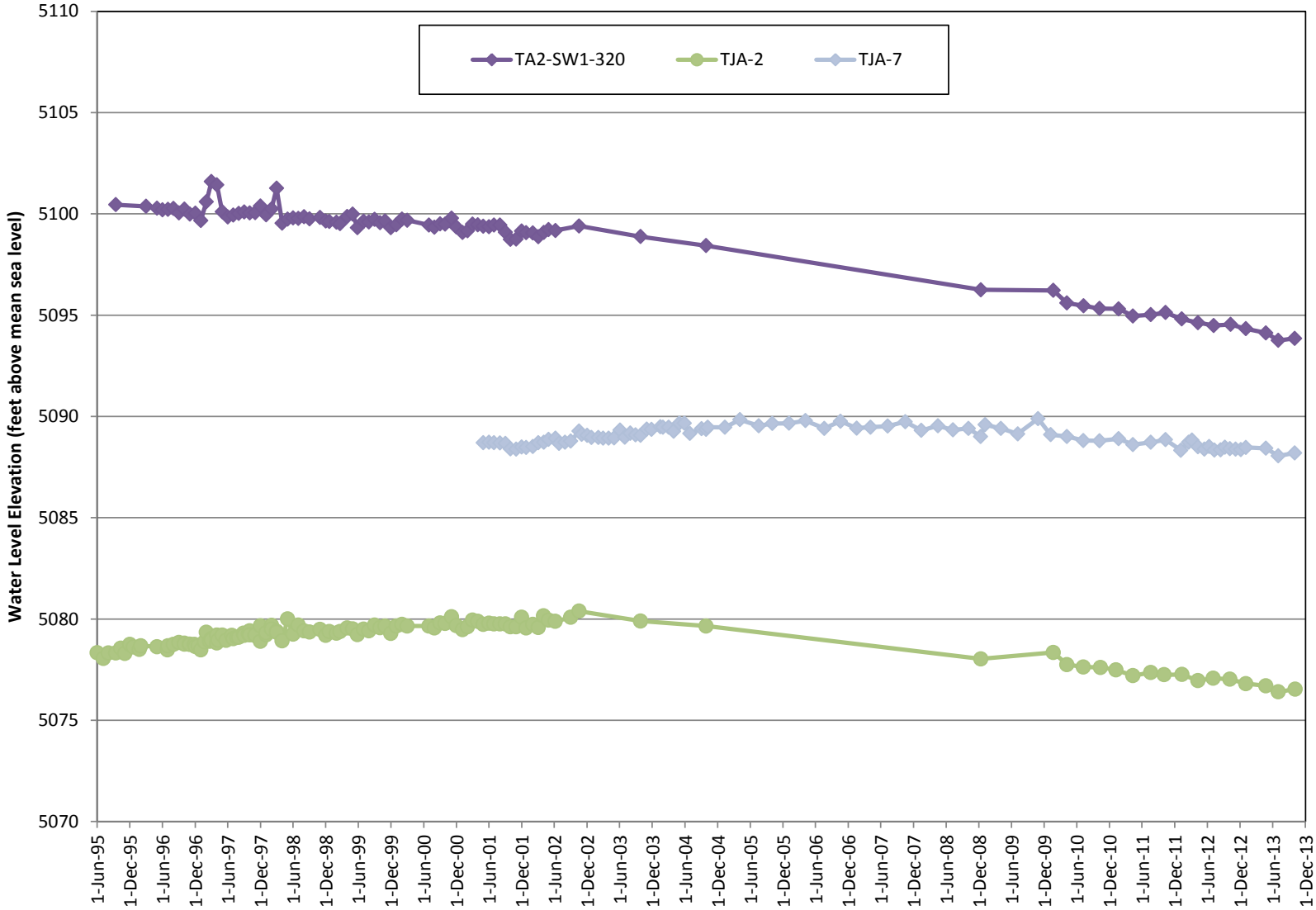


Figure 6C-5. TAG Study Area Wells (5 of 7)

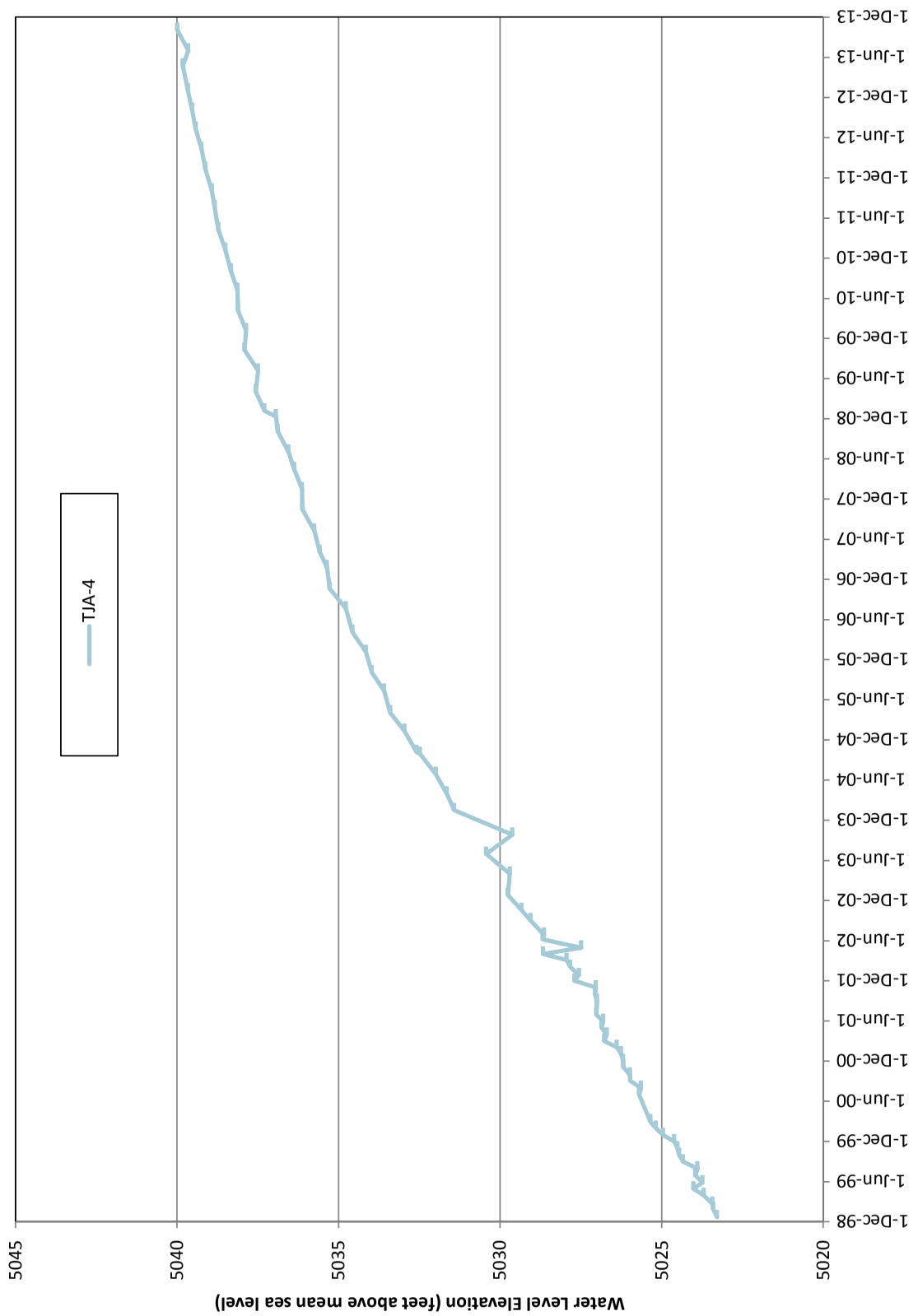


Figure 6C-6. TAG Study Area Wells (6 of 7)

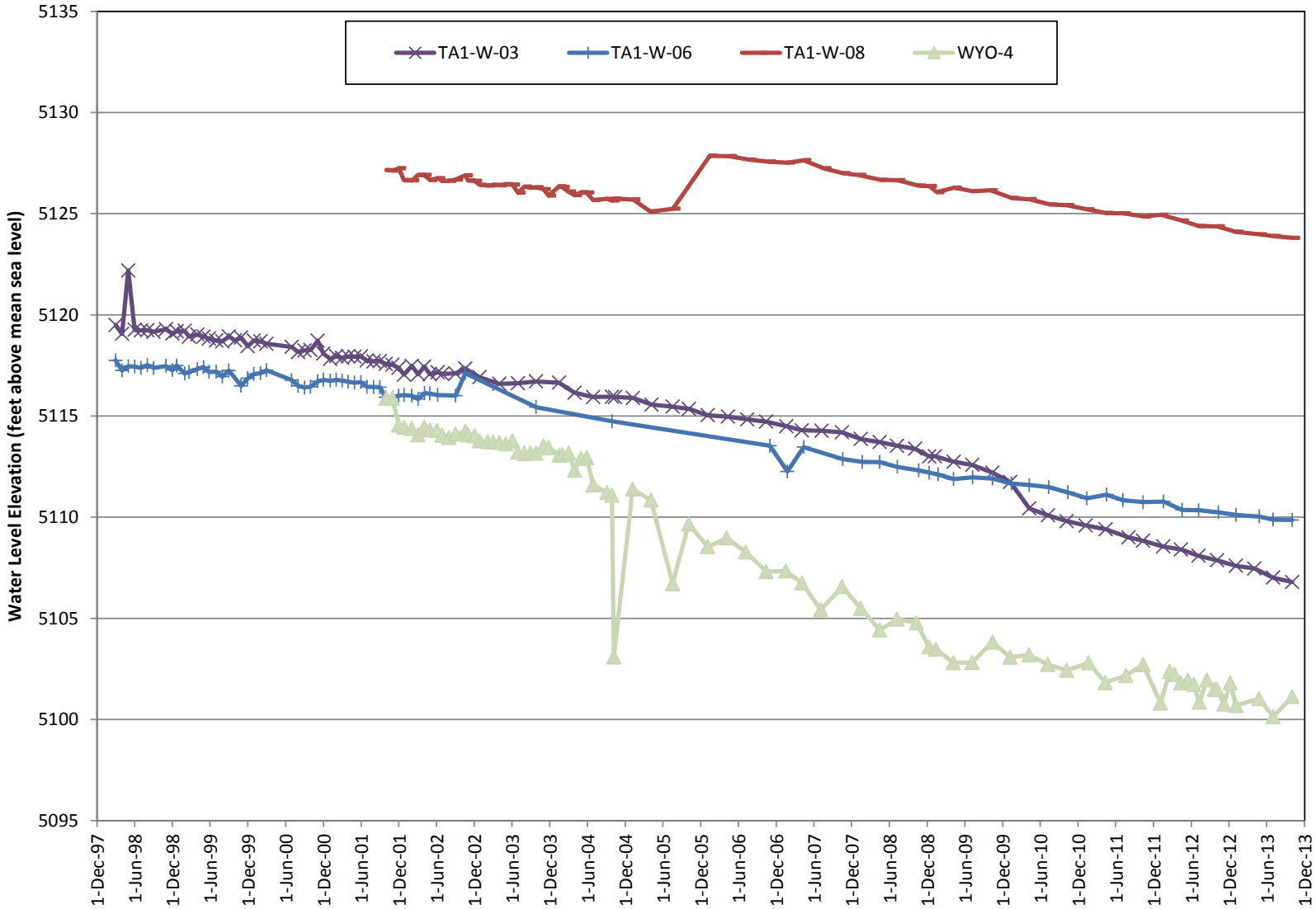


Figure 6C-7. TAG Study Area Wells (7 of 7)

This page intentionally left blank.

7.0 Burn Site Groundwater Study Area

7.1 Introduction

Unique features of the Burn Site Groundwater (BSG) Study Area (also referred to as "Burn Site Area Groundwater Investigation Area of Concern"), located in the Manzanita Mountains (Figure 7-1), include low concentrations of nitrate in a fractured bedrock aquifer. Nitrate has been identified as a constituent of concern (COC) in groundwater at the study area based on detections above the U.S. Environmental Protection Agency (EPA) maximum contaminant level (MCL) in samples collected from monitoring wells. Since August 1998, the maximum concentration of nitrate detected in the study area has been 41.9 milligrams per liter (mg/L). The EPA MCL and State of New Mexico drinking water standard for nitrate is 10 mg/L (as nitrogen).

Perchlorate has been detected in only one groundwater monitoring well in the BSG Study Area. Currently there is no EPA MCL or State of New Mexico drinking water standard for perchlorate. However, Section IV.B of the Compliance Order on Consent (the Order), between the New Mexico Environment Department (NMED), the U.S. Department of Energy (DOE), and Sandia Corporation (Sandia) stipulates that a select group of groundwater monitoring wells be sampled for perchlorate using a screening level/method detection limit (MDL) of 4 micrograms per liter (μg/L) (NMED April 2004). Furthermore, the Order requires that for detections equal to or greater than 4 μg/L, the DOE, National Nuclear Security Administration (NNSA) and Sandia will evaluate the nature and extent of perchlorate contamination. Since March 2006, the maximum concentration of perchlorate in the BSG Study Area has been 8.93 μg/L.

7.1.1 Location

The Coyote Canyon Test Area at Sandia National Laboratories, New Mexico (SNL/NM) is located in the eastern portion of Kirtland Air Force Base (KAFB). The SNL/NM facility is a government-owned/contractor-operated laboratory. Sandia, a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM for the DOE/NNSA. The DOE/NNSA Field Office administers the contract and oversees contractor operations at the site.

The Burn Site is located in Lurance Canyon, one of three canyons that are located on the eastern edge of the Coyote Canyon Test Area and within the Manzanita Mountains. Two other canyons, Madera Canyon and Sol se Mete Canyon, intersect Lurance Canyon to the west of the Burn Site. These three canyons are the headwaters of Arroyo del Coyote. Testing activities at the Lurance Canyon Burn Facility, which includes the Burn Site, began in 1967.

The BSG Study Area is located along the eastern margin of the Albuquerque Basin, and the terrain is characterized by large topographic relief, exceeding 500 feet (ft). Lurance Canyon, deeply incised into Paleozoic and Precambrian rocks, provides local westward drainage of ephemeral surface water flows to Arroyo del Coyote.

7.1.2 Site History

The Lurance Canyon Burn Site (Solid Waste Management Unit [SWMU] 94) and the nearby Lurance Canyon Explosive Test Site (SWMU 65) have been used since 1967. Most research has involved testing the fire survivability of transportation containers, weapon components, simulated weapons, and satellite components. Historical operations also include open detonation of high explosive (HE) compounds (Table 7-1) and the open burning of HE compounds, liquid propellants, and solid propellants. Most HE testing occurred between 1967 and 1975 and was completely phased out by the 1980s.

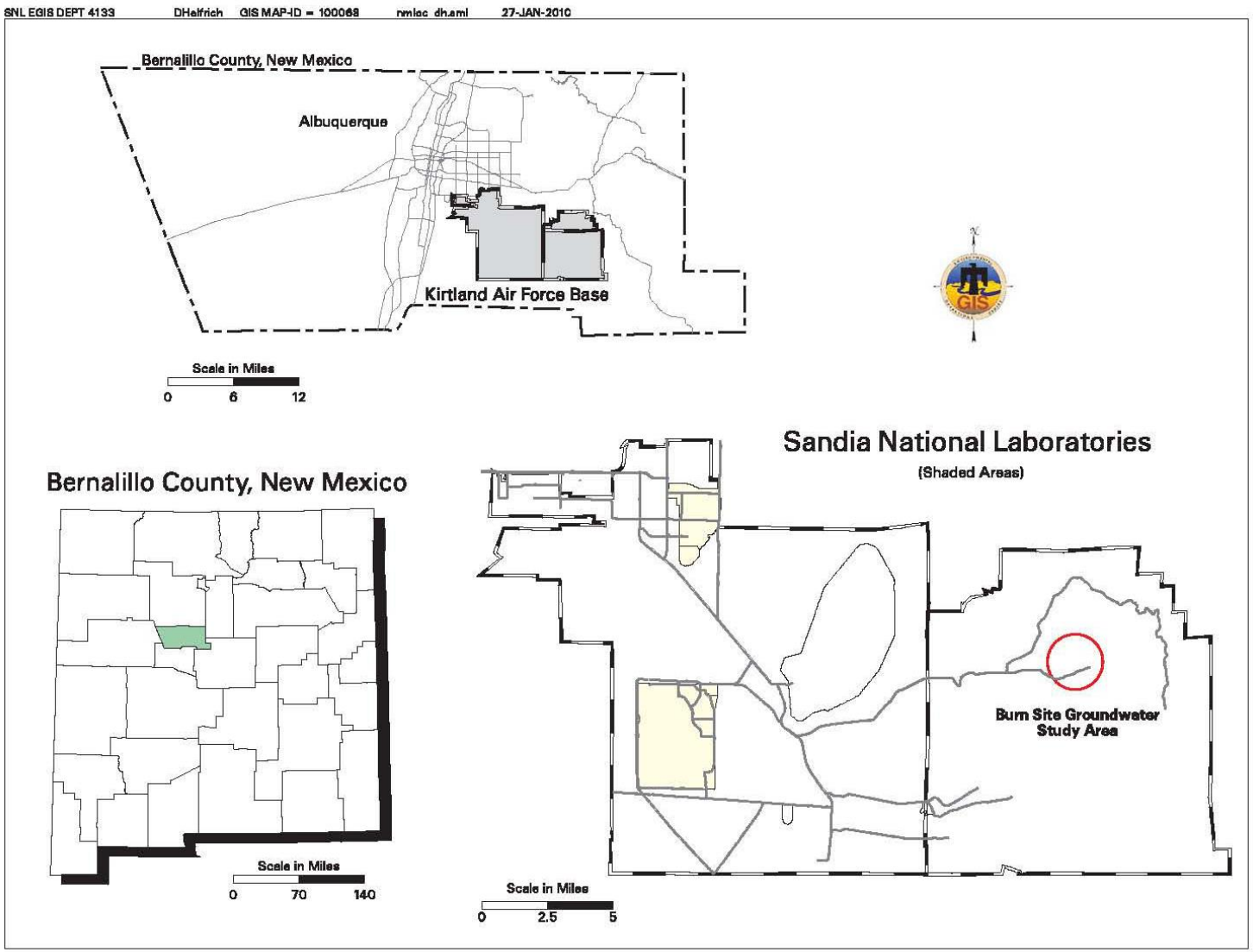


Figure 7-1. Location of the Burn Site Groundwater Study Area

Table 7-1. Historical Timeline of the Burn Site Groundwater Study Area

Month	Year	Event	Reference
	1967-early 1980s	HE testing conducted at the BSG Study Area until early 1980s. Burn testing began in 1970s using excavation pits and portable burn pans with JP-4. Open detonations of HE materials conducted. Wastewater discharged into unlined pits.	SNL November 2001
	1987	Eighteen potential SWMUs were identified during the Comprehensive Environmental Assessment and Response Program investigation. HE compounds, nitrate, and diesel range organics identified as potential COCs.	DOE September 1987
February	1998	Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report containing description of BSG hydrogeology submitted.	SNL February 1998
November	1996	Groundwater sample from Burn Site Well yielded nitrate concentration of 25 mg/L.	SNL January 2005
July	1997	NMED/DOE/OB, DOE and Sandia agree on installation of deep and shallow monitoring wells and one year of quarterly sampling.	SNL July 1997
November	1997	Monitoring wells CYN-MW2S and 12AUP-01 are installed to serve as piezometers. (Piezometers are constructed of narrow-diameter casing and not used for collecting groundwater samples.)	SNL June 1998
December	1997	Monitoring well CYN-MW1D installed.	SNL June 1998
March	1999	GWPP Fiscal Year 1998 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL March 1999
June	1999	Monitoring wells CYN-MW3 and CYN-MW4 installed.	SNL November 2001
	Various (e.g., 1994)	BSG Study Area SWMUs 94 and 65 proposed and approved for NFA/CAC.	Numerous references, for example: SNL February 2004
March	2000	GWPP Fiscal Year 1999 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL March 2000
April	2001	GWPP Fiscal Year 2000 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL April 2001
August	2001	Monitoring well CYN-MW5 installed 1.7 miles west of the BSG Study Area.	SNL June 2005
November	2001	Comprehensive BSG Investigation Report documenting hydrogeologic characteristics of the study area prepared.	SNL November 2001
March	2002	GWPP Fiscal Year 2001 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL March 2002
March	2003	GWPP Fiscal Year 2002 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL March 2003
June	2003	Further refinements of the hydrogeologic setting of the BSG Study Area are presented.	Van Hart June 2003
March	2004	GWPP Fiscal Year 2003 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL March 2004
April	2004	Compliance Order on Consent lists BSG as an Area of Concern that requires a CME.	NMED April 2004
June	2004	A CCM of the BSG Study Area prepared.	SNL June 2004a
June	2004	A CME work plan for the BSG Study Area prepared.	SNL June 2004b
January	2005	Nitrate source evaluation of deep soil in the BSG Study Area performed.	SNL January 2005

Table 7-1. Historical Timeline of the Burn Site Groundwater Study Area *(Continued)*

Month	Year	Event	Reference
February	2005	NMED requires additional site characterization and the preparation of an Interim Measures Work Plan.	NMED February 2005
May	2005	BSG Interim Measures Work Plan submitted.	SNL May 2005
July	2005	NMED sends an RSI for the Interim Measures Work Plan.	NMED July 2005
August	2005	Response for RSI is submitted to NMED.	SNL August 2005
October	2005	GWPP Fiscal Year 2004 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL October 2005
December	2005	Monitoring wells CYN-MW6 and CYN-MW7 installed.	SNL October 2006
January	2006	Monitoring well CYN-MW8 installed.	SNL October 2006
March	2007	GWPP Fiscal Year 2006 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL March 2007
April	2008	BSG CCM resubmitted.	SNL April 2008a
April	2008	BSG CME Work Plan resubmitted.	SNL April 2008b
March	2008	GWPP Fiscal Year 2007 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL March 2008
April	2009	NMED requires supplemental characterization of soil and groundwater in the BSG Study Area.	NMED April 2009
November	2009	BSG Characterization Work Plan submitted.	SNL November 2009
June	2009	GWPP Calendar Year 2008 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL June 2009a
February	2010	Received notice of conditional approval for the November 2009 BSG Characterization Work Plan.	NMED February 2010
July	2010	Completed subsurface soil sampling at 10 deep soil boring locations to determine contaminant sources.	SNL November 2009
July	2010	Installed four groundwater monitoring wells (CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12) to determine extent of groundwater contamination.	SNL November 2009
September	2010	An extension request for the BSG CME Report submitted.	SNL September 2010
September	2010	Initial sampling at groundwater monitoring wells CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12.	SNL August 2010
October	2010	Received approval of a time extension for submittal of the BSG CME Report.	NMED October 2010
October	2010	GWPP Calendar Year 2009 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL October 2010
August	2011	Received approval of the March 2008 Corrective Measures Evaluation Work Plan, BSG.	NMED August 2011
September	2011	GWPP Calendar Year 2010 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL September 2011
January	2012	Summary Report for BSG Characterization Field Program submitted.	SNL January 2012
February	2012	Monitoring Well Plug and Abandonment Plan and Well Construction Plan for BSG wells and status of CYN-MW3 submitted.	SNL February 2012
April	2012	Received notice of approval for the January 2012 BSG Monitoring Well Plug and Abandonment Plan and Well Construction Plan.	NMED April 2012
June	2012	Received notice of approval for the January 2012 Summary Report for BSG Characterization Field Program.	NMED June 2012

Table 7-1. Historical Timeline of the Burn Site Groundwater Study Area *(Concluded)*

Month	Year	Event	Reference
September	2012	GWPP Calendar Year 2011 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL September 2012
December	2012	Completed field program to decommission BSG monitoring wells 12AUP-01, CYN-MW1D, CYN-MW2S, and install monitoring well CYN-MW13.	SNL March 2013a
August	2013	DOE/NNSA submitted an Extension Request to the NMED for the Burn Site Groundwater Corrective Measures Evaluation Report to March 31, 2013.	DOE August 2013
September	2013	Groundwater sampling analytical results for BSG wells reported in the Calendar Year 2012 SNL/NM Annual Groundwater Monitoring Report.	SNL September 2013a
October	2013	In October 2013, DOE Office of Environmental Management submitted an Internal Remedy Review of the Burn Site Groundwater Area of Concern to DOE/NNSA Sandia Field Office.	DOE October 2013
November	2013	Monitoring Well Plug and Abandonment Plan and Well Construction Plan for Installation of groundwater monitoring wells CYN-MW14 and CYN-MW15 submitted.	SNL September 2013b

NOTES:
BSG = Burn Site Groundwater.
CAC = Corrective Action Complete.
CCM = Current Conceptual Site Model.
CME = Corrective Measures Evaluation.
CYN = Canyons.
COC = Constituent of concern.
DOE = U.S. Department of Energy.
GWPP = Groundwater Protection Program.
HE = High explosive.
JP-4 = Jet propellant fuel composition 4.
mg/L = Milligram(s) per liter.
MW = Monitoring well.
NFA = No Further Action.
NMED = New Mexico Environment Department.
NNSA = National Nuclear Security Administration.
OB = Oversight Bureau.
RSI = Request for Supplemental Information.
Sandia = Sandia Corporation.
SNL = Sandia National Laboratories.
SNL/NM = Sandia National Laboratories, New Mexico.
SWMU = Solid Waste Management Unit.

Burn testing began in the early 1970s and has continued to the present. Early burn testing was conducted in unlined pits excavated in native soil. By 1975, portable, steel, burn pans were used for open burning, mostly using jet propellant fuel composition 4 (JP-4). The Light Air Transport Accident Resistant Container Unit was constructed in 1980, and other engineered burn units were constructed by 1983. These burn units used jet fuel, gasoline, and diesel for the burn tests. In the mid-1990s, jet propellant fuel composition 8 (JP-8) replaced JP-4 as the petroleum fuel used for burn tests.

7.1.3 Monitoring History

Groundwater samples collected during 1996 from the Burn Site Well (a nonpotable production well used for fire suppression) contained elevated concentrations of nitrate (24.3 mg/L in November 1996). In 1997, the NMED, DOE, and Sandia agreed to investigate the source of this contamination. Later in 1997,

monitoring wells CYN-MW1D and CYN-MW2S were installed downgradient of the Burn Site Well (Table 7-2). Samples from monitoring well CYN-MW1D contained nitrate concentrations exceeding the MCL. Two more monitoring wells, CYN-MW3 and CYN-MW4, were installed between 1999 and 2001 to further characterize the study area. Based on regulatory requirements (discussed further in Section 7.2), monitoring wells CYN-MW6, CYN-MW7, and CYN-MW8 were installed in 2006.

Table 7-2. Groundwater Monitoring Wells at the Burn Site Groundwater Study Area

Well	Installation Year	WQ	WL	Comments
2AUP01	1996		√	Underflow monitoring well, plugged and abandoned in November 2012
Burn Site Well	1986			Nonpotable production well
CYN-MW1D	1997		√	Bedrock groundwater well, plugged and abandoned in November 2012
CYN-MW2S	1997		√	Underflow monitoring well, plugged and abandoned in November 2012
CYN-MW3	1999		√	Bedrock groundwater well
CYN-MW4	1999	√	√	Bedrock groundwater well
CYN-MW6	2005		√	Bedrock groundwater well
CYN-MW7	2005	√	√	Bedrock groundwater well
CYN-MW8	2006	√	√	Bedrock groundwater well
CYN-MW9	2010	√	√	Bedrock groundwater well
CYN-MW10	2010	√	√	Bedrock groundwater well
CYN-MW11	2010	√	√	Bedrock groundwater well
CYN-MW12	2010	√	√	Bedrock groundwater well
CYN-MW13	2012		√	Bedrock groundwater well installed in December 2012, replaced CYN-MW1D

NOTES:
Check marks in the WQ and WL columns indicate WQ sampling and WL measurements were obtained during this reporting period.
CYN = Canyons.
MW = Monitoring well.
WL = Water level.
WQ = Water quality.

Previous monitoring reports include analytical results for monitoring well CYN-MW5. Groundwater monitoring well CYN-MW5 was installed in 2001 as part of the investigation of Drain and Septic System (DSS) sites. This monitoring well was sampled for eight quarters as part of the DSS investigation and was incorporated into the BSG Study Area investigation as a downgradient well. However, in its February 2005 letter, the NMED stated that it "will not consider monitoring well CYN-MW5 as a downgradient well because it is located over two miles away from the Burn Site" (NMED February 2005). Based on the NMED determination, monitoring well CYN-MW5 has not been sampled as part of the BSG investigation since the third quarter of Fiscal Year 2005. Most recently, sampling at monitoring well CYN-MW5 has been incorporated into the SNL/NM Long-Term Stewardship groundwater sampling program in response to NMED requirements (NMED April 2010). Results for recent sampling of monitoring well CYN-MW5 are presented in Chapter 9.0 of this Annual Groundwater Monitoring Report.

Since the initial discovery of nitrate at the BSG Study Area, numerous characterization activities have been conducted (Table 7-1). The results of these characterization activities are summarized in two versions of the *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Burn Site* (SNL June 2004a and April 2008a). These two versions of the BSG conceptual site model provide a comprehensive list of groundwater monitoring data sources used to support the summary of investigations.

In April 2004, the Order became effective between the DOE, Sandia, and the NMED, and the Order specifies the Burn Site as an area of groundwater contamination (NMED April 2004). In response to the Order, DOE/NNSA and Sandia submitted the Corrective Measures Evaluation (CME) Work Plan for the BSG Study Area to the NMED in June 2004 (SNL June 2004b). Based on requirements stipulated by the NMED (discussed in Section 7.2), DOE/NNSA and Sandia submitted the BSG Interim Measures Work Plan (IMWP) (SNL May 2005) on May 30, 2005. As detailed in the IMWP, three monitoring wells (CYN-MW6, CYN-MW7, and CYN-MW8) were installed near the Burn Site during December 2005 to January 2006 at locations shown on Figure 7-2. Quarterly sampling for eight quarters began for these three monitoring wells in March 2006 and was completed in December 2007. Samples from the two monitoring wells (CYN-MW7 and CYN-MW8) downgradient of CYN-MW1D were analyzed for nitrate.

Groundwater samples from monitoring well (CYN-MW6) adjacent to SWMU 94F were analyzed for nitrate, total petroleum hydrocarbons (TPH) as gasoline range organics (GRO), diesel range organics (DRO), and other parameters. Groundwater monitoring programs have continued as outlined in the IMWP (SNL May 2005).

Based on a letter received from the NMED (April 2009), DOE/NNSA and Sandia are required to further characterize the nature and extent of the perchlorate contamination at the BSG Study Area. DOE/NNSA and Sandia prepared the BSG Characterization Work Plan (SNL November 2009) that was approved by the NMED (NMED February 2010). In July 2010, DOE/NNSA and Sandia implemented the requirements of the work plan and installed four new groundwater monitoring wells (CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12) to determine the extent of groundwater contamination (Section 7.1.5). These four new wells were sampled for the first time in September 2010.

In February 2012, DOE/NNSA and Sandia submitted a work plan to decommission three groundwater monitoring wells, 12AUP-01, CYN-MW1D, and CYN-MW2S; and install a replacement groundwater monitoring well, CYN-MW13 (SNL February 2012). Monitoring wells 12AUP-01 and CYN-MW2S had been installed over 15 years ago at the contact of unconsolidated coarse sand and gravel (alluvium) and the underlying bedrock. Although the alluvium at this contact was dry during drilling, these wells were installed in anticipation of recharge occurring after rainfall events. However, these wells were consistently dry and served no useful purpose. Monitoring well CYN-MW1D was constructed with a nonstandard completion (low carbon steel screen and riser pipe), had very turbid water, and exhibited erratic nitrate concentrations. A video log showed that the well was heavily corroded (SNL February 2012). In April 2012, the NMED approved the work plan (NMED April 2012); the three monitoring wells (12AUP-01, CYN-MW1D, and CYN-MW2S) were decommissioned in November 2012; and replacement monitoring well CYN-MW13 was installed in December 2012.

7.1.4 Current Monitoring Network

Currently eight monitoring wells in the BSG Study Area are monitored for water quality, including CYN-MW4, CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, and CYN-MW13 (Figure 7-2). Monitoring well CYN-MW1D (recently replaced with CYN-MW13) and the two shallow monitoring wells (12AUP-01 and CYN-MW2S) were decommissioned during Calendar Year (CY) 2012, and none of these wells were samples in CY 2013. In addition, monitoring well CYN-MW3 was dry and CYN-MW6 did not produce adequate water volume during all CY 2013 sampling events.

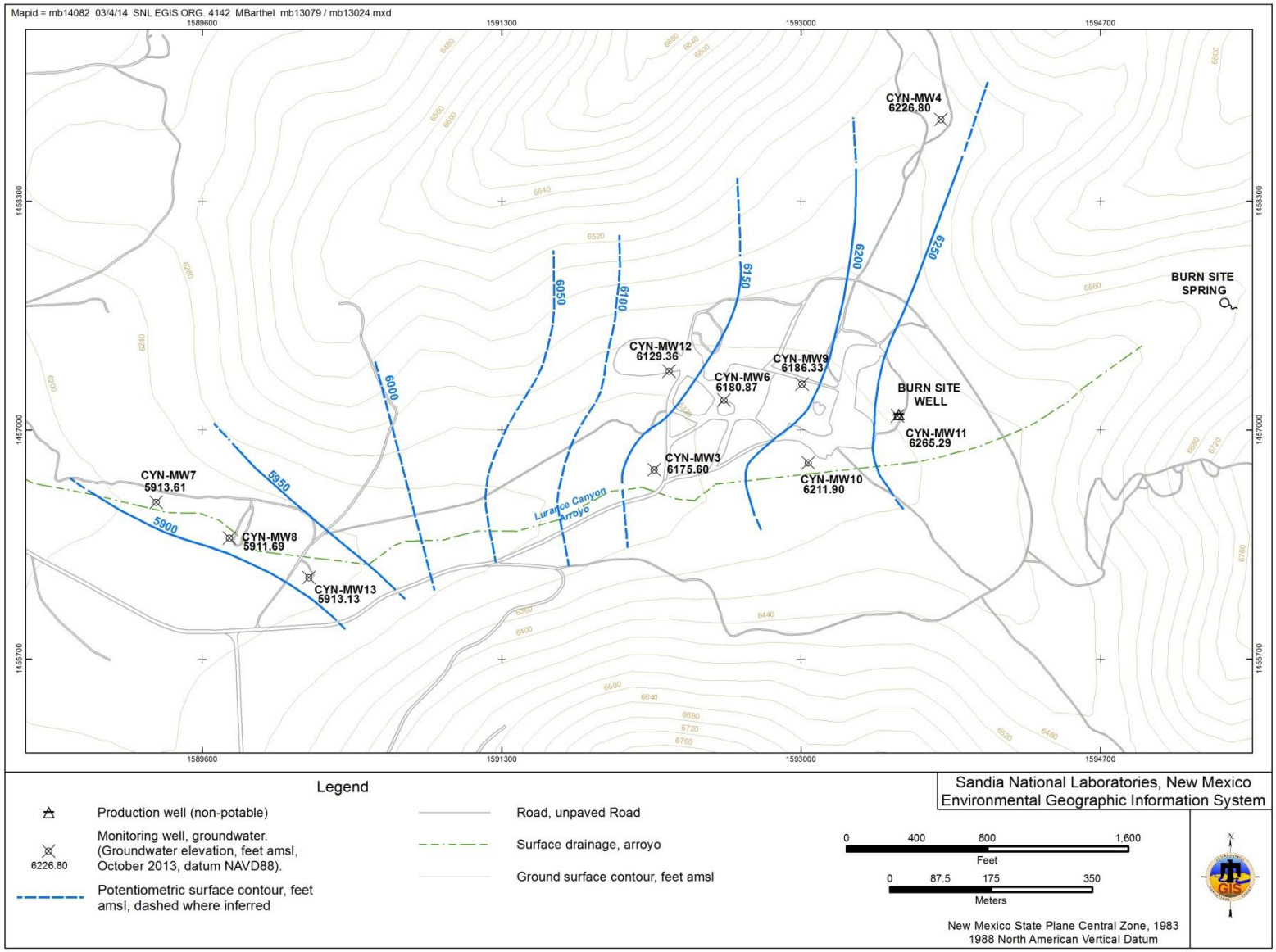


Figure 7-2. Burn Site Groundwater Study Area Potentiometric Surface Map (October 2013)

7.1.5 Summary of Calendar Year 2013 Activities

The following activities were performed for the BSG Study Area during CY 2013:

- Semiannual groundwater sampling was conducted at eight monitoring wells (CYN-MW4, CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, and CYN-MW13) in April/May, and December 2013.

- Initial groundwater monitoring activities were performed at monitoring well CYN-MW13 during CY13.

- Tables of analytical results (Attachment 7A), concentration versus time graphs (Attachment 7B), and hydrographs (Attachment 7C) were prepared in support of this report.

- A Monitoring Well Plug and Abandonment Plan and Well Construction Plan for installation of groundwater monitoring wells CYN-MW14 and CYN-MW15 was submitted to the NMED (SNL September 2013b).

- In August 2013, DOE/NNSA submitted an Extension Request to the NMED for the Burn Site Groundwater Corrective Measures Evaluation Report to March 31, 2013 (DOE August 2013).

- In October 2013, DOE Office of Environmental Management submitted an Internal Remedy Review of the Burn Site Groundwater Area of Concern to DOE/NNSA Sandia Field Office (DOE October 2013). This review suggested that more characterization activities were required at the BSG Study Area before a Corrective Measures Evaluation could be completed.

7.1.6 Summary of Future Activities

The following activities are anticipated for the BSG Study Area investigation during CY 2014:

- Semiannual groundwater sampling will be conducted at nine monitoring wells (CYN-MW4, CYN-MW6 (if water level recovers), CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, and CYN-MW13) during the second and fourth quarters of CY 2014.

- Semiannual reporting of perchlorate analyses for monitoring well CYN-MW6 (if water level recovers) will be performed.

- If the Monitoring Well Plug and Abandonment Plan and Well Construction Plan (SNL September 2013b) is approved by NMED, groundwater monitoring wells CYN-MW14 and CYN-MW15 will be installed and a report describing well installation field activities will be prepared and submitted to the NMED.

7.1.7 Conceptual Site Model

Groundwater flow in the BSG Study Area is controlled by the local geologic framework and structural features described in the following sections.

7.1.7.1 Regional Hydrogeologic Conditions

The Manzanita Mountains are composed of a complex sequence of uplifted Precambrian metamorphic and granitic units that were subjected to several episodes of significant deformation. These units are capped by Paleozoic sandstones, shales, and limestones of the Sandia Formation and Madera Group. The geologic history of the Manzanita Mountains is thoroughly described in the *Groundwater Investigation, Canyons Test Area, Operable Unit 1333, Burn Site, Lurance Canyon* (SNL November 2001) and utilizes the model presented by Brown et al. (1999). The local geology is also summarized in the *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Burn Site* (SNL June 2004a and April 2008a).

Groundwater in the Manzanita Mountains predominantly occurs in fractured metamorphic and intrusive units that consist of metavolcanics, quartzite, metasediments (schists and phyllites), and the Manzanita Granite. Groundwater migrates through bedrock fractures in a generally westward direction. The only perennial spring in the area, the Burn Site Spring, is located upgradient and upslope of the testing facilities at a limestone outcrop. The permeability of the fractured bedrock units is low and well yields are minimal. Groundwater discharges to small ephemeral springs located at the base of the Manzanita Mountains approximately 3 miles west of the Burn Site. Additionally, some groundwater may discharge as underflow to unconsolidated sedimentary deposits of the Albuquerque Basin.

The Precambrian metamorphic rocks (predominantly schists and phyllite) and the Precambrian intrusive rocks (predominantly granitic gneiss) are typically fractured as a result of the long and complex history of regional deformation. Drill core data and outcrop exposures indicate that the fractures in shallow bedrock are filled with chemical precipitates such as calcium carbonate. The carbonate precipitation likely occurred when the water table was regionally elevated prior to the development of the Rio Grande. As chemical precipitates filled the fractures, permeability was effectively reduced, creating a semiconfined unit above underlying bedrock with open fractures.

The Burn Site is bisected by a north-south trending system of faults, consisting locally of several high angle normal faults that are mostly downfaulted to the east. Faults (where exposed) are characterized by zones of crushing and brecciation. The Burn Site Fault trends north to south in the vicinity of the Burn Site Well and monitoring well CYN-MW4 (SNL June 2004a). Nearby outcrops indicate that the fault displacement is approximately 160 ft.

The canyon floor at the BSG Study Area consists of unconsolidated alluvium over bedrock. These deposits typically are sand and gravel derived from erosion of upslope colluvium and bedrock. These alluvial deposits range in thickness from 21 to 55 ft as evidenced in boreholes drilled at the BSG Study Area.

7.1.7.2 Hydrogeologic Conditions at the BSG Study Area

When the Burn Site Well was installed in 1986, the depth to groundwater bearing strata was approximately 222 ft below ground surface. Following completion of the well in fractured bedrock, the water level rose approximately 154 ft due to positive head. The fractured rocks of the Manzanita Mountains are recharged by infiltration of precipitation, largely occurring from summer thundershowers and, to a lesser degree, winter snowfall on the higher elevations. Groundwater recharge is restricted by high evapotranspiration rates (losses to the atmosphere by evaporation and plant transpiration) and low permeability of the fractured bedrock.

Regionally, groundwater in the western Manzanita Mountains flows generally toward the west from a groundwater flow divide located east of the BSG Study Area (SNL November 2001). Groundwater flow along Lurance Canyon, discharges primarily as direct underflow to the unconsolidated basin fill deposits

of the Albuquerque Basin. Based on field observations, some discharge also occurs at springs along the mountain front. Much of the flow that discharges from these springs undergoes evapotranspiration. Some flow from the springs infiltrates nearby alluvial deposits.

Annual precipitation in the Manzanita Mountains is in the form of rainfall and minor snowfall. July and August are typically the wettest months; 45 to 62 percent of annual precipitation falls during summer thunderstorms from July to October (National Weather Service 2002). The average annual precipitation in this drainage basin is estimated to range between 12 and 16 inches (SNL April 2008a). Annual potential evapotranspiration in the Albuquerque area greatly exceeds annual precipitation. Because much of the rainfall in the Lurance Canyon drainage occurs during the summer, losses to evapotranspiration are high. A small percentage of precipitation may infiltrate into the exposed bedrock or into alluvial deposits along the canyon floor.

Ephemeral surface water flows occur in response to precipitation in the drainage basin. In 1997, two monitoring wells (CYN-MW2S and 12AUP-01 [Figure 7-2]) were constructed in Lurance Canyon to monitor water levels within the channel deposits at the contact with underlying Precambrian bedrock. No groundwater was detected in either shallow monitoring well until September 2, 2004. After a series of rain events, between 1 and 2 inches of water were measured in monitoring well 12AUP-01. The water level remained fairly constant for about one month. However, no water has been measured in monitoring well 12AUP-01 since 2005. No groundwater has been measured in monitoring well CYN-MW2S since installation. It is likely that significant saturation in the alluvium occurs only after a series of significant rain events. Episodic accumulation of precipitation may provide a mechanism for recharging the brecciated fault zones and uncemented fractures in the underlying bedrock.

7.1.7.3 Local Direction of Flow

Figure 7-2 presents the October 2013 potentiometric surface for the BSG monitoring well network. The general direction of groundwater flow beneath the BSG Study Area is to the west-southwest as indicated by the potentiometric surface. No water supply wells are located near the BSG Study Area, except for the Burn Site Well that is used only rarely (last pumped in 2003) for nonpotable applications, such as fire suppression in testing structures and for fuel pool tests. Groundwater levels in the Paleozoic and Precambrian bedrock near the BSG Study Area are not influenced by regional water supply well pumping from the basin fill deposits of the Albuquerque Basin, which are located to the west of the Tijeras Fault Zone.

The potentiometric surface shown on Figure 7-2 infers an average horizontal gradient of approximately 0.1 ft/ft in the semiconfined to confined bedrock fracture system. The apparent horizontal groundwater gradient based on BSG monitoring wells varies from approximately 0.07 to 0.17 feet per foot (ft/ft). The horizontal gradient west of the BSG Study Area flattens substantially (Plate 1).

The range of hydraulic gradients in Lurance Canyon indicates that localized controls are associated with brecciated fault zones in the low-permeability fractured bedrock at the BSG Study Area. Limited groundwater flow velocity information is based on COC first arrival estimates. Based on contaminant releases from SWMU 94F arriving at monitoring well CYN-MW1D, the minimum apparent velocity of the COCs is estimated to be approximately 160 feet per year (ft/yr) (SNL April 2008a). No information is available about vertical flow velocity within the fractured rocks at the BSG Study Area. However, vertical movement of groundwater within the brecciated fault zones probably occurs as rapid, partially saturated to saturated flow. Filled fractures within the upper portion of the metamorphic and intrusive rocks act as a semiconfined unit restricting vertical flow.

Water levels have been routinely monitored in BSG monitoring wells since 1999. Figures 7C-1 through 7C-5 (Attachment 7C) show groundwater levels in BSG wells that are completed in bedrock. No

substantial seasonal variation in water levels is evident in these wells. The wide range of hydraulic gradients in Lurance Canyon and the lack of correlation between water level fluctuations in these wells support the assessment that the low-permeability fractured groundwater system at the BSG Study Area is poorly interconnected. Water level fluctuations may be a result of local heterogeneities in hydraulic properties related to the fractured system. The BSG monitoring wells have shown significant groundwater declines over the past four to five years, with decreases in water levels ranging from 0.76 to 3.46 ft/yr. Declining water levels may be due to reduced amounts of precipitation during the drought of the last several years.

7.1.7.4 Contaminant Sources

Nitrate in the BSG Study Area may be derived from both natural and anthropogenic sources. The NMED-specified background concentration for nitrate in groundwater is 4 mg/L (Dinwiddie 1997). Potential natural sources include the weathering of rocks, atmospheric deposition, and the grading of soils and alluvium. Evaporation and transpiration of rainwater that has infiltrated canyon alluvial sediments might have increased nitrate concentrations. Potential anthropogenic nitrate sources include septic systems, wastewater discharges, and the degradation of HE compounds. SNL/NM personnel have conducted several sampling events in the BSG Study Area to identify the source of nitrate; however, no conclusive source has been identified (SNL May 2005). Additional studies are being conducted.

Some evidence indicates that evaporation and transpiration may concentrate nitrate in sediments beneath ephemeral drainages in the vicinity of the Manzanita Mountains. This evidence includes nitrate concentrations that exceed the MCL in groundwater beneath these drainages and a chloride to nitrate ratio in groundwater that is similar to the chloride to nitrate ratio in rainfall (McQuillan and Space 1995).
SWMU 65 is located in the center of the BSG Study Area and contains open-air detonation areas where nitrate-based explosives were used. The detonations dispersed HE compounds across the ground surface, and subsequent degradation (weathering) of these HE materials most likely released nitrate. SWMU 94 testing also involved burning HE compounds and propellants. Nitrate is highly soluble in water, and precipitation can enhance the migration of nitrate to groundwater. In addition to nitrate, petroleum products were detected in soil samples; therefore, the potential for petroleum products in groundwater was evaluated.

7.1.7.5 Contaminant Distribution and Transport in Groundwater

Nitrate was first detected above the MCL of 10 mg/L in groundwater samples from the Burn Site Well. Since the completion of monitoring wells CYN-MW1D (December 1997), CYN-MW3 (June 1999), CYN-MW6 (February 2006), CYN-MW9 (July 2010), CYN-MW12 (July 2010), and CYN-MW13 (December 2012), nitrate concentrations that exceed the MCL have been consistently detected in samples from these wells. Nitrate concentrations in samples from monitoring wells CYN-MW10 and CYN-MW11 are near or just above the MCL (Table 7-3). Nitrate concentrations in groundwater samples from monitoring wells CYN-MW4, CYN-MW7, and CYN-MW8 have not exceeded the MCL.

Potential downgradient receptors for the nitrate plume are Coyote Springs, approximately 3 miles west of the study area, and the Albuquerque Bernalillo County Water Utility Authority and KAFB well fields, located approximately 7 to 12 miles to the west-northwest of the study area. Numerical simulations suggest nitrate concentrations will be decreasing in groundwater to below the MCL by the time the nitrate reaches Coyote Springs, and to below MDLs in the regional aquifer through dispersion and dilution as the plume moves into the more hydraulically conductive alluvial-fan and Ancestral Rio Grande deposits west of Coyote Springs. Numerical simulations also show that groundwater travel times exceed 600 years from the study area to the Albuquerque Bernalillo County Water Utility Authority and KAFB well fields (SNL May 2005).

Table 7-3. Summary of Historical Nitrate Concentrations in Groundwater Monitoring Wells that Exceed the MCL at the Burn Site Groundwater Study Area

Well	Historical Maximum NPN Concentration (mg/L)	Distance and Direction from Burn Site Well
Burn Site Well	24.3	0
CYN-MW1D	28.0	3,400 ft south southwest
CYN-MW3	14.7	1,400 ft west
CYN-MW6	39.9	1,000 ft west
CYN-MW9	41.9	600 ft west northwest
CYN-MW10	11.4	600 ft west southwest
CYN-MW11	12.3	30 ft south
CYN-MW12	14.7	1,300 ft west northwest
CYN-MW13	35.0	3,400 ft south southwest

NOTES:
CYN = Canyons.
ft = Feet.
MCL = Maximum Contaminant Level.
mg/L = Milligrams per liter.
MW = Monitoring well.
NPN = Nitrate plus nitrite.

7.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM Environmental Restoration (ER) Operations as well as implements and enforces federal regulations mandated by the Resource Conservation and Recovery Act (RCRA). All ER SWMUs and Areas of Concern are listed in Module IV of the SNL/NM RCRA Permit, *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518* (NMED 1993).

All corrective action requirements pertaining to the BSG Study Area are contained in the Order (NMED April 2004). The groundwater monitoring activities for BSG are not associated with a single SWMU, but are more regional in nature. Before the Order became effective in April 2004, groundwater investigations at the BSG Study Area had been conducted voluntarily by SNL/NM ER Operations.

Initially, groundwater monitoring for the BSG was initiated to satisfy the requirements of the SNL/NM Hazardous Solid Waste Amendments (HSWA) permit for characterization of SWMUs. The Order transferred regulatory authority for corrective action requirements from the HSWA module to the Order (NMED April 2004). The BSG investigation must comply with requirements set forth in the Order for site characterization and the development of a CME.

In response to the Order, DOE/NNSA and Sandia submitted two documents to the NMED: *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Burn Site* (SNL June 2004a), and *Corrective Measures Evaluation Work Plan for Sandia National Laboratories/New Mexico Burn Site* (SNL June 2004b). The current conceptual site model provides site-specific characteristics by which remedial alternatives were evaluated. The CME Work Plan (SNL June 2004b) provides a description and justification of the remedial alternatives considered and the methods and criteria to be used in the evaluation. The CME Work Plan was completed to comply with requirements set forth in the Order (NMED April 2004) and with the guidance of the RCRA Corrective Action Plan (EPA 1994).

On March 1, 2005, DOE/NNSA and Sandia received a letter from the NMED that rejected the CME Work Plan and stipulated the following requirements (NMED February 2005):

- DOE/NNSA and Sandia must prepare and submit an IMWP within 90 days from the receipt of the letter (by May 30, 2005).

- The NMED requires additional characterization of the nitrate-contaminated groundwater near the BSG Study Area. Specifically, the downgradient extent of groundwater with nitrate concentrations greater than 10 mg/L shall be determined.

- The NMED does not accept the *Corrective Measures Evaluation Work Plan for Sandia National Laboratories/New Mexico Burn Site* (SNL June 2004b) because it is not satisfied with the existing characterization of nitrate-contaminated groundwater near the BSG Study Area.

- The NMED also requires the installation of one additional monitoring well "adjacent to SWMU-94F in order to establish groundwater conditions in this petroleum-contamination source area."

In May 2005, DOE/NNSA and Sandia submitted an IMWP to the NMED that proposed the installation of additional groundwater monitoring wells to characterize the extent of nitrate contamination in the bedrock aquifer downgradient of monitoring well CYN-MW1D and fuel-related compounds downgradient of SWMU 94F (SNL May 2005). The selected interim measures described in the IMWP included additional well installation, groundwater monitoring, and institutional controls. These interim measures were proposed to serve three purposes: provide data to support the CME; monitor the migration of the nitrate plume to provide an early warning system to trigger an action if a danger to downgradient ecological receptors (Coyote Springs) becomes apparent; and protect human health and the environment by limiting exposure to contaminated groundwater by restricting access to the monitoring wells.

In support of the selected interim measures, the IMWP (SNL May 2005) included the following reports as attachments:

- Remedial Alternatives Data Gaps Review
- Nitrate Source Evaluation
- Evaluation of Contaminant Transport

The Remedial Alternatives Data Gaps Review included detailed definitions of remedial alternatives and a preliminary evaluation of remedial alternatives with the purpose of identifying data gaps (SNL May 2005). One of the data gaps identified included determining background nitrate concentrations and evaluating the potential for a residual source of nitrate in the vadose zone. The investigation initiated to fill this data gap and the analytical results were presented in the Nitrate Source Evaluation. The Evaluation of Contaminant Transport consisted of a simplified cross-sectional modeling approach to simulate transport and dilution of nitrate between the current location of nitrate in BSG and potential human and ecological receptors.

Data collected as part of additional characterization required by the IMWP (SNL May 2005) were incorporated into an updated version of the conceptual site model (SNL April 2008a). The updated conceptual site model provides the basis for a technically defensible remediation program that was developed and documented in the CME Work Plan (SNL April 2008b), the results of which will eventually be documented in the CME Report. The April 2008 CME Work Plan (SNL April 2008b) was developed to address the concerns outlined in the letter from the NMED (February 2005) and to comply

with requirements of the Order (NMED April 2004). The CME Work Plan (SNL April 2008b) provides information and data gathered during interim measures and performance and compliance goals and objectives for the remediation of the BSG.

On April 30, 2009, DOE/NNSA and Sandia received a letter was from the NMED entitled, *Perchlorate Contamination in Groundwater, Sandia National Laboratories, EPA ID #NM5890110518* (NMED April 2009). The letter discussed the occurrence of perchlorate in groundwater at concentrations at or greater than 1 µg/L at various locations at SNL/NM. The letter also stated that DOE/NNSA and Sandia must characterize the nature and extent of the perchlorate contamination at the BSG Study Area and submit to the NMED a plan for such characterization. DOE/NNSA and Sandia met with the NMED in June and July 2009 (SNL June 2009b and July 2009) and submitted a letter requesting an extension to November 30, 2009 (DOE July 2009). The results of the discussions at the June and July meetings (SNL June 2009b and July 2009) have been incorporated into the BSG Characterization Work Plan (SNL November 2009), which included such items as number and locations of wells and boreholes.

In February 2010, DOE/NNSA and Sandia received notice of conditional approval for the November 2009 BSG Characterization Work Plan (NMED February 2010). In July 2010, DOE/NNSA and Sandia implemented the requirements of the work plan and completed subsurface soil sampling at 10 deep soil boring locations to determine contaminant sources and installed four groundwater monitoring wells to determine the extent of groundwater contamination. Based on an outstanding schedule commitment, DOE/NNSA and Sandia submitted an extension request for the BSG CME Report in September 2010 (SNL September 2010), which was approved by the NMED (October 2010) with a revised CME Report submittal date of March 31, 2014.

In this report BSG monitoring data are presented for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (i.e., gamma spectroscopy, gross alpha/beta activity, and tritium) are provided voluntarily by the DOE/NNSA and Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Order (NMED April 2004). Additional information on radionuclides and the scope of the Order is available in Section III.A of the Order.

7.3 Scope of Activities

The activities for the BSG investigation conducted during this reporting period, including plans and reports, are listed in Section 7.1.5. The field activities completed in the study area during 2013 include groundwater monitoring (Table 7-4). The analytical parameters for each well and each sampling event are listed in Table 7-5.

Quality control (QC) samples are collected in the field at the time of environmental sample collection. Field QC samples include duplicate environmental samples, split samples, equipment blank (EB), field blank (FB), and trip blank (TB) samples. Duplicate environmental samples are used to measure the precision of the sampling process. Split samples are used to verify the performance of the analytical laboratory. EB samples are used to verify the effectiveness of sampling equipment decontamination procedures. FB samples provide a check for potential ambient sources of sample contamination during the sampling process and/or sampling error. TB samples are used to determine whether volatile organic compounds (VOCs) contaminated the sample during preparation, transportation, and handling prior to receipt by the analytical laboratory.

Table 7-4. Groundwater Monitoring Well Network and Sampling Dates for the Burn Site Groundwater Study Area, Calendar Year 2013

Date of Sampling Event	Wells Sampled		SAP
April/May 2013	CYN-MW4 CYN-MW7 CYN-MW8 CYN-MW9	CYN-MW10 CYN-MW11 CYN-MW12 CYN-MW13	*Burn Site Groundwater Monitoring, Mini-SAP for Third Quarter Fiscal Year 2013* (SNL March 2013b)
December 2013	CYN-MW4 CYN-MW7 CYN-MW8 CYN-MW9	CYN-MW10 CYN-MW11 CYN-MW12 CYN-MW13	*Burn Site Groundwater Monitoring, Mini-SAP for First Quarter Fiscal Year 2014* (SNL November 2013)

NOTES:
CYN = Canyons.
MW = Monitoring well.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories.

Table 7-5. Parameters Sampled at Burn Site Groundwater Study Area Wells for Each Sampling Event, Calendar Year 2013

Parameter	April/May 2013	
Anions Gamma Spec* Gross Alpha Gross Beta Isotopic Uranium NPN TAL Metals, plus Total Uranium TPH-DRO TPH-GRO Tritium VOCs HE compounds	CYN-MW4 CYN-MW7 CYN-MW8 CYN-MW9 CYN-MW10	CYN-MW10 (dup) CYN-MW11 CYN-MW12 CYN-MW13 CYN-MW13 (dup)
NPN	CYN-MW13 (resample) CYN-MW13 (resample dup)	
Alkalinity Cations	CYN-MW13 CYN-MW13 (dup)	
Parameter	**December 2013**	
NPN TPH-DRO TPH-GRO	CYN-MW4 CYN-MW4 (dup) CYN-MW7 CYN-MW8 CYN-MW9	CYN-MW10 CYN-MW11 CYN-MW11 (dup) CYN-MW12 CYN-MW13

NOTES:
CYN = Canyons.
DRO = Diesel range organics.
Dup = Duplicate sample.
Gamma Spec* = Gamma spectroscopy short list (Americium-241, Cesium-137, Cobalt-60, and Potassium-40).
GRO = Gasoline range organics.
HE = High explosive.
MW = Monitoring well.
NPN = Nitrate plus nitrate (reported as nitrogen).
TAL = Target Analyte List.
TPH = Total petroleum hydrocarbons.
VOC = Volatile organic compound.

7.4 Field Methods and Measurements

The monitoring procedures conducted for the BSG groundwater monitoring are described in detail in Section 1.3. The water level information was used to create the potentiometric surface map presented on Figure 7-2 and the hydrographs presented in Figures 7C-1 through 7C-5 (Attachment 7C).

7.5 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using EPA-specified protocols described in Section 1.3.2 (Tables 1-5 and 1-6).

7.6 Summary of Analytical Results

This section discusses analytical results, exceedances of regulatory standards, and pertinent trends in COC concentrations. The analytical results and field measurements for the CY 2013 BSG sampling events are presented in Tables 7A-1 through 7A-9 (Attachment 7A). Data qualifiers are explained in the footnotes following Table 7A-9.

No VOCs or HE compounds were detected. The MDLs for all analyzed VOCs are listed in Table 7A-1, and the MDLs for all analyzed HE compounds are listed in Table 7A-2.

The analytical results for nitrate plus nitrite (NPN) (reported as nitrogen) are presented in Table 7A-3, and Figure 7-3 presents NPN concentration contours for the BSG Study Area. NPN results exceed the MCL of 10 mg/L in samples from monitoring wells CYN-MW9, CYN-MW11, CYN-MW12, and CYN-MW13. NPN concentrations in samples from the other BSG wells are less than the MCL (Table 7A-3). For CY 2013, the NPN concentrations for wells exceeding the MCL are summarized as follows:

- Monitoring well CYN-MW9 had reported concentrations of 33.7 mg/L (April 2013) and 41.9 mg/L (December 2013). The historical range of NPN concentrations for monitoring well CYN-MW9 is approximately 29 to 42 mg/L with a consistent trend, with the exception of the December 2013 result (Figure 7B-1).

- Monitoring well CYN-MW11 had reported concentrations of 8.97 mg/L (April 2013), 12.3 mg/L (December 2013), and 10.1 mg/L (December 2013, duplicate). The historical range of NPN concentrations for monitoring well CYN-MW11 is approximately 9 to 12 mg/L with a consistent trend (Figure 7B-2).

- Monitoring well CYN-MW12 had reported concentrations of 14.7 mg/L (April 2013) and 14.4 mg/L (December 2013). The historical range of NPN concentrations for monitoring well CYN-MW12 is approximately 11 to 15 mg/L with a slightly increasing trend (Figure 7B-3).

- Monitoring well CYN-MW13 had reported concentrations of 33.5 mg/L (April 2013), 32.6 mg/L (April 2013, duplicate), 35.0 mg/L (May 2013), 32.3 mg/L (May 2013 duplicate), and 33.7 mg/L (December 2013). All NPN concentrations for monitoring well CYN-MW13 are displayed in Figure 7B-4.

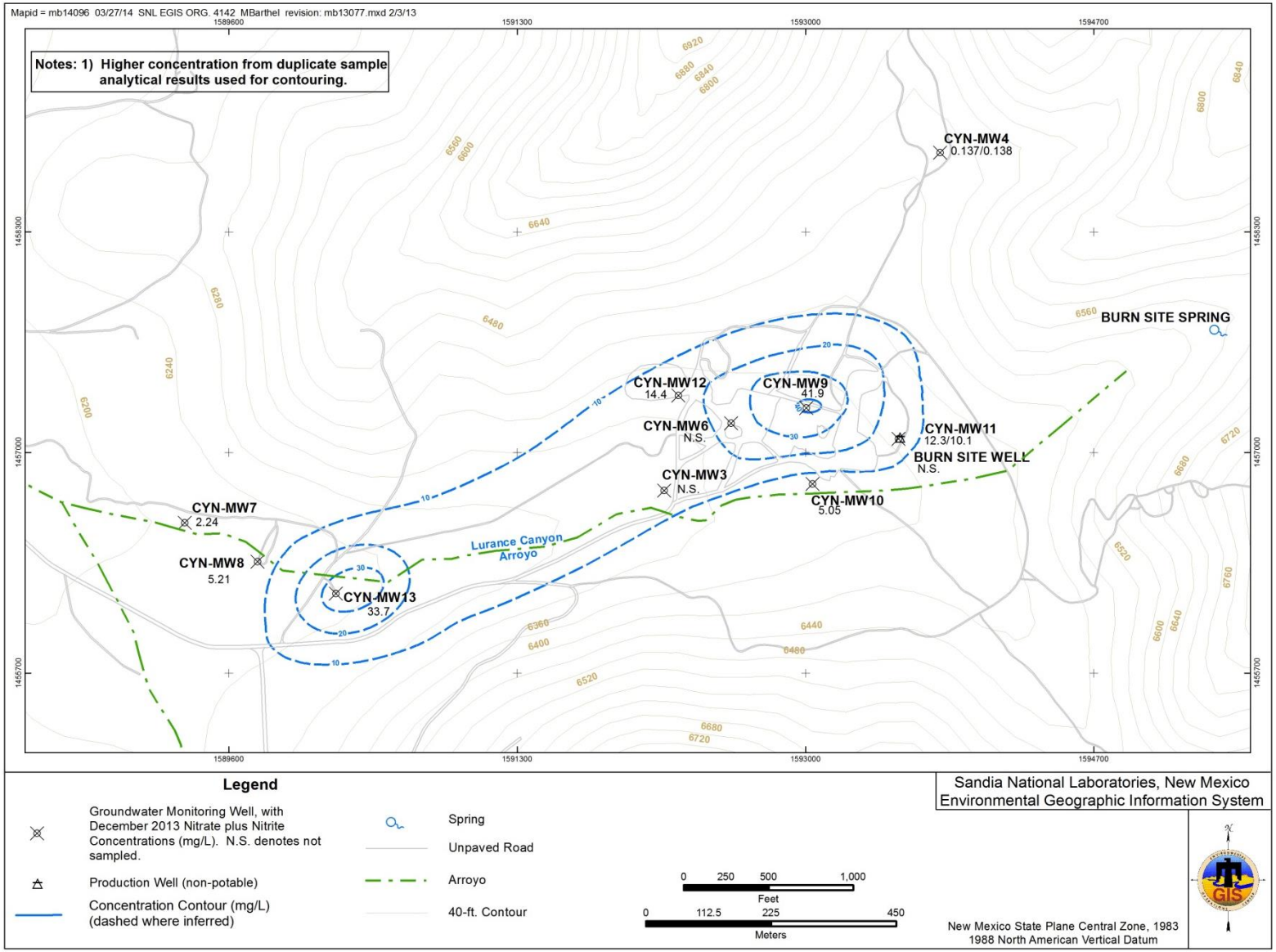


Figure 7-3. Nitrate plus Nitrite Concentration Contour Map for the Burn Site Groundwater Study Area

The results for TPH are listed for TPH-DRO and TPH-GRO in Table 7A-4. No MCLs have been established for TPH-DRO or TPH-GRO. No detections of TPH-GRO were reported for any of the samples collected during the CY 2013 sampling events. Several detections of TPH-DRO were reported in samples collected from monitoring wells CYN-MW8, CYN-MW9, and CYN-MW13 at concentrations ranging from 71.7 to 99.4 µg/L. However, these TPH-DRO results were qualified with "J" by the laboratory (Table 7A-4).

The analytical results for anions are presented in Table 7A-5. None of the analytes exceed MCLs, where established.

Total metal results are presented in Table 7A-6. No metals exceed established MCLs.

Groundwater samples were analyzed for tritium, gross alpha/beta activity, isotopic uranium, and radionuclides by gamma spectroscopy. The results are presented in Table 7A-7. All radionuclide activity results are below established MCLs. Gross alpha activity is measured as a screening tool and according to 40 Code of Federal Regulations Parts 9, 141, and 142, Table I-4, does not include uranium, which is measured independently. Therefore, gross alpha activity measurements were corrected by subtracting out the total uranium activity. Radiological results are further reviewed by an SNL/NM Certified Health Physicist to assure that the samples are nonradioactive. Corrected gross alpha activity results are below the MCL of 15 picocuries per liter (pCi/L).

Additional samples for alkalinity and major cations (as calcium, magnesium, potassium, and sodium) were collected from monitoring well CYN-MW13 only. Groundwater samples for cations are collected after groundwater is passed through in-line filters of 0.45 micron pore size. There are no established MCLs for these analytical parameters. Results for these parameters are reported in Table 7A-8.

Field water quality parameters are measured during sample purging of each well prior to sampling and include temperature, specific conductance, oxidation-reduction potential, pH, turbidity, and dissolved oxygen. The parameter measurements obtained immediately prior to sample collection are presented in Table 7A-9.

7.7 Quality Control Results

Field and laboratory QC samples were collected and prepared as described in Section 1.3. Data validation qualifiers are provided with the analytical results in Tables 7A-3 through 7A-8 (Attachment 7A). The results of QC samples and the impact on data quality for the BSG quarterly sampling events are discussed in the following sections.

Duplicate environmental sample results show good correlation (relative percent difference values less than 35 for inorganic analyses) for all calculated parameters.

The results of the EB sample analyses are as follows:

- **April/May 2013 Sampling Events at Monitoring Wells CYN-MW10 and CYN-MW13**—The EB samples were collected prior to sampling these wells and analyzed for all parameters. Bromodichloromethane, bromoform, chloride, chloroform, copper, and dibromochloromethane were detected above the laboratory MDLs. No corrective action was necessary for all parameters, with the exception of copper, because these analytes were not detected in environmental samples nor were detected in environmental samples at concentrations greater than five times the EB result. The copper values reported in CYN-MW10 environmental samples were qualified as not detected during data validation,

because copper was reported in the EB sample at a concentration greater than reported environmental samples.

- **December 2013 Sampling Events at Monitoring Wells CYN-MW4 and CYN-MW11**—The EB samples were collected prior to sampling these wells and analyzed for all parameters. No analytes were detected above laboratory MDLs in any EB sample.

The results of the TB samples are as follows:

- **April/May 2013 Sampling Event**—10 VOC and 10 TPH-GRO TB samples were submitted during this sampling event. No VOCs, except acetone and carbon disulfide, were detected above laboratory MDLs in any VOC TB sample. No corrective action was required because no VOCs were detected in environmental groundwater sample. TPH-GRO was not detected above laboratory MDLs in any TB sample.

- **December 2013 Sampling Event**—A total of 10 TPH-GRO TB samples were submitted during this sampling event. No TPH-GRO was detected above laboratory MDLs in any TB sample.

The results of the FB samples are as follows:

- **April/May 2013 Sampling Event at Monitoring Wells CYN-MW8 and CYN-MW11**—The VOCs bromodichloromethane, bromoform, chloroform, and dibromochloromethane were detected above laboratory MDLs. No corrective action was necessary as these compounds were not detected in the associated environmental sample. GRO was not detected in any FB sample.

- **December 2013 Sampling Event at Monitoring Wells CYN-MW8 and CYN-MW13**—TPH-GRO was not detected in any FB sample.

7.8 Variances and Nonconformances

No variances or nonconformances from field or sampling requirements specified in the BSG monitoring Mini-Sampling and Analysis Plans (March 2013b, and November 2013b) occurred during sampling activities. The following project-specific issues associated with the CY 2012 sampling events for BSG occurred:

- **All Sampling Events**—No groundwater samples were collected from monitoring wells CYN-MW3 or CYN-MW6 due to insufficient water.

- **April/May 2013 Sampling Event**—(1) CYN-MW13 was resampled for NPN. This resample event occurred on May 17, 2013, and reported NPN values confirmed initial sample results. Both April and May 2013 NPN results are reported. (2) Additional chemical analyses, including alkalinity and cations, were collected at monitoring well CYN-MW13.

- **December 2013 Sampling Event**—(1) From December 2 to 3, 2013, SNL/NM's Grounds and Roads Services Team repaired roads to access monitoring wells CYN-MW4, CYN-MW7, CYN-MW8, and CYN-MW13. (2) Various tests activities were performed by SNL/NM's Fire Science and Technology Group during the December 2014 groundwater monitoring event.

7.9 Summary and Conclusions

This section provides a brief summary of activities, discussion of COC concentrations, trends of concentrations versus time, the conceptual site model, and plans for studies to be completed during CY 2013 at the BSG Study Area.

The BSG Study Area is located in the vicinity of the active Lurance Canyon Burn Site facility. Groundwater investigations were initiated in 1997 at the request of the NMED after elevated nitrate levels were discovered in the nonpotable Burn Site Well. The study area currently consists of 11 monitoring wells. Monitoring wells were sampled during April/May and December 2013. The samples were analyzed for VOCs, HE compounds, TPH-DRO, TPH-GRO, NPN, Target Analyte List metals (plus uranium), anions, gross alpha/beta activity, tritium, and radionuclides by gamma spectroscopy. Additional chemical analyses for alkalinity and anions/cations were collected at monitoring well CYN-MW13.

NPN was the only COC that exceeded a drinking water standard. NPN was detected at concentrations exceeding the MCL of 10 mg/L in samples from four BSG Study Area monitoring wells: CYN-MW9, CYN-MW11, CYN-MW12, and CYN-MW13. The maximum concentration reported is 41.9 mg/L in the sample collected from monitoring well CYN-MW9 during the December 2013 sampling event. For CY 2013, the NPN concentrations for samples from wells exceeding the MCL are summarized as follows:

- Monitoring well CYN-MW9 had reported concentrations of 33.7 mg/L (April 2013) and 41.9 mg/L (December 2013). The historical range of NPN concentrations for monitoring well CYN-MW9 is approximately 29 to 42 mg/L with a consistent trend, with the exception of the December 2013 result (Figure 7B-1).

- Monitoring well CYN-MW11 had reported concentrations of 8.97 mg/L (April 2013), 12.3 mg/L (December 2013), and 10.1 mg/L (December 2013, duplicate). The historical range of NPN concentrations for monitoring well CYN-MW11 is approximately 9 to 12 mg/L with a consistent trend (Figure 7B-2).

- Monitoring well CYN-MW12 had reported concentrations of 14.7 mg/L (April 2013) and 14.4 mg/L (December 2013). The historical range of NPN concentrations for monitoring well CYN-MW12 is approximately 11 to 15 mg/L with a slightly increasing trend (Figure 7B-3).

- Monitoring well CYN-MW13 had reported concentrations of 33.5 mg/L (April 2013), 32.6 mg/L (April 2013, duplicate), 35.0 mg/L (May 2013), 32.3 mg/L (May 2013 duplicate), and 33.7 mg/L (December 2013). All NPN concentrations for monitoring well CYN-MW13 are displayed in Figure 7B-4.

The analytical results for this reporting period are mostly consistent with historical concentrations. The notable exception is that nitrate concentrations in monitoring well CYN-MW13 are significantly higher than the well it replaced (CYN-MW10). The conceptual site model described in Section 7.1.7 required slight modification based on the analytical results for this reporting period.

During CY 2014, semiannual groundwater sampling will continue at the nine BSG Study Area wells during the second and fourth quarters. In addition, if NMED approves the Well Construction Plan for CYN-MW14 and CYN-MW15 (SNL September 2013b), these wells will be installed and a Field Report will be submitted to the NMED.

7.10 References

Brown et al. 1999 Brown, C.L., K.E. Karlstrom, M. Heizler, and D. Unruh, 1999. *Paleoproterozoic deformation, metamorphism, and 40Ar/39Ar thermal history of the 1.65-Ga Manzanita Pluton, Manzanita Mountains, New Mexico,* in New Mexico Geological Society 50th Annual Fall Field Conference, Albuquerque Geology, pp. 255–68.

Dinwiddie 1997 Dinwiddie, R.S., 1997. *Request for Supplemental Information: Background Concentrations Report*, SNL/KAFB. Letter from R.S. Dinwiddie, New Mexico Environment Department, Hazardous & Radioactive Materials Bureau, to M.J. Zamorski, U.S. Department of Energy, Kirtland Area Office, September 24, 1997.

DOE October 2013 U.S. Department of Energy (DOE), October 2013. Memorandum to Geoffrey Beausoleil, DOE/NNSA SFO from Steven Golian, DOE/EM, RE: Internal Remedy Review of the Burn Site Groundwater Area of Concern, Sandia National Laboratories, Albuquerque, New Mexico, U.S. Department of Energy, Office of Environmental Management, Washington, D.C., October 30, 2013.

DOE August 2013 U.S. Department of Energy (DOE), August 2013. Letter to the New Mexico Environment Department for an Extension Request for the Burn Site Groundwater Corrective Measures Evaluation Report, U.S. Department of Energy, National Nuclear Security Administration, Sandia Site Office, Albuquerque, New Mexico, August 7, 2013.

DOE July 2009 U.S. Department of Energy (DOE), July 2009. *Extension Request for Submission of Characterization Work Plan for the Burn Site Groundwater Study Area*, U.S. Department of Energy, National Nuclear Security Administration, Sandia Site Office, Albuquerque, New Mexico, July 23, 2009.

DOE September 1987 U.S. Department of Energy (DOE), September 1987. *Draft Comprehensive Environmental Assessment and Response Program (CEARP) Phase 1: Installation Assessment, Sandia National Laboratories, Albuquerque*, Albuquerque Operations Office, Environmental Safety and Health Division, Environmental Program Branch, U.S. Department of Energy, Albuquerque, New Mexico.

EPA 1994 U.S. Environmental Protection Agency (EPA), 1994. *RCRA Corrective Action Plan*, U.S. Environmental Protection Agency, Washington, D.C.

McQuillan and Space 1995 McQuillan, D., and M. Space, 1995. "High ground-water nitrate in Tijeras Arroyo, Hells Canyon, and Abo Arroyo—Evidence for a natural geologic origin," Abstract presented in the *New Mexico Geologic Society 1995 Spring Meeting* and published in *New Mexico Geology*, Vol. 17, No. 2, p. 23.

National Weather Service 2002 National Weather Service, 2002. *New Mexico Climate Summaries*. http://www.wrcc.dri.edu/summary/climsmnm.html.

NMED June 2012 New Mexico Environment Department (NMED), June 2012. *RE: Approval: Summary Report for Burn Site Groundwater Characterization Field Program, Installation of Groundwater Monitoring Wells CYN-MW9, CYN-MW10, CYN-MW11 and CYN-MW12, Collection of Subsurface Soil Samples at Boreholes BSG-BH001 through BSG-BH010, January 2012, Sandia National Laboratories, EPA ID#NM5890110518, HWB-SNL-12-002,* New Mexico Environment Department, Santa Fe, New Mexico, June 29, 2012.

NMED April 2012 New Mexico Environment Department (NMED), April 2012. *RE: Notice of Approval: Monitoring Well Plug and Abandonment Plan and Well Construction Plan, Decommissioning of Groundwater Monitoring Wells 12AUP-01, CYN-MW1D and CYN-MW2S, Installation of Groundwater Monitoring Well CYN-MW13, January 2012, Sandia National Laboratories, EPA ID#NM5890110518, HWB-SNL-12-003,* New Mexico Environment Department, Santa Fe, New Mexico, April 13, 2012.

NMED August 2011 New Mexico Environment Department (NMED), August 2011. *RE: Notice of Approval, Corrective Measures Evaluation Work Plan, Burn Site Groundwater, March 2008, Sandia National Laboratories, EPA ID#NM5890110518, HWB-SNL-04-035,* New Mexico Environment Department, Santa Fe, New Mexico, August 3, 2011.

NMED October 2010 New Mexico Environment Department (NMED), October 2010. *RE: Time Extension Request for Submittal of the Burn Site Groundwater Corrective Measures Evaluation Report, Sandia National Laboratories, EPA ID#NM5890110518,* New Mexico Environment Department, Santa Fe, New Mexico, October 4, 2010.

NMED April 2010 New Mexico Environment Department (NMED), April 2010. *Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008), Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001.* New Mexico Environment Department, Santa Fe, New Mexico.

NMED February 2010 New Mexico Environment Department (NMED), February 2010. *RE: Notice of Conditional Approval, Burn Site Groundwater Characterization Work Plan, November 2009, Sandia National Laboratories, EPA ID #NM5890110518, SNL-09-017,* New Mexico Environment Department, Santa Fe, New Mexico, February 12, 2010.

NMED April 2009 New Mexico Environment Department (NMED), April 2009. *RE: Perchlorate Contamination in Groundwater, Sandia National Laboratories, EPA ID #NM5890110518,* New Mexico Environment Department, Santa Fe, New Mexico, April 30, 2009.

NMED July 2005 New Mexico Environment Department (NMED), July 2005. *Request for Supplemental Information: Burn Site Groundwater Interim Measures Work Plan, Dated May 2005, Sandia National Laboratories, EPA ID #NM5890110518, HWB-SNL-04-039,*" July 18, 2005.

NMED February 2005 New Mexico Environment Department (NMED), February 2005. *RE: Current Conceptual Model for the Sandia National Laboratories Canyons Area (Burn Site), June 2004: Requirement to Conduct Additional Site Characterization and Interim Measures, Sandia National Laboratories NM5890110518, HWB-SNL-04-039,* New Mexico Environment Department, Santa Fe, New Mexico.

NMED April 2004 New Mexico Environment Department (NMED), April 2004. *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order*, New Mexico Environment Department, Santa Fe, New Mexico, April 29, 2004.

NMED 1993 New Mexico Environment Department (NMED), 1993. *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518,* New Mexico Environment Department, Santa Fe, New Mexico.

SNL November 2013 Sandia National Laboratories, New Mexico (SNL/NM), November 2013. *Burn Site Groundwater Monitoring, Mini-Sampling and Analysis Plan (SAP) for First Quarter, Fiscal Year 2014,* Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, November 18, 2013.

SNL September 2013a Sandia National Laboratories, New Mexico (SNL/NM), September 2013. *Annual Groundwater Monitoring Report Calendar Year 2012, Long-Term Stewardship Consolidated Groundwater Monitoring Program,* Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2013b Sandia National Laboratories, New Mexico (SNL/NM), September 2013. *Monitoring Well Plug and Abandonment Plan and Well Construction Plan, Decommissioning of Groundwater Monitoring Wells TA2-SW1-320, Installation of Groundwater Monitoring Wells TA2-W-28, CYN-MW14, and CYN-MW15,* Sandia National Laboratories/New Mexico, Environmental Restoration Operations, Albuquerque, New Mexico.

SNL March 2013a Sandia National Laboratories, New Mexico (SNL/NM), March 2013. *Installation of Replacement Monitoring Well CYN-MW13 at the Burn Site Groundwater Study Area and the Decommissioning of Three Groundwater Monitoring Wells at the Burn Site, Eight Groundwater and Soil-Vapor Monitoring Wells at the Chemical Waste Landfill, and Eight FLUTe™ Soil-Vapor Monitoring Wells at Various SWMUs and DSS Sites,* Sandia National Laboratories/New Mexico, Environmental Restoration Operations, Albuquerque, New Mexico.

SNL March 2013b Sandia National Laboratories, New Mexico (SNL/NM), March 2013. *Burn Site Groundwater Monitoring, Mini-Sampling and Analysis Plan (SAP) for Third Quarter, Fiscal Year 2013,* Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, March 11, 2013.

SNL September 2012 Sandia National Laboratories, New Mexico (SNL/NM), September 2012. *Annual Groundwater Monitoring Report, Calendar Year 2011, Groundwater Protection Program*, Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL February 2012 Sandia National Laboratories, New Mexico (SNL/NM), February 2012. *Monitoring Well Plug and Abandonment Plan and Well Construction Plan, Decommissioning of Groundwater Monitoring Wells 12AUP-01, CYN-MW1D, and CYN-MW2S, Installation of Groundwater Monitoring Well CYN-MW13: Status of CYN-MW3, DOE/NNSA SNL/New Mexico*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, February 3, 2012.

SNL January 2012 Sandia National Laboratories, New Mexico (SNL/NM), January 2012. *Summary Report for Burn Site Groundwater Characterization Field Program, Installation of Groundwater Monitoring Wells CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12, Collection of Subsurface Soil Samples at Boreholes BSG-BH001 through BSG-BH010*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, January 30, 2012.

SNL September 2011 Sandia National Laboratories, New Mexico (SNL/NM), September 2011. *Annual Groundwater Monitoring Report, Calendar Year 2010, Groundwater Protection Program*, Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL October 2010 Sandia National Laboratories, New Mexico (SNL/NM), October 2010. *Annual Groundwater Monitoring Report, Calendar Year 2009, Groundwater Protection Program*, Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2010 Sandia National Laboratories, New Mexico (SNL/NM), September 2010. *Extension Request for the Burn Site Corrective Measures Evaluation (CME) Report*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, September 20, 2010.

SNL August 2010 Sandia National Laboratories, New Mexico (SNL/NM), August 2010. *Burn Site Groundwater Monitoring, Mini-Sampling and Analysis Plan (SAP) for Fourth Quarter, Fiscal Year 2010*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, August 23, 2010.

SNL November 2009 Sandia National Laboratories, New Mexico (SNL/NM), November, 2009. *Burn Site Groundwater Characterization Work Plan, Installation of Groundwater Monitoring Wells CYN-MW9, CYN-MW10, and CYN-MW11, Collection of Subsurface Soil Samples*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, November 23, 2009.

SNL June 2009a Sandia National Laboratories, New Mexico (SNL/NM), June 2009. *Annual Groundwater Monitoring Report, Calendar Year 2008, Groundwater Protection Program*, Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2009b Sandia National Laboratories, New Mexico (SNL/NM), June 2009. *Notes of Meeting—June 15, 2009 Meeting Between NMED, DOE, and SNL/NM to discuss the April 2009 NMED Letter entitled: Perchlorate Contamination in Groundwater, Sandia National Laboratories*, Sandia National Laboratories, Albuquerque, New Mexico, June 23, 2009.

SNL April 2008a Sandia National Laboratories, New Mexico (SNL/NM), April 2008. *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Burn Site*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL April 2008b Sandia National Laboratories, New Mexico (SNL/NM), April 2008. *Corrective Measures Evaluation Work Plan, Burn Site Groundwater*, Environmental Management Department, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 2008 Sandia National Laboratories, New Mexico (SNL/NM), March 2008. *Annual Groundwater Monitoring Report, Fiscal Year 2007, Groundwater Protection Program*, Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 2007 Sandia National Laboratories, New Mexico (SNL/NM), March 2007. *Annual Groundwater Monitoring Report, Fiscal Year 2006, Groundwater Protection Program*, Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL October 2006 Sandia National Laboratories, New Mexico (SNL/NM), October 2006. *Field Report: Installation of Burn Site Groundwater Monitoring Wells CYN-MW6, CYN-MW7, and CYN-MW8*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL October 2005 Sandia National Laboratories, New Mexico (SNL/NM), October 2005. *Annual Groundwater Monitoring Report, Fiscal Year 2004, Groundwater Protection Program*, Environmental Management Department, Sandia National Laboratories, Albuquerque, New Mexico.

SNL August 2005 Sandia National Laboratories, New Mexico (SNL/NM), August 2005. *Responses to NMED Request for Supplemental Information: Burn Site Groundwater Interim Measures Work Plan*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2005 Sandia National Laboratories, New Mexico (SNL/NM), June 2005. *Request for Supplemental Information Responses and Proposals for Corrective Action Complete, Drain and Septic Systems SWMUs 49, 101, 116, 138, 149, 154, and 161, Drain and Septic Systems Round 9,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL May 2005 Sandia National Laboratories, New Mexico (SNL/NM), May 2005. *Interim Measures Work Plan, Burn Site Groundwater*, SAND Report SAND2005-2952, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL January 2005 Sandia National Laboratories, New Mexico (SNL/NM), January 2005. *Field Report, Burn Site Groundwater Nitrate Source Evaluation, January 2005*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2004a Sandia National Laboratories, New Mexico (SNL/NM), June 2004. *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Burn Site,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2004b Sandia National Laboratories, New Mexico (SNL/NM), June 2004. *Corrective Measures Evaluation Work Plan for Sandia National Laboratories/New Mexico Burn Site,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 2004 Sandia National Laboratories, New Mexico (SNL/NM), March 2004. *Annual Groundwater Monitoring Report, Fiscal Year 2003, Groundwater Protection Program*, Environmental Management Department, Sandia National Laboratories, Albuquerque, New Mexico.

SNL February 2004 Sandia National Laboratories, New Mexico (SNL/NM), February 2004. *Justification for Class III Permit Modification, ER Site 94H Operable Unit 1333, JP-8 Fuel Site,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 2003 Sandia National Laboratories, New Mexico (SNL/NM), March 2003. *Annual Groundwater Monitoring Report, Fiscal Year 2002, Groundwater Protection Program*, Environmental Management Department, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 2002 Sandia National Laboratories, New Mexico (SNL/NM), March 2002. *Annual Groundwater Monitoring Report, Fiscal Year 2001, Groundwater Protection Program*, Environmental Management Department, Sandia National Laboratories, Albuquerque, New Mexico.

SNL November 2001 Sandia National Laboratories, New Mexico (SNL/NM), November 2001. *Groundwater Investigation, Canyons Test Area, Operable Unit 1333, Burn Site, Lurance Canyon,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL April 2001 Sandia National Laboratories, New Mexico (SNL/NM), April 2001. *Annual Groundwater Monitoring Report, Fiscal Year 2000, Groundwater Protection Program*, Environmental Management Department, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 2000 Sandia National Laboratories, New Mexico (SNL/NM), March 2000. *Annual Groundwater Monitoring Report, Fiscal Year 1999, Groundwater Protection Program*, Environmental Management and Integrated Training Department, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 1999 Sandia National Laboratories, New Mexico (SNL/NM), March 1999. *Groundwater Protection Program, Fiscal Year 1998, Annual Groundwater Monitoring Report*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 1998 Sandia National Laboratories, New Mexico (SNL/NM), June 1998. *Letter Report–Information Summarizing Recent Well Installation and Sampling Activities Near the Burn Site*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL February 1998 Sandia National Laboratories, New Mexico (SNL/NM), February 1998. *Revised Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL July 1997 Sandia National Laboratories, New Mexico (SNL/NM), July 1997. *Bullets of Understanding Between NMED DOE OB and the SNL/NM ER Project for the Nitrate Assessment at the Lurance Canyon Explosive Test Site, ER Site 65, OU 1333, Canyons Test Area*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Van Hart June 2003 Van Hart, D., June 2003. *Geologic Investigation: An Update of Subsurface Geology on Kirtland Air Force Base, New Mexico*, SAND2003-1869, Sandia National Laboratories, Albuquerque, New Mexico.

Attachment 7A
Burn Site Groundwater
Analytical Results Tables

This page intentionally left blank.

Attachment 7A Tables

7A-1 Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B), Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 7A-5

7A-2 Method Detection Limits for High Explosive Compounds (EPA Method[g] SW846-8321A), Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 7A-6

7A-3 Summary of Nitrate plus Nitrite Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 7A-7

7A-4 Summary of Diesel Range Organics and Gasoline Range Organics Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 7A-9

7A-5 Summary of Anion Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 7A-11

7A-6 Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 7A-13

7A-7 Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Tritium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 7A-23

7A-8 Summary of Alkalinity and Cation Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 7A-27

7A-9 Summary of Field Water Quality Measurements[h], Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 7A-28

Footnotes for Burn Site Groundwater Analytical Results Tables 7A-29

This page intentionally left blank.

Table 7A-1
Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B), Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Analyte	MDL[b] (µg/L)	Analyte	MDL[b] (µg/L)
1,1,1-Trichloroethane	0.300	Chlorobenzene	0.300
1,1,2,2-Tetrachloroethane	0.300	Chloroethane	0.300
1,1,2-Trichloroethane	0.300	Chloroform	0.300
1,1-Dichloroethane	0.300	Chloromethane	0.300
1,1-Dichloroethene	0.300	Cyclohexane	0.300
1,2,3-Trichlorobenzene	0.300	Dibromochloromethane	0.300
1,2,4-Trichlorobenzene	0.300	Dichlorodifluoromethane	0.300
1,2-Dibromo-3-chloropropane	0.300	Ethyl benzene	0.300
1,2-Dibromoethane	0.300	Isopropylbenzene	0.300
1,2-Dichlorobenzene	0.300	Methyl acetate	1.50
1,2-Dichloroethane	0.300	Methylcyclohexane	3.00
1,2-Dichloropropane	0.300	Methylene chloride	3.00
1,3-Dichlorobenzene	0.300	Styrene	0.300
1,4-Dichlorobenzene	0.300	Tert-butyl methyl ether	0.300
2,2-trifluoroethane, 1,1,2-Trichloro-1	1.50	Tetrachloroethene	0.300
2-Butanone	2.00	Toluene	0.300
2-Hexanone	2.20	Trichloroethene	0.300
4-methyl-, 2-Pentanone	1.50	Trichlorofluoromethane	0.300
Acetone	3.00	Vinyl chloride	0.300
Benzene	0.300	Xylene	0.300
Bromochloromethane	0.300	cis-1,2-Dichloroethene	0.300
Bromodichloromethane	0.300	cis-1,3-Dichloropropene	0.300
Bromoform	0.300	m-, p-Xylene	0.300
Bromomethane	0.300	o-Xylene	0.300
Carbon disulfide	1.50	trans-1,2-Dichloroethene	0.300
Carbon tetrachloride	0.300	trans-1,3-Dichloropropene	0.300

Refer to footnotes on page 7A-29.

Table 7A-2
Method Detection Limits for High Explosive Compounds (EPA Method[g] SW846-8321A), Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Analyte	MDL[b] (µg/L)
1,3,5-Trinitrobenzene	0.0808 – 0.0920
1,3-Dinitrobenzene	0.0808 – 0.0920
2,4,6-Trinitrotoluene	0.0808 – 0.0920
2,4-Dinitrotoluene	0.0808 – 0.0920
2,6-Dinitrotoluene	0.0808 – 0.0920
2-Amino-4,6-dinitrotoluene	0.0808 – 0.0920
2-Nitrotoluene	0.0828 – 0.0943
3-Nitrotoluene	0.0808 – 0.0920
4-Amino-2,6-dinitrotoluene	0.0808 – 0.0920
4-Nitrotoluene	0.152 – 0.172
HMX	0.0808 – 0.0920
Nitro-benzene	0.0808 – 0.0920
Pentaerythritol tetranitrate	0.101 – 0.115
RDX	0.0808 – 0.0920
Tetryl	0.0808 – 0.0920

Refer to footnotes on page 7A-29.

Table 7A-3
Summary of Nitrate plus Nitrite Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW4 09-Apr-13	Nitrate plus nitrite as N	0.124	0.017	0.050	10.0			093748-018	EPA 353.2
CYN-MW7 03-Apr-13	Nitrate plus nitrite as N	2.28	0.085	0.250	10.0			093733-018	EPA 353.2
CYN-MW8 08-Apr-13	Nitrate plus nitrite as N	5.12	0.170	0.500	10.0			093743-018	EPA 353.2
CYN-MW9 17-Apr-13	Nitrate plus nitrite as N	**33.7**	0.850	2.50	10.0			093836-018	EPA 353.2
CYN-MW10 10-Apr-13	Nitrate plus nitrite as N	5.95	0.170	0.500	10.0			093754-018	EPA 353.2
CYN-MW10 (Duplicate) 10-Apr-13	Nitrate plus nitrite as N	6.06	0.170	0.500	10.0			093756-018	EPA 353.2
CYN-MW11 11-Apr-13	Nitrate plus nitrite as N	8.97	0.170	0.500	10.0			093759-018	EPA 353.2
CYN-MW12 16-Apr-13	Nitrate plus nitrite as N	**14.7**	0.170	0.500	10.0			093833-018	EPA 353.2
CYN-MW13 04-Apr-13	Nitrate plus nitrite as N	**33.5**	0.850	2.50	10.0			093739-018	EPA 353.2
CYN-MW13 (Duplicate) 04-Apr-13	Nitrate plus nitrite as N	**32.6**	0.850	2.50	10.0			093740-018	EPA 353.2
CYN-MW13 (Resample) 17-May-13	Nitrate plus nitrite as N	**35.0**	0.850	2.50	10.0			094022-018	EPA 353.2
CYN-MW13 (Resample Duplicate) 17-May-13	Nitrate plus nitrite as N	**32.3**	0.850	2.50	10.0			094023-018	EPA 353.2
CYN-MW4 11-Dec-13	Nitrate plus nitrite	0.138	0.017	0.050	10.0			095003-018	EPA 353.2
CYN-MW4 (Duplicate) 11-Dec-13	Nitrate plus nitrite	0.137	0.017	0.050	10.0			095004-018	EPA 353.2
CYN-MW7 09-Dec-13	Nitrate plus nitrite	2.24	0.170	0.500	10.0			095006-018	EPA 353.2
CYN-MW8 04-Dec-13	Nitrate plus nitrite	5.21	0.170	0.500	10.0			095009-018	EPA 353.2
CYN-MW9 16-Dec-13	Nitrate plus nitrite	**41.9**	0.850	2.50	10.0			094998-018	EPA 353.2
CYN-MW10 02-Dec-13	Nitrate plus nitrite	5.05	0.170	0.500	10.0			094988-018	EPA 353.2

Refer to footnotes on page 7A-29.

Table 7A-3 *(Concluded)*
Summary of Nitrate plus Nitrite Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW11 03-Dec-13	Nitrate plus nitrite	**12.3**	0.170	0.500	10.0			094993-018	EPA 353.2
CYN-MW11 (Duplicate) 03-Dec-13	Nitrate plus nitrite	**10.1**	0.170	0.500	10.0			094994-018	EPA 353.2
CYN-MW12 16-Dec-13	Nitrate plus nitrite	**14.4**	0.850	2.50	10.0			094996-018	EPA 353.2
CYN-MW13 10-Dec-13	Nitrate plus nitrite	**33.7**	1.70	5.00	10.0			095012-018	EPA 353.2

Refer to footnotes on page 7A-29.

Table 7A-4
Summary of Diesel Range Organics and Gasoline Range Organics Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW4	Diesel Range Organics	ND	53.2	213	NE	U		093748-005	SW846 8015D
09-Apr-13	Gasoline Range Organics	ND	16.7	50.0	NE	U		093748-006	SW846 8015A/B
CYN-MW7	Diesel Range Organics	91.3	51.5	206	NE	B, J	206U	093733-005	SW846 8015D
03-Apr-13	Gasoline Range Organics	ND	16.7	50.0	NE	U		093733-006	SW846 8015A/B
CYN-MW8	Diesel Range Organics	ND	54.9	220	NE	U		093743-005	SW846 8015D
08-Apr-13	Gasoline Range Organics	ND	16.7	50.0	NE	U		093743-006	SW846 8015A/B
CYN-MW9	Diesel Range Organics	99.4	52.1	208	NE	J		093836-005	SW846 8015D
17-Apr-13	Gasoline Range Organics	ND	16.7	50.0	NE	U		093836-006	SW846 8015A/B
CYN-MW10	Diesel Range Organics	ND	52.1	208	NE	U		093754-005	SW846 8015D
10-Apr-13	Gasoline Range Organics	ND	16.7	50.0	NE	U		093754-006	SW846 8015A/B
CYN-MW10 (Duplicate)	Diesel Range Organics	ND	52.6	211	NE	U		093756-005	SW846 8015D
10-Apr-13	Gasoline Range Organics	ND	16.7	50.0	NE	U		093756-006	SW846 8015A/B
CYN-MW11	Diesel Range Organics	ND	51.0	204	NE	U		093759-005	SW846 8015D
11-Apr-13	Gasoline Range Organics	ND	16.7	50.0	NE	U		093759-006	SW846 8015A/B
CYN-MW12	Diesel Range Organics	ND	52.6	211	NE	U		093833-005	SW846 8015D
16-Apr-13	Gasoline Range Organics	ND	16.7	50.0	NE	U		093833-006	SW846 8015A/B
CYN-MW13	Diesel Range Organics	78.0	52.6	211	NE	B, J	211U	093739-005	SW846 8015D
04-Apr-13	Gasoline Range Organics	ND	16.7	50.0	NE	U		093739-006	SW846 8015A/B
CYN-MW13 (Duplicate)	Diesel Range Organics	121	54.3	217	NE	B, J	217U	093740-005	SW846 8015D
04-Apr-13	Gasoline Range Organics	ND	16.7	50.0	NE	U		093740-006	SW846 8015A/B
CYN-MW4	Diesel Range Organics	ND	50.0	200	NE	U		095003-005	SW846 8015D
11-Dec-13	Gasoline Range Organics	ND	16.7	50.0	NE	U		095003-006	SW846 8015A/B
CYN-MW4 (Duplicate)	Diesel Range Organics	ND	50.0	200	NE	U		095004-005	SW846 8015D
11-Dec-13	Gasoline Range Organics	ND	16.7	50.0	NE	U		095004-006	SW846 8015A/B
CYN-MW7	Diesel Range Organics	ND	50.0	200	NE	U		095006-005	SW846 8015D
09-Dec-13	Gasoline Range Organics	ND	16.7	50.0	NE	U		095006-006	SW846 8015A/B
CYN-MW8	Diesel Range Organics	85.9	51.0	204	NE	J		095009-005	SW846 8015D
04-Dec-13	Gasoline Range Organics	ND	16.7	50.0	NE	U		095009-006	SW846 8015A/B
CYN-MW9	Diesel Range Organics	81.6	50.0	200	NE	B, J	200UJ	094998-005	SW846 8015D
16-Dec-13	Gasoline Range Organics	ND	16.7	50.0	NE	U		094998-006	SW846 8015A/B
CYN-MW10	Diesel Range Organics	ND	52.1	208	NE	U		094988-005	SW846 8015D
02-Dec-13	Gasoline Range Organics	ND	16.7	50.0	NE	U		094988-006	SW846 8015A/B

Refer to footnotes on page 7A-29.

Table 7A-4 *(Concluded)*
Summary of Diesel Range Organics and Gasoline Range Organics Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW11	Diesel Range Organics	93.2	54.3	217	NE	J	217U	094993-005	SW846 8015D
03-Dec-13	Gasoline Range Organics	ND	16.7	50.0	NE	U		094993-006	SW846 8015A/B
CYN-MW11 (Duplicate)	Diesel Range Organics	ND	52.1	208	NE	U		094994-005	SW846 8015D
03-Dec-13	Gasoline Range Organics	ND	16.7	50.0	NE	U		094994-006	SW846 8015A/B
CYN-MW12	Diesel Range Organics	72.3	50.0	200	NE	B, J	200UJ	094996-005	SW846 8015D
16-Dec-13	Gasoline Range Organics	ND	16.7	50.0	NE	U		094996-006	SW846 8015A/B
CYN-MW13	Diesel Range Organics	71.7	50.0	200	NE	J		095012-005	SW846 8015D
10-Dec-13	Gasoline Range Organics	ND	16.7	50.0	NE	U		095012-006	SW846 8015A/B

Refer to footnotes on page 7A-29.

Table 7A-5
Summary of Anion Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW4	Bromide	0.394	0.067	0.200	NE			093748-016	SW846 9056
09-Apr-13	Chloride	21.9	0.670	2.00	NE			093748-016	SW846 9056
	Fluoride	0.754	0.033	0.100	4.0			093748-016	SW846 9056
	Sulfate	117	1.33	4.00	NE			093748-016	SW846 9056
CYN-MW7	Bromide	0.533	0.067	0.200	NE			093733-016	SW846 9056
03-Apr-13	Chloride	38.9	0.670	2.00	NE			093733-016	SW846 9056
	Fluoride	1.38	0.033	0.100	4.0			093733-016	SW846 9056
	Sulfate	79.8	1.33	4.00	NE			093733-016	SW846 9056
CYN-MW8	Bromide	0.763	0.067	0.200	NE			093743-016	SW846 9056
08-Apr-13	Chloride	50.0	0.670	2.00	NE			093743-016	SW846 9056
	Fluoride	1.42	0.033	0.100	4.0			093743-016	SW846 9056
	Sulfate	105	1.33	4.00	NE			093743-016	SW846 9056
CYN-MW9	Bromide	1.02	0.067	0.200	NE			093836-016	SW846 9056
17-Apr-13	Chloride	70.9	1.34	4.00	NE			093836-016	SW846 9056
	Fluoride	0.511	0.033	0.100	4.0			093836-016	SW846 9056
	Sulfate	164	2.66	8.00	NE			093836-016	SW846 9056
CYN-MW10	Bromide	0.729	0.067	0.200	NE			093754-016	SW846 9056
10-Apr-13	Chloride	41.0	0.670	2.00	NE			093754-016	SW846 9056
	Fluoride	0.741	0.033	0.100	4.0			093754-016	SW846 9056
	Sulfate	149	1.33	4.00	NE			093754-016	SW846 9056
CYN-MW10 (Duplicate)	Bromide	0.649	0.067	0.200	NE			093756-016	SW846 9056
10-Apr-13	Chloride	41.5	0.670	2.00	NE			093756-016	SW846 9056
	Fluoride	0.639	0.033	0.100	4.0			093756-016	SW846 9056
	Sulfate	149	1.33	4.00	NE			093756-016	SW846 9056
CYN-MW11	Bromide	1.02	0.067	0.200	NE			093759-016	SW846 9056
11-Apr-13	Chloride	68.8	0.670	2.00	NE			093759-016	SW846 9056
	Fluoride	0.722	0.033	0.100	4.0			093759-016	SW846 9056
	Sulfate	153	1.33	4.00	NE			093759-016	SW846 9056
CYN-MW12	Bromide	0.950	0.067	0.200	NE			093833-016	SW846 9056
16-Apr-13	Chloride	79.6	1.34	4.00	NE	H	J	093833-016	SW846 9056
	Fluoride	0.936	0.033	0.100	4.0			093833-016	SW846 9056
	Sulfate	204	2.66	8.00	NE	H	J	093833-016	SW846 9056

Refer to footnotes on page 7A-29.

Table 7A-5 *(Concluded)*
Summary of Anion Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW13 04-Apr-13	Bromide	0.346	0.067	0.200	NE			093739-016	SW846 9056
	Chloride	19.4	0.670	2.00	NE			093739-016	SW846 9056
	Fluoride	1.72	0.033	0.100	4.0			093739-016	SW846 9056
	Sulfate	73.9	1.33	4.00	NE			093739-016	SW846 9056
CYN-MW13 (Duplicate) 04-Apr-13	Bromide	0.339	0.067	0.200	NE			093740-016	SW846 9056
	Chloride	18.1	0.670	2.00	NE			093740-016	SW846 9056
	Fluoride	1.66	0.033	0.100	4.0			093740-016	SW846 9056
	Sulfate	72.0	1.33	4.00	NE			093740-016	SW846 9056
CYN-MW13 (Resample) 17-May-13	Bromide	0.289	0.067	0.200	NE			094022-016	SW846 9056
	Chloride	20.2	0.670	2.00	NE			094022-016	SW846 9056
	Fluoride	1.76	0.033	0.100	4.0			094022-016	SW846 9056
	Sulfate	81.6	1.33	4.00	NE			094022-016	SW846 9056

Refer to footnotes on page 7A-29.

Table 7A-6
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW4	Aluminum	ND	0.015	0.050	NE	U		093748-009	SW846 6020
09-Apr-13	Antimony	ND	0.001	0.003	0.006	U		093748-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093748-009	SW846 6020
	Barium	0.0444	0.0006	0.002	2.00			093748-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093748-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093748-009	SW846 6020
	Calcium	71.8	0.300	1.00	NE	B		093748-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093748-009	SW846 6020
	Cobalt	0.000218	0.0001	0.001	NE	J		093748-009	SW846 6020
	Copper	0.000964	0.00035	0.001	NE	J		093748-009	SW846 6020
	Iron	0.168	0.033	0.100	NE			093748-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093748-009	SW846 6020
	Magnesium	35.3	0.050	0.150	NE			093748-009	SW846 6020
	Manganese	0.00407	0.001	0.005	NE	J		093748-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093748-009	SW846 7470
	Nickel	0.00247	0.0005	0.002	NE	B	0.0048U	093748-009	SW846 6020
	Potassium	6.60	0.080	0.300	NE			093748-009	SW846 6020
	Selenium	0.0155	0.0015	0.005	0.050			093748-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093748-009	SW846 6020
	Sodium	43.7	0.080	0.250	NE			093748-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093748-009	SW846 6020
	Uranium	0.0143	0.000067	0.0002	0.030			093748-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		093748-009	SW846 6010
	Zinc	0.00655	0.0035	0.010	NE	J		093748-009	SW846 6020

Refer to footnotes on page 7A-29.

Table 7A-6 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW7	Aluminum	ND	0.015	0.050	NE	U		093733-009	SW846 6020
03-Apr-13	Antimony	ND	0.001	0.003	0.006	U		093733-009	SW846 6020
	Arsenic	0.00178	0.0017	0.005	0.010	J		093733-009	SW846 6020
	Barium	0.100	0.0006	0.002	2.00			093733-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093733-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093733-009	SW846 6020
	Calcium	111	0.300	1.00	NE			093733-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093733-009	SW846 6020
	Cobalt	0.000167	0.0001	0.001	NE	J	J+	093733-009	SW846 6020
	Copper	0.00154	0.00035	0.001	NE	B	0.0041U	093733-009	SW846 6020
	Iron	0.356	0.033	0.100	NE			093733-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093733-009	SW846 6020
	Magnesium	22.1	0.010	0.030	NE			093733-009	SW846 6020
	Manganese	0.00148	0.001	0.005	NE	J		093733-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093733-009	SW846 7470
	Nickel	0.00309	0.0005	0.002	NE		J+	093733-009	SW846 6020
	Potassium	2.35	0.080	0.300	NE			093733-009	SW846 6020
	Selenium	0.00606	0.0015	0.005	0.050			093733-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093733-009	SW846 6020
	Sodium	41.3	0.080	0.250	NE		J	093733-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093733-009	SW846 6020
	Uranium	0.00682	0.000067	0.0002	0.030		J	093733-009	SW846 6020
	Vanadium	0.00336	0.001	0.005	NE	J		093733-009	SW846 6010
	Zinc	0.0141	0.0035	0.010	NE			093733-009	SW846 6020

Refer to footnotes on page 7A-29.

Table 7A-6 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW8	Aluminum	ND	0.015	0.050	NE	U		093743-009	SW846 6020
08-Apr-13	Antimony	ND	0.001	0.003	0.006	U		093743-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093743-009	SW846 6020
	Barium	0.0581	0.0006	0.002	2.00			093743-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093743-009	SW846 6020
	Cadmium	0.000276	0.00011	0.001	0.005	J	J+	093743-009	SW846 6020
	Calcium	119	0.300	1.00	NE	B		093743-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093743-009	SW846 6020
	Cobalt	0.000865	0.0001	0.001	NE	J		093743-009	SW846 6020
	Copper	0.0013	0.00035	0.001	NE		J-	093743-009	SW846 6020
	Iron	0.216	0.033	0.100	NE			093743-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093743-009	SW846 6020
	Magnesium	25.7	0.050	0.150	NE			093743-009	SW846 6020
	Manganese	0.00455	0.001	0.005	NE	J		093743-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093743-009	SW846 7470
	Nickel	0.00325	0.0005	0.002	NE	B	0.0048U	093743-009	SW846 6020
	Potassium	2.47	0.080	0.300	NE			093743-009	SW846 6020
	Selenium	0.00698	0.0015	0.005	0.050			093743-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093743-009	SW846 6020
	Sodium	45.8	0.080	0.250	NE			093743-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093743-009	SW846 6020
	Uranium	0.00864	0.000067	0.0002	0.030			093743-009	SW846 6020
	Vanadium	0.00327	0.001	0.005	NE	J	J+	093743-009	SW846 6010
	Zinc	0.00791	0.0035	0.010	NE	J		093743-009	SW846 6020

Refer to footnotes on page 7A-29.

Table 7A-6 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW9	Aluminum	ND	0.015	0.050	NE	U		093836-009	SW846 6020
17-Apr-13	Antimony	ND	0.001	0.003	0.006	U		093836-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093836-009	SW846 6020
	Barium	0.0581	0.0006	0.002	2.00			093836-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093836-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093836-009	SW846 6020
	Calcium	161	0.300	1.00	NE	B		093836-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093836-009	SW846 6020
	Cobalt	0.000334	0.0001	0.001	NE	J		093836-009	SW846 6020
	Copper	0.0015	0.00035	0.001	NE		J-	093836-009	SW846 6020
	Iron	0.329	0.033	0.100	NE			093836-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093836-009	SW846 6020
	Magnesium	48.2	0.050	0.150	NE			093836-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093836-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093836-009	SW846 7470
	Nickel	0.00443	0.0005	0.002	NE	B	0.0048U	093836-009	SW846 6020
	Potassium	2.52	0.080	0.300	NE			093836-009	SW846 6020
	Selenium	0.00793	0.0015	0.005	0.050			093836-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093836-009	SW846 6020
	Sodium	36.9	0.080	0.250	NE			093836-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093836-009	SW846 6020
	Uranium	0.00779	0.000067	0.0002	0.030			093836-009	SW846 6020
	Vanadium	0.00175	0.001	0.005	NE	J	J+	093836-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093836-009	SW846 6020

Refer to footnotes on page 7A-29.

Table 7A-6 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW10	Aluminum	ND	0.015	0.050	NE	U		093754-009	SW846 6020
10-Apr-13	Antimony	ND	0.001	0.003	0.006	U		093754-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093754-009	SW846 6020
	Barium	0.0564	0.0006	0.002	2.00			093754-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093754-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093754-009	SW846 6020
	Calcium	126	0.300	1.00	NE	B		093754-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093754-009	SW846 6020
	Cobalt	0.000251	0.0001	0.001	NE	J		093754-009	SW846 6020
	Copper	0.00134	0.00035	0.001	NE		0.0083UJ	093754-009	SW846 6020
	Iron	0.228	0.033	0.100	NE			093754-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093754-009	SW846 6020
	Magnesium	35.0	0.050	0.150	NE			093754-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093754-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093754-009	SW846 7470
	Nickel	0.00342	0.0005	0.002	NE	B	0.0048U	093754-009	SW846 6020
	Potassium	1.97	0.080	0.300	NE			093754-009	SW846 6020
	Selenium	0.00715	0.0015	0.005	0.050			093754-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093754-009	SW846 6020
	Sodium	39.5	0.080	0.250	NE			093754-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093754-009	SW846 6020
	Uranium	0.00597	0.000067	0.0002	0.030			093754-009	SW846 6020
	Vanadium	0.00285	0.001	0.005	NE	J	J+	093754-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093754-009	SW846 6020

Refer to footnotes on page 7A-29.

Table 7A-6 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW10 (Duplicate)	Aluminum	0.0834	0.015	0.050	NE			093756-009	SW846 6020
10-Apr-13	Antimony	ND	0.001	0.003	0.006	U		093756-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093756-009	SW846 6020
	Barium	0.0574	0.0006	0.002	2.00			093756-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093756-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093756-009	SW846 6020
	Calcium	122	0.300	1.00	NE	B		093756-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093756-009	SW846 6020
	Cobalt	0.00025	0.0001	0.001	NE	J		093756-009	SW846 6020
	Copper	0.00128	0.00035	0.001	NE		0.0083UJ	093756-009	SW846 6020
	Iron	0.229	0.033	0.100	NE			093756-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093756-009	SW846 6020
	Magnesium	33.2	0.050	0.150	NE			093756-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093756-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093756-009	SW846 7470
	Nickel	0.00347	0.0005	0.002	NE	B	0.0048U	093756-009	SW846 6020
	Potassium	1.89	0.080	0.300	NE			093756-009	SW846 6020
	Selenium	0.00745	0.0015	0.005	0.050			093756-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093756-009	SW846 6020
	Sodium	40.6	0.080	0.250	NE			093756-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093756-009	SW846 6020
	Uranium	0.00583	0.000067	0.0002	0.030			093756-009	SW846 6020
	Vanadium	0.00318	0.001	0.005	NE	J	J+	093756-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093756-009	SW846 6020

Refer to footnotes on page 7A-29.

Table 7A-6 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW11	Aluminum	ND	0.015	0.050	NE	U		093759-009	SW846 6020
11-Apr-13	Antimony	ND	0.001	0.003	0.006	U		093759-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093759-009	SW846 6020
	Barium	0.0813	0.0006	0.002	2.00			093759-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093759-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093759-009	SW846 6020
	Calcium	136	0.300	1.00	NE	B		093759-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093759-009	SW846 6020
	Cobalt	0.000419	0.0001	0.001	NE	J		093759-009	SW846 6020
	Copper	0.00112	0.00035	0.001	NE		J-	093759-009	SW846 6020
	Iron	0.253	0.033	0.100	NE			093759-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093759-009	SW846 6020
	Magnesium	42.1	0.050	0.150	NE			093759-009	SW846 6020
	Manganese	0.313	0.001	0.005	NE			093759-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093759-009	SW846 7470
	Nickel	0.00402	0.0005	0.002	NE	B	0.0048U	093759-009	SW846 6020
	Potassium	3.33	0.080	0.300	NE			093759-009	SW846 6020
	Selenium	0.00435	0.0015	0.005	0.050	J		093759-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093759-009	SW846 6020
	Sodium	38.2	0.080	0.250	NE			093759-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093759-009	SW846 6020
	Uranium	0.00597	0.000067	0.0002	0.030			093759-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		093759-009	SW846 6010
	Zinc	0.0391	0.0035	0.010	NE			093759-009	SW846 6020

Refer to footnotes on page 7A-29.

Table 7A-6 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW12	Aluminum	ND	0.015	0.050	NE	U		093833-009	SW846 6020
16-Apr-13	Antimony	ND	0.001	0.003	0.006	U		093833-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093833-009	SW846 6020
	Barium	0.0369	0.0006	0.002	2.00			093833-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093833-009	SW846 6020
	Cadmium	0.000197	0.00011	0.001	0.005	J	J+	093833-009	SW846 6020
	Calcium	152	0.300	1.00	NE	B, N		093833-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093833-009	SW846 6020
	Cobalt	0.000544	0.0001	0.001	NE	J		093833-009	SW846 6020
	Copper	0.00206	0.00035	0.001	NE		J-	093833-009	SW846 6020
	Iron	0.291	0.033	0.100	NE			093833-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093833-009	SW846 6020
	Magnesium	42.5	0.050	0.150	NE	N		093833-009	SW846 6020
	Manganese	0.0545	0.001	0.005	NE			093833-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093833-009	SW846 7470
	Nickel	0.00428	0.0005	0.002	NE	B	0.0048U	093833-009	SW846 6020
	Potassium	3.30	0.080	0.300	NE			093833-009	SW846 6020
	Selenium	0.00804	0.0015	0.005	0.050			093833-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093833-009	SW846 6020
	Sodium	40.9	0.080	0.250	NE	N		093833-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093833-009	SW846 6020
	Uranium	0.00927	0.000067	0.0002	0.030			093833-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		093833-009	SW846 6010
	Zinc	0.0193	0.0035	0.010	NE			093833-009	SW846 6020

Refer to footnotes on page 7A-29.

Table 7A-6 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW13	Aluminum	ND	0.015	0.050	NE	U		093739-009	SW846 6020
04-Apr-13	Antimony	ND	0.001	0.003	0.006	U		093739-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093739-009	SW846 6020
	Barium	0.109	0.0006	0.002	2.00			093739-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093739-009	SW846 6020
	Cadmium	0.000384	0.00011	0.001	0.005	J		093739-009	SW846 6020
	Calcium	114	0.300	1.00	NE			093739-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093739-009	SW846 6020
	Cobalt	0.000491	0.0001	0.001	NE	J	J+	093739-009	SW846 6020
	Copper	0.0011	0.00035	0.001	NE	B	0.0041U	093739-009	SW846 6020
	Iron	0.406	0.033	0.100	NE			093739-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093739-009	SW846 6020
	Magnesium	24.0	0.010	0.030	NE			093739-009	SW846 6020
	Manganese	0.230	0.001	0.005	NE			093739-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093739-009	SW846 7470
	Nickel	0.00385	0.0005	0.002	NE		J+	093739-009	SW846 6020
	Potassium	2.58	0.080	0.300	NE			093739-009	SW846 6020
	Selenium	0.00271	0.0015	0.005	0.050	J		093739-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093739-009	SW846 6020
	Sodium	22.5	0.080	0.250	NE		J	093739-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093739-009	SW846 6020
	Uranium	0.00719	0.000067	0.0002	0.030		J	093739-009	SW846 6020
	Vanadium	0.00189	0.001	0.005	NE	J		093739-009	SW846 6010
	Zinc	0.119	0.0035	0.010	NE			093739-009	SW846 6020

Refer to footnotes on page 7A-29.

Table 7A-6 *(Concluded)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW13 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		093740-009	SW846 6020
04-Apr-13	Antimony	ND	0.001	0.003	0.006	U		093740-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093740-009	SW846 6020
	Barium	0.107	0.0006	0.002	2.00			093740-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093740-009	SW846 6020
	Cadmium	0.000387	0.00011	0.001	0.005	J		093740-009	SW846 6020
	Calcium	117	0.300	1.00	NE			093740-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093740-009	SW846 6020
	Cobalt	0.000509	0.0001	0.001	NE	J	J+	093740-009	SW846 6020
	Copper	0.00168	0.00035	0.001	NE	B	0.0041U	093740-009	SW846 6020
	Iron	0.453	0.033	0.100	NE			093740-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093740-009	SW846 6020
	Magnesium	23.7	0.010	0.030	NE			093740-009	SW846 6020
	Manganese	0.232	0.001	0.005	NE			093740-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093740-009	SW846 7470
	Nickel	0.004	0.0005	0.002	NE		J+	093740-009	SW846 6020
	Potassium	2.70	0.080	0.300	NE			093740-009	SW846 6020
	Selenium	0.00272	0.0015	0.005	0.050	J		093740-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093740-009	SW846 6020
	Sodium	24.0	0.080	0.250	NE		J	093740-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093740-009	SW846 6020
	Uranium	ND	0.000067	0.0002	0.030	U	UJ	093740-009	SW846 6020
	Vanadium	0.00205	0.001	0.005	NE	J		093740-009	SW846 6010
	Zinc	0.121	0.0035	0.010	NE			093740-009	SW846 6020

Refer to footnotes on page 7A-29.

Table 7A-7
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Tritium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW4	Americium-241	-31.8 ± 21.0	23.8	11.6	NE	U	BD	093748-033	EPA 901.1
09-Apr-13	Cesium-137	1.62 ± 1.99	3.43	1.65	NE	U	BD	093748-033	EPA 901.1
	Cobalt-60	0.239 ± 1.93	3.54	1.66	NE	U	BD	093748-033	EPA 901.1
	Potassium-40	17.4 ± 44.7	32.6	15.2	NE	U	BD	093748-033	EPA 901.1
	Gross Alpha	0.99	NA	NA	15 pCi/L	NA	None	093748-034	EPA 900.0
	Gross Beta	39.6 ± 7.04	1.98	0.956	4mrem/yr			093748-034	EPA 900.0
	Uranium-233/234	36.2 ± 4.46	0.0616	0.0274	NE			093748-035	HASL-300
	Uranium-235/236	0.609 ± 0.114	0.0378	0.0147	NE			093748-035	HASL-300
	Uranium-238	4.40 ± 0.576	0.0346	0.0139	NE			093748-035	HASL-300
	Tritium	60.4 ± 98.3	169	75.7	NE	U	BD	093748-036	EPA 906.0 M
CYN-MW7	Americium-241	0.152 ± 7.08	12.2	5.97	NE	U	BD	093733-033	EPA 901.1
03-Apr-13	Cesium-137	-0.784 ± 1.76	3.03	1.46	NE	U	BD	093733-033	EPA 901.1
	Cobalt-60	-0.0434 ± 1.73	3.01	1.42	NE	U	BD	093733-033	EPA 901.1
	Potassium-40	51.3 ± 30.5	51.4	18.9	NE	U	BD	093733-033	EPA 901.1
	Gross Alpha	4.81	NA	NA	15 pCi/L	NA	None	093733-034	EPA 900.0
	Gross Beta	4.58 ± 1.33	1.49	0.711	4mrem/yr			093733-034	EPA 900.0
	Uranium-233/234	17.4 ± 2.30	0.138	0.0613	NE			093733-035	HASL-300
	Uranium-235/236	0.0625 ± 0.0567	0.0846	0.0329	NE	U	BD	093733-035	HASL-300
	Uranium-238	2.39 ± 0.381	0.0773	0.031	NE			093733-035	HASL-300
	Tritium	-67.6 ± 91.3	179	82.3	NE	U	BD	093733-036	EPA 906.0 M
CYN-MW8	Americium-241	5.68 ± 14.8	19.8	9.72	NE	U	BD	093743-033	EPA 901.1
08-Apr-13	Cesium-137	-1.35 ± 2.74	3.90	1.89	NE	U	BD	093743-033	EPA 901.1
	Cobalt-60	0.0712 ± 2.08	3.70	1.75	NE	U	BD	093743-033	EPA 901.1
	Potassium-40	5.62 ± 36.5	36.0	17.0	NE	U	BD	093743-033	EPA 901.1
	Gross Alpha	4.17	NA	NA	15 pCi/L	NA	None	093743-034	EPA 900.0
	Gross Beta	4.78 ± 1.62	1.96	0.942	4mrem/yr		J	093743-034	EPA 900.0
	Uranium-233/234	23.7 ± 3.00	0.107	0.0478	NE			093743-035	HASL-300
	Uranium-235/236	0.380 ± 0.102	0.066	0.0256	NE			093743-035	HASL-300
	Uranium-238	2.85 ± 0.417	0.0603	0.0242	NE			093743-035	HASL-300
	Tritium	17.8 ± 91.0	167	74.4	NE	U	BD	093743-036	EPA 906.0 M

Refer to footnotes on page 7A-29.

Table 7A-7 *(Continued)*
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Tritium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW9	Americium-241	2.35 ± 14.8	23.9	11.6	NE	U	BD	093836-033	EPA 901.1
17-Apr-13	Cesium-137	1.77 ± 2.00	3.40	1.63	NE	U	BD	093836-033	EPA 901.1
	Cobalt-60	-1.15 ± 2.25	3.61	1.69	NE	U	BD	093836-033	EPA 901.1
	Potassium-40	70.0 ± 27.4	39.5	18.6	NE		J	093836-033	EPA 901.1
	Gross Alpha	2.92	NA	NA	15 pCi/L	NA	None	093836-034	EPA 900.0
	Gross Beta	2.54 ± 1.87	2.99	1.45	4mrem/yr	U	BD	093836-034	EPA 900.0
	Uranium-233/234	8.00 ± 1.02	0.0604	0.0269	NE			093836-035	HASL-300
	Uranium-235/236	0.149 ± 0.0464	0.0371	0.0144	NE			093836-035	HASL-300
	Uranium-238	2.33 ± 0.321	0.0339	0.0136	NE			093836-035	HASL-300
	Tritium	63.6 ± 85.0	144	63.1	NE	U	BD	093836-036	EPA 906.0 M
CYN-MW10	Americium-241	-23.6 ± 12.7	10.6	5.20	NE	U	R	093754-033	EPA 901.1
10-Apr-13	Cesium-137	-0.403 ± 2.73	3.50	1.69	NE	U	BD	093754-033	EPA 901.1
	Cobalt-60	0.00401 ± 1.96	3.44	1.62	NE	U	BD	093754-033	EPA 901.1
	Potassium-40	-37.3 ± 40.9	44.7	21.4	NE	U	BD	093754-033	EPA 901.1
	Gross Alpha	2.25	NA	NA	15 pCi/L	NA	None	093754-034	EPA 900.0
	Gross Beta	3.53 ± 1.69	2.52	1.22	4mrem/yr		J	093754-034	EPA 900.0
	Uranium-233/234	5.19 ± 0.679	0.0658	0.0293	NE			093754-035	HASL-300
	Uranium-235/236	0.179 ± 0.0535	0.0404	0.0157	NE			093754-035	HASL-300
	Uranium-238	1.79 ± 0.259	0.0369	0.0148	NE			093754-035	HASL-300
	Tritium	-5.9 ± 87.3	166	73.9	NE	U	BD	093754-036	EPA 906.0 M
CYN-MW10 (Duplicate)	Americium-241	10.2 ± 12.9	19.1	9.34	NE	U	BD	093756-033	EPA 901.1
10-Apr-13	Cesium-137	1.16 ± 2.53	3.84	1.85	NE	U	BD	093756-033	EPA 901.1
	Cobalt-60	0.936 ± 2.19	3.90	1.84	NE	U	BD	093756-033	EPA 901.1
	Potassium-40	-32.6 ± 51.2	50.4	24.0	NE	U	BD	093756-033	EPA 901.1
	Gross Alpha	1.69	NA	NA	15 pCi/L	NA	None	093756-034	EPA 900.0
	Gross Beta	3.88 ± 1.72	2.52	1.22	4mrem/yr		J	093756-034	EPA 900.0
	Uranium-233/234	5.25 ± 0.737	0.0989	0.044	NE			093756-035	HASL-300
	Uranium-235/236	0.0998 ± 0.0496	0.0607	0.0236	NE		J	093756-035	HASL-300
	Uranium-238	1.77 ± 0.283	0.0555	0.0223	NE			093756-035	HASL-300
	Tritium	59.9 ± 97.5	168	75.0	NE	U	BD	093756-036	EPA 906.0 M

Refer to footnotes on page 7A-29.

Table 7A-7 *(Continued)*
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Tritium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW11	Americium-241	-6.29 ± 10.9	18.3	8.92	NE	U	BD	093759-033	EPA 901.1
11-Apr-13	Cesium-137	-1.09 ± 1.77	2.80	1.34	NE	U	BD	093759-033	EPA 901.1
	Cobalt-60	-1.01 ± 3.25	3.46	1.64	NE	U	BD	093759-033	EPA 901.1
	Potassium-40	33.2 ± 34.8	29.5	13.8	NE	X	R	093759-033	EPA 901.1
	Gross Alpha	-1.67	NA	NA	15 pCi/L	NA	None	093759-034	EPA 900.0
	Gross Beta	9.80 ± 2.81	3.52	1.72	4mrem/yr		J	093759-034	EPA 900.0
	Uranium-233/234	5.29 ± 0.679	0.0575	0.0256	NE			093759-035	HASL-300
	Uranium-235/236	0.136 ± 0.0439	0.0353	0.0137	NE			093759-035	HASL-300
	Uranium-238	1.71 ± 0.243	0.0323	0.013	NE			093759-035	HASL-300
	Tritium	53.1 ± 95.1	165	73.8	NE	U	BD	093759-036	EPA 906.0 M
CYN-MW12	Americium-241	11.8 ± 16.4	24.3	11.9	NE	U	BD	093833-033	EPA 901.1
16-Apr-13	Cesium-137	1.74 ± 1.85	3.14	1.51	NE	U	BD	093833-033	EPA 901.1
	Cobalt-60	-2.03 ± 3.09	3.15	1.48	NE	U	BD	093833-033	EPA 901.1
	Potassium-40	-16.3 ± 31.7	41.5	19.8	NE	U	BD	093833-033	EPA 901.1
	Gross Alpha	0.16	NA	NA	15 pCi/L	NA	None	093833-034	EPA 900.0
	Gross Beta	4.99 ± 1.82	2.41	1.16	4mrem/yr		J	093833-034	EPA 900.0
	Uranium-233/234	12.9 ± 1.62	0.0633	0.0282	NE			093833-035	HASL-300
	Uranium-235/236	0.147 ± 0.0478	0.0389	0.0151	NE			093833-035	HASL-300
	Uranium-238	2.59 ± 0.356	0.0355	0.0143	NE			093833-035	HASL-300
	Tritium	106 ± 93.5	147	64.5	NE	U	BD	093833-036	EPA 906.0 M
CYN-MW13	Americium-241	14.9 ± 18.5	27.0	13.2	NE	U	BD	093739-033	EPA 901.1
04-Apr-13	Cesium-137	-0.921 ± 1.91	3.25	1.56	NE	U	BD	093739-033	EPA 901.1
	Cobalt-60	-3.86 ± 4.72	3.17	1.49	NE	U	BD	093739-033	EPA 901.1
	Potassium-40	22.7 ± 46.4	30.1	14.1	NE	U	BD	093739-033	EPA 901.1
	Gross Alpha	-4.87	NA	NA	15 pCi/L	NA	None	093739-034	EPA 900.0
	Gross Beta	3.89 ± 1.24	1.61	0.780	4mrem/yr		J	093739-034	EPA 900.0
	Uranium-233/234	9.73 ± 1.29	0.0895	0.0398	NE			093739-035	HASL-300
	Uranium-235/236	0.104 ± 0.0462	0.0549	0.0214	NE		J	093739-035	HASL-300
	Uranium-238	1.92 ± 0.296	0.0502	0.0202	NE			093739-035	HASL-300
	Tritium	5.74 ± 96.3	175	80.4	NE	U	BD	093739-036	EPA 906.0 M

Refer to footnotes on page 7A-29.

Table 7A-7 *(Concluded)*
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Tritium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW13 (Duplicate)	Americium-241	0.136 ± 10.9	19.2	9.39	NE	U	BD	093740-033	EPA 901.1
04-Apr-13	Cesium-137	-0.693 ± 1.85	3.03	1.45	NE	U	BD	093740-033	EPA 901.1
	Cobalt-60	0.592 ± 1.83	3.36	1.59	NE	U	BD	093740-033	EPA 901.1
	Potassium-40	29.6 ± 44.2	30.1	14.1	NE	U	BD	093740-033	EPA 901.1
	Gross Alpha	-0.10	NA	NA	15 pCi/L	NA	None	093740-034	EPA 900.0
	Gross Beta	16.2 ± 3.07	1.49	0.711	4mrem/yr			093740-034	EPA 900.0
	Uranium-233/234	10.3 ± 1.37	0.0931	0.0414	NE			093740-035	HASL-300
	Uranium-235/236	0.103 ± 0.0487	0.0571	0.0222	NE		J	093740-035	HASL-300
	Uranium-238	2.10 ± 0.321	0.0522	0.021	NE			093740-035	HASL-300
	Tritium	-23.5 ± 95.8	179	82.3	NE	U	BD	093740-036	EPA 906.0 M

Refer to footnotes on page 7A-29.

Table 7A-8
Summary of Alkalinity and Cation Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW13	Bicarbonate Alkalinity	187	0.725	1.00	NE			094022-022	SM2320B
17-May-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094022-022	SM2320B
	Calcium	119	0.300	1.00	NE	B, N		094022-017	SW846 6020
	Magnesium	22.6	0.010	0.030	NE			094022-017	SW846 6020
	Potassium	2.75	0.080	0.300	NE			094022-017	SW846 6020
	Sodium	26.4	0.400	1.25	NE	N		094022-017	SW846 6020

Refer to footnotes on page 7A-29.

Table 7A-9
Summary of Field Water Quality Measurements[h],
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
CYN-MW4	09-Apr-13	14.81	644	232.1	7.19	0.50	47.8	4.83
CYN-MW7	03-Apr-13	17.50	685	221.6	6.96	0.62	42.7	4.08
CYN-MW8	08-Apr-13	18.12	771	220.4	7.02	0.36	47.1	4.43
CYN-MW9	17-Apr-13	16.90	1022	237.5	6.90	0.39	53.5	5.15
CYN-MW10	10-Apr-13	13.69	787	246.9	7.26	0.29	69.5	7.20
CYN-MW11	11-Apr-13	15.81	902	229.4	7.10	0.30	5.1	0.51
CYN-MW12	16-Apr-13	18.64	989	232.0	6.90	0.37	12.2	1.14
CYN-MW13	04-Apr-13	18.72	685	199.9	7.04	0.97	26.4	2.44
CYN-MW13	17-May-13	20.07	687	168.2	7.06	1.12	30.1	2.72
CYN-MW4	11-Dec-13	15.52	635.3	301.5	7.52	0.34	45.4	4.51
CYN-MW7	09-Dec-13	15.14	660.5	244.5	7.34	0.59	46.2	4.63
CYN-MW8	04-Dec-13	17.37	795.1	303.1	7.36	0.26	52.5	5.03
CYN-MW9	16-Dec-13	15.93	880.2	318.9	7.25	0.53	53.2	5.26
CYN-MW10	02-Dec-13	14.83	750.9	308.3	7.55	0.19	74.0	7.47
CYN-MW11	03-Dec-13	16.20	929.6	138.7	7.43	0.68	7.9	0.78
CYN-MW12	16-Dec-13	16.29	997.3	284.2	7.26	0.35	13.4	1.31
CYN-MW13	10-Dec-13	16.28	685.1	256.5	7.42	2.46	25.7	2.51

Refer to footnotes on page 7A-29.

Footnotes for Burn Site Groundwater Analytical Results Tables

% = percent.
CFR = Code of Federal Regulations.
EPA = U.S. Environmental Protection Agency.
ID = Identifier.
µg/L = micrograms per liter.
mg/L = milligrams per liter.
mrem/yr = millirem per year.
No. = Number.
pCi/L = pico curies per liter.
RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine.
Tetryl = methyl-2,4,6-trinitrophenylnitramine.

[a]Result

Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 1-4).

Bold = Value exceeds the established MCL.
ND = not detected (at MDL). Activities of zero or less are considered to be not detected.

[b]MDL or MDA

The MDL applies to Tables 7A-1 through 7A-6, and Table 7A-8. MDA applies to Table 7A-6.

MDA = The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.
MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA = Not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

[c]PQL or Critical Level

The PQL applies to Tables 7A-1 through 7A-6, and Table 7A-8. The Critical Level applies to Table 7A-6.

Critical level = The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA = Not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

[d]MCL

MCL = Maximum contaminant level. MCLs were established by the EPA Office of Water, National Primary Water Regulations (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- Gross Alpha particle activity, excluding total uranium = 15 pCi/L (40 CFR Parts 9, 141, and 142, Table 10A- 1-4).
- Any combination of Beta and/or Gamma emitting radionuclides = 4 mrem/yr.

NE = not established.

[e]Lab Qualifier

B = The analyte was detected in the blank above the effective MDL.
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
H = Analytical holding time was exceeded.
N = Results associated with a spike analysis that was outside control limits.
NA = Not applicable.
U = Analyte is absent or below the MDL.
X = Data rejected due to peak not meeting identification criteria.

Footnotes for Burn Site Groundwater Analytical Results Tables (Concluded)

[f]Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD	=	Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J	=	The associated value is an estimated quantity.
J+	=	The associated numerical value is an estimated quantity with a suspected positive bias.
J-	=	The associated numerical value is an estimated quantity with a suspected negative bias.
None	=	No data validation for corrected gross alpha activity.
U	=	The analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ	=	The analyte was analyzed for, but not detected. The associated value is an estimate and may be inaccurate or imprecise.
R	=	The data are unusable, and resampling and reanalysis are necessary for verification.

[g]Analytical Method

Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.

DOE, Environmental Measurements Laboratory, 1990, "EML Procedures Manual," 27th ed., Vol. 1, Rev. 1992, HASL-300.

EPA, 1999 (and updates), "Perchlorate in Drinking Water Using Ion Chromatography," EPA 815/R-00-014.

EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.

EPA, 1984, "Methods for Chemical Analysis of Water and Wastes." EPA 600-4-79-020.

EPA, 1983, "The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0," EPA-600/4-84-017.

EPA, 1980, "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.

DOE = U.S. Department of Energy.
HASL = Health and Safety Laboratory.
SM = Standard Method.

[h]Field Water Quality Measurements

Field measurements collected prior to sampling.

°C	= degrees Celsius.
% Sat	= percent saturation.
μmhos/cm	= micromhos per centimeter.
mg/L	= milligrams per liter.
mV	= millivolts.
NTU	= nephelometric turbidity units.
pH	= potential of hydrogen (negative logarithm of the hydrogen ion concentration).

Attachment 7B
Burn Site Groundwater
Plots

This page intentionally left blank.

Attachment 7B Plots

7B-1 Nitrate plus Nitrite Concentrations, CYN-MW9 ..... 7B-5

7B-2 Nitrate plus Nitrite Concentrations, CYN-MW11 ..... 7B-6

7B-3 Nitrate plus Nitrite Concentrations, CYN-MW12 ..... 7B-7

7B-4 Nitrate plus Nitrite Concentrations, CYN-MW13 ..... 7B-8

This page intentionally left blank.

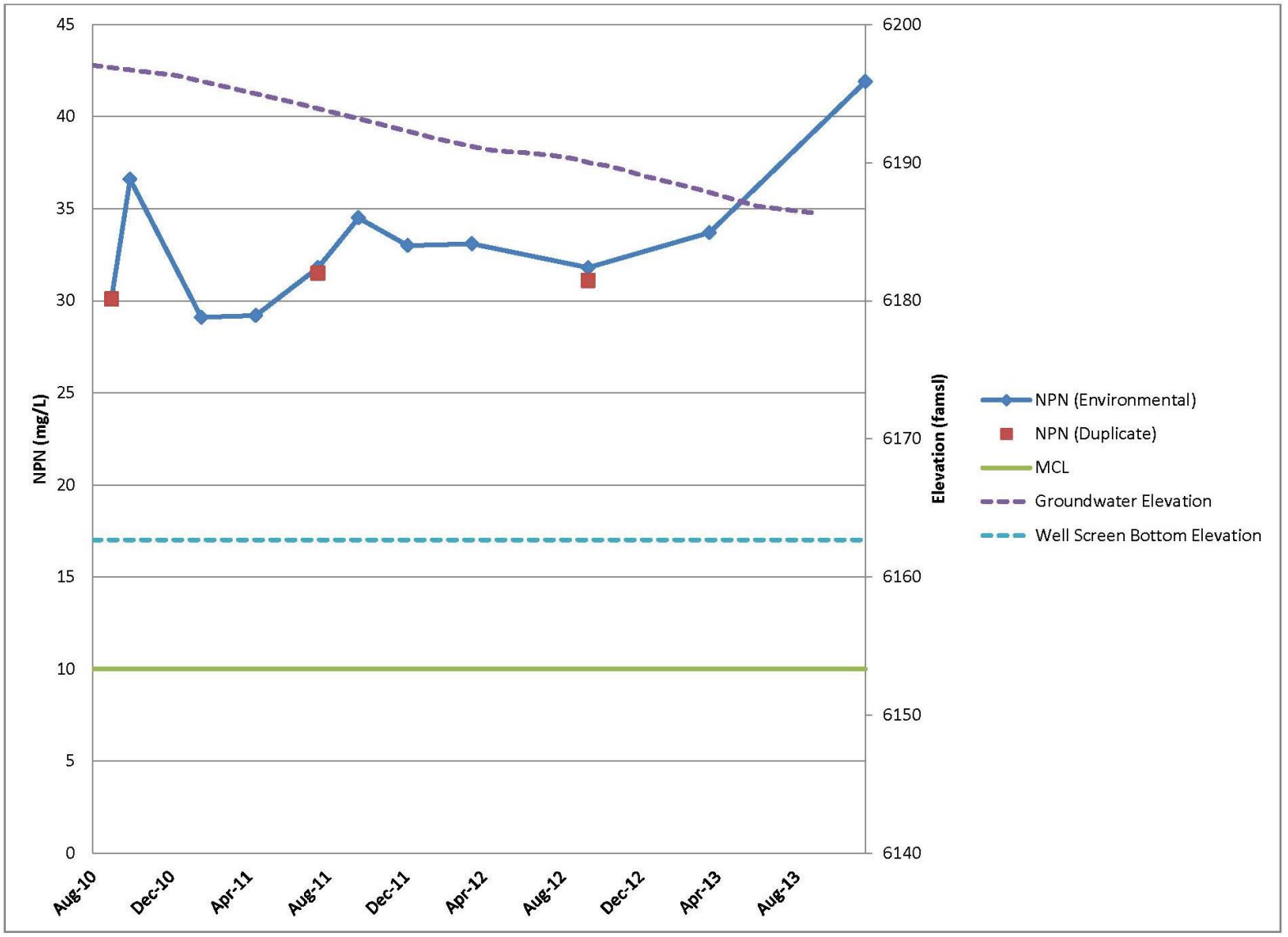


Figure 7B-1. Nitrate plus Nitrite Concentrations, CYN-MW9

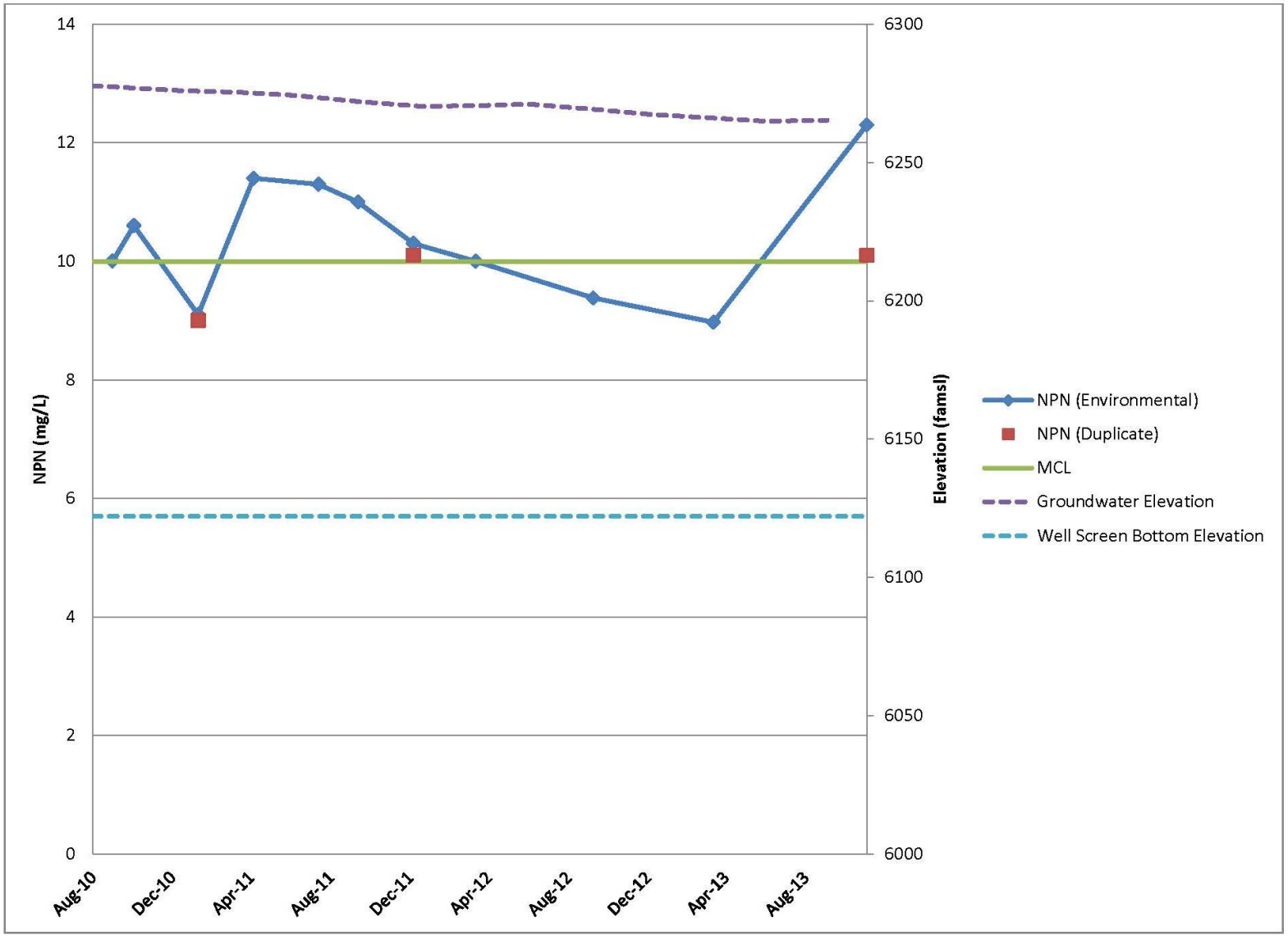


Figure 7B-2. Nitrate plus Nitrite Concentrations, CYN-MW11

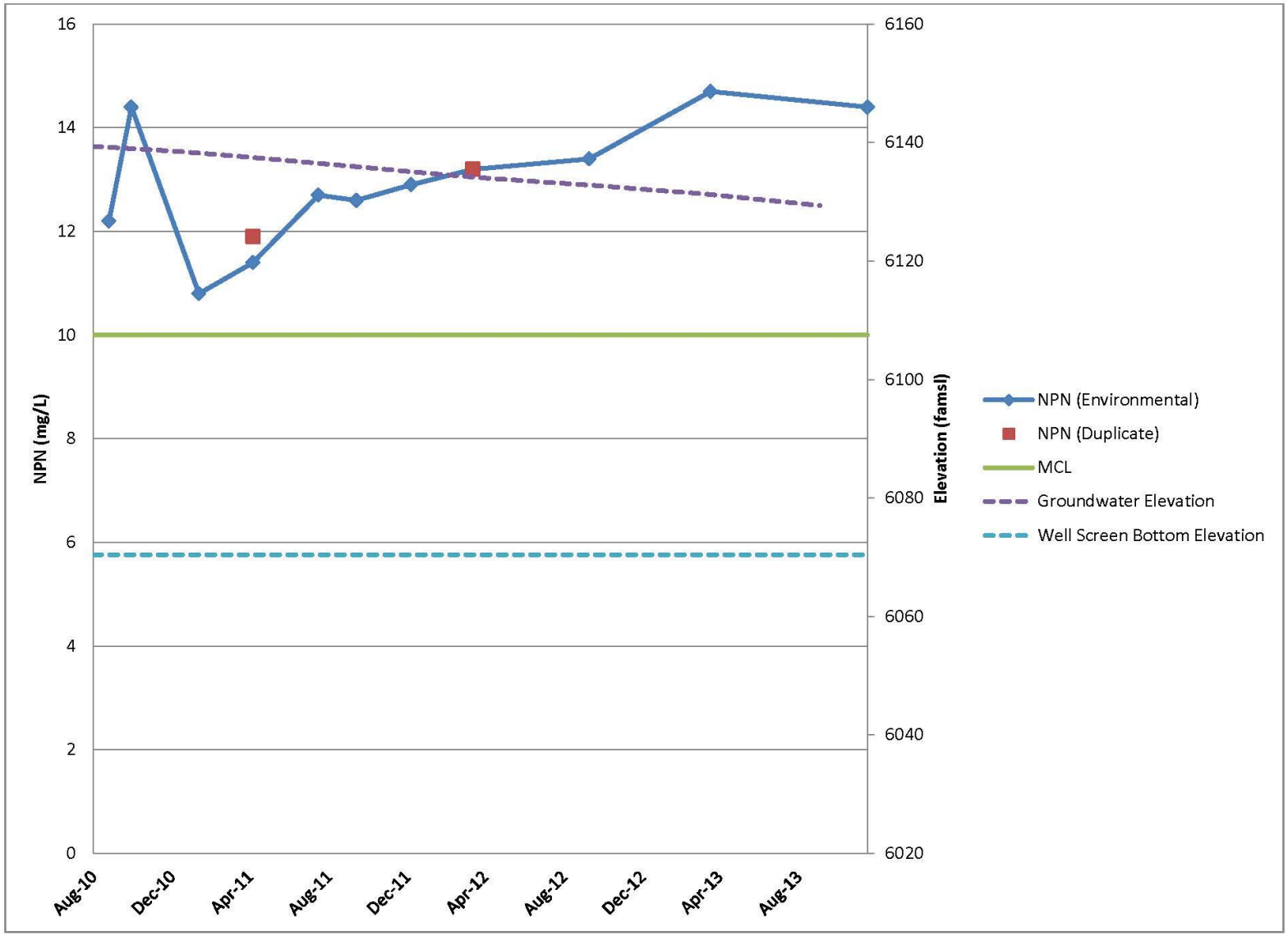


Figure 7B-3. Nitrate plus Nitrite Concentrations, CYN-MW12

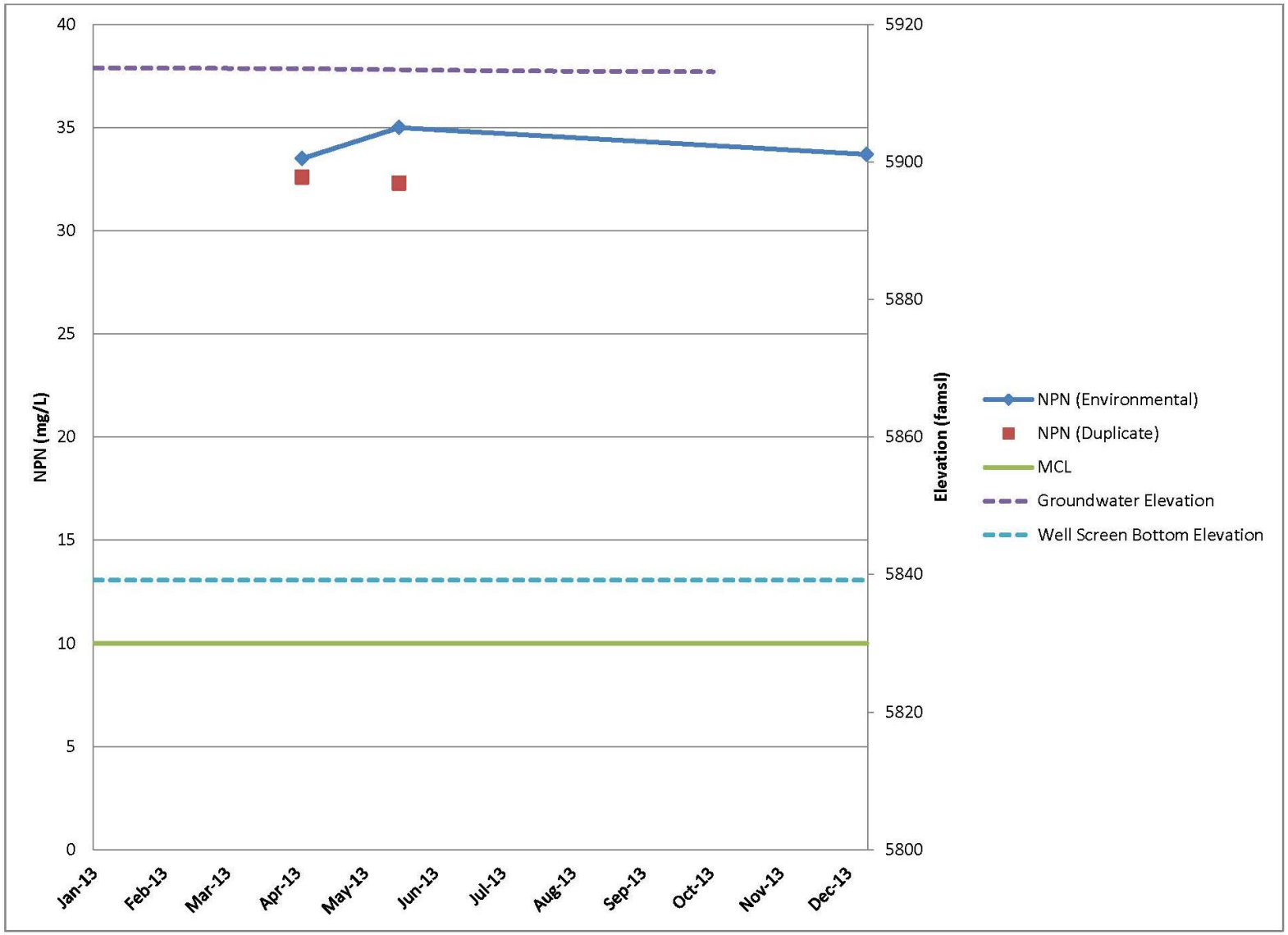


Figure 7B-4. Nitrate plus Nitrite Concentrations, CYN-MW13

Attachment 7C
Burn Site Groundwater
Hydrographs

This page intentionally left blank.

Attachment 7C Hydrographs

7C-1 BSG Study Area Wells (1 of 5) 7C-5

7C-2 BSG Study Area Wells (2 of 5) 7C-6

7C-3 BSG Study Area Wells (3 of 5) 7C-7

7C-4 BSG Study Area Wells (4 of 5) 7C-8

7C-5 BSG Study Area Wells (5 of 5) 7C-9

This page intentionally left blank.

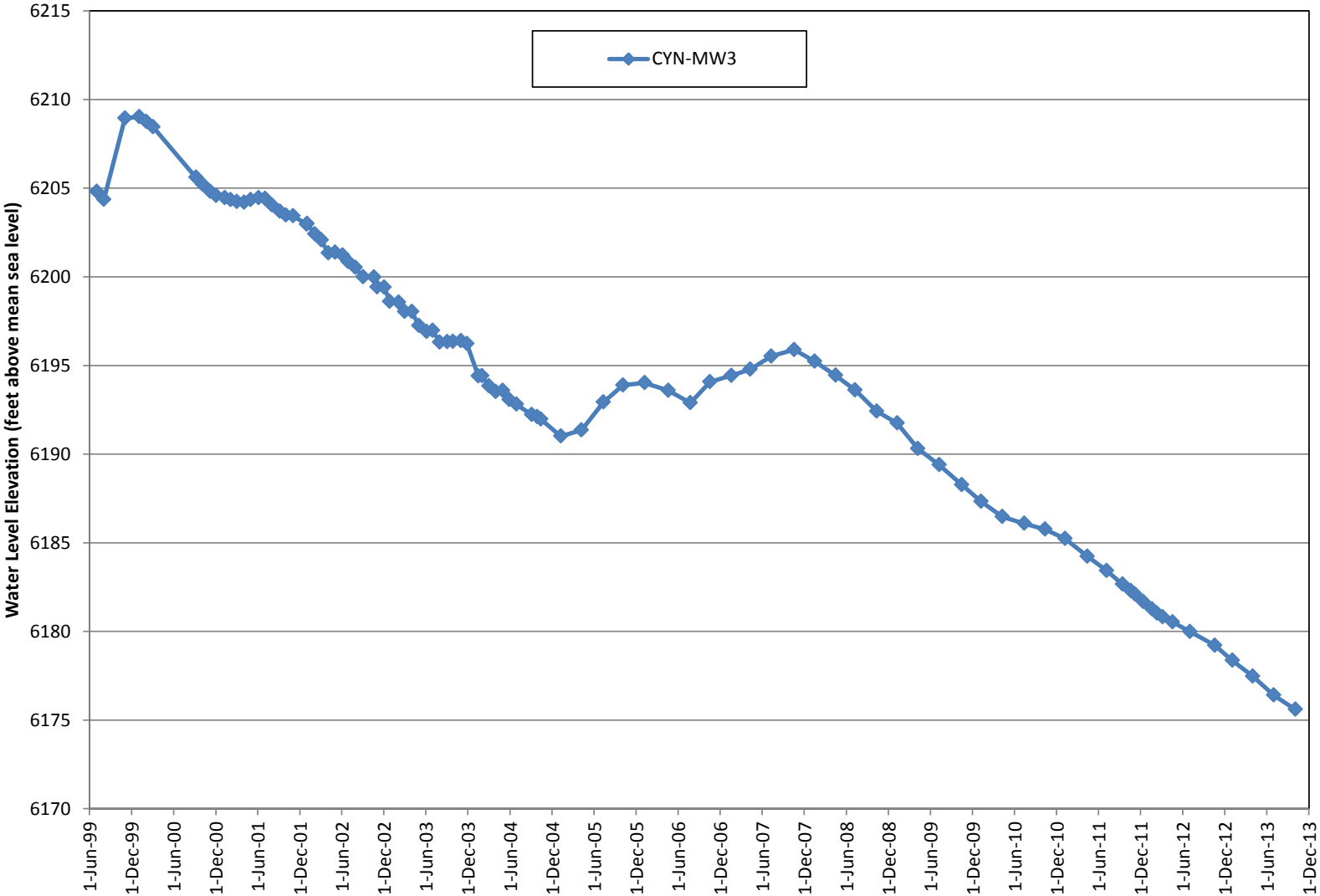


Figure 7C-1. BSG Study Area Wells (1 of 5)

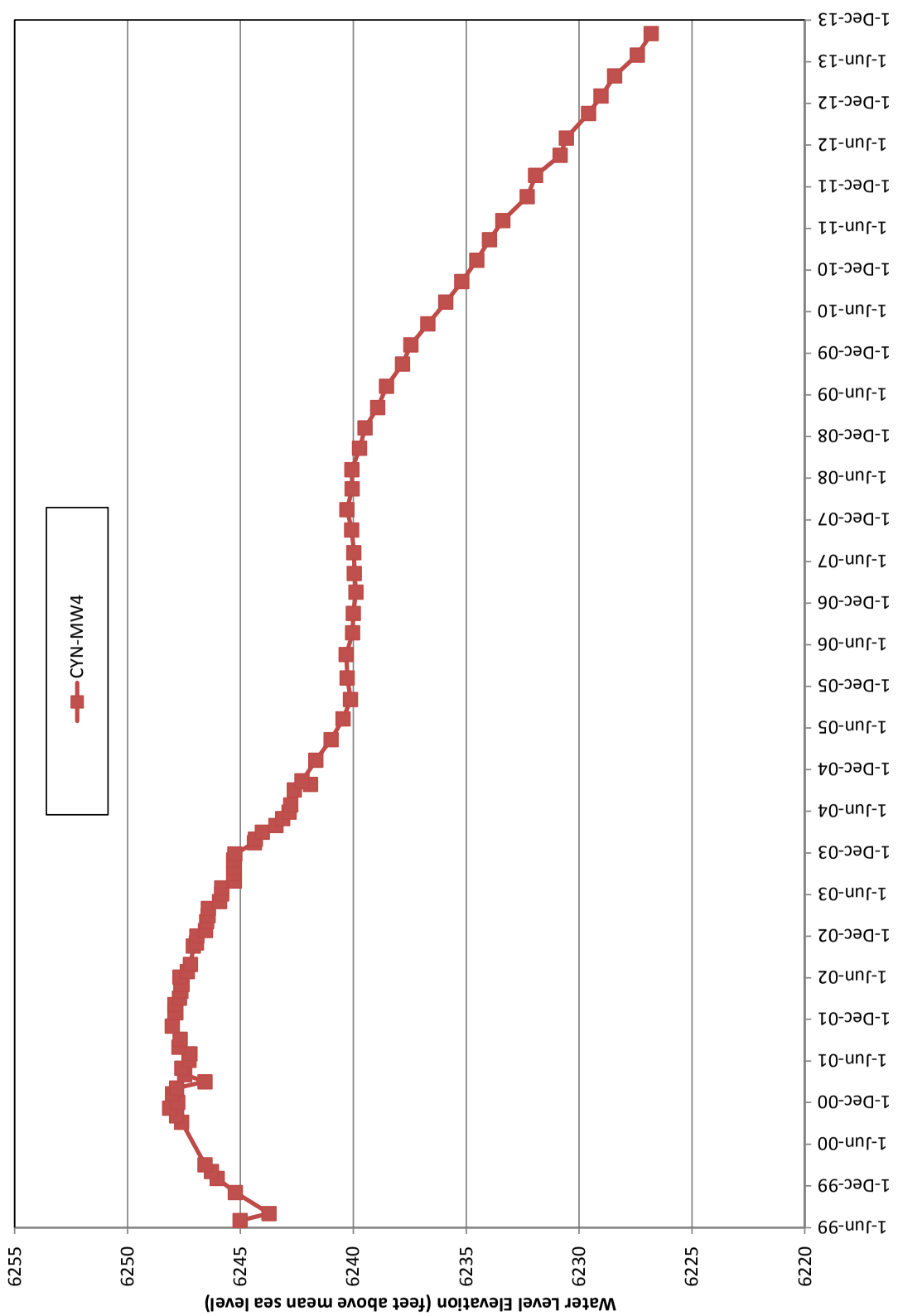


Figure 7C-2. BSG Study Area Wells (2 of 5)

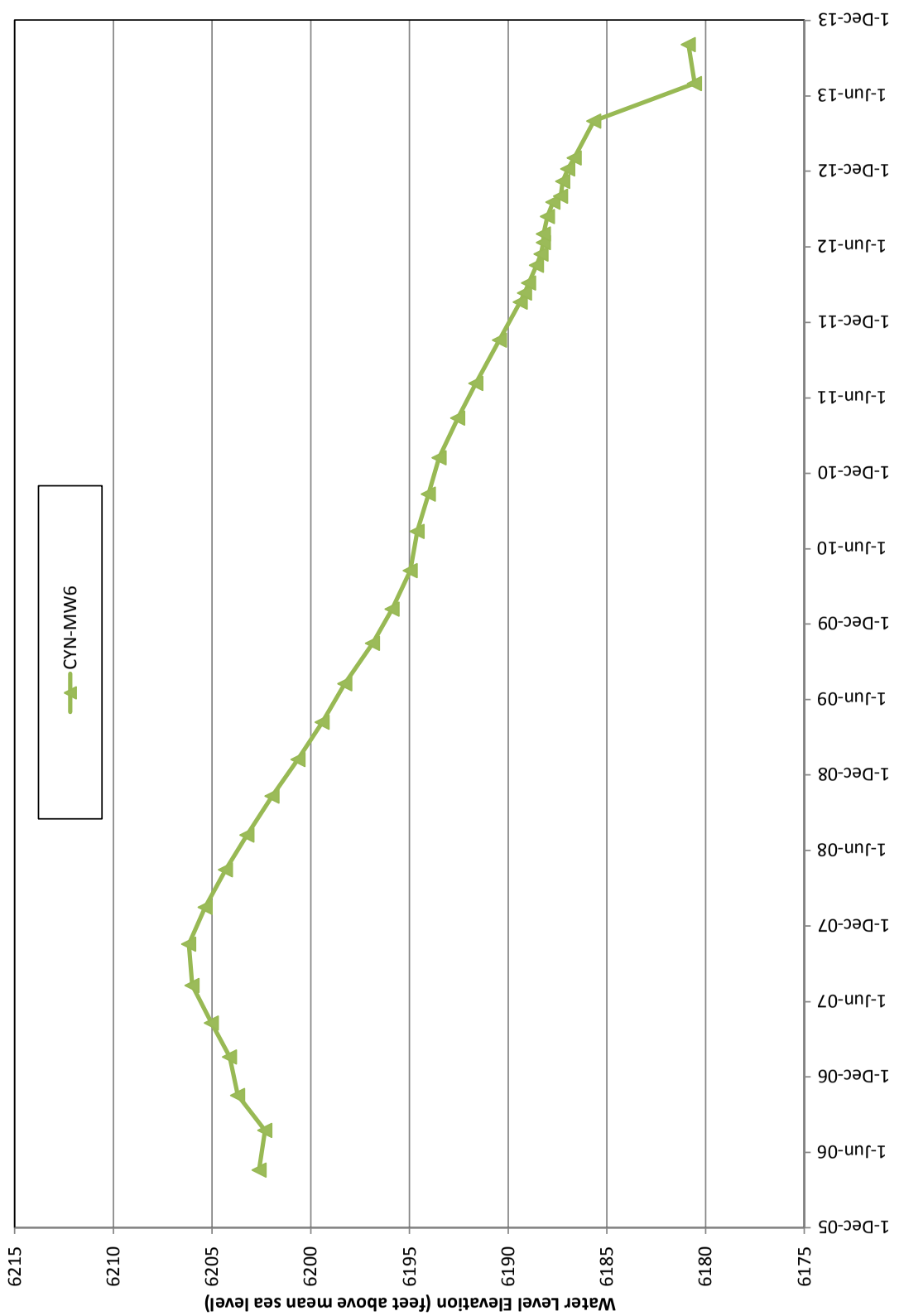


Figure 7C-3. BSG Study Area Wells (3 of 5)

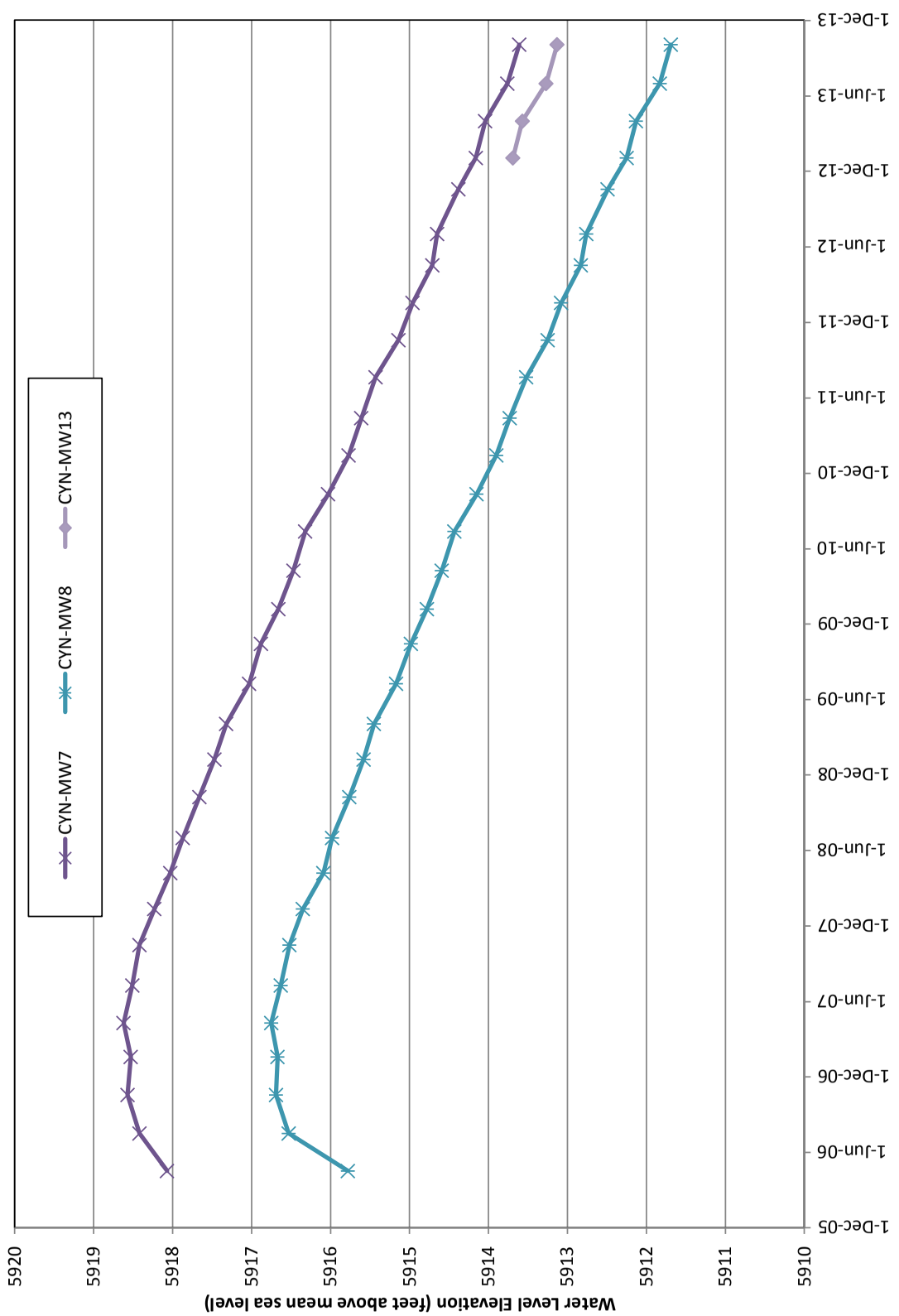


Figure 7C-4. BSG Study Area Wells (4 of 5)

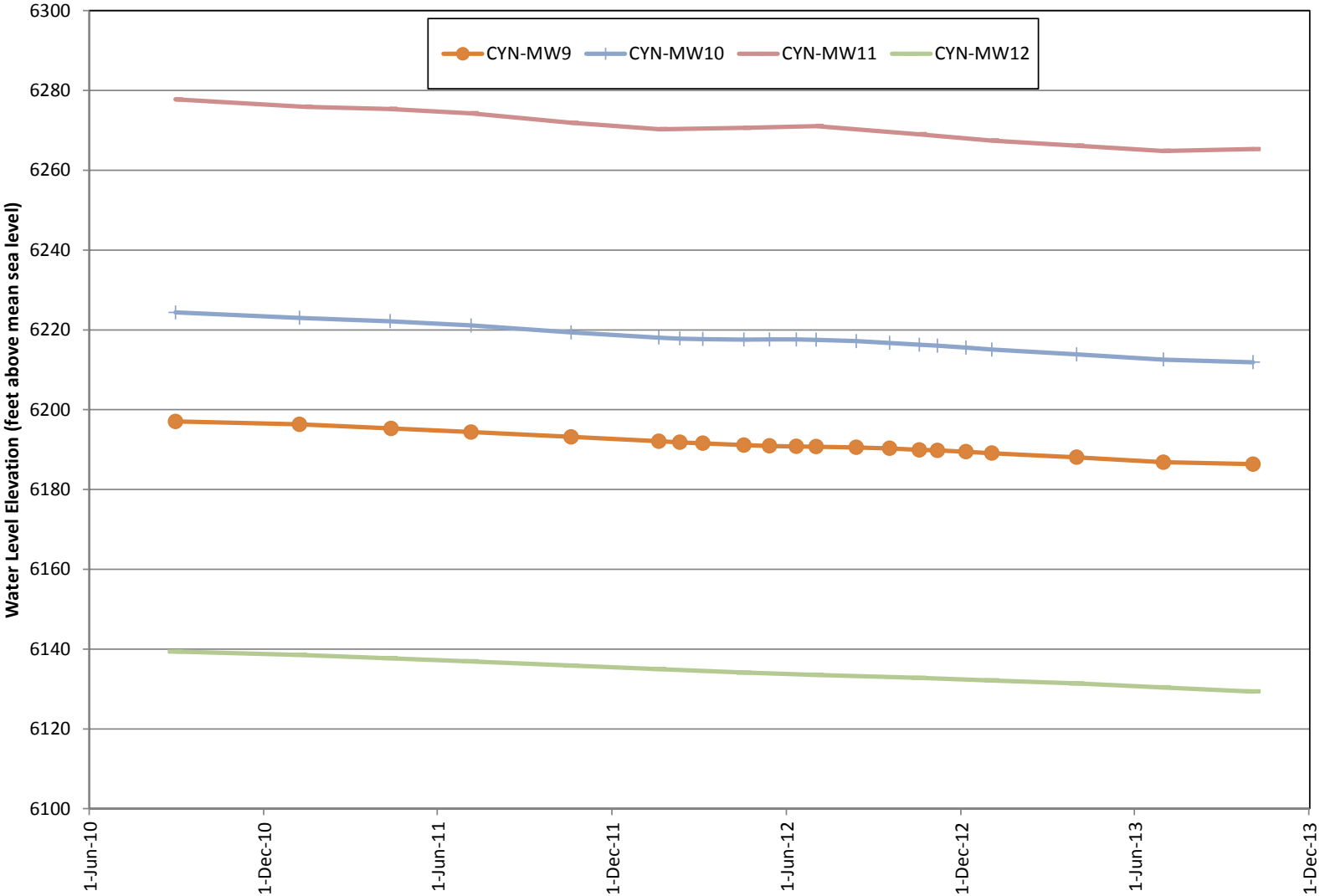


Figure 7C-5. BSG Study Area Wells (5 of 5)

This page intentionally left blank.

8.0 Solid Waste Management Units 8/58

8.1 Introduction

This chapter summarizes the Calendar Year (CY) 2013 quarterly groundwater sampling events for Coyote Canyon Blast Area (CCBA) monitoring wells CCBA-MW1 and CCBA-MW2, located within Solid Waste Management Units (SWMUs) 8/58 at Sandia National Laboratories, New Mexico (SNL/NM). The SNL/NM facility is a government-owned, contractor-operated, multi-program laboratory overseen by the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) through the Sandia Field Office in Albuquerque, New Mexico. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM under Contract DE-AC04-94AL85000.

Monitoring wells CCBA-MW1 and CCBA-MW2 were installed at SWMUs 8/58 in August 2011. In April 2012, NMED approved the SWMUs 8/58 well installation report (NMED April 2012). The installation and monitoring of these wells are designed to address the requirements of Section VII.D.6 of the Compliance Order on Consent (the Order) between the New Mexico Environment Department (NMED), DOE, and Sandia (NMED April 2004) and the NMED letter dated April 8, 2010, from the NMED Hazardous Waste Bureau requiring additional corrective action at SWMUs 8/58 (NMED April 2010).

Monitoring well CCBA-MW1 was sampled on January 16, 2013, April 24, 2013, July 16, 2013, and October 10, 2013. Monitoring well CCBA-MW2 was sampled on January 15, 2013, April 25, 2013, July 15, 2013, and October 14, 2013. The groundwater samples were collected in accordance with the NMED-approved Groundwater Characterization Work Plan (SNL September 2010) and Mini-Sampling and Analysis Plans (SAPs) (SNL December 2012, April 2013, June 2013, and September 2013a). The groundwater samples from each well were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), high explosive (HE) compounds, nitrate plus nitrite (NPN), major anions (i.e., bromide, chloride, fluoride, and sulfate), major cations (i.e., calcium, magnesium, potassium, and sodium), alkalinity, Target Analyte List (TAL) metals plus uranium, perchlorate, total cyanide, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium.

Analytical results for the CY 2013 groundwater samples were compared with the U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) for drinking water (EPA 2009). No constituents were detected above established MCLs, except for fluoride. Fluoride results from monitoring well CCBA-MW1 exceeded the established MCL of 4.0 milligrams per liter (mg/L) for all four quarters as shown in Table 8A-6 (Attachment 8A). Fluoride concentrations in samples from monitoring well CCBA-MW1 ranged from 4.57 to 5.00 mg/L.

The eighth and final quarter of required groundwater sampling (NMED April 2010) was conducted in July 2013. During CY 2014, quarterly groundwater sampling and reporting will continue for the SWMUs 8/58 groundwater monitoring wells CCBA-MW1 and CCBA-MW2 until NMED provides additional guidance.

8.1.1 Location

SWMUs 8/58 are located on Kirtland Air Force Base (KAFB) near the eastern boundary between U.S. Air Force land and the Withdrawn Area, a 22,500-acre area of the Cibola National Forest that has been withdrawn from the public domain for the exclusive use of KAFB and the DOE/NNSA (Figure 8-1). The sites are located north of Coyote Springs Road, approximately 2.7 miles east of the intersection of Coyote Springs and Lovelace Roads.

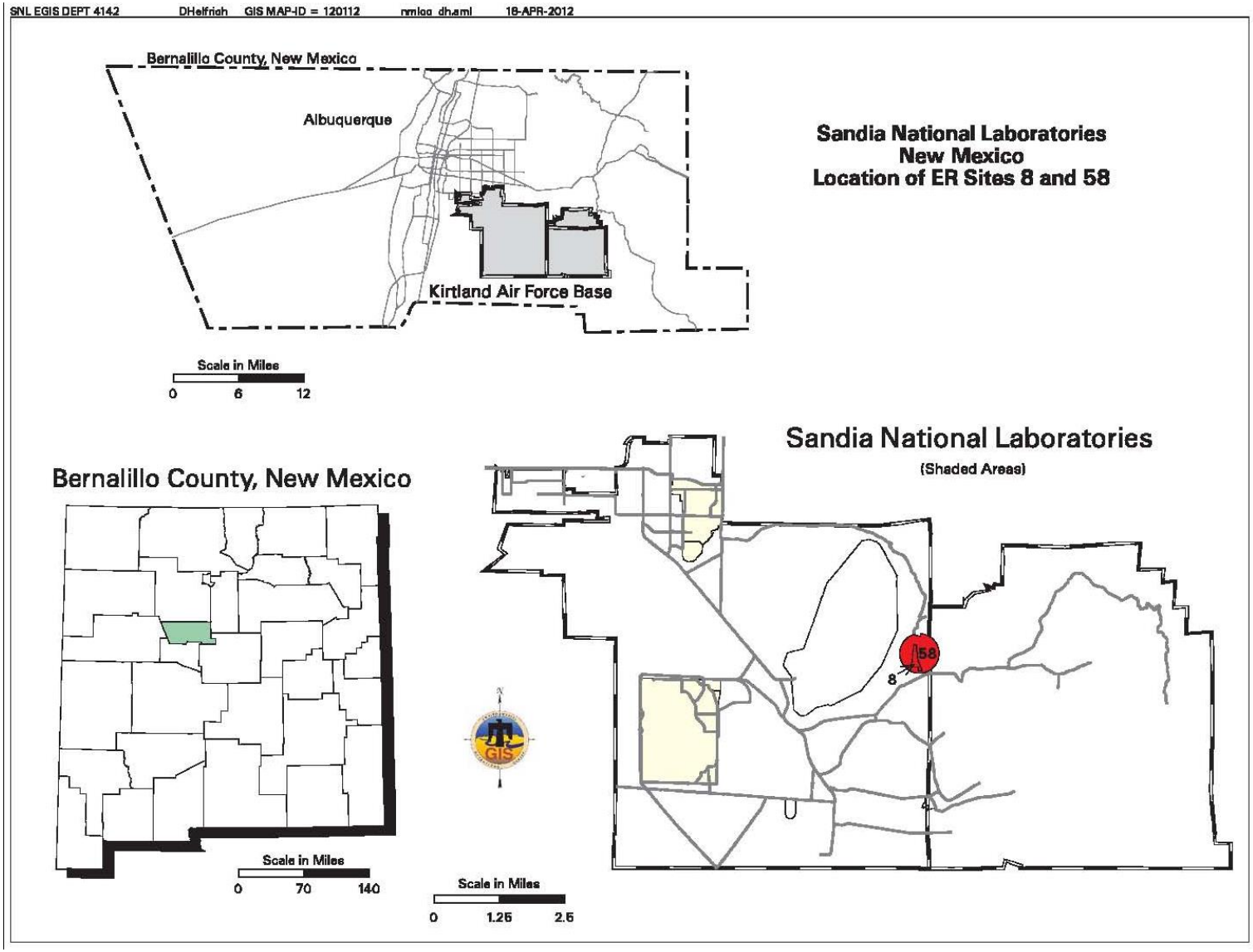


Figure 8-1. Location of SWMUs 8/58

SWMUs 8/58 are located in the Arroyo del Coyote watershed, which captures runoff from the western flank of the Manzanita Mountains. No surface water bodies are located at the site. The nearest surface water is Coyote Springs, a perennial spring located approximately 1,400 feet (ft) southwest of SWMU 58 in Arroyo del Coyote. Arroyo del Coyote intersects Tijeras Arroyo approximately 7 miles west of the two sites. Tijeras Arroyo eventually drains into the Rio Grande, approximately 16 miles west of the two sites (SNL September 2003).

SWMU 58 encompasses approximately 258 acres and is the site of the former CCBA where extensive explosive testing was conducted (Figure 8-2). A blast radius of 2,000 ft defines the boundary of SWMU 58. This boundary was based on the visual distribution of fragments (shrapnel) and the surrounding topography.

SWMU 8 is fully contained within the blast radius of SWMU 58 and consists of approximately 30 acres (Figure 8-2). A north-south road that bisects SWMU 58 provides access to the site. The boundaries of SWMU 8 are defined by this road to the east, by the end of debris and test fixtures to the north (approximately 3,200 ft north of Coyote Springs Road), by the base of the steep ridge to the west, and by the end of debris and test fixtures to the south. The majority of debris and test fixtures have been removed.

8.1.2 Site History

SWMUs 8/58 are interrelated by the types of tests conducted and their geographic locations. More than a hundred tests have occurred at SWMUs 8/58, and test debris and fixtures remain at numerous locations. Neither site is currently being used for test activities. From 1950 to the late 1960s, at various locations within SWMU 58, numerous SNL/NM research groups conducted tests involving at ground or aboveground explosive detonations (SNL June 1995). Earth penetration tests commenced after this time, but did not involve any hazardous materials. Other unknown tests were conducted at SWMU 58, which may have dispersed other materials onto the site.

Prior to the penetration tests, the primary materials dispersed were HE compound combustion by-products and associated testing materials (such as metals and radionuclides). Primary emissions from the combustion of explosives would have been gaseous and would have dissipated. However, chunks of partially combusted HE compounds were found on site. Solid residues may have been produced by explosives containing metals, such as barium from Baratol. Carbon tetrachloride was alleged to have been poured into the Underground Conduit System (UCS) to displace water before the tests were performed. Jet propellant fuel grade 4 was released to the ground during burn tests. Metals also were dispersed during some tests. Asbestos-containing material was found at various locations scattered throughout SWMUs 8/58. Gaseous argon was released during some experiments and readily dispersed into the atmosphere during the testing.

Debris from the SWMU 58 tests and possibly other off-site sources was disposed of at SWMU 8. Documented tests at SWMU 58 involved large quantities of bulk explosives, which were typically shipped in wooden crates. These wooden crates, along with scrap metals from the tests, comprised most of the solid waste found at SWMU 8.

SWMU 8 and portions of SWMU 58 are located within the Manzano Combat Range, an area where KAFB military training is periodically conducted. Most of the unexploded ordnance (e.g., spent ammunition and smoke cartridges) occasionally found on site results from this ongoing activity rather than past SNL/NM research activities.

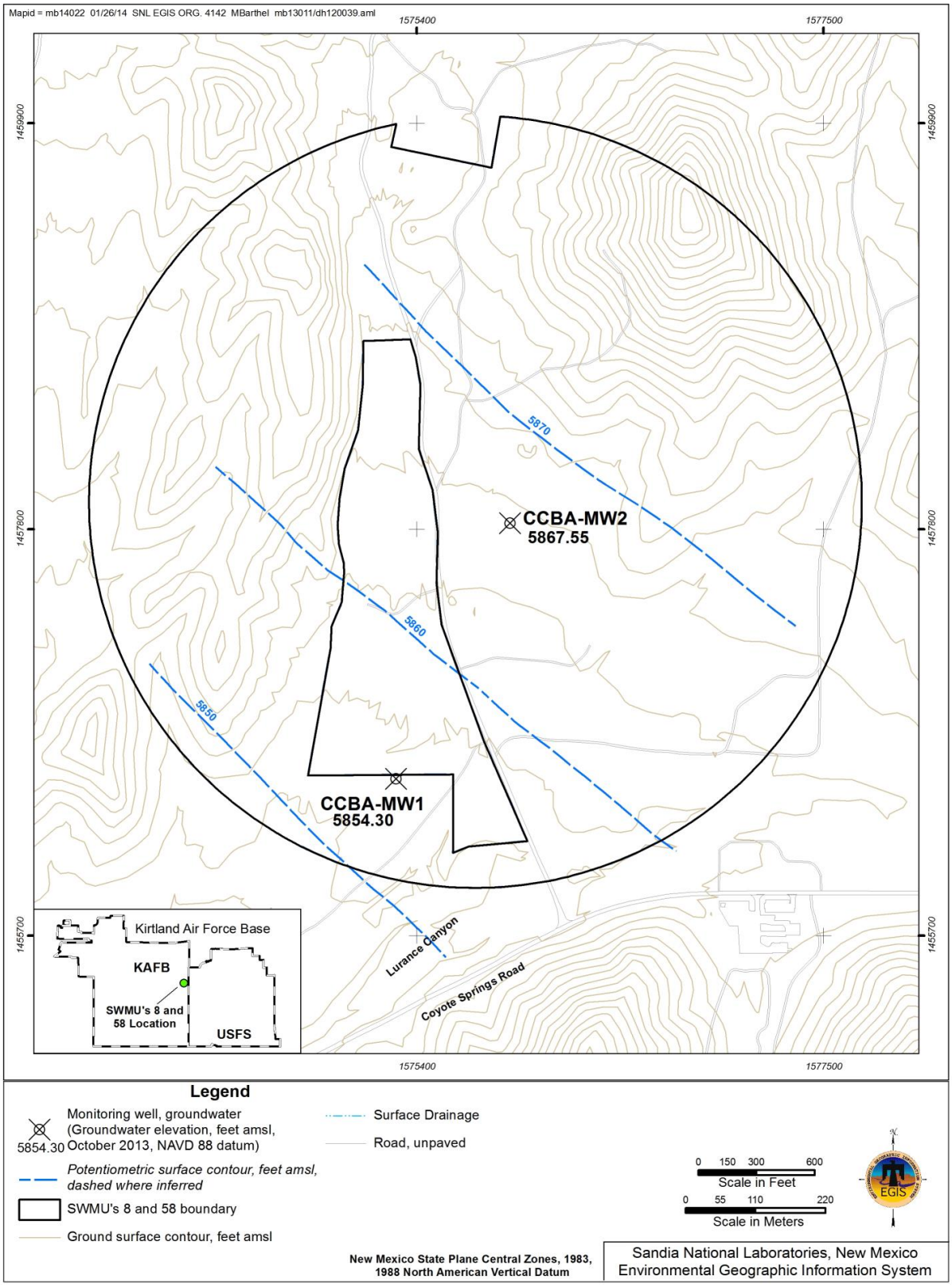


Figure 8-2. Groundwater Monitoring Wells CCBA-MW1 and CCBA-MW2 Installed at SWMUs 8/58

SWMU 58 originally contained two control bunkers, an instrument shelter, a three-sided earthen bunker with concrete inner walls clad with metal armor plate, numerous concrete pads and rubble, a UCS for running test wires, and numerous other test structures. Many of these features have been removed (SNL April 2005).

SWMU 8 primarily contained general refuse (e.g., cardboard, paper, wood) and demolition debris. All SWMU 8 debris was removed during a series of investigations and remedial activities conducted from 1996 to 2004, listed in Table 8-1 (SNL April 2005).

SWMUs 8/58 contain similar constituents of concern (COCs) consisting of HE compounds, metals (i.e., arsenic, barium, beryllium, lead, mercury, and nickel), VOCs, SVOCs, asbestos, petroleum fuels, and radionuclides (DOE September 1987).

8.1.3 Monitoring History

In 2011, SNL/NM personnel installed two groundwater monitoring wells at SWMUs 8/58 (SNL November 2011) as shown on Figure 8-2. These two new wells were sampled for the first time in October and November 2011 and were sampled for four quarters in CY 2013 as described in Section 8.1.

8.1.4 Current Monitoring Network

Currently two groundwater monitoring wells are installed at SWMUs 8/58 (Figure 8-2). Monitoring well CCBA-MW1 is located approximately 0.2 miles north of the ephemeral channel in Lurance Canyon and approximately 0.7 miles east of Coyote Springs. Lurance Canyon is the eastern extension of Arroyo del Coyote (Plate 1). Monitoring well CCBA-MW2 is located approximately 0.4 miles north of the ephemeral channel in Lurance Canyon and approximately 1 mile northeast of Coyote Springs.

Monitoring wells CCBA-MW1 and CCBA-MW2 are monitored quarterly for VOCs, SVOCs, HE compounds, NPN, major anions (i.e., bromide, chloride, fluoride, and sulfate), major cations (i.e., calcium, magnesium, potassium, and sodium), alkalinity, TAL metals plus uranium, perchlorate, total cyanide, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium.

8.1.5 Summary of Calendar Year 2013 Activities

The following activities occurred for SWMUs 8/58 during CY 2013:

- Quarterly groundwater sampling was conducted at monitoring wells CCBA-MW1 and CCBA-MW2 in January, April, July, and October 2013 (SNL July 2013, October 2013, January 2014, and September 2013b).
- Quarterly reporting of analytical results from monitoring wells CCBA-MW1 and CCBA-MW2 was conducted.
- Tables of analytical results (Attachment 8A), concentration versus time plots (Attachment 8B), and hydrographs (Attachment 8C) were prepared.

Table 8-1. Historical Timeline of SWMUs 8/58

Month	Year	Event	Reference
	1950-1960's	More than 100 tests were performed at SWMUs 8/58.	DOE September 1987
	1987	Identified as potential SWMUs in Comprehensive Environmental Assessment and Response Program Investigation due to the extensive testing done in these areas.	DOE September 1987
February	1992	Boundaries for the Radioactive Material Management Areas at SWMUs 8/58 are delineated.	SNL February 1992
October	1993	KAFB EOD conducted a visual UXO/HE survey of military debris. Material related to military training exercises was identified and removed.	Young and Byrd 1994
October	1993	RUST Geotech conducted surface gamma radiation survey across both sites. Point and area anomalies were detected and identified and removed during the 1995 VCM.	RUST Geotech, Inc. 1994
	1994	Sensitive species survey was conducted. Three sensitive species were identified for SWMU 58 (including SWMU 8). Since the survey, the three species have been removed from the New Mexico endangered plant species list and are no longer considered sensitive.	NMFRCD August 1995
	1994	Cultural Resources survey conducted seven discrete cultural resource areas were identified.	SNL February 1995a
	1994-2004	VCM and VCA conducted from 1994 until 2004 to remove surface and buried contaminated soil and wastes. Housekeeping activities conducted during same time to remove debris such as concrete, wood, metal, and shrapnel.	SNL April 1994 SNL February 1995b SNL August 1998 SNL October 2000 SNL January 2004
	1995-2004	RFI sampling activities conducted at SWMUs 8/58 to characterize the sites.	SNL August 1996 SNL November 1998
	1996-2004	UXO/HE visual surface surveys were conducted by SNL/NM personnel. Material identified was subsequently removed by KAFB EOD personnel.	SNL September 1994
February	1996	Housekeeping activities for removal of surface debris in preparation for soil sampling during the RFI activities.	SNL May 1997
March	1997	Soil sampling at Burn Test feature and contingency borehole sampling at feature 58OO.	SNL April 2005
February	1998	Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report (SNL/NM December 1995) containing description of SWMUs 8 and 58 hydrogeology submitted to NMED.	SNL February 1998
October	1998	Radiological survey of UCS conducted.	SNL April 2005
November	1998	SAP submitted for collecting additional RFI soil samples at SWMUs 8/58.	SNL November 1998
August	1999	SAP submitted to NMED for Feature 58FF.	SNL August 1999
February	2000	Meeting with NMED to discuss cleanup levels for lead at SWMU 8. It was proposed that the cleanup level for lead should be 750 mg/kg at surface and subsurface soil.	Olson and Moats 2000
October	2000	Prepare VCA plan for UCS at SWMU 58.	SNL October 2000
October	2000	Debris removal from UCS; radiological survey conducted.	SNL December 2000
January	2004	VCA plan submitted to NMED. Plan is to remove remaining debris and metal-contaminated (mainly lead) surface and subsurface soil at various features at SWMU 8.	SNL January 2004
April	2005	CAC Proposal for SWMUs 8/58 submitted to NMED. DOE/NNSA and Sandia requests a determination of CAC without controls for SWMUs 8/58 as a whole.	SNL April 2005

Table 8-1. Historical Timeline of SWMUs 8/58 *(Continued)*

Month	Year	Event	Reference
June	2005	SWMU 8 is designated as "CAC without controls" from NMED. NMED also issues an RSI for seven features of SWMU 58. Additional sampling and analysis is requested for these features to characterize the depth and lateral extent of contamination.	NMED June 2005
June	2005	Response to RSI submitted. Additional sampling will take place at the features under discussion. A SAP is included as an appendix to the response.	SNL June 2005
September	2005	NMED states the additional sampling is adequate to complete the CAC proposal pending the outcome of the sampling results. Additional field sampling begins.	NMED September 2005
March	2006	The first supplemental response and proposal for CAC for SWMUs 8/58 submitted. The new sampling analysis reveals no COCs present at levels considered hazardous to human health. DOE/NNSA and Sandia requests CAC without controls for SWMUs 8/58.	SNL March 2006
June	2006	NMED RSI states that elevated levels of lead and nickel at Feature 58FF were not sufficiently defined horizontally or vertically, therefore, additional sampling is needed.	NMED June 2006
August	2006	A SAP is submitted to NMED outlining additional sampling to be completed at Feature 58FF. Boreholes will be drilled and sampled for lead and nickel only.	SNL August 2006
September	2006	Lead and nickel samples collected from five boreholes at Feature 58FF.	SNL January 2007
October	2006	NMED officially approves the SAP for Fall 2006 sampling (after the sampling has already been completed).	NMED October 2006
January	2007	A second supplemental response and proposal for CAC submitted to NMED for SWMUs 8/58. The September 2006 sampling for lead and nickel reveals no COCs present at levels considered hazardous to human health. DOE/NNSA again requests CAC without controls for SWMUs 8/58.	SNL January 2007
June	2007	NMED approves the second RSI response and issues a Certificate of Completion for CAC with Controls for SWMUs 8/58.	NMED June 2007
January	2008	Justification for Class III Permit Modification SWMUs 8/58, Volumes 1 through 4. Includes CAC Proposal (Volumes 1–3) and RSI and Notice of Disapproval (Volume 4).	SNL January 2008
June	2009	NMED Comments that Influence Out year Planning for the ER Project. E-mail documenting important comments from a meeting with NMED including the decision to remove SWMUs 8/58 from the CAC process.	SNL June 2009
April	2010	Letter from NMED formally stating that additional corrective action is needed at SWMUs 8/58, and the specific requirements for what the additional corrective action should entail.	NMED April 2010
September	2010	Groundwater Characterization Work Plan for SWMUs 8/58 submitted to NMED (in response to April 8, 2010 letter).	SNL September 2010
January	2011	NMED approves SWMUs 8/58 Groundwater Characterization Work Plan.	NMED January 2011

Table 8-1. Historical Timeline of SWMUs 8/58 *(Concluded)*

Month	Year	Event	Reference
May	2011	Letter proposing Groundwater Monitoring Well Location Adjustment for SWMUs 8/58 submitted to NMED.	SNL May 2011a
June	2011	NMED approves SWMUs 8/58 Proposed Groundwater Monitoring Well Location Adjustment.	NMED June 2011
June	2011	Request for Extension to Complete the Final Well Installation Report for five Groundwater Monitoring Wells at SWMUs 8/58.	SNL June 2011
August	2011	Monitoring wells CCBA-MW1 and CCBA-MW2 are installed.	SNL November 2011
August	2011	NMED approves the Request for Extension to Complete Well Installation Report for Groundwater Monitoring Wells at SWMUs 8/58.	NMED August 2011
October/ November	2011	First quarterly sampling event conducted for monitoring wells CCBA-MW1 and CCBA-MW2.	SNL September 2012
November	2011	Groundwater Monitoring Well Installation Report for SWMUs 8/58 submitted.	SNL November 2011
January	2012	Slug tests performed on monitoring wells CCBA-MW1 and CCBA-MW2	SNL June 2012
April	2012	NMED approved the Well Installation Report for SWMUs 8/58 and SWMU 68	NMED April 2012
June	2012	Hydraulic conductivity calculated for monitoring wells CCBA-MW1 and CCBA-MW2.	SNL June 2012
July	2013	The eighth and final sampling event required by NMED for monitoring wells CCBA-MW1 and CCBA-MW2 was completed.	SNL June 2013

NOTES:
CAC = Corrective Action Complete.
CCBA = Coyote Canyon Blast Area.
COC = Constituent of concern.
DOE = U.S. Department of Energy.
EOD = Explosive Ordnance Disposal.
ER = Environmental Restoration.
HE = High explosive.
KAFB = Kirtland Air Force Base.
mg/kg = Milligrams per kilogram.
MW = Monitoring well.
NMED = New Mexico Environment Department.
NMFRCD = New Mexico Forestry and Resources Conservation Division.
NNSA = National Nuclear Security Administration.
RCRA = Resource Conservation and Recovery Act.
RFI = RCRA Facility Investigation.
RSI = Request for Supplemental Information.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories
SNL/NM = Sandia National Laboratories, New Mexico.
SWMU = Solid Waste Management Unit.
UCS = Underground Conduit System.
UXO = Unexploded ordnance.
VCA = Voluntary Corrective Action.
VCM = Voluntary Corrective Measure.

8.1.6 Summary of Future Activities

The following activities are anticipated for SWMUs 8/58 during CY 2014:

- Quarterly groundwater sampling will be conducted at monitoring wells CCBA-MW1 and CCBA-MW2 will continue in CY 2014 unless additional guidance is provided by NMED.

- Quarterly reporting of results for chemical analyses for monitoring wells CCBA-MW1 and CCBA-MW2 groundwater samples will be performed.

8.1.7 Current Conceptual Model

This section presents a comprehensive discussion of the hydrogeologic regime, conceptual site model, and contaminant findings for SWMUs 8/58.

8.1.7.1 Regional Hydrogeologic Conditions

SWMUs 8/58 are located in the Arroyo del Coyote watershed that captures runoff from the western flank of the Manzanita Mountains. The elevation at SWMUs 8/58 ranges from approximately 5,880 to 6,280 ft above mean sea level (amsl). SWMU 8 and the central portion of SWMU 58 are generally flat with a moderate slope to the south-southwest towards the ephemeral channel of Lurance Canyon. SWMU 58 is bordered on the northwest and northeast by ridges. No surface water bodies are located at either site. A small arroyo runs from the north to the south through the western portion of the sites and is a tributary of Arroyo del Coyote. Both arroyos are dry except during and immediately following significant thunderstorms. The sites are sparsely vegetated by bunch grasses, cacti, junipers, and pine trees.

Alluvium fills the canyon floor and a veneer of weathered bedrock (colluvium) covers the surrounding slopes. Where present, soil types across the two sites consist of Gila sandy loam, the Tesajo-Millet gravelly loam, and the Salas Complex (clayey to gravelly loam) (SNL December 1995). The soil is poorly developed. The central portion of SWMUs 8/58 is covered with alluvium derived from the surrounding outcrops of Precambrian units (i.e., quartzite, greenstone, metarhyolite, and granite) and from Paleozoic sedimentary units (i.e., limestone, sandstone, and conglomerate). A thin veneer of colluvium covers the steeper slopes that surround the western and northern portions of SWMU 58.

The depth to bedrock is variable across the sites. The northern portion of SWMU 58 is underlain by Precambrian granite (SNL December 1995). Subsurface bedrock beneath the central and southern portions of SWMUs 8/58 consists of Precambrian quartzite. Fractured and moderately dipping quartzite is exposed on the steep hillside south of the sites (Karlstrom et al. April 2000).

The regional potentiometric surface map (Plate 1) shows that groundwater flow is generally toward the west in the vicinity of SWMUs 8/58. Topographic features and faults modify the flow direction at various locations. Faults to the west of the sites may serve as hydraulic barriers or conduits depending on the type and amount of fault gouge.

8.1.7.2 Hydrogeologic Conditions at SWMUs 8/58

The amount of precipitation available for groundwater recharge is minimal due to scant rainfall and high evapotranspiration rates. Summer (monsoonal) thunderstorms are responsible for the majority of rainfall. The average rainfall, as measured at the nearest active rain gauge (the National Weather Service station at the Albuquerque International Sunport) during the period from 1915 through 2005 was 8.67 inches per year (in/yr) (WRCC-DRI 2012). The station is located 8.7 miles northwest of SWMUs 8/58 at an elevation of 5,310 ft amsl. By extrapolation of the precipitation model presented in SNL/NM conceptual model of groundwater flow and contaminant transport at the canyon area (SNL May 2004), the average annual precipitation for SWMUs 8/58, where the elevation averages approximately 6,000 ft amsl, is

estimated to be approximately 11.5 in/yr. Intense sunlight and low humidity throughout much of the year creates high rates of evapotranspiration. Estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL February 1998).

Monitoring wells CCBA-MW1 and CCBA-MW2 were installed by the air-rotary casing hammer drilling method at SWMUs 8/58 in August 2011. Monitoring well CCBA-MW1 is located at the southwestern edge of SWMU 8 and approximately 0.2 miles north of the ephemeral channel in Lurance Canyon (Figure 8-2). Monitoring well CCBA-MW2 is located near the center of SWMU 58 and approximately 1,446 ft northeast of monitoring well CCBA-MW1.

At monitoring well CCBA-MW1 borehole, Quaternary alluvium comprised mostly of poorly sorted sands and gravels was encountered from the ground surface to a depth of approximately 70 ft below ground surface (bgs). Saturated alluvium was encountered at 62 ft bgs, but the quantity of water produced was low. From approximately 65 to 70 ft bgs, the sand and gravel contained a significant amount of cobbles. Quartzite bedrock was encountered at a depth of approximately 70 ft bgs. A significant amount of borehole sloughing resulted in erratic returns of drill cuttings. The borehole was advanced to a total depth of 90 ft bgs to accommodate the 20-foot long well screen required by NMED, a 5-ft long sump, and additional rathole to deal with the severe borehole sloughing problem. Approximately 8 ft of saturated alluvium was encountered.

The well is screened across the water table from 60 to 80 ft bgs (Table 8-2). After installation, the water level in the well rose to 45 ft bgs, which indicates that the borehole most likely intercepted a saturated bedrock fracture zone with a positive pressure head. The uppermost saturated fracture is inferred to have been encountered at a depth of approximately 75 ft bgs in fractured quartzite, which produced a greater volume of water than the alluvium.

An unusually large volume of sand pack was required for building monitoring well CCBA-MW1. A total of 118 bags of sand were used to fill the annulus from the bottom of the sump to the required height above the screen. A monitoring well of similar design would typically require approximately 25 bags of sand. The large annular volume for monitoring well CCBA-MW1 indicates that a borehole with a much larger than normal diameter was created during the drilling process due to the significant amount of borehole sloughing. The large sand pack was considered when the slug tests were interpreted.

At monitoring well CCBA-MW2, dry alluvium consisting of poorly sorted sand and gravel was encountered from the ground surface to a depth of 30 ft bgs. Precambrian granite and gneiss were penetrated from 30 ft bgs to the borehole total depth of 123 ft bgs. The uppermost saturated fracture was encountered at a depth of 100 ft bgs, and the well was screened in fractured bedrock from 98 to 118 ft bgs. Competent bedrock was encountered from 30 ft bgs to the total depth of 123 ft bgs; borehole sloughing did not affect well construction.

Figure 8-3 depicts the potentiometric surface for SWMUs 8/58. The apparent hydraulic gradient between the two monitoring wells (CCBA-MW1 and CCBA-MW2) is steep. The potentiometric surface elevation in monitoring well CCBA-MW2 was 13.57 ft higher than it was in monitoring well CCBA-MW1 in October 2011. The distance between the wells is 1,446 ft. The resulting gradient between the two wells was therefore approximately 0.01 feet per foot to the southwest. The potentiometric surface map is based on the assumptions that the two wells are screened in the same fractured bedrock zone and are hydraulically connected; the fractured bedrock system is isotropic (the series of fractures is uniformly distributed and interconnected); and the contribution of water from the saturated alluvium at monitoring well CCBA-MW1 is negligible.

Table 8-2. Lithologic and Hydrogeologic Elevation Data for Monitoring Wells at SWMUs 8/58

Monitoring Well	Ground Surface Elevation (ft amsl)	Depth to Bedrock (ft bgs)	Depth to Uppermost Saturated Fracture (ft bgs[a])	Elevation of Uppermost Saturated Fracture (ft amsl)	Depth of Screened Interval (ft bgs)	Potentiometric Surface, October 2012 (ft amsl)	Mid-Point Screen Elevation (ft amsl)	Approximate Pressure Head (ft[b])	Completion Zone
CCBA-MW1	5899.89	70	75	5,825	60 - 80	5,854.15	5829.90	24	Alluvium and quartzite
CCBA-MW2	5936.95	30	100	5,837	98 - 118	5,867.72	5829.00	39	Granite and gneiss

NOTES:
[a]Observed during drilling.
[b]From mid-point of screen.
amsl = Above mean sea level.
bgs = Below ground surface.
CCBA = Coyote Canyon Blast Area.
ft = Foot (feet).
MW = Monitoring Well.
SWMU = Solid Waste Management Unit.

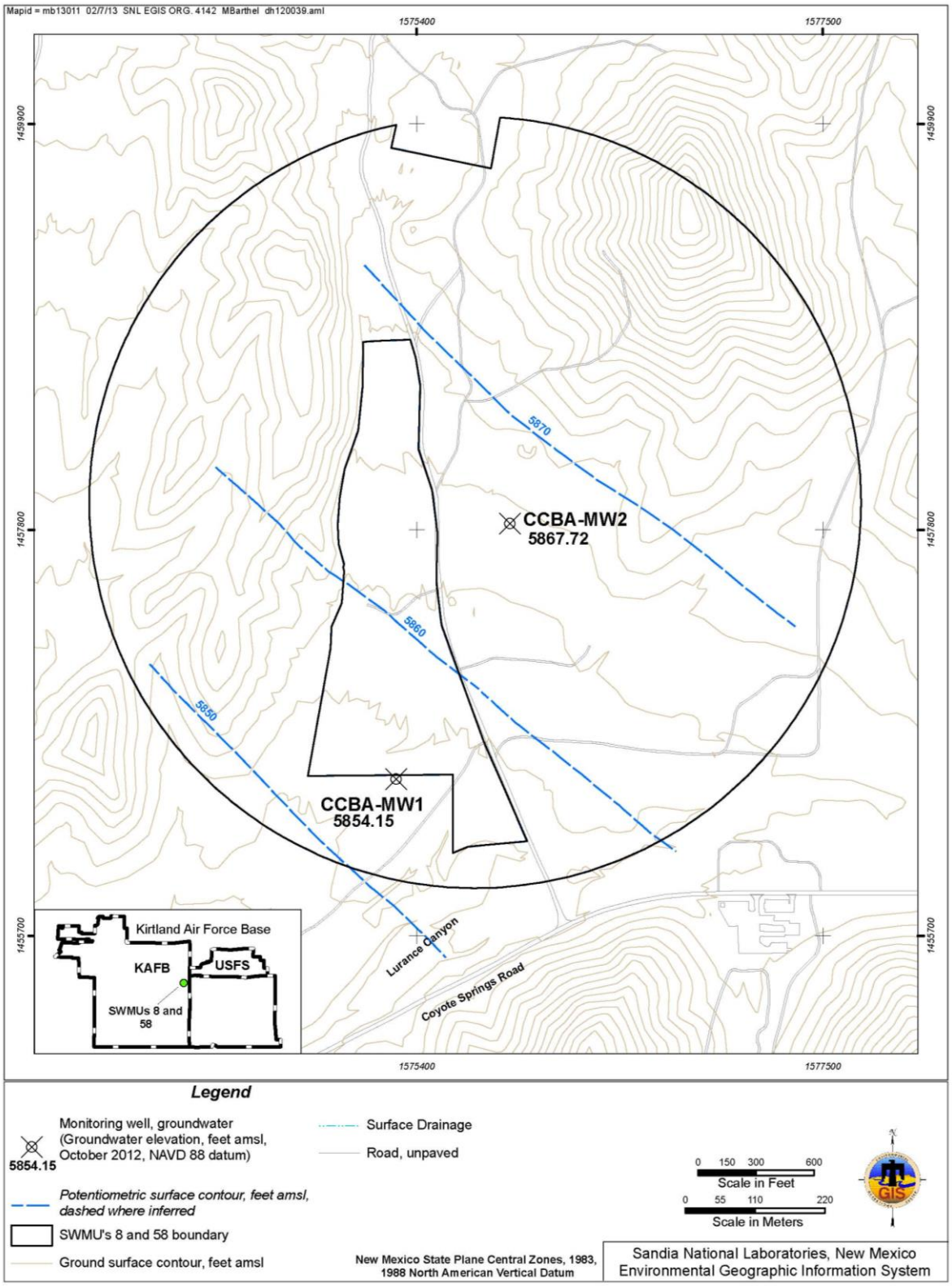


Figure 8-3. SWMUs 8/58 Potentiometric Surface Map

Groundwater in the fractured bedrock system is inferred to flow to the southwest. However, if the fractured bedrock system was anisotropic, groundwater would tend to follow the orientation of the fractures and not necessarily migrate normal to the potentiometric surface contours. The potentiometric surfaces represented by the groundwater elevations measured in both wells are above the top of each screen. This indicates that the groundwater in the saturated bedrock fractures is under semiconfined or confined conditions at both wells.

Geochemical analyses of major cations and anions are depicted on the Piper trilinear diagram shown on Figure 8-4. The groundwater composition for both wells is of the bicarbonate type dominated by calcium. The geochemical signatures from CY 2013 are consistent with CY 2012 results (Figure 8-4; SNL September 2013b) and show two separate groupings for monitoring wells CCBA-MW1 and CCBA-MW2. In contrast, results from CY 2011 indicated that mixing of groundwater sources was occurring (Figure 8-4; SNL September 2012).

During sampling, the drawdown in both wells was not excessive. The quantity of water produced by each well was clearly adequate for typical groundwater sampling. Groundwater samples were collected using pneumatic (nitrogen gas) Bennett™ piston pumps. Slug tests were performed on monitoring wells CCBA-MW1 and CCBA-MW2 in January 2012. Calculated hydraulic conductivity values for monitoring well CCBA-MW1 vary from 4.19×10^{-05} to 8.13×10^{-04} feet per minute (ft/min) and for monitoring well CCBA-MW2 from 3.49×10^{-03} to 4.28×10^{-03} ft/min (SNL June 2012). It should be noted that the slug test analyses were developed for use in unconsolidated deposits and analyses of bedrock aquifers is dominated by fracture flow. The results for monitoring wells CCBA-MW1 and CCBA-MW2 are within the range of conductivities (1.0×10^{-05} to 1.0×10^{-02} ft/min) determined for the regional aquifer within the unconsolidated Santa Fe Group sediments west of SWMUs 8/58 and SWMU 68 (SNL March 1999). This qualitatively suggests that fracture flow at SWMUs 8/58 wells is capable of moving significant amounts of groundwater.

8.1.7.3 Conceptual Site Model for SWMUs 8/58

The conceptual site model for SWMUs 8/58 is based on the findings from two on-site monitoring wells (CCBA-MW1 and CCBA-MW2), several nearby monitoring wells located upgradient and downgradient of the site in Lurance Canyon (Plate 1), and extensive field mapping conducted by the Site-Wide Hydrogeologic Characterization Project (GRAM and Lettis 1995). Lurance Canyon is deeply incised into Paleozoic and Precambrian bedrock and drains westward toward Arroyo del Coyote. No perennial surface water bodies are located at the site. Coyote Springs is located approximately 0.25 miles to the west and downslope of the site.

Groundwater in the area of SWMUs 8/58 predominantly occurs in a fractured bedrock system under semiconfined or confined conditions. Drilling indicates that the depth to groundwater in the fractured Precambrian quartzite and granite is approximately 75 to 100 ft bgs across the site and is dependent on the depth to the uppermost water-bearing fracture. A minor amount of groundwater was encountered in alluvium at 62 ft bgs during the drilling for monitoring well CCBA-MW1.

The geochemical signature is of the bicarbonate type dominated by calcium. The overlying bedrock with naturally filled fractures probably serves as the confining layer. Groundwater flows to the southwest. The hydraulic gradient in the fractured bedrock system is approximately 0.01 feet per foot. Groundwater underflow from the site probably discharges to the unconsolidated basin fill deposits (primarily the Santa Fe Group) of the Albuquerque Basin after crossing the Sandia Fault and the Tijeras Fault. No potable water supply wells are located within 4 miles of the site.

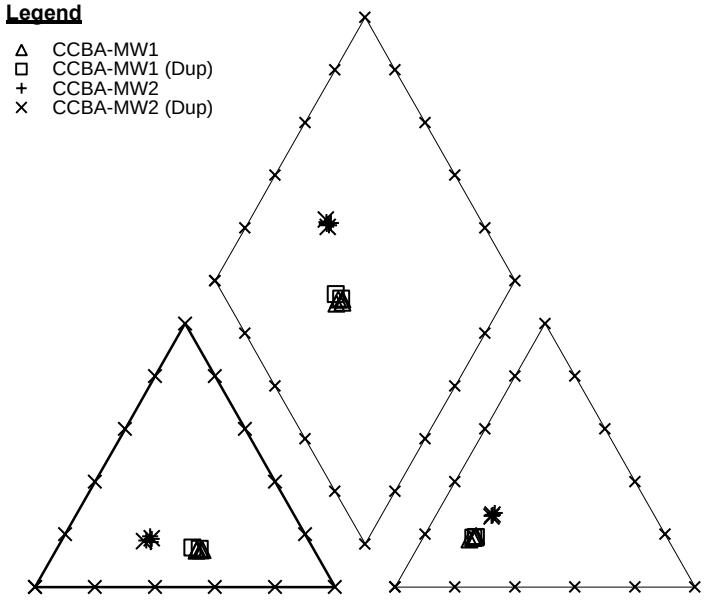


Figure 8-4. Piper Trilinear Diagram of Major Ion Chemistry for Monitoring Wells CCBA-MW1 and CCBA-MW2 at SWMUs 8/58, CY 2013

The amount of precipitation available for groundwater recharge is minimal due to the scant rainfall, high evapotranspiration rates, and the shallow sequence of bedrock. The annual precipitation is estimated to be 9 in/yr. Most rainfall occurs during summer thunderstorms. Seasonal effects probably do not significantly influence groundwater levels in the fractured bedrock system near the site.

8.1.7.4 Contaminant Sources

Sixty localized areas of interest, known as features, were investigated at SWMUs 8/58. The features consisted of test devices, various apparatus, debris piles, communication cable systems, and shrapnel. Numerous radiological and ordnance surveys were conducted and hazardous materials were removed. Additional remedial activities were conducted and approximately 1,390 cubic yards of testing debris were removed. Several phases of confirmatory soil sampling were conducted. Human health and ecological risk assessments show that remaining COC concentrations in soil are acceptable for both industrial and residential land use scenarios.

8.1.7.5 Contaminant Distribution and Transport in Groundwater

No groundwater contamination is suspected at SWMUs 8/58. Fluoride is the only analyte that exceeds the MCL in groundwater samples collected at SWMUs 8/58. In CY 2013 fluoride was detected above the MCL of 4.0 mg/L in monitoring well CCBA-MW1 groundwater samples at concentrations that ranged from 4.57 to 5.00 mg/L. However, this detection is most likely attributable to localized hydrothermal mineralization in faults and fractures within the quartzite bedrock in which the well is completed and not associated with SNL/NM testing activities. Review of nearby ore deposits demonstrates that there are large but uneconomic deposits of fluorite-bearing minerals in the Precambrian and Paleozoic rocks in the eastern portion of KAFB (Skelly August 2013). This indicates that the fluorite-bearing minerals are the source of fluoride in the groundwater samples from CCBA-MW1 and not SNL/NM activities. Fluoride concentrations from monitoring well CCBA-MW2 ranged from 1.52 to 1.61 mg/L.

8.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM Environmental Restoration (ER) Operations (formerly ER Project) and implements and enforces federal regulations mandated by the Resource Conservation and Recovery Act (RCRA). All ER Operations SWMUs are listed in Module IV of the SNL/NM RCRA Permit, *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518* (NMED 1993).

In April 2004, the Order (NMED April 2004) was issued between the NMED, DOE, and Sandia specifically identified SWMUs 8/58 as requiring further investigation. All corrective action requirements pertaining to SWMUs 8/58 are contained in the Order (NMED April 2004).

A proposal for Corrective Action Complete (CAC) for SWMUs 8/58 was submitted to the NMED in April 2005 (SNL April 2005). The NMED responded to the CAC proposal with a Request for Supplemental Information (RSI) in June 2005 and required additional characterization at the site (NMED June 2005). DOE/NNSA and Sandia responded to this RSI in June 2005 (SNL June 2005) and agreed to complete the additional site characterization work. The NMED approved the RSI response contingent on the results of field investigations proposed in the response (NMED September 2005). SNL/NM personnel completed the fieldwork in September and October 2005, and the results of the field investigations were submitted to the NMED in March 2006 (SNL March 2006). The NMED reviewed the March 2006 supplemental response and issued a second RSI (which required additional site characterization work) in June 2006 (NMED June 2006). DOE/NNSA and Sandia responded to the second RSI in August 2006 (SNL August 2006), and again agreed to complete the additional site characterization work. The second RSI response was verbally approved by the NMED in early August 2006, and the additional fieldwork

was completed in September 2006. The NMED officially approved the second RSI response in October 2006 (NMED October 2006), after fieldwork had been completed. The NMED approved SWMUs 8/58 for CAC with controls in June 2007 (NMED June 2007).

In a meeting with the NMED and participating members of the public held on June 9, 2009, the NMED decided that characterization of SWMUs 8/58 had not satisfied the requirements for CAC and that additional corrective actions were required due to insufficient information about the site hydrogeology and insufficient information about the contaminant source terms. The NMED required DOE/NNSA and Sandia to submit a Groundwater Characterization Work Plan for SWMUs 8/58 (NMED April 2010).

The Groundwater Characterization Work Plan for SWMUs 8/58 was submitted to the NMED in September 2010 (SNL September 2010) and described the activities and procedures to install and sample groundwater monitoring wells to comply with the NMED requirements and guidance of the New Mexico Office of the State Engineer (NMOSE) (NMOSE August 2005). The Work Plan was approved by the NMED in January 2011 (NMED January 2011). Due to the presence of cultural resources in the area and land use permit issues with KAFB, the locations of the proposed monitoring wells were adjusted (SNL May 2011a and NMED June 2011).

Monitoring wells CCBA-MW1 and CCBA-MW2 were installed in August 2011 and quarterly sampling began in October 2011. The well installation report describing field activities was submitted to the NMED in November 2011 (SNL November 2011). The eighth and final sampling event required by NMED for monitoring wells CCBA-MW1 and CCBA-MW2 was completed in July 2013.

In this report monitoring data for SWMUs 8/58 are presented for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (gamma spectroscopy, gross alpha/beta activity, and tritium) are provided voluntarily by the DOE/NNSA and Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Order, as specified in Section III.A of the Order (NMED April 2004).

8.3 Scope of Activities

Groundwater monitoring sampling and analysis during CY 2013 is summarized in Table 8-3. The analytical parameters for monitoring wells CCBA-MW1 and CCBA-MW2 for each sampling event are listed in Table 8-4.

8.4 Field Methods and Measurements

According to the requirements of the Order (NMED April 2004) addressing Section VII.D.6 and the NMED letter of April 8, 2010 (NMED April 2010), SNL/NM personnel will perform groundwater sampling at SWMUs 8/58. The CY 2013 sampling events were conducted in conformance with appropriate SNL/NM Field Operating Procedures for groundwater sampling activities and the site-specific Mini-SAP for SWMUs 8/58 (SNL December 2012; April 2013; June 2013; and September 2013b).

Groundwater samples were collected from monitoring wells CCBA-MW1 and CCBA-MW2 in January, April, July, and October 2013. Samples were submitted to GEL Laboratories LLC for all chemical analyses. Groundwater samples were analyzed for VOCs, SVOCs, HE compounds, NPN, major anions (i.e., bromide, chloride, fluoride, and sulfate), major cations (i.e., calcium, magnesium, potassium, and sodium), alkalinity, TAL metals plus uranium, perchlorate, total cyanide, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium.

Table 8-3. Groundwater Monitoring Well Network and Sampling Dates for SWMUs 8/58, Calendar Year 2013

Date of Sampling Event	Wells Sampled	SAP
January 2013	CCBA-MW1 CCBA-MW2	*SWMU 8 and 58 Groundwater Monitoring Mini-SAP for Second Quarter Fiscal Year 2013* (SNL December 2012)
April 2013	CCBA-MW1 CCBA-MW2	*SWMU 8 and 58 Groundwater Monitoring Mini-SAP for Third Quarter Fiscal Year 2012* (SNL April 2013)
July 2013	CCBA-MW1 CCBA-MW2	*SWMU 8 and 58 Groundwater Monitoring Mini-SAP for Fourth Quarter Fiscal Year 2012* (SNL June 2013)
October 2013	CCBA-MW1 CCBA-MW2	*SWMU 8 and 58 Groundwater Monitoring Mini-SAP for First Quarter Fiscal Year 2014* (SNL September 2013a)

NOTES:
CCBA = Coyote Canyon Blast Area.
MW = Monitoring well.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories.
SWMU = Solid Waste Management Unit.

Table 8-4. Parameters Sampled at SWMUs 8/58 for Each Sampling Event, Calendar Year 2013

Parameter	Sampling Period	
Anions	**January 2013**	**April 2013**
Alkalinity	CCBA-MW1	CCBA-MW1
Filtered Cations	CCBA-MW1 (dup)	CCBA-MW2
Gamma Spec*	CCBA-MW2	CCBA-MW2 (dup)
Gross Alpha		
Gross Beta		
HE compounds	**July 2013**	**October 2013**
Isotopic Uranium	CCBA-MW1	CCBA-MW1
NPN	CCBA-MW1 (dup)	CCBA-MW2
Perchlorate	CCBA-MW2	CCBA-MW2 (dup)
SVOCs		
TAL Metals, plus Total Uranium		
Total Cyanide		
VOCs		

NOTES:
CCBA = Coyote Canyon Blast Area.
Dup = Duplicate sample.
Gamma Spec* = Gamma spectroscopy short list (Americium-241, Cesium-137, Cobalt-60, and Potassium-40).
HE = High explosive.
MW = Monitoring well.
NPN = Nitrate plus nitrate (reported as nitrogen).
SVOC = Semivolatile organic compound.
SWMU = Solid waste management unit.
TAL = Target Analyte List.
VOC = Volatile organic compound.

The monitoring procedures are consistent with procedures identified in the EPA technical enforcement guidance document (EPA 1986) and are described in detail in Section 1.3.

The NMED DOE Oversight Bureau collected split samples with DOE/NNSA and Sandia during the April and October 2013 sampling events. The NMED DOE Oversight Bureau analytical results are not reported in this document, but are available through the DOE NNSA Sandia Field Office.

8.5 Groundwater Elevation

Throughout CY 2013, water level measurements were obtained to determine groundwater flow directions, hydraulic gradients, and changes in water table elevations. The water level information was used to create the base-wide potentiometric surface map discussed in Section 2.6.2.2 and shown in Plate 1. The potentiometric surface contours presented in Figure 8-3 are derived from the base-wide potentiometric surface map. The hydrograph for SWMUs 8/58 monitoring wells is shown in Figure 8C-1 (Attachment 8C).

8.6 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using EPA- and DOE-specified protocols described in Section 1.3.2 (Tables 1-5 and 1-6). Parameters analyzed and sampling periods in CY 2013 are presented in Table 8-4.

8.7 Summary of Analytical Results

This section discusses analytical results and field measurements for the CY 2013 sampling events at SWMUs 8/58. Data are presented in Tables 8A-1 through 8A-11 (Attachment 8A). Data qualifiers are explained in the footnotes following Table 8A-11. Analytical reports, including certificates of analyses, analytical methods, method detection limits (MDLs), practical quantitation limits, dates of analyses, results of QC analyses, and data validation findings are filed in the SNL/NM Records Center.

The analytical data were reviewed and qualified in accordance with Administrative Operating Procedure 00-03, *Data Validation Procedure for Chemical and Radiochemical Data, Revision 3* (SNL May 2011b). No problems were identified with the analytical data that resulted in qualification of the data as unusable. The data are acceptable and reported QC measures are adequate.

No VOCs or HE compounds were detected above laboratory MDLs in any groundwater samples collected from SWMUs 8/58. No SVOCs were detected above laboratory MDLs except for benzo(a)pyrene, benzo(b)fluoranthene, and benzo(k)fluoranthene in the January 2013 sampling event (Table 8A-1). Benzo(a)pyrene was reported above the MCL of 0.200 micrograms per liter (µg/L) in CBA-MW2 at a concentration of 0.640 µg/L. Benzo(b)fluoranthane and benzo(k)fluoranthane were detected in both CCBA-MW1 and CCBA-MW2 environmental samples at concentrations ranging from 0.411 µg/L to 0.980 µg/L. No SVOCs were detected in the CCBA-MW1 duplicate environmental sample. This is the initial detection of any SVOC from these monitoring wells. These SVOCs are polycyclic aromatic hydrocarbons found in exhaust fumes and smoke associated with the burning of organic compounds. During the January sampling event, air temperatures were below freezing and the field team used fuel source portable heaters inside the sampling vehicle. Use of the fuel source heater has been discontinued and detections of SVOCs has ceased. Tables 8A-2 through 8A-4 list the MDLs for associated VOCs, SVOCs, and HE compounds, respectively (Attachment 8A).

Table 8A-5 summarizes NPN results (Attachment 8A). NPN values were compared with the nitrate MCL of 10 mg/L. NPN was not detected above the MCL in any groundwater sample. NPN was reported at concentrations from 1.43 to 3.62 mg/L.

Table 8A-6 summarizes alkalinity, major anion (i.e., bromide, chloride, fluoride, and sulfate), and total cyanide results (Attachment 8A). Fluoride was detected above the established MCL of 4.0 mg/L in all samples from monitoring well CCBA-MW1 at concentrations from 4.57 to 5.00 mg/L and is shown on Figure 8B-1. This detection is most likely attributable to the presence of fluorite mineralization in the unconsolidated alluvium and possible weathered quartzite bedrock in which the well is completed and not associated with SNL/NM testing activities. Fluoride concentrations in monitoring well CCBA-MW2 samples ranged from of 1.52 to 1.61 mg/L. No other anions or total cyanide were detected above established MCLs.

Perchlorate was not detected above the screening level/MDL of 0.004 mg/L in any groundwater sample. Table 8A-7 presents perchlorate results (Attachment 8A).

TAL metals plus uranium were analyzed for all samples from monitoring wells at SWMUs 8/58. No metal parameters were detected above established regulatory limits in any groundwater sample. Metal results are summarized in Table 8A-8 (Attachment 8A).

Filtered fractions for major cations as calcium, magnesium, potassium, and sodium were analyzed for all samples. The results are presented in Table 8A-9 (Attachment 8A). These parameters have no established MCLs.

The results for gamma spectroscopy, gross alpha/beta activity, and isotopic uranium are presented in Table 8A-10 (Attachment 8A). Gross alpha activity is measured as a screening tool and in accordance with 40 Code of Federal Regulations, Parts 9, 141, and 142, Table I-4 does not include uranium, which is measured independently. Therefore, gross alpha activity measurements were corrected by subtracting the total uranium activity. Radiological results are further reviewed by an SNL/NM Certified Health Physicist to assure that the samples are nonradioactive. All radionuclide activity results are below MCLs, where established.

Table 8A-11 summarizes field water quality measurements collected prior to sampling (Attachment 8A). Field water quality measurements include turbidity, pH, temperature, specific conductance, oxidation-reduction potential, and dissolved oxygen.

8.8 Quality Control Results

Field and laboratory QC samples were prepared to determine the accuracy of the methods used and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process. The results for each QC sample and the impact on data quality for the SWMUs 8/58 quarterly sampling events are discussed in the following sections.

8.8.1 Field Quality Control Samples

Field QC samples included duplicate environmental samples, FBs, TBs, and EBs. The following sections discuss the analytical results for each QC sample type.

8.8.1.1 Duplicate Environmental Samples

Duplicate environmental samples were analyzed to estimate the overall reproducibility of the sampling and analytical process. Relative percent difference (RPD) calculations, between duplicate samples, were performed for detected chemical analytes. In January 2013 a duplicate environmental sample was collected from monitoring well CCBA-MW1. The duplicate sample results show good agreement (RPD values less than 20 for organic compounds and less than 35 for inorganic analyses) for all calculated parameters, except aluminum. The RPD for aluminum was calculated at 75, but is an estimated value because of quality control issues associated with the verification of the reporting limit and aluminum is

reported below the practical quantitation limit in one sample. The three duplicate samples collected in April, July, and October (Table 8-4) all show good agreement (RPD values less than 20 for organic compounds and less than 35 for inorganic analyses) for all calculated parameters.

8.8.1.2 Equipment Blank Samples

EB or rinsate samples are collected to verify the equipment decontamination process. The results for EB analyses are as follows:

- **January 2013 Sampling Event**—An EB or rinsate sample was collected prior to sampling monitoring well CCBA-MW1 and submitted for all analyses. Bromodichloromethane, bromoform, chloroform, chloride, dibromochloromethane, and sodium were detected above the laboratory MDLs. No corrective action was necessary for any detected parameter because these analytes were not detected in environmental samples nor were detected in environmental samples at concentrations greater than five times the blank result.

- **April 2013 Sampling Event**—An EB or rinsate sample was collected prior to sampling monitoring well CCBA-MW2 and submitted for all analyses. Bromodichloromethane, bromoform, chloroform, chloride, copper, dibromochloromethane, and sodium were detected above the laboratory MDLs. No corrective action was necessary, except for copper, because these analytes were not detected in the environmental samples, nor were detected in the environmental samples at concentrations greater than five times the EB result. Copper in the CCBA-MW2 environmental samples was qualified as not detected during data validation because copper was reported in the EB sample at a concentration greater than reported in the environmental samples.

- **July 2013 Sampling Event**—An EB or rinsate sample was collected prior to sampling monitoring well CCBA-MW1 and submitted for all analyses. Cadmium, chloroform, chloride, and copper were detected above the laboratory MDLs. No corrective action was necessary, except for copper, because these analytes were not detected in the environmental samples, nor were detected in the environmental samples at concentrations greater than five times the EB result. The copper values reported in environmental samples were qualified as not detected during data validation, because copper was reported in the EB sample at a concentration greater than reported environmental samples.

- **October 2013 Sampling Event**—An EB or rinsate sample was collected prior to sampling monitoring well CCBA-MW2 and submitted for all analyses. Alkalinity, barium, bromodichloromethane, chloroform, dibromochloromethane, and TCE were detected above the laboratory MDLs. No corrective action was necessary because these analytes were not detected in environmental samples, nor were detected in environmental samples at concentrations greater than five times the blank result.

8.8.1.3 Trip Blank Samples

TB samples are submitted whenever samples are collected for VOC analyses to assess whether contamination of the samples had occurred during shipment and storage. A total of 12 TBs were submitted during CY 2013, three per quarter. No VOCs were detected above associated laboratory MDLs for all TB samples.

8.8.1.4 Field Blank Samples

A FB sample was collected for VOCs to assess whether contamination of the samples resulted from ambient field conditions:

- **January 2013 Sampling Event—**Analysis of the monitoring well CCBA-MW1 FB sample detected the VOCs bromodichloromethane, bromoform, chloroform, and dibromochloromethane above associated laboratory MDLs. No corrective action was required, because these compounds were not detected in the associated environmental samples.

- **April 2013 Sampling Event—**Analysis of the monitoring well CCBA-MW1 FB sample detected the VOC compounds bromodichloromethane, bromoform, chloroform, and dibromochloromethane above associated laboratory MDLs. No corrective action was required, because these compounds were not detected in the associated environmental sample.

- **July 2013 Sampling Event—**Analysis of the monitoring well CCBA-MW2 FB sample detected the VOC compound chloroform above associated laboratory MDLs. No corrective action was required, because these compounds were not detected in the associated environmental sample.

- **October 2013 Sampling Event—**Analysis of the monitoring well CCBA-MW1 FB sample detected the VOC compounds acetone, bromodichloromethane, chloroform, and dibromochloromethane above associated laboratory MDLs. No corrective action was required, because these compounds were not detected in the associated environmental sample.

8.8.2 Laboratory Quality Control Samples

Internal laboratory QC samples, including method blanks and duplicate laboratory control samples, were analyzed concurrently with all groundwater samples. Some analytical results were qualified during the data validation process, but no significant data quality problems were noted in CY 2013**.**

8.9 Variances and Nonconformances

No variances or nonconformances from requirements specified in the Mini-SAP for SWMUs 8/58 (SNL December 2012, April 2013, June 2013, and September 2013a) were noted during sampling activities. However, project-specific issues identified during CY 2013 sampling activities are noted as follows:

- **January 2013 Sampling Event**—Except for fluoride and benzo(a)pyrene, none of the analytical results for the groundwater samples from SWMUs 8/58 exceed the MCLs. Fluoride was detected above the established MCL of 4.0 mg/L in the monitoring well CCBA-MW1 environmental sample and the duplicate environmental sample with concentrations of 4.97 mg/L and 5.00 mg/L, respectively. Fluoride in the monitoring well CCBA-MW2 environmental sample exceeded the MDL with a concentration of 1.52 mg/L. Benzo(a)pyrene was detected above the established MCL of 0.200 µg/L in CCBA-MW2 with a concentration of 0.640 µg/L. This is the first initial detection of any SVOC from these monitoring wells. Benzo(b)pyrene and benzo(k)pyrene were also detected in both CCBA-MW1 and CCBA-MW2 environmental samples at concentrations ranging from 0.411 to 0.980 µg/L, respectively. These SVOCs are polycyclic aromatic hydrocarbons and their detection is likely due to a fuel source portable heater used inside the sampling vehicle due to below freezing temperatures.

8.10 Summary and Conclusions

Two groundwater monitoring wells were installed at SWMUs 8/58 in August 2011. During January, April, July, and October of 2013, groundwater samples were collected from monitoring wells CCBA-MW1 and CCBA-MW2. Analytical parameters included VOCs, SVOCs, HE compounds, NPN, major anions, major cations, alkalinity, TAL metals plus uranium, perchlorate, total cyanide, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium. No parameters were detected above established MCLs, except for fluoride and benzo(a)pyrene. Fluoride was detected above the established MCL of 4.0 mg/L in monitoring well CCBA-MW1 samples that ranged from 4.57 to 5.00 mg/L. This detection is most likely attributable to the quartzite bedrock that is rich in subeconomic deposits of fluorite in which the well is completed and not associated with SNL/NM testing activities. Benzo(a)pyrene was detected above the established MCL of 0.200 µg/L in CCBA-MW2 with a concentration of 0.640 µg/L. This is the first initial detection of any SVOC from these monitoring wells. Benzo(b)pyrene and benzo(k)pyrene were also detected in both CCBA-MW1 and CCBA-MW2 environmental samples at concentrations ranging from 0.411 to 0.980 µg/L. Detection of these SVOC compounds is likely due to the use of a fuel sourced portable heater inside the sampling vehicle due to below freezing temperatures. The use of the fuel sourced heater has stopped and the detections of the SVOC compounds has ceased.

The current conceptual model described in Section 8.1.7 does not require modification based on the analytical results for this reporting period.

During CY 2014, quarterly groundwater sampling and reporting will continue for the groundwater monitoring wells (CCBA-MW1 and CCBA-MW2) located at SWMUs 8/58. The eighth and final quarterly groundwater sampling event was completed in July 2013. Quarterly groundwater sampling will continue until additional guidance is provided by NMED.

8.11 References

DOE September 1987 U.S. Department of Energy (DOE), September 1987. *Draft Comprehensive Environmental Assessment and Response Program (CEARP) Phase 1: Installation Assessment, Sandia National Laboratories, Albuquerque,* Albuquerque Operations Office, Environmental Safety and Health Division, Environmental Program Branch, U.S. Department of Energy, Albuquerque, New Mexico.

EPA 2009 U.S. Environmental Protection Agency (EPA), 2009. *National Primary Drinking Water Regulations,* EPA 816-F 09-004, U.S. Environmental Protection Agency, Washington, D.C., May.

EPA 1986 U.S. Environmental Protection Agency (EPA), 1986. *RCRA Ground-Water Monitoring Technical Enforcement Guidance Document* OSWER-9950.1, U.S. Environmental Protection Agency, Washington, D.C.

GRAM and Lettis 1995 GRAM and Lettis, 1995. *Conceptual Geologic Model of the Sandia National Laboratories and Kirtland Air Force Base,* prepared for Site-Wide Hydrogeologic Characterization Project, Organization 7584, Environmental Restoration Program, Sandia National Laboratories, Albuquerque, New Mexico, December.

Karlstrom et al. April 2000 Karlstrom, K., S.D. Connell, C.A. Ferguson, A.S. Read, G.R. Osburn, E. Kirby, J. Abbott, C. Hitchcock, K. Kelson, J. Noller, T. Sawyer, S. Ralser, D.W. Love, M. Nyman, and P.W. Bauer, April 2000. *Geology of the Tijeras Quadrangle, Bernalillo County, New Mexico*, New Mexico Bureau of Mines and Mineral Resources Open File Map Series OF-GM-4, Revision April 5, 2000.

NMED April 2012 New Mexico Environment Department (NMED), April 2012. *Notice of Approval: Groundwater Monitoring Well Installation Report for SWMU 8 (Open Dump, Coyote Canyon Blast Area) / SWMU 58 (Coyote Canyon Blast Area), and SWMU 68 (Old Burn Site), Installation of SWMU 8/58 Groundwater Monitoring Wells CCBA-MW1 and CCBA-MW2, Installation of SWMU 68 Groundwater Monitoring Wells OBS-MW1, OBS-MW2, and OBS-MW3, November 2011, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-11-017*, New Mexico Environment Department, Santa Fe, New Mexico, April 20, 2012.

NMED August 2011 New Mexico Environment Department (NMED), August 2011. *Notice of Approval: Request for Extension to Complete Well Installation Report for Groundwater Monitoring Wells at Solid Waste Management Units 8, 58 and 68, June 27, 2011, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-IO-017,* New Mexico Environment Department, Santa Fe, New Mexico, August 3, 2011.

NMED June 2011 New Mexico Environment Department (NMED), June 2011. *Approval: Solid Waste Management Units 8 and 58, Proposed Groundwater Monitoring Well Location Adjustment, May 10, 2011, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-I0-017,* New Mexico Environment Department, Santa Fe, New Mexico, June 2, 2011.

NMED January 2011 New Mexico Environment Department (NMED), January 2011. *Notice of Approval with Modification: Groundwater Monitoring Well Installation Workplans for SWMUs 8/58 and 68, September 2010, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-I0-017*, New Mexico Environment Department, Santa Fe, New Mexico, January 28, 2011.

NMED April 2010 New Mexico Environment Department (NMED), April 2010. *Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008), Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001*, New Mexico Environment Department, Santa Fe, New Mexico. April 8, 2010.

NMED June 2007 New Mexico Environment Department (NMED), June 2007. *Certificate of Completion with Controls: Response to NMED Notice of Disapproval: Supplemental Response and Proposal for Corrective Action Complete Solid Waste Management Units 8 and 58, Foothills Test Area, December 2006.* New Mexico Environment Department, Santa Fe, New Mexico. June 19, 2007.

NMED October 2006 New Mexico Environment Department (NMED), October 2006. *Notice of Approval: Sampling and Analysis Plan for Solid Waste Management Unit 58, Fall 2006, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-05-013,* New Mexico Environment Department, Santa Fe, New Mexico. October 26, 2006.

NMED June 2006 New Mexico Environment Department (NMED), June 2006. *Notice of Disapproval: Supplemental Response and Proposal for Corrective Action Complete, Solid Waste Management Units 8 and 58, Foothills Test Area, March 2006, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-05-013,* New Mexico Environment Department, Santa Fe, New Mexico. June 2, 2006.

NMED September 2005 New Mexico Environment Department (NMED), September 2005. *Notice of Approval: August 2005 Responses to NMED Request for Supplemental Information on the Corrective Action Complete Proposal for Solid Waste Management Unit 58, Foothills Test Area, April 2005,* New Mexico Environment Department, Santa Fe, New Mexico. September 13, 2005.

NMED June 2005 New Mexico Environment Department (NMED), June 2005. *Request for Supplemental Information Environmental Restoration Project Proposal for Corrective Action Complete Solid Waste Management Unit 58 (Features 58O, 58S, 58X, 58FF, 58OO, 58TT and 58YY),* New Mexico Environment Department, Santa Fe, New Mexico. June 6, 2005.

NMED April 2004 New Mexico Environment Department (NMED), April 2004. *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order*, New Mexico Environment Department, Santa Fe, New Mexico, April 29, 2004.

NMED 1993 New Mexico Environment Department (NMED), 1993. *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518,* New Mexico Environment Department, Santa Fe, New Mexico.

NMFRCD August 1995 New Mexico Forestry and Resources Conservation Division (NMFRCD), August 1995. *Inventory of the Rare and Endangered Plants of New Mexico,* New Mexico Energy, Minerals and Natural Resources Department, New Mexico Forestry and Resources Conservation Division, Santa Fe, New Mexico.

NMOSE August 2005 New Mexico Office of the State Engineer (NMOSE), August 2005. *Rules and Regulations Governing Well Driller Licensing; Construction, Repair and Plugging of Wells,* New Mexico Office of the State Engineer, Santa Fe, New Mexico.

Olson and Moats 2000 Olson, K., and W. Moats (New Mexico Environment Department), 2000. Memorandum to File, *Proposed ER Site 8 Cleanup Levels*, Hazardous and Radioactive Materials Bureau, New Mexico Environment Department, Santa Fe, New Mexico, March.

RUST Geotech, Inc. 1994 RUST Geotech, Inc., 1994. *Final Report, Surface Gamma Radiation Surveys for Sandia National Laboratories/New Mexico Environmental Restoration Project,* U.S. Department of Energy (DOE) Contract, Grand Junction Projects Office, Grand Junction, Colorado, DOE Contract No. DE-ACO4-861D12584, December.

Skelly August 2013 Skelly, M., Organization 06234, August 2013. *Occurrence of Natural Fluoride and Metals in the Eastern Portions of Kirtland Air Force Base*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL April 2014 Sandia National Laboratories, New Mexico (SNL/NM), April 2014. *Consolidated Quarterly Report, October through December 2013*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL January 2014 Sandia National Laboratories, New Mexico (SNL/NM), January 2014. *Consolidated Quarterly Report, July through September 2013*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL October 2013 Sandia National Laboratories, New Mexico (SNL/NM), October 2013. *Consolidated Quarterly Report, April through June 2013*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2013a Sandia National Laboratories, New Mexico (SNL/NM), September 2013. *SWMU 8 and 58 Groundwater Monitoring Mini-SAP for First Quarter Fiscal Year 2014*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2013b Sandia National Laboratories, New Mexico (SNL/NM), September 2013. *Annual Groundwater Monitoring Report, Calendar Year 2012 Groundwater Protection Program,* Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL July 2013 Sandia National Laboratories, New Mexico (SNL/NM), July 2013. *Consolidated Quarterly Report, January through March 2013*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2013 Sandia National Laboratories, New Mexico (SNL/NM), June 2013. *SWMU 8 and 58 Groundwater Monitoring Mini-SAP for Fourth Quarter Fiscal Year 2013*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL April 2013 Sandia National Laboratories, New Mexico (SNL/NM), April 2013. *SWMU 8 and 58 Groundwater Monitoring Mini-SAP for Third Quarter Fiscal Year 2013*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL December 2012 Sandia National Laboratories, New Mexico (SNL/NM), December 2012. *SWMU 8 and 58 Groundwater Monitoring Mini-SAP for Second Quarter Fiscal Year 2013*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2012 Sandia National Laboratories, New Mexico (SNL/NM), September 2012. *Annual Groundwater Monitoring Report, Calendar Year 2011 Groundwater Protection Program*, Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2012 Sandia National Laboratories, New Mexico (SNL/NM), June 2012. *Technical Memorandum—Field Report on the Slug Tests at SWMUs 8/58 and SWMU 68*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, June 27, 2012.

SNL November 2011 Sandia National Laboratories, New Mexico (SNL/NM), November 2011. *Groundwater Monitoring Well Installation Report for SWMU 8 (Open Dump, Coyote Canyon Blast Area) / SWMU 58 (Coyote Canyon Blast Area) and SWMU 68 (Old Burn Site)*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2011 Sandia National Laboratories, New Mexico (SNL/NM), June 2011. *Request for Extension to Complete the Final Well Installation Report for 5 Groundwater Monitoring Wells at Solid Waste Management Units 8/58 and 68*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL May 2011a Sandia National Laboratories, New Mexico (SNL/NM), May 2011. *Solid Waste Management Unit (SWMU) 8 and 58 Proposed Groundwater Monitoring Well Location Adjustment*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL May 2011b Sandia National Laboratories, New Mexico (SNL/NM), May 2011. *Data Validation Procedure for Chemical and Radiochemical Data*, AOP 00-03, Revision 3, Sample Management Office, Sandia National Laboratories, Albuquerque, New Mexico, May 11, 2011.

SNL September 2010 Sandia National Laboratories, New Mexico (SNL/NM), September 2010. *SWMU 68 and SWMUs 8/58 Groundwater Characterization Work Plans - U.S. Department of Energy/Sandia Corporation Response to the New Mexico Environment Department letter of April 8, 2010 entitled, "Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008) Sandia National Laboratories EPA ID# NM5890110518 HWB-SNL-06-007 and HWB-SNL-08-001,"* Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2009 Sandia National Laboratories, New Mexico (SNL/NM), June 2009. *Notes of Meeting—June 15, 2009 Meeting Between NMED, DOE, and SNL/NM to discuss the April 2009 NMED Letter entitled: Perchlorate Contamination in Groundwater, Sandia National Laboratories,* Sandia National Laboratories, Albuquerque, New Mexico, June 23, 2009.

SNL January 2008 Sandia National Laboratories, New Mexico (SNL/NM), January 2008. *Justification for Class III Permit Modification, January 2008, SWMUs 8 and 58, Operable Unit 1332, Canyons Blast Area, Volume 1 of 4,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL January 2007 Sandia National Laboratories, New Mexico (SNL/NM), January 2007. *Response to NMED Notice of Disapproval: Supplemental Response and Proposal for Corrective Action Complete Solid Waste Management Units 8 and 58, Foothills Test Area, March 2006,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL August 2006 Sandia National Laboratories, New Mexico (SNL/NM), August 2006. *Responses to NMED Notice of Disapproval: Supplemental Response and Proposal for Corrective Action Complete Solid Waste Management Units 8 and 58, Foothills Test Area, March 2006, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-05-013,* Sandia National Laboratories, Albuquerque, New Mexico. August 9, 2006.

SNL March 2006 Sandia National Laboratories, New Mexico (SNL/NM), March 2006. *Supplemental Response and Proposal for Corrective Action Complete Solid Waste Management Units 8 and 58, Foothills Test Area,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2005 Sandia National Laboratories, New Mexico (SNL/NM), June 2005. *Responses to NMED Request for Supplemental Information on the Corrective Action Complete Proposal for Solid Waste Management Unit 58 Dated June 6, 2005,* Sandia National Laboratories, Albuquerque, New Mexico, June 26, 2005.

SNL April 2005 Sandia National Laboratories, New Mexico (SNL/NM), April 2005. *Corrective Action Complete Proposal for Solid Waste Management Unit 8-Open Dump (Coyote Canyon Blast Area) and Solid Waste Management Unit 58-Coyote Canyon Blast Area, Foothills Test Area.* Sandia National Laboratories, Albuquerque, New Mexico, April 15, 2005.

SNL May 2004 Sandia National Laboratories, New Mexico (SNL/NM), May 2004. *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Canyon Area,* Sandia Report SAND2004-2673P.

SNL January 2004 Sandia National Laboratories, New Mexico (SNL/NM), January 2004. *Voluntary Corrective Action Plan for Excavation and Removal of Contaminated Soil at Environmental Restoration Solid Waste Management Unit 8, Area of Open Burning, Operable Unit 1332, Foothills Test Area,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2003 Sandia National Laboratories, New Mexico (SNL/NM), September 2003. *Annual Site Environmental Report, Sandia National Laboratories, New Mexico—Calendar Year 2002,* SAND2003-2549, Sandia National Laboratories, Albuquerque, New Mexico.

SNL December 2000 Sandia National Laboratories, New Mexico (SNL/NM), December 2000. *Debris Removal at Underground Conduit System, SWMU 58, Oct.-Dec. 2000,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL October 2000 Sandia National Laboratories, New Mexico (SNL/NM), October 2000. *Voluntary Corrective Action Plan for Excavation and Removal of the Underground Conduit System at Environmental Restoration SWMU 58, Operable Unit 1332, Foothills Test Area,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL August 1999 Sandia National Laboratories, New Mexico (SNL/NM), August 1999. *Sampling and Analysis Plans for SWMU 58FF Operable Unit 1332 Foothills Test Area,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 1999 Sandia National Laboratories, New Mexico (SNL/NM), March 1999. *Summary Report of Groundwater Investigations at Technical Area V, Operable Units 1306 and 1307,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL November 1998 Sandia National Laboratories, New Mexico (SNL/NM), November 1998. *Sampling and Analysis Plan for Collecting Additional RCRA Facility Investigation Surface and Subsurface Soil Samples at ER SWMU 8 and 58 Operable Unit 1332 Foothills Test Area 11/98,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL August 1998 Sandia National Laboratories, New Mexico (SNL/NM), August 1998. *Voluntary Corrective Measure Plan for Excavation and Removal of Contamination Soil at Environmental Restoration Solid Waste Management Unit 8Y and 58B, Operable Unit 1332, Foothills Test Area,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL February 1998 Sandia National Laboratories, New Mexico (SNL/NM), February 1998. *Revised Site-Wide Hydrogeologic Characterization Project, 1995 Annual Report,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL May 1997 Sandia National Laboratories, New Mexico (SNL/NM), May 1997. *RCRA Facility Investigation Work Plan for Operable Unit 1332 Foothills Test Area,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL August 1996 Sandia National Laboratories, New Mexico (SNL/NM), August 1996. *Radiological Voluntary Corrective Measures VCM Soil Resampling for Envirocare Waste Profile,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL December 1995 Sandia National Laboratories, New Mexico (SNL/NM), December 1995. *Conceptual Geologic Model of the Sandia National Laboratories and Kirtland Air Force Base,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 1995 Sandia National Laboratories, New Mexico (SNL/NM), June 1995. *RCRA Facility Investigation Work Plan for Operable Unit 1332, Foothills Test Area,* Sandia National Laboratories, Environmental Restoration Project, Albuquerque, New Mexico.

SNL February 1995a Sandia National Laboratories, New Mexico (SNL/NM), February 1995. *Cultural Resource Investigation for Sandia National Laboratories/New Mexico Environmental Restoration Program, Kirtland Air Force Base, New Mexico, Volume 1 of 2,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL February 1995b Sandia National Laboratories, New Mexico (SNL/NM), February 1995. *Voluntary Corrective Measure Plan Environmental Restoration Site 8 Open Dump Coyote Canyon Blast Area,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 1994 Sandia National Laboratories, New Mexico (SNL/NM), September 1994. *Unexploded Ordnance/High Explosives (UXO/HE) Visual Survey of ER Sites Final Report,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL April 1994 Sandia National Laboratories, New Mexico (SNL/NM), April 1994. *Voluntary Corrective Measure Plan for Removal of Radioactive Surface Contamination at Environmental Restoration Sites,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL February 1992 Sandia National Laboratories, New Mexico (SNL/NM), February 1992. *Radioactive Material Management Areas (RMMA) – Boundary Determination,* Sandia National Laboratories, Albuquerque, New Mexico.

Young and Byrd 1994 Young, M., and C. Byrd, September 1994. *Unexploded Ordnance/High Explosives (UXO/HE) Visual Survey of ER Sites, Final Report,* Sandia National Laboratories, Albuquerque, New Mexico, September 1994.

WRCC-DRI 2012 Western Regional Climate Center - Desert Research Institute, 2012. *Historical Climate Information for National Weather Service Cooperative Network Station 290234 – Albuquerque, New Mexico, Weather Service Forecast Office at the Albuquerque International Sunport for the period of 1914 through 2005,* http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?nmalbu. Accessed February 20, 2012.

This page intentionally left blank.

Attachment 8A
Solid Waste Management Units 8/58
Analytical Results Tables

This page intentionally left blank.

Attachment 8A Tables

8A-1 Summary of Detected Volatile Organic, Semivolatile Organic, and High Explosive Compounds, Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 8A-5

8A-2 Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B), Solid Waste Management Units 8/58 Groundwater Investigation, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 8A-6

8A-3 Method Detection Limits for Semivolatile Organic Compounds (EPA Method[g] SW846-8270C), Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 8A-7

8A-4 Method Detection Limits for High Explosive Compounds (EPA Method[g] SW846-8321A), Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 8A-8

8A-5 Summary of Nitrate plus Nitrate Results, Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 8A-9

8A-6 Summary of Alkalinity, Anion, and Total Cyanide Results, Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 8A-10

8A-7 Summary of Perchlorate Results, Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 8A-13

8A-8 Summary of Target Analyte List Metals and Uranium Results, Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 8A-14

8A-9 Summary of Cation Results, Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 8A-26

8A-10 Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results, Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 8A-28

8A-11 Summary of Field Water Quality Measurements[h], Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 8A-32

Footnotes for Solid Waste Management Units 8/58 Analytical Results Tables 8A-33

This page intentionally left blank.

Table 8A-1
Summary of Detected Volatile Organic, Semivolatile Organic, and High Explosive Compounds, Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW1	Benzo(b)fluoranthene	0.442	0.316	1.05	NE	J		093341-002	SW846 8270C
16-Jan-13	Benzo(k)fluoranthene	0.411	0.316	1.05	NE	J		093341-002	SW846 8270C
CCBA-MW2	Benzo(a)pyrene	**0.640**	0.440	1.00	0.200	J		093336-002	SW846 8270C
15-Jan-13	Benzo(b)fluoranthene	0.640	0.300	1.00	NE	J		093336-002	SW846 8270C
	Benzo(k)fluoranthene	0.980	0.300	1.00	NE	J		093336-002	SW846 8270C

Refer to footnotes on page 8A-33.

Table 8A-2
Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B), Solid Waste Management Units 8/58 Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2013

Analyte	MDL[b] (µg/L)	Analyte	MDL[b] (µg/L)
1,1,1-Trichloroethane	0.300	Chlorobenzene	0.300
1,1,2,2-Tetrachloroethane	0.300	Chloroethane	0.300
1,1,2-Trichloroethane	0.300	Chloroform	0.300
1,1-Dichloroethane	0.300	Chloromethane	0.300
1,1-Dichloroethene	0.300	Cyclohexane	0.300
1,2,3-Trichlorobenzene	0.300	Dibromochloromethane	0.300
1,2,4-Trichlorobenzene	0.300	Dichlorodifluoromethane	0.300
1,2-Dibromo-3-chloropropane	0.300	Ethyl benzene	0.300
1,2-Dibromoethane	0.300	Isopropylbenzene	0.300
1,2-Dichlorobenzene	0.300	Methyl acetate	1.50
1,2-Dichloroethane	0.300	Methylcyclohexane	3.00
1,2-Dichloropropane	0.300	Methylene chloride	3.00
1,3-Dichlorobenzene	0.300	Styrene	0.300
1,4-Dichlorobenzene	0.300	Tert-butyl methyl ether	0.300
2,2-trifluoroethane, 1,1,2-Trichloro-1	1.50	Tetrachloroethene	0.300
2-Butanone	2.00	Toluene	0.300
2-Hexanone	2.20	Trichloroethene	0.300
4-methyl-, 2-Pentanone	1.50	Trichlorofluoromethane	0.300
Acetone	3.00	Vinyl chloride	0.300
Benzene	0.300	Xylene	0.300
Bromochloromethane	0.300	cis-1,2-Dichloroethene	0.300
Bromodichloromethane	0.300	cis-1,3-Dichloropropene	0.300
Bromoform	0.300	m-, p-Xylene	0.300
Bromomethane	0.300	o-Xylene	0.300
Carbon disulfide	1.50	trans-1,2-Dichloroethene	0.300
Carbon tetrachloride	0.300	trans-1,3-Dichloropropene	0.300

Refer to footnotes on page 8A-33.

Table 8A-3
Method Detection Limits for Semivolatile Organic Compounds (EPA Method[g] SW846-8270C), Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Analyte	MDL[b] (µg/L)	Analyte	MDL[b] (µg/L)
1'-Biphenyl 1	3.00 - 3.16	Butylbenzyl phthalate	3.00 - 3.16
1,2,4-Trichlorobenzene	3.00 - 3.16	Caprolactam	3.00 - 3.16
2,4,5-Trichlorophenol	3.00 - 3.16	Carbazole	0.300 - 0.316
1,4-Dioxane	3.00 - 3.16	Chrysene	0.300 - 0.316
2,4,6-Trichlorophenol	3.00 - 3.16	Di-n-butyl phthalate	3.00 - 3.16
2,4-Dichlorophenol	3.00 - 3.16	Di-n-octyl phthalate	3.00 - 3.16
2,4-Dimethylphenol	3.00 - 3.16	Dibenz[a,h]anthracene	0.300 - 0.316
2,4-Dinitrophenol	5.00 - 5.26	Dibenzofuran	3.00 - 3.16
2,4-Dinitrotoluene	3.00 - 3.16	Diethylphthalate	3.00 - 3.16
2,6-Dinitrotoluene	3.00 - 3.16	Dimethylphthalate	3.00 - 3.16
2-Chloronaphthalene	0.300 - 0.432	Dinitro-o-cresol	3.00 - 3.16
2-Chlorophenol	3.00 - 3.16	Diphenyl amine	3.00 - 3.16
2-Methylnaphthalene	0.300 - 0.316	Fluoranthene	0.300 - 0.316
2-Nitroaniline	3.00 - 3.16	Fluorene	0.300 - 0.316
2-Nitrophenol	3.00 - 3.16	Hexachlorobenzene	3.00 - 3.16
3,3'-Dichlorobenzidine	3.00 - 3.16	Hexachlorobutadiene	3.00 - 3.16
3-Nitroaniline	3.00 - 3.16	Hexachlorocyclopentadiene	3.00 - 3.16
4-Bromophenyl phenyl ether	3.00 - 3.16	Hexachloroethane	3.00 - 3.16
4-Chloro-3-methylphenol	3.00 - 3.16	Indeno(1,2,3-c,d)pyrene	0.300 - 0.316
4-Chlorobenzenamine	3.30 - 3.47	Isophorone	3.00 - 3.68
4-Chlorophenyl phenyl ether	3.00 - 3.16	Naphthalene	0.300 - 0.316
4-Nitroaniline	3.00 - 3.16	Nitro-benzene	3.00 - 3.16
4-Nitrophenol	3.00 - 3.16	Pentachlorophenol	3.00 - 3.16
Acenaphthene	0.300 - 0.316	Phenanthrene	0.300 - 0.316
Acenaphthylene	0.300 - 0.316	Phenol	3.00 - 3.16
Acetophenone	3.00 - 3.16	Pyrene	0.300 - 0.316
Anthracene	0.300 - 0.316	bis(2-Chloroethoxy)methane	3.00 - 3.16
Atrazine	3.00 - 3.16	bis(2-Chloroethyl)ether	3.00 - 3.16
Benzaldehyde	3.00 - 5.26	bis(2-Chloroisopropyl)ether	3.00 - 3.16
Benzo(a)anthracene	0.300 - 0.316	bis(2-Ethylhexyl)phthalate	3.00 - 3.16
Benzo(a)pyrene	0.300 - 0.463	m,p-Cresol	3.00 - 3.89
Benzo(b)fluoranthene	0.300 - 0.316	n-Nitrosodipropylamine	3.00 - 3.16
Benzo(ghi)perylene	0.300 - 0.316	o-Cresol	3.00 - 3.16
Benzo(k)fluoranthene	0.300 - 0.316		

Refer to footnotes on page 8A-33.

Table 8A-4
Method Detection Limits for High Explosive Compounds (EPA Method[g] SW846-8321A), Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Analyte	MDL[b] (µg/L)
1,3,5-Trinitrobenzene	0.0829 – 0.0879
1,3-Dinitrobenzene	0.0829 – 0.0879
2,4,6-Trinitrotoluene	0.0829 – 0.0879
2,4-Dinitrotoluene	0.0829 – 0.0879
2,6-Dinitrotoluene	0.0829 – 0.0879
2-Amino-4,6-dinitrotoluene	0.0829 – 0.0879
2-Nitrotoluene	0.0850 – 0.0901
3-Nitrotoluene	0.0829 – 0.0879
4-Amino-2,6-dinitrotoluene	0.0829 – 0.0879
4-Nitrotoluene	0.155 – 0.165
HMX	0.0829 – 0.0879
Nitro-benzene	0.0829 – 0.0879
Pentaerythritol tetranitrate	0.104 – 0.110
RDX	0.0829 – 0.0879
Tetryl	0.0829 – 0.0879

Refer to footnotes on page 8A-33.

Table 8A-5
Summary of Nitrate plus Nitrate Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW1 16-Jan-13	Nitrate plus nitrite	1.49	0.085	0.250	10.0			093341-018	EPA 353.2
CCBA-MW1 (Duplicate) 16-Jan-13	Nitrate plus nitrite	1.50	0.085	0.250	10.0			093342-018	EPA 353.2
CCBA-MW2 15-Jan-13	Nitrate plus nitrite	3.27	0.170	0.500	10.0			093336-018	EPA 353.2
CCBA-MW1 24-Apr-13	Nitrate plus nitrite	1.43	0.085	0.250	10.0			093873-018	EPA 353.2
CCBA-MW2 25-Apr-13	Nitrate plus nitrite	3.47	0.170	0.500	10.0			093878-018	EPA 353.2
CCBA-MW2 (Duplicate) 25-Apr-13	Nitrate plus nitrite	3.28	0.170	0.500	10.0			093879-018	EPA 353.2
CCBA-MW1 16-Jul-13	Nitrate plus nitrite as N	1.57	0.085	0.250	10.0			094376-018	EPA 353.2
CCBA-MW1 (Duplicate) 16-Jul-13	Nitrate plus nitrite as N	1.63	0.085	0.250	10.0			094377-018	EPA 353.2
CCBA-MW2 15-Jul-13	Nitrate plus nitrite as N	3.62	0.085	0.250	10.0			094371-018	EPA 353.2
CCBA-MW1 10-Oct-13	Nitrate plus nitrite as N	1.70	0.170	0.500	10.0			094774-018	EPA 353.2
CCBA-MW2 14-Oct-13	Nitrate plus nitrite as N	3.35	0.170	0.500	10.0			094779-018	EPA 353.2
CCBA-MW2 (Duplicate) 14-Oct-13	Nitrate plus nitrite as N	3.31	0.170	0.500	10.0			094780-018	EPA 353.2

Refer to footnotes on page 8A-33.

Table 8A-6
Summary of Alkalinity, Anion, and Total Cyanide Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW1	Bicarbonate Alkalinity	185	0.725	1.00	NE			093341-022	SM2320B
16-Jan-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093341-022	SM2320B
	Bromide	0.284	0.067	0.200	NE			093341-016	SW846 9056
	Chloride	29.5	0.134	0.400	NE			093341-016	SW846 9056
	Fluoride	**4.97**	0.033	0.100	4.0			093341-016	SW846 9056
	Sulfate	56.6	0.266	0.800	NE			093341-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	093341-027	SW846 9012
CCBA-MW1 (Duplicate)	Bicarbonate Alkalinity	183	0.725	1.00	NE			093342-022	SM2320B
16-Jan-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093342-022	SM2320B
	Bromide	0.285	0.067	0.200	NE			093342-016	SW846 9056
	Chloride	29.5	0.134	0.400	NE			093342-016	SW846 9056
	Fluoride	**5.00**	0.033	0.100	4.0			093342-016	SW846 9056
	Sulfate	56.7	0.266	0.800	NE			093342-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	093342-027	SW846 9012
CCBA-MW2	Bicarbonate Alkalinity	180	0.725	1.00	NE			093336-022	SM2320B
15-Jan-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093336-022	SM2320B
	Bromide	0.508	0.067	0.200	NE			093336-016	SW846 9056
	Chloride	37.1	0.335	1.00	NE			093336-016	SW846 9056
	Fluoride	1.52	0.033	0.100	4.0			093336-016	SW846 9056
	Sulfate	95.3	0.665	2.00	NE			093336-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	093336-027	SW846 9012
CCBA-MW1	Bicarbonate Alkalinity	200	0.725	1.00	NE			093873-022	SM2320B
24-Apr-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093873-022	SM2320B
	Bromide	0.350	0.067	0.200	NE			093873-016	SW846 9056
	Chloride	28.1	0.670	2.00	NE			093873-016	SW846 9056
	Fluoride	**4.57**	0.330	1.00	4.0			093873-016	SW846 9056
	Sulfate	56.7	1.33	4.00	NE			093873-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	093873-027	SW846 9012

Refer to footnotes on page 8A-33.

Table 8A-6 *(Continued)*
Summary of Alkalinity, Anion, and Total Cyanide Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW2	Bicarbonate Alkalinity	179	0.725	1.00	NE			093878-022	SM2320B
25-Apr-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093878-022	SM2320B
	Bromide	0.582	0.067	0.200	NE			093878-016	SW846 9056
	Chloride	38.3	0.670	2.00	NE			093878-016	SW846 9056
	Fluoride	1.60	0.033	0.100	4.0			093878-016	SW846 9056
	Sulfate	99.5	1.33	4.00	NE			093878-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	093878-027	SW846 9012
CCBA-MW2 (Duplicate)	Bicarbonate Alkalinity	193	0.725	1.00	NE			093879-022	SM2320B
25-Apr-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093879-022	SM2320B
	Bromide	0.573	0.067	0.200	NE			093879-016	SW846 9056
	Chloride	39.0	0.670	2.00	NE			093879-016	SW846 9056
	Fluoride	1.60	0.033	0.100	4.0			093879-016	SW846 9056
	Sulfate	98.6	1.33	4.00	NE			093879-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	093879-027	SW846 9012
CCBA-MW1	Bicarbonate Alkalinity	187	0.725	1.00	NE			094376-022	SM2320B
16-Jul-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094376-022	SM2320B
	Bromide	0.329	0.067	0.200	NE			094376-016	SW846 9056
	Chloride	28.4	0.335	1.00	NE			094376-016	SW846 9056
	Fluoride	**4.78**	0.165	0.500	4.0			094376-016	SW846 9056
	Sulfate	56.2	0.665	2.00	NE			094376-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	094376-027	SW846 9012
CCBA-MW1 (Duplicate)	Bicarbonate Alkalinity	187	0.725	1.00	NE			094377-022	SM2320B
16-Jul-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094377-022	SM2320B
	Bromide	0.329	0.067	0.200	NE			094377-016	SW846 9056
	Chloride	28.5	0.335	1.00	NE			094377-016	SW846 9056
	Fluoride	**4.82**	0.165	0.500	4.0			094377-016	SW846 9056
	Sulfate	56.4	0.665	2.00	NE			094377-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	094377-027	SW846 9012

Refer to footnotes on page 8A-33.

Table 8A-6 *(Concluded)*
Summary of Alkalinity, Anion, and Total Cyanide Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW2	Bicarbonate Alkalinity	181	0.725	1.00	NE	B		094371-022	SM2320B
15-Jul-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094371-022	SM2320B
	Bromide	0.566	0.067	0.200	NE			094371-016	SW846 9056
	Chloride	36.6	0.670	2.00	NE			094371-016	SW846 9056
	Fluoride	1.61	0.033	0.100	4.0			094371-016	SW846 9056
	Sulfate	93.6	1.33	4.00	NE			094371-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	094371-027	SW846 9012
CCBA-MW1	Bicarbonate Alkalinity	182	0.725	1.00	NE			094774-022	SM2320B
10-Oct-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094774-022	SM2320B
	Bromide	0.347	0.067	0.200	NE			094774-016	SW846 9056
	Chloride	29.3	0.335	1.00	NE			094774-016	SW846 9056
	Fluoride	**4.93**	0.066	0.200	4.0			094774-016	SW846 9056
	Sulfate	57.9	0.665	2.00	NE			094774-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	094774-027	SW846 9012
CCBA-MW2	Bicarbonate Alkalinity	181	0.725	1.00	NE	B		094779-022	SM2320B
14-Oct-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094779-022	SM2320B
	Bromide	0.559	0.067	0.200	NE			094779-016	SW846 9056
	Chloride	36.9	0.670	2.00	NE			094779-016	SW846 9056
	Fluoride	1.52	0.033	0.100	4.0			094779-016	SW846 9056
	Sulfate	94.7	1.33	4.00	NE			094779-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	094779-027	SW846 9012
CCBA-MW2 (Duplicate)	Bicarbonate Alkalinity	181	0.725	1.00	NE	B		094780-022	SM2320B
14-Oct-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094780-022	SM2320B
	Bromide	0.560	0.067	0.200	NE			094780-016	SW846 9056
	Chloride	37.1	0.670	2.00	NE			094780-016	SW846 9056
	Fluoride	1.52	0.033	0.100	4.0			094780-016	SW846 9056
	Sulfate	96.3	1.33	4.00	NE			094780-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	094780-027	SW846 9012

Refer to footnotes on page 8A-33.

Table 8A-7
Summary of Perchlorate Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Perchlorate Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW1 16-Jan-13	ND	0.004	0.012	NE	U		093341-020	EPA 314.0
CCBA-MW1 (Duplicate) 16-Jan-13	ND	0.004	0.012	NE	U		093342-020	EPA 314.0
CCBA-MW2 15-Jan-13	ND	0.004	0.012	NE	U		093336-020	EPA 314.0
CCBA-MW1 24-Apr-13	ND	0.004	0.012	NE	U		093873-020	EPA 314.0
CCBA-MW2 25-Apr-13	ND	0.004	0.012	NE	U		093878-020	EPA 314.0
CCBA-MW2 (Duplicate) 25-Apr-13	ND	0.004	0.012	NE	U		093879-020	EPA 314.0
CCBA-MW1 16-Jul-13	ND	0.004	0.012	NE	U		094376-020	EPA 314.0
CCBA-MW1 (Duplicate) 16-Jul-13	ND	0.004	0.012	NE	U		094377-020	EPA 314.0
CCBA-MW2 15-Jul-13	ND	0.004	0.012	NE	U		094371-020	EPA 314.0
CCBA-MW1 10-Oct-13	ND	0.004	0.012	NE	U		094774-020	EPA 314.0
CCBA-MW2 14-Oct-13	ND	0.004	0.012	NE	U		094779-020	EPA 314.0
CCBA-MW2 (Duplicate) 14-Oct-13	ND	0.004	0.012	NE	U		094780-020	EPA 314.0

Refer to footnotes on page 8A-33.

Table 8A-8
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW1	Aluminum	0.0771	0.015	0.050	NE		J+	093341-009	SW846 6020
16-Jan-13	Antimony	ND	0.001	0.003	0.006	U		093341-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093341-009	SW846 6020
	Barium	0.00268	0.0006	0.002	2.00		J	093341-009	SW846 6020
	Beryllium	0.000406	0.0002	0.0005	0.004	J		093341-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093341-009	SW846 6020
	Calcium	41.9	0.060	0.200	NE			093341-009	SW846 6020
	Chromium	0.00237	0.002	0.010	0.100	B, J	0.015U	093341-009	SW846 6020
	Cobalt	0.000152	0.0001	0.001	NE	J		093341-009	SW846 6020
	Copper	0.000581	0.00035	0.001	NE	B, J	0.0025U	093341-009	SW846 6020
	Iron	0.156	0.033	0.100	NE			093341-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093341-009	SW846 6020
	Magnesium	8.93	0.010	0.030	NE		J	093341-009	SW846 6020
	Manganese	0.00421	0.001	0.005	NE	J		093341-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093341-009	SW846 7470
	Nickel	0.00201	0.0005	0.002	NE			093341-009	SW846 6020
	Potassium	3.78	0.080	0.300	NE			093341-009	SW846 6020
	Selenium	0.00224	0.0015	0.005	0.050	J		093341-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093341-009	SW846 6020
	Sodium	66.8	0.400	1.25	NE		J	093341-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093341-009	SW846 6020
	Uranium	0.0021	0.000067	0.0002	0.03			093341-009	SW846 6020
	Vanadium	0.00106	0.001	0.005	NE	J		093341-009	SW846 6010
	Zinc	0.00485	0.0035	0.010	NE	J		093341-009	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW1 (Duplicate)	Aluminum	0.0351	0.015	0.050	NE	J	J+	093342-009	SW846 6020
16-Jan-13	Antimony	ND	0.001	0.003	0.006	U		093342-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093342-009	SW846 6020
	Barium	0.00253	0.0006	0.002	2.00		J	093342-009	SW846 6020
	Beryllium	0.00047	0.0002	0.0005	0.004	J		093342-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093342-009	SW846 6020
	Calcium	41.3	0.060	0.200	NE			093342-009	SW846 6020
	Chromium	0.00268	0.002	0.010	0.100	B, J	0.015U	093342-009	SW846 6020
	Cobalt	0.000141	0.0001	0.001	NE	J		093342-009	SW846 6020
	Copper	0.000496	0.00035	0.001	NE	B, J	0.0025U	093342-009	SW846 6020
	Iron	0.159	0.033	0.100	NE			093342-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093342-009	SW846 6020
	Magnesium	9.45	0.010	0.030	NE		J	093342-009	SW846 6020
	Manganese	0.00401	0.001	0.005	NE	J		093342-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093342-009	SW846 7470
	Nickel	0.00188	0.0005	0.002	NE	J		093342-009	SW846 6020
	Potassium	3.75	0.080	0.300	NE			093342-009	SW846 6020
	Selenium	0.00229	0.0015	0.005	0.050	J		093342-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093342-009	SW846 6020
	Sodium	61.7	0.400	1.25	NE		J	093342-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093342-009	SW846 6020
	Uranium	0.00201	0.000067	0.0002	0.03			093342-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		093342-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093342-009	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW2	Aluminum	0.0224	0.015	0.050	NE	J	J+	093336-009	SW846 6020
15-Jan-13	Antimony	ND	0.001	0.003	0.006	U		093336-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093336-009	SW846 6020
	Barium	0.0413	0.0006	0.002	2.00		J	093336-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093336-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093336-009	SW846 6020
	Calcium	75.4	0.300	1.00	NE			093336-009	SW846 6020
	Chromium	0.00274	0.002	0.010	0.100	B, J	0.015U	093336-009	SW846 6020
	Cobalt	0.000171	0.0001	0.001	NE	J		093336-009	SW846 6020
	Copper	0.000881	0.00035	0.001	NE	B, J	0.0025U	093336-009	SW846 6020
	Iron	0.244	0.033	0.100	NE			093336-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093336-009	SW846 6020
	Magnesium	13.8	0.010	0.030	NE		J	093336-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093336-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093336-009	SW846 7470
	Nickel	0.00269	0.0005	0.002	NE			093336-009	SW846 6020
	Potassium	1.21	0.080	0.300	NE			093336-009	SW846 6020
	Selenium	0.00433	0.0015	0.005	0.050	J		093336-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093336-009	SW846 6020
	Sodium	43.2	0.080	0.250	NE		J	093336-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093336-009	SW846 6020
	Uranium	0.00533	0.000067	0.0002	0.03			093336-009	SW846 6020
	Vanadium	0.00988	0.001	0.005	NE			093336-009	SW846 6010
	Zinc	0.00366	0.0035	0.010	NE	J		093336-009	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW1	Aluminum	0.0609	0.015	0.050	NE			093873-009	SW846 6020
24-Apr-13	Antimony	ND	0.001	0.003	0.006	U		093873-009	SW846 6020
	Arsenic	0.00183	0.0017	0.005	0.010	J		093873-009	SW846 6020
	Barium	0.00253	0.0006	0.002	2.00			093873-009	SW846 6020
	Beryllium	0.000506	0.0002	0.0005	0.004			093873-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093873-009	SW846 6020
	Calcium	48.0	0.600	2.00	NE	B, N		093873-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093873-009	SW846 6020
	Cobalt	0.000142	0.0001	0.001	NE	B, J	0.00053U	093873-009	SW846 6020
	Copper	0.000771	0.00035	0.001	NE	J		093873-009	SW846 6020
	Iron	0.123	0.033	0.100	NE			093873-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093873-009	SW846 6020
	Magnesium	11.4	0.010	0.030	NE			093873-009	SW846 6020
	Manganese	0.00454	0.001	0.005	NE	J		093873-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093873-009	SW846 7470
	Nickel	0.00143	0.0005	0.002	NE	J		093873-009	SW846 6020
	Potassium	4.43	0.080	0.300	NE			093873-009	SW846 6020
	Selenium	0.00252	0.0015	0.005	0.050	J		093873-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093873-009	SW846 6020
	Sodium	66.2	0.800	2.50	NE	N		093873-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093873-009	SW846 6020
	Uranium	0.0024	0.000067	0.0002	0.03	B		093873-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U	UJ	093873-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093873-009	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW2	Aluminum	ND	0.015	0.050	NE	U		093878-009	SW846 6020
25-Apr-13	Antimony	ND	0.001	0.003	0.006	U		093878-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093878-009	SW846 6020
	Barium	0.0445	0.0006	0.002	2.00			093878-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093878-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093878-009	SW846 6020
	Calcium	79.8	0.600	2.00	NE	B, N		093878-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093878-009	SW846 6020
	Cobalt	0.000124	0.0001	0.001	NE	B, J	0.00053U	093878-009	SW846 6020
	Copper	0.000652	0.00035	0.001	NE	J	0.0097UJ	093878-009	SW846 6020
	Iron	0.137	0.033	0.100	NE			093878-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093878-009	SW846 6020
	Magnesium	15.9	0.010	0.030	NE			093878-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093878-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093878-009	SW846 7470
	Nickel	0.00192	0.0005	0.002	NE	J		093878-009	SW846 6020
	Potassium	1.43	0.080	0.300	NE			093878-009	SW846 6020
	Selenium	0.00436	0.0015	0.005	0.050	J		093878-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093878-009	SW846 6020
	Sodium	52.0	0.800	2.50	NE	N		093878-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093878-009	SW846 6020
	Uranium	0.00571	0.000067	0.0002	0.03	B		093878-009	SW846 6020
	Vanadium	0.00846	0.001	0.005	NE			093878-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093878-009	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW2 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		093879-009	SW846 6020
25-Apr-13	Antimony	ND	0.001	0.003	0.006	U		093879-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093879-009	SW846 6020
	Barium	0.0452	0.0006	0.002	2.00			093879-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093879-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093879-009	SW846 6020
	Calcium	76.2	0.600	2.00	NE	B, N		093879-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093879-009	SW846 6020
	Cobalt	0.000126	0.0001	0.001	NE	B, J	0.00053U	093879-009	SW846 6020
	Copper	0.000663	0.00035	0.001	NE	J	0.0097UJ	093879-009	SW846 6020
	Iron	0.139	0.033	0.100	NE			093879-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093879-009	SW846 6020
	Magnesium	16.7	0.010	0.030	NE			093879-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093879-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093879-009	SW846 7470
	Nickel	0.00198	0.0005	0.002	NE	J		093879-009	SW846 6020
	Potassium	1.44	0.080	0.300	NE			093879-009	SW846 6020
	Selenium	0.00445	0.0015	0.005	0.050	J		093879-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093879-009	SW846 6020
	Sodium	48.5	0.800	2.50	NE	N		093879-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093879-009	SW846 6020
	Uranium	0.0057	0.000067	0.0002	0.03	B		093879-009	SW846 6020
	Vanadium	0.00892	0.001	0.005	NE			093879-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093879-009	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW1	Aluminum	0.0195	0.015	0.050	NE	J		094376-009	SW846 6020
16-Jul-13	Antimony	ND	0.001	0.003	0.006	U		094376-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094376-009	SW846 6020
	Barium	0.00271	0.0006	0.002	2.00			094376-009	SW846 6020
	Beryllium	0.000411	0.0002	0.0005	0.004	J		094376-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094376-009	SW846 6020
	Calcium	48.7	0.060	0.200	NE			094376-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094376-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		094376-009	SW846 6020
	Copper	0.000351	0.00035	0.001	NE	J	0.0047U	094376-009	SW846 6020
	Iron	0.0927	0.033	0.100	NE	J		094376-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094376-009	SW846 6020
	Magnesium	10.2	0.010	0.030	NE			094376-009	SW846 6020
	Manganese	0.00328	0.001	0.005	NE	J		094376-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094376-009	SW846 7470
	Nickel	0.00068	0.0005	0.002	NE	J		094376-009	SW846 6020
	Potassium	4.16	0.080	0.300	NE			094376-009	SW846 6020
	Selenium	0.00241	0.0015	0.005	0.050	J		094376-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094376-009	SW846 6020
	Sodium	57.2	0.400	1.25	NE			094376-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094376-009	SW846 6020
	Uranium	0.00219	0.000067	0.0002	0.03			094376-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U	UJ	094376-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094376-009	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW1 (Duplicate)	Aluminum	0.019	0.015	0.050	NE	J		094377-009	SW846 6020
16-Jul-13	Antimony	ND	0.001	0.003	0.006	U		094377-009	SW846 6020
	Arsenic	0.00198	0.0017	0.005	0.010	J		094377-009	SW846 6020
	Barium	0.00256	0.0006	0.002	2.00			094377-009	SW846 6020
	Beryllium	0.000456	0.0002	0.0005	0.004	J		094377-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094377-009	SW846 6020
	Calcium	45.9	0.060	0.200	NE			094377-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094377-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		094377-009	SW846 6020
	Copper	0.000384	0.00035	0.001	NE	J	0.0047U	094377-009	SW846 6020
	Iron	0.0759	0.033	0.100	NE	J		094377-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094377-009	SW846 6020
	Magnesium	10.7	0.010	0.030	NE			094377-009	SW846 6020
	Manganese	0.00341	0.001	0.005	NE	J		094377-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094377-009	SW846 7470
	Nickel	0.000571	0.0005	0.002	NE	J		094377-009	SW846 6020
	Potassium	3.74	0.080	0.300	NE			094377-009	SW846 6020
	Selenium	0.0022	0.0015	0.005	0.050	J		094377-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094377-009	SW846 6020
	Sodium	56.3	0.400	1.25	NE			094377-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094377-009	SW846 6020
	Uranium	0.00209	0.000067	0.0002	0.03			094377-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U	UJ	094377-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094377-009	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW2	Aluminum	ND	0.015	0.050	NE	U		094371-009	SW846 6020
15-Jul-13	Antimony	ND	0.001	0.003	0.006	U		094371-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094371-009	SW846 6020
	Barium	0.0478	0.0006	0.002	2.00			094371-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094371-009	SW846 6020
	Cadmium	0.000131	0.00011	0.001	0.005	J		094371-009	SW846 6020
	Calcium	73.2	0.300	1.00	NE			094371-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094371-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		094371-009	SW846 6020
	Copper	0.000935	0.00035	0.001	NE	J		094371-009	SW846 6020
	Iron	0.101	0.033	0.100	NE			094371-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094371-009	SW846 6020
	Magnesium	15.1	0.010	0.030	NE			094371-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		094371-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094371-009	SW846 7470
	Nickel	0.000641	0.0005	0.002	NE	J		094371-009	SW846 6020
	Potassium	1.34	0.080	0.300	NE			094371-009	SW846 6020
	Selenium	0.00447	0.0015	0.005	0.050	J		094371-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094371-009	SW846 6020
	Sodium	45.2	0.080	0.250	NE			094371-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094371-009	SW846 6020
	Uranium	0.00532	0.000067	0.0002	0.03			094371-009	SW846 6020
	Vanadium	0.00895	0.001	0.005	NE			094371-009	SW846 6010
	Zinc	0.00448	0.0035	0.010	NE	J		094371-009	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW1	Aluminum	0.0312	0.015	0.050	NE	J		094774-009	SW846 6020
10-Oct-13	Antimony	ND	0.001	0.003	0.006	U		094774-009	SW846 6020
	Arsenic	0.00205	0.0017	0.005	0.010	J		094774-009	SW846 6020
	Barium	0.00268	0.0006	0.002	2.00			094774-009	SW846 6020
	Beryllium	0.000422	0.0002	0.0005	0.004	J		094774-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094774-009	SW846 6020
	Calcium	47.7	0.600	2.00	NE			094774-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094774-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		094774-009	SW846 6020
	Copper	0.000668	0.00035	0.001	NE	J		094774-009	SW846 6020
	Iron	0.0619	0.033	0.100	NE	J		094774-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094774-009	SW846 6020
	Magnesium	9.70	0.010	0.030	NE			094774-009	SW846 6020
	Manganese	0.00318	0.001	0.005	NE	J		094774-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094774-009	SW846 7470
	Nickel	0.000974	0.0005	0.002	NE	J		094774-009	SW846 6020
	Potassium	3.97	0.080	0.300	NE			094774-009	SW846 6020
	Selenium	0.00248	0.0015	0.005	0.050	J		094774-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094774-009	SW846 6020
	Sodium	63.0	0.800	2.50	NE			094774-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094774-009	SW846 6020
	Uranium	0.00203	0.000067	0.0002	0.03			094774-009	SW846 6020
	Vanadium	0.00105	0.001	0.005	NE	J		094774-009	SW846 6010
	Zinc	0.00375	0.0035	0.010	NE	J		094774-009	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW2	Aluminum	ND	0.015	0.050	NE	U		094779-009	SW846 6020
14-Oct-13	Antimony	ND	0.001	0.003	0.006	U		094779-009	SW846 6020
	Arsenic	0.00246	0.0017	0.005	0.010	J		094779-009	SW846 6020
	Barium	0.0446	0.0006	0.002	2.00			094779-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094779-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094779-009	SW846 6020
	Calcium	73.8	0.600	2.00	NE			094779-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094779-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		094779-009	SW846 6020
	Copper	0.000518	0.00035	0.001	NE	J		094779-009	SW846 6020
	Iron	0.0882	0.033	0.100	NE	J		094779-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094779-009	SW846 6020
	Magnesium	14.4	0.010	0.030	NE			094779-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		094779-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094779-009	SW846 7470
	Nickel	0.00104	0.0005	0.002	NE	J		094779-009	SW846 6020
	Potassium	1.18	0.080	0.300	NE			094779-009	SW846 6020
	Selenium	0.00467	0.0015	0.005	0.050	J		094779-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094779-009	SW846 6020
	Sodium	43.6	0.080	0.250	NE			094779-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094779-009	SW846 6020
	Uranium	0.00486	0.000067	0.0002	0.03			094779-009	SW846 6020
	Vanadium	0.0102	0.001	0.005	NE			094779-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094779-009	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-8 *(Concluded)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW2 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		094780-009	SW846 6020
14-Oct-13	Antimony	ND	0.001	0.003	0.006	U		094780-009	SW846 6020
	Arsenic	0.00259	0.0017	0.005	0.010	J		094780-009	SW846 6020
	Barium	0.0461	0.0006	0.002	2.00			094780-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094780-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094780-009	SW846 6020
	Calcium	76.6	0.600	2.00	NE			094780-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094780-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		094780-009	SW846 6020
	Copper	0.000721	0.00035	0.001	NE	J		094780-009	SW846 6020
	Iron	0.0953	0.033	0.100	NE	J		094780-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094780-009	SW846 6020
	Magnesium	15.3	0.010	0.030	NE			094780-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		094780-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094780-009	SW846 7470
	Nickel	0.00111	0.0005	0.002	NE	J		094780-009	SW846 6020
	Potassium	1.28	0.080	0.300	NE			094780-009	SW846 6020
	Selenium	0.00468	0.0015	0.005	0.050	J		094780-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094780-009	SW846 6020
	Sodium	47.2	0.080	0.250	NE			094780-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094780-009	SW846 6020
	Uranium	0.00515	0.000067	0.0002	0.03			094780-009	SW846 6020
	Vanadium	0.00983	0.001	0.005	NE			094780-009	SW846 6010
	Zinc	0.00377	0.0035	0.010	NE	J		094780-009	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-9
Summary of Cation Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW1	Calcium	49.8	0.060	0.200	NE	B		093341-017	SW846 6020
16-Jan-13	Magnesium	11.3	0.010	0.030	NE			093341-017	SW846 6020
	Potassium	4.84	0.080	0.300	NE			093341-017	SW846 6020
	Sodium	72.5	0.400	1.25	NE			093341-017	SW846 6020
CCBA-MW1 (Duplicate)	Calcium	49.6	0.300	1.00	NE	B		093342-017	SW846 6020
16-Jan-13	Magnesium	11.4	0.010	0.030	NE			093342-017	SW846 6020
	Potassium	4.84	0.080	0.300	NE			093342-017	SW846 6020
	Sodium	68.8	0.400	1.25	NE			093342-017	SW846 6020
CCBA-MW2	Calcium	81.8	0.300	1.00	NE	B		093336-017	SW846 6020
15-Jan-13	Magnesium	17.3	0.010	0.030	NE			093336-017	SW846 6020
	Potassium	1.54	0.080	0.300	NE			093336-017	SW846 6020
	Sodium	53.1	0.400	1.25	NE			093336-017	SW846 6020
CCBA-MW1	Calcium	50.1	0.600	2.00	NE	B, N		093873-017	SW846 6020
24-Apr-13	Magnesium	10.6	0.010	0.030	NE			093873-017	SW846 6020
	Potassium	4.32	0.080	0.300	NE			093873-017	SW846 6020
	Sodium	66.4	0.800	2.50	NE	N		093873-017	SW846 6020
CCBA-MW2	Calcium	77.8	0.600	2.00	NE	B, N		093878-017	SW846 6020
25-Apr-13	Magnesium	15.1	0.010	0.030	NE			093878-017	SW846 6020
	Potassium	1.42	0.080	0.300	NE			093878-017	SW846 6020
	Sodium	50.0	0.800	2.50	NE	N		093878-017	SW846 6020
CCBA-MW2 (Duplicate)	Calcium	76.2	0.600	2.00	NE	B, N		093879-017	SW846 6020
25-Apr-13	Magnesium	16.3	0.010	0.030	NE			093879-017	SW846 6020
	Potassium	1.44	0.080	0.300	NE			093879-017	SW846 6020
	Sodium	49.4	0.800	2.50	NE	N		093879-017	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-9 *(Concluded)*
Summary of Cation Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW1	Calcium	46.3	0.060	0.200	NE			094376-017	SW846 6020
16-Jul-13	Magnesium	10.3	0.010	0.030	NE			094376-017	SW846 6020
	Potassium	4.43	0.080	0.300	NE			094376-017	SW846 6020
	Sodium	61.8	0.400	1.25	NE			094376-017	SW846 6020
CCBA-MW1 (Duplicate)	Calcium	48.9	0.060	0.200	NE			094377-017	SW846 6020
16-Jul-13	Magnesium	11.0	0.010	0.030	NE			094377-017	SW846 6020
	Potassium	4.45	0.080	0.300	NE			094377-017	SW846 6020
	Sodium	60.6	0.400	1.25	NE			094377-017	SW846 6020
CCBA-MW2	Calcium	69.9	0.300	1.00	NE			094371-017	SW846 6020
15-Jul-13	Magnesium	15.5	0.010	0.030	NE			094371-017	SW846 6020
	Potassium	1.42	0.080	0.300	NE			094371-017	SW846 6020
	Sodium	43.7	0.080	0.250	NE			094371-017	SW846 6020
CCBA-MW1	Calcium	46.5	0.600	2.00	NE			094774-017	SW846 6020
10-Oct-13	Magnesium	10.2	0.010	0.030	NE			094774-017	SW846 6020
	Potassium	4.25	0.080	0.300	NE			094774-017	SW846 6020
	Sodium	65.6	0.800	2.50	NE			094774-017	SW846 6020
CCBA-MW2	Calcium	77.0	0.600	2.00	NE			094779-017	SW846 6020
14-Oct-13	Magnesium	15.1	0.010	0.030	NE			094779-017	SW846 6020
	Potassium	1.27	0.080	0.300	NE			094779-017	SW846 6020
	Sodium	45.7	0.080	0.250	NE			094779-017	SW846 6020
CCBA-MW2 (Duplicate)	Calcium	74.0	0.600	2.00	NE			094780-017	SW846 6020
14-Oct-13	Magnesium	14.1	0.010	0.030	NE			094780-017	SW846 6020
	Potassium	1.16	0.080	0.300	NE			094780-017	SW846 6020
	Sodium	42.2	0.080	0.250	NE			094780-017	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-10
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results, Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW1	Americium-241	10.8 ± 11.7	17.0	8.30	NE	U	BD	093341-033	EPA 901.1
16-Jan-13	Cesium-137	1.20 ± 4.12	2.92	1.41	NE	U	BD	093341-033	EPA 901.1
	Cobalt-60	-0.119 ± 1.79	3.15	1.49	NE	U	BD	093341-033	EPA 901.1
	Potassium-40	-6.29 ± 36.0	42.2	20.3	NE	U	BD	093341-033	EPA 901.1
	Gross Alpha	2.09	NA	NA	15 pCi/L	NA	None	093341-034	EPA 900.0
	Gross Beta	7.85 ± 1.80	1.80	0.873	4mrem/yr		J	093341-034	EPA 900.0
	Uranium-233/234	1.86 ± 0.332	0.158	0.0702	NE			093341-035	HASL-300
	Uranium-235/236	0.0314 ± 0.0489	0.0889	0.0338	NE	U	BD	093341-035	HASL-300
	Uranium-238	0.630 ± 0.155	0.0658	0.0243	NE			093341-035	HASL-300
CCBA-MW1 (Duplicate)	Americium-241	-3.53 ± 13.5	20.1	9.85	NE	U	BD	093342-033	EPA 901.1
16-Jan-13	Cesium-137	0.0224 ± 2.21	3.85	1.85	NE	U	BD	093342-033	EPA 901.1
	Cobalt-60	-0.0698 ± 2.21	3.90	1.84	NE	U	BD	093342-033	EPA 901.1
	Potassium-40	-7.69 ± 46.7	51.8	24.7	NE	U	BD	093342-033	EPA 901.1
	Gross Alpha	0.98	NA	NA	15 pCi/L	NA	None	093342-034	EPA 900.0
	Gross Beta	6.89 ± 1.67	1.81	0.880	4mrem/yr		J	093342-034	EPA 900.0
	Uranium-233/234	1.72 ± 0.314	0.160	0.0714	NE			093342-035	HASL-300
	Uranium-235/236	-0.024 ± 0.052	0.0905	0.0344	NE	U	BD	093342-035	HASL-300
	Uranium-238	0.667 ± 0.158	0.067	0.0247	NE			093342-035	HASL-300
CCBA-MW2	Americium-241	0.904 ± 7.09	10.4	5.09	NE	U	BD	093336-033	EPA 901.1
15-Jan-13	Cesium-137	-0.97 ± 2.21	3.08	1.49	NE	U	BD	093336-033	EPA 901.1
	Cobalt-60	0.836 ± 1.73	3.12	1.48	NE	U	BD	093336-033	EPA 901.1
	Potassium-40	-19 ± 34.4	44.3	21.4	NE	U	BD	093336-033	EPA 901.1
	Gross Alpha	0.15	NA	NA	15 pCi/L	NA	None	093336-034	EPA 900.0
	Gross Beta	5.00 ± 1.97	2.81	1.37	4mrem/yr		J	093336-034	EPA 900.0
	Uranium-233/234	7.02 ± 0.969	0.132	0.0586	NE			093336-035	HASL-300
	Uranium-235/236	0.151 ± 0.0671	0.0742	0.0282	NE		J	093336-035	HASL-300
	Uranium-238	1.70 ± 0.286	0.055	0.0203	NE			093336-035	HASL-300

Refer to footnotes on page 8A-33.

Table 8A-10 *(Continued)*
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW1	Americium-241	9.60 ± 11.3	16.3	8.03	NE	U	BD	093873-033	EPA 901.1
24-Apr-13	Cesium-137	1.10 ± 2.09	3.11	1.50	NE	U	BD	093873-033	EPA 901.1
	Cobalt-60	-1.13 ± 2.90	3.43	1.63	NE	U	BD	093873-033	EPA 901.1
	Potassium-40	-8.14 ± 33.2	42.7	20.3	NE	U	BD	093873-033	EPA 901.1
	Gross Alpha	2.11	NA	NA	15 pCi/L	NA	None	093873-034	EPA 900.0
	Gross Beta	4.68 ± 1.33	1.62	0.788	4mrem/yr		J	093873-034	EPA 900.0
	Uranium-233/234	2.21 ± 0.385	0.179	0.0794	NE			093873-035	HASL-300
	Uranium-235/236	0.0721 ± 0.0566	0.110	0.0426	NE	U	BD	093873-035	HASL-300
	Uranium-238	0.663 ± 0.166	0.100	0.0402	NE			093873-035	HASL-300
CCBA-MW2	Americium-241	-1.55 ± 17.3	26.2	12.8	NE	U	BD	093878-033	EPA 901.1
25-Apr-13	Cesium-137	0.876 ± 1.99	3.13	1.50	NE	U	BD	093878-033	EPA 901.1
	Cobalt-60	-0.74 ± 2.87	3.20	1.50	NE	U	BD	093878-033	EPA 901.1
	Potassium-40	-22.7 ± 33.0	42.0	20.0	NE	U	BD	093878-033	EPA 901.1
	Gross Alpha	1.44	NA	NA	15 pCi/L	NA	None	093878-034	EPA 900.0
	Gross Beta	4.72 ± 1.24	1.37	0.663	4mrem/yr		J	093878-034	EPA 900.0
	Uranium-233/234	7.73 ± 1.03	0.0849	0.0377	NE			093878-035	HASL-300
	Uranium-235/236	0.124 ± 0.0507	0.0521	0.0203	NE		J	093878-035	HASL-300
	Uranium-238	1.91 ± 0.290	0.0476	0.0191	NE			093878-035	HASL-300
CCBA-MW2 (Duplicate)	Americium-241	4.70 ± 11.7	18.6	9.09	NE	U	BD	093879-033	EPA 901.1
25-Apr-13	Cesium-137	-2.28 ± 2.14	2.97	1.42	NE	U	BD	093879-033	EPA 901.1
	Cobalt-60	-0.803 ± 1.84	3.03	1.42	NE	U	BD	093879-033	EPA 901.1
	Potassium-40	-25.5 ± 38.8	43.2	20.6	NE	U	BD	093879-033	EPA 901.1
	Gross Alpha	6.70	NA	NA	15 pCi/L	NA	None	093879-034	EPA 900.0
	Gross Beta	2.80 ± 1.03	1.40	0.679	4mrem/yr		J	093879-034	EPA 900.0
	Uranium-233/234	7.87 ± 1.07	0.0964	0.0429	NE			093879-035	HASL-300
	Uranium-235/236	0.151 ± 0.0581	0.0592	0.023	NE		J	093879-035	HASL-300
	Uranium-238	1.78 ± 0.282	0.0541	0.0217	NE			093879-035	HASL-300

Refer to footnotes on page 8A-33.

Table 8A-10 *(Continued)*
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results, Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW1	Americium-241	4.75 ± 9.29	14.0	6.86	NE	U	BD	094376-033	EPA 901.1
16-Jul-13	Cesium-137	1.66 ± 1.77	2.86	1.38	NE	U	BD	094376-033	EPA 901.1
	Cobalt-60	0.201 ± 1.52	2.70	1.27	NE	U	BD	094376-033	EPA 901.1
	Potassium-40	-0.298 ± 33.0	40.1	19.3	NE	U	BD	094376-033	EPA 901.1
	Gross Alpha	-0.58	NA	NA	15 pCi/L	NA	None	094376-034	EPA 900.0
	Gross Beta	3.93 ± 1.21	1.52	0.736	4mrem/yr		J	094376-034	EPA 900.0
	Uranium-233/234	2.32 ± 0.351	0.0845	0.037	NE			094376-035	HASL-300
	Uranium-235/236	0.0529 ± 0.0347	0.0518	0.0194	NE		J	094376-035	HASL-300
	Uranium-238	0.720 ± 0.140	0.0733	0.0314	NE			094376-035	HASL-300
CCBA-MW1 (Duplicate)	Americium-241	8.04 ± 16.2	24.6	12.0	NE	U	BD	094377-033	EPA 901.1
16-Jul-13	Cesium-137	1.55 ± 1.85	2.91	1.39	NE	U	BD	094377-033	EPA 901.1
	Cobalt-60	-0.72 ± 1.83	3.05	1.43	NE	U	BD	094377-033	EPA 901.1
	Potassium-40	10.9 ± 32.2	45.5	21.8	NE	U	BD	094377-033	EPA 901.1
	Gross Alpha	-0.81	NA	NA	15 pCi/L	NA	None	094377-034	EPA 900.0
	Gross Beta	4.63 ± 1.09	1.02	0.488	4mrem/yr		J	094377-034	EPA 900.0
	Uranium-233/234	2.30 ± 0.355	0.0908	0.0397	NE			094377-035	HASL-300
	Uranium-235/236	0.0465 ± 0.0342	0.0556	0.0208	NE	U	BD	094377-035	HASL-300
	Uranium-238	0.745 ± 0.146	0.0788	0.0337	NE			094377-035	HASL-300
CCBA-MW2	Americium-241	-3.57 ± 6.02	9.53	4.66	NE	U	BD	094371-033	EPA 901.1
15-Jul-13	Cesium-137	-0.387 ± 2.51	2.76	1.32	NE	U	BD	094371-033	EPA 901.1
	Cobalt-60	-0.0207 ± 2.93	2.70	1.27	NE	U	BD	094371-033	EPA 901.1
	Potassium-40	4.44 ± 30.8	25.7	12.0	NE	U	BD	094371-033	EPA 901.1
	Gross Alpha	-1.03	NA	NA	15 pCi/L	NA	None	094371-034	EPA 900.0
	Gross Beta	2.87 ± 1.18	1.69	0.820	4mrem/yr		J	094371-034	EPA 900.0
	Uranium-233/234	7.80 ± 1.06	0.110	0.0432	NE			094371-035	HASL-300
	Uranium-235/236	0.113 ± 0.0594	0.0674	0.0252	NE		J	094371-035	HASL-300
	Uranium-238	1.71 ± 0.284	0.0956	0.0409	NE			094371-035	HASL-300

Refer to footnotes on page 8A-33.

Table 8A-10 *(Concluded)*
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW1	Americium-241	7.67 ± 12.8	19.5	9.54	NE	U	BD	094774-033	EPA 901.1
10-Oct-13	Cesium-137	0.377 ± 3.88	4.06	1.95	NE	U	BD	094774-033	EPA 901.1
	Cobalt-60	-1.7 ± 2.51	4.08	1.91	NE	U	BD	094774-033	EPA 901.1
	Potassium-40	1.15 ± 40.9	56.1	26.8	NE	U	BD	094774-033	EPA 901.1
	Gross Alpha	1.98	NA	NA	15 pCi/L	NA	None	094774-034	EPA 900.0
	Gross Beta	5.38 ± 1.56	1.98	0.965	4mrem/yr		J	094774-034	EPA 900.0
	Uranium-233/234	2.04 ± 0.334	0.125	0.0554	NE			094774-035	HASL-300
	Uranium-235/236	0.00 ± 0.0404	0.0598	0.0211	NE	U	BD	094774-035	HASL-300
	Uranium-238	0.637 ± 0.146	0.105	0.0451	NE			094774-035	HASL-300
CCBA-MW2	Americium-241	5.75 ± 16.8	25.7	12.6	NE	U	BD	094779-033	EPA 901.1
14-Oct-13	Cesium-137	0.515 ± 1.73	3.11	1.49	NE	U	BD	094779-033	EPA 901.1
	Cobalt-60	0.0218 ± 1.67	2.94	1.37	NE	U	BD	094779-033	EPA 901.1
	Potassium-40	26.7 ± 39.7	29.2	13.6	NE	U	BD	094779-033	EPA 901.1
	Gross Alpha	-0.55	NA	NA	15 pCi/L	NA	None	094779-034	EPA 900.0
	Gross Beta	3.69 ± 1.31	1.82	0.890	4mrem/yr		J	094779-034	EPA 900.0
	Uranium-233/234	7.82 ± 1.03	0.0787	0.0349	NE			094779-035	HASL-300
	Uranium-235/236	0.127 ± 0.0526	0.0376	0.0133	NE			094779-035	HASL-300
	Uranium-238	1.62 ± 0.249	0.0658	0.0284	NE			094779-035	HASL-300
CCBA-MW2 (Duplicate)	Americium-241	4.39 ± 11.7	18.5	9.05	NE	U	BD	094780-033	EPA 901.1
14-Oct-13	Cesium-137	0.835 ± 1.74	2.96	1.42	NE	U	BD	094780-033	EPA 901.1
	Cobalt-60	2.17 ± 2.04	3.49	1.65	NE	U	BD	094780-033	EPA 901.1
	Potassium-40	-15.2 ± 38.3	43.6	20.9	NE	U	BD	094780-033	EPA 901.1
	Gross Alpha	2.82	NA	NA	15 pCi/L	NA	None	094780-034	EPA 900.0
	Gross Beta	2.87 ± 1.25	1.83	0.894	4mrem/yr		J	094780-034	EPA 900.0
	Uranium-233/234	7.16 ± 0.933	0.0699	0.031	NE			094780-035	HASL-300
	Uranium-235/236	0.269 ± 0.0713	0.0334	0.0118	NE			094780-035	HASL-300
	Uranium-238	1.45 ± 0.222	0.0585	0.0252	NE			094780-035	HASL-300

Refer to footnotes on page 8A-33.

Table 8A-11
Summary of Field Water Quality Measurements[h],
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
CCBA-MW1	16-Jan-13	13.20	494	211.7	6.34	0.57	30.3	3.17
CCBA-MW2	15-Jan-13	12.34	573	178.3	7.28	0.40	57.4	6.13
CCBA-MW1	24-Apr-13	14.31	493	230.0	6.44	1.15	32.0	3.24
CCBA-MW2	25-Apr-13	15.53	572	252.1	7.35	0.22	62.8	6.23
CCBA-MW1	16-Jul-13	17.72	490	142.0	6.75	0.70	33.4	3.17
CCBA-MW2	15-Jul-13	17.13	579	130.3	7.70	0.36	65.7	6.32
CCBA-MW1	10-Oct-13	16.83	579	171.7	6.61	0.56	33.7	3.26
CCBA-MW2	14-Oct-13	16.82	670	160.0	7.54	0.42	65.3	6.32

Refer to footnotes on page 8A-33.

Footnotes for Solid Waste Management Units 8/58 Analytical Results Tables

% = percent.
CFR = Code of Federal Regulations.
EPA = U.S. Environmental Protection Agency.
HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
ID = Identifier.
µg/L = micrograms per liter.
mg/L = milligrams per liter.
mrem/yr = millirem per year.
No. = Number.
pCi/L = picocuries per liter.
RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine.
Tetryl = methyl-2,4,6-trinitrophenylnitramine.

[a]Result

Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 1-4).

Bold = Value exceeds the established MCL.
ND = not detected (at MDL). Activities of zero or less are considered to be not detected.

[b]MDL or MDA

The MDL applies to Table 8A-1 through 8A-11. MDA applies to Table 8A-10.

MDA = The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.
MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA = Not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

[c]PQL or Critical Level

The PQL applies to Table 8A-1 through 8A-11. Critical level applies to Table 8A-10.

Critical level = The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA = Not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

[d]MCL

MCL = Maximum contaminant level. MCLs were established by the EPA Office of Water, National Primary Water Regulations (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- Gross Alpha particle activity, excluding total uranium = 15 pCi/L (40 CFR Parts 9, 141, and 142, Table 1-4).
- Any combination of Beta and/or Gamma emitting radionuclides = 4 mrem/yr (as dose rate).

NE = not established.

[e]Lab Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

B = The analyte was detected in the blank above the effective MDL.
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
N = Results associated with a spike analysis that was outside control limits.
NA = Not applicable.
U = Analyte is absent or below the MDL.

Footnotes for Solid Waste Management Units 8/58 Analytical Results Tables (Concluded)

[f]Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD	=	Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J	=	The associated value is an estimated quantity.
J+	=	The associated numerical value is an estimated quantity with a suspected positive bias.
None	=	No data validation for corrected gross alpha activity.
U	=	The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
UJ	=	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

[g]Analytical Method

Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.

DOE, 1990, "Environmental Measurements Laboratory Procedures Manual," 27th ed., Vol. 1, Rev. 1992, HASL-300.

EPA, 1999 (and updates), "Perchlorate in Drinking Water Using Ion Chromatography," EPA 815/R-00-014.

EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.

EPA, 1984, "Methods for Chemical Analysis of Water and Wastes." EPA 600-4-79-020.

EPA, 1980, "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.

DOE = U.S. Department of Energy.
HASL = Health and Safety Laboratory.
SM = Standard Method.

[h]Field Water Quality Measurements

Field measurements collected prior to sampling.

°C	= degrees Celsius.
% Sat	= percent saturation.
μmhos/cm	= micromhos per centimeter.
mg/L	= milligrams per liter.
mV	= millivolts.
NTU	= nephelometric turbidity units.
pH	= potential of hydrogen (negative logarithm of the hydrogen ion concentration).

Attachment 8B
Solid Waste Management Units 8/58
Plots

This page intentionally left blank.

Attachment 8B Plots

8B-1 Fluoride Concentrations, CCBA-MW1 ..... 8B-5

This page intentionally left blank.

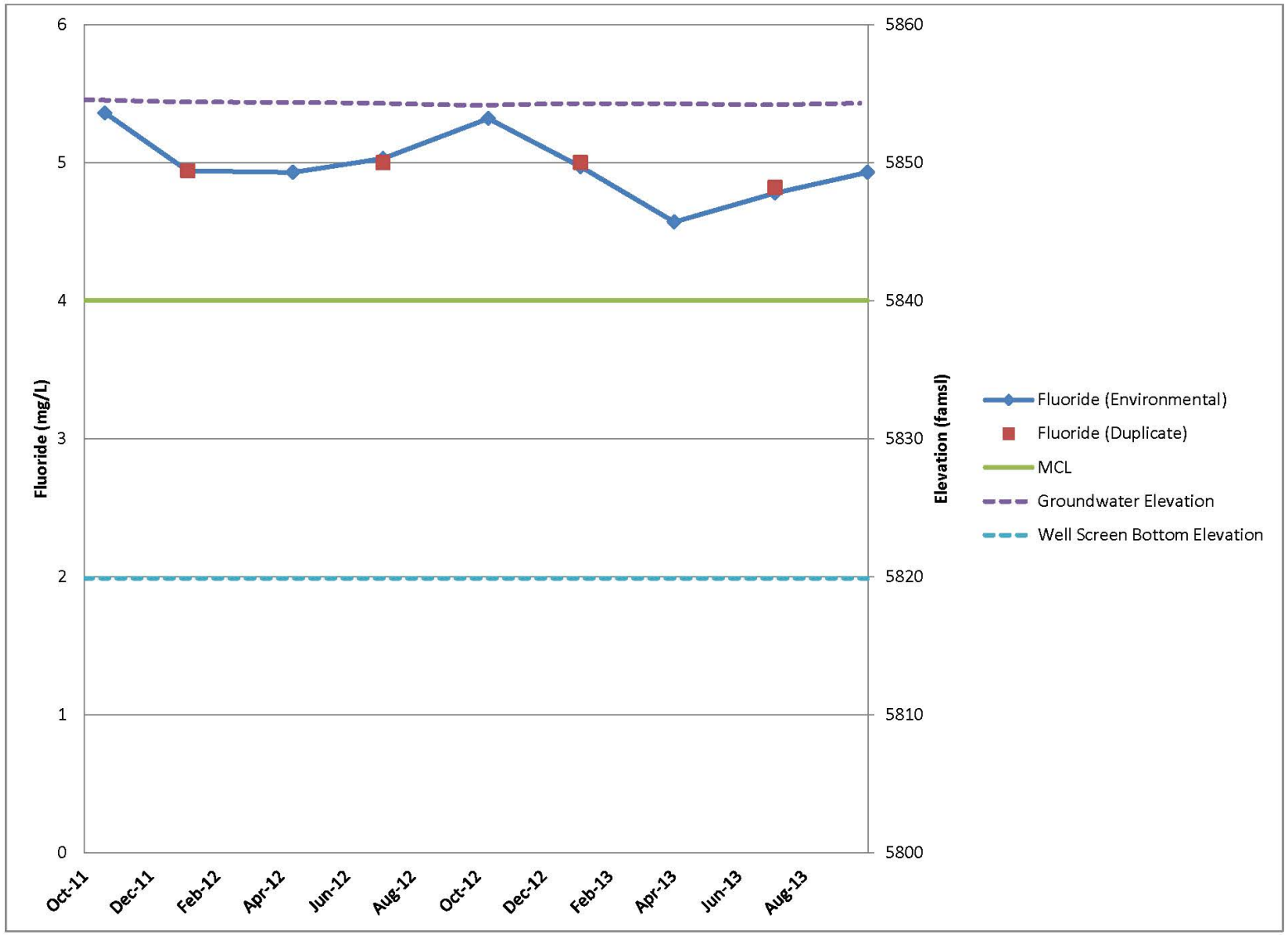


Figure 8B-1. Fluoride Concentrations, CCBA-MW1

This page intentionally left blank.

Attachment 8C
Solid Waste Management Units 8/58
Hydrographs

This page intentionally left blank.

Attachment 8C Hydrographs

8C-1 SWMUs 8/58 Study Area Wells 8C-5

This page intentionally left blank.

Figure 8C-1. SWMUs 8/58 Study Area Wells

This page intentionally left blank.

9.0 Solid Waste Management Unit 49

9.1 Introduction

Drain and Septic System (DSS) Solid Waste Management Unit (SWMU) 49 is located in Lurance Canyon of the Manzanita Mountains (Figure 9-1). Results for groundwater samples from the fractured bedrock have historically been reported as nondetected, or were detected at background concentrations for the constituents of concern (COCs).

9.1.1 Location

The Coyote Canyon Test Area at Sandia National Laboratories, New Mexico (SNL/NM) is located in the eastern portion of Kirtland Air Force Base (KAFB). The SNL/NM facility is a government-owned, contractor-operated, multi-program laboratory overseen by the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) through the Sandia Field Office in Albuquerque, New Mexico. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM under Contract DE-AC04-94AL85000.

SWMU 49, the Building 9820 Drains, is located within the boundaries of the U.S. Forest Service Withdrawn Area on federally owned land controlled by KAFB and permitted to the DOE/NNSA. The site is located in Lurance Canyon, one of three canyons that are located on the eastern edge of the Coyote Canyon Test Area and within the Manzanita Mountains. Two other canyons, Madera Canyon and Sol se Mete Canyon, intersect Lurance Canyon to the east of SWMU 49. These three canyons form the headwaters of Arroyo del Coyote. The Manzanita Mountains border the eastern margin of the Albuquerque Basin, and the terrain near the site is characterized by large topographic relief exceeding 500 feet (ft). Lurance Canyon, deeply incised into Paleozoic and Precambrian rocks, provides local westward drainage of ephemeral surface-water flows to Arroyo del Coyote.

9.1.2 Site History

SWMU 49 consists of two former ground-surface discharge areas that cover a combined 1,584 square feet (approximately 0.04 acres) near inactive Building 9820 (Figure 9-1). The first area (SWMU 49A) is located on the west side of the building where a former trailer was used as a darkroom. Photo-processing chemicals may have been discharged there. The second area (SWMU 49B) is located approximately 80 ft south of the building where a drainpipe discharged. Wastewater from the building floor drains and a sink discharged there. Building 9820 was constructed in 1958 and used until 1988 (Table 9-1) (SNL June 1996). Due to its remote location, Building 9820 was not connected to the base-wide water supply or sanitary waste systems. A tanker truck was used to haul nonpotable water to a 1,000-gallon storage tank at the building.

Environmental concern about SWMU 49 is based on the potential release of COCs in wastewater discharged to the ground surface at the trailer and the drainpipe outfall. The site is located in a side canyon that slopes to the northwest and drains into the ephemeral channel of Lurance Canyon approximately 1,750 ft north of the site. Coyote Springs is located approximately 6,000 ft west of the site. The surrounding area is unpaved and sparsely vegetated by bunch grasses, cacti, junipers, and pine trees. No storm sewers are used to direct surface water away from the site.

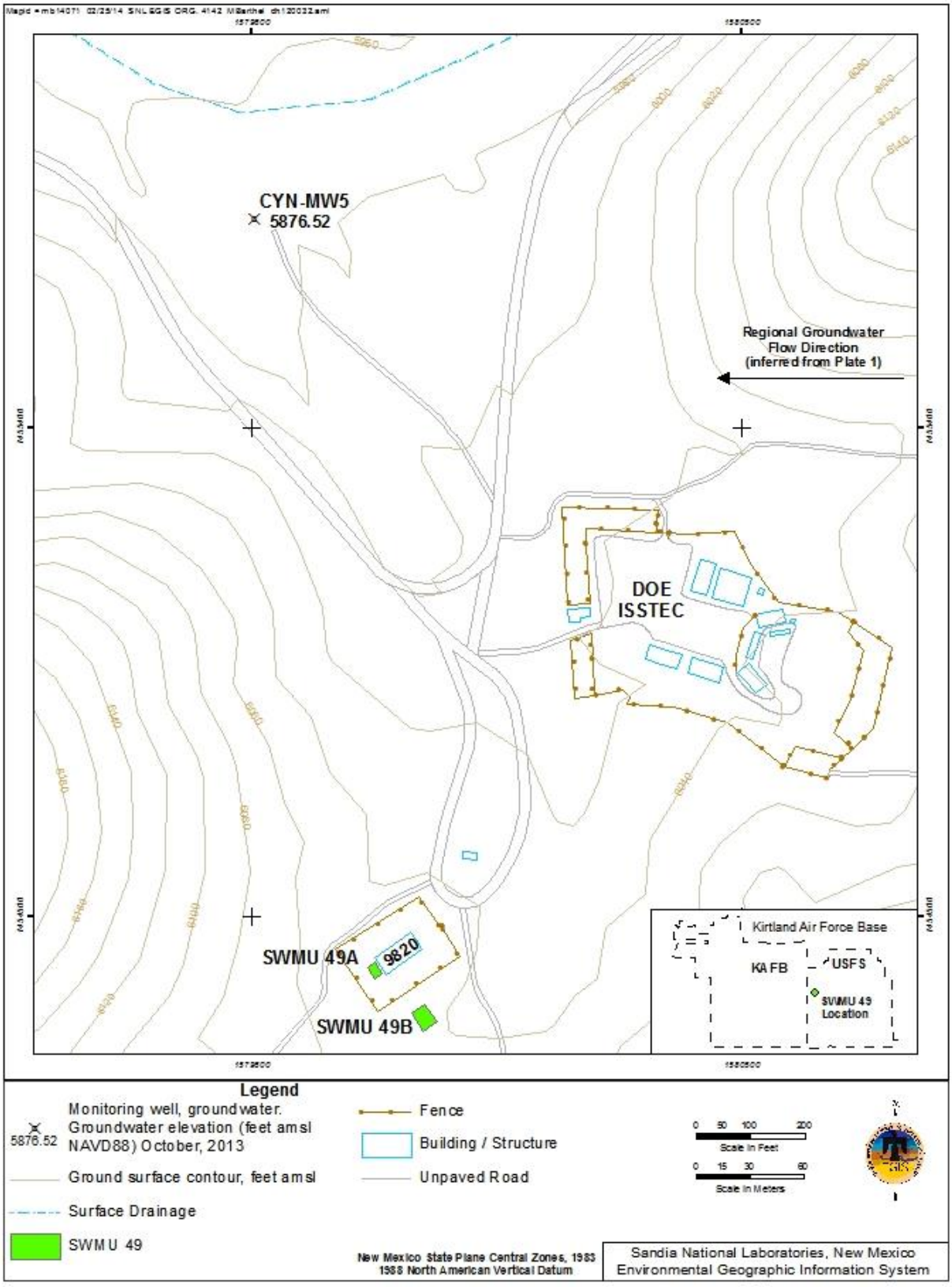


Figure 9-1. Location and Groundwater Elevation at SWMU 49

Table 9-1. Historical Timeline of SWMU 49

Month	Year	Event	Reference
--	1958	Building 9820 and drainpipe constructed.	SNL June 1996
September	1987	DSS SWMU 49 first identified as a potential release site in the September 1987 Comprehensive Environmental Assessment and Response Program Report.	SNL June 1996
--	1988	Use of Building 9820 discontinued.	SNL June 1996
March	1993	Septic Tanks and Drainfields (OU 1295) RCRA Facility Investigation Work Plan submitted to the EPA.	SNL March 1993
--	1993 -1995	Field Investigations completed at SWMU 49.	SNL June 1996
June	1996	NFA proposal for SWMU 49 submitted to the NMED.	SNL June 1996
June	1998	NMED responded with an RSI on the SWMU 49 NFA proposal.	NMED June 1998
November	1998	Response submitted to the first NMED RSI for SWMU 49.	SNL November 1998
October	1998	A SAP describing technical procedures to be used to complete environmental investigations at the SWMU and AOC sites submitted to the NMED.	SNL October 1999
January	2000	October 1999 SAP approved by the NMED.	NMED January 2000
June	2000	NMED issued a second RSI on the SWMU 49 NFA proposal and submitted the first response for SWMU 49.	NMED June 2000
September	2000	Response submitted to the second NMED RSI for SWMU 49.	SNL September 2000
August	2001	Groundwater monitoring well CYN-MW5 is installed downslope of SWMU 49.	SNL June 2005
November	2001	FIP documenting specific investigation procedures to be completed at DSS AOC sites submitted to the NMED.	SNL November 2001
February	2002	The DSS FIP approved by the NMED.	NMED February 2002
April	2004	Completion of eight quarters of groundwater sampling for monitoring well CYN-MW5.	SNL June 2005
May	2004	Well CYN-MW5 incorporated into the Burn Site Groundwater Study Area.	SNL October 2005
June	2005	A third RSI response submitted to the NMED that included the results of fieldwork completed at SWMU 49 since the June 1996 NFA report and an updated risk assessment.	SNL June 2005
September	2005	NMED issues Certificate of Completion for CAC without Controls for SWMU 49.	NMED September 2005
March	2006	Request for Class III Permit Modification submitted. Public Notice meeting published. Documents supporting NFA (CAC) for DSS SWMU 49 compiled.	SNL March 2006
February	2005	NMED states that well CYN-MW5 is too distant to be considered part of the Burn Site Groundwater Study Area. Groundwater sampling discontinued.	NMED February 2005

Table 9-1. Historical Timeline of SWMU 49 *(Concluded)*

Month	Year	Event	Reference
April	2010	NMED requires that well CYN-MW5 be sampled annually as part of LTS requirements for SWMU 49.	NMED April 2010
March	2011	Well CYN-MW5 sampled as part of LTS.	SNL February 2011
January	2012	Well CYN-MW5 sampled as part of LTS.	SNL January 2012
January	2013	Well CYN-MW5 sampled as part of LTS.	SNL December 2012

NOTES:
AOC = Area of Concern.
CAC = Corrective Action Complete.
CYN = Canyons.
DSS = Drain and Septic System.
EPA = U.S. Environmental Protection Agency.
FIP = Field Implementation Plan.
LTS = Long-Term Stewardship.
MW = Monitoring Well.
NFA = No Further Action.
NMED = New Mexico Environment Department.
OU = Operable Unit.
RCRA = Resource Conservation and Recovery Act.
RSI = Request for Supplemental Information.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories.
SWMU = Solid Waste Management Unit.

Building 9820 is a small, one-story building that was used for the synthesis of high explosive (HE) compounds, photo-processing, woodworking, and metal machining in support of weapons testing. Five floor drains and a hand sink were connected to a 4-inch diameter drain line. The machine shop opened in the mid-1960s and may have discharged solvents into the floor drains. Small quantities of photographic film were processed from the mid-1970s to 1988 inside the building and also in the darkroom trailer. Occasional washing of nickel-cadmium batteries with dilute acetic acid may have discharged up to 1 gallon of wastewater into the building floor drains or sink. Based on the activities performed at the building and trailer, the primary COCs for SWMU 49 are HE compounds (e.g., Baratol), photo-processing chemicals (e.g., fixers and developers), various metals (i.e., cadmium, hexavalent chromium, cyanide, and silver), and volatile organic compounds (VOCs; e.g., methanol, toluene, and trichloroethene).

Groundwater monitoring well CYN-MW5 is located approximately 1,350 ft to the north and downslope of Building 9820. The ground surface at the wellhead is approximately 60 ft lower than the elevation near the building. The well is located near a small arroyo that directs storm water from the site into the channel in Lurance Canyon. The well is screened in fractured Precambrian quartzite at a depth of 135 to 155 ft below ground surface (bgs) (SNL June 2005). The primary channel of the Lurance Canyon arroyo is located about 350 ft to the north of the well.

9.1.3 Monitoring History

Groundwater monitoring well CYN-MW5 was installed in August 2001 as part of the DSS investigation of SWMU 49. Eight sampling events occurred during the initial DSS investigation (July 2002 through April 2004) and the results were submitted to the New Mexico Environment Department (NMED) in the SNL/NM Environmental Restoration (ER) Project's response to the third Request for Supplemental Information (SNL June 2005). The well has been sampled sporadically since then.

Following the April 2004 sampling event, monitoring well CYN-MW5 was incorporated into the Burn Site Groundwater (BSG) monitoring network as a downgradient well. The analytical results for monitoring well CYN-MW5 were reported in the BSG chapter of the Annual Groundwater Monitoring Reports for several years (SNL April 2004). However, in its February 2005 letter, the NMED stated that it "will not consider monitoring well CYN-MW5 as a downgradient well because it is located over two miles away from the Burn Site" (NMED February 2005). Based on the NMED determination, monitoring well CYN-MW5 has not been sampled as part of the BSG investigation since June 2005. Most recently, sampling at monitoring well CYN-MW5 has been incorporated into the SNL/NM Long-Term Stewardship groundwater sampling program in response to other NMED requirements (NMED April 2010).

9.1.4 Current Monitoring Network

Monitoring well CYN-MW5 is the only groundwater monitoring well in the SWMU 49 study area. This well was installed in August 2001 and is screened from 135 to 155 ft bgs in fractured Precambrian quartzite.

9.1.5 Summary of Calendar Year 2013 Activities

The following activities took place for the SWMU 49 investigation during Calendar Year (CY) 2013 (January through December 2013):

- Annual groundwater sampling was conducted at monitoring well CYN-MW5 in January 2013.
- Periodic groundwater elevation data were obtained from monitoring well CYN-MW5.
- Tables of analytical results (Attachment 9A) and a hydrograph (Attachment 9B) were prepared in support of this report.

9.1.6 Summary of Future Activities

The following activities are planned for SWMU 49 during CY 2014:

- Annual groundwater sampling will be conducted at monitoring well CYN-MW5.
- Periodic groundwater elevation data will be obtained from monitoring well CYN-MW5.

9.1.7 Current Conceptual Model

The following sections present an updated discussion of the hydrogeologic regime, conceptual site model, and contaminant findings for SWMU 49.

9.1.7.1 Regional Hydrogeologic Conditions

SWMU 49 is located in a side canyon on the south side of Lurance Canyon (Plate 1). Alluvium covers the canyon floor. The surrounding ridges consist of Precambrian outcrops (e.g., granite, gneiss, and quartzite) and Paleozoic outcrops (e.g., limestone, sandstone, and conglomerate). The outcrops are sporadically covered by colluvium. The base-wide potentiometric surface map (Plate 1) shows that groundwater flow in fractured bedrock is generally toward the west. The regional groundwater flow direction is depicted in Figure 9-1. No potable water-supply wells are located within 5 miles of the site.

9.1.7.2 Hydrogeologic Conditions at SWMU 49

SWMU 49 consists of two small areas (SWMUs 49A and 49B) near Building 9820 where wastewater discharged from 1958 to 1988 (Figure 9-1). The site is covered by colluvium that is underlain by bedrock. Building 9820 is situated at an elevation of approximately 6,040 ft above mean sea level (amsl). Overall, the terrain slopes northwest and west. No perennial surface-water features such as springs are located within 1 mile of SWMU 49. Monitoring well CYN-MW5 is located approximately 1,350 ft to the north and downslope of Building 9820. The ground surface at the wellhead is approximately 60 ft lower than at the building.

The amount of precipitation available for groundwater recharge at SWMU 49 is minimal due to scant rainfall and high evapotranspiration rates. Summer (monsoonal) thunderstorms are responsible for the majority of rainfall. The average rainfall, as measured at the nearest active rain gauge (the National Weather Service station at the Albuquerque International Sunport) during the period from 1915 through 2005 was 8.67 inches per year (WRCC-DRI 2012). The station is located 10 miles northwest of SWMU 49 at an elevation of 5,310 ft amsl. By extrapolation of the precipitation model presented in SNL/NM conceptual model of groundwater flow and contaminant transport at the canyon area (SNL May 2004), the average annual precipitation for SWMU 49, where the elevation is approximately 6,040 ft amsl, is estimated to be approximately 11.5 inches per year. Intense sunlight and low humidity throughout much of the year creates high rates of evapotranspiration. Estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL February 1998).

In 2001, a location downslope of SWMU 49 was agreed on by NMED, DOE/NNSA and Sandia for the installation of groundwater monitoring well CYN-MW5. The well was installed in August 2001 using the air-rotary casing hammer technique, and the borehole was temporarily cased to 50 ft bgs. Dry alluvium consisting of silty sand and fine-to-coarse gravel was encountered from the ground surface to 90 ft bgs. Fractured Precambrian quartzite was encountered from 90 ft bgs to the borehole total depth of 190 ft bgs. During drilling, groundwater was encountered at a depth of 140 ft bgs. The most productive zone in the borehole was 140 to 160 ft bgs and corresponded to the most highly fractured interval. The borehole was blown dry and allowed to recover overnight. The water level was at 102 ft bgs on the following morning, which indicates that groundwater in the area is mostly likely under confined condition. The well was screened from 135 to 155 ft bgs in fractured quartzite (Table 9-2).

Table 9-2. Lithologic and Hydrogeologic Elevation Data for Monitoring Well CYN-MW5 at SWMU 49

Monitoring Well	Ground Surface Elevation (ft amsl)	Depth of Screened Interval (ft bgs)	Elevation for Top of Screen (ft amsl)	Potentiometric Surface, October 2013 (ft amsl)	Mid-Point Screen Elevation (ft amsl)	Approximate Pressure Head (ft[a])
CYN-MW5	5981.30	135 – 155	5846.30	5876.52	5836.30	40

NOTES:
[a]From mid-point of screen.
amsl = Above mean sea level.
bgs = Below ground surface.
CYN = Canyons.
ft = Foot (feet).
MW = Monitoring Well.
SWMU = Solid Waste Management Unit.

The October 2013 groundwater elevation at monitoring well CYN-MW5 was 5876.52 ft amsl. Compared to the mid-point elevation of the screen, the pressure head was approximately 40 ft and indicative of confined conditions. Groundwater flows to the west through a fractured bedrock system. Based on the potentiometric surface depicted on Plate 1, the horizontal gradient is approximately 0.01 feet per foot.

During sampling, the drawdown in monitoring well CYN-MW5 is not excessive and the quantity of water produced is clearly adequate for low-flow sampling purposes. Groundwater samples are collected using pneumatic (nitrogen gas activated) Bennett™ piston pumps.

The conceptual hydrogeologic model for SWMU 49 is based on data and findings obtained from monitoring well CYN-MW5, several nearby monitoring wells located upgradient and downgradient in Lurance Canyon (Plate 1), and hydrogeologic investigations conducted at the Burn Site (SNL May 2004) and at SWMU 58 (Chapter 8.0). Groundwater in the SWMU 49 area occurs in a fractured bedrock system under confined conditions. The depth to groundwater at monitoring well CYN-MW5 is approximately 140 ft bgs in a fractured interval of Precambrian quartzite. Groundwater in the bedrock predominantly moves through a confined low-permeability fracture system. A series of naturally filled fractures in the upper bedrock probably serves as a confining unit. The potentiometric surface at monitoring well CYN-MW5 in October 2013 has an elevation of approximately 5,876 ft amsl. The amount of precipitation available for groundwater recharge at SWMU 49 is minimal due to the scant rainfall and high evapotranspiration. Historical water level data indicate that seasonal effects, primarily due to thunderstorms, rarely occur. The hydrograph (Figure 9B-1) shows that significant water level increases only occurred twice in the last 10 years. During 2002 through 2013, the overall trend has been downward. For the last five years, the water level in monitoring well CYN-MW5 has declined at approximately 0.3 feet per year. Groundwater underflow along Lurance Canyon probably discharges to the unconsolidated basin-fill deposits (primarily the Santa Fe Group) of the Albuquerque Basin after crossing the Tijeras and Sandia faults. The hydraulic gradient is approximately 0.01 feet per foot near the well. No potable water supply wells are located within 5 miles of the site.

9.1.7.3 Contaminant Sources

From 1958 to 1988, wastewater discharged to the ground surface at two locations at SWMU 49. The water possibly contained photo-processing chemicals, HE compounds, and VOCs. The areas around the discharge points were characterized by soil sampling as part of the DSS investigation.

9.1.7.4 Contaminant Distribution and Transport in Groundwater

No COCs exceed the applicable U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) (EPA 2009) in the CY 2013 groundwater samples collected from monitoring well CYN-MW5. No groundwater contamination is suspected at SWMU 49.

9.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM ER Operations (formerly ER Project) as well as implements and enforces federal regulations mandated by the Resource Conservation and Recovery Act (RCRA). All ER Operations SWMUs and Areas of Concern (AOCs) are listed in Module IV of the SNL/NM RCRA Permit, *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518* (NMED 1993). All corrective action requirements pertaining to SWMUs and AOCs are contained in the Compliance Order on Consent (the Order) (NMED April 2004) between the DOE, Sandia, and NMED.

The DOE/NNSA and Sandia received a letter from the NMED on April 14, 2010, entitled *Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008), Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001* (NMED April 2010). The NMED letter lists SWMU 49 under the heading of "SWMUs/AOCs to be Subject to Groundwater Monitoring Controls" and further stated that pursuant to Section III.W.3.b of the Order (NMED April 2004), SWMU 49 requires long-term monitoring of groundwater on an annual basis as a site control. The NMED specified that for SWMU 49, the analytes to be monitored include general chemistry, VOCs, HE compounds, perchlorate, metals, cyanide, nitrate plus nitrite (NPN), gross alpha/beta activity, and radionuclides by gamma spectroscopy.

In this report SWMU 49 groundwater monitoring data are presented for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (i.e., gamma spectroscopy and gross alpha/beta activity) are provided voluntarily by the DOE/NNSA and Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Order, as specified in Section III.A of the Order (NMED April 2004).

9.3 Scope of Activities

The activities conducted for SWMU 49 during this reporting period are listed in Section 9.1.5 and involved groundwater monitoring that consisted of water level measurements and sampling and analysis as summarized in Table 9-3.

Table 9-3. Groundwater Monitoring Well Network and Sampling Date for SWMU 49, Calendar Year 2013

Date of Sampling Event	Wells Sampled	SAP
January 2013	CYN-MW5	*SWMU 49 and 116 Groundwater Monitoring, Mini-SAP for Fiscal Year 2013 Annual Sampling* (SNL December 2012)

NOTES:
CYN = Canyons.
MW = Monitoring Well.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories.
SWMU = Solid Waste Management Unit.

The analytical parameters are listed in Table 9-4. Quality control (QC) samples are collected in the field at the time of environmental sample collection. Field QC samples may include duplicate environmental, split, equipment blank (EB), and trip blank (TB) samples.

Table 9-4. Parameters Sampled at SWMU 49

Parameter	January 2013
Alkalinity (total, bicarbonate, carbonate)	CYN-MW5
Anions	CYN-MW5 (duplicate)
Cations	
Gamma Spec*	
Gross Alpha Activity	
Gross Beta Activity	
High Explosive Compounds	
NPN	
Perchlorate	
TAL Metals, plus Total Uranium	
Total Cyanide	
VOCs	

NOTES:

CYN = Canyons.
Gamma Spec* = Gamma spectroscopy short list (americium-241, cesium-137, cobalt-60, and potassium-40).
MW = Monitoring well.
NPN = Nitrate plus nitrate (reported as nitrogen).
SWMU = Solid Waste Management Unit.
TAL = Target Analyte List.
VOC = Volatile organic compound.

9.4 Field Methods and Measurements

The monitoring procedures conducted for SWMU 49 groundwater monitoring are described in detail in Section 1.3. The groundwater elevation is shown on Figure 9-1 and depicted on the hydrograph presented on Figure 9B-1 (Attachment 9B).

9.5 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using EPA-specified protocols described in Section 1.3.2 (Tables 1-5 and 1-6).

9.6 Summary of Analytical Results

This section discusses analytical results, exceedances of regulatory standards, and pertinent trends in COC concentrations. The analytical results and field measurements for the CY 2013 SWMU 49 sampling event are presented in Tables 9A-1 through 9A-8 (Attachment 9A). Data qualifiers are explained in the footnotes following Table 9A-8.

No VOCs were detected. The method detection limits (MDLs) for all analyzed VOCs are listed in Table 9A-1 (Attachment 9A).

No HE compounds were detected. The MDLs for all analyzed HE compounds are listed in Table 9A-2 (Attachment 9A).

The analytical results for NPN (reported as nitrogen) are presented in Table 9A-3 (Attachment 9A). No NPN results exceed the MCL of 10 milligrams per liter (mg/L). The NPN concentration in the environmental sample was 1.79 mg/L, and the concentration in the environmental duplicate sample was 1.89 mg/L

The results for alkalinity, anion, cation, and total cyanide results are provided in Table 9A-4 (Attachment 9A). No detections of these constituents exceed MCLs, where established.

The analytical results for perchlorate are presented in Table 9A-5 (Attachment 9A). There were no detections of perchlorate. Currently, no MCL is established for perchlorate. Perchlorate results do not exceed the NMED-specified screening level/MDL of 4 micrograms per liter (NMED April 2004).

Total metal results are presented in Table 9A-6 (Attachment 9A). No metals exceed established MCLs.

Groundwater samples were analyzed for gross alpha/beta activity and radionuclides by gamma spectroscopy. The results are presented in Table 9A-7 (Attachment 9A). All gross alpha/beta activity results are below MCLs, where established. Gross alpha activity is measured as a screening tool and according to 40 Code of Federal Regulations Parts 9, 141, and 142, Table I-4, does not include uranium, which is measured independently. Therefore, the gross alpha activity measurement is corrected by subtracting out the uranium activity. Radiological results are further reviewed by an SNL/NM Certified Health Physicist to assure that the samples are nonradioactive. Gamma spectroscopy analysis detected no isotopes above the associated minimum detectable activity.

Field water quality parameters are measured during purging of the well prior to sampling and include temperature, specific conductance, oxidation-reduction potential, pH, turbidity, and dissolved oxygen. Parameter measurements obtained immediately prior to sample collection are presented in Table 9A-8 (Attachment 9A).

9.7 Quality Control Results

Field and laboratory QC samples were collected and prepared as described in Section 1.3. Data validation qualifiers are presented with the analytical results in Tables 9A-3 through 9A-7 (Attachment 9A). The results of QC samples and the impact on data quality for the SWMU 49 sampling event are discussed in the following sections.

All reported values for any QC sample did not exceed established MCLs.

Duplicate environmental sample results show good correlation. Relative percent difference for inorganic detections are less than 35, except for aluminum. The relative percent difference for aluminum is an estimated value because the analytical results are reported at concentrations of less than the laboratory practical quantitation limit. The analytical results for the organic compounds were all nondect; therefore, no relative percent difference can be calculated. The metals antimony, chromium, and copper were qualified as nondect during data validation. All three metals were detected in the associated laboratory method blank sample at concentrations greater than the environmental sample values.

An EB sample was collected at monitoring well CYN-MW5 during the CY 2013 sampling event. VOC detections are not applicable because there were no VOCs detected in the associated environmental sample. There were no issues with detected inorganics because detections were qualified as nondetect due to laboratory method blanks detections or reported concentrations are less than 5 times than environmental sample results.

No VOCs were detected above laboratory MDLs in any TB sample.

Laboratory data qualifiers are provided with the analytical results in Tables 9A-3 through 9A-7 (Attachment 9A).

9.8 Variances and Nonconformances

No variances or nonconformances from field or sampling requirements as specified in the SWMU 49 groundwater monitoring Mini-Sampling and Analysis Plan (SNL December 2012) occurred during CY 2013 sampling activities.

Although some analytical results were qualified during the data validation process, no significant data quality problems were noted. Data validation qualifiers are provided with the analytical results in Tables 9A-3 through 9A-7 (Attachment 9A).

9.9 Summary and Conclusions

This section provides a brief summary of activities, discussion of COCs, if any, that exceed standards, trends of concentrations versus time, the current conceptual site model, and plans for studies to be completed during CY 2014 at SWMU 49.

SWMU 49 is located in western Lurance Canyon. The DSS groundwater investigation was initiated in 2001 at the request of the NMED to evaluate the discharge areas associated with Building 9820. The one groundwater monitoring well in the study area (CYN-MW5) is located downgradient of the site and was sampled in January 2013. The samples were analyzed for alkalinity (total, bicarbonate, carbonate), anions, cations, HE compounds, NPN, perchlorate, Target Analyte List metals (plus total uranium), total cyanide, VOCs, gross alpha/beta activity, and radionuclides by gamma spectroscopy. Analytical results were compared with EPA MCL guidelines for drinking water (EPA 2009). No parameters were detected above established MCLs in the groundwater samples.

The analytical results for this reporting period are consistent with historical concentrations. The conceptual model described in Section 9.1.7 does not require modification based on the analytical results for this reporting period.

Annual groundwater sampling will be conducted at monitoring well CYN-MW5 during the first quarter of CY 2014, subject to scheduling. Periodic monitoring of groundwater elevations will also be completed during the year.

9.10 References

EPA 2009 U.S. Environmental Protection Agency (EPA), 2009. *National Primary Drinking Water Regulations*, EPA 816-F 09-004, U.S. Environmental Protection Agency, Washington, D.C., May.

NMED April 2010 New Mexico Environment Department (NMED), April 2010. *Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008), Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001*. New Mexico Environment Department, Santa Fe, New Mexico.

NMED September 2005 New Mexico Environment Department (NMED), September 2005. *RE: Notice of Approval/Disapproval: Responses to Request for Supplemental Information for Proposals for Corrective Action Complete, Drain and Septic Systems SWMUs 49, 101, 116, 138, 149, 154, and 161, June 2005, Sandia National Laboratories EPA ID# NM5890110518 HWB-SNL-99-008, HWB-SNL-99-012*, New Mexico Environment Department, Santa Fe, New Mexico.

NMED February 2005 New Mexico Environment Department (NMED), February 2005. *RE: Current Conceptual Model for the Sandia National Laboratories Canyons Area (Burn Site), June 2004: Requirement to Conduct Additional Site Characterization and Interim Measures, Sandia National Laboratories NM5890110518, HWB-SNL-04-039,* New Mexico Environment Department, Santa Fe, New Mexico.

NMED April 2004 New Mexico Environment Department (NMED), April 2004. *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order*, New Mexico Environment Department, Santa Fe, New Mexico.

NMED February 2002 New Mexico Environment Department (NMED), February 2002. *Approval of Field Implementation Plan, Characterization of Non Environmental Restoration Drain and Septic Systems Submittal Dated November 2001, Sandia National Laboratories, NM5890110518-1, HWB-SNL-02-009,* New Mexico Environment Department, Santa Fe, New Mexico.

NMED June 2000 New Mexico Environment Department (NMED), June 2000. *Request for Supplemental Information: Sandia National Laboratories, New Mexico, Environmental Restoration Project Responses to NMED Request for Supplemental Information: No Further Action Proposals (4th Round), Dated June 1996, Sandia National Laboratories, EPA ID# NM5890110518, HRMB-SNL-99-008,* New Mexico Environment Department, Santa Fe, New Mexico.

NMED January 2000 New Mexico Environment Department (NMED), January 2000. *Approval of Sampling and Analysis Plan for Characterizing and Assessing Potential Releases to the Environment from Septic and other Miscellaneous Drain Systems at Sandia National Laboratories/New Mexico, HRMB-SNL-00-002,* New Mexico Environment Department, Santa Fe, New Mexico.

NMED June 1998 New Mexico Environment Department (NMED), June 1998. *Request for Supplemental Information: Proposal for No Further Action (4th Round), Environmental Restoration Project, Sandia National Laboratories, June 1996,* New Mexico Environment Department, Santa Fe, New Mexico.

NMED 1993 New Mexico Environment Department (NMED), 1993. *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518,* New Mexico Environment Department, Santa Fe, New Mexico.

SNL December 2012 Sandia National Laboratories, New Mexico (SNL/NM), December 2012. *SWMU 49 and 116 Groundwater Monitoring, Mini-SAP for Fiscal Year 2013 Annual Sampling.* Environmental Restoration Operations, Sandia National Laboratories, New Mexico, December 17.

SNL January 2012 Sandia National Laboratories, New Mexico (SNL/NM), January 2012. *SWMU 49 and 116 Groundwater Monitoring, Mini-SAP for Fiscal Year 2012 Annual Sampling.* Environmental Restoration Operations, Sandia National Laboratories, New Mexico, January 3.

SNL February 2011 Sandia National Laboratories, New Mexico (SNL/NM), February 2011. *SWMU 49 and 116 Groundwater Monitoring, Mini-SAP for Fiscal Year 2011.* Environmental Restoration Operations, Sandia National Laboratories, New Mexico.

SNL March 2006 Sandia National Laboratories, New Mexico (SNL/NM), March 2006. *Justification for Class III Permit Modification, March 2006, SWMU 116 Operable Unit 1295 Building 9990 Septic System (Technical Area III),* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL October 2005 Sandia National Laboratories, New Mexico (SNL/NM), October 2005. *Annual Groundwater Monitoring Report, Fiscal Year 2004, Groundwater Protection Program,* Environmental Management Department, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2005 Sandia National Laboratories, New Mexico (SNL/NM), June 2005. *Request for Supplemental Information Responses and Proposals for Corrective Action Complete, Drain and Septic Systems SWMUs 49, 101, 116, 138, 149, 154, and 161, Drain and Septic Systems Round 9,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL May 2004 Sandia National Laboratories, New Mexico (SNL/NM), May 2004. *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Canyon Area,* Sandia Report SAND2004-2673P, May 2004.

SNL April 2004 Sandia National Laboratories, New Mexico (SNL/NM), April 2004. *Fiscal Year 2003 Annual Groundwater Monitoring Report," Report #75-10077-6,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL November 2001 Sandia National Laboratories, New Mexico (SNL/NM), November 2001. *Field Implementation Plan, Characterization of Non-Environmental Restoration Drain and Septic Systems,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2000 Sandia National Laboratories, New Mexico (SNL/NM), September 2000. *Environmental Restoration Project Responses to NMED Request for Supplemental Information, No Further Action Proposals (4th Round) Dated June 1996,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL October 1999 Sandia National Laboratories, New Mexico (SNL/NM), October 1999. *Sampling and Analysis Plan (SAP) for Characterizing and Assessing Potential Releases to the Environment from Septic and Other Miscellaneous Drain Systems at Sandia National Laboratories/New Mexico,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL November 1998 Sandia National Laboratories, New Mexico (SNL/NM), November 1998. *Environmental Restoration Project Responses to NMED Request for Supplemental Information, No Further Action Proposals (4th Round), Dated June 1996,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL February 1998 Sandia National Laboratories, New Mexico (SNL/NM), February 1998. *Revised Site-Wide Hydrogeologic Characterization Project, 1995 Annual Report,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 1996 Sandia National Laboratories, New Mexico (SNL/NM), June 1996. *Proposal for No Further Action, Environmental Restoration Site 116, Building 9990 Septic System, Operable Unit 1295,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 1993 Sandia National Laboratories, New Mexico (SNL/NM), March 1993. *Septic Tanks and Drainfields (ADS-1295) RCRA Facility Investigation Work Plan,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

WRCC-DRI 2012 Western Regional Climate Center - Desert Research Institute, 2012. *Historical climate information for National Weather Service Cooperative Network Station 290234 – Albuquerque, New Mexico, Weather Service Forecast Office at the Albuquerque International Sunport for the period of 1914 through 2005,* http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?nmalbu. Accessed 20 February 2012.

Attachment 9A
Solid Waste Management Unit 49
Analytical Results Tables

This page intentionally left blank.

Attachment 9A Tables

9A-1 Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B), Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 9A-5

9A-2 Method Detection Limits for High Explosive Compounds (EPA Method[g] SW846-8321A), Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 9A-6

9A-3 Summary of Nitrate plus Nitrite Results, Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 9A-7

9A-4 Summary of Alkalinity, Anion, Cation, and Total Cyanide Results, Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 9A-8

9A-5 Summary of Perchlorate Results, Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 9A-9

9A-6 Summary of Target Analyte List Metals and Uranium Results, Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 9A-10

9A-7 Summary of Gamma Spectroscopy, Gross Alpha, and Gross Beta Results, Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 9A-12

9A-8 Summary of Field Water Quality Measurements[h], Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 9A-13

Footnotes for Solid Waste Management Unit 49 Analytical Results Tables 9A-15

This page intentionally left blank.

Table 9A-1
Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B),
Solid Waste Management Unit 49 Groundwater Monitoring,
Sandia National Laboratories/New Mexico

Calendar Year 2013

Analyte	MDL[b] (µg/L)	Analyte	MDL[b] (µg/L)
1,1,1-Trichloroethane	0.300	Chlorobenzene	0.300
1,1,2,2-Tetrachloroethane	0.300	Chloroethane	0.300
1,1,2-Trichloroethane	0.300	Chloroform	0.300
1,1-Dichloroethane	0.300	Chloromethane	0.300
1,1-Dichloroethene	0.300	Cyclohexane	0.300
1,2,3-Trichlorobenzene	0.300	Dibromochloromethane	0.300
1,2,4-Trichlorobenzene	0.300	Dichlorodifluoromethane	0.300
1,2-Dibromo-3-chloropropane	0.300	Ethyl benzene	0.300
1,2-Dibromoethane	0.300	Isopropylbenzene	0.300
1,2-Dichlorobenzene	0.300	Methyl acetate	1.50
1,2-Dichloroethane	0.300	Methylcyclohexane	3.00
1,2-Dichloropropane	0.300	Methylene chloride	3.00
1,3-Dichlorobenzene	0.300	Styrene	0.300
1,4-Dichlorobenzene	0.300	Tert-butyl methyl ether	0.300
2,2-trifluoroethane, 1,1,2-Trichloro-1	1.50	Tetrachloroethene	0.300
2-Butanone	2.00	Toluene	0.300
2-Hexanone	2.20	Trichloroethene	0.300
4-methyl-, 2-Pentanone	1.50	Trichlorofluoromethane	0.300
Acetone	3.00	Vinyl chloride	0.300
Benzene	0.300	Xylene	0.300
Bromochloromethane	0.300	cis-1,2-Dichloroethene	0.300
Bromodichloromethane	0.300	cis-1,3-Dichloropropene	0.300
Bromoform	0.300	m-, p-Xylene	0.300
Bromomethane	0.300	o-Xylene	0.300
Carbon disulfide	1.50	trans-1,2-Dichloroethene	0.300
Carbon tetrachloride	0.300	trans-1,3-Dichloropropene	0.300

Refer to footnotes on page 9A-15.

Table 9A-2
Method Detection Limits for High Explosive Compounds (EPA Method[g] SW846-8321A), Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Analyte	MDL[b] (µg/L)
1,3,5-Trinitrobenzene	0.0842 – 0.0860
1,3-Dinitrobenzene	0.0842 – 0.0860
2,4,6-Trinitrotoluene	0.0842 – 0.0860
2,4-Dinitrotoluene	0.0842 – 0.0860
2,6-Dinitrotoluene	0.0842 – 0.0860
2-Amino-4,6-dinitrotoluene	0.0842 – 0.0860
2-Nitrotoluene	0.0863 – 0.0882
3-Nitrotoluene	0.0842 – 0.0860
4-Amino-2,6-dinitrotoluene	0.0842 – 0.0860
4-Nitrotoluene	0.158 – 0.161
HMX	0.0842 – 0.0860
Nitro-benzene	0.0842 – 0.0860
Pentaerythritol tetranitrate	0.105 – 0.108
RDX	0.0842 – 0.0860
Tetryl	0.0842 – 0.0860

Refer to footnotes on page 9A-15.

Table 9A-3
Summary of Nitrate plus Nitrite Results,
Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW5 24-Jan-13	Nitrate plus nitrite	1.79	0.085	0.250	10.0			093356-018	EPA 353.2
CYN-MW5 (Duplicate) 24-Jan-13	Nitrate plus nitrite	1.89	0.085	0.250	10.0			093357-018	EPA 353.2

Refer to footnotes on page 9A-15.

Table 9A-4
Summary of Alkalinity, Anion, Cation, and Total Cyanide Results,
Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW5	Bicarbonate Alkalinity	153	0.725	1.00	NE			093356-022	SM2320B
24-Jan-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093356-022	SM2320B
	Bromide	0.196	0.067	0.200	NE	J	J-	093356-016	SW846 9056
	Chloride	17.8	0.067	0.200	NE			093356-016	SW846 9056
	Fluoride	0.331	0.033	0.100	4.0			093356-016	SW846 9056
	Sulfate	27.4	0.133	0.400	NE			093356-016	SW846 9056
	Calcium	49.9	0.060	0.200	NE			093356-017	SW846 6020
	Magnesium	9.80	0.010	0.030	NE			093356-017	SW846 6020
	Potassium	2.14	0.080	0.300	NE			093356-017	SW846 6020
	Sodium	14.2	0.080	0.250	NE			093356-017	SW846 6020
	Total Cyanide	ND	0.00167	0.005	0.200	U		093356-027	SW846 9012A
CYN-MW5 (Duplicate)	Bicarbonate Alkalinity	154	0.725	1.00	NE			093357-022	SM2320B
24-Jan-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093357-022	SM2320B
	Bromide	0.162	0.067	0.200	NE	J	J-	093357-016	SW846 9056
	Chloride	17.7	0.067	0.200	NE			093357-016	SW846 9056
	Fluoride	0.331	0.033	0.100	4.0			093357-016	SW846 9056
	Sulfate	27.5	0.133	0.400	NE			093357-016	SW846 9056
	Calcium	55.4	0.300	1.00	NE			093357-017	SW846 6020
	Magnesium	10.0	0.010	0.030	NE			093357-017	SW846 6020
	Potassium	2.26	0.080	0.300	NE			093357-017	SW846 6020
	Sodium	14.9	0.080	0.250	NE			093357-017	SW846 6020
	Total Cyanide	ND	0.00167	0.005	0.200	U		093357-027	SW846 9012A

Refer to footnotes on page 9A-15.

Table 9A-5
Summary of Perchlorate Results,
Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Perchlorate Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW5 24-Jan-13	ND	0.004	0.012	NE	U		093356-020	EPA 314.0
CYN-MW5 (Duplicate) 24-Jan-13	ND	0.004	0.012	NE	U		093357-020	EPA 314.0

Refer to footnotes on page 9A-15.

Table 9A-6
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW5	Aluminum	0.0397	0.015	0.050	NE	J		093356-009	SW846 6020
24-Jan-13	Antimony	0.00101	0.001	0.003	0.006	B, J	0.011U	093356-009	SW846 6020
	Arsenic	0.00546	0.0017	0.005	0.010			093356-009	SW846 6020
	Barium	0.177	0.0006	0.002	2.00			093356-009	SW846 6020
	Beryllium	0.000207	0.0002	0.0005	0.004	J		093356-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093356-009	SW846 6020
	Calcium	64.0	0.300	1.00	NE		J	093356-009	SW846 6020
	Chromium	0.00272	0.002	0.010	0.100	B, J	0.011U	093356-009	SW846 6020
	Cobalt	0.0001	0.0001	0.001	NE	J		093356-009	SW846 6020
	Copper	0.00186	0.00035	0.001	NE	B	0.003U	093356-009	SW846 6020
	Iron	0.174	0.033	0.100	NE			093356-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093356-009	SW846 6020
	Magnesium	10.6	0.010	0.030	NE			093356-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093356-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093356-009	SW846 7470
	Nickel	0.00276	0.0005	0.002	NE			093356-009	SW846 6020
	Potassium	2.19	0.080	0.300	NE			093356-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		093356-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093356-009	SW846 6020
	Sodium	14.0	0.080	0.250	NE			093356-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093356-009	SW846 6020
	Uranium	0.000803	0.000067	0.0002	0.03			093356-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		093356-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093356-009	SW846 6020

Refer to footnotes on page 9A-15.

Table 9A-6 *(Concluded)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW5 (Duplicate)	Aluminum	0.0231	0.015	0.050	NE	J		093357-009	SW846 6020
24-Jan-13	Antimony	0.00114	0.001	0.003	0.006	B, J	0.011U	093357-009	SW846 6020
	Arsenic	0.00439	0.0017	0.005	0.010	J		093357-009	SW846 6020
	Barium	0.172	0.0006	0.002	2.00			093357-009	SW846 6020
	Beryllium	0.000252	0.0002	0.0005	0.004	J		093357-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093357-009	SW846 6020
	Calcium	56.4	0.300	1.00	NE		J	093357-009	SW846 6020
	Chromium	0.00292	0.002	0.010	0.100	B, J	0.011U	093357-009	SW846 6020
	Cobalt	0.000105	0.0001	0.001	NE	J		093357-009	SW846 6020
	Copper	0.00136	0.00035	0.001	NE	B	0.003U	093357-009	SW846 6020
	Iron	0.185	0.033	0.100	NE			093357-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093357-009	SW846 6020
	Magnesium	10.6	0.010	0.030	NE			093357-009	SW846 6020
	Manganese	0.00106	0.001	0.005	NE	J		093357-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093357-009	SW846 7470
	Nickel	0.00271	0.0005	0.002	NE			093357-009	SW846 6020
	Potassium	2.09	0.080	0.300	NE			093357-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		093357-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093357-009	SW846 6020
	Sodium	13.6	0.080	0.250	NE			093357-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093357-009	SW846 6020
	Uranium	0.000774	0.000067	0.0002	0.03			093357-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		093357-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093357-009	SW846 6020

Refer to footnotes on page 9A-15.

Table 9A-7
Summary of Gamma Spectroscopy, Gross Alpha, and Gross Beta Results, Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
CYN-MW5	Americium-241	8.09 ± 7.16	10.3	5.06	NE	U	BD	093356-033	EPA 901.1
24-Jan-13	Cesium-137	-0.507 ± 2.56	2.97	1.43	NE	U	BD	093356-033	EPA 901.1
	Cobalt-60	-0.662 ± 1.65	2.84	1.33	NE	U	BD	093356-033	EPA 901.1
	Potassium-40	-14.3 ± 30.3	36.6	17.5	NE	U	BD	093356-033	EPA 901.1
	Gross Alpha	1.47	NA	NA	15 pCi/L	NA	None	093356-034	EPA 900.0
	Gross Beta	4.55 ± 1.05	1.00	0.482	4mrem/yr		J	093356-034	EPA 900.0
CYN-MW5 (Duplicate)	Americium-241	-2.71 ± 7.09	12.0	5.86	NE	U	BD	093357-033	EPA 901.1
24-Jan-13	Cesium-137	-0.50 ± 2.39	4.21	2.00	NE	U	BD	093357-033	EPA 901.1
	Cobalt-60	0.538 ± 2.69	4.94	2.29	NE	U	BD	093357-033	EPA 901.1
	Potassium-40	-37.7 ± 67.1	58.4	27.4	NE	U	BD	093357-033	EPA 901.1
	Gross Alpha	2.20	NA	NA	15 pCi/L	NA	None	093357-034	EPA 900.0
	Gross Beta	3.99 ± 0.999	0.996	0.477	4mrem/yr		J	093357-034	EPA 900.0

Refer to footnotes on page 9A-15.

Table 9A-8
Summary of Field Water Quality Measurements[h],
Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
CYN-MW5	24-Jan-13	16.18	347	230.0	5.71	0.87	48.0	4.71

Refer to footnotes on page 9A-15.

This page intentionally left blank.

Footnotes for Solid Waste Management Unit 49 Analytical Results Tables

%	= percent.
μg/L	= micrograms per liter.
CFR	= Code of Federal Regulations.
EPA	= U.S. Environmental Protection Agency.
HMX	= octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
ID	= Identifier.
mg/L	= milligrams per liter.
mrem/yr	= millirem per year.
No.	= Number.
pCi/L	= picocuries per liter.
RDX	= hexahydro-1,3,5-trinitro-1,3,5-triazine.
Tetryl	= methyl-2,4,6-trinitrophenylnitramine.

[a]Result

Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 2A- 1-4).

Bold = Indicates the value exceeds the established MCL and/or MAC.

ND = not detected (at method detection limit). Activities of zero or less are considered to be not detected.

[b]MDL or MDA

MDL applies to the data listed in Tables 9A-1 through 9A-6. MDA applies to radiological data in Table 9A-7.

MDA = Minimum detectable activity. The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.

MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

NA = not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

[c]PQL or Critical Level

The PQL applies to Tables 9A-3 through 9A-6. Critical Level applies to Table 9A-7.

Critical Level = The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

NA = Not Applicable (for gross alpha activities). The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

[d]MCL

MCL = Maximum contaminant level. MCLs were established by the EPA Office of Water, National Primary Water Regulations (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- Gross alpha particle activity, excluding total uranium = 15 pCi/L (40 CFR Parts 9, 141, and 142,
- Table 2A-1-4).
- Beta and/or Gamma-emitting radionuclides (any combination) = 4 mrem/yr (as dose rate).
- Combined radium-226 and radium-228 MAC = 30 pCi/L.
- Combined radium-226 and radium-228 MCL = 5 pCi/L.

NE = Not Established.

Footnotes for Solid Waste Management Unit 49 Groundwater Analytical Results Tables (Concluded)

[e]Lab Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

B = Analyte was detected in the blank above the effective MDL.
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
NA = Not Applicable.
U = Analyte is absent or below the method detection limit.

[f]Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = Associated value is an estimated quantity.
J- = Associated numerical value is an estimated quantity with a suspected negative bias.
None = No data validation for corrected gross alpha activity.
U = Analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.

[g]Analytical Method

Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.

DOE, 1990, "EML [Environmental Measurements Laboratory] Procedures Manual," 27th ed., Vol. 1, Rev. 1992, HASL-300.

EPA, 1999 (and updates), "Perchlorate in Drinking Water Using Ion Chromatography," EPA 815/R-00-014.

EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.

EPA, 1984, "Methods for Chemical Analysis of Water and Wastes." EPA 600-4-79-020.

EPA, 1980, "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.

DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
HASL = Health and Safety Laboratory.
SM = Standard Method.

[h]Field Water Quality Measurements

Field measurements collected prior to sampling.

°C = degrees Celsius.
% Sat = percent saturation.
μmho/cm = micromhos per centimeter.
mg/L = milligrams per liter.
mV = millivolts.
NTU = nephelometric turbidity units.
pH = potential of hydrogen (negative logarithm of the hydrogen ion concentration).

Attachment 9B
Solid Waste Management Unit 49
Hydrographs

This page intentionally left blank.

Attachment 9B Hydrographs

9B-1 SWMU 49 Study Area Well 9B-5

This page intentionally left blank.

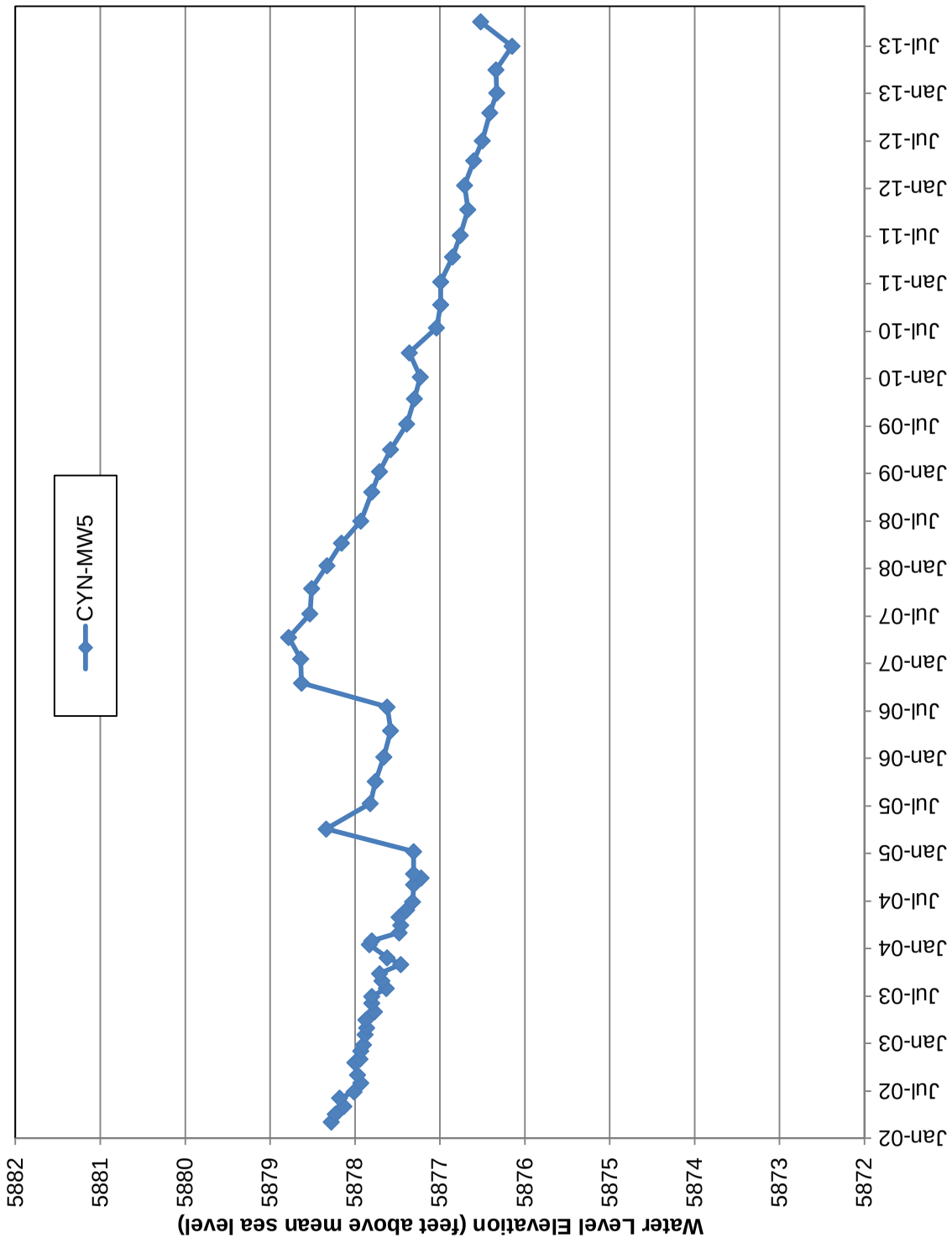


Figure 9B-1. SWMU 49 Study Area Well

This page intentionally left blank.

10.0 Solid Waste Management Unit 68

10.1 Introduction

This chapter summarizes the Calendar Year (CY) 2013 quarterly groundwater sampling events for Old Burn Site monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3, located within Solid Waste Management Unit (SWMU) 68 at Sandia National Laboratories, New Mexico (SNL/NM). The SNL/NM facility is a government-owned, contractor-operated, multi-program laboratory overseen by the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) through the Sandia Field Office in Albuquerque, New Mexico. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM under Contract DE-AC04-94AL85000.

Monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 were installed at SWMU 68 in August 2011. The installation report was approved by NMED in April 2012 (NMED April 2012). The installation and monitoring of these wells are designed to address the requirements of Section VII.D.6 of the Compliance Order on Consent (the Order) (NMED April 2004) between the New Mexico Environment Department (NMED), DOE, and Sandia, and the NMED letter dated April 8, 2010, from the NMED Hazardous Waste Bureau requiring additional corrective action at SWMU 68 (NMED April 2010).

Monitoring well OBS-MW1 was sampled on January 22, 2013; April 18, 2013; July 9, 2013; and October 8, 2013. Monitoring well OBS-MW2 was sampled on January 21, 2013; April 22, 2013; July 10, 2013; and October 7, 2013. Monitoring well OBS-MW3 was sampled on January 23, 2013; April 23, 2013; July 11, 2013; and October 09, 2013. The groundwater samples were collected in accordance with the NMED-approved Groundwater Characterization Work Plan (SNL September 2010) and Mini-Sampling and Analysis Plans (SAPs) (SNL December 2012, April 2013, June 2013, and September 2013a). The groundwater samples from each well were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), high explosive (HE) compounds, nitrate plus nitrite (NPN), major anions (as bromide, chloride, fluoride, and sulfate), major cations (as calcium, magnesium, potassium, and sodium), alkalinity, Target Analyte List (TAL) metals plus uranium, perchlorate, total cyanide, hexavalent chromium, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium.

Analytical results for the CY 2013 groundwater samples were compared with the U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) for drinking water (EPA 2009). No parameters were detected above established MCLs.

The eighth and final quarter of required groundwater sampling (NMED April 2010) was conducted in July 2013. During CY 2014, quarterly groundwater sampling and reporting will continue for the SWMU 68 groundwater monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 until NMED provides additional guidance.

10.1.1 Location

SWMU 68 is located in the Coyote Test Field, approximately 0.8 miles north of the southern boundary of Kirtland Air Force Base (KAFB), and approximately 0.6 miles to the west of the U.S. Forest Service Withdrawn Area (Figure 10-1). SWMU 68 encompasses approximately 6.5 acres of generally flat and gently westerly sloping terrain at an average elevation of approximately 5,860 feet (ft) above mean sea level (amsl).

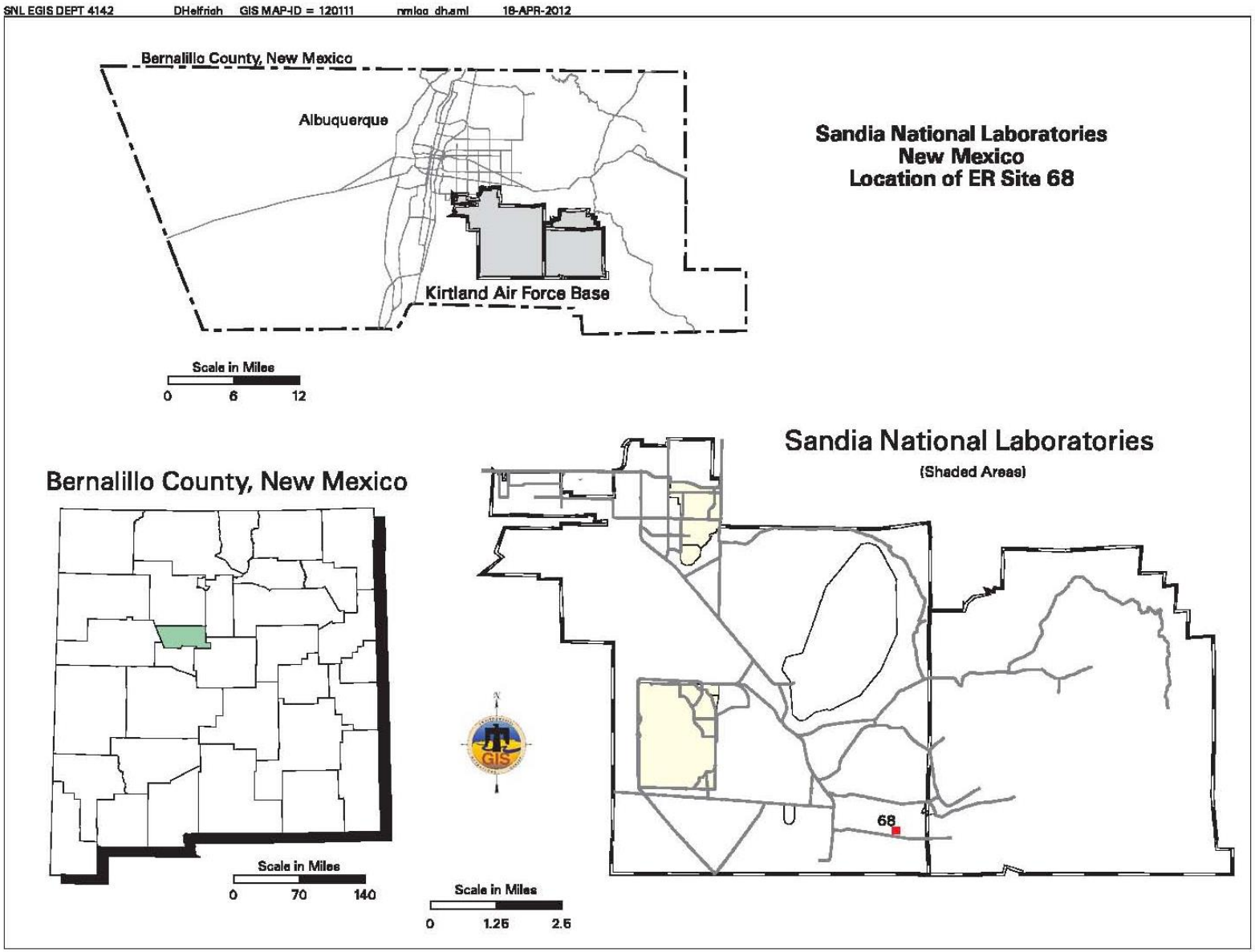


Figure 10-1. Location of SWMU 68

10.1.2 Site History

From 1965 to 1978, pool fire tests were conducted at SWMU 68 to study the effects of fire on weapons components and to determine the potential for release of radioactive material in case of a transportation (air, truck, and rail) accident. The primary fuel used for the pool fire tests was jet fuel. Prior to investigative and remedial activities that were completed in 2004 (Table 10-1), SWMU 68 consisted of an aboveground, approximately 3-ft deep, steel burn pool; a drainage ditch; an overflow basin; a rectangular burn pit that was once lined with plastic; three debris piles; and two irregularly shaped borrow pits.

From 1995 to 2004, multiple surveys and remediation projects were conducted at SWMU 68 to identify and remove nonhazardous and hazardous materials from the site. Wastes removed from SWMU 68 included soil contaminated with radionuclides and metals (primarily lead), assorted metal fragments, scrap metal, concrete, wire, scrap wood, cardboard, plastic fencing, and burn debris. All testing materials and features were removed. As a final measure, the disturbed areas were graded and reseeded in 2004.

A total of 499 confirmatory soil samples were collected at SWMU 68 from 1996 to 2004. Soil samples were collected from the plastic-lined pit, the overflow basin, the drainage ditch running from the burn pan to the overflow basin, the soil underneath the burn pan, and other remediated areas of the site. The sample results were used in the final risk assessment for SWMU 68.

In April 2004, the Order (NMED April 2004) specifically identified SWMU 68 as requiring additional investigation. All corrective action requirements pertaining to SWMUs are contained in the Order (NMED April 2004). Additional soil samples were collected in January 2005.

In September 2005, DOE/NNSA and Sandia submitted a letter to the NMED requesting a Corrective Action Complete (CAC) status determination for SWMU 68 (SNL September 2005). The NMED approved SWMU 68 as CAC without controls in October 2005 (NMED October 2005).

In March 2006, DOE/NNSA and Sandia submitted a letter to the NMED justifying a Class III Permit Modification Request for SWMU 68 (SNL March 2006). In April 2010, the NMED responded to the SNL/NM Permit Modification Request, stating that SWMU 68 required additional site characterization work, including the installation of three groundwater monitoring wells. The wells were required to be installed near the former locations of the burn pan and associated ditch/surface impoundment (Figure 10-2). The NMED also required the submittal of a well installation work plan (NMED April 2010).

DOE/NNSA and Sandia submitted a groundwater characterization work plan for the installation of three monitoring wells at SWMU 68 (SNL September 2010), which was approved by the NMED (January 2011). Three groundwater monitoring wells (OBS-MW1, OBS-MW2, and OBS-MW3) were installed at SWMU 68 in August 2011 (SNL November 2011) and the first quarterly groundwater sampling event occurred in October 2011.

Table 10-1. Historical Timeline of SWMU 68

Month	Year	Event	Reference
	Mid 1950s	The site was used for pool fire tests. Features at this testing site consisted of an aboveground earthen-bermed burn pan, drainage ditch and overflow basin, rectangular burn pit once lined with plastic, three debris piles, and two irregularly shaped borrow pits. Constituents of concern are metals, VOCs, SVOCs, and radionuclides.	SNL September 2005
	1981 & 1983	Cultural resources surveys were conducted at SWMU 68 in 1981 and again in 1983. No cultural resources were identified in either survey.	SNL February 1995
April	1987	SWMU 68 identified in the RCRA Facility Assessment Report.	EPA 1987
September	1987	SWMU 68 discussed in the Comprehensive Environmental Assessment and Response Program report.	DOE September 1987
September	1992	SWMU 68 added to Hazardous and Solid Waste Amendments module of the RCRA permit.	SNL September 1992
November	1993	KAFB EOD personnel conducted a visual survey for UXO/HE materials. No live ordnance found; only empty shells and shell fragments were found.	SNL September 1994
	1993-1994	Phase I surface radiation survey was conducted at SWMU 68. Gamma anomalies were identified and attributed to fragments of radioactive material buried just beneath the soil surface.	RUST Geotech, Inc. 1994
	1993-1994	Los Alamos National Laboratory conducts alpha radiation survey at SWMU 68. No readings above background detected.	Bounds 1994
June	1994	Sensitive species survey performed. No sensitive species were found.	IT Corporation 1995
October	1994	Draft RFI Work Plan submitted to NMED.	SNL October 1994
January-March	1995	Surface radiological VCM remediation conducted at SWMU 68**.** Point and small area sources identified during the 1993 Phase I survey were removed.	RUST Geotech, Inc. 1994
March	1995	NMED comments on RFI Work Plan received.	NMED March 1995
May	1995	DOE and SNL/NM ER responded to NMED comments on RFI Work Plan.	SNL May 1995
June	1995	SWMU 68 investigated as part of a site-wide scoping sampling program	Chain of custody
October	1995	DOE and SNL/NM ER performed a Housekeeping VCM and removed steel test stands and piping from the site and conducted screening of three debris mounds.	SNL November 1995
November	1995	EPA's NOD on Work Plan received. Additional sampling required at SWMU 68; consisting of sampling beneath debris piles for total constituents (metals and SVOCs); and collecting VOC samples at 3 ft beneath the overflow basin and plastic lined pit.	EPA 1995
January-March	1996	Resurveying of SWMU 68 performed. Point and area sources identified during this survey were removed during cleanup activities.	Lambert et al. 1997
February	1996	Response to EPA NOD on RFI Work Plan submitted.	SNL February 1996
August	1996	DOE and SNL/NM ER conducted RFI sampling. A buried concrete slab is discovered while trenching across the overflow basin. No elevated readings are measured on its surface. A large mound (68A Mound) is discovered.	Field logs

Table 10-1. Historical Timeline of SWMU 68 *(Continued)*

Month	Year	Event	Reference
August	1997	NMED issues RSI on the Work Plan. Additional soil sampling for VOCs, SVOCs, total metals, gross alpha/beta, and gamma spectroscopy needed at and below various features including below a shallow arroyo channel. The newly discovered mound, 68A, was administratively added as a subsite of SWMU 68.	NMED August 1997
November	1997	RSI responses submitted to NMED, agreeing to conduct additional soil and sediment sampling.	SNL November 1997
February	1998	Site-Wide Hydrological Characterization Project, Calendar Year 1995 Annual Report (SNL/NM December 1995) containing a description of SWMU 68 hydrogeology submitted to NMED.	SNL February 1998
March	1998	NMED issues NOD on the Work Plan. Additional soil sampling must be conducted and the large debris mound (68A) must be investigated.	NMED March 1998
May-June	1998	Surface radiological VCM activities continued to complete remediation of three area source anomalies. During the remediation a single area source, buried debris, and other materials were discovered. An area approximately 30 by 36 feet wide and 4 feet deep was excavated.	SNL July 1998
July	1998	Responses submitted to NMED on the Work Plan NOD.	SNL July 1998
August	1998	Soil vapor survey conducted at SWMU 68. Insignificant, trace concentrations of VOCs in soil vapor were detected.	
November/ December	1998	Geophysical surveys conducted at SWMU 68 around the burn pan and surrounding area to detect possible locations of additional buried waste; 68A Mound also surveyed. No anomalies indicative of buried waste were identified at either site.	Hyndman 1998
December	1998	Soil sampling conducted at SWMU 68. Additional sampling specified in the NOD is performed.	NMED March 1998
February	1999	Another soil mound discovered; this mound was trenched and sampled. No evidence for waste disposal was detected with field screening instruments or visually observed. No contamination was detected in the soil samples. Following regulator inspection and approval, the mound was leveled and the area graded.	Chain of Custody
August	2001	The soil piles and scrap materials were removed from the site and disposed of at appropriate off-site facilities.	Photos
April	2004	The Compliance Order on Consent identified SWMU 68 as requiring investigation.	NMED April 2004
May	2004	DOE/NNSA and SNL/NM ER requested radiological restrictions be removed from SWMU 68.	SNL May 2004a
July	2004	Removal of radiological restrictions approved by Sandia Field Office.	NNSA July 2004
October	2004	VCA Plan for SWMU 68; excavation of lead-contaminated soil. Conducted confirmatory sampling and removed debris from other areas at SWMU 68.	SNL October 2004
January	2005	Soil sampling of the earthen berm was conducted. The soil used to create the earthen berm surrounding the burn pan assembly at SWMU 68 was the last remaining area at the site with the potential for radiological contamination. Removal of the earthen berm completed in order to remove the burn pan assembly and restore the site to acceptable conditions for closure.	SNL January 2005
September	2005	Final investigation report and proposal for CAC submitted to NMED.	SNL September 2005
October	2005	Letter received approving CAC without controls for SWMU 68.	NMED October 2005

Table 10-1. Historical Timeline of SWMU 68 *(Concluded)*

Month	Year	Event	Reference
March	2006	Request for Class III Permit Modification submitted.	SNL March 2006
June	2009	NMED decision to remove SWMU 68 from the CAC process.	SNL June 2009
April	2010	Letter from NMED formally stating requirements for corrective action at SWMU 68.	NMED April 2010
September	2010	SWMU 68 Groundwater Characterization Work Plan submitted to NMED (in response to April 8, 2010 letter).	SNL September 2010
January	2011	NMED approves SWMU 68 Work Plan.	NMED January 2011
June	2011	Request for Extension to Complete the Well Installation Report for SWMUs 8/58 and 68 submitted.	SNL June 2011
August	2011	Monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 installed.	SNL November 2011
August	2011	NMED approves the Request for Extension to complete the Well Installation Report for SWMUs 8/58 and 68.	NMED August 2011
October	2011	First quarterly sampling event for monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 at SWMU 68 conducted.	SNL September 2012
November	2011	Well Installation Report for SWMU 68 submitted.	SNL November 2011
January	2012	Slug tests performed on monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3.	SNL June 2012
April	2012	NMED approved the Well Installation Report for SWMUs 8/58 and 68	NMED April 2012
June	2012	Hydraulic conductivity calculated for monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3.	SNL June 2012
July	2013	The eighth and final sampling event required by NMED for monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 was completed.	SNL June 2013

NOTES:
CAC = Corrective Action Complete.
DOE = U.S. Department of Energy.
EOD = Explosive Ordnance Disposal.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
HE = High explosive.
KAFB = Kirtland Air Force Base.
NMED = New Mexico Environment Department.
NNSA = National Nuclear Security Administration.
NOD = Notice of Disapproval.
OBS = Old Burn Site.
RCRA = Resource Conservation and Recovery Act.
RFI = RCRA Facility Investigation.
RSI = Request for Supplemental Information.
SNL = Sandia National Laboratories.
SNL/NM = Sandia National Laboratories, New Mexico.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.
UXO = Unexploded ordnance.
VCA = Voluntary Corrective Action.
VCM = Voluntary Corrective Measure.
VOC = Volatile organic compound.

10.1.3 Monitoring History

In 2011, SNL/NM personnel installed three groundwater monitoring wells at SWMU 68 (SNL November 2011) as shown in Figure 10-2. These three monitoring wells were sampled for the first time in October 2011 as described in Section 10.1 and have been sampled quarterly since then.

10.1.4 Current Monitoring Network

Currently there are three groundwater monitoring wells at SWMU 68 (Figure 10-2). Monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 are monitored quarterly for VOCs, SVOCs, HE compounds, NPN, major anions (as bromide, chloride, fluoride, and sulfate), major cations (as calcium, magnesium, potassium, and sodium), alkalinity, TAL metals plus uranium, perchlorate, total cyanide, hexavalent chromium, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium.

10.1.5 Summary of Calendar Year 2013 Activities

The following activities occurred for SWMU 68 in CY 2013:

- Quarterly groundwater sampling was conducted at monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 in January, April, July and October 2013 (SNL December 2012, April 2013, June 2013, and September 2013a).
- Quarterly reporting of analytical results from monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 was conducted.
- Tables of analytical results (Attachment 10A) and hydrographs (Attachment 10B) were prepared in support of this report.

10.1.6 Summary of Future Activities

The following activities are anticipated for SWMU 68 during CY 2014:

- Quarterly groundwater sampling at monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 will continue in CY 2014 unless additional guidance is provided by NMED.
- Quarterly and annual reporting of chemical analyses for monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 groundwater samples will be performed.

10.1.7 Current Conceptual Model

This section presents a comprehensive discussion of the hydrogeologic regime, conceptual site model, and previous contaminant findings for SWMU 68.

10.1.7.1 Regional Hydrogeologic Conditions

SWMU 68 is located in the central portion of the Coyote Test Field, approximately 7 miles southeast of Technical Area I and 0.5 miles southwest of the Starfire Optical Range. SWMU 68 covers approximately 6.5 acres of generally flat and gently westerly sloping terrain at an average elevation of approximately 5,860 ft amsl. The site is sparsely vegetated by bunch grasses, cacti, and a few junipers. No perennial surface water features such as springs are located within 1 mile of SWMU 68. A minor arroyo is located approximately 300 ft north of SWMU 68, but trends from east to west and does not cross the site.

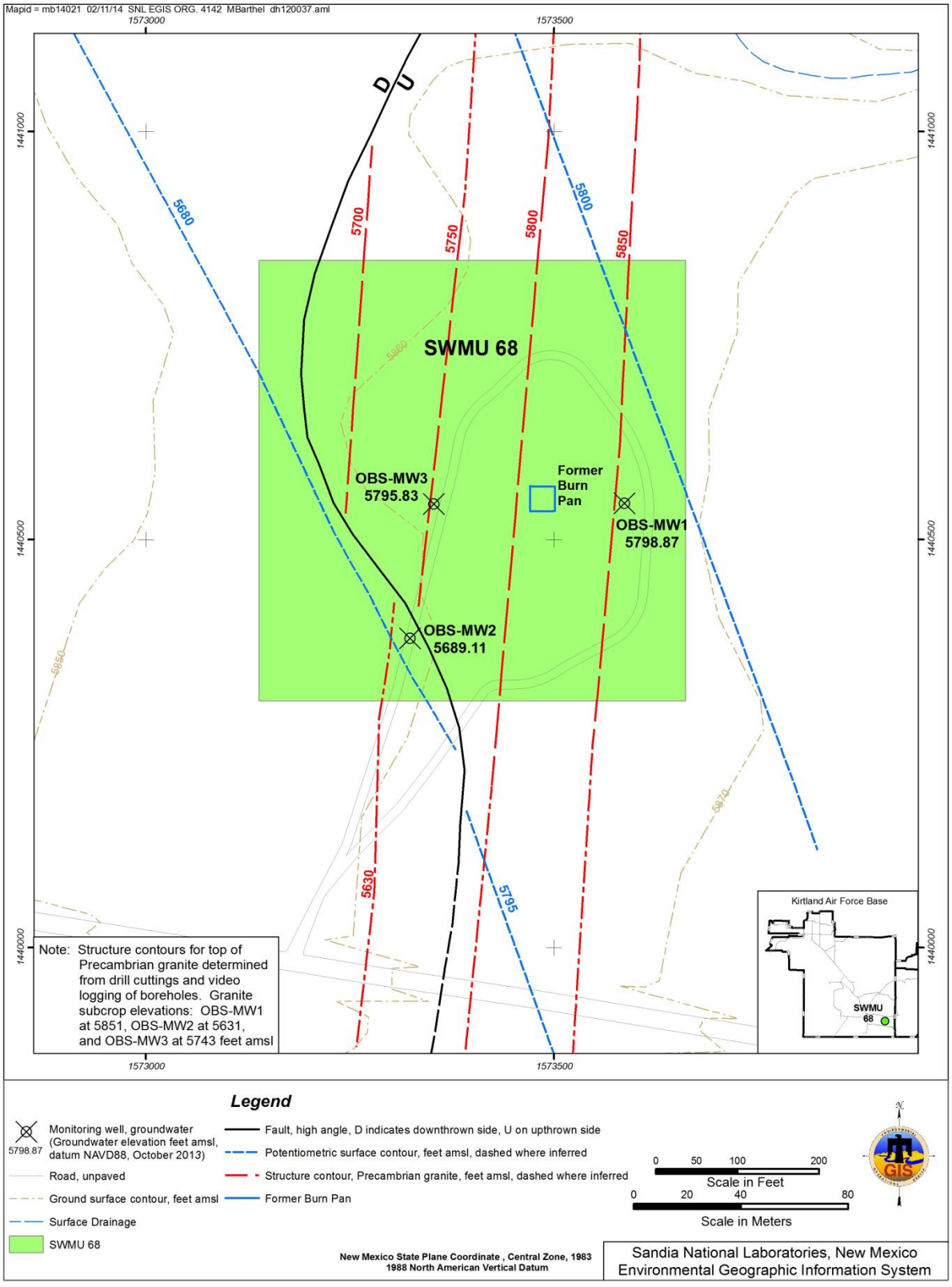


Figure 10-2. Groundwater Monitoring Wells OBS-MW1, OBS-MW2, and OBS-MW3 Installed at SWMU 68

In the mid-1990s, the Site-Wide Hydrogeologic Characterization Project conducted extensive mapping of the surface geology in the Coyote Test Field (GRAM and Lettis 1995). SWMU 68 is located approximately 1 to 2 miles to the west of the mountain front that undulates along the western edge of the Manzanita Mountains. The mountain front is defined as the slope break between the nearly horizontal alluvial fan sediments and the bedrock outcrops that comprise the mountains. Most of SWMU 68 is covered with a thin veneer of soil and unconsolidated alluvial fan sediments that have a combined maximum thickness of approximately 5 ft. Paleozoic limestone of the Madera Group outcrops at the northwest portion of the site. The Coyote Fault trends north to south across the eastern edge of the site and is buried by soil and sediment. At KAFB, the Coyote Fault consists of a series of high-angle faults and splays with a composite down to the west displacement of approximately 700 to 1,000 ft.

The regional potentiometric surface map (Plate 1) shows that groundwater flow is generally toward the west in the vicinity of SWMU 68. Topographic features and faults modify the flow direction at various locations. Faults to the west of the site may serve as hydraulic barriers or conduits depending on the type and amount of fault gouge.

10.1.7.2 Hydrogeologic Conditions at SWMU 68

The amount of precipitation available for groundwater recharge is minimal due to scant rainfall and high evapotranspiration. Summer (monsoonal) thunderstorms are responsible for the majority of rainfall. The average rainfall, as measured at the nearest active rain gauge (the National Weather Service station at the Albuquerque International Sunport), during the period from 1915 through 2005 was 8.67 inches per year (in/yr) (WRCC-DRI 2012). The station is located 10 miles northwest of SWMU 68 at an elevation of 5,310 ft amsl. By extrapolation of the precipitation model presented in SNL/NM conceptual model of groundwater flow and contaminant transport for Lurance Canyon (SNL May 2004b), the average annual precipitation for SWMU 68, where the elevation averages approximately 5,860 ft amsl, is estimated to be approximately 11 in/yr. Intense sunlight and low humidity throughout much of the year creates high rates of evapotranspiration. Estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL February 1998).

Three monitoring wells (OBS-MW1, OBS-MW2, and OBS-MW3) were installed at SWMU 68 using the air-rotary casing hammer drilling method in August 2011 (SNL November 2011). No petroleum odors, stains, or sheens were observed on the cuttings or groundwater samples. During drilling of the three boreholes, groundwater was encountered at depths ranging from approximately 135 to 240 ft below ground surface (bgs), and was dependent on the depth of the uppermost water-bearing fracture at a particular borehole (Table 10-2). Monitoring wells OBS-MW1 and OBS-MW3 are located closest to the former location of the burn pan and are most similar. Therefore, these two wells are discussed first as follows.

At the monitoring well OBS-MW1 borehole, poorly sorted sand was encountered from the ground surface to a depth of approximately 3 ft bgs. Hard limestone, most likely of the Sandia Formation, was encountered from 3 to 18 ft bgs. The Precambrian granite contact was at 18 ft bgs. Saturated granitic cuttings were encountered at 135 ft bgs, and monitoring well OBS-MW1 was screened in granite at 135 to 155 ft bgs (Table 10-2).

At the monitoring well OBS-MW3 borehole, soil and silty gravelly sand were encountered from the ground surface to a depth of approximately 2 ft bgs. Hard cherty limestone, most likely of the Madera Group, was encountered from 2 to 102 ft bgs. A conglomerate layer extended from 102 to 105 ft bgs. A sequence of the Sandia Formation consisting of coarse sandstone, claystone, black shale, and limestone was encountered from 105 to 120 ft bgs. The Precambrian granite contact was at 120 ft bgs. Saturated granitic cuttings were encountered at 190 ft bgs. Monitoring well OBS-MW3 was screened in Precambrian granite at an interval of 190 to 210 ft bgs (Table 10-2).

Table 10-2. Lithologic and Hydrogeologic Elevation Data for Monitoring Wells at SWMU 68

Monitoring Well	Ground Surface Elevation (ft amsl)	Depth to Granite (ft bgs)	Top Granite Elevation (ft amsl)	Depth to Uppermost Saturated Fracture (ft bgs[a])	Elevation of Uppermost Saturated Fracture (ft amsl[a])	Depth of Screened Interval (ft bgs)	Potentiometric Surface October 2013 (ft amsl)	Mid-Point Screen Elevation (ft amsl)	Pressure Head (ft[b])
OBS-MW1	5869.08	18	5851	135	5734	135 - 155	5798.87	5724.10	75
OBS-MW2	5860.75	230	5631	240	5621	234 - 254	5689.11	5616.80	72
OBS-MW3	5863.31	120	5743	190	5673	190 - 210	5795.83	5663.30	133

NOTES:
[a]Observed during drilling.
[b]From mid-point of screen.
amsl = Above mean sea level.
bgs = Below ground surface.
ft = Foot (feet).
MW = Monitoring Well.
OBS = Old Burn Site.
SWMU = Solid Waste Management Unit.

At the monitoring well OBS-MW2 borehole, poorly sorted sand was encountered from the ground surface to a depth of approximately 3 ft bgs. Hard cherty limestone, most likely of the Madera Group, was encountered from 3 to 184 ft bgs. From 184 to 190 ft bgs, sandstone of the Sandia Formation was encountered. Limestone was encountered from 190 to 205 ft bgs. No drill cuttings were returned from 205 to 305 ft bgs where the borehole apparently intercepted a splay of the Coyote Fault. Saturated granitic cuttings were returned starting at 305 ft bgs. Video logging of the borehole was used for selecting the screen depth. The flowing groundwater visible on the video log from approximately 240 to 250 ft bgs represents the uppermost saturated fracture zone. The well was screened across the flowing zone at 234 to 254 ft bgs.

Because cloudy water obscured the borehole lithology below a depth of 182 ft bgs and no drill cuttings were returned from 205 to 305 ft bgs at monitoring well OBS-MW2 borehole, the lithology of the screened interval has been inferred using the geochemical composition of water samples that were collected during CY 2013. As shown on the Piper diagram (Figure 10-3), the geochemical composition is similar, nearly identical, for groundwater samples collected from all three of the wells. The similar geochemical signature is indicative of a single water source and hydrofacies. The CY 2013 Piper diagram and interpretation of a single water source is consistent with the data and interpretation provided in the Calendar Year 2011 and 2012 Annual Groundwater Reports (SNL September 2012, September 2013b) Because the completion zones are well known for monitoring wells OBS-MW1 and OBS-MW3, it is postulated that monitoring well OBS-MW2 is also screened in fractured granite. The groundwater composition for all three wells is of the bicarbonate type and dominated by calcium.

An unusually large volume of sand pack was required for building monitoring well OBS-MW2. A total of 125 bags of sand were used to fill the annulus from the bottom of the sump to the required height above the screen. A monitoring well of similar design would typically be expected to require approximately 25 bags of sand. The large annular volume for monitoring well OBS-MW2 indicates that a borehole with a much larger than normal diameter was created during the drilling process and/or a void exists along the fault zone. The large amount of sand pack was considered when slug tests were interpreted.

Structure contours for the granite subcrop are shown in Figure 10-4 with the corresponding elevations listed in Table 10-2. The amount of throw on the fault splay is estimated to be approximately 110 ft. The orientation of the fault splay and the structure contours are interpreted to mimic the north-south structural grain of the Manzanita Mountains and associated faults. The fault splay is probably high-angle with a down to the west offset.

The potentiometric surface contours for SWMU 68 are shown in Figure 10-4. The water-level elevation in monitoring well OBS-MW1 was 3.04 ft higher than monitoring well OBS-MW3 in October 2013. The distance between the two wells is 248 ft. The horizontal gradient between monitoring wells OBS-MW1 and OBS-MW3 is approximately 0.01 feet per foot to the west. The groundwater elevation at monitoring well OBS-MW2 is much lower by approximately 110 ft and indicates that the fault splay is a hydraulic barrier between monitoring well OBS-MW2 and the other two monitoring wells (OBS-MW1 and OBS-MW3). The potentiometric surface at each well is above the top of each respective screen and is indicative of semi-confined or confined conditions in the SWMU 68 area.

During sampling, the drawdown in each of the three wells was not excessive. The quantity of water produced by each well was clearly adequate for typical groundwater sampling. Groundwater samples were collected using pneumatic (nitrogen gas) Bennett™ piston pumps. Slug tests were performed on monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 in January 2012. Calculated hydraulic conductivity values for the three monitoring wells varied from 3.02×10^{-4} to 5.22×10^{-2} feet per minute (SNL June 2012). It should be noted that the slug test analyses were developed for use in

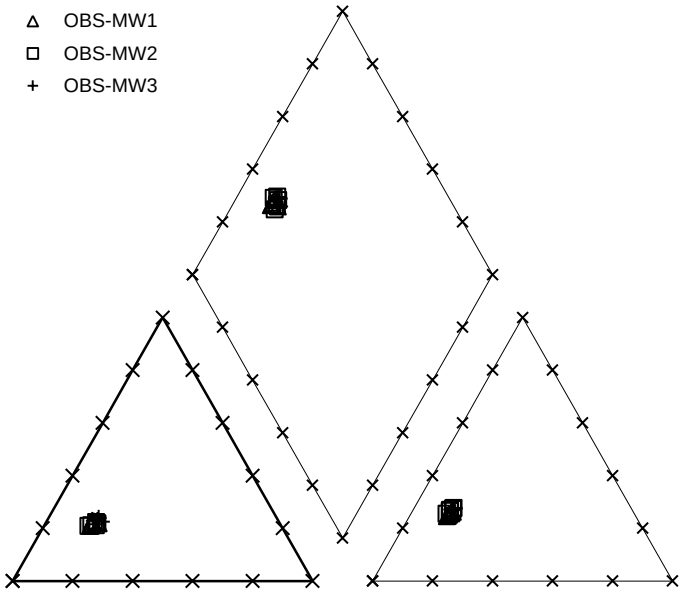


Figure 10-3. Piper Trilinear Diagram of Major Ion Chemistry for Monitoring Wells OBS-MW1, OBS-MW2, and OBS-MW3 at SWMU 68, CY 2013

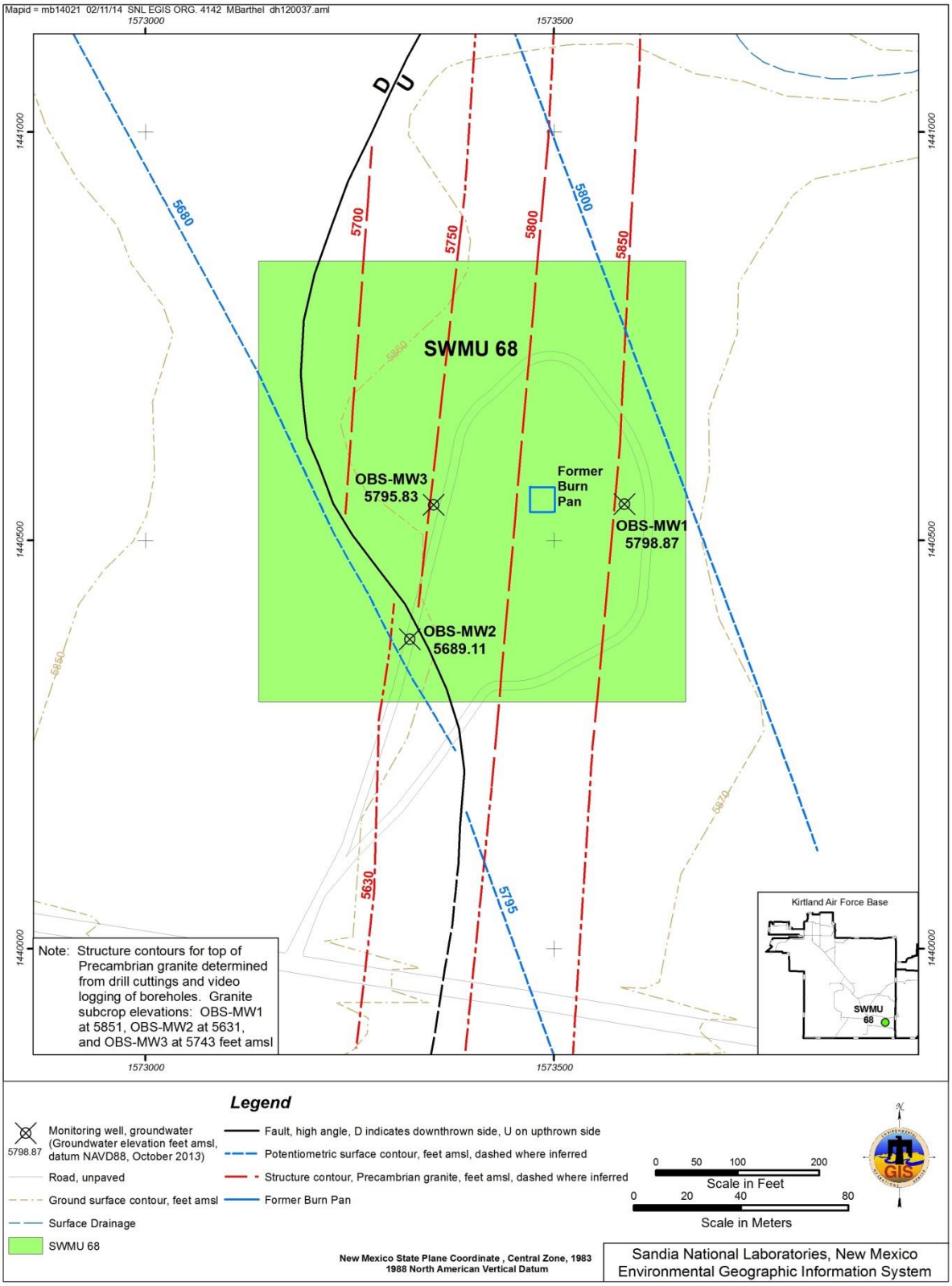


Figure 10-4. SWMU 68 Potentiometric Surface Map (October 2013)

unconsolidated deposits and analyses of bedrock aquifers are dominated by fracture flow. The results for monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 are within the range of conductivities (10^{-5} to 10^{-2} feet per minute) determined for the regional aquifer within the unconsolidated Santa Fe Group sediments west of SWMUs 8/58 and SWMU 68 (SNL March 1999). This qualitatively suggests that fracture flow at the SWMU 68 wells is capable of moving significant amounts of groundwater.

10.1.7.3 Conceptual Site Model for SWMU 68

The conceptual site model for SWMU 68 is based on the findings from three on-site monitoring wells (OBS-MW1, OBS-MW2, and OBS-MW3), several nearby monitoring wells located across the Coyote Test Field (Plate 1), and extensive field mapping conducted by the Site-Wide Hydrogeologic Characterization Project (GRAM and Lettis 1995). The site is relatively flat and slopes gently to the west. No arroyos or perennial surface water bodies are located near the site. The infrequent storm water drains westward across the site and typically dissipates nearby on the flat terrain. Most of the site is covered by a thin layer of soil. Madera Group limestone outcrops at the northwest corner of the site.

The August 2011 drilling encountered Paleozoic units (limestone, sandstone, claystone, and shale) overlying Precambrian granite. Groundwater was encountered in fractured granite at depths ranging from approximately 135 to 240 ft bgs, and was dependent on the depth of the uppermost water-bearing fracture at a particular borehole. Groundwater in the SWMU 68 area occurs in a fractured bedrock system under semi-confined or confined conditions. The geochemical signature is of the bicarbonate type dominated by calcium.

The overlying granitic bedrock with naturally filled fractures probably serves as the confining layer. A buried splay of the Coyote Fault trends across the western side of the site and restricts the migration rate of groundwater. The amount of throw is estimated to be 110 ft. The hydraulic gradient on the east side of the fault is approximately 0.01 feet per foot to the west. The amount of precipitation available for groundwater recharge is minimal due to the scant rainfall (approximately 9 in/yr) and high evapotranspiration rates. Seasonal effects probably do not influence groundwater levels near the site. Groundwater from the site probably discharges to the unconsolidated basin fill deposits (primarily the Santa Fe Group) of the Albuquerque Basin after crossing the Sandia and Tijeras faults (SNL February 1998). No potable water supply wells are located within 6 miles of the site.

10.1.7.4 Contaminant Sources

At SWMU 68, soil contamination was suspected at the burn pan, the overflow basin, a plastic-lined pit, and three shallow earthen pits. During 1995 to 2004, radiological and ordnance surveys were conducted and hazardous materials were removed. Additional remedial activities were conducted in 2004, and all the testing features were removed. Approximately 425 cubic yards of lead-contaminated soil and 3 cubic ft of radiologically contaminated soil were removed along with approximately 120 cubic yards of construction debris. Confirmatory soil sampling was conducted in 2004 to validate the results of the soil removal activities. Human health and ecological risk assessments show that the remaining constituents of concern concentrations in soil are acceptable for both industrial and residential land use scenarios.

10.1.7.5 Contaminant Distribution and Transport in Groundwater

Three groundwater monitoring wells were installed at SWMU 68 in August 2011. During CY 2013 groundwater samples were collected from monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3. Analytical parameters included VOCs, SVOCs, HE compounds, NPN, major anions, major cations, alkalinity, TAL metals plus uranium, hexavalent chromium, perchlorate, total cyanide, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium. No parameters were detected above established MCLs.

10.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM Environmental Restoration (ER) Operations (formerly ER Project) and implements and enforces federal regulations mandated by the Resource Conservation and Recovery Act (RCRA). All ER Operations SWMUs are listed in Module IV of the SNL/NM RCRA Permit, *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518* (NMED 1993).

In April 2004, the Order (NMED April 2004) specifically identified SWMU 68 as requiring investigation. All corrective action requirements pertaining to SWMU 68 are contained in the Order (NMED April 2004).

In September 2005, DOE/NNSA and Sandia submitted a letter to the NMED requesting a CAC status determination for SWMU 68 (SNL September 2005). The NMED approved SWMU 68 as CAC without controls in October 2005 (NMED October 2005).

On March 1, 2006, DOE/NNSA and Sandia submitted a letter to the NMED justifying a Class III Permit Modification Request for SWMU 68 (SNL March 2006). On April 8, 2010, the NMED responded to the Permit Modification request, stating that SWMU 68 required additional site characterization work, including the installation of three groundwater monitoring wells near the previous locations of the burn pan and associated ditch/surface impoundment. The NMED also required the submittal of a well installation work plan (NMED April 2010). On September 23, 2010, DOE/NNSA and Sandia responded to the NMED by submitting a groundwater characterization work plan for the installation of three monitoring wells at SWMU 68 (SNL September 2010). The NMED responded to the SNL/NM September 2010 submittal in January 2011, and approved the SWMU 68 well installation work plan (NMED January 2011).

Monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 were installed in August 2011 and quarterly sampling began in October 2011. The well installation report describing field activities was submitted to NMED in November 2011. The eighth and final sampling event required by NMED for monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 was completed in July 2013.

In this report, monitoring data for SWMU 68 are presented for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (gamma spectroscopy, gross alpha/beta activity, and tritium) are provided voluntarily by the DOE/NNSA and Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Order, as specified in Section III.A of the Order (NMED April 2004).

10.3 Scope of Activities

The field activity discussed in this section is groundwater monitoring sampling and analysis during CY 2013 sampling events (Table 10-3). The analytical parameters for monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 for each sampling event are listed in Table 10-4.

Table 10-3. Groundwater Monitoring Well Network and Sampling Dates for SWMU 68, Calendar Year 2013

Date of Sampling Event	Monitoring Wells Sampled	SAP
January 2013	OBS-MW1 OBS-MW2 OBS-MW3	*SWMU 68 Groundwater Monitoring Mini-SAP for Second Quarter Fiscal Year 2013* (SNL December 2012)
April 2013	OBS-MW1 OBS-MW2 OBS-MW3	*SWMU 68 Groundwater Monitoring Mini-SAP for Third Quarter Fiscal Year 2013* (SNL April 2013)
July 2013	OBS-MW1 OBS-MW2 OBS-MW3	*SWMU 68 Groundwater Monitoring Mini-SAP for Fourth Quarter Fiscal Year 2013* (SNL June 2013)
October 2013	OBS-MW1 OBS-MW2 OBS-MW3	*SWMU 68 Groundwater Monitoring Mini-SAP for First Quarter Fiscal Year 2014* (SNL September 2013a)

NOTES:
MW = Monitoring well.
OBS = Old Burn Site.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories.
SWMU = Solid Waste Management Unit.

Table 10-4. Parameters Sampled at SWMU 68 for Each Sampling Event, Calendar Year 2013

Parameter	Sampling Period	
Anions	**January 2013**	**April 2013**
Alkalinity	OBS-MW1	OBS-MW1
Filtered Cations	OBS-MW1 (dup)	OBS-MW2
Gamma Spec*	OBS-MW2	OBS-MW3
Gross Alpha	OBS-MW3	OBS-MW3 (dup)
Gross Beta		
HE compounds		
Hexavalent Chromium	**July 2013**	**October 2013**
Isotopic Uranium	OBS-MW1	OBS-MW1
NPN	OBS-MW2	OBS-MW1 (dup)
Perchlorate	OBS-MW2 (dup)	OBS-MW2
SVOCs	OBS-MW3	OBS-MW3
TAL Metals, plus Total Uranium		
Total Cyanide		
VOCs		

NOTES:
Dup = Duplicate sample.
Gamma Spec* = Gamma spectroscopy short list (Americium-241, Cesium-137, Cobalt-60, and Potassium-40).
HE = High explosive.
NPN = Nitrate plus nitrate (reported as nitrogen).
SVOC = Semivolatile organic compound.
TAL = Target Analyte List.
VOC = Volatile organic compound.

10.4 Field Methods and Measurements

According to the requirements of Section VII.D.6 of the Order (NMED April 2004) and the NMED letter of April 8, 2010 (NMED April 2010), groundwater sampling was performed at SWMU 68. The CY 2013 sampling events were conducted in conformance with appropriate SNL/NM Field Operating Procedures for groundwater sampling activities, the SWMU 68 site-specific SAP (SNL/NM September 2010), and the SWMU 68 site-specific Mini-SAPs (SNL December 2012, April 2013, June 2013, and September 2013a).

Groundwater samples were collected from monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 in January, April, July, and October 2013. Samples were submitted to GEL Laboratories, LLC for all chemical analyses. All samples were analyzed for VOCs, SVOCs, HE compounds, NPN, major anions (as bromide, chloride, fluoride, and sulfate), major cations (as calcium, magnesium, potassium, and sodium), alkalinity, TAL metals plus uranium, hexavalent chromium, perchlorate, total cyanide, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium.

The monitoring procedures for SWMU 68 are consistent with the procedures identified in the EPA technical enforcement guidance document (EPA 1986) and are described in detail in Section 1.3.

The NMED DOE Oversight Bureau collected split samples with Sandia during April and July 2013 sampling events. The NMED DOE Oversight Bureau analytical results are not reported in this document, but are available through the DOE NNSA Sandia Field Office.

10.5 Groundwater Elevation

During the quarterly CY 2013 sampling, water level measurements were obtained to determine groundwater flow directions, hydraulic gradients, and changes in potentiometric surface elevations. The CY 2013 water level information was used to create the base-wide potentiometric surface map discussed in Section 2.6.2.2 and shown in Plate 1. The potentiometric surface contours presented in Figure 10-4 are derived from the base-wide potentiometric surface map. The hydrograph for SWMU 68 monitoring wells is shown in Figures 10B-1 (Attachment 10B).

10.6 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using EPA- and DOE-specified protocols described in Section 1.3.2 (Tables 1-5 and 1-6). Parameters analyzed and sampling periods in CY 2013 are presented in Table 10-4.

10.7 Summary of Analytical Results

This section discusses analytical results and field measurements for the CY 2013 SWMU 68 sampling events. Data are presented in Tables 10A-1 through 10A-11 (Attachment 10A). Data qualifiers are explained in the footnotes following Table 10A-11. Analytical reports, including certificates of analyses, analytical methods, method detection limits (MDLs), practical quantitation limits (PQLs), dates of analyses, results of quality control (QC) analyses, and data validation findings are filed in the SNL/NM Records Center.

The analytical data were reviewed and qualified in accordance with SNL/NM Administrative Operating Procedure 00-03 (SNL May 2011). No problems were identified with the analytical data that resulted in qualification of the data as unusable. The data are acceptable and reported QC measures are adequate.

In CY 2013 no SWMU 68 groundwater samples detected any VOCs, SVOCs, or HE compounds above laboratory MDLs. Table 10A-1 lists the MDLs for associated VOCs, Table 10A-2 the MDLs for SVOCs, and Table 10A-3 the MDLs for HE compounds.

Table 10A-4 (Attachment 10A) summarizes NPN results. NPN values were compared with the nitrate MCL of 10 mg/L. NPN was not detected above the MCL in any groundwater sample. NPN concentrations range from 1.21 to 1.95 mg/L.

Table 10A-5 (Attachment 10A) summarizes alkalinity, major anion (as bromide, chloride, fluoride, and sulfate) and total cyanide results. No parameters were detected above established MCLs.

Perchlorate was not detected above the screening level/MDL of 0.004 mg/L (NMED April 2004) in any of the SWMU 68 groundwater sample. Table 10A-6 (Attachment 10A) presents the perchlorate results.

Hexavalent chromium results are summarized in Table 10A-7 (Attachment 10A). No hexavalent chromium was detected above laboratory MDLs. No MCL is established for hexavalent chromium.

TAL metals plus uranium were analyzed in samples from all SWMU 68 monitoring wells. No metal parameters were detected above established regulatory limits in any groundwater sample. Metal results are summarized in Table 10A-8 (Attachment 10A).

Filtered fractions for major cations as calcium, magnesium, potassium, and sodium were analyzed in all SWMU 68 samples. The results are summarized in Table 10A-9 (Attachment 10A). No MCLs are established for these analytes.

The results for gamma spectroscopy, gross alpha, gross beta, and isotopic uranium are presented in Table 10A-10 (Attachment 10A). Gross alpha activity is measured as a screening tool and in accordance with 40 Code of Federal Regulations, Parts 9, 141, and 142, Table I-4 does not include uranium, which is measured independently. Therefore, gross alpha activity measurements were corrected by subtracting the total uranium activity. Radiological results are further reviewed by an SNL/NM Certified Health Physicist to assure that the samples are nonradioactive. All radionuclide activity results are below MCLs, where established.

Table 10A-11 (Attachment 10A) summarizes field water quality measurements collected prior to sampling. Field water quality measurements include turbidity, pH, temperature, specific conductance, oxidation-reduction potential, and dissolved oxygen.

10.8 Quality Control Results

Field and laboratory QC samples were prepared to determine the accuracy of the methods used and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process. The results for each QC sample and the impact on data quality for the SWMU 68 quarterly sampling events are discussed in the following sections.

10.8.1 Field Quality Control Samples

Field QC samples included duplicate environmental samples, field blanks (FBs), trip blanks (TBs), and equipment blanks (EBs). The following sections discuss the analytical results for each QC sample type.

10.8.1.1 Duplicate Environmental Samples

Duplicate environmental samples were analyzed to estimate the overall reproducibility of the sampling and analytical process. Relative percent difference (RPD) calculations, between duplicate samples, were performed for detected chemical analytes. Duplicate environmental samples were collected and analyzed in January, April, July, and October 2013 (Table 10-4). Results show good agreement (RPD values less than 20 percent for organic compounds and less than 35 for inorganic analyses), with the following exceptions:

- **April 2013 Sampling Event—**The RPD for aluminum was calculated at 53 and is an estimated value as aluminum was reported below the PQL in both the environmental and environmental duplicate.

- **July 2013 Sampling Event—**The RPD for nickel was calculated at 47 and is an estimated value as nickel was reported at below the PQL in both the environmental and environmental duplicate.

10.8.1.2 Equipment Blank Samples

EB or rinsate samples are collected to verify the equipment decontamination process. The results for EB analyses are as follows:

- **January 2013 Sampling Event**—An EB or rinsate sample was collected prior to sampling monitoring well OBS-MW1 and submitted for all analyses. Alkalinity, bromodichloromethane, bromoform, calcium, chloroform, chloride, copper, dibromochloromethane, and sodium were detected above laboratory MDLs. No corrective action was necessary because these analytes were not detected in environmental samples, nor were detected in environmental samples at concentrations greater than five times the EB result, except for copper. Copper was detected in the EB sample at concentration higher than values reported for the associated environmental samples. Therefore, copper was qualified as not detected during data validation for both environmental and duplicate environmental samples.

- **April 2013 Sampling Event**—An EB or rinsate sample was collected prior to sampling monitoring well OBS-MW3 and submitted for all analyses. Barium, bromodichloromethane, bromoform, chloroform, chloride, copper, dibromochloromethane, and sodium were detected above laboratory MDLs. No correction was necessary because these analytes were not detected in environmental samples, nor were detected in environmental samples at concentrations greater than five times the EB result, except for copper. Copper was detected in the EB sample at concentration higher than values reported for the associated environmental samples. Therefore, copper was qualified as not detected during data validation in both environmental and duplicate environmental samples.

- **July 2013 Sampling Event—**An EB or rinsate sample was collected prior to sampling monitoring well OBS-MW2 and submitted for all analyses. Acetone, chloroform, and copper were detected above laboratory MDLs. No correction was necessary because these analytes were not detected in environmental samples, except for copper. Copper was detected in the EB sample at concentration higher than values reported for the associated environmental samples. Therefore, copper was qualified as not detected during data validation in both environmental and duplicate environmental samples.

- **October 2013 Sampling Event**—An EB or rinsate sample was collected prior to sampling monitoring well OBS-MW1 and submitted for all analyses. Acetone, barium, chloroform, copper, dibromochloromethane, and zinc were detected above laboratory MDLs. No correction was necessary because these compounds were not detected in environmental samples, nor detected in environmental samples at concentrations greater than five times the EB result, except for copper and zinc. Copper and zinc were detected in the EB sample at concentrations similar to values reported for the associated environmental samples. Therefore, copper and zinc were qualified as not detected during data validation in OBS-MW1 environmental and duplicate environmental samples.

10.8.1.3 Trip Blank Samples

TB samples are submitted whenever samples are collected for VOC analyses to assess whether contamination of the samples had occurred during shipment and storage. A total of 16 TB samples were submitted in CY 2013 with four submitted for each sampling event in January, April, July, and October. No VOCs were detected above the associated laboratory MDLs in any TB sample.

10.8.1.4 Field Blank Samples

A FB sample was collected for VOCs to assess whether contamination of the samples resulted from ambient field conditions.

- **January 2013 Sampling Event—**Analysis of the monitoring well OBS-MW3 FB sample detected the VOC compounds bromodichloromethane, bromoform, chloroform, and dibromochloromethane above laboratory MDL. No correction was necessary, because these compounds were not detected in the associated environmental samples.

- **April 2013 Sampling Event—**Analysis of the monitoring well OBS-MW2 FB sample detected the VOC compounds bromodichloromethane, bromoform, chloroform, and dibromochloromethane above laboratory MDL. No correction was necessary, because these compounds were not detected in the associated environmental samples.

- **July 2013 Sampling Event—**Analysis of the monitoring well OBS-MW2 FB sample detected the VOC compound chloroform above laboratory MDL. No correction was necessary, because the compound was not detected in the associated environmental samples.

- **October 2013 Sampling Event**—Analysis of the monitoring well OBS-MW3 FB sample detected the VOC compound chloroform above laboratory MDLs. No correction was necessary because the compound was not detected in the associated environmental samples.

10.8.2 Laboratory Control Samples

Internal laboratory QC samples, including method blanks and duplicate laboratory control samples, were analyzed concurrently with all groundwater samples. Some analytical results were qualified during the data validation process, but no significant data quality problems were noted in CY 2013**.**

10.9 Variances and Nonconformances

No variances or nonconformances from requirements specified in the SWMU 68 Groundwater Monitoring Mini-SAPs (SNL December 2012, April 2013, June 2013, and September 2013a) were noted during sampling activities

10.10 Summary and Conclusions

Three groundwater monitoring wells were installed at SWMU 68 in August 2011. In January, April, July, and October 2013, groundwater samples were collected from monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3. Analytical parameters included VOCs, SVOCs, HE compounds, NPN, major anions, major cations, alkalinity, TAL metals plus uranium, hexavalent chromium, perchlorate, total cyanide, gross alpha beta activity, radionuclides by gamma spectroscopy, and isotopic uranium. No parameters were detected above established MCLs.

The current conceptual model described in Section 10.1.7 does not require modification based on the analytical results for this reporting period.

During CY 2014, quarterly groundwater sampling and reporting will continue at the SWMU 68 groundwater monitoring wells (OBS-MW1, OBS-MW2, and OBS-MW3). The eighth and final quarterly groundwater sampling event was completed in July 2013. Quarterly groundwater sampling and reporting will continue until additional guidance is provided by NMED.

10.11 References

Bounds 1994 Bounds, J. (Los Alamos National Laboratory), January 1994. Letter report to D. Sandhaus (Sandia National Laboratories, New Mexico), *LRAD Alpha Monitoring for Sandia National Laboratories, Albuquerque, New Mexico*. January 19, 1994.

DOE September 1987 U.S. Department of Energy (DOE), September 1987. *Draft Comprehensive Environmental Assessment and Response Program (CEARP) Phase 1: Installation Assessment, Sandia National Laboratories, Albuquerque,* Albuquerque Operations Office, Environmental Safety and Health Division, Environmental Program Branch, U.S. Department of Energy, Albuquerque, New Mexico.

EPA 2009 U.S. Environmental Protection Agency (EPA), 2009. *National Primary Drinking Water Regulations,* EPA 816-F 09-004, U.S. Environmental Protection Agency, Washington, D.C., May.

EPA 1995 U.S. Environmental Protection Agency (EPA), November 1995. *Comments on the OU 1334 Central Coyote Test Area RFI Work Plan, Sandia National Laboratories,* Region 6, U.S. Environmental Protection Agency, Dallas, Texas.

EPA 1987 U.S. Environmental Protection Agency (EPA), April 1987. *Final RCRA Facility Assessment Report of Solid Waste Management Units at Sandia National Laboratories, Albuquerque, New Mexico,* U.S. Environmental Protection Agency, Washington, D.C.

EPA 1986 U.S. Environmental Protection Agency (EPA), 1986. *RCRA Ground-Water Monitoring Technical Enforcement Guidance Document* OSWER-9950.1, U.S. Environmental Protection Agency, Washington, D.C.

GRAM and Lettis 1995 GRAM and Lettis, 1995. *Conceptual Geologic Model of the Sandia National Laboratories and Kirtland Air Force Base,* prepared for Site-Wide Hydrogeologic Characterization Project, Organization 7584, Environmental Restoration Program, Sandia National Laboratories, Albuquerque, New Mexico.

Hyndman 1998 Hyndman, D., 1998. *Geophysical Surveys of Environmental Restoration Sites 68, 68A, and 57A,* MDM/Lamb, Inc., Albuquerque, New Mexico, December 1998.

IT Corporation 1995 IT Corporation, 1995. *Sensitive Species Survey Results, Environmental Restoration Project, Sandia National Laboratories/New Mexico.* Albuquerque, New Mexico.

Lambert et al. 1997 Lambert, K.A., M.M. Mitchell, D. Jean, C. Brown, C.S. Byrd, September 1997. *Final Report, Survey and Removal of Radioactive Surface Contamination at Environmental Restoration Sites,* SAND97-2320/1, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

NMED April 2012 New Mexico Environment Department (NMED), April 2012. *Notice of Approval: Groundwater Monitoring Well Installation Report for SWMU 8 (Open Dump, Coyote Canyon Blast Area) / SWMU 58 (Coyote Canyon Blast Area), and SWMU 68 (Old Burn Site), Installation of SWMU 8/58 Groundwater Monitoring Wells CCBA-MW1 and CCBA-MW2, Installation of SWMU 68 Groundwater Monitoring Wells OBS-MW1, OBS-MW2, and OBS-MW3, November 2011, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-11-017,* New Mexico Environment Department, Santa Fe, New Mexico, April 20, 2012.

NMED August 2011 New Mexico Environment Department (NMED), August 2011. *Notice of Approval: Request for Extension to Complete Well Installation Report for Groundwater Monitoring Wells at Solid Waste Management Units 8, 58 and 68, June 27, 2011, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-IO-017,* New Mexico Environment Department, Santa Fe, New Mexico, August 3, 2011.

NMED January 2011 New Mexico Environment Department (NMED), January 2011. *Notice of Approval with Modification: Groundwater Monitoring Well Installation Workplans for SWMUs 8/58 and 68, September 2010, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-I0-017,* New Mexico Environment Department, Santa Fe, New Mexico, January 28, 2011.

NMED April 2010 New Mexico Environment Department (NMED), April 2010. *Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008), Sandia National Laboratories, EPA ID # NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001,* New Mexico Environment Department, Santa Fe, New Mexico, April 8, 2010.

NMED October 2005 New Mexico Environment Department (NMED), October 2005. *Notice of Approval: Final Investigation Report and Proposal for Corrective Action Complete Solid Waste Management Unit 68, Old Burn Site,* New Mexico Environment Department, Santa Fe, New Mexico, October 26, 2005.

NMED April 2004 New Mexico Environment Department (NMED), April 2004. *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order*, New Mexico Environment Department, Santa Fe, New Mexico, April 29, 2004.

NMED March 1998 New Mexico Environment Department (NMED), March 1998. *Notice of Deficiency: Technical Comments on the Sandia National Laboratories RCRA Facility Investigation Work Plan for Operable Unit 1334, Central Coyote Test Area*, New Mexico Environment Department, Santa Fe, New Mexico.

NMED August 1997 New Mexico Environment Department (NMED), August 1997. *Request for Supplemental Information (RSI) on the Sandia National Laboratories RCRA Facility Investigation Work Plan for Operable Unit 1334, Central Coyote Test Area*, New Mexico Environment Department, Santa Fe, New Mexico.

NMED March 1995 New Mexico Environment Department (NMED), March 1995. *Review of SNL/NM RFI Work Plan for Operable Unit 1334 Central Coyote Test Area,* New Mexico Environment Department, Santa Fe, New Mexico.

NMED 1993 New Mexico Environment Department (NMED), 1993. *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518,* New Mexico Environment Department, Santa Fe, New Mexico.

NNSA July 2004 National Nuclear Security Administration (NNSA), 2004. *Removal of Radiological Restrictions from Solid Waste Management Unit (SWMU) 2-Classified Waste Landfill and SWMU 68-Old Burn Site,* National Nuclear Security Administration, Albuquerque, New Mexico, July 29, 2004.

RUST Geotech, Inc. 1994 RUST Geotech, Inc., December 1994. *Final Report, Surface Gamma Radiation Surveys for Sandia National Laboratories/New Mexico Environmental Restoration Project*, U.S. Department of Energy (DOE) Contract, Grand Junction Projects Office, Grand Junction, Colorado, DOE Contract No. DE-ACO4-861D12584.

SNL September 2013a Sandia National Laboratories, New Mexico (SNL/NM), September 2013. *SWMU 68 Groundwater Monitoring Mini-SAP for First Quarter Fiscal Year 2013*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2013b Sandia National Laboratories, New Mexico (SNL/NM), September 2013. *Annual Groundwater Monitoring Report, Calendar Year 2012 Groundwater Protection Program*, Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2012 Sandia National Laboratories, New Mexico (SNL/NM), September 2012. *Annual Groundwater Monitoring Report, Calendar Year 2011 Groundwater Protection Program*, Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2013 Sandia National Laboratories, New Mexico (SNL/NM), June 2013. *SWMU 68 Groundwater Monitoring Mini-SAP for Fourth Quarter Fiscal Year 2012*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2012 Sandia National Laboratories, New Mexico (SNL/NM), June 2012. *Technical Memorandum—Field Report on the Slug Tests at SWMUs 8/58 and SWMU 68*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, June 27, 2012.

SNL April 2013 Sandia National Laboratories, New Mexico (SNL/NM), April 2013. *SWMU 68 Groundwater Monitoring Mini-SAP for Third Quarter Fiscal Year 2012*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL December 2012 Sandia National Laboratories, New Mexico (SNL/NM), December 2012. *SWMU 68 Groundwater Monitoring Mini-SAP for Second Quarter Fiscal Year 2012*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL November 2011 Sandia National Laboratories, New Mexico (SNL/NM), November 2011. *Groundwater Monitoring Well Installation Report for SWMU 8 (Open Dump, Coyote Canyon Blast Area) / SWMU 58 (Coyote Canyon Blast Area) and SWMU 68 (Old Burn Site)*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2011 Sandia National Laboratories, New Mexico (SNL/NM), June 2011. *Request for Extension to Complete the Final Well Installation Report for 5 Groundwater Monitoring Wells at Solid Waste Management Units 8/58 and 68*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL May 2011 Sandia National Laboratories, New Mexico (SNL/NM) May 2011. *Data Validation Procedure for Chemical and Radiochemical Data*, AOP 00-03, Revision 3, Sample Management Office, Sandia National Laboratories, Albuquerque, New Mexico, May 11, 2011.

SNL September 2010 Sandia National Laboratories, New Mexico (SNL/NM), September 2010. *SWMU 68 and SWMUs 8/58 Groundwater Characterization Work Plans - U.S. Department of Energy/Sandia Corporation Response to the New Mexico Environment Department letter of April 8, 2010 entitled, "Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008) Sandia National Laboratories EPA ID# NM5890110518 HWB-SNL-06-007 and HWB-SNL-08-001,"* Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2009 Sandia National Laboratories, New Mexico (SNL/NM), June 2009. *Notes of Meeting—June 15, 2009 Meeting Between NMED, DOE, and SNL/NM to discuss the April 2009 NMED Letter entitled: Perchlorate Contamination in Groundwater, Sandia National Laboratories*, Sandia National Laboratories, Albuquerque, New Mexico, June 23, 2009.

SNL March 2006 Sandia National Laboratories, New Mexico (SNL/NM), March 2006. *Justification for Class III Permit Modification March 2006 SWMU 68 Operable Unit 1334, Old Burn Site,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2005 Sandia National Laboratories, New Mexico (SNL/NM), September 2005. *Final Investigation Report and Proposal for Corrective Action Complete Solid Waste Management Unit 68, Old Burn Site,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL January 2005 Sandia National Laboratories, New Mexico (SNL/NM), January 2005. *Radiological Sampling, Analysis and Waste Management Plan for Solid Waste Management Unit (SWMU) 68,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL October 2004 Sandia National Laboratories, New Mexico (SNL/NM), October 2004. *Voluntary Corrective Action Plan for SWMU 68, Old Burn Site,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL May 2004a Sandia National Laboratories, New Mexico (SNL/NM), May 2004. *Justification for Removal of Radiological Restrictions at SWMU 68, the Old Burn Site,* Sandia National Laboratories, Albuquerque, New Mexico, May 7, 2004.

SNL May 2004b Sandia National Laboratories, New Mexico (SNL/NM), May 2004. *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Canyon Area,* Sandia Report SAND2004-2673P.

SNL March 1999 Sandia National Laboratories, New Mexico (SNL/NM), March 1999. *Summary Report of Groundwater Investigations at Technical Area V, Operable Units 1306 and 1307,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL July 1998 Sandia National Laboratories, New Mexico (SNL/NM), July 1998. *Environmental Restoration Project Response to NMED Technical Comments on the RCRA Facility Investigation Work Plan for Operable Unit 1334, Central Coyote Test Area Dated March 31, 1998,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL February 1998 Sandia National Laboratories, New Mexico (SNL/NM), February 1998. *Revised Site-Wide Hydrogeologic Characterization Project, 1995 Annual Report,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL November 1997 Sandia National Laboratories, New Mexico (SNL/NM), November 1997. *Response to Request for Supplemental Information on the RCRA Facility Investigation Work Plan for Operable Unit 1334, Central Coyote Test Area,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL February 1996 Sandia National Laboratories, New Mexico (SNL/NM), February 1996. *Response to EPA NOD Comments on the RFI Work Plan for OU 1334, Central Coyote Test Area, Sandia National Laboratories, New Mexico, Environmental Restoration Project,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL November 1995 Sandia National Laboratories, New Mexico (SNL/NM), November 1995. Cox, W. (Sandia National Laboratories, New Mexico) letter report to M. Jackson (U.S. Department of Energy, Kirtland Area Office), *SNL/NM Reapplication Pick Up of Steel Test Stands at ER Site 68*, November 9, 1995.

SNL May 1995 Sandia National Laboratories, New Mexico (SNL/NM), May 1995. *Preliminary Response to NMED Comments on the Draft OU 1334 RFI Work Plan*, Sandia National Laboratories, Albuquerque, New Mexico, May 25, 1995.

SNL February 1995 Sandia National Laboratories, New Mexico (SNL/NM), February 1995. *Cultural Resource Investigation for Sandia National Laboratories/New Mexico Environmental Restoration Program, Kirtland Air Force Base, New Mexico, Volume 1 of 2*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL October 1994 Sandia National Laboratories, New Mexico (SNL/NM), October 1994. *RCRA Facility Investigation Work Plan for Operable Unit 1334, Central Coyote Test Area*, draft, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 1994 Sandia National Laboratories, New Mexico (SNL/NM), September 1994. *Unexploded Ordnance/High Explosives (UXO/HE) Visual Survey of ER Sites Final Report*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 1992 Sandia National Laboratories, New Mexico (SNL/NM), September 1992. *Resource Conservation and Recovery Act (RCRA) Hazardous and Solid Waste Amendments Act (HSWA) Final Permit for Sandia National Laboratories New Mexico*, Sandia National Laboratories, Albuquerque, New Mexico.

WRCC-DRI 2012 Western Regional Climate Center - Desert Research Institute, 2012. *Historical climate information for National Weather Service Cooperative Network Station 290234 – Albuquerque, New Mexico, Weather Service Forecast Office at the Albuquerque International Sunport for the period of 1914 through 2005*, http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?nmalbu. Accessed February 20, 2012.

Attachment 10A
Solid Waste Management Unit 68
Analytical Results Tables

This page intentionally left blank

Attachment 10A Tables

10A-1 Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B), Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 10A-5

10A-2 Method Detection Limits for Semivolatile Organic Compounds (EPA Method[g] SW846-8270C), Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 10A-6

10A-3 Method Detection Limits for High Explosive Compounds (EPA Method[g] SW846-8321A), Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 10A-7

10A-4 Summary of Nitrate plus Nitrite Results, Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 10A-8

10A-5 Summary of Alkalinity, Anions, and Total Cyanide Results, Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 10A-9

10A-6 Summary of Perchlorate Results, Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2012 ..... 10A-13

10A-7 Summary of Hexavalent Chromium Results, Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 10A-14

10A-8 Summary of Target Analyte List Metals and Uranium Results, Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 10A-15

10A-9 Summary of Cation Results, Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 10A-31

10A-10 Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results, Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 10A-33

10A-11 Summary of Field Water Quality Measurements[h], Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 10A-37

Footnotes for Solid Waste Management Unit 68 Analytical Results Tables 10A-39

This page intentionally left blank.

Table 10A-1
Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B), Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Analyte	MDL[b] (µg/L)	Analyte	MDL[b] (µg/L)
1,1,1-Trichloroethane	0.300	Chlorobenzene	0.300
1,1,2,2-Tetrachloroethane	0.300	Chloroethane	0.300
1,1,2-Trichloroethane	0.300	Chloroform	0.300
1,1-Dichloroethane	0.300	Chloromethane	0.300
1,1-Dichloroethene	0.300	Cyclohexane	0.300
1,2,3-Trichlorobenzene	0.300	Dibromochloromethane	0.300
1,2,4-Trichlorobenzene	0.300	Dichlorodifluoromethane	0.300
1,2-Dibromo-3-chloropropane	0.300	Ethyl benzene	0.300
1,2-Dibromoethane	0.300	Isopropylbenzene	0.300
1,2-Dichlorobenzene	0.300	Methyl acetate	1.50
1,2-Dichloroethane	0.300	Methylcyclohexane	3.00
1,2-Dichloropropane	0.300	Methylene chloride	3.00
1,3-Dichlorobenzene	0.300	Styrene	0.300
1,4-Dichlorobenzene	0.300	Tert-butyl methyl ether	0.300
2,2-trifluoroethane, 1,1,2-Trichloro-1	1.50	Tetrachloroethene	0.300
2-Butanone	2.00	Toluene	0.300
2-Hexanone	2.20	Trichloroethene	0.300
4-methyl-, 2-Pentanone	1.50	Trichlorofluoromethane	0.300
Acetone	3.00	Vinyl chloride	0.300
Benzene	0.300	Xylene	0.300
Bromochloromethane	0.300	cis-1,2-Dichloroethene	0.300
Bromodichloromethane	0.300	cis-1,3-Dichloropropene	0.300
Bromoform	0.300	m-, p-Xylene	0.300
Bromomethane	0.300	o-Xylene	0.300
Carbon disulfide	1.50	trans-1,2-Dichloroethene	0.300
Carbon tetrachloride	0.300	trans-1,3-Dichloropropene	0.300

Refer to footnotes on page 10A-39.

Table 10A-2
Method Detection Limits for Semivolatile Organic Compounds (EPA Method[g] SW846-8270C), Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Analyte	MDL[b] (µg/L)	Analyte	MDL[b] (µg/L)
1'-Biphenyl 1	2.94 - 3.26	Butylbenzyl phthalate	2.94 - 3.26
1,2,4-Trichlorobenzene	2.94 - 3.26	Caprolactam	2.94 - 3.26
2,4,5-Trichlorophenol	2.94 - 3.26	Carbazole	0.294 - 0.326
1,4-Dioxane	2.94 - 3.26	Chrysene	0.294 - 0.326
2,4,6-Trichlorophenol	2.94 - 3.26	Di-n-butyl phthalate	2.94 - 3.26
2,4-Dichlorophenol	2.94 - 3.26	Di-n-octyl phthalate	2.94 - 3.26
2,4-Dimethylphenol	2.94 - 3.26	Dibenz[a,h]anthracene	0.294 - 0.326
2,4-Dinitrophenol	4.90 - 5.43	Dibenzofuran	2.94 - 3.26
2,4-Dinitrotoluene	2.94 - 3.26	Diethylphthalate	2.94 - 3.26
2,6-Dinitrotoluene	2.94 - 3.26	Dimethylphthalate	2.94 - 3.26
2-Chloronaphthalene	0.294 - 0.446	Dinitro-o-cresol	2.94 - 3.26
2-Chlorophenol	2.94 - 3.26	Diphenyl amine	2.94 - 3.26
2-Methylnaphthalene	0.294 - 0.326	Fluoranthene	0.294 - 0.326
2-Nitroaniline	2.94 - 3.26	Fluorene	0.294 - 0.326
2-Nitrophenol	2.94 - 3.26	Hexachlorobenzene	2.94 - 3.26
3,3'-Dichlorobenzidine	2.94 - 3.26	Hexachlorobutadiene	2.94 - 3.26
3-Nitroaniline	2.94 - 3.26	Hexachlorocyclopentadiene	2.94 - 3.26
4-Bromophenyl phenyl ether	2.94 - 3.26	Hexachloroethane	2.94 - 3.26
4-Chloro-3-methylphenol	2.94 - 3.26	Indeno(1,2,3-c,d)pyrene	0.294 - 0.326
4-Chlorobenzenamine	3.24 - 3.56	Isophorone	2.94 - 3.80
4-Chlorophenyl phenyl ether	2.94 - 3.26	Naphthalene	0.294 - 0.313
4-Nitroaniline	2.94 - 3.26	Nitro-benzene	2.94 - 3.26
4-Nitrophenol	2.94 - 3.26	Pentachlorophenol	2.94 - 3.26
Acenaphthene	0.294 - 0.326	Phenanthrene	0.294 - 0.326
Acenaphthylene	0.294 - 0.326	Phenol	2.94 - 3.26
Acetophenone	2.94 - 3.26	Pyrene	0.294 - 0.326
Anthracene	0.294 - 0.326	bis(2-Chloroethoxy)methane	2.94 - 3.26
Atrazine	2.94 - 3.26	bis(2-Chloroethyl)ether	2.94 - 3.26
Benzaldehyde	3.00 - 5.38	bis(2-Chloroisopropyl)ether	2.94 - 3.26
Benzo(a)anthracene	0.294 - 0.326	bis(2-Ethylhexyl)phthalate	2.94 - 3.26
Benzo(a)pyrene	0.300 - 0.473	m,p-Cresol	2.94 - 4.02
Benzo(b)fluoranthene	0.294 - 0.326	n-Nitrosodipropylamine	2.94 - 3.26
Benzo(ghi)perylene	0.294 - 0.326	o-Cresol	2.94 - 3.26
Benzo(k)fluoranthene	0.294 - 0.326		

Refer to footnotes on page 10A-39.

Table 10A-3
Method Detection Limits for High Explosive Compounds (EPA Method[g] SW846-8321A), Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Analyte	MDL[b] (µg/L)
1,3,5-Trinitrobenzene	0.0812 – 0.0874
1,3-Dinitrobenzene	0.0812 – 0.0874
2,4,6-Trinitrotoluene	0.0812 – 0.0874
2,4-Dinitrotoluene	0.0812 – 0.0874
2,6-Dinitrotoluene	0.0812 – 0.0874
2-Amino-4,6-dinitrotoluene	0.0812 – 0.0874
2-Nitrotoluene	0.0832 – 0.0896
3-Nitrotoluene	0.0812 – 0.0874
4-Amino-2,6-dinitrotoluene	0.0812 – 0.0874
4-Nitrotoluene	0.152 – 0.164
HMX	0.0812 – 0.0874
Nitro-benzene	0.0812 – 0.0874
Pentaerythritol tetranitrate	0.102 – 0.109
RDX	0.0812 – 0.0874
Tetryl	0.0812 – 0.0874

Refer to footnotes on page 10A-39.

Table 10A-4
Summary of Nitrate plus Nitrite Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW1 22-Jan-13	Nitrate plus nitrite	1.87	0.085	0.250	10.0			093349-018	EPA 353.2
OBS-MW1 (Duplicate) 22-Jan-13	Nitrate plus nitrite	1.84	0.085	0.250	10.0			093350-018	EPA 353.2
OBS-MW2 21-Jan-13	Nitrate plus nitrite	1.55	0.085	0.250	10.0			093344-018	EPA 353.2
OBS-MW3 23-Jan-13	Nitrate plus nitrite	1.70	0.085	0.250	10.0			093352-018	EPA 353.2
OBS-MW1 18-Apr-13	Nitrate plus nitrite	1.21	0.085	0.250	10.0			093863-018	EPA 353.2
OBS-MW2 22-Apr-13	Nitrate plus nitrite	1.57	0.085	0.250	10.0			093866-018	EPA 353.2
OBS-MW3 23-Apr-13	Nitrate plus nitrite	1.78	0.085	0.250	10.0			093870-018	EPA 353.2
OBS-MW3 (Duplicate) 23-Apr-13	Nitrate plus nitrite	1.72	0.085	0.250	10.0			093871-018	EPA 353.2
OBS-MW1 09-Jul-13	Nitrate plus nitrite	1.95	0.085	0.250	10.0			094361-018	EPA 353.2
OBS-MW2 10-Jul-13	Nitrate plus nitrite	1.60	0.085	0.250	10.0			094365-018	EPA 353.2
OBS-MW2 (Duplicate) 10-Jul-13	Nitrate plus nitrite	1.58	0.085	0.250	10.0			094366-018	EPA 353.2
OBS-MW3 11-Jul-13	Nitrate plus nitrite	1.73	0.085	0.250	10.0			094368-018	EPA 353.2
OBS-MW1 08-Oct-13	Nitrate plus nitrite	1.85	0.170	0.500	10.0			094767-018	EPA 353.2
OBS-MW1 (Duplicate) 08-Oct-13	Nitrate plus nitrite	1.85	0.170	0.500	10.0			094768-018	EPA 353.2
OBS-MW2 07-Oct-13	Nitrate plus nitrite	1.59	0.170	0.500	10.0			094762-018	EPA 353.2
OBS-MW3 09-Oct-13	Nitrate plus nitrite	1.80	0.170	0.500	10.0			094771-018	EPA 353.2

Refer to footnotes on page 10A-39.

Table 10A-5
Summary of Alkalinity, Anions, and Total Cyanide Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW1	Bicarbonate Alkalinity	186	0.725	1.00	NE			093349-022	SM2320B
22-Jan-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093349-022	SM2320B
	Bromide	0.336	0.067	0.200	NE			093349-016	SW846 9056
	Chloride	22.1	0.335	1.00	NE			093349-016	SW846 9056
	Fluoride	2.13	0.033	0.100	4.00			093349-016	SW846 9056
	Sulfate	76.5	0.665	2.00	NE			093349-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U		093349-027	SW846 9012B
OBS-MW1 (Duplicate)	Bicarbonate Alkalinity	186	0.725	1.00	NE			093350-022	SM2320B
22-Jan-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093350-022	SM2320B
	Bromide	0.345	0.067	0.200	NE			093350-016	SW846 9056
	Chloride	22.7	0.335	1.00	NE			093350-016	SW846 9056
	Fluoride	2.11	0.033	0.100	4.00			093350-016	SW846 9056
	Sulfate	78.4	0.665	2.00	NE			093350-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U		093350-027	SW846 9012B
OBS-MW2	Bicarbonate Alkalinity	179	0.725	1.00	NE			093344-022	SM2320B
21-Jan-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093344-022	SM2320B
	Bromide	0.322	0.067	0.200	NE			093344-016	SW846 9056
	Chloride	21.3	0.335	1.00	NE			093344-016	SW846 9056
	Fluoride	2.21	0.033	0.100	4.00			093344-016	SW846 9056
	Sulfate	83.0	0.0665	2.00	NE			093344-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U		093344-027	SW846 9012B
OBS-MW3	Bicarbonate Alkalinity	178	0.725	1.00	NE			093352-022	SM2320B
23-Jan-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093352-022	SM2320B
	Bromide	0.344	0.067	0.200	NE			093352-016	SW846 9056
	Chloride	22.1	0.335	1.00	NE			093352-016	SW846 9056
	Fluoride	2.23	0.033	0.100	4.00			093352-016	SW846 9056
	Sulfate	83.3	0.665	2.00	NE			093352-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U		093352-027	SW846 9012B

Refer to footnotes on page 10A-39.

Table 10A-5 *(Continued)*
Summary of Alkalinity, Anions, and Total Cyanide Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW1	Bicarbonate Alkalinity	184	0.725	1.00	NE			093863-022	SM2320B
18-Apr-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093863-022	SM2320B
	Bromide	0.324	0.067	0.200	NE			093863-016	SW846 9056
	Chloride	21.4	0.670	2.00	NE	H		093863-016	SW846 9056
	Fluoride	2.04	0.033	0.100	4.00			093863-016	SW846 9056
	Sulfate	74.5	1.33	4.00	NE	H		093863-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	093863-027	SW846 9012B
OBS-MW2	Bicarbonate Alkalinity	180	0.725	1.00	NE	B		093866-022	SM2320B
22-Apr-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093866-022	SM2320B
	Bromide	0.370	0.067	0.200	NE			093866-016	SW846 9056
	Chloride	23.2	0.670	2.00	NE			093866-016	SW846 9056
	Fluoride	2.32	0.033	0.100	4.00			093866-016	SW846 9056
	Sulfate	86.0	1.33	4.00	NE			093866-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	093866-027	SW846 9012B
OBS-MW3	Bicarbonate Alkalinity	178	0.725	1.00	NE	B		093870-022	SM2320B
23-Apr-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093870-022	SM2320B
	Bromide	0.359	0.067	0.200	NE			093870-016	SW846 9056
	Chloride	23.9	0.670	2.00	NE			093870-016	SW846 9056
	Fluoride	2.32	0.033	0.100	4.00			093870-016	SW846 9056
	Sulfate	87.2	1.33	4.00	NE			093870-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	093870-027	SW846 9012B
OBS-MW3 (Duplicate)	Bicarbonate Alkalinity	180	0.725	1.00	NE	B		093871-022	SM2320B
23-Apr-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093871-022	SM2320B
	Bromide	0.372	0.067	0.200	NE			093871-016	SW846 9056
	Chloride	24.5	0.670	2.00	NE			093871-016	SW846 9056
	Fluoride	2.37	0.033	0.100	4.00			093871-016	SW846 9056
	Sulfate	87.5	1.33	4.00	NE			093871-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	093871-027	SW846 9012B

Refer to footnotes on page 10A-39.

Table 10A-5 *(Continued)*
Summary of Alkalinity, Anions, and Total Cyanide Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW1	Bicarbonate Alkalinity	184	0.725	1.00	NE			094361-022	SM2320B
09-Jul-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094361-022	SM2320B
	Bromide	0.356	0.067	0.200	NE			094361-016	SW846 9056
	Chloride	23.5	1.34	4.00	NE			094361-016	SW846 9056
	Fluoride	2.17	0.033	0.100	4.00			094361-016	SW846 9056
	Sulfate	81.3	2.66	8.00	NE			094361-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	N, U	UJ	094361-027	SW846 9012B
OBS-MW2	Bicarbonate Alkalinity	194	0.725	1.00	NE			094365-022	SM2320B
10-Jul-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094365-022	SM2320B
	Bromide	0.391	0.067	0.200	NE			094365-016	SW846 9056
	Chloride	13.6	1.34	4.00	NE			094365-016	SW846 9056
	Chloride (reanalysis)	21.6	1.34	4.00	NE	H	J	094365-R16	SW846 9056
	Fluoride	2.32	0.033	0.100	4.00			094365-016	SW846 9056
	Sulfate	51.6	2.66	8.00	NE			094365-016	SW846 9056
	Sulfate (reanalysis)	82.5	2.66	8.00	NE	H	J	094365-R16	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	N, U	UJ	094365-027	SW846 9012B
OBS-MW2 (Duplicate)	Bicarbonate Alkalinity	180	0.725	1.00	NE	B		094366-022	SM2320B
10-Jul-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094366-022	SM2320B
	Bromide	0.313	0.067	0.200	NE			094366-016	SW846 9056
	Chloride	21.5	1.34	4.00	NE			094366-016	SW846 9056
	Fluoride	2.34	0.033	0.100	4.00			094366-016	SW846 9056
	Sulfate	81.9	2.66	8.00	NE			094366-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	N, U	UJ	094366-027	SW846 9012B
OBS-MW3	Bicarbonate Alkalinity	179	0.725	1.00	NE	B		094368-022	SM2320B
11-Jul-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094368-022	SM2320B
	Bromide	0.317	0.067	0.200	NE			094368-016	SW846 9056
	Chloride	22.7	1.34	4.00	NE			094368-016	SW846 9056
	Fluoride	2.37	0.033	0.100	4.00			094368-016	SW846 9056
	Sulfate	83.4	2.66	8.00	NE			094368-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	N, U	UJ	094368-027	SW846 9012B

Refer to footnotes on page 10A-39.

Table 10A-5 *(Concluded)*
Summary of Alkalinity, Anions, and Total Cyanide Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW1	Bicarbonate Alkalinity	181	0.725	1.00	NE			094767-022	SM2320B
08-Oct-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094767-022	SM2320B
	Bromide	0.373	0.067	0.200	NE			094767-016	SW846 9056
	Chloride	24.0	0.670	2.00	NE			094767-016	SW846 9056
	Fluoride	2.17	0.033	0.100	4.00			094767-016	SW846 9056
	Sulfate	82.0	1.33	4.00	NE			094767-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	094767-027	SW846 9012B
OBS-MW1 (Duplicate)	Bicarbonate Alkalinity	185	0.725	1.00	NE			094768-022	SM2320B
08-Oct-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094768-022	SM2320B
	Bromide	0.395	0.067	0.200	NE			094768-016	SW846 9056
	Chloride	23.9	0.670	2.00	NE			094768-016	SW846 9056
	Fluoride	2.18	0.033	0.100	4.00			094768-016	SW846 9056
	Sulfate	81.3	1.33	4.00	NE			094768-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	094768-027	SW846 9012B
OBS-MW2	Bicarbonate Alkalinity	172	0.725	1.00	NE			094762-022	SM2320B
07-Oct-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094762-022	SM2320B
	Bromide	0.388	0.067	0.200	NE			094762-016	SW846 9056
	Chloride	22.3	0.670	2.00	NE			094762-016	SW846 9056
	Fluoride	2.30	0.033	0.100	4.00			094762-016	SW846 9056
	Sulfate	83.6	1.33	4.00	NE			094762-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	094762-027	SW846 9012B
OBS-MW3	Bicarbonate Alkalinity	176	0.725	1.00	NE			094771-022	SM2320B
09-Oct-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094771-022	SM2320B
	Bromide	0.370	0.067	0.200	NE			094771-016	SW846 9056
	Chloride	22.8	0.670	2.00	NE			094771-016	SW846 9056
	Fluoride	2.33	0.033	0.100	4.00			094771-016	SW846 9056
	Sulfate	84.2	1.33	4.00	NE			094771-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	094771-027	SW846 9012B

Refer to footnotes on page 10A-39.

Table 10A-6
Summary of Perchlorate Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Perchlorate Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW1 22-Jan-13	ND	0.004	0.012	NE	U		093349-020	EPA 314.0
OBS-MW1 (Duplicate) 22-Jan-13	ND	0.004	0.012	NE	U		093350-020	EPA 314.0
OBS-MW2 21-Jan-13	ND	0.004	0.012	NE	U		093344-020	EPA 314.0
OBS-MW3 23-Jan-13	ND	0.004	0.012	NE	U		093352-020	EPA 314.0
OBS-MW1 18-Apr-13	ND	0.004	0.012	NE	U		093863-020	EPA 314.0
OBS-MW2 22-Apr-13	ND	0.004	0.012	NE	U		093866-020	EPA 314.0
OBS-MW3 23-Apr-13	ND	0.004	0.012	NE	U		093870-020	EPA 314.0
OBS-MW3 (Duplicate) 23-Apr-13	ND	0.004	0.012	NE	U		093871-020	EPA 314.0
OBS-MW1 09-Jul-13	ND	0.004	0.012	NE	U		094361-020	EPA 314.0
OBS-MW2 10-Jul-13	ND	0.004	0.012	NE	U		094365-020	EPA 314.0
OBS-MW2 (Duplicate) 10-Jul-13	ND	0.004	0.012	NE	U		094366-020	EPA 314.0
OBS-MW3 11-Jul-13	ND	0.004	0.012	NE	U		094368-020	EPA 314.0
OBS-MW1 08-Oct-13	ND	0.004	0.012	NE	U		094767-020	EPA 314.0
OBS-MW1 (Duplicate) 08-Oct-13	ND	0.004	0.012	NE	U		094768-020	EPA 314.0
OBS-MW2 07-Oct-13	ND	0.004	0.012	NE	U		094762-020	EPA 314.0
OBS-MW3 09-Oct-13	ND	0.004	0.012	NE	U		094771-020	EPA 314.0

Refer to footnotes on page 10A-39.

Table 10A-7
Summary of Hexavalent Chromium Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Hexavalent Chromium Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW1 22-Jan-13	ND	0.0033	0.010	NE	U		093349-014	SW846 7196A
OBS-MW1 (Duplicate) 22-Jan-13	ND	0.0033	0.010	NE	U		093350-014	SW846 7196A
OBS-MW2 21-Jan-13	ND	0.0033	0.010	NE	U		093344-014	SW846 7196A
OBS-MW3 23-Jan-13	ND	0.0033	0.010	NE	U		093352-014	SW846 7196A
OBS-MW1 18-Apr-13	ND	0.0033	0.010	NE	U		093863-014	SW846 7196A
OBS-MW2 22-Apr-13	ND	0.0033	0.010	NE	U		093866-014	SW846 7196A
OBS-MW3 23-Apr-13	ND	0.0033	0.010	NE	U		093870-014	SW846 7196A
OBS-MW3 (Duplicate) 23-Apr-13	ND	0.0033	0.010	NE	U		093871-014	SW846 7196A
OBS-MW1 09-Jul-13	ND	0.0033	0.010	NE	U		094361-014	SW846 7196A
OBS-MW2 10-Jul-13	ND	0.0033	0.010	NE	U		094365-014	SW846 7196A
OBS-MW2 (Duplicate) 10-Jul-13	ND	0.0033	0.010	NE	U		094366-014	SW846 7196A
OBS-MW3 11-Jul-13	ND	0.0033	0.010	NE	U		094368-014	SW846 7196A
OBS-MW1 08-Oct-13	ND	0.0033	0.010	NE	U		094767-014	SW846 7196A
OBS-MW1 (Duplicate) 08-Oct-13	ND	0.0033	0.010	NE	U		094768-014	SW846 7196A
OBS-MW2 07-Oct-13	ND	0.0033	0.010	NE	U		094762-014	SW846 7196A
OBS-MW3 09-Oct-13	ND	0.0033	0.010	NE	U		094771-014	SW846 7196A

Refer to footnotes on page 10A-39.

Table 10A-8
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW1	Aluminum	ND	0.015	0.050	NE	U		093349-009	SW846 6020
22-Jan-13	Antimony	ND	0.001	0.003	0.006	U		093349-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093349-009	SW846 6020
	Barium	0.0182	0.0006	0.002	2.00			093349-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093349-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093349-009	SW846 6020
	Calcium	78.3	0.300	1.00	NE			093349-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093349-009	SW846 6020
	Cobalt	0.000133	0.0001	0.001	NE	J		093349-009	SW846 6020
	Copper	0.000494	0.00035	0.001	NE	J	0.0064U	093349-009	SW846 6020
	Iron	0.260	0.033	0.100	NE			093349-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093349-009	SW846 6020
	Magnesium	17.6	0.010	0.030	NE			093349-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093349-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093349-009	SW846 7470
	Nickel	0.00255	0.0005	0.002	NE			093349-009	SW846 6020
	Potassium	1.66	0.080	0.300	NE			093349-009	SW846 6020
	Selenium	0.00342	0.0015	0.005	0.050	J		093349-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093349-009	SW846 6020
	Sodium	22.9	0.080	0.250	NE			093349-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093349-009	SW846 6020
	Uranium	0.00987	0.000067	0.0002	0.03			093349-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		093349-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093349-009	SW846 6020

Refer to footnotes on page 10A-39.

Table 10A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW1 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		093350-009	SW846 6020
22-Jan-13	Antimony	0.00108	0.001	0.003	0.006	J		093350-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093350-009	SW846 6020
	Barium	0.0188	0.0006	0.002	2.00			093350-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093350-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093350-009	SW846 6020
	Calcium	84.5	0.300	1.00	NE			093350-009	SW846 6020
	Chromium	0.00234	0.002	0.010	0.100	B, J	0.013U	093350-009	SW846 6020
	Cobalt	0.000157	0.0001	0.001	NE	J		093350-009	SW846 6020
	Copper	0.000832	0.00035	0.001	NE	J	0.0064U	093350-009	SW846 6020
	Iron	0.294	0.033	0.100	NE			093350-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093350-009	SW846 6020
	Magnesium	17.5	0.010	0.030	NE			093350-009	SW846 6020
	Manganese	0.00127	0.001	0.005	NE	J		093350-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093350-009	SW846 7470
	Nickel	0.0027	0.0005	0.002	NE			093350-009	SW846 6020
	Potassium	1.65	0.080	0.300	NE			093350-009	SW846 6020
	Selenium	0.00425	0.0015	0.005	0.050	J		093350-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093350-009	SW846 6020
	Sodium	26.7	0.080	0.250	NE			093350-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093350-009	SW846 6020
	Uranium	0.0102	0.000067	0.0002	0.03			093350-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		093350-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093350-009	SW846 6020

Refer to footnotes on page 10A-39.

Table 10A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW2	Aluminum	ND	0.015	0.050	NE	U		093344-009	SW846 6020
21-Jan-13	Antimony	ND	0.001	0.003	0.006	U		093344-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093344-009	SW846 6020
	Barium	0.0196	0.0006	0.002	2.00			093344-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093344-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093344-009	SW846 6020
	Calcium	79.6	0.300	1.00	NE			093344-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093344-009	SW846 6020
	Cobalt	0.000146	0.0001	0.001	NE	J		093344-009	SW846 6020
	Copper	0.000427	0.00035	0.001	NE	J	NJ-	093344-009	SW846 6020
	Iron	0.253	0.033	0.100	NE			093344-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093344-009	SW846 6020
	Magnesium	17.0	0.010	0.030	NE			093344-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093344-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093344-009	SW846 7470
	Nickel	0.00267	0.0005	0.002	NE			093344-009	SW846 6020
	Potassium	1.54	0.080	0.300	NE			093344-009	SW846 6020
	Selenium	0.00399	0.0015	0.005	0.050	J		093344-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093344-009	SW846 6020
	Sodium	22.4	0.080	0.250	NE			093344-009	SW846 6020
	Thallium	0.000468	0.00045	0.002	0.002	J		093344-009	SW846 6020
	Uranium	0.0132	0.000067	0.0002	0.03			093344-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		093344-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093344-009	SW846 6020

Refer to footnotes on page 10A-39.

Table 10A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW3	Aluminum	ND	0.015	0.050	NE	U		093352-009	SW846 6020
23-Jan-13	Antimony	ND	0.001	0.003	0.006	U		093352-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093352-009	SW846 6020
	Barium	0.0261	0.0006	0.002	2.00			093352-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093352-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093352-009	SW846 6020
	Calcium	80.3	0.300	1.00	NE			093352-009	SW846 6020
	Chromium	0.00213	0.002	0.010	0.100	B, J	0.013U	093352-009	SW846 6020
	Cobalt	0.000148	0.0001	0.001	NE	J		093352-009	SW846 6020
	Copper	0.00042	0.00035	0.001	NE	J	NJ-	093352-009	SW846 6020
	Iron	0.255	0.033	0.100	NE			093352-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093352-009	SW846 6020
	Magnesium	16.2	0.010	0.030	NE			093352-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093352-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093352-009	SW846 7470
	Nickel	0.00267	0.0005	0.002	NE			093352-009	SW846 6020
	Potassium	1.63	0.080	0.300	NE			093352-009	SW846 6020
	Selenium	0.0041	0.0015	0.005	0.050	J		093352-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093352-009	SW846 6020
	Sodium	22.3	0.080	0.250	NE			093352-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093352-009	SW846 6020
	Uranium	0.0119	0.000067	0.0002	0.03			093352-009	SW846 6020
	Vanadium	0.001	0.001	0.005	NE	J		093352-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093352-009	SW846 6020

Refer to footnotes on page 10A-39.

Table 10A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW1	Aluminum	0.279	0.015	0.050	NE			093863-009	SW846 6020
18-Apr-13	Antimony	ND	0.001	0.003	0.006	U		093863-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093863-009	SW846 6020
	Barium	0.0236	0.0006	0.002	2.00			093863-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093863-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093863-009	SW846 6020
	Calcium	81.3	0.300	1.00	NE	B		093863-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093863-009	SW846 6020
	Cobalt	0.000296	0.0001	0.001	NE	J		093863-009	SW846 6020
	Copper	0.00102	0.00035	0.001	NE			093863-009	SW846 6020
	Iron	0.268	0.033	0.100	NE			093863-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093863-009	SW846 6020
	Magnesium	17.8	0.050	0.015	NE			093863-009	SW846 6020
	Manganese	0.0646	0.001	0.005	NE			093863-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093863-009	SW846 7470
	Nickel	0.0025	0.0005	0.002	NE	B		093863-009	SW846 6020
	Potassium	1.97	0.080	0.300	NE			093863-009	SW846 6020
	Selenium	0.00269	0.0015	0.005	0.050	J		093863-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093863-009	SW846 6020
	Sodium	21.4	0.080	0.250	NE			093863-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093863-009	SW846 6020
	Uranium	0.0107	0.000067	0.0002	0.03			093863-009	SW846 6020
	Vanadium	0.00116	0.001	0.005	NE	J		093863-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093863-009	SW846 6020

Refer to footnotes on page 10A-39.

Table 10A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW2	Aluminum	ND	0.015	0.050	NE	U		093866-009	SW846 6020
22-Apr-13	Antimony	ND	0.001	0.003	0.006	U		093866-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093866-009	SW846 6020
	Barium	0.019	0.0006	0.002	2.00			093866-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093866-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093866-009	SW846 6020
	Calcium	80.5	0.600	2.00	NE	B, N		093866-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093866-009	SW846 6020
	Cobalt	0.000103	0.0001	0.001	NE	B, J	0.00053U	093866-009	SW846 6020
	Copper	0.000506	0.00035	0.001	NE	J		093866-009	SW846 6020
	Iron	0.151	0.033	0.100	NE			093866-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093866-009	SW846 6020
	Magnesium	18.3	0.010	0.030	NE			093866-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093866-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093866-009	SW846 7470
	Nickel	0.00152	0.0005	0.002	NE	J		093866-009	SW846 6020
	Potassium	1.76	0.080	0.300	NE			093866-009	SW846 6020
	Selenium	0.00328	0.0015	0.005	0.050	J		093866-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093866-009	SW846 6020
	Sodium	24.0	0.800	2.50	NE	N		093866-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093866-009	SW846 6020
	Uranium	0.0146	0.000067	0.0002	0.03	B		093866-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U	UJ	093866-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093866-009	SW846 6020

Refer to footnotes on page 10A-39.

Table 10A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW3	Aluminum	0.028	0.015	0.050	NE	J		093870-009	SW846 6020
23-Apr-13	Antimony	ND	0.001	0.003	0.006	U		093870-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093870-009	SW846 6020
	Barium	0.0253	0.0006	0.002	2.00			093870-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093870-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093870-009	SW846 6020
	Calcium	76.5	0.600	2.00	NE	B, N		093870-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093870-009	SW846 6020
	Cobalt	0.000275	0.0001	0.001	NE	B, J	0.00053U	093870-009	SW846 6020
	Copper	0.000694	0.00035	0.001	NE	J	0.018UJ	093870-009	SW846 6020
	Iron	0.165	0.033	0.100	NE			093870-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093870-009	SW846 6020
	Magnesium	17.5	0.010	0.030	NE			093870-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093870-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093870-009	SW846 7470
	Nickel	0.00199	0.0005	0.002	NE	J		093870-009	SW846 6020
	Potassium	1.70	0.080	0.300	NE			093870-009	SW846 6020
	Selenium	0.0033	0.0015	0.005	0.050	J		093870-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093870-009	SW846 6020
	Sodium	23.6	0.800	2.50	NE	N		093870-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093870-009	SW846 6020
	Uranium	0.013	0.000067	0.0002	0.03	B		093870-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U	UJ	093870-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093870-009	SW846 6020

Refer to footnotes on page 10A-39.

Table 10A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW3 (Duplicate)	Aluminum	0.0162	0.015	0.050	NE	J		093871-009	SW846 6020
23-Apr-13	Antimony	ND	0.001	0.003	0.006	U		093871-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093871-009	SW846 6020
	Barium	0.025	0.0006	0.002	2.00			093871-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093871-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093871-009	SW846 6020
	Calcium	79.9	0.600	2.00	NE	B, N		093871-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093871-009	SW846 6020
	Cobalt	0.000151	0.0001	0.001	NE	B, J	0.00053U	093871-009	SW846 6020
	Copper	0.000712	0.00035	0.001	NE	J	0.018UJ	093871-009	SW846 6020
	Iron	0.159	0.033	0.100	NE			093871-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093871-009	SW846 6020
	Magnesium	18.0	0.010	0.030	NE			093871-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093871-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093871-009	SW846 7470
	Nickel	0.00203	0.0005	0.002	NE			093871-009	SW846 6020
	Potassium	1.85	0.080	0.300	NE			093871-009	SW846 6020
	Selenium	0.00318	0.0015	0.005	0.050	J		093871-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093871-009	SW846 6020
	Sodium	24.6	0.800	2.50	NE	N		093871-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093871-009	SW846 6020
	Uranium	0.0135	0.000067	0.0002	0.03	B		093871-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U	UJ	093871-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093871-009	SW846 6020

Refer to footnotes on page 10A-39.

Table 10A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW1	Aluminum	0.0442	0.015	0.050	NE	J		094361-009	SW846 6020
09-Jul-13	Antimony	ND	0.001	0.003	0.006	U		094361-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094361-009	SW846 6020
	Barium	0.0204	0.0006	0.002	2.00		J	094361-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094361-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094361-009	SW846 6020
	Calcium	74.5	0.300	1.00	NE			094361-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094361-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		094361-009	SW846 6020
	Copper	0.00064	0.00035	0.001	NE	J		094361-009	SW846 6020
	Iron	0.116	0.033	0.100	NE			094361-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094361-009	SW846 6020
	Magnesium	16.9	0.010	0.030	NE			094361-009	SW846 6020
	Manganese	0.00714	0.001	0.005	NE		J	094361-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094361-009	SW846 7470
	Nickel	0.000971	0.0005	0.002	NE	J		094361-009	SW846 6020
	Potassium	1.76	0.080	0.300	NE			094361-009	SW846 6020
	Selenium	0.00242	0.0015	0.005	0.050	J		094361-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094361-009	SW846 6020
	Sodium	23.3	0.080	0.250	NE			094361-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094361-009	SW846 6020
	Uranium	0.0105	0.000067	0.0002	0.03			094361-009	SW846 6020
	Vanadium	0.00165	0.001	0.005	NE	J		094361-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094361-009	SW846 6020

Refer to footnotes on page 10A-39.

Table 10A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW2	Aluminum	ND	0.015	0.050	NE	U		094365-009	SW846 6020
10-Jul-13	Antimony	ND	0.001	0.003	0.006	U		094365-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094365-009	SW846 6020
	Barium	0.0221	0.0006	0.002	2.00		J	094365-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094365-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094365-009	SW846 6020
	Calcium	76.6	0.300	1.00	NE			094365-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094365-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		094365-009	SW846 6020
	Copper	0.000415	0.00035	0.001	NE	J	0.008U	094365-009	SW846 6020
	Iron	0.0947	0.033	0.100	NE	J		094365-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094365-009	SW846 6020
	Magnesium	16.4	0.010	0.030	NE			094365-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U	UJ	094365-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094365-009	SW846 7470
	Nickel	0.000747	0.0005	0.002	NE	J		094365-009	SW846 6020
	Potassium	1.73	0.080	0.300	NE			094365-009	SW846 6020
	Selenium	0.00241	0.0015	0.005	0.050	J		094365-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094365-009	SW846 6020
	Sodium	23.9	0.080	0.250	NE			094365-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094365-009	SW846 6020
	Uranium	0.0139	0.000067	0.0002	0.03			094365-009	SW846 6020
	Vanadium	0.00105	0.001	0.005	NE	J		094365-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094365-009	SW846 6020

Refer to footnotes on page 10A-39.

Table 10A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW2 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		094366-009	SW846 6020
10-Jul-13	Antimony	ND	0.001	0.003	0.006	U		094366-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094366-009	SW846 6020
	Barium	0.0223	0.0006	0.002	2.00		J	094366-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094366-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094366-009	SW846 6020
	Calcium	76.4	0.300	1.00	NE			094366-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094366-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		094366-009	SW846 6020
	Copper	0.000463	0.00035	0.001	NE	J	0.008U	094366-009	SW846 6020
	Iron	0.120	0.033	0.100	NE			094366-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094366-009	SW846 6020
	Magnesium	16.2	0.010	0.030	NE			094366-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U	UJ	094366-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094366-009	SW846 7470
	Nickel	0.0012	0.0005	0.002	NE	J		094366-009	SW846 6020
	Potassium	1.65	0.080	0.300	NE			094366-009	SW846 6020
	Selenium	0.00249	0.0015	0.005	0.050	J		094366-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094366-009	SW846 6020
	Sodium	22.4	0.080	0.250	NE			094366-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094366-009	SW846 6020
	Uranium	0.014	0.000067	0.0002	0.03			094366-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		094366-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094366-009	SW846 6020

Refer to footnotes on page 10A-39.

Table 10A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW3	Aluminum	0.0587	0.015	0.050	NE			094368-009	SW846 6020
11-Jul-13	Antimony	ND	0.001	0.003	0.006	U		094368-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094368-009	SW846 6020
	Barium	0.0299	0.0006	0.002	2.00		J	094368-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094368-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094368-009	SW846 6020
	Calcium	78.4	0.300	1.00	NE			094368-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094368-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		094368-009	SW846 6020
	Copper	0.00089	0.00035	0.001	NE	J		094368-009	SW846 6020
	Iron	0.141	0.033	0.100	NE			094368-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094368-009	SW846 6020
	Magnesium	16.2	0.010	0.030	NE			094368-009	SW846 6020
	Manganese	0.00138	0.001	0.005	NE	J	J	094368-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094368-009	SW846 7470
	Nickel	0.000888	0.0005	0.002	NE	J		094368-009	SW846 6020
	Potassium	1.77	0.080	0.300	NE			094368-009	SW846 6020
	Selenium	0.00239	0.0015	0.005	0.050	J		094368-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094368-009	SW846 6020
	Sodium	22.0	0.080	0.250	NE			094368-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094368-009	SW846 6020
	Uranium	0.0126	0.000067	0.0002	0.03			094368-009	SW846 6020
	Vanadium	0.00111	0.001	0.005	NE	J		094368-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094368-009	SW846 6020

Refer to footnotes on page 10A-39.

Table 10A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW1	Aluminum	0.0157	0.015	0.050	NE	J		094767-009	SW846 6020
08-Oct-13	Antimony	ND	0.001	0.003	0.006	U		094767-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094767-009	SW846 6020
	Barium	0.0183	0.0006	0.002	2.00			094767-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094767-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094767-009	SW846 6020
	Calcium	80.4	0.600	2.00	NE			094767-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094767-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		094767-009	SW846 6020
	Copper	0.000851	0.00035	0.001	NE	J	0.0019U	094767-009	SW846 6020
	Iron	0.112	0.033	0.100	NE			094767-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094767-009	SW846 6020
	Magnesium	16.4	0.010	0.030	NE			094767-009	SW846 6020
	Manganese	0.00202	0.001	0.005	NE	J		094767-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	094767-009	SW846 7470
	Nickel	0.00105	0.0005	0.002	NE	J		094767-009	SW846 6020
	Potassium	1.66	0.080	0.300	NE			094767-009	SW846 6020
	Selenium	0.00372	0.0015	0.005	0.050	J		094767-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094767-009	SW846 6020
	Sodium	22.4	0.080	0.250	NE			094767-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094767-009	SW846 6020
	Uranium	0.00983	0.000067	0.0002	0.03			094767-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		094767-009	SW846 6010
	Zinc	0.00481	0.0035	0.010	NE	J	0.022U	094767-009	SW846 6020

Refer to footnotes on page 10A-39.

Table 10A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW1 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		094768-009	SW846 6020
08-Oct-13	Antimony	ND	0.001	0.003	0.006	U		094768-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094768-009	SW846 6020
	Barium	0.0184	0.0006	0.002	2.00			094768-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094768-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094768-009	SW846 6020
	Calcium	84.1	0.600	2.00	NE			094768-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094768-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		094768-009	SW846 6020
	Copper	0.00199	0.00035	0.001	NE			094768-009	SW846 6020
	Iron	0.103	0.033	0.100	NE			094768-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094768-009	SW846 6020
	Magnesium	15.9	0.010	0.030	NE			094768-009	SW846 6020
	Manganese	0.00201	0.001	0.005	NE	J		094768-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	094768-009	SW846 7470
	Nickel	0.0011	0.0005	0.002	NE	J		094768-009	SW846 6020
	Potassium	1.61	0.080	0.300	NE			094768-009	SW846 6020
	Selenium	0.00351	0.0015	0.005	0.050	J		094768-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094768-009	SW846 6020
	Sodium	21.6	0.080	0.250	NE			094768-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094768-009	SW846 6020
	Uranium	0.00994	0.000067	0.0002	0.03			094768-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		094768-009	SW846 6010
	Zinc	0.0039	0.0035	0.010	NE	J	0.022U	094768-009	SW846 6020

Refer to footnotes on page 10A-39.

Table 10A-8 *(Continued)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW2	Aluminum	ND	0.015	0.050	NE	U		094762-009	SW846 6020
07-Oct-13	Antimony	ND	0.001	0.003	0.006	U		094762-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094762-009	SW846 6020
	Barium	0.0199	0.0006	0.002	2.00			094762-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094762-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094762-009	SW846 6020
	Calcium	76.8	0.300	1.00	NE			094762-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094762-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		094762-009	SW846 6020
	Copper	0.000369	0.00035	0.001	NE	J		094762-009	SW846 6020
	Iron	0.104	0.033	0.100	NE			094762-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094762-009	SW846 6020
	Magnesium	16.0	0.010	0.030	NE			094762-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		094762-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	094762-009	SW846 7470
	Nickel	0.00119	0.0005	0.002	NE	J		094762-009	SW846 6020
	Potassium	1.60	0.080	0.300	NE			094762-009	SW846 6020
	Selenium	0.00343	0.0015	0.005	0.050	J		094762-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094762-009	SW846 6020
	Sodium	22.0	0.080	0.250	NE			094762-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094762-009	SW846 6020
	Uranium	0.0135	0.000067	0.0002	0.03			094762-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		094762-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094762-009	SW846 6020

Refer to footnotes on page 10A-39.

Table 10A-8 *(Concluded)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW3	Aluminum	ND	0.015	0.050	NE	U		094771-009	SW846 6020
09-Oct-13	Antimony	ND	0.001	0.003	0.006	U		094771-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094771-009	SW846 6020
	Barium	0.0269	0.0006	0.002	2.00			094771-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094771-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094771-009	SW846 6020
	Calcium	80.7	0.600	2.00	NE			094771-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094771-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		094771-009	SW846 6020
	Copper	0.000473	0.00035	0.001	NE	J		094771-009	SW846 6020
	Iron	0.113	0.033	0.100	NE			094771-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094771-009	SW846 6020
	Magnesium	16.1	0.010	0.030	NE			094771-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		094771-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	094771-009	SW846 7470
	Nickel	0.00116	0.0005	0.002	NE	J		094771-009	SW846 6020
	Potassium	1.64	0.080	0.300	NE			094771-009	SW846 6020
	Selenium	0.00335	0.0015	0.005	0.050	J		094771-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094771-009	SW846 6020
	Sodium	22.6	0.080	0.250	NE			094771-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094771-009	SW846 6020
	Uranium	0.0121	0.000067	0.0002	0.03			094771-009	SW846 6020
	Vanadium	0.00112	0.001	0.005	NE	J		094771-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		094771-009	SW846 6020

Refer to footnotes on page 10A-39.

Table 10A-9
Summary of Cation Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW1	Calcium	85.3	0.300	1.00	NE			093349-017	SW846 6020
22-Jan-13	Magnesium	17.9	0.010	0.030	NE		J	093349-017	SW846 6020
	Potassium	1.74	0.080	0.300	NE			093349-017	SW846 6020
	Sodium	23.0	0.080	0.250	NE			093349-017	SW846 6020
OBS-MW1 (Duplicate)	Calcium	87.1	0.300	1.00	NE			093350-017	SW846 6020
22-Jan-13	Magnesium	19.0	0.010	0.030	NE		J	093350-017	SW846 6020
	Potassium	1.89	0.080	0.300	NE			093350-017	SW846 6020
	Sodium	23.5	0.080	0.250	NE			093350-017	SW846 6020
OBS-MW2	Calcium	83.9	0.300	1.00	NE			093344-017	SW846 6020
21-Jan-13	Magnesium	16.4	0.010	0.030	NE		J	093344-017	SW846 6020
	Potassium	1.58	0.080	0.300	NE			093344-017	SW846 6020
	Sodium	21.4	0.080	0.250	NE			093344-017	SW846 6020
OBS-MW3	Calcium	81.2	0.300	1.00	NE			093352-017	SW846 6020
23-Jan-13	Magnesium	18.2	0.010	0.030	NE		J	093352-017	SW846 6020
	Potassium	1.74	0.080	0.300	NE			093352-017	SW846 6020
	Sodium	22.9	0.080	0.250	NE			093352-017	SW846 6020
OBS-MW1	Calcium	79.6	0.300	1.00	NE	B		093863-017	SW846 6020
18-Apr-13	Magnesium	17.6	0.050	0.150	NE			093863-017	SW846 6020
	Potassium	1.77	0.080	0.300	NE			093863-017	SW846 6020
	Sodium	21.5	0.080	0.250	NE			093863-017	SW846 6020
OBS-MW2	Calcium	80.9	0.600	2.00	NE	B, N		093866-017	SW846 6020
22-Apr-13	Magnesium	17.9	0.010	0.030	NE			093866-017	SW846 6020
	Potassium	1.77	0.080	0.300	NE			093866-017	SW846 6020
	Sodium	24.5	0.800	2.50	NE	N		093866-017	SW846 6020
OBS-MW3	Calcium	78.5	0.600	2.00	NE	B, N		093870-017	SW846 6020
23-Apr-13	Magnesium	18.1	0.010	0.030	NE			093870-017	SW846 6020
	Potassium	1.82	0.080	0.300	NE			093870-017	SW846 6020
	Sodium	24.2	0.800	2.50	NE	N		093870-017	SW846 6020
OBS-MW3 (Duplicate)	Calcium	76.7	0.600	2.00	NE	B, N		093871-017	SW846 6020
23-Apr-13	Magnesium	18.6	0.010	0.030	NE			093871-017	SW846 6020
	Potassium	1.89	0.080	0.300	NE			093871-017	SW846 6020
	Sodium	23.9	0.800	2.50	NE	N		093871-017	SW846 6020

Refer to footnotes on page 10A-39.

Table 10A-9 *(Concluded)*
Summary of Cation Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW1	Calcium	75.0	0.300	1.00	NE			094361-017	SW846 6020
09-Jul-13	Magnesium	16.4	0.010	0.030	NE			094361-017	SW846 6020
	Potassium	1.81	0.080	0.300	NE			094361-017	SW846 6020
	Sodium	24.4	0.080	0.250	NE			094361-017	SW846 6020
OBS-MW2	Calcium	75.6	0.300	1.00	NE			094365-017	SW846 6020
10-Jul-13	Magnesium	16.4	0.010	0.030	NE			094365-017	SW846 6020
	Potassium	1.65	0.080	0.300	NE			094365-017	SW846 6020
	Sodium	23.8	0.080	0.250	NE			094365-017	SW846 6020
OBS-MW2 (Duplicate)	Calcium	77.9	0.300	1.00	NE			094366-017	SW846 6020
10-Jul-13	Magnesium	16.0	0.010	0.030	NE			094366-017	SW846 6020
	Potassium	1.74	0.080	0.300	NE			094366-017	SW846 6020
	Sodium	23.9	0.080	0.250	NE			094366-017	SW846 6020
OBS-MW3	Calcium	72.1	0.300	1.00	NE			094368-017	SW846 6020
11-Jul-13	Magnesium	16.5	0.010	0.030	NE			094368-017	SW846 6020
	Potassium	1.61	0.080	0.300	NE			094368-017	SW846 6020
	Sodium	25.2	0.080	0.250	NE			094368-017	SW846 6020
OBS-MW1	Calcium	79.2	0.600	2.00	NE			094767-017	SW846 6020
08-Oct-13	Magnesium	16.0	0.010	0.030	NE			094767-017	SW846 6020
	Potassium	1.65	0.080	0.300	NE			094767-017	SW846 6020
	Sodium	21.9	0.080	0.250	NE			094767-017	SW846 6020
OBS-MW1 (Duplicate)	Calcium	75.7	0.600	2.00	NE			094768-017	SW846 6020
08-Oct-13	Magnesium	14.9	0.010	0.030	NE			094768-017	SW846 6020
	Potassium	1.52	0.080	0.300	NE			094768-017	SW846 6020
	Sodium	20.3	0.080	0.250	NE			094768-017	SW846 6020
OBS-MW2	Calcium	78.5	0.600	2.00	NE			094762-017	SW846 6020
07-Oct-13	Magnesium	15.8	0.010	0.030	NE			094762-017	SW846 6020
	Potassium	1.55	0.080	0.300	NE			094762-017	SW846 6020
	Sodium	21.6	0.080	0.250	NE			094762-017	SW846 6020
OBS-MW3	Calcium	75.0	0.600	2.00	NE			094771-017	SW846 6020
09-Oct-13	Magnesium	15.6	0.010	0.030	NE			094771-017	SW846 6020
	Potassium	1.57	0.080	0.300	NE			094771-017	SW846 6020
	Sodium	21.6	0.080	0.250	NE			094771-017	SW846 6020

Refer to footnotes on page 10A-39.

Table 10A-10
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results, Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW1	Americium-241	-13.9 ± 19.4	30.8	15.1	NE	U	BD	093349-033	EPA 901.1
22-Jan-13	Cesium-137	0.943 ± 2.87	3.78	1.82	NE	U	BD	093349-033	EPA 901.1
	Cobalt-60	1.04 ± 2.27	4.13	1.96	NE	U	BD	093349-033	EPA 901.1
	Potassium-40	15.6 ± 37.4	54.3	26.1	NE	U	BD	093349-033	EPA 901.1
	Gross Alpha	7.00	NA	NA	15 pCi/L			093349-034	EPA 900.0
	Gross Beta	4.81 ± 1.18	1.08	0.517	4 mrem/yr		J	093349-034	EPA 900.0
	Uranium-233/234	16.7 ± 2.13	0.0749	0.0334	NE			093349-035	HASL-300
	Uranium-235/236	0.172 ± 0.057	0.0422	0.0161	NE			093349-035	HASL-300
	Uranium-238	3.03 ± 0.421	0.0313	0.0115	NE			093349-035	HASL-300
OBS-MW1 (Duplicate)	Americium-241	2.22 ± 8.97	13.2	6.50	NE	U	BD	093350-033	EPA 901.1
22-Jan-13	Cesium-137	0.502 ± 2.90	3.42	1.66	NE	U	BD	093350-033	EPA 901.1
	Cobalt-60	-0.0873 ± 2.04	3.62	1.73	NE	U	BD	093350-033	EPA 901.1
	Potassium-40	-14.5 ± 32.1	40.7	19.5	NE	U	BD	093350-033	EPA 901.1
	Gross Alpha	0.57	NA	NA	15 pCi/L			093350-034	EPA 900.0
	Gross Beta	5.67 ± 1.33	1.18	0.567	4 mrem/yr		J	093350-034	EPA 900.0
	Uranium-233/234	17.7 ± 2.26	0.0785	0.035	NE			093350-035	HASL-300
	Uranium-235/236	0.145 ± 0.0513	0.0443	0.0168	NE			093350-035	HASL-300
	Uranium-238	3.39 ± 0.470	0.0328	0.0121	NE			093350-035	HASL-300
OBS-MW2	Americium-241	14.9 ± 23.4	34.6	17.0	NE	U	BD	093344-033	EPA 901.1
21-Jan-13	Cesium-137	-0.0433 ± 2.41	3.72	1.80	NE	U	BD	093344-033	EPA 901.1
	Cobalt-60	1.31 ± 2.35	4.06	1.93	NE	U	BD	093344-033	EPA 901.1
	Potassium-40	3.51 ± 33.2	50.6	24.3	NE	U	BD	093344-033	EPA 901.1
	Gross Alpha	7.22	NA	NA	15 pCi/L			093344-034	EPA 900.0
	Gross Beta	5.54 ± 1.30	0.994	0.474	4 mrem/yr		J	093344-034	EPA 900.0
	Uranium-233/234	22.5 ± 2.87	0.114	0.0507	NE			093344-035	HASL-300
	Uranium-235/236	0.267 ± 0.0848	0.0642	0.0244	NE			093344-035	HASL-300
	Uranium-238	4.01 ± 0.567	0.0476	0.0176	NE			093344-035	HASL-300
OBS-MW3	Americium-241	10.5 ± 12.9	18.2	8.92	NE	U	BD	093352-033	EPA 901.1
23-Jan-13	Cesium-137	2.72 ± 3.53	3.67	1.78	NE	U	BD	093352-033	EPA 901.1
	Cobalt-60	1.22 ± 2.24	3.97	1.89	NE	U	BD	093352-033	EPA 901.1
	Potassium-40	78.2 ± 49.6	31.8	14.9	NE	X	R	093352-033	EPA 901.1
	Gross Alpha	14.68	NA	NA	15 pCi/L			093352-034	EPA 900.0
	Gross Beta	5.85 ± 1.36	0.994	0.470	4 mrem/yr		J	093352-034	EPA 900.0
	Uranium-233/234	19.9 ± 2.59	0.0899	0.040	NE			093352-035	HASL-300
	Uranium-235/236	0.215 ± 0.0691	0.0507	0.0193	NE			093352-035	HASL-300
	Uranium-238	3.81 ± 0.537	0.0376	0.0139	NE			093352-035	HASL-300

Refer to footnotes on page 10A-39.

Table 10A-10 *(Continued)*
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results, Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW1	Americium-241	-2.64 ± 11.2	19.1	9.32	NE	U	BD	093863-033	EPA 901.1
18-Apr-13	Cesium-137	-0.971 ± 2.17	3.61	1.73	NE	U	BD	093863-033	EPA 901.1
	Cobalt-60	1.97 ± 2.67	4.10	1.94	NE	U	BD	093863-033	EPA 901.1
	Potassium-40	-1.48 ± 50.5	47.7	22.7	NE	U	BD	093863-033	EPA 901.1
	Gross Alpha	7.44	NA	NA	15 pCi/L	NA	None	093863-034	EPA 900.0
	Gross Beta	5.43 ± 1.32	1.24	0.599	4 mrem/yr		J	093863-034	EPA 900.0
	Uranium-233/234	17.5 ± 2.29	0.124	0.055	NE			093863-035	HASL-300
	Uranium-235/236	0.262 ± 0.0876	0.0759	0.0295	NE			093863-035	HASL-300
	Uranium-238	3.30 ± 0.489	0.0694	0.0278	NE			093863-035	HASL-300
OBS-MW2	Americium-241	-17.7 ± 11.0	12.3	6.04	NE	U	BD	093866-033	EPA 901.1
22-Apr-13	Cesium-137	1.63 ± 2.47	3.63	1.75	NE	U	BD	093866-033	EPA 901.1
	Cobalt-60	0.0269 ± 2.25	3.92	1.87	NE	U	BD	093866-033	EPA 901.1
	Potassium-40	-59.9 ± 56.6	49.2	23.7	NE	U	BD	093866-033	EPA 901.1
	Gross Alpha	9.60	NA	NA	15 pCi/L	NA	None	093866-034	EPA 900.0
	Gross Beta	5.63 ± 1.29	1.04	0.497	4 mrem/yr		J	093866-034	EPA 900.0
	Uranium-233/234	23.9 ± 3.12	0.0936	0.0416	NE			093866-035	HASL-300
	Uranium-235/236	0.288 ± 0.0822	0.0575	0.0223	NE			093866-035	HASL-300
	Uranium-238	4.51 ± 0.632	0.0525	0.0211	NE			093866-035	HASL-300
OBS-MW3	Americium-241	17.1 ± 18.4	26.4	12.9	NE	U	BD	093870-033	EPA 901.1
23-Apr-13	Cesium-137	-1.25 ± 2.25	3.25	1.56	NE	U	BD	093870-033	EPA 901.1
	Cobalt-60	-0.787 ± 1.96	3.40	1.60	NE	U	BD	093870-033	EPA 901.1
	Potassium-40	-17.3 ± 50.0	46.4	22.1	NE	U	BD	093870-033	EPA 901.1
	Gross Alpha	8.88	NA	NA	15 pCi/L	NA	None	093870-034	EPA 900.0
	Gross Beta	9.49 ± 1.96	1.34	0.649	4 mrem/yr		J	093870-034	EPA 900.0
	Uranium-233/234	21.3 ± 2.74	0.0847	0.0377	NE			093870-035	HASL-300
	Uranium-235/236	0.355 ± 0.0893	0.052	0.0202	NE			093870-035	HASL-300
	Uranium-238	3.87 ± 0.540	0.0475	0.0191	NE			093870-035	HASL-300
OBS-MW3 (Duplicate)	Americium-241	-1.03 ± 10.2	15.7	7.69	NE	U	BD	093871-033	EPA 901.1
23-Apr-13	Cesium-137	0.889 ± 3.21	3.43	1.65	NE	U	BD	093871-033	EPA 901.1
	Cobalt-60	-1.35 ± 2.09	3.33	1.57	NE	U	BD	093871-033	EPA 901.1
	Potassium-40	35.6 ± 40.9	34.8	16.5	NE	X	R	093871-033	EPA 901.1
	Gross Alpha	11.60	NA	NA	15 pCi/L	NA	None	093871-034	EPA 900.0
	Gross Beta	6.38 ± 1.40	0.978	0.466	4 mrem/yr		J	093871-034	EPA 900.0
	Uranium-233/234	19.5 ± 2.48	0.0758	0.0337	NE			093871-035	HASL-300
	Uranium-235/236	0.287 ± 0.0763	0.0465	0.0181	NE			093871-035	HASL-300
	Uranium-238	3.81 ± 0.522	0.0425	0.0171	NE			093871-035	HASL-300

Refer to footnotes on page 10A-39.

Table 10A-10 *(Continued)*
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results,
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW1	Americium-241	8.25 ± 8.00	11.3	5.56	NE	U	BD	094361-033	EPA 901.1
09-Jul-13	Cesium-137	-0.29 ± 2.22	3.36	1.63	NE	U	BD	094361-033	EPA 901.1
	Cobalt-60	-1.42 ± 2.40	3.32	1.59	NE	U	BD	094361-033	EPA 901.1
	Potassium-40	-26.9 ± 42.4	44.5	21.5	NE	U	BD	094361-033	EPA 901.1
	Gross Alpha	3.33	NA	NA	15 pCi/L	NA	None	094361-034	EPA 900.0
	Gross Beta	6.80 ± 1.55	1.46	0.708	4 mrem/yr			094361-034	EPA 900.0
	Uranium-233/234	17.2 ± 2.15	0.0433	0.0188	NE			094361-035	HASL-300
	Uranium-235/236	0.273 ± 0.0633	0.0253	0.00915	NE			094361-035	HASL-300
	Uranium-238	3.30 ± 0.439	0.0349	0.0146	NE			094361-035	HASL-300
OBS-MW2	Americium-241	-30.1 ± 24.3	32.7	16.1	NE	U	BD	094365-033	EPA 901.1
10-Jul-13	Cesium-137	-1.26 ± 3.67	3.98	1.92	NE	U	BD	094365-033	EPA 901.1
	Cobalt-60	-3.45 ± 4.40	4.55	2.17	NE	U	BD	094365-033	EPA 901.1
	Potassium-40	-33 ± 44.9	51.3	24.6	NE	U	BD	094365-033	EPA 901.1
	Gross Alpha	-4.44	NA	NA	15 pCi/L	NA	None	094365-034	EPA 900.0
	Gross Beta	6.16 ± 1.55	1.64	0.797	4 mrem/yr			094365-034	EPA 900.0
	Uranium-233/234	23.1 ± 2.93	0.0485	0.0211	NE			094365-035	HASL-300
	Uranium-235/236	0.283 ± 0.0687	0.0283	0.0103	NE			094365-035	HASL-300
	Uranium-238	4.26 ± 0.569	0.0391	0.0164	NE			094365-035	HASL-300
OBS-MW2 (Duplicate)	Americium-241	7.39 ± 8.28	12.1	5.93	NE	U	BD	094366-033	EPA 901.1
10-Jul-13	Cesium-137	0.146 ± 2.37	3.63	1.76	NE	U	BD	094366-033	EPA 901.1
	Cobalt-60	-1.18 ± 2.12	3.52	1.67	NE	U	BD	094366-033	EPA 901.1
	Potassium-40	1.15 ± 48.2	34.3	16.3	NE	U	BD	094366-033	EPA 901.1
	Gross Alpha	2.51	NA	NA	15 pCi/L	NA	None	094366-034	EPA 900.0
	Gross Beta	6.24 ± 1.49	1.39	0.672	4 mrem/yr			094366-034	EPA 900.0
	Uranium-233/234	22.1 ± 2.77	0.0437	0.019	NE			094366-035	HASL-300
	Uranium-235/236	0.268 ± 0.0627	0.0255	0.00922	NE			094366-035	HASL-300
	Uranium-238	4.22 ± 0.554	0.0352	0.0147	NE			094366-035	HASL-300
OBS-MW3	Americium-241	-8.99 ± 11.2	17.6	8.58	NE	U	BD	094368-033	EPA 901.1
11-Jul-13	Cesium-137	1.18 ± 3.66	3.14	1.51	NE	U	BD	094368-033	EPA 901.1
	Cobalt-60	-0.763 ± 1.86	3.16	1.48	NE	U	BD	094368-033	EPA 901.1
	Potassium-40	25.7 ± 42.9	31.8	15.0	NE	U	BD	094368-033	EPA 901.1
	Gross Alpha	-6.04	NA	NA	15 pCi/L	NA	None	094368-034	EPA 900.0
	Gross Beta	8.12 ± 1.67	1.15	0.557	4 mrem/yr			094368-034	EPA 900.0
	Uranium-233/234	20.5 ± 2.59	0.0484	0.021	NE			094368-035	HASL-300
	Uranium-235/236	0.210 ± 0.0561	0.0283	0.0102	NE			094368-035	HASL-300
	Uranium-238	3.63 ± 0.488	0.039	0.0163	NE			094368-035	HASL-300

Refer to footnotes on page 10A-39.

Table 10A-10 *(Concluded)*
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results, Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW1	Americium-241	5.32 ± 10.4	16.0	7.85	NE	U	BD	094767-033	EPA 901.1
08-Oct-13	Cesium-137	-1.09 ± 3.51	3.83	1.85	NE	U	BD	094767-033	EPA 901.1
	Cobalt-60	1.61 ± 2.22	3.04	1.43	NE	U	BD	094767-033	EPA 901.1
	Potassium-40	26.0 ± 38.4	44.4	21.2	NE	U	BD	094767-033	EPA 901.1
	Gross Alpha	-5.17	NA	NA	15 pCi/L	NA	None	094767-034	EPA 900.0
	Gross Beta	7.48 ± 3.15	4.12	1.88	4 mrem/yr		J	094767-034	EPA 900.0
	Uranium-233/234	17.4 ± 2.24	0.108	0.0478	NE			094767-035	HASL-300
	Uranium-235/236	0.197 ± 0.0714	0.0516	0.0182	NE			094767-035	HASL-300
	Uranium-238	3.27 ± 0.473	0.0903	0.039	NE			094767-035	HASL-300
OBS-MW1 (Duplicate)	Americium-241	2.53 ± 6.55	9.74	4.77	NE	U	BD	094768-033	EPA 901.1
08-Oct-13	Cesium-137	0.654 ± 1.53	2.71	1.30	NE	U	BD	094768-033	EPA 901.1
	Cobalt-60	-0.336 ± 1.44	2.55	1.19	NE	U	BD	094768-033	EPA 901.1
	Potassium-40	62.1 ± 28.9	24.8	11.5	NE		J	094768-033	EPA 901.1
	Gross Alpha	-3.56	NA	NA	15 pCi/L	NA	None	094768-034	EPA 900.0
	Gross Beta	4.38 ± 1.20	1.25	0.601	4 mrem/yr		J	094768-034	EPA 900.0
	Uranium-233/234	16.3 ± 2.08	0.0748	0.0332	NE			094768-035	HASL-300
	Uranium-235/236	0.203 ± 0.0625	0.0358	0.0126	NE			094768-035	HASL-300
	Uranium-238	2.96 ± 0.416	0.0626	0.027	NE			094768-035	HASL-300
OBS-MW2	Americium-241	6.72 ± 17.9	26.7	13.2	NE	U	BD	094762-033	EPA 901.1
07-Oct-13	Cesium-137	-0.415 ± 3.44	4.25	2.07	NE	U	BD	094762-033	EPA 901.1
	Cobalt-60	0.114 ± 2.94	4.49	2.17	NE	U	BD	094762-033	EPA 901.1
	Potassium-40	29.4 ± 54.1	44.0	21.2	NE	U	BD	094762-033	EPA 901.1
	Gross Alpha	-1.53	NA	NA	15 pCi/L	NA	None	094762-034	EPA 900.0
	Gross Beta	8.29 ± 3.20	3.82	1.73	4 mrem/yr		J	094762-034	EPA 900.0
	Uranium-233/234	23.8 ± 3.14	0.137	0.0609	NE			094762-035	HASL-300
	Uranium-235/236	0.379 ± 0.115	0.0657	0.0232	NE			094762-035	HASL-300
	Uranium-238	4.65 ± 0.678	0.115	0.0496	NE			094762-035	HASL-300
OBS-MW3	Americium-241	-1.85 ± 10.8	16.2	7.89	NE	U	BD	094771-033	EPA 901.1
09-Oct-13	Cesium-137	-1.68 ± 3.30	3.53	1.71	NE	U	BD	094771-033	EPA 901.1
	Cobalt-60	0.707 ± 1.88	3.34	1.58	NE	U	BD	094771-033	EPA 901.1
	Potassium-40	5.80 ± 31.6	31.7	15.0	NE	U	BD	094771-033	EPA 901.1
	Gross Alpha	0.46	NA	NA	15 pCi/L	NA	None	094771-034	EPA 900.0
	Gross Beta	4.39 ± 1.27	1.55	0.748	4 mrem/yr		J	094771-034	EPA 900.0
	Uranium-233/234	21.3 ± 2.77	0.0884	0.0392	NE			094771-035	HASL-300
	Uranium-235/236	0.244 ± 0.0749	0.0423	0.0149	NE			094771-035	HASL-300
	Uranium-238	4.00 ± 0.565	0.0739	0.0319	NE			094771-035	HASL-300

Refer to footnotes on page 10A-39.

Table 10A-11
Summary of Field Water Quality Measurements[h],
Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
OBS-MW1	22-Jan-13	16.19	505	190.4	7.13	0.66	37.3	3.66
OBS-MW2	21-Jan-13	17.07	501	200.8	7.11	0.52	37.0	3.56
OBS-MW3	23-Jan-13	15.29	501	189.5	7.14	0.54	44.2	4.42
OBS-MW1	18-Apr-13	14.54	503	252.5	7.27	0.56	36.2	3.69
OBS-MW2	22-Apr-13	18.11	501	250.3	7.14	0.25	38.0	3.58
OBS-MW3	23-Apr-13	16.74	501	240.9	7.24	0.52	45.5	4.41
OBS-MW1	09-Jul-13	18.32	499	108.9	7.56	0.62	43.6	3.99
OBS-MW2	10-Jul-13	20.17	482	124.5	7.53	0.43	38.3	3.47
OBS-MW3	11-Jul-13	18.43	471	103.2	7.55	0.69	46.3	4.33
OBS-MW1	08-Oct-13	16.77	592	166.1	7.46	0.55	38.8	3.74
OBS-MW2	07-Oct-13	18.12	588	175.1	7.29	0.43	36.5	3.44
OBS-MW3	09-Oct-13	17.37	587	159.2	7.43	0.47	47.8	4.58

Refer to footnotes on page 10A-39.

This page intentionally left blank

Footnotes for Solid Waste Management Unit 68 Analytical Results Tables

% = percent.
µg/L = micrograms per liter.
CFR = Code of Federal Regulations.
EPA = U.S. Environmental Protection Agency.
HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
ID = Identifier.
mg/L = milligrams per liter.
mrem/yr = millirem per year.
No. = Number.
pCi/L = picocuries per liter.
RDX = hexahydro-1,3,5-trinitro-1,3,5-triazineN
Tetryl = methyl-2,4,6-trinitrophenylnitramine.

[a]Result

Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 2A- 1-4).

Bold = Indicates the value exceed the established MCL.
ND = Not detected (at MDL). Activities of zero or less are considered to be not detected.

[b]MDL or MDA

MDL applies to the data listed in Tables 10A-1 through 10A-9. MDA applies to radiological data in Table 10A-10.

MDA = Minimum detectable activity. The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.
MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA = Not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

[c]PQL or Critical Level

The PQL applies to Tables 10A-1 through 10A-9. Critical level applies to Table 10A-10.

Critical level = The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA = Not applicable (for gross alpha activities). The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

[d]MCL

Regulatory limits: the MCL is listed first, followed by the MAC. A single value is listed when the MCL and MAC are equal (for example, nitrate plus nitrate). If no value exists, NE is used.

MCL = Maximum contaminant level. Established by the U.S. Environmental Protection Agency (EPA) Office of Water, National Primary Water Regulations (EPA May 2009).

The following are MCLs for gross alpha particles and beta particles in community water systems:

- Gross alpha particle activity, excluding total uranium = 15 pCi/L= (40 CFR Parts 9, 141, and 142, Table 10A- 1-4).
- Any combination of beta and/or gamma emitting radionuclides = 4 mrem/yr = (as dose rate).

NE = Not established.

Footnotes for Solid Waste Management Unit 68 Analytical Results Tables (Concluded)

[e]Lab Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

B = The analyte was detected in the blank above the effective MDL.
H = Analytical holding time was exceeded.
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
N = Results associated with a spike analysis that was outside control limits.
NA = Not applicable.
U = Analyte is absent or below the method detection limit.
X = Data rejected due to peak not meeting identification criteria.

[f]Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = The associated value is an estimated quantity.
NJ- = Presumptive evidence of the presence of the material at an estimated quantity with a suspected negative bias.
None = No data validation for corrected gross alpha activity.
U = The analyte was analyzed for but not detected. The associated numerical value is the sample quantitation limit.
UJ = The analyte was analyzed for but not detected. The associated value is an estimate and may be inaccurate or imprecise.
R = The data are unusable (compound may or may not be present). Resampling and reanalysis are for verification.

[g]Analytical Method

Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.

DOE, 1990, "EML [Environmental Measurements Laboratory] Procedures Manual," 27th ed., Vol. 1, Rev. 1992, HASL-300.

EPA, 1980, "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.

DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
HASL = Health and Safety Laboratory.
SM = Standard Method.

[h]Field Water Quality Measurements

Field measurements collected prior to sampling.

°C = Degrees Celsius.
% Sat = Percent saturation.
μmhos/cm = Micromhos per centimeter.
mg/L = Milligrams per liter.
mV = Millivolts.
NTU = Nephelometric turbidity units.
pH = Potential of hydrogen (negative logarithm of the hydrogen ion concentration).

Attachment 10B
Solid Waste Management Unit 68
Hydrographs

This page intentionally left blank.

Attachment 10B Hydrographs

10B-1 SWMU 68 Study Area Wells..... 10B-5

This page intentionally left blank.

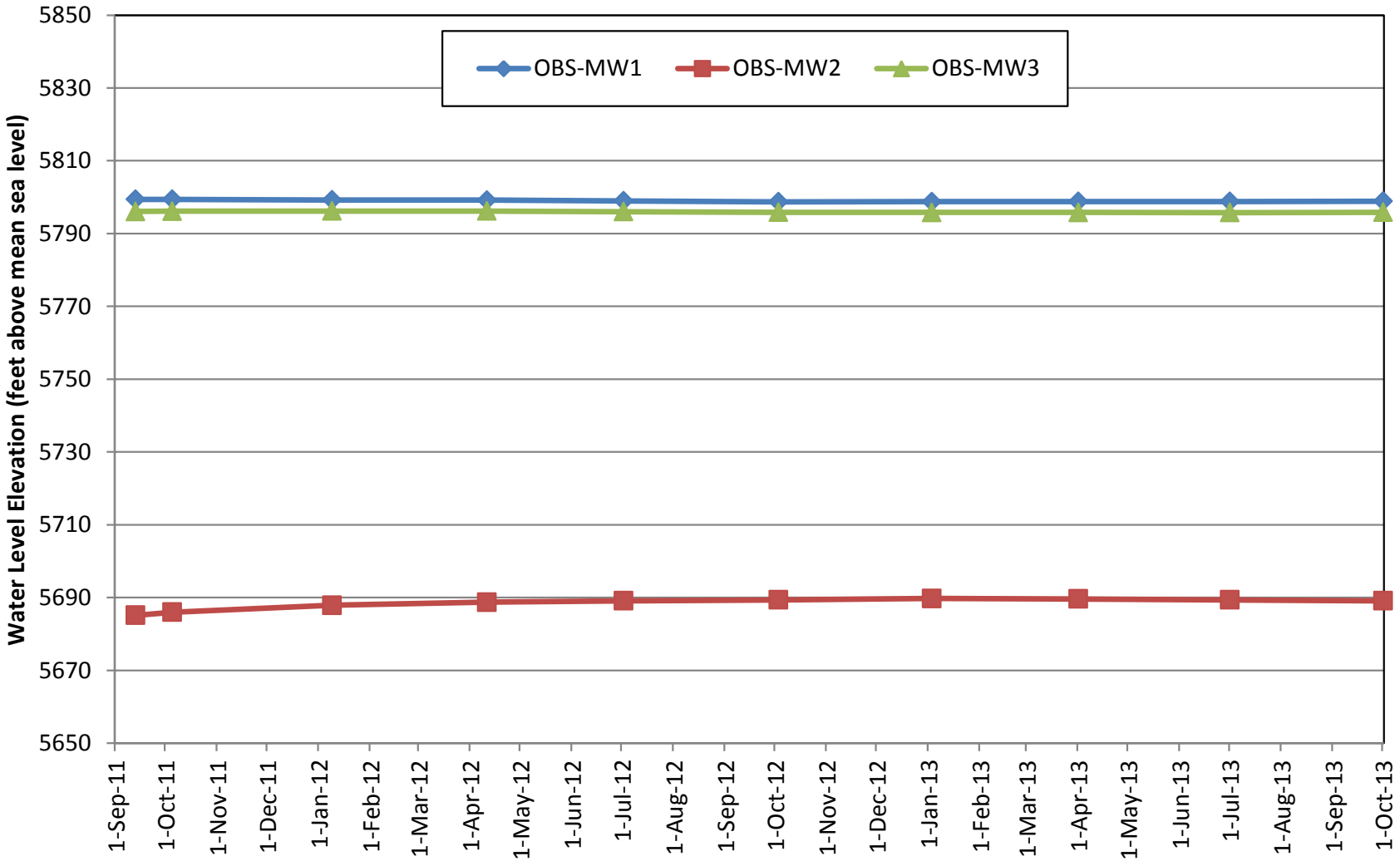


Figure 10B-1. SWMU 68 Study Area Wells

This page intentionally left blank

11.0 Solid Waste Management Unit 116

11.1 Introduction

Drain and Septic System (DSS) Solid Waste Management Unit (SWMU) 116 is located in the Coyote Test Field on the western margin of the Manzanita Mountains. Analytical results for groundwater samples from the fractured bedrock have historically been reported as nondetected or detected at background concentrations for constituents of concern (COCs).

11.1.1 Location

The Coyote Canyon Test Area at Sandia National Laboratories, New Mexico (SNL/NM) is located in the eastern portion of Kirtland Air Force Base (KAFB). The SNL/NM facility is a government-owned, contractor-operated, multi-program laboratory overseen by the U.S. Department of Energy (DOE), National Nuclear Security Administration through the Sandia Field Office in Albuquerque, New Mexico. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM.

SWMU 116 is located on the western margin of the Manzanita Mountain foothills within the U.S. Forest Service Withdrawn Area. The site lies in a minor southwesterly-sloping tributary that drains to the alluvial fan along the mountain front. This short tributary drains mountainous terrain immediately north and east of the site. Outcrops in the immediate area include Precambrian granite, gneiss, metarhyolite, and amphibolites that are unconformably overlain by Pennsylvanian limestone, sandstone, and conglomerate (SNL March 1993). Recent sediments include a thin discontinuous veneer of stream-deposited alluvium along the floor of the tributary and also colluvium on nearby hillsides. Vegetation in the vicinity consists predominantly of sparse juniper and pinon woodlands, low-lying shrubs (including sand sage, winter fat, saltbush, and rabbitbush), cacti (e.g., cholla, pincushion, strawberry, and prickly pear), and bunch grasses (e.g., grama, muhly, dropseed, and galleta).

SWMU 116 contains five seepage pits on the south side of Building 9990. Four of the seepage pits were connected to a septic tank. A fifth seepage pit was connected directly to floor drains and a sink in the building. The site is located approximately 50 feet (ft) south of Building 9990 and covers 2,473 square feet (approximately 0.06 acres). The site elevation is 6,120 ft above mean sea level (amsl).

11.1.2 Site History

Building 9990, the Electroexplosive Research Facility, was constructed in 1969 and was used as an explosive test facility from 1969 to 1986 (Table 11-1). Explosive testing was discontinued in 1986 and no significant research activity has occurred there since 1994. Tests were conducted north of the building, and debris from the blasts, which often used depleted uranium, were dispersed over the nearby hillside.

Environmental concern about SWMU 116 is based on the potential release of COCs in sanitary waste or wastewater that discharged at the Building 9990 seepage pits. While in operation, the DSS is estimated to have discharged approximately 60 to 600 gallons per day of sanitary waste and wastewater. The DSS at SWMU 116 was removed from service in 1989, but remains in place. The 750-gallon septic tank is connected to a distribution box and four seepage pits, each 5 ft in diameter. Three of the four seepage pits are 13 ft deep, and the fourth is 11 ft deep. The septic system received sanitary waste from restrooms and possibly wastewater from floor drains (SNL March 1993).

Table 11-1. Historical Timeline of SWMU 116

Month	Year	Event	Reference
--	1969	Building 9990 and septic system constructed.	SNL June 1996
September	1987	SWMU 116 first identified as a potential release site.	SNL June 1996
--	1989	SWMU 116 septic tank pumped for the last time.	SNL June 1996
June	1992	Waste characterization samples collected from SWMU 116 septic tank.	SNL June 1996
March	1993	Septic Tanks and Drainfields (OU 1295), RCRA Facility Investigation Work Plan submitted to the EPA.	SNL March 1993
March	1994	OU 1295 SAP prepared.	IT March 1994
--	1993-1995	Field Investigations and Voluntary Corrective Measures completed at SWMU 116.	SNL June 1996
June	1996	NFA proposal for SWMU 116 submitted to the NMED.	SNL June 1996
June	1998	NMED responded with an RSI on the SWMU 116 NFA proposal.	NMED June 1998
November	1998	Response submitted to the first NMED RSI for SWMU 116.	SNL November 1998
October	1999	A SAP describing technical procedures to be used for environmental investigations at DSS sites and AOCs submitted to the NMED.	SNL October 1999
January	2000	October 1999 DSS SAP approved by the NMED.	NMED January 2000
June	2000	NMED issued a second RSI on the SWMU 116 NFA proposal, and the first SNL/NM response for SWMU 116.	NMED June 2000
September	2000	Response submitted to NMED for the second RSI for SWMU 116.	SNL September 2000
August	2001	Groundwater monitoring well CTF-MW1 installed near SWMU 116.	SNL June 2005
November	2001	Follow-up FIP documenting specific investigation procedures to be completed at DSS sites and AOCs submitted to the NMED.	SNL November 2001
February	2002	The DSS FIP approved by the NMED.	NMED February 2002
May	2004	Completion of eight quarters of groundwater sampling from monitoring well CTF-MW1.	SNL June 2005
June	2005	A third RSI response submitted to the NMED describing the results of investigation work completed at SWMU 116 since the June 1996 NFA report that also included an updated risk assessment evaluation.	SNL June 2005
September	2005	NMED issues Certificate of Completion for CAC without Controls for SWMU 116.	NMED September 2005
March	2006	Request for Class III Permit Modification submitted. Public Notice meeting published. Documents supporting NFA (CAC) for SWMU 116 compiled.	SNL March 2006
April	2010	NMED requires that monitoring well CTF-MW1 be sampled annually as part of LTS requirements for SWMU 116.	NMED April 2010
March	2011	Monitoring well CTF-MW1 is sampled as part of LTS.	SNL September 2012
February	2012	Monitoring well CTF-MW1 is sampled as part of LTS.	SNL January 2012
January	2013	Well CYN-MW5 sampled as part of LTS.	SNL December 2012

NOTES:

AOC = Area of Concern.
CAC = Corrective Action Complete.
CTF = Coyote Test Field.
DSS = Drain and Septic System.
EPA = U.S. Environmental Protection Agency.
FIP = Field Implementation Plan.
LTS = Long-term Stewardship.
MW = Monitoring well.
NFA = No Further Action.
NMED = New Mexico Environment Department.
OU = Operable Unit.
RCRA = Resource Conservation and Recovery Act.
RSI = Request for Supplemental Information.
SAP = Sampling and Analysis Plan.
SNL/NM = Sandia National Laboratories, New Mexico.
SWMU = Solid Waste Management Unit.

A fifth seepage pit received wastewater from the upstairs darkroom sink and from floor drains on the west side of the building. This seepage pit probably received the largest volume of wastewater. The pit is 13 ft deep and received photo-processing chemicals from an upstairs sink. Floor drains connected to the fifth seepage pit may have received polychlorinated biphenyl-contaminated capacitor oil that leaked from a bank of 72 capacitors. Although undocumented, the floor drains may have also received methylene chloride that leaked from drums stored in the building, and small quantities of dilute copper sulfate from high-voltage water resistors may have been discharged to either the septic system or the fifth seepage pit.

11.1.3 Monitoring History

For the DSS investigation, groundwater monitoring well CTF-MW1 (Figure 11-1) was installed in 2001. The well is located approximately 500 ft to the south and downslope of Building 9990. The ground surface at the wellhead is approximately 40 ft lower than the elevation at the site. The well is located along a small arroyo that directs storm water southwestward from the site to an alluvial fan adjoining the mountain front. The well is screened in fractured Precambrian granite at a depth of 240 to 260 ft below ground surface (bgs) (SNL June 2005).

Monitoring well CTF-MW1 was sampled on a quarterly basis from July 2002 to May 2004 to acquire the eight quarters of groundwater data as required by the New Mexico Environment Department (NMED) in the June 2000 Request for Supplemental Information (NMED June 2000). No analytes exceeded maximum contaminant levels (MCLs) or other groundwater standards during the eight sampling events. After the eight quarters of data were collected, the well became part of the Groundwater Protection Program monitoring network and was sampled sporadically. Most recently, annual sampling at monitoring well CTF-MW1 has been reinstated based on NMED requirements (NMED April 2010).

11.1.4 Current Monitoring Network

Monitoring well CTF-MW1 is the only well in the SWMU 116 area. This monitoring well was installed in 2001 and monitors groundwater that migrates through fractured Precambrian granite.

11.1.5 Summary of Calendar Year 2013 Activities

The following activities were conducted for the SWMU 116 monitoring effort during Calendar Year (CY) 2013 (January through December 2013):

- Annual groundwater sampling was conducted at monitoring well CTF-MW1 in January 2013.
- Periodic groundwater elevation data were obtained from monitoring well CTF-MW1.
- Tables of analytical results (Attachment 11A) and a hydrograph (Attachment 11B) were prepared in support of this report.

11.1.6 Summary of Future Activities

The following activities are anticipated for SWMU 116 during CY 2014:

- Annual groundwater sampling will be conducted at monitoring well CTF-MW1.
- Periodic groundwater elevation data will be obtained from monitoring well CTF-MW1.

11.1.7 Current Conceptual Model

The following sections present an updated discussion of the hydrogeologic regime, conceptual model, and previous contaminant findings for SWMU 116.

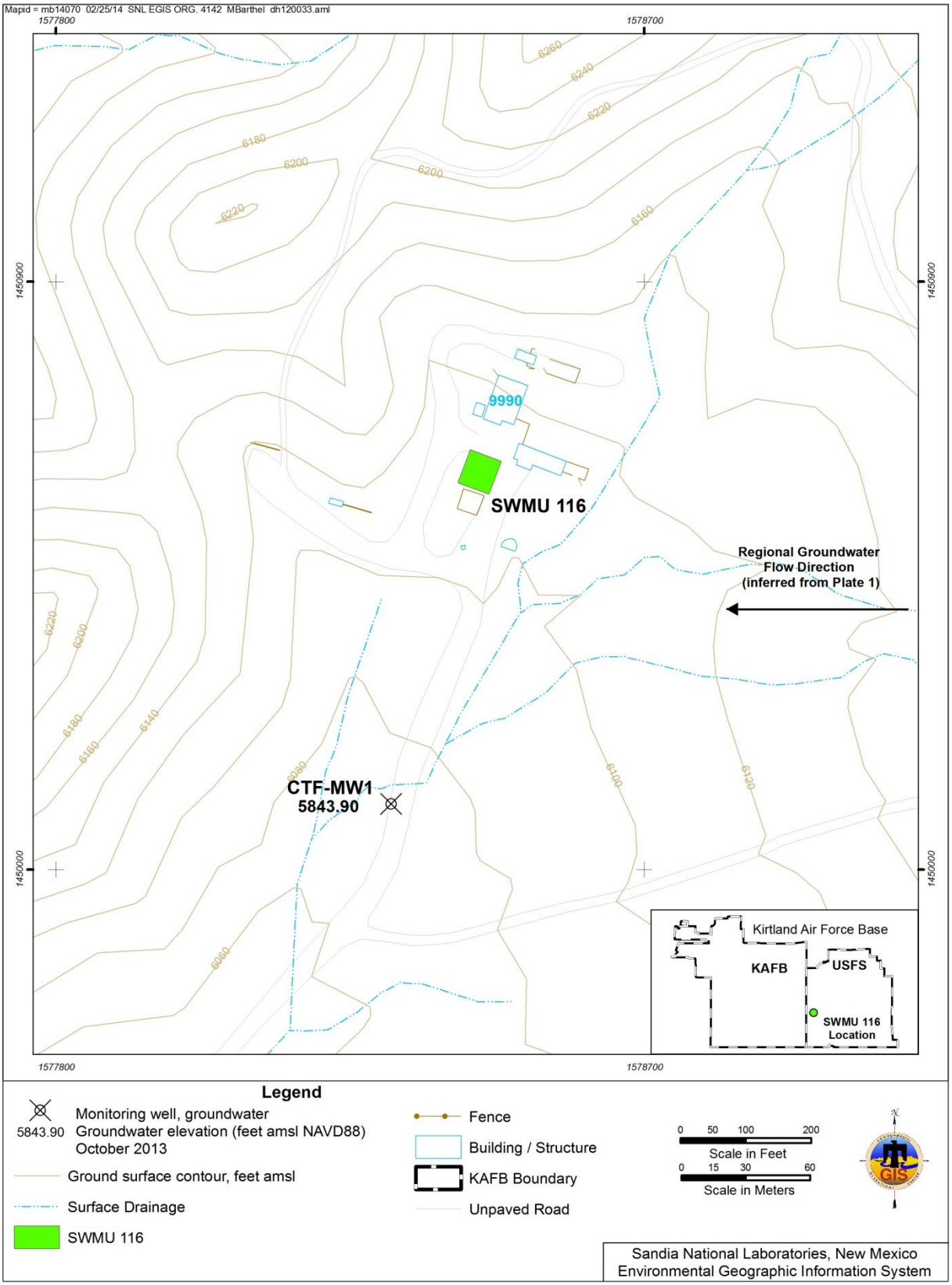


Figure 11-1. Location and Groundwater Elevation at SWMU 116

11.1.7.1 Regional Hydrogeologic Conditions

SWMU 116 is located on the western margin of the Manzanita Mountains (Figure 11-1). Alluvium covers the canyon floor where Building 9990 is located. The surrounding ridges consist of Precambrian outcrops (e.g., granite, gneiss, metarhyolite, and amphibolites) that are unconformably overlain by Paleozoic limestone, sandstone, and conglomerate. The outcrops are sporadically covered by colluvium. The base-wide potentiometric surface map (Plate 1) shows that groundwater flow in fractured bedrock is generally toward the west. The regional groundwater flow direction is depicted in Figure 11-1. No potable water-supply wells are located within 5 miles of the site.

11.1.7.2 Hydrogeologic Conditions at SWMU 116

SWMU 116 consists of five seepage pits near Building 9990 where sanitary waste and wastewater discharged from 1969 to 1989. The site is covered by colluvium that is underlain by bedrock. The site elevation is approximately 6,120 ft amsl (Figure 11-1). Overall, the terrain slopes to the southwest (Plate 1). No perennial surface water features, such as springs, are located within 1 mile of SWMU 116. Monitoring well CTF-MW1 is located approximately 500 ft downslope of Building 9990. The ground surface at the wellhead is approximately 40 ft lower than at the site.

The amount of precipitation available for groundwater recharge at SWMU 116 is minimal due to scant rainfall and high evapotranspiration rates. Summer (monsoonal) thunderstorms are responsible for the majority of rainfall. The average rainfall, as measured at the nearest active rain gauge (the National Weather Service station at the Albuquerque International Sunport) during the period from 1915 through 2005, was 8.67 inches per year (WRCC-DRI 2012). The station is located 10 miles northwest of the SWMU 116 at an elevation of 5,310 ft amsl. By extrapolation of the precipitation model presented in SNL/NM conceptual model of groundwater flow and contaminant transport at the canyon area (SNL May 2004), the average annual precipitation for SWMU 116, where the elevation is approximately 6,120 ft amsl, is estimated to be approximately 11.5 inches per year. Intense sunlight and low humidity throughout much of the year creates high rates of evapotranspiration. Estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL February 1998).

In 2001, a location downslope from SWMU 116, and agreed upon by NMED and SNL/NM, was selected for the installation of groundwater monitoring well CTF-MW1. The well was installed in August 2001 using the air rotary casing hammer drilling technique; the borehole was temporarily cased to 8 ft bgs. Dry alluvium consisting of silty sand and fine to medium gravel was encountered from the ground surface to 12 ft bgs. Competent (unfractured) Precambrian granite was encountered from 16 to 240 ft bgs. Groundwater was encountered at 240 ft bgs in slightly fractured granite. Water production increased steadily to the borehole total depth of 270 ft bgs. The well was screened from 240 to 260 ft bgs in fractured granite (Table 11-2).

Table 11-2. Lithologic and Hydrogeologic Elevation Data for Monitoring Well CTF-MW1 at SWMU 116

Monitoring Well	Ground Surface Elevation (ft amsl)	Depth of Screened Interval (ft bgs)	Elevation for Top of Screen (ft amsl)	Potentiometric Surface, October 2013 (ft amsl)	Mid-Point Screen Elevation (ft amsl)	Approximate Pressure Head (ft[a])
CTF-MW1	6079.70	240 – 260	5839.70	5843.90	5829.70	14

NOTES:
[a]From mid-point of screen.
amsl = Above mean sea level.
bgs = Below ground surface.
CTF = Coyote Test Field.
ft = Foot (feet).
MW = Monitoring Well.
SWMU = Solid Waste Management Unit.

The October 2013 groundwater elevation at monitoring well CTF-MW1 was 5,843.90 ft amsl. Compared to the mid-point elevation of the screen, the pressure head was approximately 14 ft and is indicative of confined conditions. Based on the potentiometric surface depicted on Plate 1, the horizontal gradient is steep and on the order of approximately 0.02 feet per foot near the monitoring well. Groundwater flows to the west through a fractured bedrock system.

During sampling, the drawdown in monitoring well CTF-MW1 is not excessive and the quantity of water produced is clearly adequate for low-flow sampling purposes. Groundwater samples are collected using a portable pneumatic (nitrogen-gas activated) Bennett™ piston pump.

11.1.7.3 Local Direction of Flow

The conceptual hydrogeologic model for SWMU 116 is based on the findings for monitoring well CTF-MW1, other wells located along the mountain front (Plate 1), and extensive field mapping conducted by the Site-Wide Hydrogeologic Characterization Project (GRAM and Lettis 1995). Groundwater in the SWMU 116 area occurs in a fractured bedrock system under confined conditions. During drilling, the depth to groundwater at monitoring well CTF-MW1 was approximately 240 ft bgs in a fractured interval of Precambrian quartzite. Groundwater in the bedrock predominantly moves through a confined, low-permeability fracture system. A series of naturally filled fractures in the upper bedrock probably serves as a confining unit.

The amount of precipitation available for groundwater recharge at SWMU 116 is minimal due to the scant rainfall and high evapotranspiration rates. Historical water level data indicate that seasonal effects, primarily due to thunderstorms, rarely occur. The hydrograph (Figure 11B-1 from Attachment 11B) shows that significant water level increases occurred only twice in the last 10 years. During 2002 through 2013, the overall trend was downward. For the last five years, the water level in monitoring well CTF-MW1 has declined at approximately 0.4 foot per year. Groundwater probably discharges to the unconsolidated basin fill deposits (primarily the Santa Fe Group) of the Albuquerque Basin after crossing the Coyote, Tijeras, and Sandia Faults (SNL February 1998). No potable water supply wells are located within 5 miles of the site (Plate 1).

11.1.7.4 Contaminant Sources

From 1969 to 1989, sanitary waste and wastewater discharged to five buried seepage pits near Building 9990. The sanitary waste and wastewater possibly contained sewage, photo-processing chemicals, high explosive (HE) compounds, and volatile organic compounds (VOCs). The areas around the seepage pits were characterized by soil sampling as part of the DSS investigation.

11.1.7.5 Contaminant Distribution and Transport in Groundwater

No COCs exceeded applicable U.S. Environmental Protection Agency (EPA) MCLs (EPA 2009) in the CY 2013 groundwater samples collected from monitoring well CTF-MW1. No groundwater contamination is suspected at SWMU 116.

11.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM Environmental Restoration (ER) Operations (formerly ER Project), as well as implements and enforces federal regulations mandated by the Resource Conservation and Recovery Act (RCRA). All ER Operations SWMUs and Areas of Concern (AOCs) are listed in Module IV of the SNL/NM RCRA Permit, *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518* (NMED 1993). All corrective action requirements pertaining to SWMUs and AOCs are

contained in the Compliance Order on Consent (the Order) between the DOE, Sandia, and NMED (April 2004).

The DOE/National Nuclear Security Administration and Sandia received a letter from the NMED on April 14, 2010, entitled *Class 3 Permit Modification Requests for Granting Corrective Action Complete status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008), Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001* (NMED April 2010). The NMED's letter lists SWMU 116 under the heading of "SWMUs/AOCs to be Subject to Groundwater Monitoring Controls" and further states that pursuant to Section III.W.3.b of the Order (NMED April 2004), SWMU 116 requires long-term monitoring of groundwater on an annual basis as a site control. The NMED specified that the following analytes are to be monitored for SWMU 116 general chemistry parameters, VOCs, HE compounds, perchlorate, metals, cyanide, and nitrate plus nitrite (NPN).

11.3 Scope of Activities

The groundwater monitoring activities for SWMU 116 conducted during this reporting period consisted of the measurement of water levels and sampling and analysis as summarized in Table 11-3.

Table 11-3. Groundwater Monitoring Well Network and Sampling Dates for SWMU 116, Calendar Year 2013

Date of Sampling Event	Wells Sampled	SAP
January 2013	CTF-MW1	*SWMU 49 and 116 Groundwater Monitoring, Mini-SAP for Fiscal Year 2013 Annual Sampling* (SNL December 2012)

NOTES:
CTF = Coyote Test Field.
MW = Monitoring Well.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories.
SWMU = Solid Waste Management Unit.

The analytical parameters are listed in Table 11-4. Quality control (QC) samples are collected in the field at the time of environmental sample collection. Field QC samples may include duplicate environmental, split, equipment blank (EB), and trip blank (TB) samples. No duplicate environmental or EB sample was collected at monitoring well CTF-MW1 during the CY 2013 sampling event.

11.4 Field Methods and Measurements

The monitoring procedures conducted for SWMU 116 groundwater monitoring are described in detail in Section 1.3.

The groundwater elevation is shown on Figure 11-1 and depicted in the hydrograph presented on Figure 11B-1 (Attachment 11B).

Table 11-4. Parameters Sampled at SWMU 116

Parameter	January 2013
Alkalinity (total, bicarbonate, carbonate) Anions Cations High Explosive Compounds NPN Perchlorate TAL Metals, plus Total Uranium Total Cyanide VOCs	CTF-MW1

NOTES:
CTF = Coyote Test Field.
MW = Monitoring Well.
NPN = Nitrate plus nitrate (reported as nitrogen).
SWMU = Solid Waste Management Unit.
TAL = Target Analyte List.
VOC = Volatile organic compound.

11.5 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using EPA-specified protocols described in Section 1.3.2 (Tables 1-5 and 1-6).

11.6 Summary of Analytical Results

This section discusses analytical results, exceedances of regulatory standards, and pertinent trends in COC concentrations. The analytical results and field measurements for the CY 2013 SWMU 116 sampling event are presented in Tables 11A-1 through 11A-9 (Attachment 11A). Data qualifiers are explained in the footnotes following Table 11A-9.

One VOC (1,1,2-trichloro-1,2,2-trifluoroethane) was detected in the CTF-MW1 sample at a concentration of 14.8 micrograms per liter, listed in Table 11A-1 (Attachment 11A). There is not an established MCL for this compound. The method detection limits (MDLs) for all analyzed VOCs are listed in Table 11A-2 (Attachment 11A). No HE compounds were detected. The MDLs for all analyzed HE compounds are listed in Table 11A-3.

The analytical result for NPN (reported as nitrogen) is presented in Table 11A-4 (Attachment 11A). No NPN result exceeded the MCL of 10 milligrams per liter (mg/L). For CY 2013, the NPN concentration was 7.29 mg/L.

The results for alkalinity, anion, cation, and total cyanide results are provided in Table 11A-5 (Attachment 11A). No detections of the constituents exceed applicable MCLs.

The analytical result for perchlorate is presented in Table 11A-6 (Attachment 11A). Currently, no MCL is established for perchlorate and perchlorate does not exceed the NMED-specified screening level/MDL of 4 micrograms per liter (NMED April 2004).

Total metal results are presented in Table 11A-7 (Attachment 11A). No metals exceed established MCLs.

Gross alpha activity is measured as a screening tool and in accordance with 40 Code of Federal Regulations, Parts 9, 141, and 142, Table I-4 does not include uranium, which is measured independently. Therefore, gross alpha activity measurements were corrected by subtracting the total uranium activity. Radiological results are further reviewed by an SNL/NM Certified Health Physicist to assure that the

samples are nonradioactive. Gamma spectroscopy (short list), gross alpha, gross beta, and isotopic uranium results are presented in Table 11A-8. None of the constituents exceeded the established MCLs.

Field water quality parameters are measured during purging of the well prior to sampling and include temperature, specific conductance, oxidation-reduction potential, pH, turbidity, and dissolved oxygen. The parameter measurements obtained immediately prior to sample collection are presented in Table 11A-9 (Attachment 11A).

11.7 Quality Control Results

Field and laboratory QC samples were collected and prepared as described in Section 1.3. Data validation qualifiers are presented with the analytical results in Tables 11A-4 through 11A-8 (Attachment 11A). The results of QC samples and the impact on data quality for the SWMU 116 sampling event are discussed in the following sections.

All reported values did not exceed established MCLs.

No VOCs were detected above laboratory MDLs in any TB sample.

The VOC detections in the FB are not applicable because VOCs were not detected in the associated environmental sample.

Laboratory data qualifiers are provided with the analytical results (Attachment 11A).

11.8 Variances and Nonconformances

The following sections describe differences between planned work and actual work, findings of the data validation process, and any impacts to the schedule.

11.8.1 Variances and Nonconformances

No variances or nonconformances from field or sampling requirements, as specified in the SWMU 116 groundwater monitoring Mini-Sampling and Analysis Plan (SNL December 2012), occurred during sampling activities.

11.8.2 Data Validation

Although some analytical results were qualified during the data validation process, no significant data quality problems were noted. Data validation qualifiers are provided with the analytical results in Tables 11A-3 through 11A-6 (Attachment 11A).

11.9 Summary and Conclusions

This section provides a brief summary of activities, discussion of COCs in relation to MCLs, trends of concentrations versus time, the current conceptual model, and plans for studies to be completed during CY 2014 at the SWMU 116.

SWMU 116 is located in the western Manzanita Mountains. Groundwater investigations were initiated in 2001 at the request of the NMED to evaluate the DSS associated with Building 9990. The one monitoring well at SWMU 116 (CTF-MW1) was sampled in January 2013, and the sample was analyzed for VOCs, HE compounds, NPN, alkalinity (total, bicarbonate, carbonate), anions, cations, perchlorate, Target Analyte List metals (plus total uranium), and total cyanide. Analytical results were compared with EPA MCL guidelines for drinking water (EPA 2009). No parameters were detected above established MCLs in the groundwater samples.

The analytical results for CY 2013 are consistent with historical concentrations. The conceptual model described in Section 11.1.7 does not require modification based on the analytical results for this reporting period.

During CY 2014, annual groundwater sampling will continue at monitoring well CTF-MW1 during the first quarter of CY 2014, subject to scheduling. Periodic monitoring of groundwater elevations will also be conducted.

11.10 References

EPA 2009 U.S. Environmental Protection Agency (EPA), 2009. *National Primary Drinking Water Regulations,* EPA 816-F 09-004, U.S. Environmental Protection Agency, Washington, D.C., May.

GRAM and Lettis 1995 GRAM and Lettis, 1995. *Conceptual Geologic Model of the Sandia National Laboratories and Kirtland Air Force Base,* prepared for Site Wide Hydrogeologic Characterization Project, Organization 7584, Environmental Restoration Program, Sandia National Laboratories, Albuquerque, New Mexico, December.

IT March 1994 IT Corporation (IT), March 1994. *Sampling and Analysis Plan for Shallow Subsurface Soil Sampling, RCRA Facility Investigation of Septic Tanks and Drainfields (OU 1295)*, IT Corporation, Albuquerque, New Mexico.

NMED April 2010 New Mexico Environment Department (NMED), April 2010. *Class 3 Permit Modification Requests for Granting Corrective Action Complete status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008), Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001*. New Mexico Environment Department, Santa Fe, New Mexico.

NMED September 2005 New Mexico Environment Department (NMED), September 2005. *RE: Notice of Approval/Disapproval: Responses to Request for Supplemental Information for Proposals for Corrective Action Complete, Drain and Septic Systems SWMUs 49, 101, 116, 138, 149, 154, and 161, June 2005, Sandia National Laboratories EPA ID# NM5890110518 HWB-SNL-99-008, HWB-SNL-99-012,* New Mexico Environment Department, Santa Fe, New Mexico.

NMED April 2004 New Mexico Environment Department (NMED), April 2004. *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order*, New Mexico Environment Department, Santa Fe, New Mexico.

NMED February 2002 New Mexico Environment Department (NMED), February 2002. *Approval of Field Implementation Plan, Characterization of Non Environmental Restoration Drain and Septic Systems Submittal Dated November 2001, Sandia National Laboratories, NM5890110518-1, HWB-SNL-02-009,* New Mexico Environment Department, Santa Fe, New Mexico.

NMED June 2000 New Mexico Environment Department (NMED), June 2000. *Request for Supplemental Information: Sandia National Laboratories, New Mexico, Environmental Restoration Project Responses to NMED Request for Supplemental Information: No Further Action Proposals (4th Round), Dated June 1996, Sandia National Laboratories, EPA ID# NM5890110518, HRMB-SNL-99-008,* New Mexico Environment Department, Santa Fe, New Mexico.

NMED January 2000 New Mexico Environment Department (NMED), January 2000. *Approval of Sampling and Analysis Plan for Characterizing and Assessing Potential Releases to the Environment from Septic and other Miscellaneous Drain Systems at Sandia National Laboratories/New Mexico, HRMB-SNL-00-002,* New Mexico Environment Department, Santa Fe, New Mexico.

NMED June 1998 New Mexico Environment Department (NMED), June 1998. *Request for Supplemental Information: Proposal for No Further Action (4th Round), Environmental Restoration Project, Sandia National Laboratories, June 1996,* New Mexico Environment Department, Santa Fe, New Mexico.

NMED 1993 New Mexico Environment Department (NMED), 1993. *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518,* New Mexico Environment Department, Santa Fe, New Mexico.

SNL December 2012 Sandia National Laboratories, New Mexico (SNL/NM), December 2012. *SWMU 49 and 116 Groundwater Monitoring, Mini-SAP for Fiscal Year 2013 Annual Sampling.* Environmental Restoration Operations, Sandia National Laboratories, New Mexico, December 17.

SNL September 2012 Sandia National Laboratories, New Mexico (SNL/NM), September 2012. *Annual Groundwater Monitoring Report Calendar Year 2011,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL January 2012 Sandia National Laboratories, New Mexico (SNL/NM), January 2012. *SWMU 49 and 116 Groundwater Monitoring, Mini-SAP for Fiscal Year 2012 Annual Sampling.* Environmental Restoration Operations, Sandia National Laboratories, New Mexico, January 3.

SNL March 2006 Sandia National Laboratories, New Mexico (SNL/NM), March 2006. *Justification for Class III Permit Modification, March 2006, SWMU 116 Operable Unit 1295 Building 9990 Septic System (Technical Area III),* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2005 Sandia National Laboratories, New Mexico (SNL/NM), June 2005. *Request for Supplemental Information Responses and Proposals for Corrective Action Complete, Drain and Septic Systems SWMUs 49, 101, 116, 138, 149, 154, and 161, Drain and Septic Systems Round 9,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL May 2004 Sandia National Laboratories, New Mexico (SNL/NM), May 2004. *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Canyon Area,* Sandia Report SAND2004-2673P, May 2004.

SNL November 2001 Sandia National Laboratories, New Mexico (SNL/NM), November 2001. *Field Implementation Plan, Characterization of Non-Environmental Restoration Drain and Septic Systems,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2000 Sandia National Laboratories, New Mexico (SNL/NM), September 2000. *Environmental Restoration Project Responses to NMED Request for Supplemental Information, No Further Action Proposals (4th Round) Dated June 1996,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL October 1999 Sandia National Laboratories, New Mexico (SNL/NM), October 1999. *Sampling and Analysis Plan (SAP) for Characterizing and Assessing Potential Releases to the Environment from Septic and Other Miscellaneous Drain Systems at Sandia National Laboratories/New Mexico,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL November 1998 Sandia National Laboratories, New Mexico (SNL/NM), November 1998. *Environmental Restoration Project Responses to NMED Request for Supplemental Information, No Further Action Proposals (4th Round), Dated June 1996,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL February 1998 Sandia National Laboratories, New Mexico (SNL/NM), February 1998. *Revised Site-Wide Hydrogeologic Characterization Project, 1995 Annual Report,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 1996 Sandia National Laboratories, New Mexico (SNL/NM), June 1996. *Proposal for No Further Action, Environmental Restoration Site 116, Building 9990 Septic System, Operable Unit 1295,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 1993 Sandia National Laboratories, New Mexico (SNL/NM), March 1993, *Septic Tanks and Drainfields (ADS-1295) RCRA Facility Investigation Work Plan,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

WRCC-DRI 2012 Western Regional Climate Center - Desert Research Institute, 2012. *Historical climate information for National Weather Service Cooperative Network Station 290234 – Albuquerque, New Mexico, Weather Service Forecast Office at the Albuquerque International Sunport for the period of 1914 through 2005*, http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?nmalbu. Accessed February 20, 2012.

Attachment 11A
Solid Waste Management Unit 116
Analytical Results Tables

This page intentionally left blank.

Attachment 11A Tables

11A-1 Summary of Detected Volatile Organic Compounds and High Explosive Compounds, Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 11A-5

11A-2 Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B), Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 11A-6

11A-3 Method Detection Limits for High Explosive Compounds (EPA Method[g] SW846-8321A), Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 11A-7

11A-4 Summary of Nitrate plus Nitrite Result, Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 11A-8

11A-5 Summary of Alkalinity, Anion, Cation, and Total Cyanide Results, Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 11A-9

11A-6 Summary of Perchlorate Result, Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 11A-10

11A-7 Summary of Target Analyte List Metals and Uranium Results, Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 11A-11

11A-8 Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results, Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 11A-12

11A-9 Summary of Field Water Quality Measurements[h], Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 11A-13

Footnotes for Solid Waste Management Unit 116 Groundwater Monitoring Tables 11A-15

This page intentionally left blank.

Table 11A-1
Summary of Detected Volatile Organic Compounds and High Explosive Compounds, Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW1 28-Jan-13	1,1,2-Trichloro-1,2,2-trifluoroethane	14.8	1.50	5.00	NE			093359-001	SW846 8260B

Refer to footnotes on page 11A-15.

Table 11A-2
Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B), Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Analyte	MDL[b] (µg/L)	Analyte	MDL[b] (µg/L)
1,1,1-Trichloroethane	0.300	Chlorobenzene	0.300
1,1,2,2-Tetrachloroethane	0.300	Chloroethane	0.300
1,1,2-Trichloroethane	0.300	Chloroform	0.300
1,1-Dichloroethane	0.300	Chloromethane	0.300
1,1-Dichloroethene	0.300	Cyclohexane	0.300
1,2,3-Trichlorobenzene	0.300	Dibromochloromethane	0.300
1,2,4-Trichlorobenzene	0.300	Dichlorodifluoromethane	0.300
1,2-Dibromo-3-chloropropane	0.300	Ethyl benzene	0.300
1,2-Dibromoethane	0.300	Isopropylbenzene	0.300
1,2-Dichlorobenzene	0.300	Methyl acetate	1.50
1,2-Dichloroethane	0.300	Methylcyclohexane	3.00
1,2-Dichloropropane	0.300	Methylene chloride	3.00
1,3-Dichlorobenzene	0.300	Styrene	0.300
1,4-Dichlorobenzene	0.300	Tert-butyl methyl ether	0.300
2,2-trifluoroethane, 1,1,2-Trichloro-1	1.50	Tetrachloroethene	0.300
2-Butanone	2.00	Toluene	0.300
2-Hexanone	2.20	Trichloroethene	0.300
4-methyl-, 2-Pentanone	1.50	Trichlorofluoromethane	0.300
Acetone	3.00	Vinyl chloride	0.300
Benzene	0.300	Xylene	0.300
Bromochloromethane	0.300	cis-1,2-Dichloroethene	0.300
Bromodichloromethane	0.300	cis-1,3-Dichloropropene	0.300
Bromoform	0.300	m-, p-Xylene	0.300
Bromomethane	0.300	o-Xylene	0.300
Carbon disulfide	1.50	trans-1,2-Dichloroethene	0.300
Carbon tetrachloride	0.300	trans-1,3-Dichloropropene	0.300

Refer to footnotes on page 11A-15.

Table 11A-3
Method Detection Limits for High Explosive Compounds (EPA Method[g] SW846-8321A), Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Analyte	MDL[b] (µg/L)
1,3,5-Trinitrobenzene	0.0847
1,3-Dinitrobenzene	0.0847
2,4,6-Trinitrotoluene	0.0847
2,4-Dinitrotoluene	0.0847
2,6-Dinitrotoluene	0.0847
2-Amino-4,6-dinitrotoluene	0.0847
2-Nitrotoluene	0.0868
3-Nitrotoluene	0.0847
4-Amino-2,6-dinitrotoluene	0.0847
4-Nitrotoluene	0.159
HMX	0.0847
Nitro-benzene	0.0847
Pentaerythritol tetranitrate	0.106
RDX	0.0847
Tetryl	0.0847

Refer to footnotes on page 11A-15.

Table 11A-4
Summary of Nitrate plus Nitrite Result,
Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW1 28-Jan-13	Nitrate plus nitrite as N	7.29	0.170	0.500	10.0			093359-018	EPA 353.2

Refer to footnotes on page 11A-15.

Table 11A-5
Summary of Alkalinity, Anion, Cation, and Total Cyanide Results,
Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW1	Bicarbonate Alkalinity	196	0.725	1.00	NE			093359-022	SM2320B
28-Jan-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093359-022	SM2320B
	Bromide	0.713	0.067	0.200	NE		J-	093359-016	SW846 9056
	Chloride	41.2	0.670	2.00	NE			093359-016	SW846 9056
	Fluoride	1.48	0.033	0.100	4.0			093359-016	SW846 9056
	Sulfate	81.6	1.33	4.00	NE			093359-016	SW846 9056
	Calcium	102	0.300	1.00	NE	B		093359-017	SW846 6020
	Magnesium	19.4	0.010	0.030	NE			093359-017	SW846 6020
	Potassium	1.84	0.080	0.300	NE			093359-017	SW846 6020
	Sodium	33.9	0.080	0.250	NE			093359-017	SW846 6020
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	093359-027	SW846 9012A

Refer to footnotes on page 11A-15.

Table 11A-6
Summary of Perchlorate Result,
Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Perchlorate Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW1 28-Jan-13	ND	0.004	0.012	NE	U		093359-020	EPA 314.0

Refer to footnotes on page 11A-15.

Table 11A-7
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW1	Aluminum	ND	0.015	0.050	NE	U		093359-009	SW846 6020
28-Jan-13	Antimony	ND	0.001	0.003	0.006	U		093359-009	SW846 6020
	Arsenic	0.00188	0.0017	0.005	0.010	J		093359-009	SW846 6020
	Barium	0.0458	0.0006	0.002	2.00			093359-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093359-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093359-009	SW846 6020
	Calcium	98.7	0.300	1.00	NE	B		093359-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093359-009	SW846 6020
	Cobalt	0.000301	0.0001	0.001	NE	J		093359-009	SW846 6020
	Copper	0.0013	0.00035	0.001	NE	B	0.0023U	093359-009	SW846 6020
	Iron	0.275	0.033	0.100	NE			093359-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093359-009	SW846 6020
	Magnesium	19.1	0.010	0.030	NE			093359-009	SW846 6020
	Manganese	0.00127	0.001	0.005	NE	J		093359-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		093359-009	SW846 7470
	Nickel	0.00255	0.0005	0.002	NE			093359-009	SW846 6020
	Potassium	1.89	0.080	0.300	NE			093359-009	SW846 6020
	Selenium	0.00492	0.0015	0.005	0.050	J		093359-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093359-009	SW846 6020
	Sodium	33.3	0.080	0.250	NE			093359-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093359-009	SW846 6020
	Uranium	0.0111	0.000067	0.0002	0.03			093359-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		093359-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		093359-009	SW846 6020

Refer to footnotes on page 11A-15.

Table 11A-8
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results, Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
CTF-MW1	Americium-241	3.57 ± 13.2	22.3	10.9	NE	U	BD	093359-033	EPA 901.1
28-Jan-13	Cesium-137	-0.155 ± 2.05	3.56	1.71	NE	U	BD	093359-033	EPA 901.1
	Cobalt-60	-1.69 ± 2.15	3.31	1.54	NE	U	BD	093359-033	EPA 901.1
	Potassium-40	-3.93 ± 38.9	48.6	23.2	NE	U	BD	093359-033	EPA 901.1
	Gross Alpha	3.75	NA	NA	15 pCi/L	NA	None	093359-034	EPA 900.0
	Gross Beta	5.81 ± 1.54	1.72	0.837	4mrem/yr		J	093359-034	EPA 900.0
	Uranium-233/234	23.3 ± 2.96	0.101	0.0448	NE			093359-035	HASL-300
	Uranium-235/236	0.272 ± 0.084	0.0589	0.0221	NE			093359-035	HASL-300
	Uranium-238	3.38 ± 0.484	0.055	0.0215	NE			093359-035	HASL-300

Refer to footnotes on page 11A-15.

Table 11A-9
Summary of Field Water Quality Measurements[h],
Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
CTF-MW1	28-Jan-13	15.24	614	211.9	7.08	0.66	68.5	6.85

Refer to footnotes on page 11A-15.

This page intentionally left blank.

Footnotes for Solid Waste Management Unit 116 Groundwater Monitoring Tables

%	= Percent.
CFR	= Code of Federal Regulations.
EPA	= U.S. Environmental Protection Agency.
HMX	= Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
ID	= Identifier.
µg/L	= Micrograms per liter.
mg/L	= Milligrams per liter.
mrem/yr	= Millirem per year.
No.	= Number.
RDX	= Hexahydro-1,3,5-trinitro-1,3,5-triazine.
Tetryl	= Methyl-2,4,6-trinitrophenylnitramine.
pCi/L	= Pico curies per liter.

[a]Result

Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 1-4).

Bold **=** Values in bold exceed the established MCL.

ND = Not detected (at method detection limit). Activities of zero or less are considered to be not detected.

[b]MDL or MDA

The MDL applies to Tables 11A-1 through 11A-7. The MDA applies to Table 11A-8.

MDA = The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.

MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

NA = Not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

[c]PQL or Critical Level

The PQL applies to Tables 11A-1 through 11A-7. The critical level applies to Table 11A-8.

Critical level = The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

NA = Not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

[d]MCL

MCL = Maximum contaminant level. Established by the EPA Office of Water, National Primary Water Regulations (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- Gross Alpha particle activity, excluding total uranium = 15 pCi/L (40 CFR Parts 9, 141, and 142, Table 1-4).
- Any Combination of Beta and/or Gamma emitting radionuclides = 4 mrem/yr (as dose rate).

NE = Not established.

Footnotes for Solid Waste Management Unit 116 Groundwater Monitoring Tables *(Concluded)*

---

[e]Lab Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

B = The analyte was detected in the blank above the effective MDL.
J = Estimated value; the analyte concentration fell above the effective MDL and below the effective PQL.
NA = Not applicable.
U = Analyte is absent or below the MDL.

[f]Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = The associated value is an estimated quantity.
J- = The associated numerical value is an estimated quantity with a suspected negative bias.
None = No data validation for corrected gross alpha activity.
U = The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
UJ = The analyte was analyzed for but not detected. The associated value is an estimate and may be inaccurate or imprecise.

[g]Analytical Method

Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.
DOE, 1990, "Environmental Measurements Laboratory Procedures Manual," 27th ed., Vol. 1, Rev. 1992, HASL-300.
EPA, 1999 (and updates), "Perchlorate in Drinking Water Using Ion Chromatography," EPA 815/R-00-014.
EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.
EPA, 1984, "Methods for Chemical Analysis of Water and Wastes." EPA 600-4-79-020.
EPA, 1980, "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.

[h]Field Water Quality Measurements

Field measurements collected prior to sampling.

°C = Degrees Celsius.
% Sat = Percent saturation.
μmhos/cm = Micromhos per centimeter.
mg/L = Milligrams per liter.
mV = Millivolts.
NTU = Nephelometric turbidity units.
pH = Potential of hydrogen (negative logarithm of the hydrogen ion concentration).

Attachment 11B
Solid Waste Management Unit 116
Hydrographs

This page intentionally left blank.

Attachment 11B Hydrographs

11B-1 SWMU 116 Study Area Well 11B-5

This page intentionally left blank.

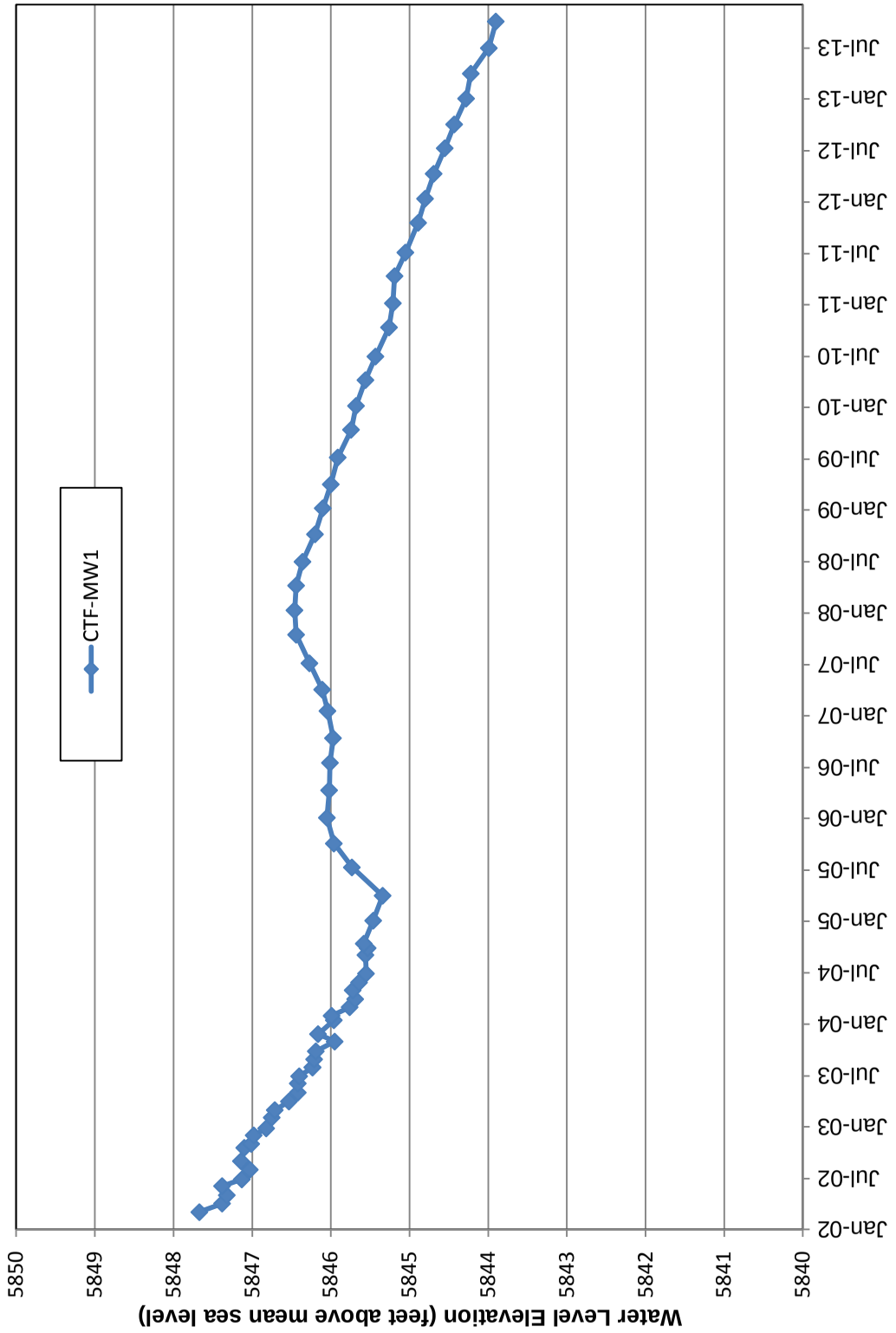


Figure 11B-1. SWMU 116 Study Area Well

This page intentionally left blank.

12.0 Solid Waste Management Unit 149

12.1 Introduction

This chapter summarizes Calendar Year (CY) 2013 quarterly groundwater sampling events for Coyote Test Field (CTF) monitoring well CTF-MW3, located near Solid Waste Management Unit (SWMU) 149 at Sandia National Laboratories, New Mexico (SNL/NM). The SNL/NM facility is a government-owned/contractor-operated laboratory. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM for the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA). The DOE/NNSA Sandia Field Office administers the contract and oversees contractor operations at the site.

This supplemental groundwater monitoring at monitoring well CTF-MW3 is designed to address the requirements of Section VII.D.6 of the Compliance Order on Consent (the Order) (NMED April 2004) and the letter dated April 8, 2010, from the New Mexico Environment Department (NMED) Hazardous Waste Bureau (NMED April 2010).

Monitoring well CTF-MW3 was sampled on March 22, June 28, and December 13, 2013. No groundwater samples were collected in September 2013 because both roads to monitoring well CTF-MW3 were impassible due to erosion caused by severe thunderstorms. In October 2013, the service road parallel to the monitoring well was repaired and additional repairs are being evaluated by facilities. The CY 2013 groundwater samples were collected in accordance with the NMED-approved Sampling and Analysis Plan (SAP) (SNL June 2010). The samples from monitoring well CTF-MW3 were analyzed for all required constituents, consisting of volatile organic compounds (VOCs), Target Analyte List (TAL) metals (including selenium), general chemistry parameters, perchlorate, and nitrate plus nitrite (NPN).

Analytical results for the CY 2013 groundwater samples were compared with the U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) for drinking water (EPA 2009). No analytical results for the monitoring well CTF-MW3 groundwater samples exceed the corresponding MCLs. Detailed results for all quarterly sampling events are discussed in Section 12.6.

The eighth and final quarter of required groundwater sampling (NMED April 2010) was conducted on December 14, 2012. Quarterly groundwater sampling will continue until NMED provides additional guidance.

12.1.1 Location

SWMU 149, the Building 9930 Septic System, is located in the CTF on federally-owned land controlled by Kirtland Air Force Base (KAFB) and permitted to the DOE/NNSA. Monitoring well CTF-MW3 (Figure 12-1) is located approximately 290 feet (ft) to the west and downgradient of SWMU 149 and is screened in Precambrian bedrock.

12.1.2 Site History

Building 9930 was constructed in 1961 (SNL March 1993), and it is assumed that the septic system was constructed at the same time. The building included a darkroom, laboratory and shop area, bathroom, and a compressor room. These areas were served by a septic system consisting of one 750-gallon septic tank and a 4-ft diameter seepage pit with a gravel bottom that is 7 ft below ground surface (bgs).

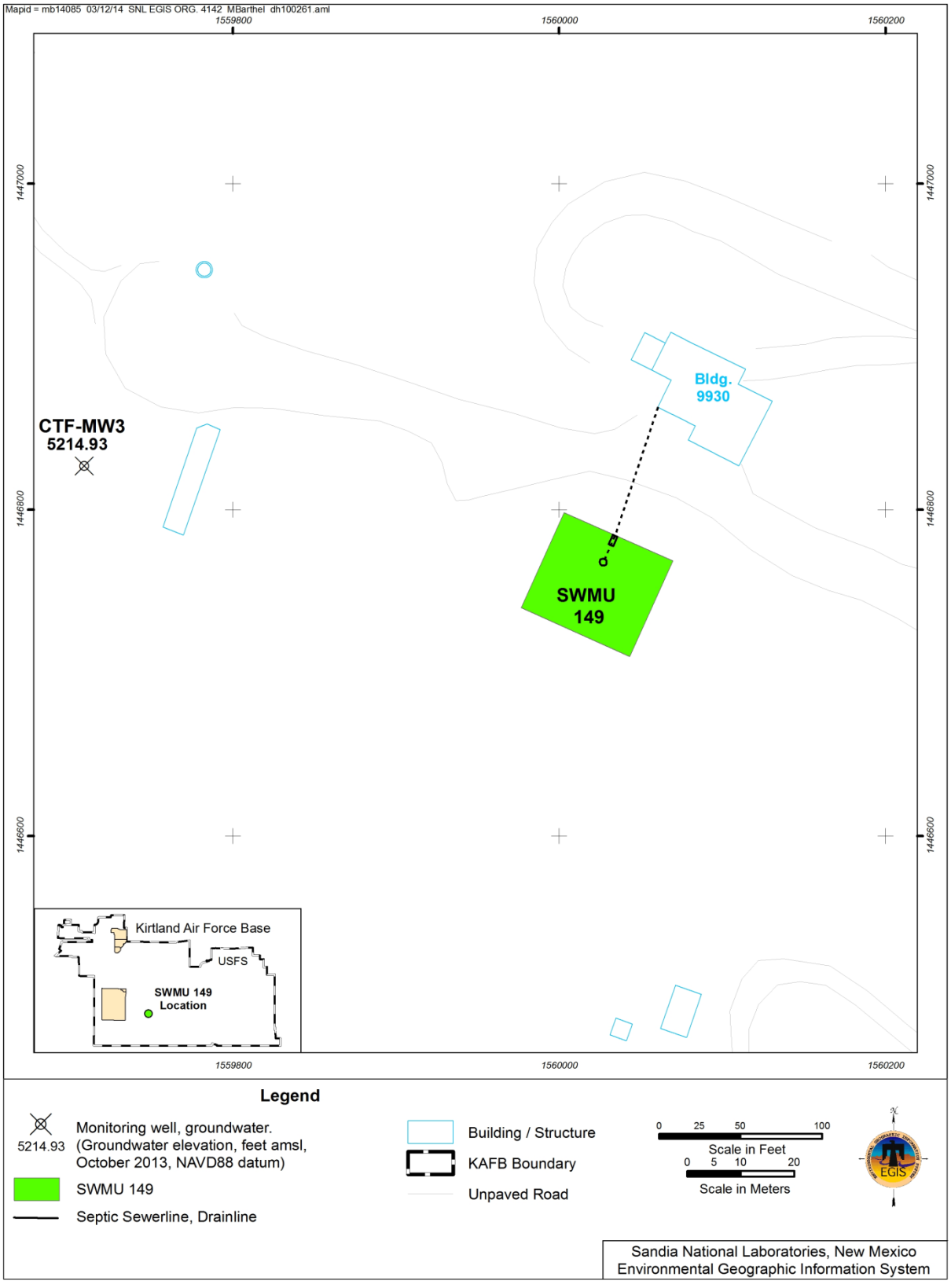


Figure 12-1. Location of Monitoring Well CTF-MW3 near SWMU 149

In the past, the following operations were conducted at Building 9930: photographic reproduction, explosives testing, and general laboratory operations. Water discharged to the septic system contained sanitary waste and waste water containing photographic chemicals, including alkaline-based developers, acetic acid, ammonium thiosulfate fixer, and small quantities of sulfuric acid associated with photographic reproduction. Testing of explosives was performed adjacent to the building in a concrete-bunkered area that contains no drains. SWMU 149 was first listed as a potential release site in 1987 (SNL June 1996) because sanitary and industrial wastes may have been discharged to septic tanks and drain fields during past operations.

By 1993, the septic system was connected to the City of Albuquerque sanitary sewer system (Jones July 1993). The old septic system line was disconnected, capped, and the system was abandoned in place (Romero September 2003). Waste in the septic tank was removed and managed according to SNL/NM policy. The empty and decontaminated septic tank was inspected by the NMED and a closure form was signed (SNL November 1995). The septic tank and seepage pit were then backfilled with clean, native soil from the area in early 1996 (Table 12-1).

In June 1996, a No Further Action proposal was submitted to the NMED for SWMU 149 (SNL June 1996) to which the NMED responded with a Request for Supplemental Information (RSI) (NMED June 1998). The general and site-specific comments were addressed in the Environmental Restoration (ER) Project Responses to the RSI in November 1998 (SNL November 1998). Negotiations were in process after the RSI response submittal, and a SAP (SNL October 1999) was prepared that documented investigations planned for SWMU 149. The SAP was approved by the NMED in January 2000 (NMED January 2000).

After the October 1999 SAP was submitted, the NMED issued a second RSI (NMED June 2000) that required the collection of additional samples for high explosive (HE) compound analysis. If samples could not be collected as specified in the SAP (SNL October 1999), a downgradient groundwater monitoring well would be required. The DOE/NNSA and Sandia responded to this second RSI (SNL September 2000) and agreed to collect additional samples for HE compound analysis, as well as install a groundwater monitoring well at a location agreed upon by the NMED. Groundwater samples would be collected from this well for a minimum of eight quarters and analyzed for VOCs, Resource Conservation and Recovery Act (RCRA) metals, cyanide, and HE compounds.

Technical details for soil sampling procedures, soil sampling locations, laboratory analytical methods, and passive soil vapor sampling requirements at SWMU 149 were specified in a follow-up Field Implementation Plan (SNL November 2001) that was approved by the NMED (February 2002).

Monitoring well CTF-MW3 was installed near SWMU 149 in August 2001 and sampled on a quarterly basis from July 2002 to June 2004 to acquire the eight quarters of groundwater data required by the NMED. Analytical results for these sampling events were included in a third RSI response and Corrective Action Complete (CAC) proposal submitted to the NMED (SNL June 2005).

In September 2005, the NMED issued a Certificate of Completion for CAC without Controls for SWMU 149 (NMED September 2005). In March 2006, DOE/NNSA and Sandia requested a Class III Permit Modification (SNL March 2006). In April 2010, the NMED responded to the Permit Modification Request with a letter requiring further corrective action at SWMU 149 (NMED April 2010) in the form of an additional eight quarters of groundwater monitoring at monitoring well CTF-MW3. In June 2010, DOE/NNSA and Sandia submitted a SAP for monitoring well CTF-MW3 (SNL June 2010), which the NMED approved (NMED December 2010). Quarterly groundwater sampling was resumed at monitoring well CTF-MW3 in March 2011 and continued through CY 2013. The CY 2013 analytical results are presented in Section 12.6.

Table 12-1. Historical Timeline of SWMU 149

Month	Year	Event	Reference
	1961	Building 9930 was constructed, and it is assumed that the septic system was constructed at the same time.	SNL June 1996
April	1987	SWMU 149 first identified as a potential release site.	SNL June 1996
June	1992	Waste characterization samples collected from SWMU 149 septic tank.	SNL June 1996
	1993	Building 9930 connected to the City of Albuquerque sanitary sewer system. The old septic system line was disconnected and capped, and the system was abandoned in place. Waste in the septic tank was removed and managed according to SNL/NM policy.	Jones July 1993, Romero September 2003, SNL June 1996
March	1993	Septic Tanks and Drainfields (OU 1295) RCRA Facility Investigation Work Plan submitted.	SNL March 1993
March	1994	OU 1295 SAP prepared.	IT March 1994
April	1994	Additional waste characterization samples collected from SWMU 149 septic tank.	SNL June 1996
July	1994	A PETREX^{IM} passive soil vapor survey was completed on the septic system to identify any releases of VOCs and SVOCs from the seepage pit.	SNL June 1996
September	1994	EPA provided comments on the March 1993 OU 1295 work plan as a NOD.	EPA September 1994
October	1994	Backhoe used at SWMU 149 to determine depth to shallow bedrock at the site.	SNL June 1996
November	1994	Response to the September 1994 EPA NOD submitted.	SNL November 1994
November	1994	Additional waste characterization samples collected from SWMU 149 septic tank.	SNL June 1996
January	1995	Confirmatory soil samples were collected from four boreholes next to the septic tank and seepage pit.	Field logs
November	1995	The empty and decontaminated septic tank was inspected by the NMED, and a closure form was signed.	SNL November 1995
June	1996	Proposal for NFA ER Project Site 149, Building 9930 Septic System OU 1295 submitted.	SNL June 1996
February	1998	Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report (SNL/NM December 1995) containing description of SWMU 149 hydrogeology submitted to NMED.	SNL February 1998
June	1998	NMED responded with RSI on the SWMU 149 NFA proposal.	NMED June 1998
November	1998	DOE and SNL/NM ER Project submitted the first response to the first NMED RSI for SWMU 149.	SNL November 1998
October	1999	A SAP describing technical procedures to be used to complete environmental investigations at SWMU 149 submitted to the NMED.	SNL October 1999
January	2000	SAP approved by NMED.	NMED January 2000
June	2000	NMED issued a second RSI.	NMED June 2000
September	2000	DOE/NNSA and SNL/NM ER Project response for the second RSI submitted to NMED.	SNL September 2000
August	2001	Monitoring well CTF-MW3 installed near SWMU 149.	SNL June 2005
November	2001	An FIP documenting specific investigation procedure to be completed at SWMU 149 submitted to the NMED.	SNL November 2001
February	2002	The FIP approved by the NMED.	NMED February 2002
	2002-2004	Monitoring well CTF-MW3 was sampled on a quarterly basis from July 2002 to June 2004 to acquire the eight quarters of groundwater data required by the NMED.	SNL June 2005
October	2002	A soil sample collected from a borehole drilled beneath the former seepage pit was analyzed for HE compounds.	SNL June 2005
June	2005	Third RSI response to RSI and CAC Proposal submitted to NMED.	SNL June 2005

Table 12-1. Historical Timeline of SSWMU 149 *(Concluded)*

Month	Year	Event	Reference
September	2005	NMED issues Certificate of Completion for CAC without Controls for SWMU 149.	NMED September 2005
March	2006	Request for Class III Permit Modification submitted.	SNL March 2006
April	2010	Letter from NMED requiring additional corrective action for SWMU 149.	NMED April 2010
June	2010	SWMU 149 SAP submitted to NMED.	SNL June 2010
December	2010	SAP approved by the NMED.	NMED December 2010
March	2011	Quarterly sampling of monitoring well CTF-MW3 resumed.	SNL September 2012
December	2012	Eight quarters of additional groundwater sampling of monitoring well CTF-MW3 completed.	SNL September 2013

NOTES:
CAC = Corrective Action Complete.
CTF = Coyote Test Field.
DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
FIP = Field Implementation Plan.
MW = Monitoring Well.
NFA = No Further Action.
NMED = New Mexico Environment Department.
NNSA = National Nuclear Security Administration.
NOD = Notice of Deficiency.
OU = Operable Unit.
RCRA = Resource Conservation and Recovery Act.
RSI = Request for Supplemental Information.
SAP = Sampling and Analysis Plan.
SNL/NM = Sandia National Laboratories, New Mexico.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.
VOC = Volatile organic compound.

12.1.3 Monitoring History

Monitoring well CTF-MW3 was installed in August 2001 and sampled on a quarterly basis from July 2002 to June 2004 to acquire the eight quarters of groundwater data required by the NMED. The groundwater samples were analyzed for VOCs, HE compounds, RCRA metals, and cyanide. Although not required by the NMED, additional samples were also collected and analyzed for NPN and anions and cations. These additional samples were collected to further characterize the general ion chemistry of groundwater in this well and for purge water waste characterization purposes. Results for the eight quarters of groundwater sampling are as follows:

- **VOCs:** Trace amounts of five VOCs were detected in the groundwater samples collected. Acetone was detected in the July 2002 sample. Bromodichloromethane was detected in two samples collected in March and June 2004. Dibromochloromethane was detected during three of the eight sampling events. Chloroform was detected in samples collected during six of the eight sampling events. Toluene was detected in the sample collected in June 2004 and the associated trip blank (TB) sample. No other VOCs were detected in the TB samples associated with these samples.

- **HE Compounds:** A trace amount of 2-amino-4,6-dinitrotoluene was detected in the sample collected in July 2002. No HE compounds were detected in any subsequent groundwater sample collected from this well.

- **RCRA Metals:** Selenium was detected in all eight groundwater samples, slightly above background levels. All other metal concentrations were below both background levels and regulatory limits.

- **Total Cyanide, NPN, Anions, and Cations:** Cyanide was detected in one of the eight groundwater samples collected. NPN was detected at concentrations slightly above background in the first five samples collected. Fluoride was reported at concentrations slightly above background. The fluoride detected is most likely naturally occurring. None of the known activities conducted at Building 9930 would have produced wastewater containing fluoride.

12.1.4 Current Monitoring Network

Currently, one groundwater monitoring well is installed at SWMU 149 (Figure 12-1). Monitoring well CTF-MW3 is being monitored quarterly for VOCs, TAL metals, general chemistry parameters, perchlorate, and NPN. The eighth and final quarter of required groundwater sampling (NMED April 2010) occurred on December 14, 2012. Quarterly groundwater sampling will continue until additional guidance is provided by NMED.

12.1.5 Summary of Calendar Year 2013 Activities

The following activities for monitoring well CTF-MW3 near SWMU 149 occurred during CY 2013 (January through December 2013):

- Quarterly groundwater sampling was conducted at monitoring well CTF-MW3 in March, June, and December 2013. Groundwater samples were not collected in September 2013 because both roads to monitoring well CTF-MW3 were impassible due to severe thunderstorms.

- Quarterly reporting of analytical results for monitoring well CTF-MW3 groundwater samples was conducted.

- Tables of analytical results (Attachment 12A) and a hydrograph (Attachment 12B) were prepared in support of this report.

12.1.6 Summary of Future Activities

The following activities are anticipated for monitoring well CTF-MW3 near SWMU 149 during CY 2014:

- Analytical results will be summarized and additional analysis may be performed and submitted to NMED to support resumption of the regulatory process for designating the site as CAC with No Further Action.

12.1.7 Current Conceptual Model

This section presents a revised discussion of the hydrogeologic regime, conceptual site model, and contaminant findings for SWMU 149.

12.1.7.1 Regional Hydrogeologic Conditions

SWMU 149 is located in the Travertine Hills within the western portion of the CTF. The site is located between the Sandia and Tijeras faults. One splay of the Tijeras Fault is exposed about 800 ft south of the site. Nearby outcrops are composed of the Sandia Formation (carbonate cemented sandstone and conglomerate), Madera Group limestone, and Precambrian quartzite and granite (GRAM and Lettis

1995). The base-wide potentiometric surface map (Plate 1) shows that groundwater flow in the regional aquifer is generally toward the west. Faults in the vicinity of the site may serve as hydraulic barriers or conduits depending on the type and amount of fault gouge. No potable water-supply wells are located within 4 miles of the site.

12.1.7.2 Hydrogeologic Conditions at SWMU 149

SWMU 149 covers 4,686 square feet (approximately 0.1 acres) and is located approximately 70 ft southwest of Building 9930 and approximately 0.8 miles east of Technical Area III. The site is covered with a layer of soil and colluvium approximately 12- to 16-ft thick that is underlain by caliche and bedrock. SWMU 149 consists of an inactive septic system that was used from 1961 to 1993. Building 9930 is located in a notch of the Travertine Hills at an elevation of approximately 5,520 ft above mean sea level (amsl). The surrounding area is moderately rugged and sparsely vegetated by bunch grasses, cacti, and a few junipers. Monitoring well CTF-MW3 is located approximately 290 ft west of the site on the floor of a shallow arroyo. The arroyo channel slopes down to the west. No perennial surface water features, such as springs, are located within one mile of SWMU 149.

The amount of precipitation available for groundwater recharge is minimal due to scant rainfall and high evapotranspiration. Summer (monsoonal) thunderstorms are responsible for the majority of rainfall. The average rainfall, as measured at the nearest active rain gauge (the National Weather Service station at the Albuquerque International Sunport), during the period from 1915 through 2005 was 8.67 inches per year (WRCC-DRI 2012). The station is located 7.2 miles northwest of the site at an elevation of 5,310 ft amsl, which is similar enough to the site elevation to infer that the annual rainfall at SWMU 149 is approximately 9 inches per year. Intense sunlight and low humidity throughout much of the year creates high rates of evapotranspiration. Estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL February 1998).

In 2001, a drilling location downgradient of SWMU 149 was selected for the installation of monitoring well CTF-MW3. The location was selected using the historical potentiometric surface for the regional aquifer. The well was installed in August 2001 using the air-rotary casing hammer drilling technique. Alluvium consisting of silty fine-grained sand was encountered from the ground surface to 28 ft bgs. Precambrian granite and gneiss were encountered from 28 to 345 ft bgs. From 345 ft bgs to the borehole total depth of 430 ft bgs, Precambrian quartzite was encountered. The drilling rate from 28 to 430 ft bgs was relatively consistent and no significantly fractured zones were encountered. Drilling was paused at several depths and the borehole blown dry and allowed to recover. However, due to the low yield of the borehole, the water-bearing zone was not initially apparent. Geophysical logging (temperature and neutron) and drilling observations were used to select the screen interval. The caliper log recorded a fairly consistent borehole diameter that did not reflect any significantly fractured intervals. The depth to groundwater was estimated to be approximately 345 ft bgs. The well was screened from 340 to 360 ft bgs in Precambrian quartzite (Table 12-2).

The October 2013 groundwater elevation was 5,214.93 ft amsl. Compared to the mid-point elevation of the screen, the pressure head was approximately 45 ft and indicative of confined conditions. Based on the potentiometric surface depicted on Plate 1, the horizontal gradient is steep and approximately 0.15 feet per foot westward in the vicinity of the well. Groundwater in the bedrock most likely migrates through a confined low-permeability fracture system. The groundwater composition is of the bicarbonate type and dominated by calcium.

During sampling, the drawdown in monitoring well CTF-MW3 is not excessive and the quantity of water produced is clearly adequate for typical groundwater sampling. Groundwater samples are collected using pneumatic (nitrogen gas) Bennett™ piston pumps.

Table 12-2. Lithologic and Hydrogeologic Elevation Data for Monitoring Well CTF-MW3 near SWMU 149

Monitoring Well	Ground Surface Elevation (ft amsl)	Depth of Screened Interval (ft bgs)	Elevation for Top of Screen (ft amsl)	Potentiometric Surface, October 2013 (ft amsl)	Mid-Point Screen Elevation (ft amsl)	Pressure Head (ft[a])
CTF-MW3	5519.80	340 – 360	5179.80	5214.93	5169.80	45

NOTES:
[a]From mid-point of screen.
amsl = Above mean sea level.
bgs = Below ground surface.
CTF = Coyote Test Field.
ft = Foot (feet).
MW = Monitoring Well.
SWMU = Solid Waste Management Unit.

The conceptual hydrogeologic model for SWMU 149 is based on information from monitoring well CTF-MW3, several nearby monitoring wells located across CTF (Plate 1), and extensive field mapping conducted by the Site-Wide Hydrogeologic Characterization Project (SNL February 1998). Groundwater in the SWMU 149 area occurs in the fractured bedrock system under confined conditions. The depth to groundwater at monitoring well CTF-MW3 at the time of installation was approximately 345 ft bgs in a slightly fractured interval of Precambrian quartzite. The overlying granite that has naturally filled fractures probably serves as the confining layer. The amount of precipitation available for groundwater recharge is minimal due to the scant rainfall and high evapotranspiration rates. Hydrographs of historical water level data (Figure 12B-1 in Attachment 12B) indicate that seasonal effects, primarily due to thunderstorms, do not influence groundwater levels near the site. Groundwater underflow from the site probably discharges to the unconsolidated basin fill deposits (primarily the Santa Fe Group) of the Albuquerque Basin after crossing the Sandia Fault. The steep hydraulic gradient, approximately 0.15 feet per foot near the well, indicates that the fault limits the rate of groundwater migration near the site. No potable water supply wells are located within 4 miles of the site.

12.1.7.3 Contaminant Sources

From 1961 to 1993, wastewater from the SWMU 149 septic system discharged to the subsurface via a single seepage pit. The septic water contained photo processing chemicals and sanitary waste. The area around the seepage pit and septic tank was characterized using soil vapor samplers and soil samples collected from five boreholes.

12.1.7.4 Contaminant Distribution and Transport in Groundwater

The first phase of quarterly groundwater sampling for monitoring well CTF-MW3 was conducted from July 2002 to June 2004. Trace amounts of VOCs, cyanide, nitrate, and one HE compound (2-amino-4,6-dinitrotoluene) were detected. Concentrations have decreased over time. Selenium and fluoride were reported at concentrations slightly above background and are mostly likely attributable to the local bedrock. The second phase of quarterly groundwater sampling began in March 2011. During CY 2013, no metals, VOCs, NPN, alkalinity, or major ions exceed the respective MCLs. Perchlorate was not detected.

12.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM ER Operations as well as implements and enforces federal regulations mandated by RCRA. All ER Operations SWMUs are listed in Module IV of the SNL/NM RCRA Permit, *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units to the RCRA Part B*

Permit (Module IV), Sandia National Laboratories, NM5890110518 (NMED 1993). All corrective action requirements pertaining to SWMUs are contained in the Order (NMED April 2004). Quarterly groundwater monitoring will continue as part of the CAC process until additional guidance is provided by NMED. The analytical results for CY 2013 are presented in Section 12.6.

12.3 Scope of Activities

Groundwater monitoring sampling and analysis during CY 2013 is summarized in Table 12-3. The analytical parameters for monitoring well CTF-MW3 for each sampling event are listed in Table 12-4.

Table 12-3. Sampling Dates and SAPs for Monitoring Well CTF-MW3 near SWMU 149, Calendar Year 2013

Date of Sampling Event	SAP
March 22, 2013	*SWMU 149 Groundwater Monitoring Mini-SAP for Second Quarter Fiscal Year 2013* (SNL March 2013)
June 28, 2013	*SWMU 149 Groundwater Monitoring Mini-SAP for Third Quarter Fiscal Year 2013* (SNL June 2013)
December 13, 2013	*SWMU 149 Groundwater Monitoring Mini-SAP for First Quarter Fiscal Year 2014* (SNL November 2013)

NOTES:
CTF = Coyote Test Field.
MW = Monitoring Well.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories
SWMU = Solid Waste Management Unit.

Table 12-4. Parameters Sampled at SWMU 149 for Each Sampling Event, Calendar Year 2013

Parameter	Sampling Period	
Anions	**March 2013**	**June 2013**
Alkalinity	CTF-MW3	CTF-MW3
NPN	CTF-MW3 (dup)	
Perchlorate		
TAL Metals	**December 2013**	
VOCs	CTF-MW3	

NOTES:
Dup = Duplicate sample.
NPN = Nitrate plus nitrate (reported as nitrogen).
SWMU = Solid Waste Management Unit.
TAL = Target Analyte List.
VOC = Volatile organic compound.

12.4 Field Methods and Measurements

According to the requirements of the Order (NMED April 2004) and the NMED letter of April 8, 2010 (NMED April 2010), groundwater sampling was performed at SWMU 149. The CY 2013 sampling events were conducted in conformance with appropriate SNL/NM Field Operating Procedures for groundwater sampling activities, the SWMU 149 site-specific SAP (SNL June 2010), and Mini-SAPs (SNL March 2013, June 2013, and November 2013).

Environmental groundwater samples were collected from monitoring well CTF-MW3. Samples were submitted to GEL Laboratories LLC for all chemical analyses. Groundwater samples were analyzed for VOCs, NPN, major anions (i.e., bromide, chloride, fluoride, and sulfate), alkalinity, TAL metals, and perchlorate.

The monitoring procedures are consistent with procedures identified in the EPA technical enforcement guidance document (EPA 1986) and are described in detail in Section 1.3.

12.5 Groundwater Elevation

Throughout CY 2013, water level measurements were obtained to determine groundwater flow directions, hydraulic gradients, and changes in water table elevations. The water level information used to create the base-wide potentiometric surface map discussed in Section 2.6.2.2 and shown in Plate 1. From the base-wide potentiometric surface map, the local groundwater flow direction was inferred and is presented in Figure 12-2. The hydrograph for monitoring well CTF-MW3 is provided in Figure 12B-1 (Attachment 12B).

12.6 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using EPA analytical methods and protocols described in Section 1.3.2 (Tables 1-5 and 1-6). Parameters analyzed and sampling periods in CY 2013 are presented in Table 12-4.

12.7 Summary of Analytical Results

This section discusses analytical results and field measurements for the CY 2013 SWMU 149 sampling events. Data are presented in Tables 12A-1 through 12A-8 (Attachment 12A). Groundwater sampling results are compared with established EPA MCLs for drinking water (EPA 2009). Data qualifiers are explained in the footnotes following Table 12A-8. Analytical reports, including certificates of analyses, analytical methods, method detection limits (MDLs), practical quantitation limits, dates of analyses, results of quality control (QC) analyses, and data validation findings are filed in the SNL/NM Records Center.

The analytical data were reviewed and qualified in accordance with SNL/NM Administrative Operating Procedure 00-03 (May 2011). No problems were identified with the analytical data that resulted in qualification of the data as unusable. The data are acceptable and reported QC measures are adequate.

No VOCs were detected at concentrations above established MCLs from any monitoring well CTF-MW3 groundwater sample. During CY 2013 the compounds bromodichloromethane, chloroform, and dibromochloromethane were detected at low concentrations above the laboratory MDL and are comparable to historical values. The March VOC results were qualified as not detected in during data validation, because all compounds were detected in associated blank samples. These compounds are all breakdown products of chlorine and their detection in both the groundwater and equipment decontamination samples suggests the source is the deionized water used for the decontamination of the sampling system. The June and December VOC results detected the same compounds at low concentrations above the laboratory MDLs and are comparable to historical values. These detections could not be qualified as not detected during data validation because equipment blank samples were not obtained. However, the source for these detections is most likely the deionized water used for decontamination. Table 12A-1 summarizes detected VOCs in environmental groundwater samples (Attachment 12A), and Table 12A-2 lists the MDLs for associated VOCs analyzed.

Table 12A-3 (Attachment 12A) summarizes NPN results. NPN values were compared with the nitrate MCL of 10 milligrams per liter. NPN was not detected above the MCL.

Table 12A-4 (Attachment 12A) summarizes alkalinity and major anion (i.e., bromide, chloride, fluoride, and sulfate) results. No parameters were detected above established MCLs.

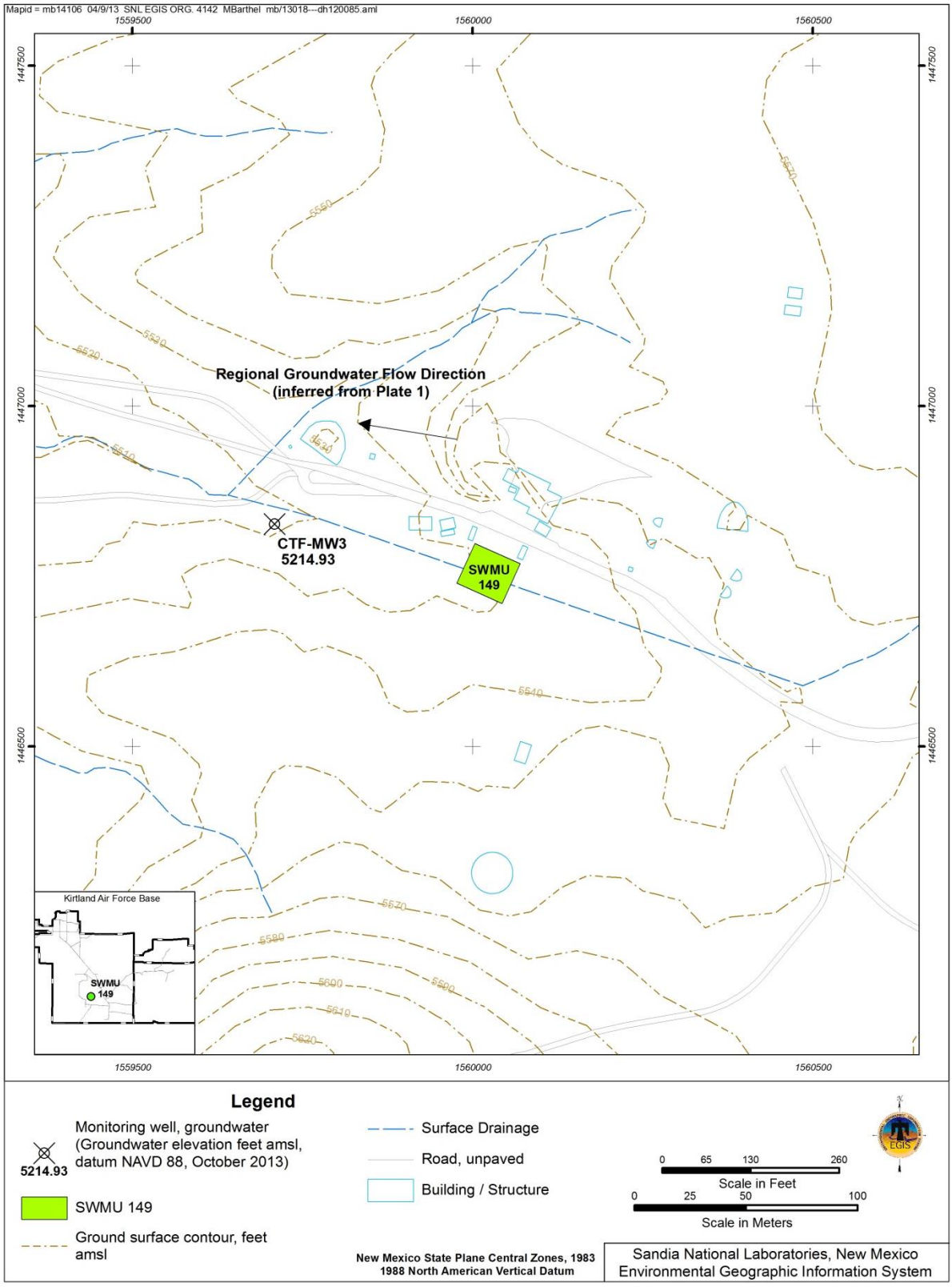


Figure 12-2. SWMU 149 Groundwater Flow Direction (October 2013)

Perchlorate was not detected in monitoring well CTF-MW3 samples. The NMED-specified screening level/MDL for perchlorate is 4 micrograms per liter; NMED April 2004). Table 12A-5 presents perchlorate results (Attachment 12A).

TAL metals, both in unfiltered and filtered fractions, were analyzed in monitoring well CTF-MW3 samples. No metal parameters were detected above established MCLs in any groundwater sample. Metal results for both unfiltered and filtered samples are summarized in Tables 12A-6 and 12A-7 (Attachment 12A), respectively.

Table 12A-8 (Attachment 12A) summarizes field water quality measurements collected prior to sampling. Field water quality measurements include turbidity, pH, temperature, specific conductance, oxidation-reduction potential, and dissolved oxygen.

12.8 Quality Control Results

Field and laboratory QC samples were prepared to determine the accuracy of the methods used, and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process. The results for each QC sample, and the impact on data quality for the SWMU 149 monitoring well CTF- MW3 quarterly sampling events, are discussed in the following sections.

12.8.1 Field Quality Control Samples

Field QC samples included duplicate environmental samples, field blanks (FBs), TBs, and equipment blanks (EBs). The following sections discuss the analytical results for each QC sample type.

12.8.1.1 Duplicate Environmental Samples

Duplicate environmental samples were analyzed to estimate the overall reproducibility of the sampling and analytical process. Relative percent difference (RPD) calculations, between duplicate samples, were performed for detected chemical analytes. The March 2013 duplicate sample data results show good agreement (low RPD values < 20 percent for organic compounds and < 35 for inorganic analyses) for all calculated parameters.

12.8.1.2 Equipment Blank Samples

EB or rinsate samples are collected to verify the equipment decontamination process. The March 2013 EB or rinsate sample was collected prior to sampling monitoring well CTF-MW3 and submitted for all analyses. Alkalinity, bromodichloromethane, bromoform, chloroform, chloride, copper, dibromochloromethane, iron, selenium, sodium, and zinc were all detected above laboratory MDLs in the EB sample. No corrective action was required because all reported values in the environmental sample are five times greater than the EB concentration.

12.8.1.3 Trip Blank Samples

TB samples are submitted whenever samples are collected for VOC analyses to assess whether contamination of the samples had occurred during shipment and storage. A total of four TB samples were submitted during CY 2013. Two TBs were submitted for the March 2013 sampling event and one sample for June and December 2013. No VOCs were detected above the associated laboratory MDLs in all TB samples.

12.8.1.4 Field Blank Samples

A FB sample was collected for VOCs to assess whether contamination of the samples resulted from ambient field conditions. The March 2013 FB sample from the monitoring well CTF-MW3 detected the VOC compounds bromodichloromethane, bromoform, chloroform, and dibromochloromethane. No

correction action was applied during data validation, because these compounds were also reported in the EB sample. These compounds are common by-products of the deionization water purification process.

12.8.2 Laboratory Control Samples

Internal laboratory QC samples, including method blanks and duplicate laboratory control samples were analyzed concurrently with all groundwater samples. No significant data quality problems were noted during the data validation process for all four quarters of CY 2013 sampling events.

12.9 Variances and Nonconformances

No variances or nonconformances from requirements in the SWMU 149 Groundwater Monitoring SAP (SNL June 2010) or Mini-SAPs (SNL March 2013, June 2013, and November 2013) were identified during any of the CY 2013 sampling events. However, project-specific issues identified during CY 2013 sampling activities are noted as follows:

- **September 2013 Sampling Event—**No groundwater samples were collected in September 2013 because severe thunderstorms eroded both roads to monitoring well CTF-MW3. In October 2013 the service road that parallels the monitoring well was repaired and the facilities drainage system repair plans are being evaluated.

12.10 Summary and Conclusions

Three quarterly sampling events occurred in CY 2013 at monitoring well CTF-MW3 near SWMU 149. Groundwater samples were collected in March, June, and December 2013. The September 2013 sampling event did not occur because both roads to monitoring well CTF-MW3 were impassible due to erosion caused by severe thunderstorms. Analytical parameters included VOCs, NPN, major anions, alkalinity, TAL total metals, and perchlorate. Results were compared with EPA MCL guidelines for drinking water (EPA 2009). No parameters were detected above established MCLs. The analytical results for this reporting period are consistent with historical concentrations. The current conceptual model described in Section 12.1.7 does not require modification based on the analytical results for this reporting period.

During CY 2014, analytical results will be summarized and additional analysis may be performed and submitted to NMED to support discussions of resuming the regulatory process for designating the site as CAC.

12.11 References

EPA 2009 U.S. Environmental Protection Agency (EPA), 2009. *National Primary Drinking Water Standards*, 40 CFR 141.11, Subpart B, U.S. Environmental Protection Agency, Washington, D.C., May.

EPA September 1994 U.S. Environmental Protection Agency (EPA), September 1994. *Notice of Deficiency, Sandia National Laboratories, Septic Tanks and Drainfields RFI Work Plan*, U.S. Environmental Protection Agency, Washington, D.C.

EPA 1986 U.S. Environmental Protection Agency (EPA), 1986. *RCRA Ground-Water Monitoring Technical Enforcement Guidance Document* OSWER-9950.1, U.S. Environmental Protection Agency, Washington, D.C.

GRAM and Lettis 1995 GRAM and Lettis, 1995. *Conceptual Geologic Model of the Sandia National Laboratories and Kirtland Air Force Base,* prepared for Site-Wide Hydrogeologic Characterization Project, Organization 7584, Environmental Restoration Program, Sandia National Laboratories, Albuquerque, New Mexico, December.

IT March 1994 IT Corporation (IT), March 1994. *Sampling and Analysis Plan for Shallow Subsurface Soil Sampling, RCRA Facility Investigation of Septic Tanks and Drainfields (OU 1295),* IT Corporation, Albuquerque, New Mexico.

Jones July 1993 Jones, J. (Sandia National Laboratories, New Mexico), July 1993. Internal Memorandum to B. Galloway listing the septic tanks that were removed from service with the construction of the Area III sanitary sewer system, July 26, 1993.

NMED December 2010 New Mexico Environment Department (NMED), December 2010. *Approval with Modifications, Response to April 8, 2010 Letter, Groundwater Monitoring Plan for SWMUs 149 and 154,* New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico.

NMED April 2010 New Mexico Environment Department (NMED), April 2010. *Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008), Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001,* New Mexico Environment Department, Santa Fe, New Mexico, April 8, 2010.

NMED September 2005 New Mexico Environment Department (NMED), September 2005. *Notice of Approval/Disapproval: Sandia National Laboratories Environmental Restoration Project Request for Supplemental Information Responses and Proposals for Corrective Action Complete, Drain and Septic Systems SWMUs 49, 101, 116, 138, 149, 154, and 161,* New Mexico Environment Department, Santa Fe, New Mexico, September 13, 2005.

NMED April 2004 New Mexico Environment Department (NMED), April 2004. *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order*, New Mexico Environment Department, Santa Fe, New Mexico, April 29, 2004.

NMED February 2002 New Mexico Environment Department (NMED), February 2002. *Letter from W. Moats (New Mexico Environment Department/Hazardous Waste Bureau) to M.J. Zamorski (U.S. Department of Energy) and P. Davies (Sandia National Laboratories/New Mexico) approving the "Field Implementation Plan, Characterization of Non-Environmental Restoration Drain and Septic Systems."* New Mexico Environment Department, Santa Fe, New Mexico, February 21, 2002.

NMED June 2000 New Mexico Environment Department (NMED), June 2000. *Request for Supplemental Information: Sandia National Laboratories, New Mexico, Environmental Restoration Project Responses to NMED Request for Supplemental Information: No Further Action Proposals (4th Round), Dated June 1996,* New Mexico Environment Department, Santa Fe, New Mexico, June 9, 2000.

NMED January 2000 New Mexico Environment Department (NMED), January 2000. *Letter from J. Bearzi (New Mexico Environment Department/Hazardous Waste Bureau), to M.J. Zamorski (U.S. Department of Energy) and L. Shephard (Sandia National Laboratories/New Mexico) approving the "Sampling and Analysis Plan for Characterizing and Assessing Potential Releases to the Environment for Septic and Other Miscellaneous Drain Systems at Sandia National Laboratories/New Mexico,"* New Mexico Environment Department, Santa Fe, New Mexico, January 28, 2000.

NMED June 1998 New Mexico Environment Department (NMED), June 1998. *Request for Supplemental Information: Proposal for No Further Action (4th Round), Environmental Restoration Project, Sandia National Laboratories, June 1996,* New Mexico Environment Department, Santa Fe, New Mexico, June 5, 1998.

NMED 1993 New Mexico Environment Department (NMED), 1993. *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518,* New Mexico Environment Department, Santa Fe, New Mexico.

Romero September 2003 Romero, T. (Sandia National Laboratories, New Mexico), September 2003. Internal communication to M. Sanders stating that during the connection of septic systems to the new City of Albuquerque sewer system, the old systems were disconnected and the lines capped, September 16, 2003.

SNL November 2013 Sandia National Laboratories, New Mexico (SNL/NM), November 2013. *SWMU 149 Groundwater Monitoring Mini-SAP for First Quarter Fiscal Year 2014,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2013 Sandia National Laboratories, New Mexico (SNL/NM), September 2013. *Annual Groundwater Monitoring Report, Calendar Year 2012 Groundwater Protection Program,* Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico

SNL September 2012 Sandia National Laboratories, New Mexico (SNL/NM), September 2012. *Annual Groundwater Monitoring Report, Calendar Year 2011 Groundwater Protection Program,* Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2013 Sandia National Laboratories, New Mexico (SNL/NM), June 2013. *SWMU 149 Groundwater Monitoring Mini-SAP for Third Quarter Fiscal Year 2013,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 2013 Sandia National Laboratories, New Mexico (SNL/NM), March 2013. *SWMU 149 Groundwater Monitoring Mini-SAP for Second Quarter Fiscal Year 2013,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL May 2011 Sandia National Laboratories, New Mexico (SNL/NM), May 2011. *Data Validation Procedure for Chemical and Radiochemical Data,* AOP 00-03, Revision 3, Sample Management Office, Sandia National Laboratories, Albuquerque, New Mexico, May 11, 2011.

SNL June 2010 Sandia National Laboratories, New Mexico (SNL/NM), June 2010. *U.S. Department of Energy/Sandia Corporation Response to the New Mexico Environment Department letter of April 8, 2010, entitled, Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008) Sandia National Laboratories EPA ID# NM5890110518 HWB-SNL-06-007 and HWB-SNL-08-001,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 2006 Sandia National Laboratories, New Mexico (SNL/NM), March 2006. *Justification for Class III Permit Modification March 2006 SWMU 149 Operable Unit 1295, Building 9930 Septic System, Coyote Test Field,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2005 Sandia National Laboratories, New Mexico (SNL/NM), June 2005. *Request for Supplemental Information Response and Proposal for Corrective Action Complete for Drain and Septic Systems SWMU 149, Building 9930 Septic System, Coyote Test Field,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL November 2001 Sandia National Laboratories, New Mexico (SNL/NM), November 2001. *Field Implementation Plan, Characterization of Non-Environmental Restoration Drain and Septic Systems,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2000 Sandia National Laboratories, New Mexico (SNL/NM), September 2000. *Environmental Restoration Project Response to NMED Request for Supplemental Information, No Further Action Proposals (4th Round) Dated June 1996,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico, September 28, 2000.

SNL October 1999 Sandia National Laboratories, New Mexico (SNL/NM), October 1999. *Sampling and Analysis Plan for Characterizing and Assessing Potential Releases to the Environment From Septic and Other Miscellaneous Drain Systems at Sandia National Laboratories/New Mexico,* Sandia National Laboratories, Albuquerque, New Mexico, October 19, 1999.

SNL November 1998 Sandia National Laboratories, New Mexico (SNL/NM), November 1998. *Environmental Restoration Project Responses to NMED Request for Supplemental Information, No Further Action Proposals (4th Round) Dated June 1996,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL February 1998 Sandia National Laboratories, New Mexico (SNL/NM), February 1998. *Revised Site-Wide Hydrogeologic Characterization Project, 1995 Annual Report,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 1996 Sandia National Laboratories, New Mexico (SNL/NM), June 1996. *Proposal for Risk-Based No Further Action, Environmental Restoration Site 149 Building 9930 Septic System, Operable Unit 1295,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL November 1995 Sandia National Laboratories, New Mexico (SNL/NM), November 1995. *Septic Tank Inspection and Closure Form for ER Site 149, Building 9930, November 7, 1995,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL November 1994 Sandia National Laboratories, New Mexico (SNL/NM), November 1994, *Septic Tanks and Drainfields RFI Work Plan, Comment Responses to USEPA Notice of Deficiency September 1994,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 1993 Sandia National Laboratories, New Mexico (SNL/NM), March 1993. *Septic Tanks and Drainfields (ADS-1295) RCRA Facility Investigation Work Plan,* Sandia National Laboratories, Albuquerque, New Mexico.

WRCC-DRI 2012 Western Regional Climate Center - Desert Research Institute, 2012. *Historical climate information for National Weather Service Cooperative Network Station 290234 – Albuquerque, New Mexico, Weather Service Forecast Office at the Albuquerque International Sunport for the period of 1914 through 2005*, http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?nmalbu. Accessed February 20, 2012.

This page intentionally left blank.

Attachment 12A
Solid Waste Management Unit 149
Analytical Results Tables

This page intentionally left blank.

Attachment 12A Tables

12A-1 Summary of Detected Volatile Organic Compounds, Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 12A-5

12A-2 Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260), Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 12A-6

12A-3 Summary of Nitrate plus Nitrite Results, Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 12A-7

12A-4 Summary of Anion and Alkalinity Results, Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 12A-8

12A-5 Summary of Perchlorate Results, Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 12A-9

12A-6 Summary of Unfiltered Target Analyte List Metal Results, Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 12A-10

12A-7 Summary of Filtered Target Analyte List Metal Results, Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 12A-14

12A-8 Summary of Field Water Quality Measurements[h], Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 12A-18

Footnotes for Solid Waste Management Unit 149 Analytical Results Tables 12A-19

This page intentionally left blank.

Table 12A-1
Summary of Detected Volatile Organic Compounds,
Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW3 22-Mar-13	Bromodichloromethane	0.540	0.300	1.00	NE	J	1.0U	093717-001	SW846 8260B
	Chloroform	0.780	0.300	1.00	NE	J	1.0U	093717-001	SW846 8260B
	Dibromochloromethane	0.380	0.300	1.00	NE	J	1.0U	093717-001	SW846 8260B
CTF-MW3 (Duplicate) 22-Mar-13	Bromodichloromethane	0.520	0.300	1.00	NE	J	1.0U	093718-001	SW846 8260B
	Chloroform	0.690	0.300	1.00	NE	J	1.0U	093718-001	SW846 8260B
	Dibromochloromethane	0.390	0.300	1.00	NE	J	1.0U	093718-001	SW846 8260B
CTF-MW3 28-Jun-13	Bromodichloromethane	0.580	0.300	1.00	NE	J		094044-001	SW846 8260B
	Chloroform	0.830	0.300	1.00	NE	J		094044-001	SW846 8260B
	Dibromochloromethane	0.380	0.300	1.00	NE	J		094044-001	SW846 8260B
CTF-MW3 13-Dec-13	Bromodichloromethane	0.600	0.300	1.00	NE	J		095084-001	SW846 8260B
	Chloroform	0.680	0.300	1.00	NE	J		095084-001	SW846 8260B
	Dibromochloromethane	0.450	0.300	1.00	NE	J		095084-001	SW846 8260B

Refer to footnotes on page 12A-19.

Table 12A-2
Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260), Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Analyte	MDL[b] (µg/L)	Analyte	MDL[b] (µg/L)
1,1,1-Trichloroethane	0.300	Chlorobenzene	0.300
1,1,2,2-Tetrachloroethane	0.300	Chloroethane	0.300
1,1,2-Trichloroethane	0.300	Chloroform	0.300
1,1-Dichloroethane	0.300	Chloromethane	0.300
1,1-Dichloroethene	0.300	Cyclohexane	0.300
1,2,3-Trichlorobenzene	0.300	Dibromochloromethane	0.300
1,2,4-Trichlorobenzene	0.300	Dichlorodifluoromethane	0.300
1,2-Dibromo-3-chloropropane	0.300	Ethyl benzene	0.300
1,2-Dibromoethane	0.300	Isopropylbenzene	0.300
1,2-Dichlorobenzene	0.300	Methyl acetate	1.50
1,2-Dichloroethane	0.300	Methylcyclohexane	3.00
1,2-Dichloropropane	0.300	Methylene chloride	3.00
1,3-Dichlorobenzene	0.300	Styrene	0.300
1,4-Dichlorobenzene	0.300	Tert-butyl methyl ether	0.300
2,2-trifluoroethane, 1,1,2-Trichloro-1	1.50	Tetrachloroethene	0.300
2-Butanone	2.00	Toluene	0.300
2-Hexanone	2.20	Trichloroethene	0.300
4-methyl-, 2-Pentanone	1.50	Trichlorofluoromethane	0.300
Acetone	3.00	Vinyl chloride	0.300
Benzene	0.300	Xylene	0.300
Bromochloromethane	0.300	cis-1,2-Dichloroethene	0.300
Bromodichloromethane	0.300	cis-1,3-Dichloropropene	0.300
Bromoform	0.300	m-, p-Xylene	0.300
Bromomethane	0.300	o-Xylene	0.300
Carbon disulfide	1.50	trans-1,2-Dichloroethene	0.300
Carbon tetrachloride	0.300	trans-1,3-Dichloropropene	0.300

Refer to footnotes on page 12A-19.

Table 12A-3
Summary of Nitrate plus Nitrite Results,
Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW3 22-Mar-13	Nitrate plus nitrite	5.54	0.170	0.500	10.0			093717-018	EPA 353.2
CTF-MW3 (Duplicate) 22-Mar-13	Nitrate plus nitrite	5.66	0.170	0.500	10.0			093718-018	EPA 353.2
CTF-MW3 28-Jun-13	Nitrate plus nitrite	5.94	0.170	0.500	10.0			094044-018	EPA 353.2
CTF-MW3 13-Dec-13	Nitrate plus nitrite	5.71	0.170	0.500	10.0			095084-018	EPA 353.2

Refer to footnotes on page 12A-19.

Table 12A-4
Summary of Anion and Alkalinity Results,
Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW3	Bicarbonate Alkalinity	331	0.725	1.00	NE			093717-022	SM2320B
22-Mar-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093717-022	SM2320B
	Bromide	1.15	0.067	0.200	NE			093717-016	SW846 9056
	Chloride	118	1.68	5.00	NE			093717-016	SW846 9056
	Fluoride	2.39	0.033	0.100	4.0			093717-016	SW846 9056
	Sulfate	487	3.33	10.0	NE			093717-016	SW846 9056
CTF-MW3 (Duplicate)	Bicarbonate Alkalinity	333	0.725	1.00	NE			093718-022	SM2320B
22-Mar-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093718-022	SM2320B
	Bromide	1.14	0.067	0.200	NE			093718-016	SW846 9056
	Chloride	120	1.68	5.00	NE			093718-016	SW846 9056
	Fluoride	2.39	0.033	0.100	4.0			093718-016	SW846 9056
	Sulfate	495	3.33	10.0	NE			093718-016	SW846 9056
CTF-MW3	Bicarbonate Alkalinity	322	0.725	1.00	NE			094044-022	SM2320B
28-Jun-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094044-022	SM2320B
	Bromide	1.17	0.067	0.200	NE			094044-016	SW846 9056
	Chloride	115	3.35	10.0	NE			094044-016	SW846 9056
	Fluoride	2.49	0.033	0.100	4.0			094044-016	SW846 9056
	Sulfate	497	6.65	20.0	NE			094044-016	SW846 9056
CTF-MW3	Bicarbonate Alkalinity	334	0.725	1.00	NE			095084-022	SM2320B
13-Dec-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095084-022	SM2320B
	Bromide	1.21	0.067	0.200	NE			095084-016	SW846 9056
	Chloride	124	3.35	10.0	NE			095084-016	SW846 9056
	Fluoride	2.47	0.033	0.100	4.0			095084-016	SW846 9056
	Sulfate	511	6.65	20.0	NE			095084-016	SW846 9056

Refer to footnotes on page 12A-19.

Table 12A-5
Summary of Perchlorate Results,
Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Perchlorate Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW3 22-Mar-13	ND	0.004	0.012	NE	U		093717-020	EPA 314.0
CTF-MW3 (Duplicate) 22-Mar-13	ND	0.004	0.012	NE	U		093718-020	EPA 314.0
CTF-MW3 28-Jun-13	ND	0.004	0.012	NE	U		094044-020	EPA 314.0
CTF-MW3 13-Dec-13	ND	0.004	0.012	NE	U		095084-020	EPA 314.0

Refer to footnotes on page 12A-19.

Table 12A-6
Summary of Unfiltered Target Analyte List Metal Results,
Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW3	Aluminum	0.0159	0.015	0.050	NE	J		093717-009	SW846 6020
22-Mar-13	Antimony	ND	0.001	0.003	0.006	U		093717-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093717-009	SW846 6020
	Barium	0.0316	0.0006	0.002	2.00			093717-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093717-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093717-009	SW846 6020
	Calcium	194	0.300	1.00	NE			093717-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093717-009	SW846 6020
	Cobalt	0.000289	0.0001	0.001	NE	J		093717-009	SW846 6020
	Copper	0.00221	0.00035	0.001	NE		0.018UJ	093717-009	SW846 6020
	Iron	0.557	0.033	0.100	NE			093717-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093717-009	SW846 6020
	Magnesium	46.8	0.010	0.030	NE		J	093717-009	SW846 6020
	Manganese	0.00197	0.001	0.005	NE	J		093717-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093717-009	SW846 7470
	Nickel	0.00369	0.0005	0.002	NE	B	0.027UJ	093717-009	SW846 6020
	Potassium	11.0	0.080	0.300	NE			093717-009	SW846 6020
	Selenium	0.0307	0.0015	0.005	0.050			093717-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093717-009	SW846 6020
	Sodium	166	0.400	1.25	NE			093717-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093717-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		093717-009	SW846 6010
	Zinc	0.00552	0.0035	0.010	NE	J	0.034U	093717-009	SW846 6020

Refer to footnotes on page 12A-19.

Table 12A-6 *(Continued)*
Summary of Unfiltered Target Analyte List Metal Results,
Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW3	Aluminum	0.0168	0.015	0.050	NE	J		093718-009	SW846 6020
22-Mar-13	Antimony	ND	0.001	0.003	0.006	U		093718-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093718-009	SW846 6020
	Barium	0.0339	0.0006	0.002	2.00			093718-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093718-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		093718-009	SW846 6020
	Calcium	198	0.300	1.00	NE			093718-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093718-009	SW846 6020
	Cobalt	0.000296	0.0001	0.001	NE	J		093718-009	SW846 6020
	Copper	0.00266	0.00035	0.001	NE		0.018UJ	093718-009	SW846 6020
	Iron	0.697	0.033	0.100	NE			093718-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093718-009	SW846 6020
	Magnesium	46.7	0.010	0.030	NE		J	093718-009	SW846 6020
	Manganese	0.00198	0.001	0.005	NE	J		093718-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093718-009	SW846 7470
	Nickel	0.0037	0.0005	0.002	NE	B	0.027UJ	093718-009	SW846 6020
	Potassium	11.5	0.080	0.300	NE			093718-009	SW846 6020
	Selenium	0.0265	0.0015	0.005	0.050			093718-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093718-009	SW846 6020
	Sodium	167	0.400	1.25	NE			093718-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093718-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		093718-009	SW846 6010
	Zinc	0.00761	0.0035	0.010	NE	J	0.034U	093718-009	SW846 6020

Refer to footnotes on page 12A-19.

Table 12A-6 *(Continued)*
Summary of Unfiltered Target Analyte List Metal Results,
Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW3	Aluminum	ND	0.015	0.050	NE	U		094044-009	SW846 6020
28-Jun-13	Antimony	ND	0.001	0.003	0.006	U		094044-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094044-009	SW846 6020
	Barium	0.0284	0.0006	0.002	2.00			094044-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094044-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094044-009	SW846 6020
	Calcium	189	0.600	2.00	NE			094044-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094044-009	SW846 6020
	Cobalt	0.000344	0.0001	0.001	NE	J		094044-009	SW846 6020
	Copper	0.00194	0.00035	0.001	NE		J-	094044-009	SW846 6020
	Iron	0.351	0.033	0.100	NE			094044-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094044-009	SW846 6020
	Magnesium	47.9	0.010	0.030	NE			094044-009	SW846 6020
	Manganese	0.00117	0.001	0.005	NE	J		094044-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094044-009	SW846 7470
	Nickel	0.0055	0.0005	0.002	NE		J+	094044-009	SW846 6020
	Potassium	11.3	0.080	0.300	NE			094044-009	SW846 6020
	Selenium	0.0308	0.0015	0.005	0.050			094044-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094044-009	SW846 6020
	Sodium	160	0.800	2.50	NE			094044-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094044-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U	UJ	094044-009	SW846 6010
	Zinc	0.00553	0.0035	0.010	NE	J		094044-009	SW846 6020

Refer to footnotes on page 12A-19.

Table 12A-6 *(Concluded)*
Summary of Unfiltered Target Analyte List Metal Results,
Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW3	Aluminum	ND	0.015	0.050	NE	U		095084-009	SW846 6020
13-Dec-13	Antimony	ND	0.001	0.003	0.006	U		095084-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095084-009	SW846 6020
	Barium	0.0301	0.0006	0.002	2.00			095084-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095084-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095084-009	SW846 6020
	Calcium	212	0.300	1.00	NE	B		095084-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095084-009	SW846 6020
	Cobalt	0.000156	0.0001	0.001	NE	J		095084-009	SW846 6020
	Copper	0.00156	0.00035	0.001	NE		J-	095084-009	SW846 6020
	Iron	0.252	0.033	0.100	NE			095084-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095084-009	SW846 6020
	Magnesium	44.5	0.010	0.030	NE			095084-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095084-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095084-009	SW846 7470
	Nickel	0.00329	0.0005	0.002	NE		J-	095084-009	SW846 6020
	Potassium	10.8	0.080	0.300	NE			095084-009	SW846 6020
	Selenium	0.0295	0.0015	0.005	0.050			095084-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095084-009	SW846 6020
	Sodium	182	0.400	1.25	NE			095084-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095084-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095084-009	SW846 6010
	Zinc	0.0174	0.0035	0.010	NE			095084-009	SW846 6020

Refer to footnotes on page 12A-19.

Table 12A-7
Summary of Filtered Target Analyte List Metal Results,
Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW3	Aluminum	ND	0.015	0.050	NE	U		093717-010	SW846 6020
22-Mar-13	Antimony	ND	0.001	0.003	0.006	U		093717-010	SW846 6020
	Arsenic	0.00194	0.0017	0.005	0.010	J		093717-010	SW846 6020
	Barium	0.0325	0.0006	0.002	2.00			093717-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093717-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U	UJ	093717-010	SW846 6020
	Calcium	196	1.20	4.00	NE			093717-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093717-010	SW846 6020
	Cobalt	0.000427	0.0001	0.001	NE	J	J	093717-010	SW846 6020
	Copper	0.00211	0.00035	0.001	NE		0.0084UJ	093717-010	SW846 6020
	Iron	0.747	0.033	0.100	NE		J	093717-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093717-010	SW846 6020
	Magnesium	49.5	0.200	0.600	NE		J	093717-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093717-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093717-010	SW846 7470
	Nickel	0.00613	0.0005	0.002	NE			093717-010	SW846 6020
	Potassium	11.4	0.080	0.300	NE			093717-010	SW846 6020
	Selenium	0.0272	0.0015	0.005	0.050			093717-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093717-010	SW846 6020
	Sodium	175	1.60	5.00	NE			093717-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093717-010	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U	UJ	093717-010	SW846 6010
	Zinc	0.00521	0.0035	0.010	NE	J	J	093717-010	SW846 6020

Refer to footnotes on page 12A-19.

Table 12A-7 *(Continued)*
Summary of Filtered Target Analyte List Metal Results,
Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW3	Aluminum	ND	0.015	0.050	NE	U		093718-010	SW846 6020
22-Mar-13	Antimony	ND	0.001	0.003	0.006	U		093718-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		093718-010	SW846 6020
	Barium	0.0318	0.0006	0.002	2.00			093718-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		093718-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U	UJ	093718-010	SW846 6020
	Calcium	193	1.20	4.00	NE			093718-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093718-010	SW846 6020
	Cobalt	0.000424	0.0001	0.001	NE	J	J	093718-010	SW846 6020
	Copper	0.00245	0.00035	0.001	NE		0.0084UJ	093718-010	SW846 6020
	Iron	0.774	0.033	0.100	NE		J	093718-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093718-010	SW846 6020
	Magnesium	49.6	0.200	0.600	NE		J	093718-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		093718-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093718-010	SW846 7470
	Nickel	0.00619	0.0005	0.002	NE			093718-010	SW846 6020
	Potassium	11.6	0.080	0.300	NE			093718-010	SW846 6020
	Selenium	0.0273	0.0015	0.005	0.050			093718-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093718-010	SW846 6020
	Sodium	168	1.60	5.00	NE			093718-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		093718-010	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U	UJ	093718-010	SW846 6010
	Zinc	0.00547	0.0035	0.010	NE	J	J	093718-010	SW846 6020

Refer to footnotes on page 12A-19.

Table 12A-7 *(Continued)*
Summary of Filtered Target Analyte List Metal Results,
Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW3	Aluminum	ND	0.015	0.050	NE	U		094044-010	SW846 6020
28-Jun-13	Antimony	ND	0.001	0.003	0.006	U		094044-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		094044-010	SW846 6020
	Barium	0.0311	0.0006	0.002	2.00			094044-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		094044-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		094044-010	SW846 6020
	Calcium	193	0.600	2.00	NE			094044-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094044-010	SW846 6020
	Cobalt	0.000351	0.0001	0.001	NE	J		094044-010	SW846 6020
	Copper	0.00193	0.00035	0.001	NE		J-	094044-010	SW846 6020
	Iron	0.327	0.033	0.100	NE			094044-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094044-010	SW846 6020
	Magnesium	47.5	0.010	0.030	NE			094044-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		094044-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094044-010	SW846 7470
	Nickel	0.00527	0.0005	0.002	NE		J+	094044-010	SW846 6020
	Potassium	11.1	0.080	0.300	NE			094044-010	SW846 6020
	Selenium	0.0299	0.0015	0.005	0.050			094044-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094044-010	SW846 6020
	Sodium	165	0.800	2.50	NE			094044-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		094044-010	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U	UJ	094044-010	SW846 6010
	Zinc	0.00524	0.0035	0.010	NE	J		094044-010	SW846 6020

Refer to footnotes on page 12A-19.

Table 12A-7 *(Concluded)*
Summary of Filtered Target Analyte List Metal Results,
Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW3	Aluminum	ND	0.015	0.050	NE	U		095084-010	SW846 6020
13-Dec-13	Antimony	ND	0.001	0.003	0.006	U		095084-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095084-010	SW846 6020
	Barium	0.0301	0.0006	0.002	2.00			095084-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095084-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095084-010	SW846 6020
	Calcium	202	0.300	1.00	NE	B		095084-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095084-010	SW846 6020
	Cobalt	0.000196	0.0001	0.001	NE	J		095084-010	SW846 6020
	Copper	0.00143	0.00035	0.001	NE		J-	095084-010	SW846 6020
	Iron	0.230	0.033	0.100	NE			095084-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095084-010	SW846 6020
	Magnesium	44.6	0.010	0.030	NE			095084-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095084-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095084-010	SW846 7470
	Nickel	0.00325	0.0005	0.002	NE		J-	095084-010	SW846 6020
	Potassium	10.7	0.080	0.300	NE			095084-010	SW846 6020
	Selenium	0.029	0.0015	0.005	0.050			095084-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095084-010	SW846 6020
	Sodium	175	0.400	1.25	NE			095084-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095084-010	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095084-010	SW846 6010
	Zinc	0.00432	0.0035	0.010	NE	J		095084-010	SW846 6020

Refer to footnotes on page 12A-19.

Table 12A-8
Summary of Field Water Quality Measurements[h],
Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
CTF-MW3	22-Mar-13	20.48	1557	228.9	6.72	0.70	84.5	7.56
CTF-MW3	28-Jun-13	22.26	1799	172.2	6.83	0.78	92.7	8.04
CTF-MW3	13-Dec-13	16.80	1570.6	326.4	7.10	0.21	86.5	8.37

Refer to footnotes on page 12A-19.

Footnotes for Solid Waste Management Unit 149 Analytical Results Tables

%	= Percent.
µg/L	= Micrograms per liter.
CFR	= Code of Federal Regulations.
EPA	= U.S. Environmental Protection Agency.
ID	= Identifier.
mg/L	= Milligrams per liter.
mrem/yr	= Millirem per year.
No.	= Number.
pCi/L	= Picocuries per liter.

[a]Result

Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 2A- 1-4).

Bold indicates the value exceed the established MCL.

ND = Not detected (at MDL).

[b]MDL

MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

[c]PQL

PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

[d]MCL

MCL = Maximum contaminant level. MCLs were established by the EP) Office of Water, National Primary Water Regulations (EPA May 2009).

NE = Not established.

[e]Lab Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

B = The analyte was detected in the blank above the effective MDL.

J = Amount detected is below the PQL.

U = Analyte is absent or below the MDL.

[f]Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

J = The associated value is an estimated quantity.

J+ = The associated numerical value is an estimated quantity with a suspected positive bias.

J- = The associated numerical value is an estimated quantity with a suspected negative bias.

U = The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.

UJ = The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

[g]Analytical Method

Clesceri, Greenburg, and Eaton, 1998, Standard Methods for the Examination of Water and Wastewater, 20th ed., Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.

EPA, 1999 (and updates), "Perchlorate in Drinking Water Using Ion Chromatography," EPA 815/R-00-014.

EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.

EPA, 1983, "The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0," EPA-600/4-84-017.

[h] **Field Water Quality Measurements**

Field measurements were collected prior to sampling.

°C	= Degrees Celsius.
% sat	= Percent saturation.
µmhos/cm	= Micromhos per centimeter.
mg/L	= Milligrams per liter.
mV	= Millivolts.
NTU	= Nephelometric turbidity units.
pH	= Potential of hydrogen (negative logarithm of the hydrogen ion concentration).

Attachment 12B
Solid Waste Management Unit 149
Hydrographs

This page intentionally left blank.

Attachment 12B Hydrographs

12B-1 SWMU 149 Study Area Well 12B-5

This page intentionally left blank.

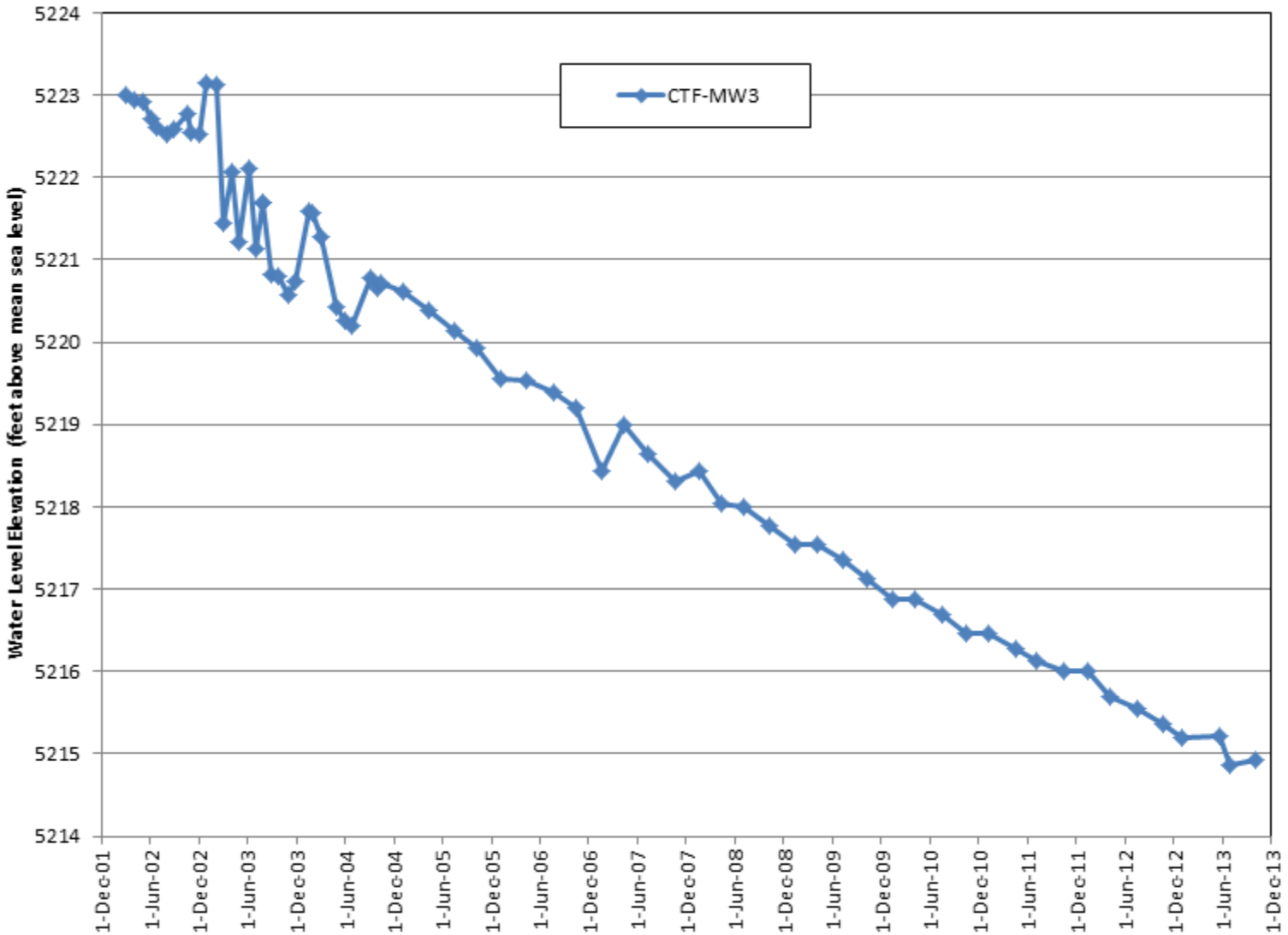


Figure 12B-1. SWMU 149 Study Area Well

This page intentionally left blank.

13.0 Solid Waste Management Unit 154

13.1 Introduction

This chapter summarizes Calendar Year (CY) 2013 quarterly groundwater sampling events for Coyote Test Field (CTF) monitoring well CTF-MW2, located near Solid Waste Management Unit (SWMU) 154 at Sandia National Laboratories, New Mexico (SNL/NM). The SNL/NM facility is a government-owned, contractor-operated laboratory. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM for the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA). The DOE/NNSA Sandia Field Office administers the contract and oversees contractor operations at the site.

Supplemental groundwater monitoring at SWMU 154 is designed to address the requirements of Section VII.D.6 of the Compliance Order on Consent (the Order) (NMED April 2004) and the letter dated April 8, 2010, from the New Mexico Environment Department (NMED) Hazardous Waste Bureau (NMED April 2010).

During CY 2013, four quarterly groundwater samples were collected from monitoring well CTF-MW2 on March 26, June 25, September 17, and December 17, 2013. The groundwater samples were collected in accordance with the NMED-approved Sampling and Analysis Plan (SAP) (SNL June 2010). Analytical parameters included volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), high explosive (HE) compounds, nitrate plus nitrite (NPN), major anions, alkalinity, Target Analyte List (TAL) metals plus uranium, perchlorate, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium.

Analytical results were compared with U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) for drinking water (EPA 2009). During all four quarters, arsenic was detected above the established MCL and is most likely attributable to naturally occurring background (geogenic source) because monitoring well CTF-MW2 is screened in a highly fractured interval of Precambrian granite and gneiss. Detailed results for all quarterly sampling events are discussed in Section 13.6.

The eighth and final quarter of the required groundwater sampling (NMED April 2010) was conducted on December 18, 2012. Supplemental quarterly groundwater sampling will continue until NMED provides additional guidance.

13.1.1 Location

SWMU 154, the Building 9960 Septic Systems, is located in the CTF on federally-owned land controlled by Kirtland Air Force Base (KAFB) and permitted to the DOE/NNSA. It is approximately 1.3 miles east of SNL/NM Technical Area III, 0.4 miles west of Lovelace Road, and 1.3 miles north of the Solar Power Tower, a prominent landmark in the area (Figure 13-1).

13.1.2 Site History

SWMU 154 was identified as a potential release site in 1987 (SNL August 1997; Table 13-1) and is composed of two adjacent, but separate systems. The east septic system (SWMU 154-B) is located north of Building 9960 and consists of a 900-gallon septic tank that discharged to a 5-foot (ft) diameter, 10-ft deep seepage pit. The west septic system (SWMU 154-A) consists of a pair of HE seepage pits located southwest of Building 9960 (Figure 13-2).

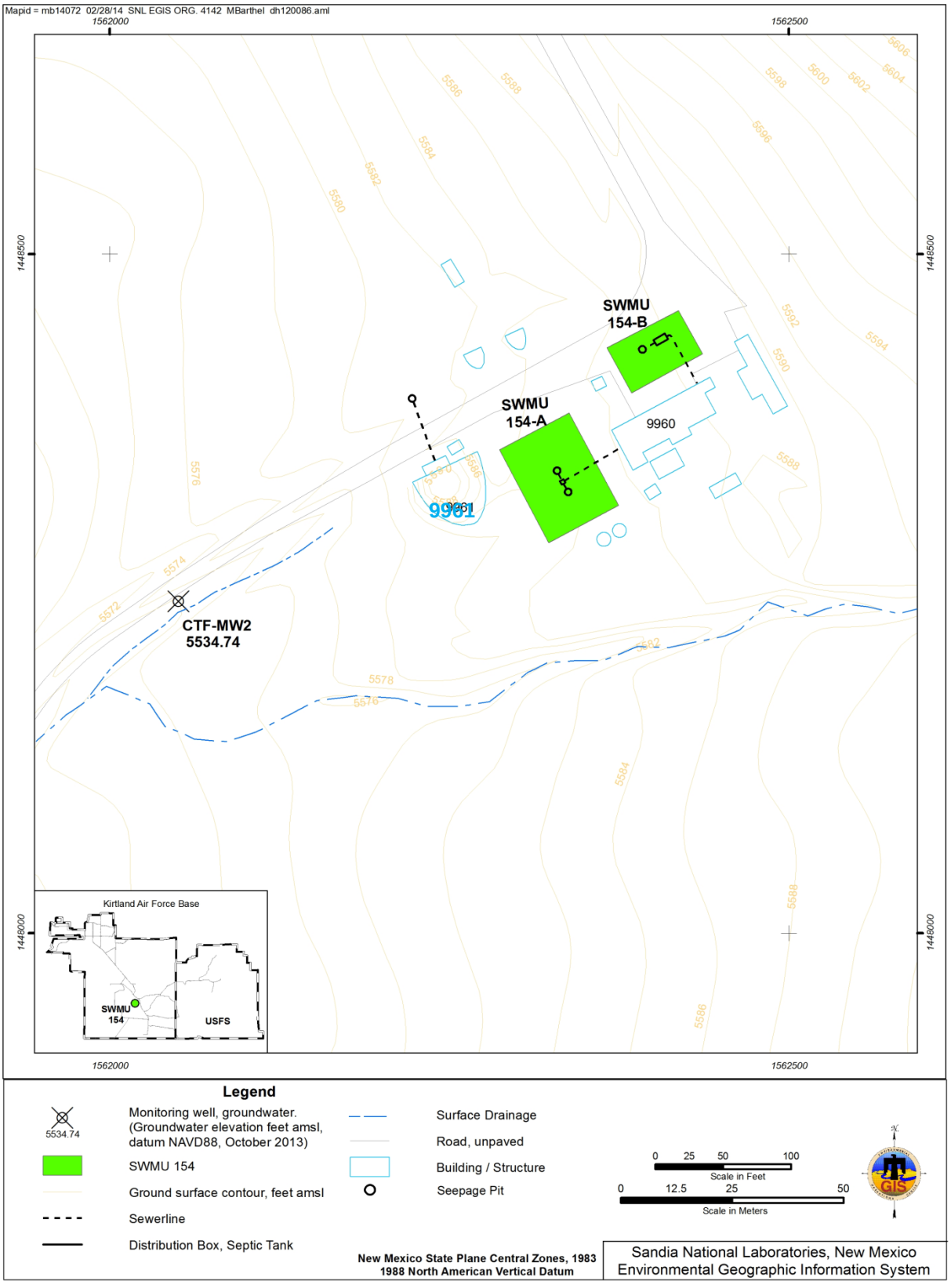


Figure 13-1. Location of Monitoring Well CTF-MW2 near SWMU 154

Table 13-1. Historical Timeline of SWMU 154

Month	Year	Event	Reference
	1965	Building 9960 and 9961 are constructed.	SNL August 1997
April	1987	SWMU 154 is identified as a potential release site. Building 9960 HE two seepage pits (SWMU 154A) and septic system (SWMU 154B).	SNL August 1997
June	1992	Waste characterization samples collected from SWMU 154 septic tank.	SNL August 1997
	1993	Building 9960 connected to the City of Albuquerque sanitary sewer system.	SNL August 1997
March	1993	Septic Tanks and Drainfields (OU 1295) RCRA Facility Investigation Work Plan submitted.	SNL March 1993
March	1994	OU 1295 SAP prepared.	IT March 1994
	1994	Cultural Resources and Sensitive Species Surveys conducted at SMWU 154.	SNL August 1997
May	1994	Additional waste characterization samples collected from SWMU 154 septic tank.	SNL August 1997
May-June	1994	A PETREX™ passive soil vapor survey completed at the septic system area at SWMU 154.	SNL August 1997
September	1994	EPA comments on the March 1993 OU 1295 work plan received as a NOD.	EPA September 1994
November	1994	Response to the September 1994 EPA NOD submitted.	SNL November 1994
October	1994	Confirmatory soil samples collected from SWMU 154.	SNL August 1997
October	1995	A second round of soil samples collected from two boreholes next to the two HE seepage pits at SWMU 154.	Chain-of-Custody
January	1996	Remaining waste removed from SWMU 154 septic system septic tank, and the tank was decontaminated and backfilled in place with clean soil. The septic system seepage pit was also backfilled in place with clean fill.	SNL January 1996
June-July	1996	A third round of soil samples collected from four previous and six new borehole locations around the HE seepage pits at SWMU 154.	Chain-of-Custody
March	1997	A fourth round of soil samples collected from four additional boring locations in the HE seepage pits area at SWMU 154.	Chain-of-Custody
August	1997	NFA proposal for SWMU 154 submitted to the NMED.	SNL August 1997
January	1998	SWMU 154 was one of five OU 1295 SWMUs selected by the NMED for additional soil sampling through the center and beneath seepage pits.	NMED January 1998
January	1998	SNL/NM collected samples down through the center of and beneath the two HE seepage pits at SWMU 154.	Chain-of-Custody
February	1998	Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report (SNL/NM 1995) containing description of SWMU 154 hydrogeology submitted to NMED.	SNL February 1998
June	1999	The NMED responded with an RSI on the SWMU 154 NFA proposal. Installation of a groundwater monitoring well downgradient of SWMU 154 was requested.	NMED June 1999
September	1999	First response submitted to the June 1999 NMED RSI for SWMU 154.	SNL September 1999a
October	1999	A SAP describing technical procedures to complete environmental investigations submitted to the NMED.	SNL September 1999b
January	2000	SAP approved by the NMED.	NMED January 2000
August	2001	Groundwater monitoring well CTF-MW2 installed downgradient from SWMU 154.	SNL June 2005
November	2001	A follow-up FIP documenting specific investigation procedure to be completed submitted to the NMED.	SNL November 2001

Table 13-1. Historical Timeline of SWMU 154 *(Concluded)*

Month	Year	Event	Reference
February	2002	The FIP approved by the NMED.	NMED February 2002
June	2004	Completed eight quarters of sampling for groundwater monitoring well CTF-MW2 near SWMU 154.	SNL June 2005
June	2005	A third RSI response submitted to the NMED. This document described the results of the investigations completed at SWMU 154 since the August 1997 NFA report was written and an updated risk assessment evaluation for the site.	SNL June 2005
August	2005	As required by the NMED, additional soil samples were collected and analyzed from beneath a fourth seepage pit associated with Building 9961 near SWMU 154.	Chain-of-Custody
September	2005	The NMED issued a NOD requiring soil sampling at a Building 9961 seepage pit not located within the SWMU border.	NMED September 2005
January	2006	Response to NOD submitted, consisting of a report summarizing results of soil sampling beneath the Building 9961 HE seepage pit. No significant contamination is detected in the soil samples.	SNL January 2006
March	2006	The NMED issues a Certificate of Completion for CAC.	NMED March 2006
March	2006	Request for Class III Permit Modification submitted.	SNL March 2006
April	2010	NMED issues a letter requiring additional corrective action is needed at SWMU 154. It specifies eight additional quarters of groundwater monitoring at CTF-MW2.	NMED April 2010
June	2010	SAP for SWMU 154 submitted to the NMED.	SNL June 2010
December	2010	SAP approved by the NMED.	NMED December 2010
March	2011	Quarterly sampling of CTF-MW2 resumed.	SNL September 2012
December	2012	Eight quarters of additional groundwater sampling of CTF-MW2 completed.	SNL September 2013
March	2013	Began voluntary quarterly groundwater sampling	

NOTES:
CAC = Corrective Action Complete.
CTF = Coyote Test Field.
EPA = U.S. Environmental Protection Agency.
FIP = Field Implementation Plan.
HE = High explosive.
MW = Monitoring Well.
NFA = No Further Action.
NMED = New Mexico Environment Department.
NOD = Notice of Disapproval.
OU = Operable Unit.
RCRA = Resource Conservation and Recovery Act.
RSI = Request for Supplemental Information.
SAP = Sampling and Analysis Plan.
SNL/NM = Sandia National Laboratories, New Mexico.
SWMU = Solid Waste Management Unit.

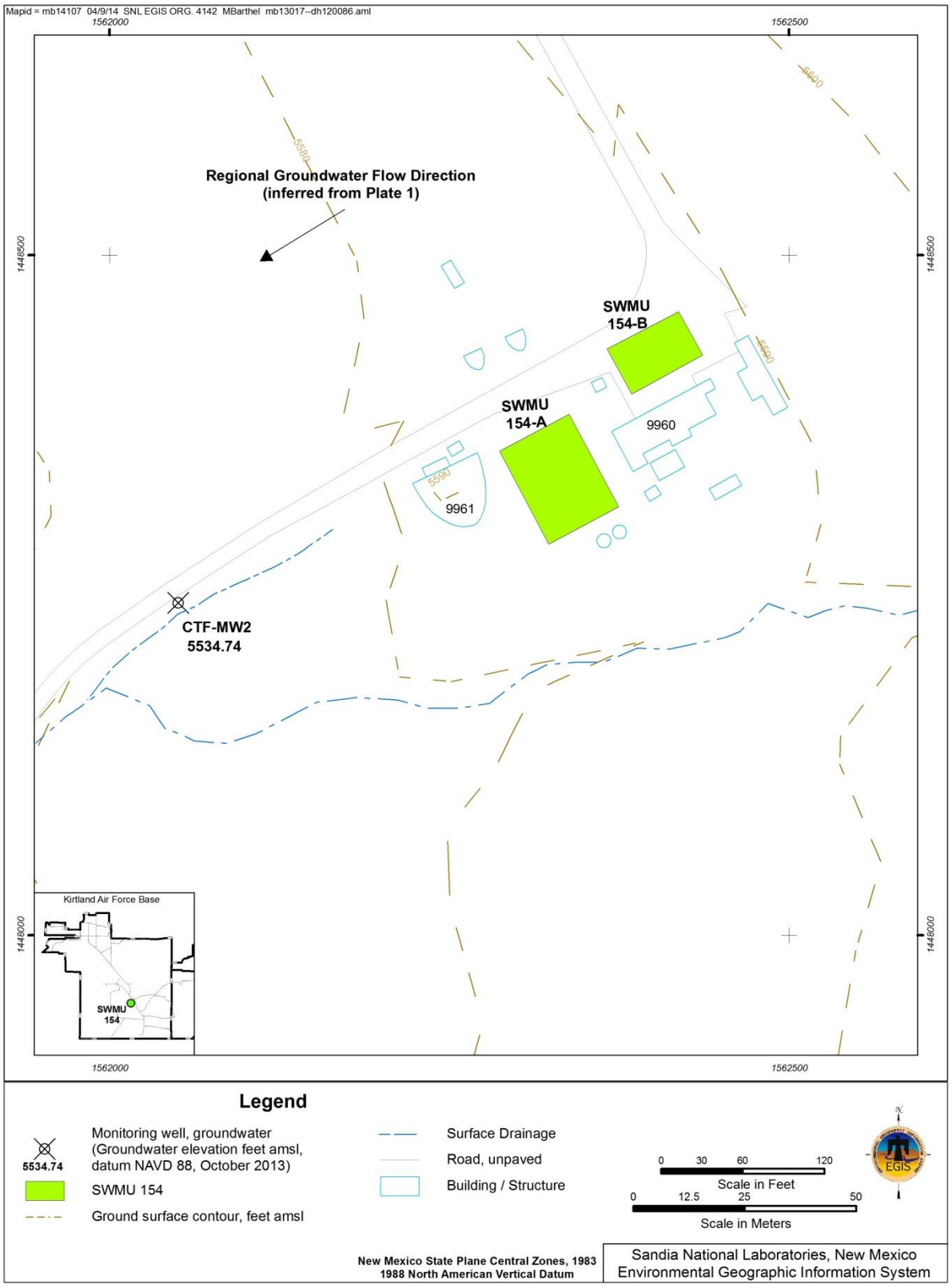


Figure 13-2. SWMU 154 Groundwater Flow Direction (October 2013)

The two HE compound seepage pits (SWMU 154A) are 5 ft in diameter and were installed to approximately 23 ft below ground surface (bgs). Combined, the two SWMU 154 septic systems encompass approximately 0.15 acres of essentially flat-lying land at an average mean elevation of 5,585 ft above mean sea level (amsl).

Available information indicates that Building 9960 was constructed in 1965, and it is assumed that the septic and HE drain systems were also constructed at that time. In 1993, the septic systems were connected to the City of Albuquerque sanitary sewer system (Jones July 1993). The obsolete septic system lines were disconnected and capped, and the system was abandoned in place (Romero September 2003). Waste in the SWMU 154B septic tank was removed and managed according to SNL/NM policy. The empty and decontaminated septic tank was inspected by the NMED on January 26, 1996, and a closure form was signed by the NMED (SNL January 1996). The septic tank and associated seepage pit were then backfilled with clean, native soil from the area in early 1996. The two SWMU 154A HE seepage pits are inactive and have not been backfilled. Rinse water from HE machining operations at the facility are currently directed to polypropylene tanks that are routinely analyzed and the contents properly disposed.

SWMU 154 environmental concerns are based upon the potential for the release of contaminants of concern (COCs) in effluent discharged to the environment via the septic and HE seepage pits. Because operational records were not available, the initial investigation was planned to be consistent with other Drain and Septic System site investigations, and to sample for possible COCs that may have been released during facility operations.

In August 1997, a No Further Action (NFA) proposal was submitted to the NMED for SWMU 154 (SNL August 1997). The NMED stated that the NFA proposal would not be approved without groundwater characterization. Subsequently, monitoring well CTF-MW2 was installed in August 2001, and groundwater samples were collected for the required minimum of eight quarters. Groundwater samples were analyzed for VOCs, Resource Conservation and Recovery Act (RCRA) metals, and HE compounds. Analytical results for these sampling events were presented in the third Request for Supplemental Information (RSI) responses and a Corrective Action Complete (CAC) proposal submitted to the NMED (SNL June 2005). In September 2005, the NMED issued a Notice of Disapproval (NOD) (NMED September 2005) requiring DOE/NNSA and Sandia to characterize an uninvestigated seepage pit associated with Building 9961 in accordance with the approved SAP (SNL October 1999). In January 2006, the NOD response summarizing the results of the soil sampling submitted (SNL January 2006), and the NMED then issued a Certificate of Completion for CAC (NMED March 2006).

In March 2006, a request for Class III Permit Modification was submitted to the NMED (SNL March 2006). In April 2010, the NMED responded to the Permit Modification Request with a letter requiring further corrective action at SWMU 154 (NMED April 2010), in the form of an additional eight quarters of groundwater monitoring at monitoring well CTF-MW2. In June 2010, the SAP for monitoring well CTF-MW2 was submitted (SNL June 2010), which was approved by the NMED (December 2010). Quarterly groundwater sampling was resumed at monitoring well CTF-MW2 in March 2011 and continued through CY 2013. The analytical results for CY 2013 are presented in Section 13.6.

13.1.3 Monitoring History

Monitoring well CTF-MW2 was installed in August 2001 and was sampled on a quarterly basis from July 2002 to June 2004 to acquire the eight quarters of groundwater data required by the NMED. The groundwater samples were analyzed for VOCs, HE compounds, and RCRA metals. Although not required by the NMED, additional samples were also collected and analyzed for NPN, anions, and cations. These additional samples were collected to further characterize the general geochemistry of

groundwater and for purge water waste characterization purposes. Results for these eight quarters of groundwater sampling are as follows:

- **VOCs:** Acetone was detected only in the first groundwater sample collected in July 2002 as well as in the August 2003 trip blank (TB) and equipment blank (EB) samples. Bromoform was detected only in the December 2003 EB sample and dibromochloromethane was detected in the February and April 2003 EB samples. Methylene chloride and toluene were detected only in TB samples.

- **HE Compounds:** The compound 1,3,5-trinitrobenzene was detected in the February 2003 groundwater sample. No other HE compounds were detected in the groundwater samples associated with this monitoring well. A trace of methyl 2,4,6-trinitrophenylnitramine (tetryl) and 4-amino-2,6-dinitrotoluene were detected in separate EB samples associated with sampling of this well.

- **RCRA Metals:** Arsenic exceeded the EPA MCL in all groundwater samples. SNL/NM personnel identified that the arsenic concentrations were greater than background values and promulgated limits, as well as explained that these concentrations were most likely naturally occurring and not caused by a release at SWMU 154 (SNL September 2002). All other metal concentrations were below regulatory limits.

- **NPN, Anions, and Cations:** Fluoride was detected in all eight primary and two duplicate environmental samples collected, but in all cases, were less than the MCL of 4.0 milligrams per liter (mg/L). The fluoride detected was most likely naturally occurring. None of the known activities conducted at Building 9960 would have produced wastewater containing fluoride.

- **Field Water Quality Parameters:** Compared to other monitoring wells in the same hydrogeologic region CTF-MW2 specific conductivity values were two to three times higher, oxidation and reduction potential values were much lower, and dissolved oxygen values were much lower.

13.1.4 Current Monitoring Network

Currently, one monitoring well (CTF-MW2) is located southwest of SWMU 154 (Figure 13-2). Monitoring well CTF-MW2 is monitored quarterly for VOCs, SVOCs, HE compounds, NPN, major anions, alkalinity, TAL total metals plus uranium, perchlorate, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium. The eighth and final quarter of required groundwater sampling (NMED April 2010) occurred on December 18, 2012. Quarterly groundwater sampling will continue until additional guidance is provided by NMED.

13.1.5 Summary of Calendar Year 2013 Activities

The following activities took place for monitoring well CTF-MW2 near SWMU 154 during CY 2013 (January through December 2013):

- Quarterly groundwater sampling was conducted at monitoring well CTF-MW2 in March, June, September, and December 2013.

- Quarterly reporting of analytical results for monitoring well CTF-MW2 groundwater samples was conducted.

- Tables of analytical results (Attachment 13A), arsenic concentration and gross alpha versus time plots for (Attachment 13B), and a hydrograph (Attachment 13C) were prepared in support of this report.

13.1.6 Summary of Future Activities

The following activities are anticipated for monitoring well CTF-MW2 near SWMU 154 during CY 2014:

- Analytical results will be summarized and additional analysis may be performed and submitted to NMED to support resumption of the regulatory process for designating the site as CAC with NFA.

13.1.7 Conceptual Model

For the resumption of quarterly groundwater sampling at monitoring well CTF-MW2, this section presents a revised discussion of the hydrogeologic regime, conceptual model, and contaminant findings for SWMU 154.

13.1.7.1 Regional Hydrogeologic Conditions

SWMU 154 is located in the Travertine Hills within the western portion of CTF. The site is located approximately 1,000 ft east of the Tijeras Fault (Plate 1). Nearby outcrops are composed of the Sandia Formation (carbonate-cemented sandstone and conglomerate), Madera Group limestone, and Precambrian quartzite and granite (GRAM and Lettis 1995). The base-wide potentiometric surface map (Plate 1) shows that groundwater flow in the regional aquifer is generally towards the west. Faults in the vicinity of the site may serve as hydraulic barriers or conduits depending on the type and amount of fault gouge. No potable water supply wells are located within 4 miles of the site.

13.1.7.2 Hydrogeologic Conditions at SWMU 154

SWMU 154 consists of two septic systems (SWMUs 154-A and 154-B) located near Building 9960. SWMU 154-A is located approximately 20 ft to the west of the building, and SWMU 154-B is located approximately 20 ft to the north of the building (Figure 13-2). The combined area of SWMU 154 comprises 6,710 square ft (approximately 0.15 acres). The site is covered by colluvium that is underlain by caliche and bedrock. The septic systems were used from 1965 to 1993. Building 9960 is located on the northeastern edge of the Travertine Hills at an elevation of approximately 5,585 ft amsl. The area surrounding Building 9960 consists of rolling hills and is sparsely vegetated by bunch grasses, cacti, and junipers. Overall, the terrain slopes gently to the southwest. No perennial surface-water features such as springs are located within 1 mile of SWMU 154. Monitoring well CTF-MW2 is located approximately 330 ft to the southwest and slightly downslope of Building 9960.

The amount of precipitation available for groundwater recharge is minimal due to scant rainfall and high evapotranspiration rates. Summer (monsoonal) thunderstorms are responsible for the majority of rainfall. The average rainfall, as measured at the nearest active rain gauge (the National Weather Service station at the Albuquerque International Sunport), during the period from 1915 through 2005 was 8.67 inches per year (WRCC-DRI 2012). The station is located 7.2 miles northwest of the site at an elevation of 5,310 ft amsl, which is similar enough to the site elevation to infer that the annual rainfall at SWMU 154 is approximately 9 inches. Intense sunlight and low humidity throughout much of the year creates high rates of evapotranspiration. Estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL February 1998).

In 2001, a location west of SWMU 154 was selected with NMED's approval for the installation of monitoring well CTF-MW2. The well was installed in August 2001 using the air rotary casing hammer

drilling technique. Alluvium consisting of silty fine- to medium-grained sand was encountered from the ground surface to 10 ft bgs. Silty gravel extended from 10 to 17 ft bgs. A hard layer of caliche with a gravel matrix was encountered from 17 to 32 ft bgs. From 32 to 44 ft bgs, the strata consisted of silty gravel and Abo Formation siltstone. Clayey fine gravel was encountered from 44 to 110 ft bgs. Fractured granite and gneiss was encountered from 110 ft bgs to the borehole total depth of 190 ft bgs. Groundwater was encountered at a depth of 120 ft bgs. Borehole sloughing, especially below 135 ft bgs, in the highly fractured Precambrian granite and gneiss made for difficult drilling. Fault breccia (indicated by manganese and iron cementation) was possibly encountered at 145 ft bgs. The most productive zone in the borehole was 120 to 135 ft bgs. The well was screened from 110 to 130 ft bgs in fractured Precambrian granite and gneiss (Table 13-2).

Table 13-2. Lithologic and Hydrogeologic Elevation Data for Monitoring Well CTF-MW2 near SWMU 154

Monitoring Well	Ground Surface Elevation (ft amsl)	Depth of Screened Interval (ft bgs)	Elevation for Top of Screen (ft amsl)	Potentiometric Surface, October 2013 (ft amsl)	Mid-Point Screen Elevation (ft amsl)	Pressure Head (ft[a])
CTF-MW2	5575.60	110 – 130	5465.60	5534.74	5455.60	79

NOTES:
[a]From mid-point of screen.
amsl = Above mean sea level.
bgs = Below ground surface.
CTF = Coyote Test Field.
ft = Foot (feet).
MW = Monitoring Well.
SWMU = Solid Waste Management Unit.

The October 2013 groundwater elevation was 5,534.74 ft amsl (Figure 13-2). Compared to the mid-point elevation of the screen, the pressure head was approximately 79 ft and indicative of confined conditions. Groundwater in the bedrock most likely migrates through a confined fracture system. The geochemical signature for monitoring well CTF-MW2 is of the bicarbonate type dominated by calcium.

During sampling, the drawdown in monitoring well CTF-MW2 is not excessive and the quantity of water produced is clearly adequate for low flow sampling purposes. Groundwater samples are collected using pneumatic (nitrogen-gas activated) Bennett™ piston pumps.

The conceptual hydrogeologic model for SWMU 154 is based on the findings for monitoring well CTF-MW2, several nearby monitoring wells located across the CTF (Plate 1), and extensive field mapping conducted by the Site-Wide Hydrogeologic Characterization Project (SNL February 1998). Groundwater in the SWMU 154 area occurs in the fractured bedrock system under confined conditions. The depth to groundwater at monitoring well CTF-MW2 at the time of installation was approximately 120 ft bgs in a severely fractured interval of Precambrian granite and gneiss. A thick sequence of clayey fine gravel overlying the fractured granite probably serves as the confining layer. The borehole possibly intercepted a splay of the Tijeras Fault at 145 ft bgs that yielded only a minor amount of groundwater.

The amount of precipitation available for groundwater recharge at SWMU 154 is minimal due to the scant rainfall, high evapotranspiration rates, and the shallow sequence of competent bedrock. Historical water level data indicate that seasonal effects, primarily due to thunderstorms, do not influence groundwater levels near the site. Groundwater underflow from the site probably discharges to the unconsolidated basin fill deposits (primarily the Santa Fe Group) of the Albuquerque Basin after crossing the Tijeras and Sandia faults (SNL February 1998). No potable water supply wells are located within 4 miles of the site.

13.1.7.3 Contaminant Sources

From 1965 to 1993, water from the two SWMU 154 septic systems discharged to the subsurface via three seepage pits. The septic water contained photo-processing chemicals, HE compounds, and sanitary waste. The areas around the seepage pits and septic tanks were characterized using soil vapor samplers and soil samples collected from 14 boreholes.

13.1.7.4 Contaminant Distribution and Transport in Groundwater

The first phase of quarterly groundwater sampling for monitoring well CTF-MW2 was conducted from July 2002 to June 2004. Trace amounts of VOCs and one HE compound (1,3,5-trinitrobenzene) were detected. Concentrations decreased over time. NPN and fluoride concentrations reported were less than the MCLs. Except for arsenic, no metals exceeded the MCLs. Arsenic exceeded the MCL in all of the first phase groundwater samples and was attributed to the natural sources, and not to research activities conducted at Building 9960.

The second phase of quarterly groundwater sampling began in March 2011. During CY 2013, four quarterly groundwater events were conducted at monitoring well CTF-MW2. The analytical parameters included VOCs, SVOCs, HE compounds, NPN, major anions, alkalinity, TAL total metals plus uranium, perchlorate, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium. Except for arsenic and gross alpha, no constituents exceed the respective MCLs. The occurrence of arsenic and gross alpha in groundwater samples from monitoring well CTF-MW2 is mostly likely attributable to natural sources. Analysis of trace gases and helium isotope data from groundwater samples collected from CTF-MW2 in December 2011 show that it is a mixture of shallow and upwelling endogenic (deeply derived) fluids (Williams, *et al*., October 2012). The elevated arsenic, uranium, and gross alpha values in samples from CTF-MW2 are consistent with and indicate that upwelling deeply derived fluids are the source.

13.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM Environmental Restoration (ER) Operations (formerly ER Project), as well as implements and enforces federal regulations mandated by RCRA. All ER Operations SWMUs are listed in Module IV of the SNL/NM RCRA Permit, *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518* (NMED 1993). All corrective action requirements pertaining to SWMUs are contained in the Order (NMED April 2004).

In August 1997, an NFA proposal was submitted to the NMED for SWMU 154 (SNL August 1997). In January 1998, as part of a five site sampling comparison study required by the NMED (January 1998), additional samples were collected at SWMU 154 from boreholes drilled through the center of, and beneath, the two SWMU 154-A HE compound seepage pits. The analytical results were submitted to the NMED, and in June 1999, the NMED responded with an RSI on the NFA proposal (NMED June 1999). The NMED also stated that no septic system NFA proposals would be approved without groundwater characterization unless the NMED received assurance that such approvals would be protective of human health and the environment.

The general and site-specific comments were addressed in a response to the RSI submitted in September 1999 (SNL September 1999a). As specified in the subsequently approved SAP (SNL October 1999), DOE/NNSA and Sandia agreed to install a groundwater monitoring well. The SAP was approved by the NMED in January 2000 (NMED January 2000). Technical details for soil sampling procedures, soil sampling locations, laboratory analytical methods, and passive soil vapor sampling requirements at these sites were specified in a follow-up Field Implementation Plan (SNL November 2001), which was also

approved by the NMED (February 2002). DOE/NNSA and Sandia were required to collect groundwater samples for a minimum of eight quarters and analyze the samples for VOCs, RCRA metals, and HE compounds.

Analytical results for these sampling events were included in a third RSI response and the CAC proposal submitted to the NMED (SNL June 2005). In September 2005, the NMED issued a NOD (NMED September 2005) requiring DOE/NNSA and Sandia to characterize an uninvestigated seepage pit associated with Building 9961 in accordance with the approved SAP (SNL October 1999). In January 2006, a response summarizing the results of the soil sampling was submitted (SNL January 2006), and the NMED then issued a Certificate of Completion for CAC (NMED March 2006).

In March 2006, a Class III Permit Modification Request was submitted to the NMED (SNL March 2006). In April 2010, the NMED responded to the Permit Modification Request with a letter requiring further corrective action at SWMU 154 (NMED April 2010) in the form of an additional eight quarters of groundwater monitoring at monitoring well CTF-MW2. In June 2010, a SAP for monitoring well CTF-MW2 was submitted (SNL June 2010), which the NMED approved (NMED December 2010).

Quarterly groundwater sampling was resumed at monitoring well CTF-MW2 in CY 2011 and (NMED April 2010) and the eighth and final quarter required by NMED was completed in December 2012. Quarterly groundwater sampling will continue until additional guidance is provided by NMED and the analytical results for CY2013 are presented in Section 13.6.

In this report, SWMU 154 groundwater monitoring data are presented for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (gamma spectroscopy and gross alpha/beta activity) are provided voluntarily by the DOE/NNSA and Sandia. The voluntary inclusion of radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Order, as specified in Section III.A of the Order (NMED April 2004).

13.3 Scope of Activities

The field activity discussed in this section is for groundwater monitoring sampling and analysis conducted during CY 2013 sampling events (Table 13-3). The analytical parameters for monitoring well CTF-MW2 for each sampling event are listed in Table 13-4.

13.4 Field Methods and Measurements

According to the requirements of the Order (NMED April 2004) addressing Section VII.D.6 and the NMED letter of April 8, 2010 (NMED April 2010), SNL/NM personnel performed groundwater sampling at SWMU 154. The CY 2013 sampling events were conducted in conformance with appropriate SNL/NM Field Operating Procedures for groundwater sampling activities, the SWMU 154 site-specific SAP (SNL June 2010), and Mini-SAP (SNL March 2013, June 2013, August 2013, and November 2013).

Environmental groundwater samples were collected from monitoring well CTF-MW2. Samples were submitted to GEL Laboratories LLC for all analyses. Groundwater samples were analyzed for VOCs, SVOCs, HE compounds, NPN, major anions (i.e., bromide, chloride, fluoride, and sulfate), alkalinity, TAL metals plus uranium, perchlorate, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium.

Table 13-3. Sampling Dates and SAPs for Monitoring Well CTF-MW2 near SWMU 154, Calendar Year 2013

Date of Sampling Event	SAP
March 26, 2013	*SWMU 154 Groundwater Monitoring Mini-SAP for Second Quarter Fiscal Year 2013* (SNL March 2013)
June 25, 2013	*SWMU 154 Groundwater Monitoring Mini-SAP for Third Quarter Fiscal Year 2013* (SNL June 2013)
September 17, 2013	*SWMU 154 Groundwater Monitoring Mini-SAP for Fourth Quarter Fiscal Year 2013* (SNL August 2013)
December 17, 2013	*SWMU 154 Groundwater Monitoring Mini-SAP for First Quarter Fiscal Year 2014* (SNL November 2013)

NOTES:
CTF = Coyote Test Field.
MW = Monitoring Well.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories.
SWMU = Solid Waste Management Unit.

Table 13-4. Parameters Sampled at SWMU 154 for Each Sampling Event, Calendar Year 2013

Parameter	Sampling Period	
Anions	**March 26, 2013**	**June 25, 2013**
Alkalinity	CTF-MW2	CTF-MW2
Gamma Spec*	CTF-MW2 (dup)	
Gross Alpha		
Gross Beta		
HE Compounds	**September 17, 2013**	**December 17, 2013**
Isotopic Uranium	CTF-MW2	CTF-MW2
NPN		
Perchlorate		
SVOCs		
TAL Metals, plus Total Uranium		
VOCs		

NOTES:
CTF = Coyote Test Field.
Dup = Duplicate sample.
Gamma Spec* = Gamma spectroscopy short list (Americium-241, Cesium-137, Cobalt-60, and Potassium-40).
HE = High explosive.
MW = Monitoring well.
NPN = Nitrate plus nitrite (reported as nitrogen).
SVOC = Semivolatile organic compound.
TAL = Target Analyte List.
VOC = Volatile organic compound.
SWMU = Solid Waste Management Unit.

The monitoring procedures are consistent with procedures identified in the EPA technical enforcement guidance document (EPA 1986) and are described in detail in Section 1.3.

13.5 Groundwater Elevation

Throughout CY 2013, water level measurements were obtained to determine groundwater flow directions, hydraulic gradients, and changes in water table elevations. The water level information was used to create the base-wide potentiometric surface map discussed in Section 2.6.2.2 and shown in Plate 1. The hydrograph for monitoring well CTF-MW2 is provided in Figure 13C-1 (Attachment 13C).

13.6 Analytical Methods

EPA and DOE analytical methods are discussed in Section 1.3.2. Parameters analyzed and sampling periods in CY 2013 are presented in Table 13-4.

13.7 Summary of Analytical Results

This section discusses analytical results, exceedances of standards, and field measurements for the CY 2013 SWMU 154 sampling events. Data are presented in Tables 13A-1 through 13A-11 (Attachment 13A). Groundwater sampling results are compared with established EPA MCLs for drinking water (EPA 2009). Concentration trend plots for parameters that exceed the MCLs are presented in Attachments 13B, Figure 13B-1, and Figure 13B-2. Data qualifiers are explained in the footnotes following Table 13A-11. Analytical reports, including certificates of analyses, analytical methods, method detection limits (MDLs), minimum detectable activity, critical level, practical quantitation limits (PQLs), dates of analyses, results of QC analyses, and data validation findings are filed in the SNL/NM Records Center.

The analytical data were reviewed and qualified in accordance with SNL/NM AOP 00-03 (SNL May 2011). No problems were identified with the analytical data that resulted in qualification of the data as unusable. The data are acceptable and reported QC measures are adequate.

No VOCs, SVOCs, or HE compounds were detected at concentrations exceeding established MCLs in any of the monitoring well CTF-MW2 groundwater samples. No SVOCs were reported above laboratory MDLs. Table 13A-1 summarizes detected VOCs, SVOCs, and HE compounds for monitoring well CTF-MW2 environmental groundwater samples (Attachment 13A). Table 13A-2 lists the MDLs for associated VOCs. Table 13A-3 lists the MDLs for associated SVOCs. The MDLs for HE compounds are presented in Table 13A-4. Detected compounds for the CY 2013 sampling events are summarized as follows:

- **March 2013 Sampling Event—**The HE compound RDX was detected in monitoring well CTF-MW2 environmental and duplicate environmental samples at concentrations of 0.354 and 0.352 micrograms per liter (µg/L), respectively.
- **June 2013 Sampling Event—**The HE compound RDX was detected at a concentration of 0.248 µg/L.
- **September 2013 Sampling Event—**The HE compound RDX was detected at a concentration of 0.357 µg/L.
- **December 2013 Sampling Event—**The HE compound RDX was detected at a concentration of 0.357 µg/L.

Table 13A-5 summarizes NPN results (Attachment 13A). NPN values were compared with the nitrate MCL of 10 mg/L. NPN was not detected above the established MCL in monitoring well CTF-MW2 samples for CY 2013.

Table 13A-6 summarizes major anion (i.e., bromide, chloride, fluoride, and sulfate) and alkalinity results (Attachment 13A). No parameters were detected above established MCLs in monitoring well CTF-MW2 samples for CY 2013.

Perchlorate was not detected above the NMED screening level/MDL of 4 µg/L in CY 2013 monitoring well CTF-MW2 samples. Table 13A-7 presents the perchlorate results (Attachment 13A).

Metal analysis includes two sets of analyses and results. Samples were collected as both filtered and unfiltered fractions. One sample was filtered, using an in-line disposable filter, to remove suspended solids. Unfiltered and filtered metal results are summarized in Tables 13A-8 and 13A-9, respectively (Attachment 13A). The only metal detected above established MCLs in monitoring well CTF-MW2 CY 2013 groundwater samples is arsenic, discussed as follows:

- **March 2013 Sampling Event—**Arsenic was detected above the MCL of 0.010 mg/L in both unfiltered and filtered environmental and duplicate environmental samples. Unfiltered arsenic was reported at concentrations of 0.0456 and 0.0444 mg/L, and filtered arsenic at 0.0496 and 0.0463 mg/L.

- **June 2013 Sampling Event—**Arsenic was detected above the MCL of 0.010 mg/L in both unfiltered and filtered groundwater samples. Unfiltered arsenic was reported at a concentration of 0.046 mg/L, and filtered arsenic at 0.0477 mg/L.

- **September 2013 Sampling Event—**Arsenic was detected above the MCL of 0.010 mg/L in both unfiltered and filtered groundwater samples. Unfiltered arsenic was reported at a concentration of 0.0438 mg/L, and filtered arsenic at 0.0448 mg/L.

- **December 2013 Sampling Event—**Arsenic was detected above the MCL of 0.010 mg/L in both unfiltered and filtered groundwater samples. Unfiltered arsenic was reported at a concentration of 0.039 mg/L, and filtered arsenic at 0.0366 mg/L.

Arsenic concentrations in groundwater samples collected since March 2002 are plotted on Figure 13B-1 (Attachment 13B).

The results for gamma spectroscopy, gross alpha/beta activity, and isotopic uranium analyses are presented in Table 13A-10 (Attachment 13A). Gross alpha activity is measured as a screening tool and in accordance with 40 Code of Federal Regulations, Parts 9, 141, and 142, Table I-4 does not include uranium, which is measured independently. Therefore, gross alpha activity measurements were corrected by subtracting the total uranium activity. Radiological results are further reviewed by an SNL/NM Certified Health Physicist to assure that the samples are nonradioactive. All radionuclide activity results are below the MCLs, where established, except for gross alpha, discussed as follows:

- **September 2013 Sampling Event—**The initial corrected gross alpha activity was reported above the MCL of 15 picocuries per liter (pCi/L) at an activity of 23.54 pCi/L and 26.94 pCi/L in the reanalysis. The reported activities are comparable to historic values and are likely due to deep upwelling waters.

- **December 2013 Sampling Event—**The corrected gross alpha activity was reported above the MCL of 15 pCi/L at an activity of 21.25 pCi/L. The reported activities are comparable to historic values and are likely due to deep upwelling waters. Corrected gross alpha activities are **plotted** on Figure 13B-2 (Attachment 13B.)

Table 13A-11 summarizes field water quality measurements collected prior to sampling (Attachment 13A). Field water quality measurements include turbidity, pH, temperature, specific conductance, oxidation-reduction potential, and dissolved oxygen.

13.8 Quality Control Results

Field and laboratory QC samples were prepared to determine the accuracy of the methods used and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process. The results for each QC sample and the impact on data quality for the SWMU 154 monitoring well CTF-MW2 quarterly sampling events are discussed in the following sections.

13.8.1 Field Quality Control Samples

Field QC samples included duplicate environmental samples, FBs, TBs, and EBs. The following sections discuss the analytical results for each QC sample type.

13.8.1.1 Duplicate Environmental Samples

Duplicate environmental samples were analyzed to estimate the overall reproducibility of the sampling and analytical process. Relative percent difference (RPD) calculations, between duplicate samples, were performed for detected chemical analytes. The March 2013 duplicate sample data results show good agreement (low RPD values less than or equal to 20 percent for organic compounds and less than or equal to 35 for inorganic analyses) for all calculated parameters. The bromide RPD was calculated at 77, but is considered an estimated value because both results are reported below the laboratory practical quantitation limit.

13.8.1.2 Equipment Blank Samples

EB (rinsate) samples are collected to verify the equipment decontamination process. The March 2013 EB, or rinsate, sample was collected prior to sampling monitoring well CTF-MW3 and submitted for all analyses. Aluminum, bromodichloromethane, bromoform, chloroform, chloride, copper, dibromochloromethane, nickel, sodium, and zinc were detected above laboratory MDLs. No corrective action was necessary, for parameters except aluminum and copper, because these analytes were not detected in environmental samples, nor were detected in environmental samples at concentrations greater than five times the EB result. Both aluminum and copper were detected in the EB sample at concentrations less than five times then the associated environmental samples. Therefore, aluminum and copper were qualified as not detected during data validation for both environmental and duplicate environmental samples.

13.8.1.3 Trip Blank Samples

TB samples are submitted whenever samples are collected for VOC analyses to assess whether contamination of the samples had occurred during shipment and storage. A total of five TB samples were submitted during CY 2013. Two TBs were submitted for the March 2013 sampling event and one sample each for June, September, and December 2013. No VOCs were detected above the associated laboratory MDLs in any of the TB samples.

13.8.1.4 Field Blank Samples

A FB sample was collected for VOCs to assess whether contamination of the samples resulted from ambient field conditions. The March 2013 FB sample from the monitoring well CTF-MW3 detected the VOCs bromodichloromethane, bromoform, chloroform, and dibromochloromethane. No correction action was applied during data validation, because these compounds were not detected in the environmental samples. These compounds are common by-products of the deionization water purification process.

13.8.2 Laboratory Control Samples

Internal laboratory QC samples, including method blanks and duplicate laboratory control samples, were analyzed concurrently with all groundwater samples. During the March 2013 sampling event, no significant data quality problems were noted during the data validation process. In June, September, and

December 2013 some analytical results were qualified during the data validation process; however, no significant data quality problems were noted for project COCs. All analytical data are acceptable and reported QC measures appear adequate.

13.9 Variances and Nonconformances

No variances or nonconformances from requirements in the SWMU 154 SAP (SNL June 2010) occurred during the CY 2013 sampling activities.

13.10 Summary and Conclusions

During CY 2013, four quarterly groundwater samples were collected from monitoring well CTF-MW2. Analytical parameters included VOCs, SVOCs, HE compounds, NPN, major anions, alkalinity, TAL total metals plus uranium, perchlorate, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium. Results were compared with MCL guidelines for drinking water (EPA 2009) and are summarized as follows:

- **March 2013 Sampling Event—**No parameters were detected above established MCLs, except for arsenic. Arsenic exceeded the MCL of 0.010 mg/L in all monitoring well CTF-MW2 groundwater samples at concentrations ranging from 0.0456 to 0.0444 mg/L in unfiltered samples and ranging from 0.0496 to 0.0463 mg/L in filtered samples, respectively.

- **May 2013 Sampling Event—**No parameters were detected above established MCLs, except for arsenic. Arsenic exceeds the MCL of 0.010 mg/L in both unfiltered and filtered monitoring well CTF-MW2 groundwater samples at concentrations of 0.046 mg/L, and 0.0477 mg/L, respectively.

- **September 2013 Sampling Event—**No parameters were detected above established MCLs, except for arsenic and gross alpha. Arsenic exceeded the MCL of 0.010 mg/L in both unfiltered and filtered monitoring well CTF-MW2 groundwater samples. Unfiltered arsenic was reported at a concentration of 0.0438 mg/L, and filtered arsenic at 0.0448 mg/L. The initial corrected gross alpha activity was reported above the MCL of 15 pCi/L at an activity of 23.54 pCi/L and 26.94 pCi/L in the reanalysis. The reported activities are comparable to historic values and are likely due to deep upwelling waters.

- **December 2013 Sampling Event—**No parameters were detected above established MCLs, except for arsenic and gross alpha. Arsenic exceeded the MCL of 0.010 mg/L in both unfiltered and filtered monitoring well CTF-MW2 groundwater samples. Unfiltered arsenic was reported at a concentration of 0.039 mg/L, and filtered arsenic at 0.0366 mg/L. The corrected gross alpha activity was reported above the MCL of 15 pCi/L at an activity of 21.25 pCi/L. The reported activities are comparable to historic values and are likely due to deep upwelling waters.

The analytical results for this reporting period are consistent with historical concentrations. The current conceptual model described in Section 13.1.7 does not require modification based on the analytical results for this reporting period.

During CY 2014, analytical results will be summarized and additional analysis may be performed and submitted to NMED to support discussions of resuming the regulatory process for designating the site as CAC.

13.11 References

EPA 2009 U.S. Environmental Protection Agency (EPA), 2009. *National Primary Drinking Water Standards,* 40 CFR 141.11, Subpart B, U.S. Environmental Protection Agency, Washington, D.C., May.

EPA September 1994 U.S. Environmental Protection Agency (EPA), September 1994. *Notice of Deficiency, Sandia National Laboratories, Septic Tanks and Drainfields RFI Work Plan,* U.S. Environmental Protection Agency, Washington, D.C.

EPA 1986 U.S. Environmental Protection Agency (EPA), 1986. *RCRA Ground-Water Monitoring Technical Enforcement Guidance Document* OSWER-9950.1, U.S. Environmental Protection Agency, Washington, D.C.

GRAM and Lettis 1995 GRAM and Lettis, 1995. *Conceptual Geologic Model of the Sandia National Laboratories and Kirtland Air Force Base,* prepared for Site-Wide Hydrogeologic Characterization Project, Organization 7584, Environmental Restoration Program, Sandia National Laboratories, Albuquerque, New Mexico, December.

Jones July 1993 Jones, J. (Sandia National Laboratories, New Mexico), July 1993. *Internal Memorandum to B. Galloway listing the septic tanks that were removed from service with the construction of the Area III sanitary sewer system.* July 26, 1993.

IT March 1994 IT Corporation (IT), March 1994. *Sampling and Analysis Plan for Shallow Subsurface Soil Sampling, RCRA Facility Investigation of Septic Tanks and Drainfields (OU 1295),* IT Corporation, Albuquerque, New Mexico.

NMED December 2010 New Mexico Environment Department (NMED), December 2010. *Approval with Modifications, Response to April 8, 2010 Letter, Groundwater Monitoring Plan for SWMUs 149 and 154,* New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico.

NMED April 2010 New Mexico Environment Department (NMED), April 2010. *Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008), Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001,* New Mexico Environment Department, Santa Fe, New Mexico. April 8, 2010.

NMED March 2006 New Mexico Environment Department (NMED), March 2006. *Fee Assessment and Notice Approval Response to Request for Supplemental Information and Proposal for Corrective Action Complete Building 9961 Seepage Pit Adjacent to Drain and Septic Systems SWMU 154,* New Mexico Environment Department, Santa Fe, New Mexico, March 1, 2006.

NMED September 2005 New Mexico Environment Department (NMED), September 2005. *Notice of Approval/Disapproval: Sandia National Laboratories Environmental Restoration Project Request for Supplemental Information Responses and Proposals for Corrective Action Complete, Drain and Septic Systems SWMUs 49, 101, 116, 138, 149, 154, and 161,* New Mexico Environment Department, Santa Fe, New Mexico, September 13, 2005.

NMED April 2004 New Mexico Environment Department (NMED), April 2004. *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order*, New Mexico Environment Department, Santa Fe, New Mexico, April 29, 2004.

NMED February 2002 New Mexico Environment Department (NMED), February 2002. *Approval of Field Implementation Plan Characterization of Non Environmental Restoration Drain and Septic Systems Submittal Dated November 2001 Sandia National Laboratories,* New Mexico Environment Department, Santa Fe, New Mexico, February 21, 2002.

NMED January 2000 New Mexico Environment Department (NMED), January 2000. *Approval of Sampling and Analysis Plan for Characterizing and Assessing Potential Releases to the Environment From Septic and Other Miscellaneous Drain Systems at Sandia National Laboratories/New Mexico,* New Mexico Environment Department, Santa Fe, New Mexico, January 28, 2000.

NMED June 1999 New Mexico Environment Department (NMED), June 1999. *Request for Supplemental Information – SNL Proposals for No Further Action, August 1997, 8th Round*, New Mexico Environment Department, Santa Fe, New Mexico, June 9, 1999.

NMED January 1998 New Mexico Environment Department (NMED), January 1998. Letter from R.S. Dinwiddie (New Mexico Environment Department) to M.J. Zamorski (U.S. Department of Energy), *"Sampling Protocol for Septic Systems"* January 29, 1998.

NMED 1993 New Mexico Environment Department (NMED), 1993. *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518,* New Mexico Environment Department, Santa Fe, New Mexico.

Romero September 2003 Romero, T. (Sandia National Laboratories, New Mexico), September 2003. *Internal communication to M. Sanders stating that during the connection of septic systems to the new City of Albuquerque sewer system, the old systems were disconnected and the lines capped,* September 16, 2003.

SNL November 2013 Sandia National Laboratories, New Mexico (SNL/NM), November 2013. *SWMU 154 Groundwater Monitoring Mini-SAP for First Quarter Fiscal Year 2014,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2013 Sandia National Laboratories, New Mexico (SNL/NM), September 2013. *Annual Groundwater Monitoring Report, Calendar Year 2012 Groundwater Protection Program,* Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2012 Sandia National Laboratories, New Mexico (SNL/NM), September 2012. *Annual Groundwater Monitoring Report, Calendar Year 2011 Groundwater Protection Program,* Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL August 2013 Sandia National Laboratories, New Mexico (SNL/NM), August 2013. *SWMU 154 Groundwater Monitoring Mini-SAP for Fourth Quarter Fiscal Year 2013,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2013 Sandia National Laboratories, New Mexico (SNL/NM), June 2013. *SWMU 154 Groundwater Monitoring Mini-SAP for Third Quarter Fiscal Year 2013,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 2013 Sandia National Laboratories, New Mexico (SNL/NM), March 2013. *SWMU 154 Groundwater Monitoring Mini-SAP for Second Quarter Fiscal Year 2013,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL May 2011 Sandia National Laboratories, New Mexico (SNL/NM), May 2011. *Data Validation Procedure for Chemical and Radiochemical Data*, AOP 00-03, Revision 3, Sample Management Office, Sandia National Laboratories, Albuquerque, New Mexico, May 11, 2011.

SNL June 2010 Sandia National Laboratories, New Mexico (SNL/NM), June 2010. *U.S. Department of Energy/Sandia Corporation Response to the New Mexico Environment Department letter of April 8, 2010, entitled, Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008) Sandia National Laboratories EPA ID# NM5890110518 HWB-SNL-06-007 and HWB-SNL-08-001,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 2006 Sandia National Laboratories, New Mexico (SNL/NM), March 2006. *Justification for Class III Permit Modification March 2006 SWMU 154 Operable Unit 1295 Building 9960 Septic System and Seepage Pits Coyote Test Area,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL January 2006 Sandia National Laboratories, New Mexico (SNL/NM), January 2006. *Response to Request for Supplemental Information and Proposal for Corrective Action Complete, Building 9961 Seepage Pit Adjacent to Drain and Septic Systems SWMU 154, Technical Area III January 2006.* Sandia National Laboratories, Albuquerque, New Mexico, January 30, 2006.

SNL June 2005 Sandia National Laboratories, New Mexico (SNL/NM), June 2005. *Sandia National Laboratories Environmental Restoration Project Request for Supplemental Information Responses and Proposals for Corrective Action Complete, Drain and Septic Systems SWMUs 49, 101, 116, 138, 149, 154, and 161,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2002 Sandia National Laboratories, New Mexico (SNL/NM), September 2002. Letter from F. Lauffer (Sandia National Laboratories, New Mexico) to K. Agogino (U.S. Department of Energy) notifying DOE of *Elevated Arsenic Concentration in Monitor Well CTF-MW2,* Environmental Management Groundwater Protection Program, Sandia National Laboratories, Albuquerque, New Mexico, September 20, 2002.

SNL November 2001 Sandia National Laboratories, New Mexico (SNL/NM), November 2001. *Field Implementation Plan, Characterization of Non-Environmental Restoration Drain and Septic Systems,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL October 1999 Sandia National Laboratories, New Mexico (SNL/NM), October 1999. *Sampling and Analysis Plan for Characterizing and Assessing Potential Releases to the Environment From Septic and Other Miscellaneous Drain Systems at Sandia National Laboratories/New Mexico,* Sandia National Laboratories, Albuquerque, New Mexico, October 19, 1999.

SNL September 1999a Sandia National Laboratories, New Mexico (SNL/NM), September 1999. *Environmental Restoration Project Responses to NMED Request for Supplemental Information No Further Action Proposals (8th Round) August 1997,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 1999b Sandia National Laboratories, New Mexico (SNL/NM), September 1999. *Sampling and Analysis Plan (SAP) for Characterizing and Assessing Potential Releases to the Environment from Septic and Other Miscellaneous Drain Systems at Sandia National Laboratories/New Mexico,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL February 1998 Sandia National Laboratories, New Mexico (SNL/NM), February 1998. *Revised Site-Wide Hydrogeologic Characterization Project, 1995 Annual Report,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL August 1997 Sandia National Laboratories, New Mexico (SNL/NM), August 1997. *Proposal for Risk-Based No Further Action, Environmental Restoration Site 154, Building 9960 Septic Systems Operable Unit 1295,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL January 1996 Sandia National Laboratories, New Mexico (SNL/NM), January 1996. *Septic Tank Inspection and Closure Form for ER Site 154, Building 9960, January 26, 1996,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL November 1994 Sandia National Laboratories, New Mexico (SNL/NM), November 1994. *Septic Tanks and Drainfields RFI Work Plan, Comment Responses to USEPA Notice of Deficiency September 1994,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 1993 Sandia National Laboratories, New Mexico (SNL/NM), March 1993. *Septic Tanks and Drainfields (ADS-1295) RCRA Facility Investigation Work Plan,* Sandia National Laboratories, Albuquerque, New Mexico.

WRCC-DRI 2012 Western Regional Climate Center - Desert Research Institute, 2012 *Historical climate information for National Weather Service Cooperative Network Station 290234 – Albuquerque, New Mexico, Weather Service Forecast Office at the Albuquerque International Sunport for the period of 1914 through 2005,* http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?nmalbu, Accessed February 20, 2012.

Williams et al., October 2013 Williams, A.J., Crossey, L.J., Karlstrom, K.A., Newell, D., Person, M., and Woolsey, E., October 2013. Hydrogeochemistry of the Middle Rio Grande aquifer system – Fluid mixing and salinization of the Rio Grande due to fault inputs, Chemical Geology, 351, 281-289, 2103.

This page intentionally left blank.

Attachment 13A
Solid Waste Management Unit 154
Analytical Results Tables

This page intentionally left blank.

Attachment 13A Tables

13A-1 Summary of Detected Volatile Organic, Semivolatile Organic, and High Explosive Compounds, Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 13A-5

13A-2 Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B), Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 13A-6

13A-3 Method Detection Limits for Semivolatile Organic Compounds (EPA Method[g] SW846-8270D), Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 13A-7

13A-4 Method Detection Limits for High Explosive Compounds (EPA Method[g] SW846-8321A), Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 13A-8

13A-5 Summary of Nitrate plus Nitrate Results, Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 13A-9

13A-6 Summary of Anion and Alkalinity Results, Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 13A-10

13A-7 Summary of Perchlorate Results, Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 13A-11

13A-8 Summary of Target Analyte List Metal Results, Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 13A-12

13A-9 Summary of Filtered Target Analyte List Metal Results, Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 13A-17

13A-10 Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results, Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 13A-22

13A-11 Summary of Field Water Quality Measurements[h], Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 13A-24

Footnotes for Solid Waste Management Unit 154 Analytical Results Tables 13A-25

This page intentionally left blank.

Table 13A-1
Summary of Detected Volatile Organic, Semivolatile Organic, and High Explosive Compounds, Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW2 26-Mar-13	RDX	0.354	0.0889	0.278	NE		J+	093723-024	SW846 8321A
CTF-MW2 (Duplicate) 26-Mar-13	RDX	0.352	0.0879	0.275	NE		J+	093724-024	SW846 8321A
CTF-MW2 25-Jun-13	RDX	0.248	0.087	0.272	NE	J		094042-024	SW846 8321A
CTF-MW2 17-Sep-13	RDX	0.357	0.0833	0.260	NE	*	J	094646-024	SW846 8321A
CTF-MW2 17-Dec-13	RDX	0.357	0.0865	0.270	NE			095086-024	SW846 8321A

Refer to footnotes on page 13A-25.

Table 13A-2
Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B), Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Analyte	MDL[b] (µg/L)	Analyte	MDL[b] (µg/L)
1,1,1-Trichloroethane	0.300	Chlorobenzene	0.300
1,1,2,2-Tetrachloroethane	0.300	Chloroethane	0.300
1,1,2-Trichloroethane	0.300	Chloroform	0.300
1,1-Dichloroethane	0.300	Chloromethane	0.300
1,1-Dichloroethene	0.300	Cyclohexane	0.300
1,2,3-Trichlorobenzene	0.300	Dibromochloromethane	0.300
1,2,4-Trichlorobenzene	0.300	Dichlorodifluoromethane	0.300
1,2-Dibromo-3-chloropropane	0.300	Ethyl benzene	0.300
1,2-Dibromoethane	0.300	Isopropylbenzene	0.300
1,2-Dichlorobenzene	0.300	Methyl acetate	1.50
1,2-Dichloroethane	0.300	Methylcyclohexane	3.00
1,2-Dichloropropane	0.300	Methylene chloride	3.00
1,3-Dichlorobenzene	0.300	Styrene	0.300
1,4-Dichlorobenzene	0.300	Tert-butyl methyl ether	0.300
2,2-trifluoroethane, 1,1,2-Trichloro-1	1.50	Tetrachloroethene	0.300
2-Butanone	2.00	Toluene	0.300
2-Hexanone	2.20	Trichloroethene	0.300
4-methyl-, 2-Pentanone	1.50	Trichlorofluoromethane	0.300
Acetone	3.00	Vinyl chloride	0.300
Benzene	0.300	Xylene	0.300
Bromochloromethane	0.300	cis-1,2-Dichloroethene	0.300
Bromodichloromethane	0.300	cis-1,3-Dichloropropene	0.300
Bromoform	0.300	m-, p-Xylene	0.300
Bromomethane	0.300	o-Xylene	0.300
Carbon disulfide	1.50	trans-1,2-Dichloroethene	0.300
Carbon tetrachloride	0.300	trans-1,3-Dichloropropene	0.300

Refer to footnotes on page 13A-25.

Table 13A-3
Method Detection Limits for Semivolatile Organic Compounds (EPA Method[g] SW846-8270D), Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Analyte	MDL[b] (µg/L)	Analyte	MDL[b] (µg/L)
1'-Biphenyl 1	3.00 – 3.33	Butylbenzyl phthalate	3.00 – 3.33
1,4-Dioxane	3.00 – 3.33	Caprolactam	3.00 – 3.33
1,2,4-Trichlorobenzene	3.00 – 3.33	Carbazole	0.300 – 0.333
2,4,5-Trichlorophenol	3.00 – 3.33	Chrysene	0.300 – 0.333
2,4,6-Trichlorophenol	3.00 – 3.33	Di-n-butyl phthalate	3.00 – 3.33
2,4-Dichlorophenol	3.00 – 3.33	Di-n-octyl phthalate	3.00 – 3.33
2,4-Dimethylphenol	3.00 – 3.33	Dibenz[a,h]anthracene	0.300 – 0.333
2,4-Dinitrophenol	5.00 – 5.56	Dibenzofuran	3.00 – 3.33
2,4-Dinitrotoluene	3.00 – 3.33	Diethylphthalate	3.00 – 3.33
2,6-Dinitrotoluene	3.00 – 3.33	Dimethylphthalate	3.00 – 3.33
2-Chloronaphthalene	0.300 – 0.410	Dinitro-o-cresol	3.00 – 3.33
2-Chlorophenol	3.00 – 3.33	Diphenyl amine	3.00 – 3.33
2-Methylnaphthalene	0.300 – 0.333	Fluoranthene	0.300 – 0.333
2-Nitroaniline	3.00 – 3.33	Fluorene	0.300 – 0.333
2-Nitrophenol	3.00 – 3.33	Hexachlorobenzene	3.00 – 3.33
3,3'-Dichlorobenzidine	3.00 – 3.33	Hexachlorobutadiene	3.00 – 3.33
3-Nitroaniline	3.00 – 3.33	Hexachlorocyclopentadiene	3.00 – 3.33
4-Bromophenyl phenyl ether	3.00 – 3.33	Hexachloroethane	3.00 – 3.33
4-Chloro-3-methylphenol	3.00 – 3.33	Indeno(1,2,3-c,d)pyrene	0.300 – 0.333
4-Chlorobenzenamine	3.30 – 3.67	Isophorone	3.00 – 3.50
4-Chlorophenyl phenyl ether	3.00 – 3.33	Naphthalene	0.300 – 0.333
4-Nitroaniline	3.00 – 3.33	Nitro-benzene	3.00 – 3.33
4-Nitrophenol	3.00 – 3.33	Pentachlorophenol	3.00 – 3.33
Acenaphthene	0.300 – 0.333	Phenanthrene	0.300 – 0.333
Acenaphthylene	0.300 – 0.333	Phenol	3.00 – 3.33
Acetophenone	3.00 – 3.33	Pyrene	0.300 – 0.333
Anthracene	0.300 – 0.333	bis(2-Chloroethoxy)methane	3.00 – 3.33
Atrazine	3.00 – 3.33	bis(2-Chloroethyl)ether	3.00 – 3.33
Benzaldehyde	5.00 – 5.56	bis(2-Chloroisopropyl)ether	3.00 – 3.33
Benzo(a)anthracene	0.300 – 0.333	bis(2-Ethylhexyl)phthalate	3.00 – 3.33
Benzo(a)pyrene	0.300 – 0.489	m,p-Cresol	3.00 – 3.70
Benzo(b)fluoranthene	0.300 – 0.333	n-Nitrosodipropylamine	3.00 – 3.33
Benzo(ghi)perylene	0.300 – 0.333	o-Cresol	3.00 – 3.33
Benzo(k)fluoranthene	0.300 – 0.333		

Refer to footnotes on page 13A-25.

Table 13A-4
Method Detection Limits for High Explosive Compounds (EPA Method[g] SW846-8321A), Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Analyte	MDL[b] (µg/L)
1,3,5-Trinitrobenzene	0.0833 – 0.0889
1,3-Dinitrobenzene	0.0833 – 0.0889
2,4,6-Trinitrotoluene	0.0833 – 0.0889
2,4-Dinitrotoluene	0.0833 – 0.0889
2,6-Dinitrotoluene	0.0833 – 0.0889
2-Amino-4,6-dinitrotoluene	0.0833 – 0.0889
2-Nitrotoluene	0.0854 – 0.0911
3-Nitrotoluene	0.0833 – 0.0889
4-Amino-2,6-dinitrotoluene	0.0833 – 0.0889
4-Nitrotoluene	0.156 – 0.167
HMX	0.0833 – 0.0889
Nitro-benzene	0.0833 – 0.0889
Pentaerythritol tetranitrate	0.104 – 0.111
RDX	0.0833 – 0.0889
Tetryl	0.0833 – 0.0889

Refer to footnotes on page 13A-25.

Table 13A-5
Summary of Nitrate plus Nitrite Results,
Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW2 26-Mar-13	Nitrate plus nitrite	ND	0.085	0.250	10.0	U		093723-018	EPA 353.2
CTF-MW2 (Duplicate) 26-Mar-13	Nitrate plus nitrite	ND	0.085	0.250	10.0	U		093724-018	EPA 353.2
CTF-MW2 25-Jun-13	Nitrate plus nitrite	ND	0.017	0.050	10.0	U		094042-018	EPA 353.2
CTF-MW2 17-Sep-13	Nitrate plus nitrite	ND	0.017	0.050	10.0	U		094646-018	EPA 353.2
CTF-MW2 17-Dec-13	Nitrate plus nitrite	ND	0.017	0.050	10.0	U		095086-018	EPA 353.2

Refer to footnotes on page 13A-25.

Table 13A-6
Summary of Anion and Alkalinity Results,
Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW2	Bicarbonate Alkalinity	1580	0.725	1.00	NE			093723-022	SM2320B
26-Mar-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093723-022	SM2320B
	Bromide	1.64	0.670	2.00	NE	J		093723-016	SW846 9056
	Chloride	380	6.70	20.0	NE			093723-016	SW846 9056
	Fluoride	2.28	0.033	0.100	4.0			093723-016	SW846 9056
	Sulfate	130	1.33	4.00	NE			093723-016	SW846 9056
CTF-MW2 (Duplicate)	Bicarbonate Alkalinity	1580	0.725	1.00	NE			093724-022	SM2320B
26-Mar-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		093724-022	SM2320B
	Bromide	0.725	0.670	2.00	NE	J		093724-016	SW846 9056
	Chloride	414	6.70	20.0	NE			093724-016	SW846 9056
	Fluoride	2.30	0.033	0.100	4.0			093724-016	SW846 9056
	Sulfate	181	1.33	4.00	NE			093724-016	SW846 9056
CTF-MW2	Bicarbonate Alkalinity	1560	0.725	1.00	NE			094042-022	SM2320B
25-Jun-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094042-022	SM2320B
	Bromide	1.69	0.134	0.400	NE			094042-016	SW846 9056
	Chloride	437	6.70	20.0	NE			094042-016	SW846 9056
	Fluoride	2.37	0.033	0.100	4.0			094042-016	SW846 9056
	Sulfate	152	13.3	40.0	NE			094042-016	SW846 9056
CTF-MW2	Bicarbonate Alkalinity	1480	0.725	1.00	NE			094646-022	SM2320B
17-Sep-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		094646-022	SM2320B
	Bromide	1.89	0.067	0.200	NE			094646-016	SW846 9056
	Chloride	453	6.70	20.0	NE			094646-016	SW846 9056
	Fluoride	2.22	0.033	0.100	4.0			094646-016	SW846 9056
	Sulfate	150	13.3	40.0	NE			094646-016	SW846 9056
CTF-MW2	Bicarbonate Alkalinity	1540	0.725	1.00	NE			095086-022	SM2320B
17-Dec-13	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095086-022	SM2320B
	Bromide	1.48	0.268	0.800	NE	H	J	095086-016	SW846 9056
	Chloride	437	6.70	20.0	NE			095086-016	SW846 9056
	Fluoride	2.57	0.033	0.100	4.0			095086-016	SW846 9056
	Sulfate	153	13.3	40.0	NE			095086-016	SW846 9056

Refer to footnotes on page 13A-25.

Table 13A-7
Summary of Perchlorate Results,
Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Perchlorate Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW2 26-Mar-13	ND	0.004	0.012	NE	U		093723-020	EPA 314.0
CTF-MW2 (Duplicate) 26-Mar-13	ND	0.004	0.012	NE	U		093724-020	EPA 314.0
CTF-MW2 25-Jun-13	ND	0.004	0.012	NE	U		094042-020	EPA 314.0
CTF-MW2 17-Sep-13	ND	0.004	0.012	NE	U		094646-020	EPA 314.0
CTF-MW2 17-Dec-13	ND	0.004	0.012	NE	U		095086-020	EPA 314.0

Refer to footnotes on page 13A-25.

Table 13A-8
Summary of Target Analyte List Metal Results,
Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW2	Aluminum	0.0957	0.015	0.050	NE		0.11U	093723-009	SW846 6020
26-Mar-13	Antimony	ND	0.001	0.003	0.006	U		093723-009	SW846 6020
	Arsenic	**0.0456**	0.0017	0.005	0.010			093723-009	SW846 6020
	Barium	0.0797	0.0006	0.002	2.00			093723-009	SW846 6020
	Beryllium	0.00228	0.0002	0.0005	0.004			093723-009	SW846 6020
	Cadmium	0.000163	0.00011	0.001	0.005	J		093723-009	SW846 6020
	Calcium	366	2.40	8.00	NE			093723-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093723-009	SW846 6020
	Cobalt	0.00872	0.0001	0.001	NE		J	093723-009	SW846 6020
	Copper	0.00155	0.00035	0.001	NE		0.015UJ	093723-009	SW846 6020
	Iron	2.95	0.033	0.100	NE		J	093723-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093723-009	SW846 6020
	Magnesium	76.2	0.400	1.20	NE		J	093723-009	SW846 6020
	Manganese	2.97	0.040	0.200	NE			093723-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093723-009	SW846 7470
	Nickel	0.0223	0.0005	0.002	NE			093723-009	SW846 6020
	Potassium	44.9	0.080	0.300	NE			093723-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		093723-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093723-009	SW846 6020
	Sodium	486	1.60	5.00	NE			093723-009	SW846 6020
	Thallium	0.00109	0.00045	0.002	0.002	J		093723-009	SW846 6020
	Uranium	0.0242	0.000067	0.0002	0.03			093723-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U	UJ	093723-009	SW846 6010
	Zinc	0.405	0.0035	0.010	NE		J	093723-009	SW846 6020

Refer to footnotes on page 13A-25.

Table 13A-8 *(Continued)*
Summary of Target Analyte List Metal Results,
Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW2 (Duplicate)	Aluminum	0.0932	0.015	0.050	NE		0.11U	093724-009	SW846 6020
26-Mar-13	Antimony	ND	0.001	0.003	0.006	U		093724-009	SW846 6020
	Arsenic	**0.0444**	0.0017	0.005	0.010			093724-009	SW846 6020
	Barium	0.0805	0.0006	0.002	2.00			093724-009	SW846 6020
	Beryllium	0.00224	0.0002	0.0005	0.004			093724-009	SW846 6020
	Cadmium	0.000158	0.00011	0.001	0.005	J		093724-009	SW846 6020
	Calcium	365	2.40	8.00	NE			093724-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093724-009	SW846 6020
	Cobalt	0.0088	0.0001	0.001	NE		J	093724-009	SW846 6020
	Copper	0.0017	0.00035	0.001	NE		0.015UJ	093724-009	SW846 6020
	Iron	2.92	0.033	0.100	NE		J	093724-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093724-009	SW846 6020
	Magnesium	75.6	0.400	1.20	NE		J	093724-009	SW846 6020
	Manganese	2.94	0.040	0.200	NE			093724-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093724-009	SW846 7470
	Nickel	0.0224	0.0005	0.002	NE			093724-009	SW846 6020
	Potassium	45.1	0.080	0.300	NE			093724-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		093724-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093724-009	SW846 6020
	Sodium	491	1.60	5.00	NE			093724-009	SW846 6020
	Thallium	0.00105	0.00045	0.002	0.002	J		093724-009	SW846 6020
	Uranium	0.0234	0.000067	0.0002	0.03			093724-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U	UJ	093724-009	SW846 6010
	Zinc	0.422	0.0035	0.010	NE		J	093724-009	SW846 6020

Refer to footnotes on page 13A-25.

Table 13A-8 *(Continued)*
Summary of Target Analyte List Metal Results,
Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW2	Aluminum	0.111	0.015	0.050	NE			094042-009	SW846 6020
25-Jun-13	Antimony	ND	0.001	0.003	0.006	U		094042-009	SW846 6020
	Arsenic	**0.046**	0.0017	0.005	0.010			094042-009	SW846 6020
	Barium	0.0766	0.0006	0.002	2.00			094042-009	SW846 6020
	Beryllium	0.00292	0.0002	0.0005	0.004			094042-009	SW846 6020
	Cadmium	0.000535	0.00011	0.001	0.005	J	J+	094042-009	SW846 6020
	Calcium	355	0.600	2.00	NE			094042-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094042-009	SW846 6020
	Cobalt	0.0104	0.0001	0.001	NE			094042-009	SW846 6020
	Copper	0.00149	0.00035	0.001	NE		J-	094042-009	SW846 6020
	Iron	2.41	0.033	0.100	NE		J	094042-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094042-009	SW846 6020
	Magnesium	83.0	0.100	0.300	NE			094042-009	SW846 6020
	Manganese	2.81	0.010	0.050	NE		J	094042-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094042-009	SW846 7470
	Nickel	0.0228	0.0005	0.002	NE			094042-009	SW846 6020
	Potassium	44.1	0.080	0.300	NE		J	094042-009	SW846 6020
	Selenium	0.00191	0.0015	0.005	0.050	J		094042-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094042-009	SW846 6020
	Sodium	449	0.800	2.50	NE			094042-009	SW846 6020
	Thallium	0.00133	0.00045	0.002	0.002	J		094042-009	SW846 6020
	Uranium	0.0276	0.000067	0.0002	0.03			094042-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U	UJ	094042-009	SW846 6010
	Zinc	0.280	0.0175	0.050	NE		J	094042-009	SW846 6020

Refer to footnotes on page 13A-25.

Table 13A-8 *(Continued)*
Summary of Target Analyte List Metal Results,
Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW2	Aluminum	0.118	0.075	0.250	NE	J		094646-009	SW846 6020
17-Sep-13	Antimony	ND	0.001	0.003	0.006	N, U	UJ	094646-009	SW846 6020
	Arsenic	**0.0438**	0.0017	0.005	0.010			094646-009	SW846 6020
	Barium	0.080	0.0006	0.002	2.00		J	094646-009	SW846 6020
	Beryllium	0.00318	0.0002	0.0005	0.004			094646-009	SW846 6020
	Cadmium	ND	0.00055	0.005	0.005	U		094646-009	SW846 6020
	Calcium	367	6.00	20.0	NE			094646-009	SW846 6020
	Chromium	ND	0.010	0.050	0.100	U		094646-009	SW846 6020
	Cobalt	0.00968	0.0005	0.005	NE			094646-009	SW846 6020
	Copper	ND	0.00175	0.005	NE	U		094646-009	SW846 6020
	Iron	2.44	0.165	0.500	NE		J	094646-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094646-009	SW846 6020
	Magnesium	75.8	0.050	0.150	NE			094646-009	SW846 6020
	Manganese	2.93	0.005	0.025	NE			094646-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094646-009	SW846 7470
	Nickel	0.0187	0.0025	0.010	NE			094646-009	SW846 6020
	Potassium	47.4	0.400	1.50	NE			094646-009	SW846 6020
	Selenium	ND	0.0075	0.025	0.050	U		094646-009	SW846 6020
	Silver	ND	0.001	0.005	NE	U		094646-009	SW846 6020
	Sodium	451	8.00	25.0	NE			094646-009	SW846 6020
	Thallium	0.00115	0.00045	0.002	0.002	J		094646-009	SW846 6020
	Uranium	0.0255	0.000067	0.0002	0.03			094646-009	SW846 6020
	Vanadium	0.00386	0.001	0.005	NE	B, J	0.018UJ	094646-009	SW846 6010
	Zinc	0.290	0.0175	0.050	NE	N	J	094646-009	SW846 6020

Refer to footnotes on page 13A-25.

Table 13A-8 *(Concluded)*
Summary of Target Analyte List Metal Results,
Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW2	Aluminum	0.118	0.015	0.050	NE			095086-009	SW846 6020
17-Dec-13	Antimony	ND	0.001	0.003	0.006	U		095086-009	SW846 6020
	Arsenic	**0.039**	0.0017	0.005	0.010			095086-009	SW846 6020
	Barium	0.0807	0.0006	0.002	2.00			095086-009	SW846 6020
	Beryllium	0.00265	0.0002	0.0005	0.004			095086-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095086-009	SW846 6020
	Calcium	344	0.600	2.00	NE			095086-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095086-009	SW846 6020
	Cobalt	0.00898	0.0001	0.001	NE		J	095086-009	SW846 6020
	Copper	0.0013	0.00035	0.001	NE		J-	095086-009	SW846 6020
	Iron	2.22	0.033	0.100	NE		J	095086-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095086-009	SW846 6020
	Magnesium	79.1	0.100	0.300	NE		J	095086-009	SW846 6020
	Manganese	3.01	0.010	0.050	NE			095086-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095086-009	SW846 7470
	Nickel	0.0188	0.0005	0.002	NE			095086-009	SW846 6020
	Potassium	41.1	0.080	0.300	NE		J	095086-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U	UJ	095086-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095086-009	SW846 6020
	Sodium	488	1.60	5.00	NE			095086-009	SW846 6020
	Thallium	0.00117	0.00045	0.002	0.002	J		095086-009	SW846 6020
	Uranium	0.0291	0.000067	0.0002	0.03			095086-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095086-009	SW846 6010
	Zinc	0.202	0.0035	0.010	NE		J	095086-009	SW846 6020

Refer to footnotes on page 13A-25.

Table 13A-9
Summary of Filtered Target Analyte List Metal Results,
Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW2	Aluminum	0.0933	0.015	0.050	NE			093723-010	SW846 6020
26-Mar-13	Antimony	ND	0.001	0.003	0.006	U		093723-010	SW846 6020
	Arsenic	**0.0496**	0.0017	0.005	0.010			093723-010	SW846 6020
	Barium	0.0849	0.0006	0.002	2.00			093723-010	SW846 6020
	Beryllium	0.00233	0.0002	0.0005	0.004			093723-010	SW846 6020
	Cadmium	0.000155	0.00011	0.001	0.005	J		093723-010	SW846 6020
	Calcium	372	2.40	8.00	NE			093723-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093723-010	SW846 6020
	Cobalt	0.00921	0.0001	0.001	NE		J	093723-010	SW846 6020
	Copper	0.00141	0.00035	0.001	NE		0.013UJ	093723-010	SW846 6020
	Iron	3.08	0.033	0.100	NE		J	093723-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093723-010	SW846 6020
	Magnesium	81.6	0.400	1.20	NE		J	093723-010	SW846 6020
	Manganese	3.02	0.040	0.200	NE			093723-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093723-010	SW846 7470
	Nickel	0.0239	0.0005	0.002	NE			093723-010	SW846 6020
	Potassium	47.2	0.080	0.300	NE			093723-010	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		093723-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093723-010	SW846 6020
	Sodium	506	1.60	5.00	NE			093723-010	SW846 6020
	Thallium	0.0011	0.00045	0.002	0.002	J		093723-010	SW846 6020
	Uranium	0.0241	0.000067	0.0002	0.03			093723-010	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U	UJ	093723-010	SW846 6010
	Zinc	0.343	0.0035	0.010	NE		J	093723-010	SW846 6020

Refer to footnotes on page 13A-25.

Table 13A-9 *(Continued)*
Summary of Filtered Target Analyte List Metal Results,
Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW2 (Duplicate)	Aluminum	0.0937	0.015	0.050	NE			093724-010	SW846 6020
26-Mar-13	Antimony	ND	0.001	0.003	0.006	U		093724-010	SW846 6020
	Arsenic	**0.0463**	0.0017	0.005	0.010			093724-010	SW846 6020
	Barium	0.0813	0.0006	0.002	2.00			093724-010	SW846 6020
	Beryllium	0.00241	0.0002	0.0005	0.004			093724-010	SW846 6020
	Cadmium	0.000137	0.00011	0.001	0.005	J		093724-010	SW846 6020
	Calcium	298	2.40	8.00	NE			093724-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		093724-010	SW846 6020
	Cobalt	0.00896	0.0001	0.001	NE		J	093724-010	SW846 6020
	Copper	0.00247	0.00035	0.001	NE		0.013UJ	093724-010	SW846 6020
	Iron	3.06	0.033	0.100	NE		J	093724-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		093724-010	SW846 6020
	Magnesium	63.6	0.400	1.20	NE		J	093724-010	SW846 6020
	Manganese	2.44	0.040	0.200	NE			093724-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	093724-010	SW846 7470
	Nickel	0.0244	0.0005	0.002	NE			093724-010	SW846 6020
	Potassium	43.9	0.080	0.300	NE			093724-010	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		093724-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		093724-010	SW846 6020
	Sodium	474	1.60	5.00	NE			093724-010	SW846 6020
	Thallium	0.00106	0.00045	0.002	0.002	J		093724-010	SW846 6020
	Uranium	0.0238	0.000067	0.0002	0.03			093724-010	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U	UJ	093724-010	SW846 6010
	Zinc	0.352	0.0035	0.010	NE		J	093724-010	SW846 6020

Refer to footnotes on page 13A-25.

Table 13A-9 *(Continued)*
Summary of Filtered Target Analyte List Metal Results,
Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW2	Aluminum	0.111	0.015	0.050	NE			094042-010	SW846 6020
25-Jun-13	Antimony	ND	0.001	0.003	0.006	U		094042-010	SW846 6020
	Arsenic	**0.0477**	0.0017	0.005	0.010			094042-010	SW846 6020
	Barium	0.0776	0.0006	0.002	2.00			094042-010	SW846 6020
	Beryllium	0.0029	0.0002	0.0005	0.004			094042-010	SW846 6020
	Cadmium	0.000191	0.00011	0.001	0.005	J	J+	094042-010	SW846 6020
	Calcium	359	0.600	2.00	NE			094042-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		094042-010	SW846 6020
	Cobalt	0.0103	0.0001	0.001	NE			094042-010	SW846 6020
	Copper	0.00144	0.00035	0.001	NE		J-	094042-010	SW846 6020
	Iron	2.39	0.033	0.100	NE		J	094042-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094042-010	SW846 6020
	Magnesium	83.6	0.100	0.300	NE			094042-010	SW846 6020
	Manganese	2.81	0.010	0.050	NE		J	094042-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094042-010	SW846 7470
	Nickel	0.0229	0.0005	0.002	NE			094042-010	SW846 6020
	Potassium	43.7	0.080	0.300	NE		J	094042-010	SW846 6020
	Selenium	0.00183	0.0015	0.005	0.050	J		094042-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		094042-010	SW846 6020
	Sodium	471	1.60	5.00	NE			094042-010	SW846 6020
	Thallium	0.00116	0.00045	0.002	0.002	J		094042-010	SW846 6020
	Uranium	0.0265	0.000067	0.0002	0.03			094042-010	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U	UJ	094042-010	SW846 6010
	Zinc	0.302	0.0175	0.050	NE		J	094042-010	SW846 6020

Refer to footnotes on page 13A-25.

Table 13A-9 *(Continued)*
Summary of Filtered Target Analyte List Metal Results,
Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW2	Aluminum	0.106	0.075	0.250	NE	J		094646-010	SW846 6020
17-Sep-13	Antimony	ND	0.001	0.003	0.006	N, U	UJ	094646-010	SW846 6020
	Arsenic	**0.0448**	0.0085	0.025	0.010			094646-010	SW846 6020
	Barium	0.085	0.0006	0.002	2.00		J	094646-010	SW846 6020
	Beryllium	0.00287	0.001	0.0025	0.004			094646-010	SW846 6020
	Cadmium	ND	0.00055	0.005	0.005	U		094646-010	SW846 6020
	Calcium	378	6.00	20.0	NE			094646-010	SW846 6020
	Chromium	ND	0.010	0.050	0.100	U		094646-010	SW846 6020
	Cobalt	0.00958	0.0005	0.005	NE			094646-010	SW846 6020
	Copper	ND	0.00175	0.005	NE	U		094646-010	SW846 6020
	Iron	2.43	0.165	0.500	NE		J	094646-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		094646-010	SW846 6020
	Magnesium	73.8	0.050	0.150	NE			094646-010	SW846 6020
	Manganese	2.84	0.005	0.025	NE			094646-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		094646-010	SW846 7470
	Nickel	0.0192	0.0025	0.010	NE			094646-010	SW846 6020
	Potassium	45.7	0.400	1.50	NE			094646-010	SW846 6020
	Selenium	ND	0.0075	0.025	0.050	U		094646-010	SW846 6020
	Silver	ND	0.001	0.005	NE	U		094646-010	SW846 6020
	Sodium	473	8.00	25.0	NE			094646-010	SW846 6020
	Thallium	0.00122	0.00045	0.002	0.002	J		094646-010	SW846 6020
	Uranium	0.0246	0.000067	0.0002	0.03			094646-010	SW846 6020
	Vanadium	0.00409	0.001	0.005	NE	B, J	0.018UJ	094646-010	SW846 6010
	Zinc	0.291	0.0175	0.050	NE	N	J	094646-010	SW846 6020

Refer to footnotes on page 13A-25.

Table 13A-9 *(Concluded)*
Summary of Filtered Target Analyte List Metal Results,
Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW2	Aluminum	0.104	0.015	0.050	NE			095086-010	SW846 6020
17-Dec-13	Antimony	ND	0.001	0.003	0.006	U		095086-010	SW846 6020
	Arsenic	**0.0366**	0.0017	0.005	0.010			095086-010	SW846 6020
	Barium	0.0815	0.0006	0.002	2.00			095086-010	SW846 6020
	Beryllium	0.00255	0.0002	0.0005	0.004			095086-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095086-010	SW846 6020
	Calcium	352	0.600	2.00	NE			095086-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095086-010	SW846 6020
	Cobalt	0.00852	0.0001	0.001	NE		J	095086-010	SW846 6020
	Copper	0.00121	0.00035	0.001	NE		J-	095086-010	SW846 6020
	Iron	2.15	0.033	0.100	NE		J	095086-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095086-010	SW846 6020
	Magnesium	79.9	0.100	0.300	NE		J	095086-010	SW846 6020
	Manganese	3.00	0.010	0.050	NE			095086-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095086-010	SW846 7470
	Nickel	0.0186	0.0005	0.002	NE			095086-010	SW846 6020
	Potassium	42.9	0.080	0.300	NE		J	095086-010	SW846 6020
	Selenium	0.00158	0.0015	0.005	0.050	J	J-	095086-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095086-010	SW846 6020
	Sodium	508	1.60	5.00	NE			095086-010	SW846 6020
	Thallium	0.00125	0.00045	0.002	0.002	J		095086-010	SW846 6020
	Uranium	0.0298	0.000067	0.0002	0.03			095086-010	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095086-010	SW846 6010
	Zinc	0.282	0.0035	0.010	NE		J	095086-010	SW846 6020

Refer to footnotes on page 13A-25.

Table 13A-10
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results, Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW2	Americium-241	6.95 ± 18.1	23.0	11.2	NE	U	BD	093723-033	EPA 901.1
26-Mar-13	Cesium-137	2.45 ± 2.69	4.51	2.17	NE	U	BD	093723-033	EPA 901.1
	Cobalt-60	-1.77 ± 2.55	4.02	1.87	NE	U	BD	093723-033	EPA 901.1
	Potassium-40	17.9 ± 63.5	40.3	18.7	NE	U	BD	093723-033	EPA 901.1
	Gross Alpha	-13.42	NA	NA	15 pCi/L	NA	None	093723-034	EPA 900.0
	Gross Beta	58.9 ± 13.2	11.2	5.37	4mrem/yr			093723-034	EPA 900.0
	Uranium-233/234	60.9 ± 8.15	0.905	0.402	NE			093723-035	HASL 300
	Uranium-235/236	0.822 ± 0.546	0.556	0.216	NE		J	093723-035	HASL 300
	Uranium-238	10.9 ± 1.86	0.508	0.204	NE			093723-035	HASL 300
CTF-MW2 (Duplicate)	Americium-241	-28 ± 21.5	27.8	13.5	NE	U	BD	093724-033	EPA 901.1
26-Mar-13	Cesium-137	0.613 ± 2.12	3.86	1.83	NE	U	BD	093724-033	EPA 901.1
	Cobalt-60	1.56 ± 2.66	3.82	1.76	NE	U	BD	093724-033	EPA 901.1
	Potassium-40	83.8 ± 44.7	38.0	17.5	NE		J	093724-033	EPA 901.1
	Gross Alpha	-39.77	NA	NA	15 pCi/L	NA	None	093724-034	EPA 900.0
	Gross Beta	35.2 ± 10.6	13.4	6.53	4mrem/yr		J	093724-034	EPA 900.0
	Uranium-233/234	58.6 ± 7.61	0.462	0.205	NE			093724-035	HASL 300
	Uranium-235/236	0.629 ± 0.266	0.284	0.110	NE		J	093724-035	HASL 300
	Uranium-238	8.24 ± 1.29	0.259	0.104	NE			093724-035	HASL 300
CTF-MW2	Americium-241	7.09 ± 6.88	9.46	4.63	NE	U	BD	094042-033	EPA 901.1
25-Jun-13	Cesium-137	0.547 ± 1.58	2.79	1.34	NE	U	BD	094042-033	EPA 901.1
	Cobalt-60	1.01 ± 3.20	3.00	1.41	NE	U	BD	094042-033	EPA 901.1
	Potassium-40	29.7 ± 30.0	30.2	14.2	NE	U	BD	094042-033	EPA 901.1
	Gross Alpha	-32.6	NA	NA	15 pCi/L	NA	None	094042-034	EPA 900.0
	Gross Beta	51.1 ± 11.1	9.11	4.39	4mrem/yr			094042-034	EPA 900.0
	Uranium-233/234	56.8 ± 7.56	0.152	0.0667	NE			094042-035	HASL 300
	Uranium-235/236	0.625 ± 0.167	0.118	0.0476	NE			094042-035	HASL 300
	Uranium-238	7.97 ± 1.15	0.0972	0.0392	NE			094042-035	HASL 300

Refer to footnotes on page 13A-25.

Table 13A-10 *(Concluded)*
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results, Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW2	Americium-241	10.1 ± 11.7	16.9	8.28	NE	U	BD	094646-033	EPA 901.1
17-Sep-13	Cesium-137	1.05 ± 2.05	3.51	1.68	NE	U	BD	094646-033	EPA 901.1
	Cobalt-60	0.396 ± 1.95	3.49	1.63	NE	U	BD	094646-033	EPA 901.1
	Potassium-40	64.2 ± 44.8	30.3	14.1	NE		J	094646-033	EPA 901.1
	Gross Alpha	**23.54**	NA	NA	15 pCi/L	NA	None	094646-034	EPA 900.0
	Gross Alpha (Reanalysis)	**26.94**	NA	NA	15 pCi/L	NA	None	094646-R34	EPA 900.0
	Gross Beta	44.7 ± 10.4	7.85	3.71	4mrem/yr			094646-034	EPA 900.0
	Gross Beta (Reanalysis)	89.3 ± 30.0	24.5	9.86	4mrem/yr			094646-R34	EPA 900.0
	Uranium-233/234	57.3 ± 7.34	0.109	0.0477	NE			094646-035	HASL 300
	Uranium-235/236	0.536 ± 0.134	0.0677	0.0252	NE			094646-035	HASL 300
	Uranium-238	8.52 ± 1.16	0.088	0.037	NE			094646-035	HASL 300
CTF-MW2	Americium-241	9.17 ± 11.5	16.7	8.16	NE	U	BD	095086-033	EPA 901.1
17-Dec-13	Cesium-137	1.66 ± 4.49	2.80	1.35	NE	U	BD	095086-033	EPA 901.1
	Cobalt-60	-0.435 ± 1.73	2.98	1.41	NE	U	BD	095086-033	EPA 901.1
	Potassium-40	2.60 ± 35.6	30.6	14.4	NE	U	BD	095086-033	EPA 901.1
	Gross Alpha	**21.25**	NA	NA	15 pCi/L	NA	None	095086-034	EPA 900.0
	Gross Beta	73.9 ± 14.4	8.52	4.09	4mrem/yr			095086-034	EPA 900.0
	Uranium-233/234	58.6 ± 7.87	0.0907	0.0354	NE			095086-035	HASL 300
	Uranium-235/236	0.479 ± 0.146	0.0817	0.0286	NE			095086-035	HASL 300
	Uranium-238	8.77 ± 1.26	0.0568	0.0185	NE			095086-035	HASL 300

Refer to footnotes on page 13A-25.

Table 13A-11
Summary of Field Water Quality Measurements[h],
Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2013

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
CTF-MW2	26-Mar-13	16.46	3284	71.3	5.80	1.41	2.7	0.26
CTF-MW2	25-Jun-13	20.30	3322	24.5	6.01	0.61	3.1	0.27
CTF-MW2	17-Sep-13	20.30	3322	24.5	6.01	0.61	3.1	0.27
CTF-MW2	17-Dec-13	15.16	3176.2	72.9	6.11	0.76	0.8	0.08

Refer to footnotes on page 13A-25.

Footnotes for Solid Waste Management Unit 154 Analytical Results Tables

% = Percent.
µg/L = Micrograms per liter.
CFR = Code of Federal Regulations.
EPA = U.S. Environmental Protection Agency,
HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
ID = Identifier.
mg/L = Milligrams per liter.
No. = Number.
pCi/L = Picocuries per liter.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
Tetryl = Methyl-2,4,6-trinitrophenylnitramine.

[a]Result

Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 2A- 1-4).

Bold = Indicates the value exceed the established MCL.
ND = Not detected (at MDL). Activities of zero or less are considered to be not detected.

[b]MDL or MDA

MDL applies to the data listed in Tables 13A-1 through 13A-9. MDA applies to radiological data in Table 13A-10.

MDA = Minimum detectable activity. The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.
MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA = Not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

[c]PQL or Critical Level

The PQL applies to Tables 13A-1 through 13A-9. Critical level applies to Table 13A-10.

Critical level = The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA = Not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

[d]MCL

MCL = Maximum contaminant level. MCLs were established by the EPA Office of Water, National Primary Water Regulations (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- Gross alpha particle activity, excluding total uranium = 15 pCi/L (40 CFR Parts 9, 141, and 142, Table 2A-1-4).
- Beta and/or Gamma-emitting radionuclides (any combination) = 4 mrem/yr (as dose rate).
- Combined radium-226 and radium-228 MAC = 30 pCi/L.
- Combined radium-226 and radium-228 MCL = 5 pCi/L.

NE = Not established.

Footnotes for Solid Waste Management Unit 154 Analytical Results Tables (Concluded)

[e]Lab Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

* = Recovery of percent recovery not within acceptance limits and/or spike amount not compatible with the sample or the duplicate relative percent differences are not applicable.
B = The analyte was found in the blank above the effective MDL.
H = Analytical holding time was exceeded.
J = Estimated value; the analyte concentration fell above the effective MDL and below the effective PQL.
N = Results associated with a spike analysis that was outside control limits.
NA = Not applicable.
U = Analyte is absent or below the MDL.

[f]Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = The associated value is an estimated quantity.
J+ = The associated numerical value is an estimated quantity with a suspected positive bias.
J- = The associated numerical value is an estimated quantity with a suspected negative bias.
None = No data validation for corrected gross alpha activity.
U = The analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ = The analyte was analyzed for, but not detected. The associated value is an estimate and may be inaccurate or imprecise.

[g]Analytical Method

Clesceri, Greenburg, and Eaton, 1998, Standard Methods for the Examination of Water and Wastewater, 20th ed., Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.
DOE, 1990, "Environmental Measurements Laboratory Procedures Manual," 27th ed., Vol. 1, Rev. 1992, HASL-300.
EPA, 1999 (and updates), "Perchlorate in Drinking Water Using Ion Chromatography," EPA 815/R-00-014.
EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.
EPA, 1984, "Methods for Chemical Analysis of Water and Wastes." EPA 600-4-79-020.
EPA, 1980, "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.

DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
HASL = Health and Safety Laboratory.
SM = Standard Method.

[h]Field Water Quality Measurements

Field measurements were collected prior to sampling.

°C = Degrees Celsius.
% Sat = Percent saturation.
μmhos/cm = Micromhos per centimeter.
mg/L = Milligrams per liter.
mV = Millivolts.
NTU = Nephelometric turbidity units.
pH = Potential of hydrogen (negative logarithm of the hydrogen ion concentration).

Attachment 13B
Solid Waste Management Unit 154
Plots

This page intentionally left blank.

Attachment 13B Plots

13B-1 Arsenic Concentrations, CTF-MW2 ..... 13B-5

13B-2 Gross Alpha Activities, CTF-MW2 ..... 13B-6

This page intentionally left blank.

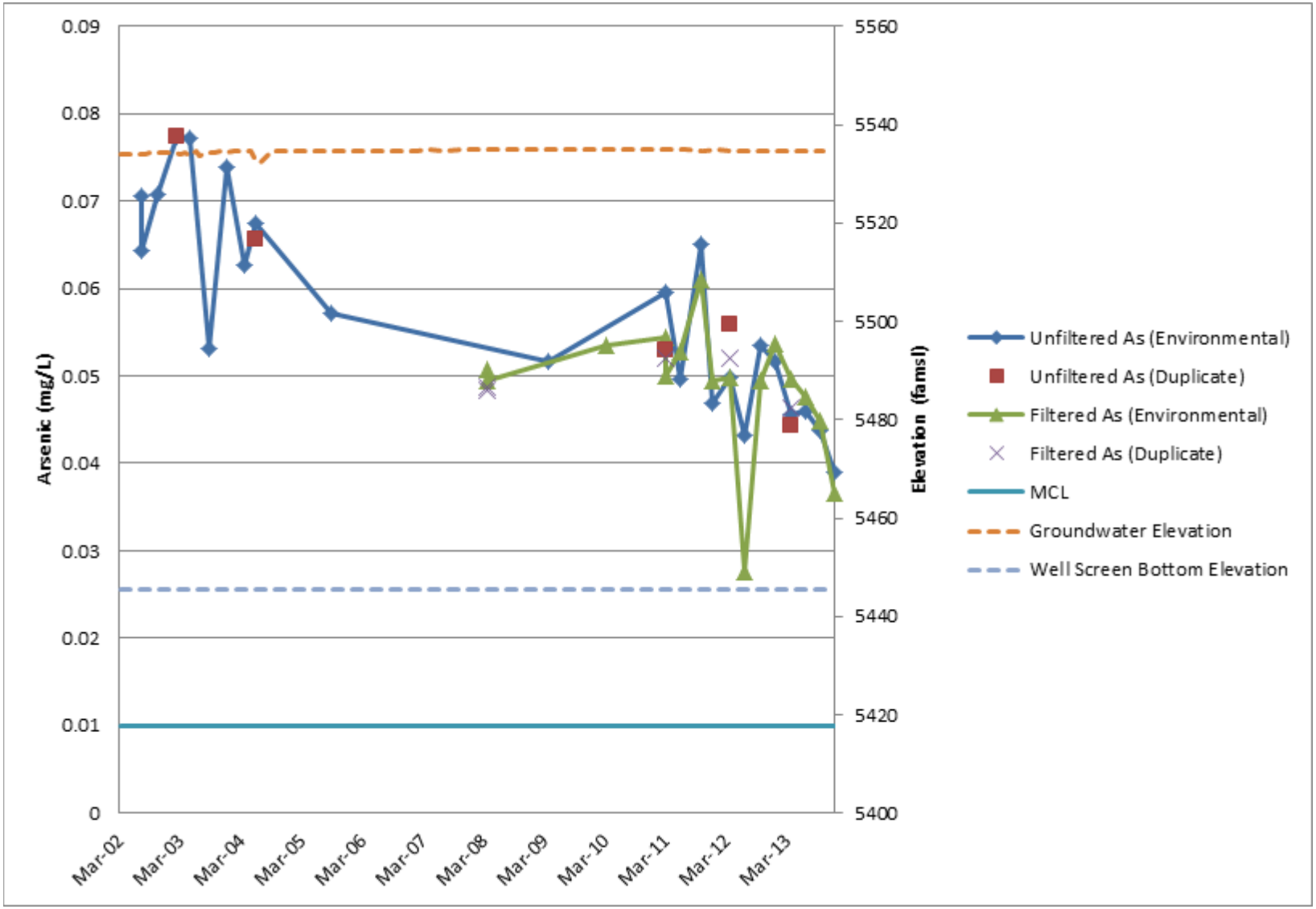


Figure 13B-1. Arsenic Concentrations, CTF-MW2

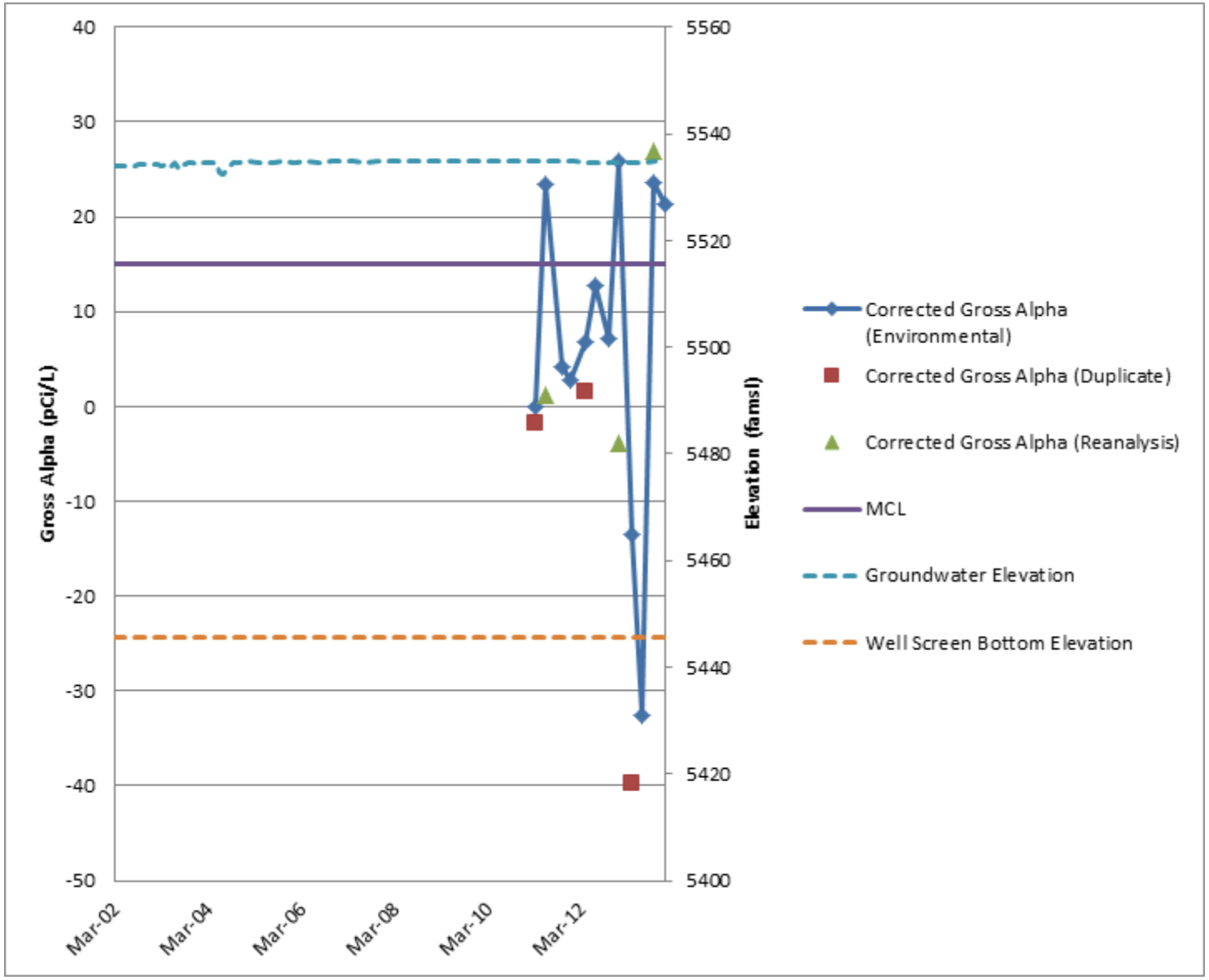


Figure 13B-2. Gross Alpha Activities, CTF-MW2

Attachment 13C
Solid Waste Management Unit 154
Hydrographs

This page intentionally left blank.

Attachment 13C Hydrographs

13C-1 SWMU 154 Study Area Well 13C-5

This page intentionally left blank.

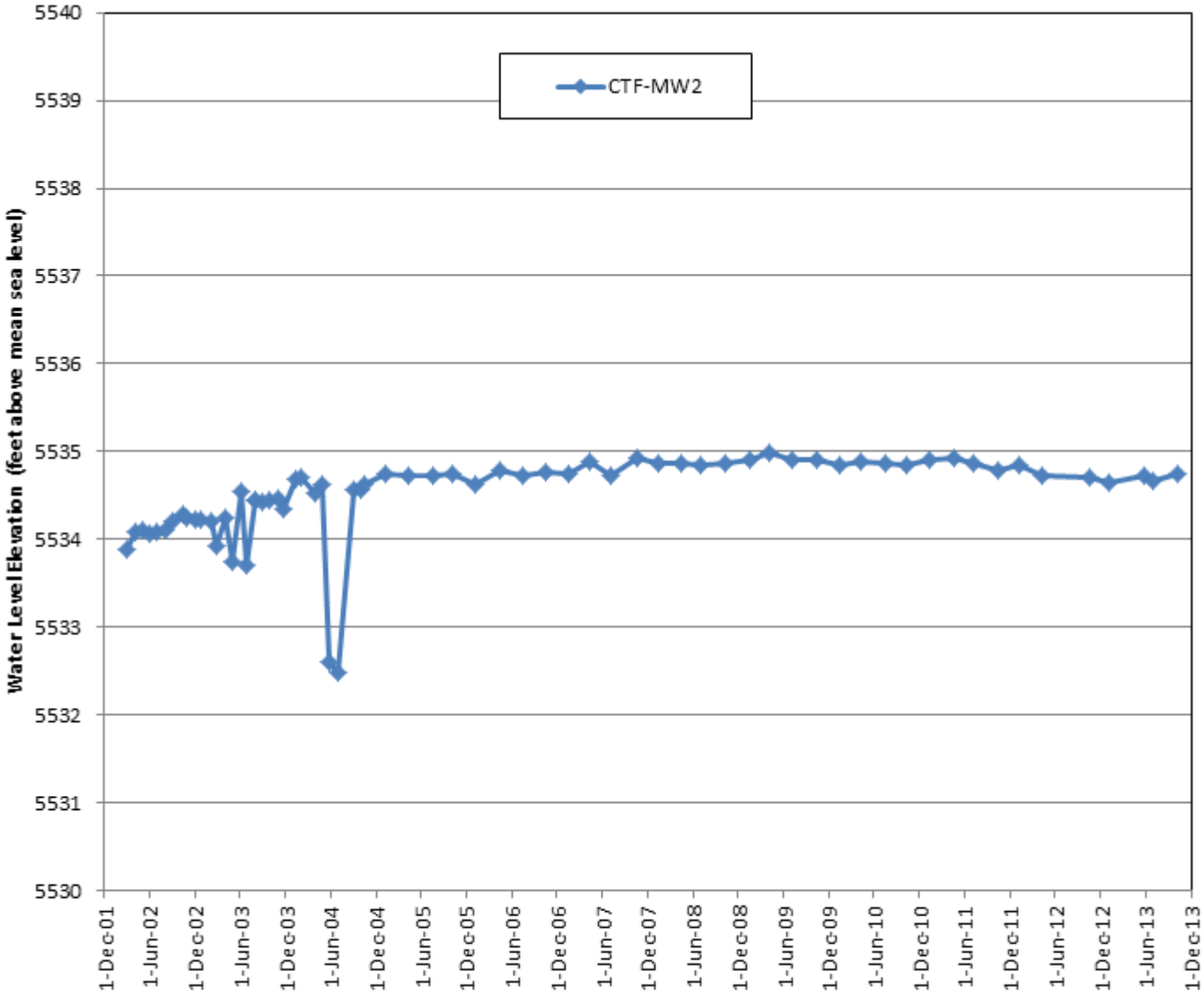


Figure 13C-1. SWMU 154 Study Area Well

This page intentionally left blank.

Table 1. Inventory of Groundwater Monitoring Wells Located at SNL/NM and Surrounding Areas, updated 3 March 2014, AGMR CY2013

Well	Measuring Point (feet amsl)	Ground Surface (feet amsl)	Top of Screen (feet bgs)	Bottom of Screen (feet bgs)	Top of Screen (feet amsl)	Bottom of Screen (feet amsl)	Casing Total Depth (feet bgs)	Casing, Inner Diameter (inches)	Casing Material	Lithology of Screened Interval	Installation Date	P&A Date, If Applicable
Chemical Waste Landfill and Vicinity												
CWL-BW1	5437.95	5436.0	445.0	495.0	4991.0	4941.0	495.0	2.1	SS	Santa Fe Group sediments	8-Jul-85	Aug-03
CWL-BW2	5436.21	5434.3	490.0	980.0	4944.3	4454.3	980.0	5.6	CS/SS	Santa Fe Group sediments	17-Sep-85	2003
CWL-BW3	5432.76	5431.6	485.0	505.0	4946.6	4926.6	507.5	4.8	PVC	Santa Fe Group sediments	22-Sep-88	12-Nov-12
CWL-BW4	5427.67	5431.7	485.0	505.0	4946.7	4926.7	510.0	4.8	PVC	Santa Fe Group sediments	6-May-1994	Jan-97
CWL-BW4A	5434.03	5431.84**	485.0	505.0	4946.8	4926.8	510.0	4.8	PVC	Santa Fe Group sediments	16-May-94	14-Apr-10
CWL-BW5	5434.79	5432.2	500.0	520.0	4932.2	4912.2	525.0	4.8	PVC	Santa Fe Group sediments	11-May-10	
CWL-MW1	5425.88	5423.7	535.0	575.0	4888.7	4848.7	610.0	2.1	SS	Santa Fe Group sediments	1-Sep-85	Sep-97
CWL-MW1A	5424.16	5423.1	474.0	494.0	4949.1	4929.1	495.0	4.8	PVC	Santa Fe Group sediments	31-Jul-88	11-Nov-12
CWL-MW2	5421.22	5419.1	520.0	650.0	4899.1	4769.1	650.0	2.1	SS	Santa Fe Group sediments	22-Sep-85	Sep-97
CWL-MW2A	5421.25	5419.8	473.0	493.0	4946.8	4926.8	495.0	5.0	PVC	Santa Fe Group sediments	1-Aug-88	Jun-04
CWL-MW2BL	5421.85	5420.1	532.5	552.5	4887.6	4867.6	557.5	4.8	PVC	Santa Fe Group sediments	5-Jun-94	10-Nov-12
CWL-MW2BU	5421.88	5420.1	476.0	496.0	4944.1	4924.1	501.0	1.9	PVC	Santa Fe Group sediments	5-Jun-94	10-Nov-12
CWL-MW3	5421.50	5419.5	525.0	565.0	4894.5	4854.5	615.0	2.1	SS	Santa Fe Group sediments	26-Sep-85	Sep-97
CWL-MW3A	5420.45	5419.1	470.0	490.0	4949.1	4929.1	492.0	4.8	PVC/SS	Santa Fe Group sediments	11-Aug-88	10-Nov-12
CWL-MW4	5423.00	5420.99**	478.0	498.0	4943.0	4923.0	503.0	3.8	PVC/SS	Santa Fe Group sediments	4-May-90	14-Apr-10
CWL-MW5L	5418.47	5416.7	533.0	553.0	4883.7	4863.7	558.0	1.9	PVC	Santa Fe Group sediments	19-Apr-94	14-Apr-10
CWL-MW5U	5418.68	5416.7	477.0	497.0	4939.7	4919.7	502.0	4.8	PVC	Santa Fe Group sediments	19-Apr-94	14-Apr-10
CWL-MW6L	5419.80	5417.3	539.0	559.0	4878.3	4858.3	564.0	1.9	PVC	Santa Fe Group sediments	4-May-94	14-Apr-10
CWL-MW6U	5419.45	5417.3	477.0	497.0	4940.3	4920.3	502.0	4.8	PVC	Santa Fe Group sediments	4-May-94	14-Apr-10
CWL-MW7	5421.98	5419.9	618.0	638.0	4801.9	4781.9	643.0	4.8	PVC	Santa Fe Group sediments	20-Mar-03	12-Nov-12
CWL-MW8	5421.71	5419.8	612.0	632.0	4807.8	4787.8	637.0	4.8	PVC	Santa Fe Group sediments	2-Apr-03	12-Nov-12
CWL-MW9	5426.12	5423.5	495.0	515.0	4928.5	4908.5	520.0	4.8	PVC	Santa Fe Group sediments	13-May-10	
CWL-MW10	5424.58	5422.2	493.0	513.0	4929.2	4909.2	518.0	4.8	PVC	Santa Fe Group sediments	27-May-10	
CWL-MW11	5423.24	5420.8	491.0	511.0	4929.8	4909.8	516.0	4.8	PVC	Santa Fe Group sediments	27-May-10	
MRN-1	5308.54	5306.4	546.7	586.7	4759.7	4719.7	606.7	4.8	SS	Santa Fe Group sediments	22-Jan-95	Aug-01
MRN-2	5308.18	5306.2	410.0	440.0	4896.2	4866.2	450.0	3.7	PVC	Santa Fe Group sediments	28-Jan-95	
MRN-3D	5309.34	5306.8	660.3	680.3	4646.5	4626.5	685.3	4.8	PVC	Santa Fe Group sediments	20-Jul-03	
SWTA-3	5323.24	5321.6	407.2	427.2	4914.4	4894.4	432.2	4.8	PVC/SS	Santa Fe Group sediments	6-Sep-89	Apr-98
SWTA3-MW2	5325.60	5323.2	455.0	475.0	4868.2	4848.2	480.0	4.8	PVC	Santa Fe Group sediments	7-May-02	
SWTA3-MW3	5323.94	5321.4	619.0	639.0	4702.4	4682.4	659.4	4.8	PVC	Santa Fe Group sediments	20-Feb-04	
SWTA3-MW4	5324.81	5322.3	430.0	450.0	4892.3	4872.3	460.0	4.7	PVC	Santa Fe Group sediments	26-Aug-05	
Lurance Canyon and Vicinity												
CCBA-MW1	5902.34	5899.9	60.0	80.0	5839.9	5819.9	85.0	4.7	PVC	Alluvium and bedrock (granite)	1-Sep-11	
CCBA-MW2	5939.28	5937.0	98.0	118.0	5839.0	5819.0	123.0	4.7	PVC	Bedrock (granite)	31-Aug-11	
Burn Site Well	6374.52	6373.7**	231.0	341.0	6142.7	6032.7	341.0	4.0	PVC	Bedrock (schist and granite)	20-Feb-86	
CYN-MW1D	6239.59	6236.7	372.0	382.0	5864.7	5854.7	392.0	5.1	CS	Bedrock (granitic gneiss)	22-Dec-97	15-Nov-02
CYN-MW2S	6239.41	6236.7	23.6	28.6	6213.1	6208.1	34.2	4.0	PVC	Alluvium and bedrock (granitic gneiss)	22-Dec-97	15-Nov-02
CYN-MW3	6313.26	6311.9	120.0	130.0	6191.9	6181.9	135.0	5.0	PVC	Bedrock (metamorphics)	18-Jun-99	
CYN-MW4	6455.48	6454.7	260.0	280.0	6194.7	6174.7	290.0	5.0	PVC	Bedrock (quartzite)	18-Jun-99	
CYN-MW5	5984.23	5981.3	135.0	155.0	5846.3	5826.3	160.0	5.0	PVC	Bedrock (quartzite)	15-Aug-01	
CYN-MW6	6343.37	6340.5	141.5	161.3	6199.0	6179.2	161.7	5.0	PVC	Bedrock (metamorphics)	9-Dec-05	
CYN-MW7	6216.35	6213.7	315.0	334.2	5898.7	5879.5	339.9	5.0	PVC	Bedrock (granitic gneiss)	6-Dec-05	
CYN-MW8	6230.11	6227.8	338.5	358.3	5889.3	5869.5	363.4	5.0	PVC	Bedrock (granitic gneiss)	12-Jan-06	
CYN-MW9	6360.67	6358.5	175.8	195.8	6182.7	6162.7	200.8	4.8	PVC	Bedrock (metamorphics)	27-Jul-10	
CYN-MW10	6345.45	6342.8	150.4	170.4	6192.4	6172.4	175.4	4.8	PVC	Bedrock (metamorphics)	28-Jul-10	
CYN-MW11	6374.41	6371.9	229.8	249.8	6142.1	6122.1	254.8	4.8	PVC	Bedrock (metamorphics)	29-Jul-10	
CYN-MW12	6345.16	6342.9	252.5	272.5	6090.4	6070.4	277.5	4.8	PVC	Bedrock (metamorphics)	29-Jul-10	
CYN-MW13	6237.79	6236.03	376.8	396.8	5859.2	5839.2	402.2	4.8	PVC	Bedrock (granitic gneiss)	5-Dec-2012	
Greystone Well	5822.87	5820.8	44.0	54.0	5776.8	5766.8	54.0	4.0	PVC/CS	Alluvium	1-Jan-02	12-Sep-02
Greystone-MW2	5814.20	5811.4	60.0	80.0	5751.4	5731.4	85.0	4.8	PVC	Alluvium	25-Apr-02	
HERTF		6229.7	449.0*	500.0*	5780.7*	5729.7*	449.0?*	5.0	OH?	Bedrock (granite)	13-Jul-1990	
TSA-1	6063.68	6060.2	190.0	210.0	5870.2	5850.2	300.0	6.0	CS	Bedrock (metamorphics)	10-Nov-87	Aug-01

Table 1. Inventory of Groundwater Monitoring Wells Located at SNL/NM and Surrounding Areas, updated 3 March 2014, AGMR CY2013 *(Continued)*

Well	Measuring Point (feet amsl)	Ground Surface (feet amsl)	Top of Screen (feet bgs)	Bottom of Screen (feet bgs)	Top of Screen (feet amsl)	Bottom of Screen (feet amsl)	Casing Total Depth (feet bgs)	Casing, Inner Diameter (inches)	Casing Material	Lithology of Screened Interval	Installation Date	P&A Date, If Applicable
Mixed Waste Landfill and Vicinity												
MWL-BW1	5387.18	5385.4	452.2	472.2	4933.2	4913.2	477.2	5.0	PVC	Santa Fe Group sediments	1-Jul-89	24-Jan-08
MWL-BW2	5391.02	5388.7	467.0	497.0	4921.7	4891.7	502.0	4.8	PVC	Santa Fe Group sediments	22-Jan-08	
MWL-MW1	5384.21	5381.8	456.0	476.0	4925.8	4905.8	478.0	5.0	PVC/CS	Santa Fe Group sediments	1-Oct-88	Jul-08
MWL-MW2	5379.93	5378.4	452.0	472.0	4926.4	4906.4	477.0	5.0	PVC/SS	Santa Fe Group sediments	1-Aug-89	Jul-08
MWL-MW3	5383.99	5381.7	451.3	471.3	4930.4	4910.4	476.3	4.8	PVC/SS	Santa Fe Group sediments	22-Aug-89	Jul-08
MWL-MW4	5391.70	5390.2	488.4	508.4	4901.8	4881.8	553.9	4.8	PVC	Santa Fe Group sediments	10-Feb-93	
MWL-MW5	5382.56	5380.4	496.5	516.5	4883.9	4863.9	521.5	4.8	PVC	Santa Fe Group sediments	19-Nov-00	
MWL-MW6	5375.31	5372.7	505.5	525.5	4867.2	4847.2	505.5	4.8	PVC	Santa Fe Group sediments	19-Oct-00	
MWL-MW7	5383.30	5380.9	464.7	494.0	4916.2	4886.9	498.8	4.8	PVC	Santa Fe Group sediments	24-Jun-08	
MWL-MW8	5384.67	5382.4	465.0	495.0	4917.4	4887.4	500.0	4.8	PVC	Santa Fe Group sediments	26-Jun-08	
MWL-MW9	5381.91	5379.3	465.0	495.0	4914.3	4884.3	500.0	4.8	PVC	Santa Fe Group sediments	30-Jun-08	
NWTA3-MW1	5336.48	5332.9	434.9	454.9	4898.0	4878.0	460.4	4.8	PVC	Santa Fe Group sediments	20-Sep-89	12-Sep-02
NWTA3-MW2	5337.49	5335.5	455.0	475.0	4880.5	4860.5	505.0	4.8	PVC	Santa Fe Group sediments	25-Aug-00	
NWTA3-MW3D	5340.80	5335.7	654.4	674.4	4681.3	4661.3	679.4	4.8	PVC	Santa Fe Group sediments	9-Jul-03	
PL-1	5334.99	5333.4	440.0	470.0	4893.4	4863.4	480.0	2.0	PVC	Santa Fe Group sediments	28-Oct-94	12-Sep-09
PL-2	5336.01	5333.0	577.0	597.0	4756.0	4736.0	617.0	4.8	SS	Santa Fe Group sediments	18-Nov-94	
PL-3	5334.64	5332.8	445.0	465.0	4887.8	4867.8	475.0	3.8	PVC	Santa Fe Group sediments	4-Dec-94	12-Sep-09
PL-4	5334.98	5332.7	464.0	494.0	4868.7	4838.7	499.0	4.8	PVC	Santa Fe Group sediments	28-Sep-09	
Coyote Test Field and Vicinity												
OBS-MW1	5871.42	5869.1	135.0	155.0	5734.1	5714.1	160.0	4.7	PVC	Bedrock (granite)	31-Aug-11	
OBS-MW2	5863.16	5860.8	234.0	254.0	5626.8	5606.8	259.0	4.7	PVC	Bedrock (granite)	30-Aug-11	
OBS-MW3	5865.50	5863.3	190.0	210.0	5673.3	5653.3	215.0	4.7	PVC	Bedrock (granite)	30-Aug-11	
CTF-MW1	6082.63	6079.7	240.0	260.0	5839.7	5819.7	265.0	5.0	PVC	Bedrock (granite)	16-Aug-01	
CTF-MW2	5578.60	5575.6	110.0	130.0	5465.6	5445.6	135.0	5.0	PVC	Bedrock (granite)	18-Aug-01	
CTF-MW3	5522.82	5519.8	340.0	360.0	5179.8	5159.8	365.0	5.0	PVC	Bedrock (granite)	21-Aug-01	
LMF-1	5628.60	5626.5	310.0	350.0	5316.5	5276.5	360.0	4.1	PVC	Bedrock (limestone)	11-Aug-95	Yes
School House Well	5796.33	5799.0	103.0*	107.0*	5696.0*	5692.0*	103.0*	6.0	CS	Bedrock (Sandia Formation)		
SFR-1D	5399.13	5396.9	348.0	368.0	5048.9	5028.9	378.0	3.8	PVC	Santa Fe Group sediments	6-Aug-92	
SFR-1S	5399.16	5396.9	152.0	172.0	5244.9	5224.9	182.0	1.9	PVC	Santa Fe Group sediments	8-Aug-92	
SFR-2S	5432.77	5430.3	97.0	117.0	5333.3	5313.3	122.0	3.8	PVC	Santa Fe Group sediments	20-Aug-92	
SFR-3D	5497.94	5496.1	311.5	351.5	5184.6	5144.6	361.5	1.9	PVC	Santa Fe Group sediments	5-Nov-92	
SFR-3P	5499.63	5497.2	175.0	195.0	5322.2	5302.2	205.0	3.8	PVC	Santa Fe Group sediments	12-Jul-93	
SFR-3S	5498.24	5496.1	182.0	212.0	5314.1	5284.1	222.0	1.9	PVC	Santa Fe Group sediments	10-Nov-92	
SFR-3T	5498.66	5496.9	713.0	733.0	4783.9	4763.9	753.0	5.4	SS	Bedrock (sandstone)	23-Sep-93	
SFR-4P	5573.33	5571.3	344.0	354.0	5227.3	5217.3	364.0	1.9	PVC	Bedrock (sandstone)	29-Jul-93	
SFR-4T	5573.95	5572.4	340.0	360.0	5232.4	5212.4	380.0	4.8	PVC/SS	Bedrock (sandstone)	30-Sep-93	
STW-1	5535.53	5533.3	149.8	169.8	5383.5	5363.5	179.8	4.3	PVC	Santa Fe Group sediments	18-Jun-95	Yes
TRE-1	5497.25	5495.2	255.0	295.0	5240.2	5200.2	305.0	4.3	PVC	Santa Fe Group sediments	31-Jul-95	
TRE-2	5497.20	5495.2	150.0	170.0	5345.2	5325.2	190.0	2.0	PVC	Santa Fe Group sediments	31-Jul-95	
TRN-1	5735.62	5733.6	320.0	340.0	5413.6	5393.6	350.0	3.8	PVC	Bedrock (sandstone)	12-Oct-94	
TRS-1	5780.18	5777.5	134.0*	500.0*	5643.5*	5277.5*	134.0	6.4	OH	Bedrock (limestone)	4-Sep-94	converted
TRS-1D	5779.80	5777.5	266.4	306.4	5511.1	5471.1	316.4	1.9	PVC	Bedrock (limestone)	6-Sep-95	
TRS-1S	5780.07	5777.5	164.0	204.0	5613.5	5573.5	214.8	1.9	PVC	Bedrock (limestone)	6-Sep-95	
TRS-2	5780.76	5778.3	165.0	205.0	5613.3	5573.3	210.0	4.5	CS	Bedrock (limestone)	9-Sep-95	

Table 1. Inventory of Groundwater Monitoring Wells Located at SNL/NM and Surrounding Areas, updated 3 March 2014, AGMR CY2013 *(Continued)*

Well	Measuring Point (feet amsl)	Ground Surface (feet amsl)	Top of Screen (feet bgs)	Bottom of Screen (feet bgs)	Top of Screen (feet amsl)	Bottom of Screen (feet amsl)	Casing Total Depth (feet bgs)	Casing, Inner Diameter (inches)	Casing Material	Lithology of Screened Interval	Installation Date	P&A Date, If Applicable
Tijeras Arroyo Groundwater												
TA1-W-01	5403.82	5401.8	575.0	595.0	4826.8	4806.8	600.0	4.8	PVC	Santa Fe Group sediments	22-Mar-97	
TA1-W-02	5416.62	5416.9	540.0	560.0	4876.9	4856.9	565.6	5.0	PVC	Santa Fe Group sediments	27-Feb-98	
TA1-W-03	5457.03	5454.9	337.0	357.0	5117.9	5097.9	362.6	5.0	PVC	Santa Fe Group sediments	27-Jan-98	
TA1-W-04	5460.98	5458.3	576.0	596.0	4882.3	4862.3	601.7	5.0	PVC	Santa Fe Group sediments	6-Oct-98	
TA1-W-05	5433.84	5434.2	597.5	617.5	4836.7	4816.7	623.2	5.0	PVC	Santa Fe Group sediments	16-Nov-98	
TA1-W-06	5417.10	5417.4	300.0	320.0	5117.4	5097.4	325.6	5.0	PVC	Santa Fe Group sediments	27-Feb-98	
TA1-W-07	5404.92	5402.8	268.6	288.6	5134.2	5114.2	289.1	5.0	PVC	Santa Fe Group sediments	13-Aug-98	
TA1-W-08	5434.19	5434.7	302.0	322.0	5132.7	5112.7	327.0	4.5	PVC	Santa Fe Group sediments	3-Aug-01	
TA2-NW1-325	5421.94	5420.0	295.0	325.0	5125.0	5095.0	330.3	4.8	PVC	Santa Fe Group sediments	1-Apr-93	
TA2-NW1-595	5421.26	5420.0	535.0	555.0	4885.0	4865.0	598.0	4.8	PVC	Santa Fe Group sediments	27-Jul-93	
TA2-SW1-320	5411.85	5410.1	299.6	319.6	5110.5	5090.5	324.6	3.8	PVC	Santa Fe Group sediments	30-Nov-92	
TA2-W-01	5419.99	5417.4	312.0	332.0	5105.4	5085.4	332.0	4.8	PVC	Santa Fe Group sediments	27-Jun-94	
TA2-W-19	5351.21	5349.0	265.9	285.9	5083.1	5063.1	285.9	4.8	PVC	Santa Fe Group sediments	9-Nov-95	
TA2-W-24	5363.66	5361.8	465.0	485.0	4896.8	4876.8	490.6	5.0	PVC	Santa Fe Group sediments	9-Feb-98	
TA2-W-25	5374.86	5372.5	492.0	512.0	4880.5	4860.5	517.8	4.8	PVC	Santa Fe Group sediments	1-Apr-97	
TA2-W-26	5375.77	5373.8	276.0	296.0	5097.8	5077.8	301.6	5.0	PVC	Santa Fe Group sediments	19-Jan-98	
TA2-W-27	5362.85	5360.8	275.0	295.0	5085.8	5065.8	300.6	5.0	PVC	Santa Fe Group sediments	9-Feb-98	
TJA-2	5353.20	5351.3	275.0	295.0	5076.3	5056.3	305.0	3.8	PVC	Santa Fe Group sediments	12-Jul-94	
TJA-3	5390.56	5387.8	496.0	516.0	4891.8	4871.8	521.7	5.0	PVC	Santa Fe Group sediments	31-Aug-98	
TJA-4	5341.16	5338.5	360.0	380.0	4978.5	4958.5	385.7	5.0	PVC	Santa Fe Group sediments	4-Aug-98	
TJA-5	5341.33	5338.5	267.0	287.0	5071.5	5051.5	292.7	5.0	PVC	Santa Fe Group sediments	7-Aug-98	
TJA-6	5343.16	5340.6	454.9	474.9	4885.7	4865.7	480.7	5.0	PVC	Santa Fe Group sediments	4-Feb-01	
TJA-7	5391.27	5388.4	290.5	310.5	5097.9	5077.9	316.3	5.0	PVC	Santa Fe Group sediments	7-Mar-01	
WYO-1	5392.50	5390.4	510.0	560.0	4880.4	4830.4	570.0	4.3	PVC	Santa Fe Group sediments	27-Aug-95	Jul-01
WYO-2	5392.50	5390.4	265.0	285.0	5125.4	5105.4	295.0	2.0	PVC	Santa Fe Group sediments	27-Aug-95	Jul-01
WYO-3	5392.09	5390.0	520.0	540.0	4870.0	4850.0	545.0	4.5	PVC	Santa Fe Group sediments	31-Jul-01	
WYO-4	5392.57	5390.2	275.0	295.0	5115.2	5095.2	300.0	4.5	PVC	Santa Fe Group sediments	22-Jul-01	
PGS-1	5407.41	5407.9	503.0	513.0	4904.9	4894.9	538.0	5.0	SS	Santa Fe Group sediments	9-Aug-94	Apr-98
PGS-2	5408.29	5407.9	535.0	565.0	4872.9	4842.9	655.0	5.0	SS	Santa Fe Group sediments	22-Sep-95	
Technical Area V												
AVN-1	5443.00	5440.2	570.0	590.0	4870.2	4850.2	600.0	5.0	SS	Santa Fe Group sediments	23-May-95	
AVN-2	5442.39	5440.6	495.0	515.0	4945.6	4925.6	520.0	3.8	PVC	Santa Fe Group sediments	5-Jun-95	
TAV-MW1	5437.81	5435.2	489.5	509.5	4945.7	4925.7	509.5	5.0	PVC	Santa Fe Group sediments	28-Feb-95	5-Feb-08
TAV-MW2	5427.33	5424.3	497.0	513.5	4927.3	4910.8	513.5	4.8	PVC	Santa Fe Group sediments	30-Mar-95	
TAV-MW3	5464.26	5461.6	532.0	552.0	4929.6	4909.6	557.7	4.8	PVC	Santa Fe Group sediments	11-Apr-97	
TAV-MW4	5427.89	5425.4	495.0	515.0	4930.4	4910.4	520.7	4.8	PVC	Santa Fe Group sediments	18-Apr-97	
TAV-MW5	5408.71	5406.6	487.0	507.0	4919.6	4899.6	512.7	4.8	PVC	Santa Fe Group sediments	26-Apr-97	
TAV-MW6	5431.17	5431.5**	507.0	527.0	4924.5	4904.5	532.0	4.8	PVC	Santa Fe Group sediments	24-Apr-01	
TAV-MW7	5430.40	5430.9**	597.0	617.0	4833.9	4813.9	622.0	4.8	PVC	Santa Fe Group sediments	6-Apr-01	
TAV-MW8	5417.00	5417.4**	491.0	511.0	4926.4	4906.4	516.0	4.8	PVC	Santa Fe Group sediments	11-Apr-01	
TAV-MW9	5416.27	5416.9**	582.0	602.0	4834.9	4814.9	607.0	4.8	PVC	Santa Fe Group sediments	17-Mar-01	
TAV-MW10	5437.03	5434.7	508.0	528.0	4926.7	4906.7	533.0	4.8	PVC	Santa Fe Group sediments	6-Feb-08	
TAV-MW11	5440.12	5440.4**	512.0	532.0	4928.4	4908.4	537.0	4.8	PVC	Santa Fe Group sediments	19-Nov-10	
TAV-MW12	5435.72	5432.9	507.0	527.0	4925.9	4905.9	532.0	4.8	PVC	Santa Fe Group sediments	16-Nov-10	
TAV-MW13	5409.02	5406.0	525.0	545.0	4881.0	4861.0	550.0	4.8	PVC	Santa Fe Group sediments	12-Nov-10	
TAV-MW14	5441.52	5438.6	512.0	532.0	4926.6	4906.6	538.0	4.8	PVC	Santa Fe Group sediments	9-Nov-10	
LWDS-MW1	5423.83	5424.5**	495.0	515.0	4929.5	4909.5	520.3	3.9	PVC	Santa Fe Group sediments	3-May-93	
LWDS-MW2	5412.41	5411.5	506.0	526.0	4905.5	4885.5	531.0	3.9	PVC	Santa Fe Group sediments	30-Oct-92	

Table 1. Inventory of Groundwater Monitoring Wells Located at SNL/NM and Surrounding Areas, updated 3 March 2014, AGMR CY2013 *(Continued)*

Well	Measuring Point (feet amsl)	Ground Surface (feet amsl)	Top of Screen (feet bgs)	Bottom of Screen (feet bgs)	Top of Screen (feet amsl)	Bottom of Screen (feet amsl)	Casing Total Depth (feet bgs)	Casing, Inner Diameter (inches)	Casing Material	Lithology of Screened Interval	Installation Date	P&A Date, If Applicable
Inhalation Toxicology Research Institute												
ITRI MW-4	5624.47	5622.7	100.0	110.0	5522.7	5512.7	110.0	4.0	SS	Santa Fe Group sediments	1-May-88	2013
ITRI MW-16	5668.84	5667.6	100.0	120.0	5567.6	5547.6	120.0	4.0	PVC	Bedrock (sandstone)	13-Jan-93	
ITRI MW-17	5615.11	5613.7	88.6	108.6	5525.1	5505.1	109.0	4.0	PVC	Santa Fe Group sediments	28-Jul-94	2013
ITRI MW-19	5652.08	5648.9	115.1	125.1	5533.8	5523.8	125.5	4.0	PVC	Santa Fe Group sediments	2-Aug-94	2013
IP-1	5622.18	5620.7	78.0	98.0	5542.7	5422.7	98.0	2.0	PVC	Santa Fe Group Sediments	18-Jul-94	
NMED-1	5623.44	5620.7	90.0	110.0	5530.7	5510.7	115.0	4.0	PVC	Santa Fe Group Sediments	13-Jul-95	
Albuquerque Bernalillo County Water Utility Authority												
MESA DEL SOL - S	5302.67	5302.7	420.0	520.0	4882.7	4782.7	525.0	2.2	PVC	Santa Fe Group sediments	14-May-97	
MONTESSA PARK - S	5102.67	5102.7	260.0	320.0	4842.7	4782.7	330.0	2.2	PVC	Santa Fe Group sediments	10-Sep-97	
YALE-MW9	5271.06		382.0	422.0			427.0	4.0	PVC	Santa Fe Group sediments	19-May-97	
EUBANK-1	5460.02	5458.1	550.0	610.0	4908.1	4848.1	615.0	4.0	SS	Santa Fe Group sediments	16-Jul-88	
EUBANK-2	5474.39		552.0	592.0			597.0	4.0	PVC	Santa Fe Group sediments	15-Nov-96	
EUBANK-3	5498.73		590.0	650.0			655.0	4.0	PVC	Santa Fe Group sediments	15-Nov-96	
EUBANK-4			454.0	514.0			519.0	4.0	PVC	Santa Fe Group sediments	15-Nov-96	Yes
EUBANK-5	5507.40		605.0	665.0			670.0	4.0	PVC	Santa Fe Group sediments		
MVMWJ	5118.04	5118.6	200.0	220.0	4918.6	4898.6	225.0	2.0	PVC	Santa Fe Group sediments	1-Oct-88	
Kirtland Air Force Base												
EOD	5829.70	5828.7	206.0*	247.0*	5622.7*	5581.7*	206.0*	6.0	OH	Bedrock (granite)	1970?	
KAFB-0119							482.0			Santa Fe Group sediments		
KAFB-0120	5292.29	5288.7	429.0	459.0	4859.7	4829.7	461.5	4.0	PVC	Santa Fe Group sediments		
KAFB-0213	5282.00	5297.3	378.0	428.0	4919.3	4869.3	438.0		PVC	Santa Fe Group sediments		
KAFB-0307	5364.53	5362.7	405.0	450.0	4957.7	4912.7	460.0	3.8	PVC	Santa Fe Group sediments		
KAFB-0308	5381.65	5380.7	463.0	488.0	4917.7	4892.7	498.0	3.8	PVC	Santa Fe Group sediments		
KAFB-0309	5411.80	5410.7	500.0	525.0	4910.7	4885.7	535.0	3.8	PVC	Santa Fe Group sediments		
KAFB-0311	5353.29	5351.7	433.0	458.0	4918.7	4893.7	468.0	3.8	PVC	Santa Fe Group sediments		
KAFB-0312	5432.17	5430.2	503.0	528.0	4927.2	4902.2	533.0	4.5	PVC	Santa Fe Group sediments		
KAFB-0314	5455.75	5453.9	428.0	448.0	5025.9	5005.9	453.0	4.5	PVC	Santa Fe Group sediments		
KAFB-0315	5466.11	5464.1	447.0	472.0	5017.1	4992.1	477.0	4.5	PVC	Santa Fe Group sediments		
KAFB-0417	5313.07		430.0	455.0			465.0	3.8	PVC	Santa Fe Group sediments		
KAFB-0505	5362.81	5360.8	495.4	520.5	4865.4	4840.3	521.3	4.5	PVC	Santa Fe Group sediments		
KAFB-0507	5358.82		482.3	507.3			512.3	3.5	PVC	Santa Fe Group sediments		
KAFB-0508	5351.88		481.0	506.0			507.0	3.5	PVC	Santa Fe Group sediments		
KAFB-0510	5367.10		511.0	536.0			537.0	3.5	PVC	Santa Fe Group sediments		
KAFB-0512	5304.07	5301.1	424.0	449.0	4877.1	4852.1	450.0	3.5	PVC	Santa Fe Group sediments		
KAFB-0514	5206.41		340.0	365.0			366.0	3.5	PVC	Santa Fe Group sediments		
KAFB-0516	5205.64		332.0	357.0			358.0	3.5	PVC	Santa Fe Group sediments		
KAFB-0517	5197.10		325.0	350.0			352.0	4.0	PVC	Santa Fe Group sediments		
KAFB-0520	5247.90	5246.2	379.5	404.5	4866.7	4841.7	410.0	4.0	PVC	Santa Fe Group sediments		
KAFB-0522	5267.48	5265.7	405.0	430.0	4860.7	4835.7	432.5	4.0	PVC	Santa Fe Group sediments		
KAFB-0523	5352.62	5350.5					625.0			Santa Fe Group sediments		
KAFB-0608	5361.17	5359.9	307.0	327.0	5052.9	5032.9	338.0	4.0	PVC	Santa Fe Group sediments		
KAFB-0609	5365.87	5364.7	316.0	336.0	5048.7	5028.7	345.0	4.0	PVC/SS	Santa Fe Group sediments		
KAFB-0610	5359.47	5357.3	333.0	353.0	5024.3	5004.3	363.0	4.0	PVC/SS	Santa Fe Group sediments		
KAFB-0611	5386.09		498.0	508.0			513.0	4.0	PVC	Santa Fe Group sediments		
KAFB-0615	5638.43		300.0	325.0			327.0	4.0	PVC	Bedrock (granite)		
KAFB-0616	5481.07		472.0	497.0			499.0	4.0	PVC	Santa Fe Group sediments		
KAFB-0617	5505.78	5503.3	565.0	590.0	4938.3	4913.3	592.0	4.0	PVC	Santa Fe Group sediments		
KAFB-0619	5410.78	5409.0	389.0	404.0	5020.0	5005.0	406.0	4.0	PVC	Santa Fe Group sediments		
KAFB-0620	5334.64	5332.0	447.0	472.0	4885.0	4860.0	474.5		PVC	Santa Fe Group sediments		
KAFB-0621	5569.89	5568.0	624.0	649.0	4944.0	4919.0	650	4.0	PVC	Santa Fe Group sediments		
KAFB-0622	5488.64	5486.2	529.0	554.0	4957.2	4932.2	555.0	4.0	PVC	Santa Fe Group sediments		
KAFB-0624	5676.45	5671.1	765.0	790.0	4906.1	4881.1	792.5	3.8	PVC	Santa Fe Group sediments		

Table 1. Inventory of Groundwater Monitoring Wells Located at SNL/NM and Surrounding Areas, updated 3 March 2014, AGMR CY2013 *(Concluded)*

Well	Measuring Point (feet amsl)	Ground Surface (feet amsl)	Top of Screen (feet bgs)	Bottom of Screen (feet bgs)	Top of Screen (feet amsl)	Bottom of Screen (feet amsl)	Casing Total Depth (feet bgs)	Casing, Inner Diameter (inches)	Casing Material	Lithology of Screened Interval	Installation Date	P&A Date, If Applicable
Kirtland Air Force Base (Continued)												
KAFB-0901	5390.07	5389.8	465.0	527.0	4924.8	4862.8	537.0	4.0	PVC	Santa Fe Group sediments		
KAFB-1006	5257.01	5257.0	363.0	383.0	4894.0	4874.0	383.0	4.0	SS	Santa Fe Group sediments		
KAFB-1007	5260.11	5260.1	362.0	382.0	4898.1	4878.1	382.0	4.0	SS	Santa Fe Group sediments		
KAFB-1063	5339.52						501.0			Santa Fe Group sediments		
KAFB-1901	5751.58	5748.7	79.0	104.0	5669.7	5644.7	114	4	PVC/SS	Santa Fe Group sediments	1-Jul-1992	
KAFB-2005	5624.27	5624.6	126.0	156.0	5498.6	5468.6	158.5	4.0	PVC	Santa Fe Group sediments		
KAFB-2007	5567.18	5564.8	273.0	303.0	5291.8	5261.8	305.5	4.0	PVC	Santa Fe Group sediments		
KAFB-3392	5394.51	5393.4	536.0	561.0	4857.4	4832.4	562.0	4.0	PVC	Santa Fe Group sediments		
KAFB-3411	5342.81	5340.5	477.0	502.0	4863.5	4838.5	503.0		PVC	Santa Fe Group sediments		
KAFB-6301	5459.64	5457.3	535.0	560.0	4922.3	4897.3	561.0	3.5	PVC	Santa Fe Group sediments		
KAFB-8351	5325.51		474.0	499.0			500.0	4.0	PVC	Santa Fe Group sediments		
Optical Range Well	5965.70	5965.7	160.0	320.0	5805.7	5645.7	320.0	5.0	PVC	Bedrock (metarhyolite)	19-Aug-1987	

Notes:

Measuring point is the top of casing elevation used for calculating groundwater elevations.

Survey coordinates are relative to the North American Datum of 1983 (NAD83), New Mexico State Plane Coordinate System, Central Zone. Previously reported data were converted as necessary.

Elevations are relative to the North American Vertical Datum of 1988 (NAVD88), New Mexico State Plane Coordinate System, Central Zone. Previously reported data were converted as necessary. Conversion was 2.672 feet.

Acronyms

blank cell = Indicates that the corresponding data were either not available or not applicable.
* = Indicates that depth or elevation corresponds to open hole completion, no screen is present.
** = Indicates elevation of concrete pad.
AGMR = Annual Groundwater Monitoring Report.
amsl = Above mean sea level.
AVN = Area V (North).
bgs = Below ground surface.
BW = Background well.
CCBA = Coyote Canyon Blast Area,
CS = Carbon steel.
CS/SS = Composition of blank well casing is carbon steel and composition of well screen is stainless steel.
CTF = Coyote Test Field.
CWL = Chemical Waste Landfill.
CY = Calendar year.
CYN = Lurance Canyon.
EOD = Explosive Ordnance Disposal.
HERTF = High Energy Research Test Facility.
IP = Isleta Pueblo.
ITRI = Inhalation Toxicology Research Institute.
KAFB = Kirtland Air Force Base.
L = Lower.
LMF = Large Melt Facility.
LWDS = Liquid Waste Disposal System.
MRN = Magazine Road North.
MVMW = Mountain View Monitoring Well.
MW = Monitoring well.
MWL = Mixed Waste Landfill.
NMED = New Mexico Environment Department.
NWTA3 = Northwest Technical Area III.
OBS = Old Burn Site.
OH = Open hole completion (no well screen).
P&A = Plugged and abandoned.
PGS = Parade Ground South.
PL = Power Line Road, west of TA-III.
PVC = Polyvinyl chloride.
PVC/CS = Composition of blank well casing is PVC and composition of well screen is carbon steel.
PVC/SS = Composition of blank well casing is PVC and composition of well screen is stainless steel.
SFR = South Fence Road.
SNL/NM = Sandia National Laboratories, New Mexico.
SS = Stainless steel.
STW = Solar Tower (West).
SWTA = Southwest Technical Area III.
TA1-W = Technical Area I (Well).
TA2-NW = Technical Area II (Northwest).
TA2-SW = Technical Area II (Southwest).
TA2-W = Technical Area II (Well).
TAV = Technical Area V.
TJA = Tijeras Arroyo.
TRE = Thunder Road East.
TRN = Target Road North.
TRS = Target Road South.
TSA = Transportation Safeguards Academy.
U = Upper.
WYO = Wyoming.
Yes = Indicates that the well was plugged and abandoned, but the date is not known.

This page intentionally left blank.

Table 2. Base-Wide Groundwater Levels 2013, updated 3 March 2014, AGMR CY2013

Well	Date Measured	Measurement Point (feet amsl)	Depth to Water (feet btoc)	Water Level Elevation (feet amsl)	Owner	Screened Unit
AVN-1	1-Oct-13	5443.00	524.07	4918.93	SNL/NM	SFG - regional aquifer
CCBA-MW1	3-Oct-13	5902.34	48.04	5854.30	SNL/NM	Alluvium and bedrock (granite)
CCBA-MW2	3-Oct-13	5939.28	71.73	5867.55	SNL/NM	Bedrock (granite)
CTF-MW1	3-Oct-13	6082.63	238.73	5843.90	SNL/NM	Bedrock (granite)
CTF-MW2	4-Oct-13	5578.60	43.86	5534.74	SNL/NM	Bedrock (granite)
CTF-MW3	4-Oct-13	5522.82	307.89	5214.93	SNL/NM	Bedrock (granite)
CWL-BW5	2-Oct-13	5434.79	510.76	4924.03	SNL/NM	SFG - regional aquifer
CWL-MW9	2-Oct-13	5426.12	502.98	4923.14	SNL/NM	SFG - regional aquifer
CWL-MW10	11-Oct-13	5424.58	499.98	4924.60	SNL/NM	SFG - regional aquifer
CWL-MW11	2-Oct-13	5423.24	498.68	4924.56	SNL/NM	SFG - regional aquifer
CYN-MW3	3-Oct-13	6313.26	137.66	6175.60	SNL/NM	Bedrock (metamorphics)
CYN-MW4	3-Oct-13	6455.48	228.68	6226.80	SNL/NM	Bedrock (quartzite)
CYN-MW5	3-Oct-13	5984.23	107.71	5876.52	SNL/NM	Bedrock (quartzite)
CYN-MW6	3-Oct-13	6343.37	162.50	6180.87	SNL/NM	Bedrock (metamorphics)
CYN-MW7	3-Oct-13	6216.35	302.74	5913.61	SNL/NM	Bedrock (granitic gneiss)
CYN-MW8	3-Oct-13	6230.11	318.42	5911.69	SNL/NM	Bedrock (granitic gneiss)
CYN-MW9	3-Oct-13	6360.67	174.34	6186.33	SNL/NM	Bedrock (metamorphics)
CYN-MW10	3-Oct-13	6345.45	133.55	6211.90	SNL/NM	Bedrock (metamorphics)
CYN-MW11	3-Oct-13	6374.41	109.12	6265.29	SNL/NM	Bedrock (metamorphics)
CYN-MW12	3-Oct-13	6345.16	215.80	6129.36	SNL/NM	Bedrock (metamorphics)
CYN-MW13	3-Oct-13	6237.79	324.66	5913.13	SNL/NM	Bedrock (granitic gneiss)
GREYSTONE-MW2	3-Oct-13	5814.20	53.56	5760.64	SNL/NM	Alluvium
LWDS-MW1	1-Oct-13	5423.83	501.81	4922.02	SNL/NM	SFG - regional aquifer
LWDS-MW2	1-Oct-13	5412.41	490.75	4921.66	SNL/NM	SFG - regional aquifer
MRN-2	1-Oct-13	5308.18	436.00	4872.18	SNL/NM	SFG - regional aquifer
MRN-3D	1-Oct-13	5309.34	436.44	4872.90	SNL/NM	SFG - regional aquifer
MWL-BW2	2-Oct-13	5391.02	479.44	4911.58	SNL/NM	SFG - regional aquifer
MWL-MW4	2-Oct-13	5391.70	498.78	4892.92	SNL/NM	SFG - regional aquifer
MWL-MW5	2-Oct-13	5382.56	493.63	4888.93	SNL/NM	SFG - regional aquifer
MWL-MW6	2-Oct-13	5375.31	487.51	4887.80	SNL/NM	SFG - regional aquifer
MWL-MW7	2-Oct-13	5383.30	489.65	4893.65	SNL/NM	SFG - regional aquifer
MWL-MW8	2-Oct-13	5384.67	491.34	4893.33	SNL/NM	SFG - regional aquifer
MWL-MW9	2-Oct-13	5381.91	491.79	4890.12	SNL/NM	SFG - regional aquifer
NWTA3-MW2	2-Oct-13	5337.49	468.37	4869.12	SNL/NM	SFG - regional aquifer
NWTA3-MW3D	2-Oct-13	5340.80	467.54	4873.26	SNL/NM	SFG - regional aquifer

Table 2. Base-Wide Groundwater Levels 2013, updated 3 March 2014, AGMR CY2013 *(Continued)*

Well ID	Date Measured	Measurement Point (feet amsl)	Depth to Water (feet btoc)	Water Level Elevation (feet amsl)	Owner	Screened Unit
OBS-MW1	1-Oct-13	5871.42	72.55	5798.87	SNL/NM	Bedrock (granite)
OBS-MW2	1-Oct-13	5863.16	174.05	5689.11	SNL/NM	Bedrock (granite)
OBS-MW3	1-Oct-13	5865.50	69.67	5795.83	SNL/NM	Bedrock (granite)
PGS-2	2-Oct-13	5408.29	549.83	4858.46	SNL/NM	SFG - regional aquifer
PL-2	1-Oct-13	5336.01	468.97	4867.04	SNL/NM	SFG - regional aquifer
PL-4	1-Oct-13	5334.98	467.87	4867.11	SNL/NM	SFG - regional aquifer
SFR-1D	1-Oct-13	5399.13	139.47	5259.66	SNL/NM	SFG - regional aquifer
SFR-1S	1-Oct-13	5399.16	89.73	5309.43	SNL/NM	SFG - regional aquifer
SFR-2S	1-Oct-13	5432.77	100.32	5332.45	SNL/NM	SFG - regional aquifer
SFR-3D	1-Oct-13	5497.94	161.45	5336.49	SNL/NM	SFG - regional aquifer
SFR-3P	1-Oct-13	5499.63	161.61	5338.02	SNL/NM	SFG - regional aquifer
SFR-3S	1-Oct-13	5498.24	160.61	5337.63	SNL/NM	Bedrock (sandstone)
SFR-3T	1-Oct-13	5498.66	69.31	5429.35	SNL/NM	Bedrock (sandstone)
SFR-4P	1-Oct-13	5573.33	150.05	5423.28	SNL/NM	Bedrock (sandstone)
SFR-4T	1-Oct-13	5573.95	145.76	5428.19	SNL/NM	Bedrock (sandstone)
SWTA3-MW2	2-Oct-13	5325.60	451.24	4874.36	SNL/NM	SFG - regional aquifer
SWTA3-MW3	2-Oct-13	5323.94	448.51	4875.43	SNL/NM	SFG - regional aquifer
SWTA3-MW4	2-Oct-13	5324.81	449.11	4875.70	SNL/NM	SFG - regional aquifer
TA1-W-01	2-Oct-13	5403.82	542.24	4861.58	SNL/NM	SFG - regional aquifer
TA1-W-02	2-Oct-13	5416.62	524.40	4892.22	SNL/NM	SFG - regional aquifer
TA1-W-03	2-Oct-13	5457.03	350.24	5106.79	SNL/NM	SFG - PGWS
TA1-W-04	2-Oct-13	5460.98	571.16	4889.82	SNL/NM	SFG - regional aquifer
TA1-W-05	4-Oct-13	5433.84	571.39	4862.45	SNL/NM	SFG - regional aquifer
TA1-W-06	2-Oct-13	5417.10	307.24	5109.86	SNL/NM	SFG - PGWS
TA1-W-07	2-Oct-13	5404.92	285.90	5119.02	SNL/NM	SFG - PGWS
TA1-W-08	4-Oct-13	5434.19	310.39	5123.80	SNL/NM	SFG - PGWS
TA2-NW1-325	2-Oct-13	5421.94	317.64	5104.30	SNL/NM	SFG - PGWS
TA2-NW1-595	2-Oct-13	5421.26	524.02	4897.24	SNL/NM	SFG - regional aquifer
TA2-SW1-320	2-Oct-13	5411.85	318.00	5093.85	SNL/NM	SFG - PGWS
TA2-W-01	2-Oct-13	5419.99	327.47	5092.52	SNL/NM	SFG - PGWS
TA2-W-19	2-Oct-13	5351.21	271.24	5079.97	SNL/NM	SFG - PGWS
TA2-W-24	2-Oct-13	5363.66	443.03	4920.63	SNL/NM	SFG - intermediate
TA2-W-25	2-Oct-13	5374.86	470.25	4904.61	SNL/NM	SFG - regional aquifer
TA2-W-26	2-Oct-13	5375.77	286.24	5089.53	SNL/NM	SFG - PGWS
TA2-W-27	2-Oct-13	5362.85	279.34	5083.51	SNL/NM	SFG - PGWS

Table 2. Base-Wide Groundwater Levels 2013, updated 3 March 2014, AGMR CY2013 *(Continued)*

Well ID	Date Measured	Measurement Point (feet amsl)	Depth to Water (feet btoc)	Water Level Elevation (feet amsl)	Owner	Screened Unit
TAV-MW2	1-Oct-13	5427.33	506.01	4921.32	SNL/NM	SFG - regional aquifer
TAV-MW3	1-Oct-13	5464.26	544.77	4919.49	SNL/NM	SFG - regional aquifer
TAV-MW4	1-Oct-13	5427.89	506.18	4921.71	SNL/NM	SFG - regional aquifer
TAV-MW5	1-Oct-13	5408.71	490.23	4918.48	SNL/NM	SFG - regional aquifer
TAV-MW6	1-Oct-13	5431.17	509.80	4921.37	SNL/NM	SFG - regional aquifer
TAV-MW7	1-Oct-13	5430.40	512.48	4917.92	SNL/NM	SFG - regional aquifer
TAV-MW8	1-Oct-13	5417.00	494.88	4922.12	SNL/NM	SFG - regional aquifer
TAV-MW9	1-Oct-13	5416.27	498.68	4917.59	SNL/NM	SFG - regional aquifer
TAV-MW10	1-Oct-13	5437.03	515.70	4921.33	SNL/NM	SFG - regional aquifer
TAV-MW11	1-Oct-13	5440.12	518.72	4921.40	SNL/NM	SFG - regional aquifer
TAV-MW12	1-Oct-13	5435.72	515.20	4920.52	SNL/NM	SFG - regional aquifer
TAV-MW13	1-Oct-13	5409.02	495.35	4913.67	SNL/NM	SFG - regional aquifer
TAV-MW14	1-Oct-13	5441.52	521.86	4919.66	SNL/NM	SFG - regional aquifer
TJA-2	4-Oct-13	5353.20	276.66	5076.54	SNL/NM	SFG - PGWS
TJA-3	2-Oct-13	5390.56	499.08	4891.48	SNL/NM	SFG - regional aquifer
TJA-4	4-Oct-13	5341.16	301.17	5039.99	SNL/NM	SFG - intermediate
TJA-5	4-Oct-13	5341.33	269.49	5071.84	SNL/NM	SFG - PGWS
TJA-6	2-Oct-13	5343.16	451.22	4891.94	SNL/NM	SFG - regional aquifer
TJA-7	2-Oct-13	5391.27	303.07	5088.20	SNL/NM	SFG - PGWS
TRE-1	1-Oct-13	5497.25	176.98	5320.27	SNL/NM	SFG - regional aquifer
TRN-1	1-Oct-13	5735.62	91.68	5643.94	SNL/NM	Bedrock (sandstone)
TRS-1D	1-Oct-13	5779.80	127.34	5652.46	SNL/NM	Bedrock (limestone)
TRS-1S	1-Oct-13	5780.07	134.19	5645.88	SNL/NM	Bedrock (limestone)
TRS-2	1-Oct-13	5780.76	134.76	5646.00	SNL/NM	Bedrock (limestone)
WYO-3	2-Oct-13	5392.09	529.43	4862.66	SNL/NM	SFG - regional aquifer
WYO-4	2-Oct-13	5392.57	291.44	5101.13	SNL/NM	SFG - PGWS
Non Sandia Wells						
EOD	6-Nov-13	5829.70	142.88	5686.82	KAFB	Bedrock (limestone and granite)
Eubank-1	2-Oct-13	5460.02	549.97	4910.05	ABCWUA	SFG - regional aquifer
Eubank-2	15-Oct-13	5474.39	578.61	4895.78	ABCWUA	SFG - regional aquifer
Eubank-3	15-Oct-13	5498.73	607.11	4891.62	ABCWUA	SFG - regional aquifer
Eubank-5	15-Oct-13	5507.40	616.13	4891.27	ABCWUA	SFG - regional aquifer
ITRI-MW16	11-Oct-13	5668.84	121.60	5547.24	LRRI	Bedrock (sandstone)
KAFB-0213	8-Nov-13	5282.00	417.70	4864.30	KAFB	SFG - regional aquifer

Table 2. Base-Wide Groundwater Levels 2013, updated 3 March 2014, AGMR CY2013 *(Continued)*

Well ID	Date Measured	Measurement Point (feet amsl)	Depth to Water (feet btoc)	Water Level Elevation (feet amsl)	Owner	Screened Unit
KAFB-0307	6-Nov-13	5364.53	429.48	4935.05	KAFB	SFG - regional aquifer
KAFB-0309	6-Nov-13	5411.8	478.91	4932.89	KAFB	SFG - regional aquifer
KAFB-0312	6-Nov-13	5432.17	417.98	5014.19	KAFB	SFG - regional aquifer
KAFB-0313	6-Nov-13	5418.98	350.03	5068.95	KAFB	SFG - PGWS
KAFB-0314	6-Nov-13	5455.75	415.92	5039.83	KAFB	SFG - regional aquifer
KAFB-0315	6-Nov-13	5466.11	438.65	5027.46	KAFB	SFG - regional aquifer
KAFB-0505	8-Nov-13	5362.81	505.55	4857.26	KAFB	SFG - regional aquifer
KAFB-0510	7-Nov-13	5367.10	510.73	4856.37	KAFB	SFG - regional aquifer
KAFB-0516	8-Nov-13	5205.64	343.16	4862.48	KAFB	SFG - regional aquifer
KAFB-0522	8-Nov-13	5267.48	407.31	4860.17	KAFB	SFG - regional aquifer
KAFB-0611	6-Nov-13	5386.09	462.52	4923.57	KAFB	SFG - regional aquifer
KAFB-0615	6-Nov-13	5638.43	201.83	5436.60	KAFB	Bedrock (granite)
KAFB-0616	6-Nov-13	5481.07	442.76	5038.31	KAFB	SFG - regional aquifer
KAFB-0617	6-Nov-13	5505.78	559.20	4946.58	KAFB	SFG - regional aquifer
KAFB-0619	6-Nov-13	5410.78	386.52	5024.26	KAFB	SFG - PGWS
KAFB-0620	8-Nov-13	5334.64	442.46	4892.18	KAFB	SFG - regional aquifer
KAFB-0621	7-Nov-13	5569.89	627.35	4942.54	KAFB	SFG - regional aquifer
KAFB-0622	6-Nov-13	5488.64	549.52	4939.12	KAFB	SFG - regional aquifer
KAFB-1901	6-Nov-13	5757.58	85.74	5671.84	KAFB	SFG - regional aquifer
KAFB-2007	6-Nov-13	5567.18	269.81	5297.37	KAFB	SFG - regional aquifer
Mesa del Sol-S	13-Nov-13	5302.67	423.09	4879.58	ABCWUA	SFG - regional aquifer
Montessa Park - S	14-Nov-13	5102.67	221.13	4881.54	ABCWUA	SFG - regional aquifer
Optical Range Well	6-Nov-13	5965.70	146.00	5819.70	KAFB	Bedrock (metarhyolite)

NOTES:

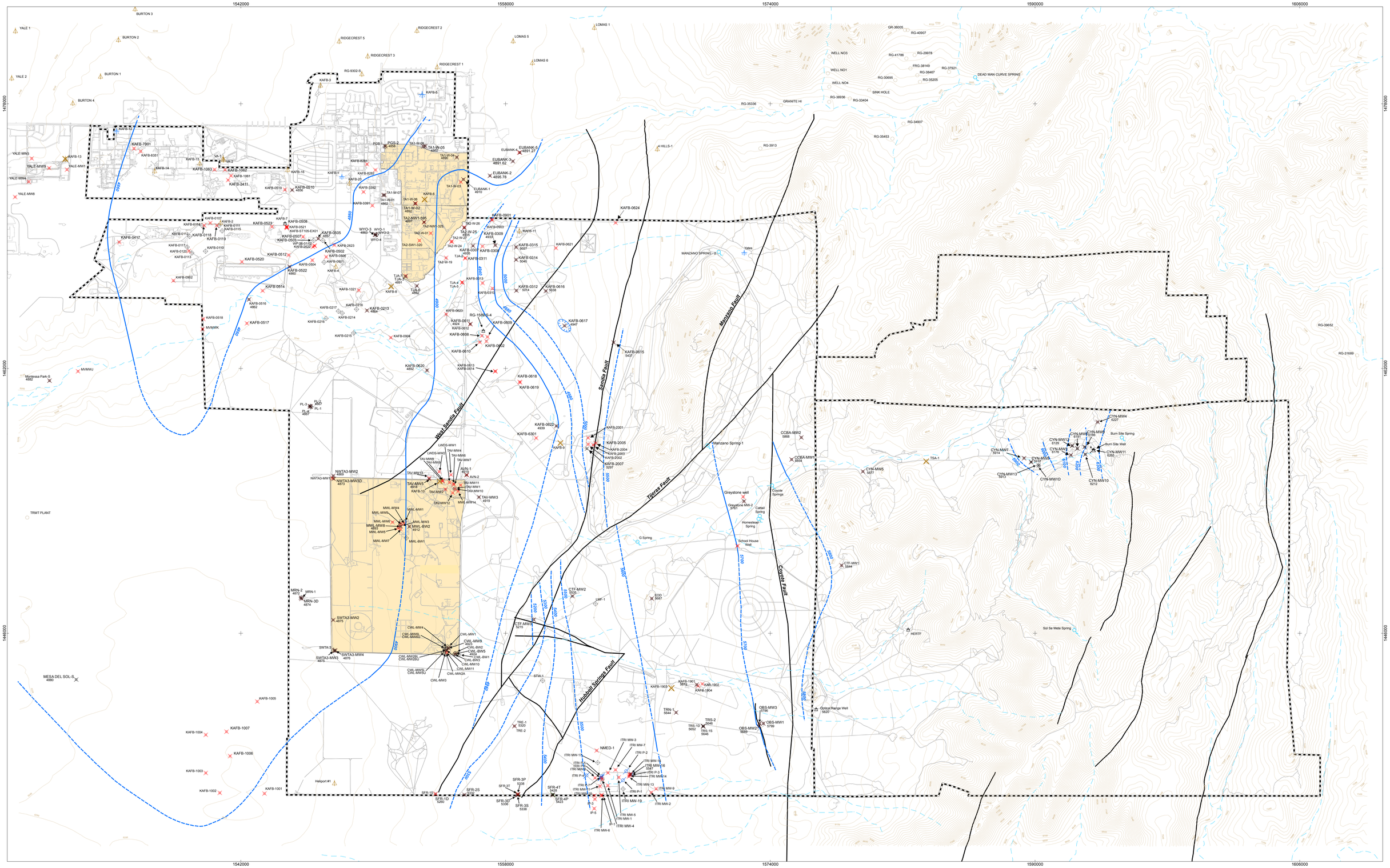
ABCWUA = Albuquerque Bernalillo County Water Utility Authority.
AGMR = Annual Groundwater Monitoring Report.
amsl = Above mean sea level.
AVN = Area V (North).
btoc = Below top of casing.
BW = Background well.
CCBA = Coyote Canyon Blast Area.
CTF = Coyote Test Field.
CWL = Chemical Waste Landfill.
CY = Calendar year.
CYN = Lurance Canyon.

Table 2. Base-Wide Groundwater Levels 2013, updated 3 March 2014, AGMR CY2013 *(Concluded)*

NOTES (continued):

EOD = Explosive Ordnance Disposal.
ITRI = Inhalation Toxicology Research Institute.
KAFB = Kirtland Air Force Base.
LRRI = Lovelace Respiratory Research Institute.
LWDS = Liquid Waste Disposal System.
MRN = Magazine Road North.
MW = Monitoring well.
MWL = Mixed Waste Landfill.
NWTA3 = Northwest Technical Area III
OBS = Old Burn Site.
PGS = Parade Ground South.
PGWS = Perched groundwater system.
PL = Power Line Road, west of TA-III.
SFG = Santa Fe Group sediments.
SFR = South Fence Road.
SNL/NM = Sandia National Laboratories, New Mexico.
SWTA = Southwest Technical Area III.
TA1-W = Technical Area I (Well).
TA2-NW = Technical Area II (Northwest).
TA2-SW = Technical Area II (Well).
TA2-W = Technical Area II (Well).
TAV = Technical Area V.
TJA = Tijeras Arroyo.
TRE = Thunder Road East.
TRN = Target Road North.
TRS = Target Road South.
WYO = Wyoming.

This page intentionally left blank.



Legend

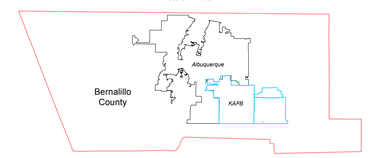
- KAFB Boundary
- Topographic Contour, feet amsl (above mean sea level)
- Road
- Drainage Feature
- Fault (exposed or concealed)
- SNL/NM Technical Areas
- Potentiometric Surface Contour, feet amsl (dashed where inferred), hachured for inferred depression

- Monitoring Well - contoured
- Monitoring Well - not contoured
- Observation Well
- Test Well
- Production Well
- Production Well (Out of Commission)

- Production Well (Plugged and Abandoned)
- Production Well (Non-Potable)
- Monitoring Well (Plugged and Abandoned)
- Spring
- Off-base Well with Unknown Use

NOTE:
1. Contours for the potentiometric surface are shown using two intervals: below 5000 feet amsl the contour interval is 40 feet, and above 5000 feet amsl the contour interval is 100 feet.
2. Fault locations are from GRAM and Lettis (1995), Karlstrom et al., (2000), and Van Hart (2003). The West Sandia fault does not affect the alluvial-fan sediments at the water table.
3. West of the Sandia Fault, the regional aquifer is present within the unconsolidated Santa Fe Group sediments. Groundwater within and east of the Tijeras Fault Zone (bounded by the Sandia and Tijeras Faults) is primarily present in Paleozoic and Precambrian bedrock.
4. Water levels were measured in SNL/NM, USGS, COA, and ITRI wells in October 2013. Water levels in KAFB wells were measured in November 2013. Specific data are listed in Table 2.
5. Groundwater elevations are rounded to the nearest foot.

0 2,000 4,000 Scale in Feet
0 480 960 Scale in Meters
0 0.5 1 Scale in Kilometers
0 0.5 1 Scale in Miles



Sandia National Laboratories, New Mexico
Environmental Geographic Information System

Plate 1
SNL/NM Monitoring Well Locations and Base-Wide Potentiometric Surface Map for the Kirtland Air Force Base Vicinity, October/November 2013

Transverse Mercator Projection, New Mexico State Plane Coordinate System, Central Zone, 1983 North American Horizontal Datum
1988 North American Vertical Datum

Mapid = mb14095 / mb13055 05/1/14 SNL EGIS ORG. 4142 MBarthel

May 1, 2014

APPENDIX D

2013 TERRESTRIAL SURVEILLANCE RESULTS

TABLE D-1. Radiological Results Sorted by Location for Calendar Year 2013, Soil

Location Type	Analyte	Location	Units	Activity and/or Concentration	Two Sigma Error	Laboratory Data Qualifiers	MDA
Community	Americium-241	9	pCi/g	0.017	0.102	U	0.174
Community	Americium-241	10	pCi/g	0.0318	0.0359	U	0.0564
Community	Americium-241	11	pCi/g	0.0483	0.0509	U	0.0821
Community	Americium-241	25	pCi/g	-0.134	0.084	U	0.0832
Community	Americium-241	62	pCi/g	0.0538	0.0836	U	0.124
Community	Cesium-137	9	pCi/g	0.266	0.042		0.0266
Community	Cesium-137	10	pCi/g	0.224	0.0345		0.0291
Community	Cesium-137	11	pCi/g	0.0626	0.0217		0.0288
Community	Cesium-137	25	pCi/g	0.0435	0.0166		0.0196
Community	Cesium-137	62	pCi/g	0.426	0.0454		0.0291
Community	Tritium	9	pCi/L	131	115	U	186
Community	Tritium	10	pCi/L	49	105	U	185
Community	Tritium	11	pCi/L	27.5	89.5	U	161
Community	Tritium	62	pCi/L	-5.59	96.1	U	179
Community	Uranium	9	mg/kg	0.416			0.0368
Community	Uranium	11	mg/kg	0.521			0.0375
Community	Uranium	25	mg/kg	0.618			0.0393
Community	Uranium	62	mg/kg	1.1			0.0398
On-Site	Americium-241	1	pCi/g	0.0128	0.0847	U	0.128
On-Site	Americium-241	02NE	pCi/g	0.0634	0.0862	U	0.147
On-Site	Americium-241	02NW	pCi/g	0.024	0.0546	U	0.0941
On-Site	Americium-241	02SE	pCi/g	0.0472	0.0554	U	0.0875
On-Site	Americium-241	02SW	pCi/g	-0.00379	0.0662	U	0.112
On-Site	Americium-241	3	pCi/g	0.0268	0.0341	U	0.0532
On-Site	Americium-241	6	pCi/g	-0.0166	0.0754	U	0.0981
On-Site	Americium-241	7	pCi/g	0.0207	0.0345	U	0.0351
On-Site	Americium-241	33	pCi/g	0.0191	0.0641	U	0.109
On-Site	Americium-241	34	pCi/g	0.0477	0.0546	U	0.0821
On-Site	Americium-241	35	pCi/g	0.00924	0.0355	U	0.0613
On-Site	Americium-241	41	pCi/g	0.0416	0.053	U	0.0866
On-Site	Americium-241	42	pCi/g	0.0689	0.0763	U	0.123
On-Site	Americium-241	43	pCi/g	0.0434	0.0312	U	0.0435
On-Site	Americium-241	45	pCi/g	0.0359	0.0813	U	0.136
On-Site	Americium-241	46	pCi/g	0.0279	0.0695	U	0.116
On-Site	Americium-241	49	pCi/g	0.0254	0.0467	U	0.0744
On-Site	Americium-241	51	pCi/g	0.0173	0.0323	U	0.0527
On-Site	Americium-241	52	pCi/g	0.0369	0.0294	U	0.0394
On-Site	Americium-241	53	pCi/g	0.00781	0.0171	U	0.0301
On-Site	Americium-241	54	pCi/g	0.0255	0.0533	U	0.0888
On-Site	Americium-241	55	pCi/g	0.00855	0.0159	U	0.0271
On-Site	Americium-241	56	pCi/g	-0.00885	0.106	U	0.185
On-Site	Americium-241	57	pCi/g	0.00163	0.0535	U	0.0887
On-Site	Americium-241	66	pCi/g	-0.151	0.122	U	0.181
On-Site	Americium-241	76	pCi/g	0.0099	0.0163	U	0.0266
On-Site	Americium-241	77	pCi/g	0.0281	0.07	U	0.114
On-Site	Americium-241	86	pCi/g	0.0657	0.074	U	0.115
On-Site	Americium-241	90	pCi/g	0.046	0.0799	U	0.138
On-Site	Americium-241	92	pCi/g	0.0183	0.0445	U	0.0728
On-Site	Cesium-137	1	pCi/g	0.128	0.0272		0.0282

TABLE D-1. Radiological Results Sorted by Location for Calendar Year 2013, Soil

Location Type	Analyte	Location	Units	Activity and/or Concentration	Two Sigma Error	Laboratory Data Qualifiers	MDA
On-Site	Cesium-137	02NE	pCi/g	0.0828	0.0232		0.0238
On-Site	Cesium-137	02NW	pCi/g	0.0572	0.0219		0.0216
On-Site	Cesium-137	02SE	pCi/g	0.16	0.0227		0.019
On-Site	Cesium-137	02SW	pCi/g	0.0347	0.0164		0.018
On-Site	Cesium-137	3	pCi/g	0.0395	0.025		0.0276
On-Site	Cesium-137	6	pCi/g	0.0631	0.0158		0.0169
On-Site	Cesium-137	7	pCi/g	0.304	0.0345		0.0244
On-Site	Cesium-137	33	pCi/g	0.27	0.0341		0.0221
On-Site	Cesium-137	34	pCi/g	0.0912	0.0245		0.028
On-Site	Cesium-137	35	pCi/g	0.125	0.032		0.033
On-Site	Cesium-137	41	pCi/g	0.119	0.0253		0.029
On-Site	Cesium-137	42	pCi/g	0.0788	0.0297		0.0286
On-Site	Cesium-137	43	pCi/g	0.0789	0.0232		0.0287
On-Site	Cesium-137	45	pCi/g	0.0417	0.0207		0.0229
On-Site	Cesium-137	46	pCi/g	0.0968	0.0318		0.029
On-Site	Cesium-137	49	pCi/g	0.216	0.0329		0.0209
On-Site	Cesium-137	51	pCi/g	0.0929	0.0221		0.03
On-Site	Cesium-137	53	pCi/g	0.0483	0.0241		0.0299
On-Site	Cesium-137	54	pCi/g	0.29	0.0318		0.0184
On-Site	Cesium-137	55	pCi/g	0.6	0.0569		0.024
On-Site	Cesium-137	56	pCi/g	0.0509	0.0206		0.025
On-Site	Cesium-137	57	pCi/g	0.0235	0.0343	U	0.0239
On-Site	Cesium-137	66	pCi/g	0.144	0.0366		0.0315
On-Site	Cesium-137	76	pCi/g	0.15	0.0214		0.0196
On-Site	Cesium-137	77	pCi/g	0.45	0.0469		0.0235
On-Site	Cesium-137	78	pCi/g	0.63	0.065		0.03
On-Site	Cesium-137	86	pCi/g	0.0147	0.0217	U	0.0297
On-Site	Cesium-137	90	pCi/g	0.229	0.0294		0.0188
On-Site	Cesium-137	92	pCi/g	0.0712	0.0145		0.0148
On-Site	Tritium	02NE	pCi/L	915	219		197
On-Site	Tritium	02NW	pCi/L	441	155		190
On-Site	Tritium	02SE	pCi/L	321	142		195
On-Site	Tritium	02SW	pCi/L	170	119	U	185
On-Site	Tritium	3	pCi/L	198	107		151
On-Site	Tritium	6	pCi/L	90.3	103	U	171
On-Site	Tritium	7	pCi/L	207	130		199
On-Site	Tritium	33	pCi/L	137	117	U	187
On-Site	Tritium	34	pCi/L	84	101	U	169
On-Site	Tritium	35	pCi/L	170	120	U	185
On-Site	Tritium	45	pCi/L	124	118	U	194
On-Site	Tritium	46	pCi/L	185	102		151
On-Site	Tritium	51	pCi/L	103	105	U	173
On-Site	Tritium	52	pCi/L	183	116		175
On-Site	Tritium	53	pCi/L	23.5	74.9	U	133
On-Site	Tritium	54	pCi/L	96.1	100	U	166
On-Site	Tritium	55	pCi/L	263	120		168
On-Site	Tritium	76	pCi/L	249	133		194
On-Site	Tritium	77	pCi/L	119	114	U	186
On-Site	Tritium	92	pCi/L	154	114	U	177

TABLE D-1. Radiological Results Sorted by Location for Calendar Year 2013, Soil

Location Type	Analyte	Location	Units	Activity and/or Concentration	Two Sigma Error	Laboratory Data Qualifiers	MDA
On-Site	Uranium	1	mg/kg	0.87			0.0391
On-Site	Uranium	02NE	mg/kg	0.221			0.0394
On-Site	Uranium	02NW	mg/kg	0.409			0.0388
On-Site	Uranium	02SE	mg/kg	0.245			0.0391
On-Site	Uranium	02SW	mg/kg	0.209			0.0391
On-Site	Uranium	6	mg/kg	0.545			0.0368
On-Site	Uranium	33	mg/kg	0.683			0.0383
On-Site	Uranium	34	mg/kg	0.605			0.0374
On-Site	Uranium	45	mg/kg	0.396			0.0352
On-Site	Uranium	51	mg/kg	0.599			0.0381
On-Site	Uranium	52	mg/kg	0.426			0.0377
On-Site	Uranium	53	mg/kg	0.233			0.0397
On-Site	Uranium	54	mg/kg	0.381			0.0374
On-Site	Uranium	55	mg/kg	0.242			0.0398
On-Site	Uranium	56	mg/kg	0.28			0.0387
On-Site	Uranium	57	mg/kg	0.958			0.0394
On-Site	Uranium	86	mg/kg	0.761			0.0398
On-Site	Uranium	91	mg/kg	0.476			0.0384
On-Site	Uranium	92	mg/kg	0.565			0.0391
Perimeter	Americium-241	4	pCi/g	0.101	0.088	U	0.134
Perimeter	Americium-241	5	pCi/g	0.0383	0.0465	U	0.0752
Perimeter	Americium-241	12	pCi/g	0.0199	0.073	U	0.12
Perimeter	Americium-241	16	pCi/g	0.0663	0.0884	U	0.143
Perimeter	Americium-241	19	pCi/g	0.0292	0.0848	U	0.144
Perimeter	Americium-241	58	pCi/g	0.0738	0.0653	U	0.0945
Perimeter	Americium-241	59	pCi/g	0.044	0.0512	U	0.0795
Perimeter	Americium-241	60	pCi/g	-0.00343	0.016	U	0.0262
Perimeter	Americium-241	61	pCi/g	0.0324	0.054	U	0.0886
Perimeter	Americium-241	63	pCi/g	0.044	0.0822	U	0.134
Perimeter	Americium-241	64	pCi/g	0.0361	0.126	U	0.204
Perimeter	Americium-241	80	pCi/g	0.0189	0.103	U	0.177
Perimeter	Americium-241	81	pCi/g	0.0807	0.0814	U	0.132
Perimeter	Americium-241	82	pCi/g	-0.00123	0.0643	U	0.103
Perimeter	Americium-241	87	pCi/g	0.0126	0.0174	U	0.0305
Perimeter	Americium-241	89	pCi/g	-0.00133	0.0619	U	0.0993
Perimeter	Cesium-137	4	pCi/g	0.139	0.0253		0.0218
Perimeter	Cesium-137	5	pCi/g	0.215	0.0274		0.0194
Perimeter	Cesium-137	12	pCi/g	0.946	0.0895		0.0313
Perimeter	Cesium-137	16	pCi/g	0.0498	0.0265		0.0338
Perimeter	Cesium-137	19	pCi/g	0.73	0.0785		0.033
Perimeter	Cesium-137	58	pCi/g	0.0562	0.0234		0.0331
Perimeter	Cesium-137	59	pCi/g	0.271	0.0367		0.0221
Perimeter	Cesium-137	60	pCi/g	0.0387	0.0229		0.0262
Perimeter	Cesium-137	61	pCi/g	0.00627	0.00933	U	0.0161
Perimeter	Cesium-137	63	pCi/g	0.24	0.0421		0.0306
Perimeter	Cesium-137	64	pCi/g	0.351	0.0474		0.0293
Perimeter	Cesium-137	80	pCi/g	0.0899	0.03		0.0366
Perimeter	Cesium-137	81	pCi/g	0.453	0.0557		0.037
Perimeter	Cesium-137	82	pCi/g	0.0274	0.0191	U	0.028

TABLE D-1. Radiological Results Sorted by Location for Calendar Year 2013, Soil

Location Type	Analyte	Location	Units	Activity and/or Concentration	Two Sigma Error	Laboratory Data Qualifiers	MDA
Perimeter	Cesium-137	87	pCi/g	0.0894	0.0337		0.0284
Perimeter	Cesium-137	89	pCi/g	0.247	0.0304		0.0214
Perimeter	Tritium	12	pCi/L	181	110		161
Perimeter	Tritium	16	pCi/L	138	86.8		133
Perimeter	Tritium	19	pCi/L	187	106		151
Perimeter	Tritium	58	pCi/L	162	119	U	188
Perimeter	Tritium	59	pCi/L	215	93.1		129
Perimeter	Tritium	61	pCi/L	95.9	103	U	171
Perimeter	Tritium	63	pCi/L	107	96.2	U	154
Perimeter	Tritium	64	pCi/L	220	111		154
Perimeter	Tritium	80	pCi/L	177	108		158
Perimeter	Tritium	81	pCi/L	94	113	U	190
Perimeter	Tritium	82	pCi/L	303	105		132
Perimeter	Uranium	4	mg/kg	0.235			0.0398
Perimeter	Uranium	12	mg/kg	0.491			0.0394
Perimeter	Uranium	16	mg/kg	0.691			0.0399
Perimeter	Uranium	19	mg/kg	0.358			0.0393
Perimeter	Uranium	58	mg/kg	0.738			0.04
Perimeter	Uranium	60	mg/kg	0.605			0.0375
Perimeter	Uranium	61	mg/kg	0.739			0.036
Perimeter	Uranium	64	mg/kg	0.934			0.0394
Perimeter	Uranium	80	mg/kg	0.632			0.0396
Perimeter	Uranium	81	mg/kg	0.333			0.0395
Perimeter	Uranium	82	mg/kg	0.635			0.0382
Perimeter	Uranium	87	mg/kg	0.143			0.0391
Perimeter	Uranium	89	mg/kg	0.256			0.036

NOTES:

MDA = minimum detectable activity
mg/kg = milligram per kilogram
n/a = not applicable
pCi/g = picocurie per gram
pCi/L = picocurie per liter
U = The analyte was analyzed for but not detected above MDA.

TABLE D-2. Radiological Results by Location for Calendar Year 2013, Sediment

Location Type	Analyte	Location	Units	Activity and/or Concentration	Two Sigma Error	Laboratory Data Qualifiers	MDA
Community	Americium-241	8	pCi/g	0.0183	0.0296	U	0.0445
Community	Americium-241	11	pCi/g	0.0631	0.06	U	0.0861
Community	Americium-241	68	pCi/g	0.0104	0.0548	U	0.0909
Community	Cesium-137	8	pCi/g	0.0659	0.0271		0.0314
Community	Cesium-137	11	pCi/g	0.161	0.0277		0.0272
Community	Cesium-137	68	pCi/g	0.0249	0.0147		0.0205
Community	Tritium	8	pCi/L	-46	94.2	U	184
Community	Tritium	11	pCi/L	-35.2	87.4	U	172
Community	Uranium	11	mg/kg	0.479			0.0382
Community	Uranium	68	mg/kg	0.943			0.0395
On-Site	Americium-241	72	pCi/g	0.00801	0.0165	U	0.0279
On-Site	Americium-241	74N	pCi/g	0.0286	0.028	U	0.0413
On-Site	Americium-241	75	pCi/g	-0.0121	0.0517	U	0.0948
On-Site	Americium-241	79	pCi/g	0.035	0.0533	U	0.0818
On-Site	Americium-241	83	pCi/g	0.000683	0.0564	U	0.0821
On-Site	Americium-241	84	pCi/g	0.0591	0.0631	U	0.0964
On-Site	Americium-241	85	pCi/g	0.0558	0.106	U	0.17
On-Site	Cesium-137	72	pCi/g	0.0405	0.0218		0.0245
On-Site	Cesium-137	74N	pCi/g	0.0165	0.0216	U	0.0282
On-Site	Cesium-137	75	pCi/g	0.0882	0.0176		0.0195
On-Site	Cesium-137	79	pCi/g	0.278	0.0282		0.0166
On-Site	Cesium-137	83	pCi/g	0.231	0.0297		0.0179
On-Site	Cesium-137	84	pCi/g	0.154	0.0388		0.0382
On-Site	Cesium-137	85	pCi/g	0.384	0.0434		0.0249
On-Site	Uranium	72	mg/kg	0.549			0.0387
On-Site	Uranium	74N	mg/kg	0.622			0.0348
On-Site	Uranium	75	mg/kg	0.513			0.0349
On-Site	Uranium	79	mg/kg	1.32			0.0396
On-Site	Uranium	83	mg/kg	0.779			0.0366
On-Site	Uranium	84	mg/kg	0.642			0.04
On-Site	Uranium	85	mg/kg	0.79			0.0394
Perimeter	Americium-241	60	pCi/g	0.022	0.0303	U	0.0495
Perimeter	Americium-241	65	pCi/g	0.0238	0.0385	U	0.063
Perimeter	Americium-241	73	pCi/g	0.0369	0.0487	U	0.0822
Perimeter	Cesium-137	60	pCi/g	0.0172	0.0185	U	0.0245
Perimeter	Cesium-137	65	pCi/g	0.0181	0.0165		0.0166
Perimeter	Tritium	60	pCi/L	105	103	U	170
Perimeter	Uranium	60	mg/kg	0.559			0.0353
Perimeter	Uranium	65	mg/kg	0.769			0.0383
Perimeter	Uranium	73	mg/kg	0.917			0.0392

NOTES:

MDA = minimum detectale activity
mg/kg = milligram per kilogram
n/a = not applicale
pCi/g = picocurie per gram
pCi/L = picocurie per liter
U = The analyte was analyzed for but not detected above the MDA.

TABLE D-3. Radiological Replicate Results Sorted by Location for Calendar Year 2013, Soil

Location Type	Analyte	Location	nple Identificat	Units	Activity and/or Concentration	Two Sigma Error	Laboratory Data Qualifiers	MDA
Community	Americium-241	11	094159-001	pCi/g	0.0483	0.0509	U	0.0821
Community	Americium-241	11	094160-001	pCi/g	-0.00767	0.0766	U	0.135
Community	Americium-241	11	094161-001	pCi/g	0.0417	0.077	U	0.129
	Average				**0.03**			
	Std Dev				**0.03**			
	CV (%)				**111.46**			
Community	Cesium-137	11	094159-001	pCi/g	0.06	0.0217		0.0288
Community	Cesium-137	11	094160-001	pCi/g	0.05	0.0264		0.023
Community	Cesium-137	11	094161-001	pCi/g	0.05	0.0303		0.0333
	Average				**0.05**			
	Std Dev				**0.01**			
	CV (%)				**13.73**			
Community	Tritium	11	094159-003	pCi/L	27.5	89.5	U	161
Community	Tritium	11	094160-003	pCi/L	-15.4	100	U	184
Community	Tritium	11	094161-003	pCi/L	19.3	109	U	197
	Average				**10.47**			
	Std Dev				**22.77**			
	CV (%)				**217.58**			
Community	Uranium	11	094159-002	mg/kg	0.52			0.0375
Community	Uranium	11	094160-002	mg/kg	0.48			0.0391
Community	Uranium	11	094161-002	mg/kg	0.54			0.0395
	Average				**0.51**			
	Std Dev				**0.03**			
	CV (%)				**6.11**			
On-Site	Americium-241	02NE	094088-001	pCi/g	0.0634	0.0862	U	0.147
On-Site	Americium-241	02NE	094089-001	pCi/g	0.0542	0.0469	U	0.0687
On-Site	Americium-241	02NE	094090-001	pCi/g	0.0112	0.0364	U	0.0636
	Average				**0.04**			
	Std Dev				**0.03**			
	CV (%)				**64.90**			
On-Site	Americium-241	33	094122-001	pCi/g	0.02	0.0641	U	0.109
On-Site	Americium-241	33	094123-001	pCi/g	0.03	0.0331	U	0.0459
On-Site	Americium-241	33	094124-001	pCi/g	-0.03	0.0922	U	0.152
	Average				**0.01**			
	Std Dev				**0.03**			

TABLE D-3. Radiological Replicate Results Sorted by Location for Calendar Year 2013, Soil

Location Type	Analyte	Location	nple Identificat	Units	Activity and/or Concentration	Two Sigma Error	Laboratory Data Qualifiers	MDA
	CV (%)				**330.91**			
On-Site	Americium-241	53	094082-001	pCi/g	0.00781	0.0171	U	0.0301
On-Site	Americium-241	53	094083-001	pCi/g	0.0418	0.072	U	0.121
On-Site	Americium-241	53	094084-001	pCi/g	0.0631	0.0774	U	0.129
	Average				**0.04**			
	Std Dev				**0.03**			
	CV (%)				**74.23**			
On-Site	Cesium-137	02NE	094088-001	pCi/g	0.08	0.0232		0.0238
On-Site	Cesium-137	02NE	094089-001	pCi/g	0.09	0.0198		0.0172
On-Site	Cesium-137	02NE	094090-001	pCi/g	0.07	0.0173		0.0157
	Average				**0.08**			
	Std Dev				**0.01**			
	CV (%)				**15.95**			
On-Site	Cesium-137	33	094122-001	pCi/g	0.27	0.0341		0.0221
On-Site	Cesium-137	33	094123-001	pCi/g	0.334	0.0436		0.0345
On-Site	Cesium-137	33	094124-001	pCi/g	0.211	0.0317		0.0229
	Average				**0.27**			
	Std Dev				**0.06**			
	CV (%)				**22.64**			
On-Site	Cesium-137	53	094082-001	pCi/g	0.05	0.0241		0.0299
On-Site	Cesium-137	53	094083-001	pCi/g	0.05	0.0235		0.0287
On-Site	Cesium-137	53	094084-001	pCi/g	0.03	0.0313		0.0315
	Average				**0.04**			
	Std Dev				**0.01**			
	CV (%)				**21.59**			
On-Site	Tritium	02NE	094088-003	pCi/L	915	219		197
On-Site	Tritium	02NE	094089-003	pCi/L	718	200		210
On-Site	Tritium	02NE	094090-003	pCi/L	769	206		209
	Average				**800.67**			
	Std Dev				**102.25**			
	CV (%)				**12.77**			
On-Site	Tritium	33	094122-003	pCi/L	137.00	117	U	187
On-Site	Tritium	33	094123-003	pCi/L	81.60	113	U	193
On-Site	Tritium	33	094124-003	pCi/L	107.00	118	U	196
	Average				**108.53**			

TABLE D-3. Radiological Replicate Results Sorted by Location for Calendar Year 2013, Soil

Location Type	Analyte	Location	nple Identificat	Units	Activity and/or Concentration	Two Sigma Error	Laboratory Data Qualifiers	MDA
	Std Dev				**27.73**			
	CV (%)				**25.55**			
On-Site	Tritium	53	094082-003	pCi/L	23.5	74.9	U	133
	Average				**23.50**			
	Std Dev				**n/a**			
	CV (%)				**n/a**			
On-Site	Uranium	02NE	094088-002	mg/kg	0.221			0.0394
On-Site	Uranium	02NE	094089-002	mg/kg	0.197			0.0386
On-Site	Uranium	02NE	094090-002	mg/kg	0.16			0.0395
	Average				**0.19**			
	Std Dev				**0.03**			
	CV (%)				**15.05**			
On-Site	Uranium	33	094122-002	mg/kg	0.68			0.0383
On-Site	Uranium	33	094123-002	mg/kg	0.56			0.0398
On-Site	Uranium	33	094124-002	mg/kg	0.594			0.0398
	Average				**0.61**			
	Std Dev				**0.06**			
	CV (%)				**10.09**			
On-Site	Uranium	53	094082-002	mg/kg	0.233			0.0397
On-Site	Uranium	53	094083-002	mg/kg	0.255			0.0397
On-Site	Uranium	53	094084-002	mg/kg	0.23			0.0395
	Average				**0.24**			
	Std Dev				**0.01**			
	CV (%)				**5.16**			
Perimeter	Americium-241	64	094133-001	pCi/g	0.04	0.126	U	0.204
Perimeter	Americium-241	64	094134-001	pCi/g	0.01	0.0932	U	0.149
Perimeter	Americium-241	64	094135-001	pCi/g	0.0926	0.102	U	0.161
	Average				**0.04**			
	Std Dev				**0.04**			
	CV (%)				**97.78**			
Perimeter	Cesium-137	64	094133-001	pCi/g	0.351	0.0474		0.0293
Perimeter	Cesium-137	64	094134-001	pCi/g	0.236	0.0349		0.0296
Perimeter	Cesium-137	64	094135-001	pCi/g	0.43	0.0457		0.0264
	Average				**0.34**			
	Std Dev				**0.10**			

TABLE D-3. Radiological Replicate Results Sorted by Location for Calendar Year 2013, Soil

Location Type	Analyte	Location	nple Identificat	Units	Activity and/or Concentration	Two Sigma Error	Laboratory Data Qualifiers	MDA
	CV (%)				**29.22**			
Perimeter	Tritium	64	094133-003	pCi/L	220.00	111		154
Perimeter	Tritium	64	094134-003	pCi/L	124.00	83.4	U	129
Perimeter	Tritium	64	094135-003	pCi/L	189	90.3		129
	Average				**177.67**			
	Std Dev				**48.99**			
	CV (%)				**27.58**			
Perimeter	Uranium	64	094133-002	mg/kg	0.934			0.0394
Perimeter	Uranium	64	094134-002	mg/kg	0.824			0.0388
Perimeter	Uranium	64	094135-002	mg/kg	1.22			0.0396
	Average				**0.99**			
	Std Dev				**0.20**			
	CV (%)				**20.59**			

NOTES:

CV = Coefficient of variation, only meaningful if data contains non-zero values.
mg/kg = milligram per kilogram
n/a = not applicable
MDA = minimum detectable activity
pCi/g = picocurie per gram
pCi/L = picocurie per liter
Std Dev = standard deviation
U = The analyte was analyzed for but not detected above MDA.

TABLE D-4. Radiological Replicate Results Sorted by Location for Calendar Year 2013, Sediment

Location Type	Analyte	Location	Sample Identification	Units	Activity and/or Concentration	Two Sigma Error	Laboratory Data Qualifiers	MDA
Community	Americium-241	11	094162-001	pCi/g	0.0631	0.06	U	0.0861
Community	Americium-241	11	094163-001	pCi/g	0.062	0.0835	U	0.126
Community	Americium-241	11	094164-001	pCi/g	0.0838	0.0919	U	0.148
	Average				**0.07**			
	Std Dev				**0.01**			
	CV (%)				**17.64**			
Community	Cesium-137	11	094162-001	pCi/g	0.161	0.0277		0.0272
Community	Cesium-137	11	094163-001	pCi/g	0.233	0.0332		0.03
Community	Cesium-137	11	094164-001	pCi/g	0.158	0.0315		0.0288
	Average				**0.18**			
	Std Dev				**0.04**			
	CV (%)				**23.08**			
Community	Tritium	11	094162-003	pCi/L	-35.20	87.4	U	172
Community	Tritium	11	094163-003	pCi/L	89.3	101	U	169
Community	Tritium	11	094164-003	pCi/L	-5.76	89.5	U	169
	Average				**16.11**			
	Std Dev				**65.07**			
	CV (%)				**403.82**			
Community	Uranium	11	094162-002	mg/kg	0.479			0.0382
Community	Uranium	11	094163-002	mg/kg	0.521			0.0354
Community	Uranium	11	094164-002	mg/kg	0.5			0.0353
	Average				**0.50**			
	Std Dev				**0.02**			
	CV (%)				**4.20**			
On-Site	Americium-241	74N	094138-001	pCi/g	0.0286	0.028	U	0.0413
On-Site	Americium-241	74N	094139-001	pCi/g	0.08	0.133	U	0.129
On-Site	Americium-241	74N	094140-001	pCi/g	0.0295	0.0506	U	0.0873
	Average				**0.05**			
	Std Dev				**0.03**			
	CV (%)				**64.46**			
On-Site	Cesium-137	74N	094138-001	pCi/g	0.0165	0.0216	U	0.0282
On-Site	Cesium-137	74N	094139-001	pCi/g	0.0341	0.0191		0.0179
On-Site	Cesium-137	74N	094140-001	pCi/g	0.0181	0.0107		0.0143
	Average				**0.02**			

TABLE D-4. Radiological Replicate Results Sorted by Location for Calendar Year 2013, Sediment

Location Type	Analyte	Location	Sample Identification	Units	Activity and/or Concentration	Two Sigma Error	Laboratory Data Qualifiers	MDA
	Std Dev				**0.01**			
	CV (%)				**42.50**			
On-Site	Uranium	74N	094138-002	mg/kg	0.62			0.0348
On-Site	Uranium	74N	094139-002	mg/kg	1.03			0.0373
On-Site	Uranium	74N	094140-002	mg/kg	0.66			0.0383
	Average				**0.77**			
	Std Dev				**0.23**			
	CV (%)				**29.25**			

NOTES:

CV = Coefficient of variation, only meaningful if data contains non-zero values.
mg/kg = milligram per kilogram
n/a = not applicable
MDA = minimum detectable activity
pCi/g = picocurie per gram
pCi/L = picocurie per liter
Std Dev = standard deviation
U = The analyte was analyzed for but not detected above MDA.

TABLE D-5. TLD Measurements by Quarter and Location Class for Calendar Year 2013

Location Class	Location Number	1st Quarter (91 Days)		2nd Quarter (84 Days)		3rd Quarter (99 Days)		4th Quarter (96 Days)	
		Exposure (mR)	Error	Exposure (mR)	Error	Exposure (mR)	Error	Exposure (mR)	Error
Community	10	33.1	2	23.9	1.3	25.3	0.8	37.6	1
Community	11	27.4	2.1	25.9	0.9	20.6	0.7	33.4	1.3
Community	21	35.2	3.3	21.3	0.9	25.5	0.8	36.3	1.2
Community	22	30.6	2	27.4	1	21.8	0.7	34.6	1
Community	23	31.1	2.1	26.9	0.9	20.4	1.1	35.2	1.4
Community	24	26.4	2.2	25.1	0.9	18.5	1	32.2	0.9
Community	25	37.2	2	26.6	0.9	19.8	0.8	32.1	0.9
Community	26	34.5	2	31	1.3	26.5	0.7	39.4	2
Community	27	33.4	2	29.4	0.9	23.7	0.9	37.5	1.6
Community	28	lost		lost		lost		lost	
Community	29	lost		lost		lost		lost	
Community	30	28.5	2	29.3	0.9	22.2	0.7	34.1	0.8
On-Site	1	32.4	2.4	23.8	0.8	22.5	1.9	35.2	1.2
On-Site	2NW	28.7	2.3	21.1	1.1	26.6	7.1	31.6	1
On-Site	3	30	2.2	21.5	1.7	23.2	1.9	33.7	1.1
On-Site	6	38	7.5	21.6	1.5	21.5	1.8	34.7	3.3
On-Site	7	29.6	2.2	22.3	0.8	21.3	1.8	34.7	0.9
On-Site	20	31.2	2.2	23.1	0.9	23.3	2	35.4	0.9
On-Site	31	30.9	2.4	22.9	0.8	23.1	1.9	36.3	1
On-Site	41	30.4	2.4	21.2	0.8	21.1	1.8	32.9	1.3
On-Site	42	29.9	2.2	21.4	0.8	21.8	2.2	34.2	2
On-Site	43	29.5	2.2	21.3	1.2	21.4	1.8	33.9	0.9
On-Site	45	31	2.2	23.3	0.9	21.6	1.9	34.1	1
On-Site	45E	31.5	2.4	22.1	1	22.2	1.9	34.6	1.2
On-Site	46	31.5	2.4	22.8	1	22	1.8	35.4	0.9
On-Site	47	32.2	3	24.9	0.9	24.6	2.3	35.2	0.9
On-Site	48	31.4	2.5	23.2	1.1	21.9	1.9	34.6	1
On-Site	66	29.8	2.2	21.9	1.2	22.2	1.8	34.1	0.9
On-Site	E1003	26.5	2.2	22.4	0.9	19.3	2	38.8	0.9
On-Site	E1004	28	2.3	23.7	2.1	20.1	2.2	37.5	1
Perimeter	4	30.3	2.4	22.6	1.1	20.9	1.9	43	6.6
Perimeter	5	27.3	2.4	20.1	1.3	19.6	1.9	31.1	1.3
Perimeter	16	36	2.3	27.9	1	25.3	1.9	38.8	1

TABLE D-5. TLD Measurements by Quarter and Location Class for Calendar Year 2013

Location Class	Location Number	1st Quarter (91 Days)		2nd Quarter (84 Days)		3rd Quarter (99 Days)		4th Quarter (96 Days)	
		Exposure (mR)	Error	Exposure (mR)	Error	Exposure (mR)	Error	Exposure (mR)	Error
Perimeter	18	31	2.3	21.6	0.9	23.4	1.8	35	1.4
Perimeter	19	32.4	2.2	24.2	1.2	24.1	1.9	34.6	1
Perimeter	39	29	2.6	22.1	1	22.2	1.9	33.1	1
Perimeter	40	30.9	2.4	21.7	1.5	20.9	1.8	33.6	0.9
Perimeter	81	31.5	2.3	22.9	1.1	22.3	2.3	34.7	1

NOTES:

mR = Milliroentgen (10E-3 roentgen)

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
Community	9	Aluminum	mg/kg	15200		13.8	46
Community	9	Antimony	mg/kg	0.53	J	0.309	0.936
Community	9	Arsenic	mg/kg	3.43		0.184	0.921
Community	9	Barium	mg/kg	166		0.0921	0.368
Community	9	Beryllium	mg/kg	0.614		0.0184	0.0921
Community	9	Cadmium	mg/kg	0.304		0.0184	0.184
Community	9	Calcium	mg/kg	28100		30.4	92.1
Community	9	Chromium	mg/kg	14.6		0.184	0.552
Community	9	Cobalt	mg/kg	6.18		0.0552	0.184
Community	9	Copper	mg/kg	11.6		0.0608	0.184
Community	9	Iron	mg/kg	14300		30.4	92.1
Community	9	Lead	mg/kg	22.9		0.0921	0.368
Community	9	Magnesium	mg/kg	4210		1.84	5.52
Community	9	Manganese	mg/kg	325		0.921	4.6
Community	9	Nickel	mg/kg	12.6		0.0921	0.368
Community	9	Potassium	mg/kg	2390		14.7	55.2
Community	9	Selenium	mg/kg	0.304	U	0.304	0.921
Community	9	Silver	mg/kg	0.0936	U	0.0936	0.468
Community	9	Sodium	mg/kg	47.3		14.7	46
Community	9	Thallium	mg/kg	0.117	J	0.0552	0.368
Community	9	Vanadium	mg/kg	40.6		0.0936	0.468
Community	9	Zinc	mg/kg	58.4		0.368	1.84
Community	11	Aluminum	mg/kg	4470		2.81	9.38
Community	11	Antimony	mg/kg	0.785	J	0.329	0.998
Community	11	Arsenic	mg/kg	1.55		0.188	0.938
Community	11	Barium	mg/kg	117		0.0938	0.375
Community	11	Beryllium	mg/kg	0.287		0.0188	0.0938
Community	11	Cadmium	mg/kg	0.121	J	0.0188	0.188
Community	11	Calcium	mg/kg	16100		31	93.8
Community	11	Chromium	mg/kg	4.73		0.188	0.563
Community	11	Cobalt	mg/kg	2.59		0.0563	0.188
Community	11	Copper	mg/kg	4.53		0.0619	0.188
Community	11	Iron	mg/kg	5170		6.19	18.8
Community	11	Lead	mg/kg	5.65		0.0938	0.375

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
Community	11	Magnesium	mg/kg	2090		1.88	5.63
Community	11	Manganese	mg/kg	213		0.938	4.69
Community	11	Nickel	mg/kg	4.82		0.0938	0.375
Community	11	Potassium	mg/kg	1150		15	56.3
Community	11	Selenium	mg/kg	0.31	U	0.31	0.938
Community	11	Silver	mg/kg	0.133	J	0.0998	0.499
Community	11	Sodium	mg/kg	139		15	46.9
Community	11	Thallium	mg/kg	0.0773	J	0.0563	0.375
Community	11	Vanadium	mg/kg	17		0.0998	0.499
Community	11	Zinc	mg/kg	17		0.375	1.88
Community	25	Aluminum	mg/kg	9410		2.95	9.82
Community	25	Antimony	mg/kg	0.404	J	0.322	0.975
Community	25	Arsenic	mg/kg	4.04		0.196	0.982
Community	25	Barium	mg/kg	226		0.491	1.96
Community	25	Beryllium	mg/kg	0.503		0.0196	0.0982
Community	25	Cadmium	mg/kg	0.304		0.0196	0.196
Community	25	Calcium	mg/kg	66800		64.8	196
Community	25	Chromium	mg/kg	9.62		0.196	0.589
Community	25	Cobalt	mg/kg	5.83		0.0589	0.196
Community	25	Copper	mg/kg	10		0.0648	0.196
Community	25	Iron	mg/kg	9000		6.48	19.6
Community	25	Lead	mg/kg	18.2		0.0982	0.393
Community	25	Magnesium	mg/kg	3430		1.96	5.89
Community	25	Manganese	mg/kg	441		0.982	4.91
Community	25	Nickel	mg/kg	12		0.0982	0.393
Community	25	Potassium	mg/kg	2410		15.7	58.9
Community	25	Selenium	mg/kg	0.324	U	0.324	0.982
Community	25	Silver	mg/kg	0.487	U	0.487	2.44
Community	25	Sodium	mg/kg	104		15.7	49.1
Community	25	Thallium	mg/kg	0.117	J	0.0589	0.393
Community	25	Vanadium	mg/kg	25.3		0.0975	0.487
Community	25	Zinc	mg/kg	50.4		0.393	1.96
Community	62	Aluminum	mg/kg	25100		14.9	49.7
Community	62	Antimony	mg/kg	0.323	J	0.31	0.938

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
Community	62	Arsenic	mg/kg	3.99		0.199	0.994
Community	62	Barium	mg/kg	246		0.497	1.99
Community	62	Beryllium	mg/kg	0.906		0.0199	0.0994
Community	62	Cadmium	mg/kg	0.445		0.0199	0.199
Community	62	Calcium	mg/kg	33600		32.8	99.4
Community	62	Chromium	mg/kg	23.7		0.199	0.596
Community	62	Cobalt	mg/kg	9.38		0.0596	0.199
Community	62	Copper	mg/kg	14.4		0.0656	0.199
Community	62	Iron	mg/kg	20100		32.8	99.4
Community	62	Lead	mg/kg	15.4		0.0994	0.398
Community	62	Magnesium	mg/kg	4560		1.99	5.96
Community	62	Manganese	mg/kg	620		0.994	4.97
Community	62	Nickel	mg/kg	21.8		0.0994	0.398
Community	62	Potassium	mg/kg	4810		15.9	59.6
Community	62	Selenium	mg/kg	0.328	U	0.328	0.994
Community	62	Silver	mg/kg	0.0938	U	0.0938	0.469
Community	62	Sodium	mg/kg	56.9		15.9	49.7
Community	62	Thallium	mg/kg	0.233	J	0.0596	0.398
Community	62	Vanadium	mg/kg	35.4		0.0938	0.469
Community	62	Zinc	mg/kg	57.8		0.398	1.99
On-Site	1	Aluminum	mg/kg	15000		14.6	48.8
On-Site	1	Antimony	mg/kg	1.58	NU	1.58	4.79
On-Site	1	Arsenic	mg/kg	2.8		0.195	0.977
On-Site	1	Barium	mg/kg	160		0.0977	0.391
On-Site	1	Beryllium	mg/kg	0.608		0.0195	0.0977
On-Site	1	Cadmium	mg/kg	0.521		0.0195	0.195
On-Site	1	Calcium	mg/kg	31600		32.2	97.7
On-Site	1	Chromium	mg/kg	11.7		0.195	0.586
On-Site	1	Cobalt	mg/kg	7.44		0.0586	0.195
On-Site	1	Copper	mg/kg	13.9	N	0.0645	0.195
On-Site	1	Iron	mg/kg	17900		32.2	97.7
On-Site	1	Lead	mg/kg	13.7	N	0.0977	0.391
On-Site	1	Magnesium	mg/kg	5510		1.95	5.86
On-Site	1	Manganese	mg/kg	480		0.977	4.88

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	1	Nickel	mg/kg	12.9		0.0977	0.391
On-Site	1	Potassium	mg/kg	5390		15.6	58.6
On-Site	1	Selenium	mg/kg	0.322	U	0.322	0.977
On-Site	1	Silver	mg/kg	0.0958	U	0.0958	0.479
On-Site	1	Sodium	mg/kg	60.9		15.6	48.8
On-Site	1	Thallium	mg/kg	0.215	J	0.0586	0.391
On-Site	1	Vanadium	mg/kg	12.1	N	0.0958	0.479
On-Site	1	Zinc	mg/kg	57.9		0.391	1.95
On-Site	02NE	Aluminum	mg/kg	6410	N	2.96	9.86
On-Site	02NE	Antimony	mg/kg	0.326	*U	0.326	0.988
On-Site	02NE	Arsenic	mg/kg	1.34		0.197	0.986
On-Site	02NE	Barium	mg/kg	66.7	N	0.0986	0.394
On-Site	02NE	Beryllium	mg/kg	0.328		0.0197	0.0986
On-Site	02NE	Cadmium	mg/kg	0.306		0.0197	0.197
On-Site	02NE	Calcium	mg/kg	5270	N	6.51	19.7
On-Site	02NE	Chromium	mg/kg	5.05		0.197	0.592
On-Site	02NE	Cobalt	mg/kg	2.34		0.0592	0.197
On-Site	02NE	Copper	mg/kg	4.84		0.0651	0.197
On-Site	02NE	Iron	mg/kg	5140	N	6.51	19.7
On-Site	02NE	Lead	mg/kg	6.54		0.0986	0.394
On-Site	02NE	Magnesium	mg/kg	1900	N	1.97	5.92
On-Site	02NE	Manganese	mg/kg	111	N	0.197	0.986
On-Site	02NE	Nickel	mg/kg	5.66		0.0986	0.394
On-Site	02NE	Potassium	mg/kg	1690	N	15.8	59.2
On-Site	02NE	Selenium	mg/kg	0.325	U	0.325	0.986
On-Site	02NE	Silver	mg/kg	0.0988	U	0.0988	0.494
On-Site	02NE	Sodium	mg/kg	20.2	JN	15.8	49.3
On-Site	02NE	Thallium	mg/kg	0.0738	J	0.0592	0.394
On-Site	02NE	Vanadium	mg/kg	22.5		0.0988	0.494
On-Site	02NE	Zinc	mg/kg	18.9		0.394	1.97
On-Site	02NW	Aluminum	mg/kg	5570	N	2.91	9.71
On-Site	02NW	Antimony	mg/kg	2.56	*	0.327	0.99
On-Site	02NW	Arsenic	mg/kg	1.3		0.194	0.971
On-Site	02NW	Barium	mg/kg	88.2	N	0.0971	0.388

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	02NW	Beryllium	mg/kg	0.381		0.0194	0.0971
On-Site	02NW	Cadmium	mg/kg	0.174	J	0.0194	0.194
On-Site	02NW	Calcium	mg/kg	26300	N	64.1	194
On-Site	02NW	Chromium	mg/kg	5.09		0.194	0.583
On-Site	02NW	Cobalt	mg/kg	2.77		0.0583	0.194
On-Site	02NW	Copper	mg/kg	4.79		0.0641	0.194
On-Site	02NW	Iron	mg/kg	5300	N	6.41	19.4
On-Site	02NW	Lead	mg/kg	7.51		0.0971	0.388
On-Site	02NW	Magnesium	mg/kg	2910	N	1.94	5.83
On-Site	02NW	Manganese	mg/kg	144	N	0.194	0.971
On-Site	02NW	Nickel	mg/kg	6.14		0.0971	0.388
On-Site	02NW	Potassium	mg/kg	1700	N	15.5	58.3
On-Site	02NW	Selenium	mg/kg	0.32	U	0.32	0.971
On-Site	02NW	Silver	mg/kg	0.099	U	0.099	0.495
On-Site	02NW	Sodium	mg/kg	91.4	N	15.5	48.5
On-Site	02NW	Thallium	mg/kg	0.0806	J	0.0583	0.388
On-Site	02NW	Vanadium	mg/kg	22.7		0.099	0.495
On-Site	02NW	Zinc	mg/kg	22.9		0.388	1.94
On-Site	02SE	Aluminum	mg/kg	7430	N	2.94	9.78
On-Site	02SE	Antimony	mg/kg	0.324	*U	0.324	0.982
On-Site	02SE	Arsenic	mg/kg	1.49		0.196	0.978
On-Site	02SE	Barium	mg/kg	73.9	N	0.0978	0.391
On-Site	02SE	Beryllium	mg/kg	0.402		0.0196	0.0978
On-Site	02SE	Cadmium	mg/kg	0.431		0.0196	0.196
On-Site	02SE	Calcium	mg/kg	12800	N	32.3	97.8
On-Site	02SE	Chromium	mg/kg	5.65		0.196	0.587
On-Site	02SE	Cobalt	mg/kg	2.54		0.0587	0.196
On-Site	02SE	Copper	mg/kg	5.39		0.0646	0.196
On-Site	02SE	Iron	mg/kg	5680	N	6.46	19.6
On-Site	02SE	Lead	mg/kg	7.38		0.0978	0.391
On-Site	02SE	Magnesium	mg/kg	2260	N	1.96	5.87
On-Site	02SE	Manganese	mg/kg	109	N	0.196	0.978
On-Site	02SE	Nickel	mg/kg	6.34		0.0978	0.391
On-Site	02SE	Potassium	mg/kg	1910	N	15.7	58.7

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	02SE	Selenium	mg/kg	0.323	U	0.323	0.978
On-Site	02SE	Silver	mg/kg	0.141	J	0.0982	0.491
On-Site	02SE	Sodium	mg/kg	18.2	JN	15.7	48.9
On-Site	02SE	Thallium	mg/kg	0.0879	J	0.0587	0.391
On-Site	02SE	Vanadium	mg/kg	16.9		0.0982	0.491
On-Site	02SE	Zinc	mg/kg	19.8		0.391	1.96
On-Site	02SW	Aluminum	mg/kg	5170	N	2.94	9.78
On-Site	02SW	Antimony	mg/kg	0.326	*U	0.326	0.988
On-Site	02SW	Arsenic	mg/kg	1.28		0.196	0.978
On-Site	02SW	Barium	mg/kg	48.1	N	0.0978	0.391
On-Site	02SW	Beryllium	mg/kg	0.277		0.0196	0.0978
On-Site	02SW	Cadmium	mg/kg	0.0984	J	0.0196	0.196
On-Site	02SW	Calcium	mg/kg	2170	N	6.46	19.6
On-Site	02SW	Chromium	mg/kg	4.32		0.196	0.587
On-Site	02SW	Cobalt	mg/kg	1.97		0.0587	0.196
On-Site	02SW	Copper	mg/kg	3.64		0.0646	0.196
On-Site	02SW	Iron	mg/kg	4440	N	6.46	19.6
On-Site	02SW	Lead	mg/kg	4.1		0.0978	0.391
On-Site	02SW	Magnesium	mg/kg	1370	N	1.96	5.87
On-Site	02SW	Manganese	mg/kg	102	N	0.196	0.978
On-Site	02SW	Nickel	mg/kg	3.79		0.0978	0.391
On-Site	02SW	Potassium	mg/kg	1400	N	15.7	58.7
On-Site	02SW	Selenium	mg/kg	0.323	U	0.323	0.978
On-Site	02SW	Silver	mg/kg	0.175	J	0.0988	0.494
On-Site	02SW	Sodium	mg/kg	20.5	JN	15.7	48.9
On-Site	02SW	Thallium	mg/kg	0.0718	J	0.0587	0.391
On-Site	02SW	Vanadium	mg/kg	20.1		0.0988	0.494
On-Site	02SW	Zinc	mg/kg	15.2		0.391	1.96
On-Site	6	Aluminum	mg/kg	23800		13.8	46
On-Site	6	Antimony	mg/kg	0.672	*J	0.315	0.954
On-Site	6	Arsenic	mg/kg	3.99		0.184	0.919
On-Site	6	Barium	mg/kg	135		0.0919	0.368
On-Site	6	Beryllium	mg/kg	0.849		0.0184	0.0919
On-Site	6	Cadmium	mg/kg	0.403		0.0184	0.184

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	6	Calcium	mg/kg	3360		6.07	18.4
On-Site	6	Chromium	mg/kg	14.8		0.184	0.551
On-Site	6	Cobalt	mg/kg	4.88		0.0551	0.184
On-Site	6	Copper	mg/kg	16		0.0607	0.184
On-Site	6	Iron	mg/kg	16900		30.3	91.9
On-Site	6	Lead	mg/kg	11.7		0.0919	0.368
On-Site	6	Magnesium	mg/kg	3620		1.84	5.51
On-Site	6	Manganese	mg/kg	178		0.184	0.919
On-Site	6	Nickel	mg/kg	12.4		0.0919	0.368
On-Site	6	Potassium	mg/kg	3730		14.7	55.1
On-Site	6	Selenium	mg/kg	0.303	U	0.303	0.919
On-Site	6	Silver	mg/kg	0.153	J	0.0954	0.477
On-Site	6	Sodium	mg/kg	55.1		14.7	46
On-Site	6	Thallium	mg/kg	0.196	J	0.0551	0.368
On-Site	6	Vanadium	mg/kg	32.2		0.0954	0.477
On-Site	6	Zinc	mg/kg	47.2		0.368	1.84
On-Site	33	Aluminum	mg/kg	7550	N	2.87	9.58
On-Site	33	Antimony	mg/kg	0.343	*J	0.325	0.984
On-Site	33	Arsenic	mg/kg	4.02		0.192	0.958
On-Site	33	Barium	mg/kg	114	N	0.0958	0.383
On-Site	33	Beryllium	mg/kg	0.803		0.0192	0.0958
On-Site	33	Cadmium	mg/kg	0.405		0.0192	0.192
On-Site	33	Calcium	mg/kg	60900	N	63.2	192
On-Site	33	Chromium	mg/kg	8.49		0.192	0.575
On-Site	33	Cobalt	mg/kg	4.52		0.0575	0.192
On-Site	33	Copper	mg/kg	7.93		0.0632	0.192
On-Site	33	Iron	mg/kg	8580	N	6.32	19.2
On-Site	33	Lead	mg/kg	11.9		0.0958	0.383
On-Site	33	Magnesium	mg/kg	4440	N	1.92	5.75
On-Site	33	Manganese	mg/kg	302	N	1.92	9.58
On-Site	33	Nickel	mg/kg	11.8		0.0958	0.383
On-Site	33	Potassium	mg/kg	2230	N	15.3	57.5
On-Site	33	Selenium	mg/kg	0.316	U	0.316	0.958
On-Site	33	Silver	mg/kg	0.492	U	0.492	2.46

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	33	Sodium	mg/kg	336	N	15.3	47.9
On-Site	33	Thallium	mg/kg	0.131	J	0.0575	0.383
On-Site	33	Vanadium	mg/kg	25.5		0.0984	0.492
On-Site	33	Zinc	mg/kg	45.5		0.383	1.92
On-Site	34	Aluminum	mg/kg	14000		14	46.7
On-Site	34	Arsenic	mg/kg	4.6		0.187	0.935
On-Site	34	Barium	mg/kg	164		0.0935	0.374
On-Site	34	Beryllium	mg/kg	0.684		0.0187	0.0935
On-Site	34	Cadmium	mg/kg	0.429		0.0187	0.187
On-Site	34	Calcium	mg/kg	17000		30.8	93.5
On-Site	34	Chromium	mg/kg	13.5		0.187	0.561
On-Site	34	Cobalt	mg/kg	6.17		0.0561	0.187
On-Site	34	Copper	mg/kg	9.63	N	0.0617	0.187
On-Site	34	Iron	mg/kg	14400		30.8	93.5
On-Site	34	Lead	mg/kg	11.4	N	0.0935	0.374
On-Site	34	Magnesium	mg/kg	3640		1.87	5.61
On-Site	34	Manganese	mg/kg	310		0.935	4.67
On-Site	34	Nickel	mg/kg	13.1		0.0935	0.374
On-Site	34	Potassium	mg/kg	2970		15	56.1
On-Site	34	Selenium	mg/kg	0.308	U	0.308	0.935
On-Site	34	Silver	mg/kg	0.0973	U	0.0973	0.486
On-Site	34	Sodium	mg/kg	48.5		15	46.7
On-Site	34	Thallium	mg/kg	0.134	J	0.0561	0.374
On-Site	34	Vanadium	mg/kg	31.4	N	0.0973	0.486
On-Site	34	Zinc	mg/kg	42.2		0.374	1.87
On-Site	45	Aluminum	mg/kg	11400		13.2	44
On-Site	45	Arsenic	mg/kg	3.01		0.176	0.88
On-Site	45	Barium	mg/kg	97.1		0.088	0.352
On-Site	45	Beryllium	mg/kg	0.486		0.0176	0.088
On-Site	45	Cadmium	mg/kg	0.258		0.0176	0.176
On-Site	45	Calcium	mg/kg	11400		29	88
On-Site	45	Chromium	mg/kg	9.31		0.176	0.528
On-Site	45	Cobalt	mg/kg	3.6		0.0528	0.176
On-Site	45	Copper	mg/kg	7.35	N	0.0581	0.176

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	45	Iron	mg/kg	9730		29	88
On-Site	45	Lead	mg/kg	7.23	N	0.088	0.352
On-Site	45	Magnesium	mg/kg	3130		1.76	5.28
On-Site	45	Manganese	mg/kg	133		0.176	0.88
On-Site	45	Nickel	mg/kg	8.19		0.088	0.352
On-Site	45	Potassium	mg/kg	2710		14.1	52.8
On-Site	45	Selenium	mg/kg	0.29	U	0.29	0.88
On-Site	45	Silver	mg/kg	0.0919	U	0.0919	0.46
On-Site	45	Sodium	mg/kg	44.7		14.1	44
On-Site	45	Thallium	mg/kg	0.112	J	0.0528	0.352
On-Site	45	Vanadium	mg/kg	21.5	N	0.0919	0.46
On-Site	45	Zinc	mg/kg	28.1		0.352	1.76
On-Site	51	Aluminum	mg/kg	13000		14.3	47.6
On-Site	51	Antimony	mg/kg	0.303	*U	0.303	0.919
On-Site	51	Arsenic	mg/kg	2.48		0.19	0.952
On-Site	51	Barium	mg/kg	110		0.0952	0.381
On-Site	51	Beryllium	mg/kg	0.544		0.019	0.0952
On-Site	51	Cadmium	mg/kg	0.393		0.019	0.19
On-Site	51	Calcium	mg/kg	18700		31.4	95.2
On-Site	51	Chromium	mg/kg	65.5		0.19	0.571
On-Site	51	Cobalt	mg/kg	3.72		0.0571	0.19
On-Site	51	Copper	mg/kg	11.3		0.0629	0.19
On-Site	51	Iron	mg/kg	10500		31.4	95.2
On-Site	51	Lead	mg/kg	12.1		0.0952	0.381
On-Site	51	Magnesium	mg/kg	3080		1.9	5.71
On-Site	51	Manganese	mg/kg	139		0.19	0.952
On-Site	51	Nickel	mg/kg	8.74		0.0952	0.381
On-Site	51	Potassium	mg/kg	2410		15.2	57.1
On-Site	51	Selenium	mg/kg	0.314	U	0.314	0.952
On-Site	51	Silver	mg/kg	0.0919	U	0.0919	0.46
On-Site	51	Sodium	mg/kg	61.6		15.2	47.6
On-Site	51	Thallium	mg/kg	0.119	J	0.0571	0.381
On-Site	51	Vanadium	mg/kg	21.9		0.0919	0.46
On-Site	51	Zinc	mg/kg	123		0.381	1.9

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	52	Aluminum	mg/kg	9200		2.82	9.42
On-Site	52	Antimony	mg/kg	2.48	*	0.307	0.929
On-Site	52	Arsenic	mg/kg	2.38		0.188	0.942
On-Site	52	Barium	mg/kg	90.8		0.0942	0.377
On-Site	52	Beryllium	mg/kg	0.418		0.0188	0.0942
On-Site	52	Cadmium	mg/kg	0.22		0.0188	0.188
On-Site	52	Calcium	mg/kg	20700		31.1	94.2
On-Site	52	Chromium	mg/kg	7.35		0.188	0.565
On-Site	52	Cobalt	mg/kg	3.03		0.0565	0.188
On-Site	52	Copper	mg/kg	5.75		0.0621	0.188
On-Site	52	Iron	mg/kg	8030		6.21	18.8
On-Site	52	Lead	mg/kg	6.35		0.0942	0.377
On-Site	52	Magnesium	mg/kg	2770		1.88	5.65
On-Site	52	Manganese	mg/kg	121		0.188	0.942
On-Site	52	Nickel	mg/kg	6.75		0.0942	0.377
On-Site	52	Potassium	mg/kg	1670		15.1	56.5
On-Site	52	Selenium	mg/kg	0.311	U	0.311	0.942
On-Site	52	Silver	mg/kg	0.163	J	0.0929	0.465
On-Site	52	Sodium	mg/kg	47.8		15.1	47.1
On-Site	52	Thallium	mg/kg	0.0919	J	0.0565	0.377
On-Site	52	Vanadium	mg/kg	18.7		0.0929	0.465
On-Site	52	Zinc	mg/kg	27.2		0.377	1.88
On-Site	53	Aluminum	mg/kg	5710		2.98	9.92
On-Site	53	Antimony	mg/kg	0.324	U	0.324	0.98
On-Site	53	Arsenic	mg/kg	1.57		0.198	0.992
On-Site	53	Barium	mg/kg	48.1		0.0992	0.397
On-Site	53	Beryllium	mg/kg	0.28		0.0198	0.0992
On-Site	53	Cadmium	mg/kg	0.0933	J	0.0198	0.198
On-Site	53	Calcium	mg/kg	2900		6.55	19.8
On-Site	53	Chromium	mg/kg	5.08		0.198	0.595
On-Site	53	Cobalt	mg/kg	2.4		0.0595	0.198
On-Site	53	Copper	mg/kg	4		0.0655	0.198
On-Site	53	Iron	mg/kg	4880		6.55	19.8
On-Site	53	Lead	mg/kg	6.11		0.0992	0.397

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	53	Magnesium	mg/kg	1500		1.98	5.95
On-Site	53	Manganese	mg/kg	103		0.198	0.992
On-Site	53	Nickel	mg/kg	4.34		0.0992	0.397
On-Site	53	Potassium	mg/kg	1340		15.9	59.5
On-Site	53	Selenium	mg/kg	0.327	U	0.327	0.992
On-Site	53	Silver	mg/kg	0.111	J	0.098	0.49
On-Site	53	Sodium	mg/kg	17.2	J	15.9	49.6
On-Site	53	Thallium	mg/kg	0.0687	J	0.0595	0.397
On-Site	53	Vanadium	mg/kg	15		0.098	0.49
On-Site	53	Zinc	mg/kg	14.5		0.397	1.98
On-Site	54	Aluminum	mg/kg	9870		14	46.7
On-Site	54	Antimony	mg/kg	0.518	*J	0.323	0.978
On-Site	54	Arsenic	mg/kg	1.72		0.187	0.935
On-Site	54	Barium	mg/kg	79		0.0935	0.374
On-Site	54	Beryllium	mg/kg	0.39		0.0187	0.0935
On-Site	54	Cadmium	mg/kg	0.584		0.0187	0.187
On-Site	54	Calcium	mg/kg	8290		6.17	18.7
On-Site	54	Chromium	mg/kg	7.95		0.187	0.561
On-Site	54	Cobalt	mg/kg	2.89		0.0561	0.187
On-Site	54	Copper	mg/kg	9.75		0.0617	0.187
On-Site	54	Iron	mg/kg	7740		6.17	18.7
On-Site	54	Lead	mg/kg	7.95		0.0935	0.374
On-Site	54	Magnesium	mg/kg	2050		1.87	5.61
On-Site	54	Manganese	mg/kg	136		0.187	0.935
On-Site	54	Nickel	mg/kg	6.61		0.0935	0.374
On-Site	54	Potassium	mg/kg	2130		15	56.1
On-Site	54	Selenium	mg/kg	0.308	U	0.308	0.935
On-Site	54	Silver	mg/kg	0.0978	U	0.0978	0.489
On-Site	54	Sodium	mg/kg	53.8		15	46.7
On-Site	54	Thallium	mg/kg	0.0895	J	0.0561	0.374
On-Site	54	Vanadium	mg/kg	20.6		0.0978	0.489
On-Site	54	Zinc	mg/kg	27		0.374	1.87
On-Site	55	Aluminum	mg/kg	6160	N	2.98	9.94
On-Site	55	Antimony	mg/kg	0.324	*U	0.324	0.98

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	55	Arsenic	mg/kg	1.32		0.199	0.994
On-Site	55	Barium	mg/kg	65.9	N	0.0994	0.398
On-Site	55	Beryllium	mg/kg	0.329		0.0199	0.0994
On-Site	55	Cadmium	mg/kg	0.181	J	0.0199	0.199
On-Site	55	Calcium	mg/kg	6420	N	6.56	19.9
On-Site	55	Chromium	mg/kg	4.9		0.199	0.596
On-Site	55	Cobalt	mg/kg	2.24		0.0596	0.199
On-Site	55	Copper	mg/kg	4.58		0.0656	0.199
On-Site	55	Iron	mg/kg	4960	N	6.56	19.9
On-Site	55	Lead	mg/kg	8.52		0.0994	0.398
On-Site	55	Magnesium	mg/kg	2400	N	1.99	5.96
On-Site	55	Manganese	mg/kg	139	N	0.199	0.994
On-Site	55	Nickel	mg/kg	5.01		0.0994	0.398
On-Site	55	Potassium	mg/kg	2010	N	15.9	59.6
On-Site	55	Selenium	mg/kg	0.328	U	0.328	0.994
On-Site	55	Silver	mg/kg	0.098	U	0.098	0.49
On-Site	55	Sodium	mg/kg	37.4	JN	15.9	49.7
On-Site	55	Thallium	mg/kg	0.0748	J	0.0596	0.398
On-Site	55	Vanadium	mg/kg	21.2		0.098	0.49
On-Site	55	Zinc	mg/kg	24.5		0.398	1.99
On-Site	56	Aluminum	mg/kg	4420		14.5	48.4
On-Site	56	Antimony	mg/kg	0.306	U	0.306	0.926
On-Site	56	Arsenic	mg/kg	1.62		0.193	0.967
On-Site	56	Barium	mg/kg	57		0.0967	0.387
On-Site	56	Beryllium	mg/kg	0.252		0.0193	0.0967
On-Site	56	Cadmium	mg/kg	0.207		0.0193	0.193
On-Site	56	Calcium	mg/kg	37700		31.9	96.7
On-Site	56	Chromium	mg/kg	4.68		0.193	0.58
On-Site	56	Cobalt	mg/kg	3.35		0.058	0.193
On-Site	56	Copper	mg/kg	9.6		0.0638	0.193
On-Site	56	Iron	mg/kg	5350		6.38	19.3
On-Site	56	Lead	mg/kg	4.64		0.0967	0.387
On-Site	56	Magnesium	mg/kg	2290		1.93	5.8
On-Site	56	Manganese	mg/kg	137		0.193	0.967

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	56	Nickel	mg/kg	7.19		0.0967	0.387
On-Site	56	Potassium	mg/kg	695		15.5	58
On-Site	56	Selenium	mg/kg	0.319	U	0.319	0.967
On-Site	56	Silver	mg/kg	0.0926	U	0.0926	0.463
On-Site	56	Sodium	mg/kg	55.6		15.5	48.4
On-Site	56	Thallium	mg/kg	0.058	U	0.058	0.387
On-Site	56	Vanadium	mg/kg	18		0.0926	0.463
On-Site	56	Zinc	mg/kg	54.1		0.387	1.93
On-Site	57	Aluminum	mg/kg	7320		2.96	9.86
On-Site	57	Antimony	mg/kg	0.327	U	0.327	0.992
On-Site	57	Arsenic	mg/kg	3.01		0.197	0.986
On-Site	57	Barium	mg/kg	171		0.0986	0.394
On-Site	57	Beryllium	mg/kg	0.36		0.0197	0.0986
On-Site	57	Cadmium	mg/kg	0.19	J	0.0197	0.197
On-Site	57	Calcium	mg/kg	47900		32.5	98.6
On-Site	57	Chromium	mg/kg	7.07		0.197	0.592
On-Site	57	Cobalt	mg/kg	3.82		0.0592	0.197
On-Site	57	Copper	mg/kg	7.09		0.0651	0.197
On-Site	57	Iron	mg/kg	8670		6.51	19.7
On-Site	57	Lead	mg/kg	7.73		0.0986	0.394
On-Site	57	Magnesium	mg/kg	4420		1.97	5.92
On-Site	57	Manganese	mg/kg	177		0.197	0.986
On-Site	57	Nickel	mg/kg	7.57		0.0986	0.394
On-Site	57	Potassium	mg/kg	1990		15.8	59.2
On-Site	57	Selenium	mg/kg	0.325	U	0.325	0.986
On-Site	57	Silver	mg/kg	0.0992	U	0.0992	0.496
On-Site	57	Sodium	mg/kg	74.7		15.8	49.3
On-Site	57	Thallium	mg/kg	0.0862	J	0.0592	0.394
On-Site	57	Vanadium	mg/kg	39.1		0.0992	0.496
On-Site	57	Zinc	mg/kg	90		0.394	1.97
On-Site	86	Aluminum	mg/kg	9720		2.99	9.96
On-Site	86	Antimony	mg/kg	0.429	J	0.325	0.984
On-Site	86	Arsenic	mg/kg	2.79		0.199	0.996
On-Site	86	Barium	mg/kg	177		0.0996	0.398

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	86	Beryllium	mg/kg	0.446		0.0199	0.0996
On-Site	86	Cadmium	mg/kg	0.167	J	0.0199	0.199
On-Site	86	Calcium	mg/kg	63500		65.7	199
On-Site	86	Chromium	mg/kg	7.74		0.199	0.598
On-Site	86	Cobalt	mg/kg	3.99		0.0598	0.199
On-Site	86	Copper	mg/kg	8.11		0.0657	0.199
On-Site	86	Iron	mg/kg	8900		6.57	19.9
On-Site	86	Lead	mg/kg	6.68		0.0996	0.398
On-Site	86	Magnesium	mg/kg	3550		1.99	5.98
On-Site	86	Manganese	mg/kg	176		0.199	0.996
On-Site	86	Nickel	mg/kg	8.74		0.0996	0.398
On-Site	86	Potassium	mg/kg	2000		15.9	59.8
On-Site	86	Selenium	mg/kg	0.329	U	0.329	0.996
On-Site	86	Silver	mg/kg	0.0984	U	0.0984	0.492
On-Site	86	Sodium	mg/kg	64.2		15.9	49.8
On-Site	86	Thallium	mg/kg	0.0976	J	0.0598	0.398
On-Site	86	Vanadium	mg/kg	42.5		0.0984	0.492
On-Site	86	Zinc	mg/kg	27		0.398	1.99
On-Site	92	Aluminum	mg/kg	11100		14.7	48.9
On-Site	92	Antimony	mg/kg	0.326	*J	0.324	0.982
On-Site	92	Arsenic	mg/kg	2.1		0.196	0.978
On-Site	92	Barium	mg/kg	84.9		0.0978	0.391
On-Site	92	Beryllium	mg/kg	0.439		0.0196	0.0978
On-Site	92	Cadmium	mg/kg	0.321		0.0196	0.196
On-Site	92	Calcium	mg/kg	1750		6.46	19.6
On-Site	92	Chromium	mg/kg	9.57		0.196	0.587
On-Site	92	Cobalt	mg/kg	4.21		0.0587	0.196
On-Site	92	Copper	mg/kg	7.27		0.0646	0.196
On-Site	92	Iron	mg/kg	9230		6.46	19.6
On-Site	92	Lead	mg/kg	7.5		0.0978	0.391
On-Site	92	Magnesium	mg/kg	2090		1.96	5.87
On-Site	92	Manganese	mg/kg	225		0.978	4.89
On-Site	92	Nickel	mg/kg	7.33		0.0978	0.391
On-Site	92	Potassium	mg/kg	2100		15.7	58.7

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	92	Selenium	mg/kg	0.323	U	0.323	0.978
On-Site	92	Silver	mg/kg	0.0982	U	0.0982	0.491
On-Site	92	Sodium	mg/kg	42.5	J	15.7	48.9
On-Site	92	Thallium	mg/kg	0.118	J	0.0587	0.391
On-Site	92	Vanadium	mg/kg	22.7		0.0982	0.491
On-Site	92	Zinc	mg/kg	25.9		0.391	1.96
Perimeter	4	Aluminum	mg/kg	6210	N	2.98	9.94
Perimeter	4	Antimony	mg/kg	0.317	*U	0.317	0.96
Perimeter	4	Arsenic	mg/kg	1.37		0.199	0.994
Perimeter	4	Barium	mg/kg	76	N	0.0994	0.398
Perimeter	4	Beryllium	mg/kg	0.318		0.0199	0.0994
Perimeter	4	Cadmium	mg/kg	0.177	J	0.0199	0.199
Perimeter	4	Calcium	mg/kg	8110	N	6.56	19.9
Perimeter	4	Chromium	mg/kg	5.35		0.199	0.596
Perimeter	4	Cobalt	mg/kg	2.41		0.0596	0.199
Perimeter	4	Copper	mg/kg	4.89		0.0656	0.199
Perimeter	4	Iron	mg/kg	5180	N	6.56	19.9
Perimeter	4	Lead	mg/kg	7.99		0.0994	0.398
Perimeter	4	Magnesium	mg/kg	2560	N	1.99	5.96
Perimeter	4	Manganese	mg/kg	140	N	0.199	0.994
Perimeter	4	Nickel	mg/kg	5.39		0.0994	0.398
Perimeter	4	Potassium	mg/kg	1940	N	15.9	59.6
Perimeter	4	Selenium	mg/kg	0.328	U	0.328	0.994
Perimeter	4	Silver	mg/kg	0.096	U	0.096	0.48
Perimeter	4	Sodium	mg/kg	37.2	JN	15.9	49.7
Perimeter	4	Thallium	mg/kg	0.0716	J	0.0596	0.398
Perimeter	4	Vanadium	mg/kg	21.4		0.096	0.48
Perimeter	4	Zinc	mg/kg	22.3		0.398	1.99
Perimeter	12	Aluminum	mg/kg	14300		14.8	49.3
Perimeter	12	Antimony	mg/kg	0.427	J	0.322	0.975
Perimeter	12	Arsenic	mg/kg	2.27		0.197	0.986
Perimeter	12	Barium	mg/kg	141		0.0986	0.394
Perimeter	12	Beryllium	mg/kg	0.528		0.0197	0.0986
Perimeter	12	Cadmium	mg/kg	0.289		0.0197	0.197

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
Perimeter	12	Calcium	mg/kg	7110		6.51	19.7
Perimeter	12	Chromium	mg/kg	10.9		0.197	0.592
Perimeter	12	Cobalt	mg/kg	6.03		0.0592	0.197
Perimeter	12	Copper	mg/kg	13.2		0.0651	0.197
Perimeter	12	Iron	mg/kg	13000		32.5	98.6
Perimeter	12	Lead	mg/kg	15.7		0.0986	0.394
Perimeter	12	Magnesium	mg/kg	3870		1.97	5.92
Perimeter	12	Manganese	mg/kg	353		0.986	4.93
Perimeter	12	Nickel	mg/kg	9.67		0.0986	0.394
Perimeter	12	Potassium	mg/kg	2640		15.8	59.2
Perimeter	12	Selenium	mg/kg	0.325	U	0.325	0.986
Perimeter	12	Silver	mg/kg	0.153	J	0.0975	0.487
Perimeter	12	Sodium	mg/kg	66.1		15.8	49.3
Perimeter	12	Thallium	mg/kg	0.135	J	0.0592	0.394
Perimeter	12	Vanadium	mg/kg	32.8		0.0975	0.487
Perimeter	12	Zinc	mg/kg	46.4		0.394	1.97
Perimeter	16	Aluminum	mg/kg	9830		2.99	9.98
Perimeter	16	Antimony	mg/kg	0.551	J	0.32	0.971
Perimeter	16	Arsenic	mg/kg	1.9		0.2	0.998
Perimeter	16	Barium	mg/kg	98.3		0.0998	0.399
Perimeter	16	Beryllium	mg/kg	0.508		0.02	0.0998
Perimeter	16	Cadmium	mg/kg	0.192	J	0.02	0.2
Perimeter	16	Calcium	mg/kg	8490		6.59	20
Perimeter	16	Chromium	mg/kg	6.9		0.2	0.599
Perimeter	16	Cobalt	mg/kg	5.39		0.0599	0.2
Perimeter	16	Copper	mg/kg	10.1		0.0659	0.2
Perimeter	16	Iron	mg/kg	13000		32.9	99.8
Perimeter	16	Lead	mg/kg	7.73		0.0998	0.399
Perimeter	16	Magnesium	mg/kg	3910		2	5.99
Perimeter	16	Manganese	mg/kg	347		0.998	4.99
Perimeter	16	Nickel	mg/kg	8.2		0.0998	0.399
Perimeter	16	Potassium	mg/kg	2530		16	59.9
Perimeter	16	Selenium	mg/kg	0.329	U	0.329	0.998
Perimeter	16	Silver	mg/kg	0.0971	U	0.0971	0.485

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
Perimeter	16	Sodium	mg/kg	43	J	16	49.9
Perimeter	16	Thallium	mg/kg	0.134	J	0.0599	0.399
Perimeter	16	Vanadium	mg/kg	54.9		0.0971	0.485
Perimeter	16	Zinc	mg/kg	43.1		0.399	2
Perimeter	19	Aluminum	mg/kg	9550		2.95	9.82
Perimeter	19	Antimony	mg/kg	0.55	J	0.324	0.982
Perimeter	19	Arsenic	mg/kg	1.94		0.196	0.982
Perimeter	19	Barium	mg/kg	94.7		0.0982	0.393
Perimeter	19	Beryllium	mg/kg	0.408		0.0196	0.0982
Perimeter	19	Cadmium	mg/kg	0.283		0.0196	0.196
Perimeter	19	Calcium	mg/kg	7750		6.48	19.6
Perimeter	19	Chromium	mg/kg	12.6		0.196	0.589
Perimeter	19	Cobalt	mg/kg	5.36		0.0589	0.196
Perimeter	19	Copper	mg/kg	12		0.0648	0.196
Perimeter	19	Iron	mg/kg	11000		32.4	98.2
Perimeter	19	Lead	mg/kg	20.2		0.0982	0.393
Perimeter	19	Magnesium	mg/kg	3930		1.96	5.89
Perimeter	19	Manganese	mg/kg	279		0.982	4.91
Perimeter	19	Nickel	mg/kg	11.2		0.0982	0.393
Perimeter	19	Potassium	mg/kg	2590		15.7	58.9
Perimeter	19	Selenium	mg/kg	0.324	U	0.324	0.982
Perimeter	19	Silver	mg/kg	0.114	J	0.0982	0.491
Perimeter	19	Sodium	mg/kg	61.4		15.7	49.1
Perimeter	19	Thallium	mg/kg	0.142	J	0.0589	0.393
Perimeter	19	Vanadium	mg/kg	28.4		0.0982	0.491
Perimeter	19	Zinc	mg/kg	43.1		0.393	1.96
Perimeter	58	Aluminum	mg/kg	11700		15	50
Perimeter	58	Antimony	mg/kg	0.397	J	0.315	0.956
Perimeter	58	Arsenic	mg/kg	3.59		0.2	1
Perimeter	58	Barium	mg/kg	195		0.1	0.4
Perimeter	58	Beryllium	mg/kg	0.495		0.02	0.1
Perimeter	58	Cadmium	mg/kg	0.232		0.02	0.2
Perimeter	58	Calcium	mg/kg	65000		66	200
Perimeter	58	Chromium	mg/kg	7.71		0.2	0.6

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
Perimeter	58	Cobalt	mg/kg	5.17		0.06	0.2
Perimeter	58	Copper	mg/kg	9.18		0.066	0.2
Perimeter	58	Iron	mg/kg	11200		33	100
Perimeter	58	Lead	mg/kg	10.9		0.1	0.4
Perimeter	58	Magnesium	mg/kg	4760		2	6
Perimeter	58	Manganese	mg/kg	224		1	5
Perimeter	58	Nickel	mg/kg	9.31		0.1	0.4
Perimeter	58	Potassium	mg/kg	3100		16	60
Perimeter	58	Selenium	mg/kg	0.33	U	0.33	1
Perimeter	58	Silver	mg/kg	0.478	U	0.478	2.39
Perimeter	58	Sodium	mg/kg	85.3		16	50
Perimeter	58	Thallium	mg/kg	0.115	J	0.06	0.4
Perimeter	58	Vanadium	mg/kg	33.2		0.0956	0.478
Perimeter	58	Zinc	mg/kg	36.4		0.4	2
Perimeter	60	Aluminum	mg/kg	9330		2.81	9.38
Perimeter	60	Arsenic	mg/kg	2.46		0.188	0.938
Perimeter	60	Barium	mg/kg	108		0.0938	0.375
Perimeter	60	Beryllium	mg/kg	0.505		0.0188	0.0938
Perimeter	60	Cadmium	mg/kg	0.308		0.0188	0.188
Perimeter	60	Calcium	mg/kg	26800		31	93.8
Perimeter	60	Chromium	mg/kg	9.1		0.188	0.563
Perimeter	60	Cobalt	mg/kg	5.02		0.0563	0.188
Perimeter	60	Copper	mg/kg	8.76	N	0.0619	0.188
Perimeter	60	Iron	mg/kg	11500		31	93.8
Perimeter	60	Lead	mg/kg	8.14	N	0.0938	0.375
Perimeter	60	Magnesium	mg/kg	3840		1.88	5.63
Perimeter	60	Manganese	mg/kg	264		0.938	4.69
Perimeter	60	Nickel	mg/kg	9.62		0.0938	0.375
Perimeter	60	Potassium	mg/kg	2890		15	56.3
Perimeter	60	Selenium	mg/kg	0.31	U	0.31	0.938
Perimeter	60	Silver	mg/kg	0.126	J	0.0965	0.483
Perimeter	60	Sodium	mg/kg	55		15	46.9
Perimeter	60	Thallium	mg/kg	0.106	J	0.0563	0.375
Perimeter	60	Vanadium	mg/kg	28.5	N	0.0965	0.483

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
Perimeter	60	Zinc	mg/kg	34.5		0.375	1.88
Perimeter	61	Aluminum	mg/kg	8180		2.7	9.01
Perimeter	61	Antimony	mg/kg	0.405	*J	0.306	0.928
Perimeter	61	Arsenic	mg/kg	3.28		0.18	0.901
Perimeter	61	Barium	mg/kg	196		0.45	1.8
Perimeter	61	Beryllium	mg/kg	0.339		0.018	0.0901
Perimeter	61	Cadmium	mg/kg	0.321		0.018	0.18
Perimeter	61	Calcium	mg/kg	44900		29.7	90.1
Perimeter	61	Chromium	mg/kg	6.5		0.18	0.541
Perimeter	61	Cobalt	mg/kg	3.11		0.0541	0.18
Perimeter	61	Copper	mg/kg	5.89		0.0595	0.18
Perimeter	61	Iron	mg/kg	6970		5.95	18
Perimeter	61	Lead	mg/kg	7.35		0.0901	0.36
Perimeter	61	Magnesium	mg/kg	3400		1.8	5.41
Perimeter	61	Manganese	mg/kg	125		0.18	0.901
Perimeter	61	Nickel	mg/kg	6.38		0.0901	0.36
Perimeter	61	Potassium	mg/kg	1680		14.4	54.1
Perimeter	61	Selenium	mg/kg	0.297	U	0.297	0.901
Perimeter	61	Silver	mg/kg	0.464	U	0.464	2.32
Perimeter	61	Sodium	mg/kg	95.1		14.4	45
Perimeter	61	Thallium	mg/kg	0.0724	J	0.0541	0.36
Perimeter	61	Vanadium	mg/kg	27.4		0.0928	0.464
Perimeter	61	Zinc	mg/kg	22.3		0.36	1.8
Perimeter	64	Aluminum	mg/kg	13600		14.8	49.2
Perimeter	64	Antimony	mg/kg	0.319	U	0.319	0.967
Perimeter	64	Arsenic	mg/kg	1.97		0.197	0.984
Perimeter	64	Barium	mg/kg	105		0.0984	0.394
Perimeter	64	Beryllium	mg/kg	0.502		0.0197	0.0984
Perimeter	64	Cadmium	mg/kg	0.344		0.0197	0.197
Perimeter	64	Calcium	mg/kg	26900		32.5	98.4
Perimeter	64	Chromium	mg/kg	6.44		0.197	0.591
Perimeter	64	Cobalt	mg/kg	7.72		0.0591	0.197
Perimeter	64	Copper	mg/kg	11.7		0.065	0.197
Perimeter	64	Iron	mg/kg	21200		32.5	98.4

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
Perimeter	64	Lead	mg/kg	9.25		0.0984	0.394
Perimeter	64	Magnesium	mg/kg	7260		1.97	5.91
Perimeter	64	Manganese	mg/kg	723		0.984	4.92
Perimeter	64	Nickel	mg/kg	9.26		0.0984	0.394
Perimeter	64	Potassium	mg/kg	2740		15.7	59.1
Perimeter	64	Selenium	mg/kg	0.325	U	0.325	0.984
Perimeter	64	Silver	mg/kg	0.0967	U	0.0967	0.484
Perimeter	64	Sodium	mg/kg	62.1		15.7	49.2
Perimeter	64	Thallium	mg/kg	0.106	J	0.0591	0.394
Perimeter	64	Vanadium	mg/kg	62.3		0.0967	0.484
Perimeter	64	Zinc	mg/kg	75.5		0.394	1.97
Perimeter	80	Aluminum	mg/kg	15000		14.9	49.5
Perimeter	80	Antimony	mg/kg	0.518	J	0.327	0.99
Perimeter	80	Arsenic	mg/kg	2.76		0.198	0.99
Perimeter	80	Barium	mg/kg	159		0.099	0.396
Perimeter	80	Beryllium	mg/kg	0.562		0.0198	0.099
Perimeter	80	Cadmium	mg/kg	0.359		0.0198	0.198
Perimeter	80	Calcium	mg/kg	81000		163	495
Perimeter	80	Chromium	mg/kg	14.9		0.198	0.594
Perimeter	80	Cobalt	mg/kg	5.44		0.0594	0.198
Perimeter	80	Copper	mg/kg	9.28		0.0653	0.198
Perimeter	80	Iron	mg/kg	13300		32.7	99
Perimeter	80	Lead	mg/kg	10.1		0.099	0.396
Perimeter	80	Magnesium	mg/kg	4930		1.98	5.94
Perimeter	80	Manganese	mg/kg	350		0.99	4.95
Perimeter	80	Nickel	mg/kg	14.2		0.099	0.396
Perimeter	80	Potassium	mg/kg	3290		15.8	59.4
Perimeter	80	Selenium	mg/kg	0.327	U	0.327	0.99
Perimeter	80	Silver	mg/kg	0.495	U	0.495	2.48
Perimeter	80	Sodium	mg/kg	65		15.8	49.5
Perimeter	80	Thallium	mg/kg	0.121	J	0.0594	0.396
Perimeter	80	Vanadium	mg/kg	23.8		0.099	0.495
Perimeter	80	Zinc	mg/kg	38.6		0.396	1.98
Perimeter	81	Aluminum	mg/kg	9490		14.8	49.4

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
Perimeter	81	Antimony	mg/kg	0.478	J	0.327	0.992
Perimeter	81	Arsenic	mg/kg	1.68		0.198	0.988
Perimeter	81	Barium	mg/kg	67.7		0.0988	0.395
Perimeter	81	Beryllium	mg/kg	0.453		0.0198	0.0988
Perimeter	81	Cadmium	mg/kg	0.205		0.0198	0.198
Perimeter	81	Calcium	mg/kg	1530		6.52	19.8
Perimeter	81	Chromium	mg/kg	8.16		0.198	0.593
Perimeter	81	Cobalt	mg/kg	3.53		0.0593	0.198
Perimeter	81	Copper	mg/kg	7.64		0.0652	0.198
Perimeter	81	Iron	mg/kg	7690		6.52	19.8
Perimeter	81	Lead	mg/kg	11.6		0.0988	0.395
Perimeter	81	Magnesium	mg/kg	2370		1.98	5.93
Perimeter	81	Manganese	mg/kg	213		0.988	4.94
Perimeter	81	Nickel	mg/kg	6.96		0.0988	0.395
Perimeter	81	Potassium	mg/kg	2580		15.8	59.3
Perimeter	81	Selenium	mg/kg	0.326	U	0.326	0.988
Perimeter	81	Silver	mg/kg	0.163	J	0.0992	0.496
Perimeter	81	Sodium	mg/kg	24.4	J	15.8	49.4
Perimeter	81	Thallium	mg/kg	0.0964	J	0.0593	0.395
Perimeter	81	Vanadium	mg/kg	17.7		0.0992	0.496
Perimeter	81	Zinc	mg/kg	26		0.395	1.98
Perimeter	82	Aluminum	mg/kg	10500		14.3	47.7
Perimeter	82	Antimony	mg/kg	0.359	J	0.329	0.998
Perimeter	82	Arsenic	mg/kg	3.19		0.191	0.954
Perimeter	82	Barium	mg/kg	137		0.0954	0.382
Perimeter	82	Beryllium	mg/kg	0.472		0.0191	0.0954
Perimeter	82	Cadmium	mg/kg	0.179	J	0.0191	0.191
Perimeter	82	Calcium	mg/kg	42300		31.5	95.4
Perimeter	82	Chromium	mg/kg	7.99		0.191	0.573
Perimeter	82	Cobalt	mg/kg	4.09		0.0573	0.191
Perimeter	82	Copper	mg/kg	8.12		0.063	0.191
Perimeter	82	Iron	mg/kg	9900		31.5	95.4
Perimeter	82	Lead	mg/kg	7.14		0.0954	0.382
Perimeter	82	Magnesium	mg/kg	4140		1.91	5.73

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
Perimeter	82	Manganese	mg/kg	163		0.191	0.954
Perimeter	82	Nickel	mg/kg	8.21		0.0954	0.382
Perimeter	82	Potassium	mg/kg	2360		15.3	57.3
Perimeter	82	Selenium	mg/kg	0.315	U	0.315	0.954
Perimeter	82	Silver	mg/kg	0.0998	U	0.0998	0.499
Perimeter	82	Sodium	mg/kg	65.7		15.3	47.7
Perimeter	82	Thallium	mg/kg	0.103	J	0.0573	0.382
Perimeter	82	Vanadium	mg/kg	32.7		0.0998	0.499
Perimeter	82	Zinc	mg/kg	35.7		0.382	1.91
Perimeter	87	Aluminum	mg/kg	4260	N	2.94	9.78
Perimeter	87	Antimony	mg/kg	0.324	*U	0.324	0.982
Perimeter	87	Arsenic	mg/kg	0.82	J	0.196	0.978
Perimeter	87	Barium	mg/kg	38.6	N	0.0978	0.391
Perimeter	87	Beryllium	mg/kg	0.22		0.0196	0.0978
Perimeter	87	Cadmium	mg/kg	0.0994	J	0.0196	0.196
Perimeter	87	Calcium	mg/kg	1460	N	6.46	19.6
Perimeter	87	Chromium	mg/kg	3.88		0.196	0.587
Perimeter	87	Cobalt	mg/kg	1.54		0.0587	0.196
Perimeter	87	Copper	mg/kg	2.82		0.0646	0.196
Perimeter	87	Iron	mg/kg	3700	N	6.46	19.6
Perimeter	87	Lead	mg/kg	4.02		0.0978	0.391
Perimeter	87	Magnesium	mg/kg	1530	N	1.96	5.87
Perimeter	87	Manganese	mg/kg	83.7	N	0.196	0.978
Perimeter	87	Nickel	mg/kg	3.21		0.0978	0.391
Perimeter	87	Potassium	mg/kg	1350	N	15.7	58.7
Perimeter	87	Selenium	mg/kg	0.323	U	0.323	0.978
Perimeter	87	Silver	mg/kg	0.0982	U	0.0982	0.491
Perimeter	87	Sodium	mg/kg	24.6	JN	15.7	48.9
Perimeter	87	Thallium	mg/kg	0.0587	U	0.0587	0.391
Perimeter	87	Vanadium	mg/kg	15.4		0.0982	0.491
Perimeter	87	Zinc	mg/kg	12.9		0.391	1.96
Perimeter	89	Aluminum	mg/kg	4700		2.7	8.99
Perimeter	89	Antimony	mg/kg	0.296	U	0.296	0.898
Perimeter	89	Arsenic	mg/kg	0.993		0.18	0.899

TABLE D-6. Non-radiological Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
Perimeter	89	Barium	mg/kg	73.2		0.0899	0.36
Perimeter	89	Beryllium	mg/kg	0.22		0.018	0.0899
Perimeter	89	Cadmium	mg/kg	0.1	J	0.018	0.18
Perimeter	89	Calcium	mg/kg	8760		5.94	18
Perimeter	89	Chromium	mg/kg	3.99		0.18	0.54
Perimeter	89	Cobalt	mg/kg	1.9		0.054	0.18
Perimeter	89	Copper	mg/kg	3.64		0.0594	0.18
Perimeter	89	Iron	mg/kg	4400		5.94	18
Perimeter	89	Lead	mg/kg	4.91		0.0899	0.36
Perimeter	89	Magnesium	mg/kg	1720		1.8	5.4
Perimeter	89	Manganese	mg/kg	109		0.18	0.899
Perimeter	89	Nickel	mg/kg	3.95		0.0899	0.36
Perimeter	89	Potassium	mg/kg	1060		14.4	54
Perimeter	89	Selenium	mg/kg	0.297	U	0.297	0.899
Perimeter	89	Silver	mg/kg	0.0898	U	0.0898	0.449
Perimeter	89	Sodium	mg/kg	59.1		14.4	45
Perimeter	89	Thallium	mg/kg	0.0577	J	0.054	0.36
Perimeter	89	Vanadium	mg/kg	15.9		0.0898	0.449
Perimeter	89	Zinc	mg/kg	17.4		0.36	1.8

NOTES:

*** = Recovery or relative percent difference not within acceptance limits.**
J = The associated value is an estimated quantity.
MDL = method detection limit
mg/kg = milligram per kilogram
N = Results associated with a spike analysis were outside control limits.
PQL = Practical quantitation limit.
U = The analyte was analyzed for but not detected.

TABLE D-7. Non-radiological Results by Location for Calendar Year 2013, Sediment

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
Community	11	Aluminum	mg/kg	6450		2.86	9.54
Community	11	Antimony	mg/kg	0.583	J	0.327	0.99
Community	11	Arsenic	mg/kg	1.39		0.191	0.954
Community	11	Barium	mg/kg	95		0.0954	0.382
Community	11	Beryllium	mg/kg	0.346		0.0191	0.0954
Community	11	Cadmium	mg/kg	0.134	J	0.0191	0.191
Community	11	Calcium	mg/kg	14200		31.5	95.4
Community	11	Chromium	mg/kg	4.97		0.191	0.573
Community	11	Cobalt	mg/kg	2.42		0.0573	0.191
Community	11	Copper	mg/kg	6.61		0.063	0.191
Community	11	Iron	mg/kg	5020		6.3	19.1
Community	11	Lead	mg/kg	5.9		0.0954	0.382
Community	11	Magnesium	mg/kg	2670		1.91	5.73
Community	11	Manganese	mg/kg	177		0.954	4.77
Community	11	Nickel	mg/kg	5.2		0.0954	0.382
Community	11	Potassium	mg/kg	1280		15.3	57.3
Community	11	Selenium	mg/kg	0.315	U	0.315	0.954
Community	11	Silver	mg/kg	0.22	J	0.099	0.495
Community	11	Sodium	mg/kg	106		15.3	47.7
Community	11	Thallium	mg/kg	0.0845	J	0.0573	0.382
Community	11	Vanadium	mg/kg	11.8		0.099	0.495
Community	11	Zinc	mg/kg	20.5		0.382	1.91
Community	68	Aluminum	mg/kg	8340		2.96	9.88
Community	68	Antimony	mg/kg	0.54	J	0.317	0.96
Community	68	Arsenic	mg/kg	6.6		0.198	0.988
Community	68	Barium	mg/kg	153		0.0988	0.395
Community	68	Beryllium	mg/kg	0.424		0.0198	0.0988
Community	68	Cadmium	mg/kg	0.299		0.0198	0.198
Community	68	Calcium	mg/kg	105000		163	494
Community	68	Chromium	mg/kg	10		0.198	0.593
Community	68	Cobalt	mg/kg	5.1		0.0593	0.198
Community	68	Copper	mg/kg	6.68		0.0652	0.198
Community	68	Iron	mg/kg	9290		6.52	19.8
Community	68	Lead	mg/kg	9.42		0.0988	0.395

TABLE D-7. Non-radiological Results by Location for Calendar Year 2013, Sediment

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
Community	68	Magnesium	mg/kg	3380		1.98	5.93
Community	68	Manganese	mg/kg	406		0.988	4.94
Community	68	Nickel	mg/kg	12.7		0.0988	0.395
Community	68	Potassium	mg/kg	1700		15.8	59.3
Community	68	Selenium	mg/kg	0.326	U	0.326	0.988
Community	68	Silver	mg/kg	0.48	U	0.48	2.4
Community	68	Sodium	mg/kg	68.2		15.8	49.4
Community	68	Thallium	mg/kg	0.142	J	0.0593	0.395
Community	68	Vanadium	mg/kg	23.6		0.096	0.48
Community	68	Zinc	mg/kg	27.4		0.395	1.98
On-Site	72	Aluminum	mg/kg	7900	N	2.9	9.67
On-Site	72	Antimony	mg/kg	0.399	*J	0.325	0.986
On-Site	72	Arsenic	mg/kg	4.43		0.193	0.967
On-Site	72	Barium	mg/kg	109	N	0.0967	0.387
On-Site	72	Beryllium	mg/kg	0.868		0.0193	0.0967
On-Site	72	Cadmium	mg/kg	0.176	J	0.0193	0.193
On-Site	72	Calcium	mg/kg	30800	N	31.9	96.7
On-Site	72	Chromium	mg/kg	6.78		0.193	0.58
On-Site	72	Cobalt	mg/kg	3.48		0.058	0.193
On-Site	72	Copper	mg/kg	6.79		0.0638	0.193
On-Site	72	Iron	mg/kg	6570	N	6.38	19.3
On-Site	72	Lead	mg/kg	8.43		0.0967	0.387
On-Site	72	Magnesium	mg/kg	3910	N	1.93	5.8
On-Site	72	Manganese	mg/kg	158	N	0.193	0.967
On-Site	72	Nickel	mg/kg	8.47		0.0967	0.387
On-Site	72	Potassium	mg/kg	1750	N	15.5	58
On-Site	72	Selenium	mg/kg	0.319	U	0.319	0.967
On-Site	72	Silver	mg/kg	0.0986	U	0.0986	0.493
On-Site	72	Sodium	mg/kg	161	N	15.5	48.4
On-Site	72	Thallium	mg/kg	0.123	J	0.058	0.387
On-Site	72	Vanadium	mg/kg	22.5		0.0986	0.493
On-Site	72	Zinc	mg/kg	27.8		0.387	1.93
On-Site	74N	Aluminum	mg/kg	3880		2.61	8.7
On-Site	74N	Arsenic	mg/kg	0.837	J	0.174	0.87

TABLE D-7. Non-radiological Results by Location for Calendar Year 2013, Sediment

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	74N	Barium	mg/kg	55.3		0.087	0.348
On-Site	74N	Beryllium	mg/kg	0.314		0.0174	0.087
On-Site	74N	Cadmium	mg/kg	0.135	J	0.0174	0.174
On-Site	74N	Calcium	mg/kg	28500		28.7	87
On-Site	74N	Chromium	mg/kg	3.37		0.174	0.522
On-Site	74N	Cobalt	mg/kg	3.25		0.0522	0.174
On-Site	74N	Copper	mg/kg	4.49	N	0.0574	0.174
On-Site	74N	Iron	mg/kg	7660		5.74	17.4
On-Site	74N	Lead	mg/kg	3.73	N	0.087	0.348
On-Site	74N	Magnesium	mg/kg	2150		1.74	5.22
On-Site	74N	Manganese	mg/kg	168		0.174	0.87
On-Site	74N	Nickel	mg/kg	4.05		0.087	0.348
On-Site	74N	Potassium	mg/kg	1020		13.9	52.2
On-Site	74N	Selenium	mg/kg	0.287	U	0.287	0.87
On-Site	74N	Silver	mg/kg	0.0904	U	0.0904	0.452
On-Site	74N	Sodium	mg/kg	43.9		13.9	43.5
On-Site	74N	Thallium	mg/kg	0.0529	J	0.0522	0.348
On-Site	74N	Vanadium	mg/kg	17.7	N	0.0904	0.452
On-Site	74N	Zinc	mg/kg	20.9		0.348	1.74
On-Site	75	Aluminum	mg/kg	4460		2.62	8.73
On-Site	75	Arsenic	mg/kg	2.61		0.175	0.873
On-Site	75	Barium	mg/kg	36.3		0.0873	0.349
On-Site	75	Beryllium	mg/kg	0.369		0.0175	0.0873
On-Site	75	Cadmium	mg/kg	0.136	J	0.0175	0.175
On-Site	75	Calcium	mg/kg	31700		28.8	87.3
On-Site	75	Chromium	mg/kg	5.17		0.175	0.524
On-Site	75	Cobalt	mg/kg	3.49		0.0524	0.175
On-Site	75	Copper	mg/kg	6.91	N	0.0576	0.175
On-Site	75	Iron	mg/kg	7410		5.76	17.5
On-Site	75	Lead	mg/kg	5.23	N	0.0873	0.349
On-Site	75	Magnesium	mg/kg	3090		1.75	5.24
On-Site	75	Manganese	mg/kg	163		0.175	0.873
On-Site	75	Nickel	mg/kg	7		0.0873	0.349
On-Site	75	Potassium	mg/kg	869		14	52.4

TABLE D-7. Non-radiological Results by Location for Calendar Year 2013, Sediment

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	75	Selenium	mg/kg	0.288	U	0.288	0.873
On-Site	75	Silver	mg/kg	0.0926	U	0.0926	0.463
On-Site	75	Sodium	mg/kg	43.4	J	14	43.6
On-Site	75	Thallium	mg/kg	0.0524	U	0.0524	0.349
On-Site	75	Vanadium	mg/kg	15.6	N	0.0926	0.463
On-Site	75	Zinc	mg/kg	24		0.349	1.75
On-Site	79	Aluminum	mg/kg	9510	N	2.97	9.9
On-Site	79	Antimony	mg/kg	0.468	*J	0.327	0.992
On-Site	79	Arsenic	mg/kg	2.41		0.198	0.99
On-Site	79	Barium	mg/kg	147	N	0.099	0.396
On-Site	79	Beryllium	mg/kg	0.45		0.0198	0.099
On-Site	79	Cadmium	mg/kg	0.393		0.0198	0.198
On-Site	79	Calcium	mg/kg	136000	N	653	1980
On-Site	79	Chromium	mg/kg	12		0.198	0.594
On-Site	79	Cobalt	mg/kg	4.58		0.0594	0.198
On-Site	79	Copper	mg/kg	8.45		0.0653	0.198
On-Site	79	Iron	mg/kg	10400	N	32.7	99
On-Site	79	Lead	mg/kg	10.8		0.099	0.396
On-Site	79	Magnesium	mg/kg	5020	N	1.98	5.94
On-Site	79	Manganese	mg/kg	298	N	0.99	4.95
On-Site	79	Nickel	mg/kg	14.8		0.099	0.396
On-Site	79	Potassium	mg/kg	1840	N	15.8	59.4
On-Site	79	Selenium	mg/kg	0.327	U	0.327	0.99
On-Site	79	Silver	mg/kg	0.496	U	0.496	2.48
On-Site	79	Sodium	mg/kg	53.7	N	15.8	49.5
On-Site	79	Thallium	mg/kg	0.114	J	0.0594	0.396
On-Site	79	Vanadium	mg/kg	21.2		0.0992	0.496
On-Site	79	Zinc	mg/kg	33.5		0.396	1.98
On-Site	83	Aluminum	mg/kg	13400		13.7	45.7
On-Site	83	Antimony	mg/kg	1.51	NU	1.51	4.59
On-Site	83	Arsenic	mg/kg	3.22		0.183	0.914
On-Site	83	Barium	mg/kg	174		0.0914	0.366
On-Site	83	Beryllium	mg/kg	0.564		0.0183	0.0914
On-Site	83	Cadmium	mg/kg	0.543		0.0183	0.183

TABLE D-7. Non-radiological Results by Location for Calendar Year 2013, Sediment

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	83	Calcium	mg/kg	39100		30.2	91.4
On-Site	83	Chromium	mg/kg	10.5		0.183	0.548
On-Site	83	Cobalt	mg/kg	6.56		0.0548	0.183
On-Site	83	Copper	mg/kg	15.2	N	0.0603	0.183
On-Site	83	Iron	mg/kg	15200		30.2	91.4
On-Site	83	Lead	mg/kg	13.9	N	0.0914	0.366
On-Site	83	Magnesium	mg/kg	5850		1.83	5.48
On-Site	83	Manganese	mg/kg	369		0.914	4.57
On-Site	83	Nickel	mg/kg	11.8		0.0914	0.366
On-Site	83	Potassium	mg/kg	5060		14.6	54.8
On-Site	83	Selenium	mg/kg	0.308	J	0.302	0.914
On-Site	83	Silver	mg/kg	0.193	J	0.0917	0.459
On-Site	83	Sodium	mg/kg	81.1		14.6	45.7
On-Site	83	Thallium	mg/kg	0.188	J	0.0548	0.366
On-Site	83	Vanadium	mg/kg	29.4	N	0.0917	0.459
On-Site	83	Zinc	mg/kg	55.1		0.366	1.83
On-Site	84	Aluminum	mg/kg	7130		3	10
On-Site	84	Antimony	mg/kg	0.455	J	0.32	0.971
On-Site	84	Arsenic	mg/kg	1.88		0.2	1
On-Site	84	Barium	mg/kg	74.7		0.1	0.4
On-Site	84	Beryllium	mg/kg	0.423		0.02	0.1
On-Site	84	Cadmium	mg/kg	0.172	J	0.02	0.2
On-Site	84	Calcium	mg/kg	26900		33	100
On-Site	84	Chromium	mg/kg	7.67		0.2	0.6
On-Site	84	Cobalt	mg/kg	4.3		0.06	0.2
On-Site	84	Copper	mg/kg	8.26		0.066	0.2
On-Site	84	Iron	mg/kg	8590		6.6	20
On-Site	84	Lead	mg/kg	6.63		0.1	0.4
On-Site	84	Magnesium	mg/kg	3640		2	6
On-Site	84	Manganese	mg/kg	256		1	5
On-Site	84	Nickel	mg/kg	9.04		0.1	0.4
On-Site	84	Potassium	mg/kg	1370		16	60
On-Site	84	Selenium	mg/kg	0.33	U	0.33	1
On-Site	84	Silver	mg/kg	0.0971	U	0.0971	0.485

TABLE D-7. Non-radiological Results by Location for Calendar Year 2013, Sediment

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	84	Sodium	mg/kg	71.9		16	50
On-Site	84	Thallium	mg/kg	0.168	J	0.06	0.4
On-Site	84	Vanadium	mg/kg	20.1		0.0971	0.485
On-Site	84	Zinc	mg/kg	29.7		0.4	2
On-Site	85	Aluminum	mg/kg	11400	N	14.8	49.3
On-Site	85	Antimony	mg/kg	0.318	*U	0.318	0.963
On-Site	85	Arsenic	mg/kg	2.78		0.197	0.986
On-Site	85	Barium	mg/kg	170	N	0.0986	0.394
On-Site	85	Beryllium	mg/kg	0.538		0.0197	0.0986
On-Site	85	Cadmium	mg/kg	0.357		0.0197	0.197
On-Site	85	Calcium	mg/kg	65800	N	65.1	197
On-Site	85	Chromium	mg/kg	10.9		0.197	0.592
On-Site	85	Cobalt	mg/kg	5.24		0.0592	0.197
On-Site	85	Copper	mg/kg	11.4		0.0651	0.197
On-Site	85	Iron	mg/kg	11300	N	32.5	98.6
On-Site	85	Lead	mg/kg	12.8		0.0986	0.394
On-Site	85	Magnesium	mg/kg	4400	N	1.97	5.92
On-Site	85	Manganese	mg/kg	324	N	0.986	4.93
On-Site	85	Nickel	mg/kg	13.6		0.0986	0.394
On-Site	85	Potassium	mg/kg	2210	N	15.8	59.2
On-Site	85	Selenium	mg/kg	0.325	U	0.325	0.986
On-Site	85	Silver	mg/kg	0.482	U	0.482	2.41
On-Site	85	Sodium	mg/kg	46.7	JN	15.8	49.3
On-Site	85	Thallium	mg/kg	0.119	J	0.0592	0.394
On-Site	85	Vanadium	mg/kg	25		0.0963	0.482
On-Site	85	Zinc	mg/kg	39.6		0.394	1.97
Perimeter	60	Aluminum	mg/kg	6190		2.65	8.82
Perimeter	60	Arsenic	mg/kg	1.72		0.176	0.882
Perimeter	60	Barium	mg/kg	77.5		0.0882	0.353
Perimeter	60	Beryllium	mg/kg	0.309		0.0176	0.0882
Perimeter	60	Cadmium	mg/kg	0.138	J	0.0176	0.176
Perimeter	60	Calcium	mg/kg	16300		29.1	88.2
Perimeter	60	Chromium	mg/kg	7.47		0.176	0.529
Perimeter	60	Cobalt	mg/kg	3.36		0.0529	0.176

TABLE D-7. Non-radiological Results by Location for Calendar Year 2013, Sediment

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
Perimeter	60	Copper	mg/kg	5.21	N	0.0582	0.176
Perimeter	60	Iron	mg/kg	9820		29.1	88.2
Perimeter	60	Lead	mg/kg	5.08	N	0.0882	0.353
Perimeter	60	Magnesium	mg/kg	2610		1.76	5.29
Perimeter	60	Manganese	mg/kg	171		0.176	0.882
Perimeter	60	Nickel	mg/kg	6.12		0.0882	0.353
Perimeter	60	Potassium	mg/kg	1630		14.1	52.9
Perimeter	60	Selenium	mg/kg	0.291	U	0.291	0.882
Perimeter	60	Silver	mg/kg	0.112	J	0.0978	0.489
Perimeter	60	Sodium	mg/kg	59		14.1	44.1
Perimeter	60	Thallium	mg/kg	0.0741	J	0.0529	0.353
Perimeter	60	Vanadium	mg/kg	21.2	N	0.0978	0.489
Perimeter	60	Zinc	mg/kg	24.1		0.353	1.76
Perimeter	65	Aluminum	mg/kg	3560		2.87	9.58
Perimeter	65	Antimony	mg/kg	0.306	*U	0.306	0.926
Perimeter	65	Arsenic	mg/kg	0.465	J	0.192	0.958
Perimeter	65	Barium	mg/kg	35.6		0.0958	0.383
Perimeter	65	Beryllium	mg/kg	0.229		0.0192	0.0958
Perimeter	65	Cadmium	mg/kg	0.166	J	0.0192	0.192
Perimeter	65	Calcium	mg/kg	17900		31.6	95.8
Perimeter	65	Chromium	mg/kg	2.56		0.192	0.575
Perimeter	65	Cobalt	mg/kg	2.51		0.0575	0.192
Perimeter	65	Copper	mg/kg	5.01		0.0632	0.192
Perimeter	65	Iron	mg/kg	5900		6.32	19.2
Perimeter	65	Lead	mg/kg	2.83		0.0958	0.383
Perimeter	65	Magnesium	mg/kg	1930		1.92	5.75
Perimeter	65	Manganese	mg/kg	158		0.192	0.958
Perimeter	65	Nickel	mg/kg	3.27		0.0958	0.383
Perimeter	65	Potassium	mg/kg	960		15.3	57.5
Perimeter	65	Selenium	mg/kg	0.316	U	0.316	0.958
Perimeter	65	Silver	mg/kg	0.0926	U	0.0926	0.463
Perimeter	65	Sodium	mg/kg	92.6		15.3	47.9
Perimeter	65	Thallium	mg/kg	0.0575	U	0.0575	0.383
Perimeter	65	Vanadium	mg/kg	11		0.0926	0.463

TABLE D-7. Non-radiological Results by Location for Calendar Year 2013, Sediment

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
Perimeter	65	Zinc	mg/kg	20.4		0.383	1.92
Perimeter	73	Aluminum	mg/kg	6310		2.94	9.8
Perimeter	73	Arsenic	mg/kg	1.04		0.196	0.98
Perimeter	73	Barium	mg/kg	104		0.098	0.392
Perimeter	73	Beryllium	mg/kg	0.355		0.0196	0.098
Perimeter	73	Cadmium	mg/kg	0.16	J	0.0196	0.196
Perimeter	73	Calcium	mg/kg	25300		32.4	98
Perimeter	73	Chromium	mg/kg	4.41		0.196	0.588
Perimeter	73	Cobalt	mg/kg	5.03		0.0588	0.196
Perimeter	73	Copper	mg/kg	7.54	N	0.0647	0.196
Perimeter	73	Iron	mg/kg	13000		32.4	98
Perimeter	73	Lead	mg/kg	5.88	N	0.098	0.392
Perimeter	73	Magnesium	mg/kg	4270		1.96	5.88
Perimeter	73	Manganese	mg/kg	319		0.98	4.9
Perimeter	73	Nickel	mg/kg	6.21		0.098	0.392
Perimeter	73	Potassium	mg/kg	2010		15.7	58.8
Perimeter	73	Selenium	mg/kg	0.324	U	0.324	0.98
Perimeter	73	Silver	mg/kg	0.0958	U	0.0958	0.479
Perimeter	73	Sodium	mg/kg	52.1		15.7	49
Perimeter	73	Thallium	mg/kg	0.113	J	0.0588	0.392
Perimeter	73	Vanadium	mg/kg	21.9	N	0.0958	0.479
Perimeter	73	Zinc	mg/kg	40.1		0.392	1.96

NOTES:

*** = Recovery or relative percent difference not within acceptance limits.**
J = The associated value is an estimated quantity.
MDL = method detection limit
mg/kg = milligram per kilogram
N = Results associated with a spike analysis were outside control limits.
PQL = practical quantitation limit
U = The analyte was analyzed for but not detected.

TABLE D-8. Non-radiological Replicate Results for Calendar Year 2013, Soil

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
Community	11	Aluminum	094159-002	mg/kg	4470.00		2.81	9.38
Community	11	Aluminum	094160-002	mg/kg	3950.00		2.94	9.78
Community	11	Aluminum	094161-002	mg/kg	4930.00		2.96	9.88
			Average		**4450.00**			
			Std Dev		**490.31**			
			CV (%)		**11.02**			
Community	11	Antimony	094159-002	mg/kg	0.79	J	0.329	0.998
Community	11	Antimony	094160-002	mg/kg	0.32	U	0.315	0.954
Community	11	Antimony	094161-002	mg/kg	0.33	U	0.327	0.99
			Average		**0.48**			
			Std Dev		**0.27**			
			CV (%)		**56.33**			
Community	11	Arsenic	094159-002	mg/kg	1.55		0.188	0.938
Community	11	Arsenic	094160-002	mg/kg	1.62		0.196	0.978
Community	11	Arsenic	094161-002	mg/kg	2.11		0.198	0.988
			Average		**1.76**			
			Std Dev		**0.31**			
			CV (%)		**17.34**			
Community	11	Barium	094159-002	mg/kg	117.00		0.0938	0.375
Community	11	Barium	094160-002	mg/kg	91.90		0.0978	0.391
Community	11	Barium	094161-002	mg/kg	123.00		0.0988	0.395
			Average		**110.63**			
			Std Dev		**16.50**			
			CV (%)		**14.91**			
Community	11	Beryllium	094159-002	mg/kg	0.29		0.0188	0.0938
Community	11	Beryllium	094160-002	mg/kg	0.26		0.0196	0.0978
Community	11	Beryllium	094161-002	mg/kg	0.30		0.0198	0.0988
			Average		**0.28**			
			Std Dev		**0.02**			
			CV (%)		**6.82**			
Community	11	Cadmium	094159-002	mg/kg	0.12	J	0.0188	0.188
Community	11	Cadmium	094160-002	mg/kg	0.10	J	0.0196	0.196
Community	11	Cadmium	094161-002	mg/kg	0.13	J	0.0198	0.198
			Average		**0.12**			

TABLE D-8. Non-radiological Replicate Results for Calendar Year 2013, Soil

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
			Std Dev		**0.01**			
			CV (%)		**12.01**			
Community	11	Calcium	094159-002	mg/kg	16100.00		31	93.8
Community	11	Calcium	094160-002	mg/kg	13600.00		32.3	97.8
Community	11	Calcium	094161-002	mg/kg	16100.00		32.6	98.8
			Average		**15266.67**			
			Std Dev		**1443.38**			
			CV (%)		**9.45**			
Community	11	Chromium	094159-002	mg/kg	4.73		0.188	0.563
Community	11	Chromium	094160-002	mg/kg	4.29		0.196	0.587
Community	11	Chromium	094161-002	mg/kg	8.15		0.198	0.593
			Average		**5.72**			
			Std Dev		**2.11**			
			CV (%)		**36.92**			
Community	11	Cobalt	094159-002	mg/kg	2.59		0.0563	0.188
Community	11	Cobalt	094160-002	mg/kg	2.50		0.0587	0.196
Community	11	Cobalt	094161-002	mg/kg	3.20		0.0593	0.198
			Average		**2.76**			
			Std Dev		**0.38**			
			CV (%)		**13.78**			
Community	11	Copper	094159-002	mg/kg	4.53		0.0619	0.188
Community	11	Copper	094160-002	mg/kg	4.67		0.0646	0.196
Community	11	Copper	094161-002	mg/kg	7.58		0.0652	0.198
			Average		**5.59**			
			Std Dev		**1.72**			
			CV (%)		**30.79**			
Community	11	Iron	094159-002	mg/kg	5170.00		6.19	18.8
Community	11	Iron	094160-002	mg/kg	4710.00		6.46	19.6
Community	11	Iron	094161-002	mg/kg	16300.00		32.6	98.8
			Average		**8726.67**			
			Std Dev		**6562.73**			
			CV (%)		**75.20**			
Community	11	Lead	094159-002	mg/kg	5.65		0.0938	0.375
Community	11	Lead	094160-002	mg/kg	5.52		0.0978	0.391

TABLE D-8. Non-radiological Replicate Results for Calendar Year 2013, Soil

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
Community	11	Lead	094161-002	mg/kg	6.01		0.0988	0.395
			Average		**5.73**			
			Std Dev		**0.25**			
			CV (%)		**4.43**			
Community	11	Magnesium	094159-002	mg/kg	2090.00		1.88	5.63
Community	11	Magnesium	094160-002	mg/kg	1940.00		1.96	5.87
Community	11	Magnesium	094161-002	mg/kg	2710.00		1.98	5.93
Community	11	Manganese	094159-002	mg/kg	213.00		0.938	4.69
Community	11	Manganese	094160-002	mg/kg	192.00		0.196	0.978
Community	11	Manganese	094161-002	mg/kg	291.00		0.988	4.94
			Average		**232.00**			
			Std Dev		**52.16**			
			CV (%)		**22.48**			
Community	11	Nickel	094159-002	mg/kg	4.82		0.0938	0.375
Community	11	Nickel	094160-002	mg/kg	4.82		0.0978	0.391
Community	11	Nickel	094161-002	mg/kg	6.84		0.0988	0.395
			Average		**5.49**			
			Std Dev		**1.17**			
			CV (%)		**21.23**			
Community	11	Potassium	094159-002	mg/kg	1150.00		15	56.3
Community	11	Potassium	094160-002	mg/kg	1050.00		15.7	58.7
Community	11	Potassium	094161-002	mg/kg	1420.00		15.8	59.3
			Average		**1206.67**			
			Std Dev		**191.40**			
			CV (%)		**15.86**			
Community	11	Selenium	094159-002	mg/kg	0.31	U	0.31	0.938
Community	11	Selenium	094160-002	mg/kg	0.32	U	0.323	0.978
Community	11	Selenium	094161-002	mg/kg	0.33	U	0.326	0.988
			Average		**0.32**			
			Std Dev		**0.01**			
			CV (%)		**2.66**			
Community	11	Silver	094159-002	mg/kg	0.13	J	0.0998	0.499
Community	11	Silver	094160-002	mg/kg	0.19	J	0.0954	0.477
Community	11	Silver	094161-002	mg/kg	0.23	J	0.099	0.495

TABLE D-8. Non-radiological Replicate Results for Calendar Year 2013, Soil

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
			Average		**0.18**			
			Std Dev		**0.05**			
			CV (%)		**26.24**			
Community	11	Sodium	094159-002	mg/kg	139.00		15	46.9
Community	11	Sodium	094160-002	mg/kg	124.00		15.7	48.9
Community	11	Sodium	094161-002	mg/kg	292.00		15.8	49.4
			Average		**185.00**			
			Std Dev		**92.97**			
			CV (%)		**50.25**			
Community	11	Thallium	094159-002	mg/kg	0.08	J	0.0563	0.375
Community	11	Thallium	094160-002	mg/kg	0.07	J	0.0587	0.391
Community	11	Thallium	094161-002	mg/kg	0.08	J	0.0593	0.395
			Average		**0.07**			
			Std Dev		**0.00**			
			CV (%)		**5.94**			
Community	11	Vanadium	094159-002	mg/kg	17.00		0.0998	0.499
Community	11	Vanadium	094160-002	mg/kg	17.50		0.0954	0.477
Community	11	Vanadium	094161-002	mg/kg	18.00		0.099	0.495
			Average		**17.50**			
			Std Dev		**0.50**			
			CV (%)		**2.86**			
Community	11	Zinc	094159-002	mg/kg	17.00		0.375	1.88
Community	11	Zinc	094160-002	mg/kg	16.40		0.391	1.96
Community	11	Zinc	094161-002	mg/kg	19.70		0.395	1.98
			Average		**17.70**			
			Std Dev		**1.76**			
			CV (%)		**9.93**			
On-Site	02NE	Aluminum	094088-002	mg/kg	6410.00	N	2.96	9.86
On-Site	02NE	Aluminum	094089-002	mg/kg	5080.00	N	2.9	9.65
On-Site	02NE	Aluminum	094090-002	mg/kg	4670.00	N	2.96	9.88
			Average		**5386.67**			
			Std Dev		**909.63**			
			CV (%)		**16.89**			
On-Site	02NE	Antimony	094088-002	mg/kg	0.33	*U	0.326	0.988

TABLE D-8. Non-radiological Replicate Results for Calendar Year 2013, Soil

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	02NE	Antimony	094089-002	mg/kg	0.33	*U	0.327	0.992
On-Site	02NE	Antimony	094090-002	mg/kg	0.32	*U	0.322	0.977
			Average		**0.33**			
			Std Dev		**0.00**			
			CV (%)		**0.81**			
On-Site	02NE	Arsenic	094088-002	mg/kg	1.34		0.197	0.986
On-Site	02NE	Arsenic	094089-002	mg/kg	1.06		0.193	0.965
On-Site	02NE	Arsenic	094090-002	mg/kg	0.99	J	0.198	0.988
			Average		**1.13**			
			Std Dev		**0.19**			
			CV (%)		**16.58**			
On-Site	02NE	Barium	094088-002	mg/kg	66.70	N	0.0986	0.394
On-Site	02NE	Barium	094089-002	mg/kg	51.60	N	0.0965	0.386
On-Site	02NE	Barium	094090-002	mg/kg	51.40	N	0.0988	0.395
			Average		**56.57**			
			Std Dev		**8.78**			
			CV (%)		**15.51**			
On-Site	02NE	Beryllium	094088-002	mg/kg	0.33		0.0197	0.0986
On-Site	02NE	Beryllium	094089-002	mg/kg	0.28		0.0193	0.0965
On-Site	02NE	Beryllium	094090-002	mg/kg	0.24		0.0198	0.0988
			Average		**0.28**			
			Std Dev		**0.04**			
			CV (%)		**15.14**			
On-Site	02NE	Cadmium	094088-002	mg/kg	0.31		0.0197	0.197
On-Site	02NE	Cadmium	094089-002	mg/kg	0.14	J	0.0193	0.193
On-Site	02NE	Cadmium	094090-002	mg/kg	0.17	J	0.0198	0.198
			Average		**0.20**			
			Std Dev		**0.09**			
			CV (%)		**44.17**			
On-Site	02NE	Calcium	094088-002	mg/kg	5270.00	N	6.51	19.7
On-Site	02NE	Calcium	094089-002	mg/kg	2350.00	N	6.37	19.3
On-Site	02NE	Calcium	094090-002	mg/kg	2740.00	N	6.52	19.8
			Average		**3453.33**			
			Std Dev		**1585.32**			

TABLE D-8. Non-radiological Replicate Results for Calendar Year 2013, Soil

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
			CV (%)		**45.91**			
On-Site	02NE	Chromium	094088-002	mg/kg	5.05		0.197	0.592
On-Site	02NE	Chromium	094089-002	mg/kg	4.13		0.193	0.579
On-Site	02NE	Chromium	094090-002	mg/kg	4.03		0.198	0.593
			Average		**4.40**			
			Std Dev		**0.56**			
			CV (%)		**12.77**			
On-Site	02NE	Cobalt	094088-002	mg/kg	2.34		0.0592	0.197
On-Site	02NE	Cobalt	094089-002	mg/kg	1.87		0.0579	0.193
On-Site	02NE	Cobalt	094090-002	mg/kg	1.81		0.0593	0.198
			Average		**2.01**			
			Std Dev		**0.29**			
			CV (%)		**14.46**			
On-Site	02NE	Copper	094088-002	mg/kg	4.84		0.0651	0.197
On-Site	02NE	Copper	094089-002	mg/kg	3.73		0.0637	0.193
On-Site	02NE	Copper	094090-002	mg/kg	3.51		0.0652	0.198
			Average		**4.03**			
			Std Dev		**0.71**			
			CV (%)		**17.70**			
On-Site	02NE	Iron	094088-002	mg/kg	5140.00	N	6.51	19.7
On-Site	02NE	Iron	094089-002	mg/kg	4260.00	N	6.37	19.3
On-Site	02NE	Iron	094090-002	mg/kg	4030.00	N	6.52	19.8
			Average		**4476.67**			
			Std Dev		**585.86**			
			CV (%)		**13.09**			
On-Site	02NE	Lead	094088-002	mg/kg	6.54		0.0986	0.394
On-Site	02NE	Lead	094089-002	mg/kg	5.29		0.0965	0.386
On-Site	02NE	Lead	094090-002	mg/kg	5.40		0.0988	0.395
			Average		**5.74**			
			Std Dev		**0.69**			
			CV (%)		**12.05**			
On-Site	02NE	Magnesium	094088-002	mg/kg	1900.00	N	1.97	5.92
On-Site	02NE	Magnesium	094089-002	mg/kg	1420.00	N	1.93	5.79
On-Site	02NE	Magnesium	094090-002	mg/kg	1430.00	N	1.98	5.93

TABLE D-8. Non-radiological Replicate Results for Calendar Year 2013, Soil

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
			Average		**1583.33**			
			Std Dev		**274.29**			
			CV (%)		**17.32**			
On-Site	02NE	Manganese	094088-002	mg/kg	111.00	N	0.197	0.986
On-Site	02NE	Manganese	094089-002	mg/kg	97.50	N	0.193	0.965
On-Site	02NE	Manganese	094090-002	mg/kg	94.40	N	0.198	0.988
			Average		**100.97**			
			Std Dev		**8.83**			
			CV (%)		**8.74**			
On-Site	02NE	Nickel	094088-002	mg/kg	5.66		0.0986	0.394
On-Site	02NE	Nickel	094089-002	mg/kg	3.81		0.0965	0.386
On-Site	02NE	Nickel	094090-002	mg/kg	3.72		0.0988	0.395
			Average		**4.40**			
			Std Dev		**1.10**			
			CV (%)		**24.91**			
On-Site	02NE	Potassium	094088-002	mg/kg	1690.00	N	15.8	59.2
On-Site	02NE	Potassium	094089-002	mg/kg	1430.00	N	15.4	57.9
On-Site	02NE	Potassium	094090-002	mg/kg	1220.00	N	15.8	59.3
			Average		**1446.67**			
			Std Dev		**235.44**			
			CV (%)		**16.27**			
On-Site	02NE	Selenium	094088-002	mg/kg	0.33	U	0.325	0.986
On-Site	02NE	Selenium	094089-002	mg/kg	0.32	U	0.319	0.965
On-Site	02NE	Selenium	094090-002	mg/kg	0.33	U	0.326	0.988
			Average		**0.32**			
			Std Dev		**0.00**			
			CV (%)		**1.17**			
On-Site	02NE	Silver	094088-002	mg/kg	0.10	U	0.0988	0.494
On-Site	02NE	Silver	094089-002	mg/kg	0.10	U	0.0992	0.496
On-Site	02NE	Silver	094090-002	mg/kg	0.10	U	0.0977	0.488
			Average		**0.10**			
			Std Dev		**0.00**			
			CV (%)		**0.79**			
On-Site	02NE	Sodium	094088-002	mg/kg	20.20	JN	15.8	49.3

TABLE D-8. Non-radiological Replicate Results for Calendar Year 2013, Soil

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	02NE	Sodium	094089-002	mg/kg	22.00	JN	15.4	48.3
On-Site	02NE	Sodium	094090-002	mg/kg	21.10	JN	15.8	49.4
			Average		**21.10**			
			Std Dev		**0.90**			
			CV (%)		**4.27**			
On-Site	02NE	Thallium	094088-002	mg/kg	0.07	J	0.0592	0.394
On-Site	02NE	Thallium	094089-002	mg/kg	0.06	J	0.0579	0.386
On-Site	02NE	Thallium	094090-002	mg/kg	0.06	U	0.0593	0.395
			Average		**0.06**			
			Std Dev		**0.01**			
			CV (%)		**12.85**			
On-Site	02NE	Vanadium	094088-002	mg/kg	22.50		0.0988	0.494
On-Site	02NE	Vanadium	094089-002	mg/kg	21.30		0.0992	0.496
On-Site	02NE	Vanadium	094090-002	mg/kg	19.30		0.0977	0.488
			Average		**21.03**			
			Std Dev		**1.62**			
			CV (%)		**7.69**			
On-Site	02NE	Zinc	094088-002	mg/kg	18.90		0.394	1.97
On-Site	02NE	Zinc	094089-002	mg/kg	15.80		0.386	1.93
On-Site	02NE	Zinc	094090-002	mg/kg	15.30		0.395	1.98
			Average		**16.67**			
			Std Dev		**1.95**			
			CV (%)		**11.70**			
On-Site	33	Aluminum	094122-002	mg/kg	7550.00	N	2.87	9.58
On-Site	33	Aluminum	094123-002	mg/kg	7100.00	N	2.99	9.96
On-Site	33	Aluminum	094124-002	mg/kg	6630.00	N	2.99	9.96
			Average		**7093.33**			
			Std Dev		**460.04**			
			CV (%)		**6.49**			
On-Site	33	Antimony	094122-002	mg/kg	0.34	*J	0.325	0.984
On-Site	33	Antimony	094123-002	mg/kg	0.33	*U	0.325	0.984
On-Site	33	Antimony	094124-002	mg/kg	0.32	*U	0.32	0.971
			Average		**0.33**			
			Std Dev		**0.01**			

TABLE D-8. Non-radiological Replicate Results for Calendar Year 2013, Soil

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
			CV (%)		**3.67**			
On-Site	33	Arsenic	094122-002	mg/kg	4.02		0.192	0.958
On-Site	33	Arsenic	094123-002	mg/kg	3.49		0.199	0.996
On-Site	33	Arsenic	094124-002	mg/kg	4.42		0.199	0.996
			Average		**3.98**			
			Std Dev		**0.47**			
			CV (%)		**11.73**			
On-Site	33	Barium	094122-002	mg/kg	114.00	N	0.0958	0.383
On-Site	33	Barium	094123-002	mg/kg	101.00	N	0.0996	0.398
On-Site	33	Barium	094124-002	mg/kg	99.50	N	0.0996	0.398
			Average		**104.83**			
			Std Dev		**7.97**			
			CV (%)		**7.61**			
On-Site	33	Beryllium	094122-002	mg/kg	0.80		0.0192	0.0958
On-Site	33	Beryllium	094123-002	mg/kg	0.83		0.0199	0.0996
On-Site	33	Beryllium	094124-002	mg/kg	1.01		0.0199	0.0996
			Average		**0.88**			
			Std Dev		**0.11**			
			CV (%)		**12.80**			
On-Site	33	Cadmium	094122-002	mg/kg	0.41		0.0192	0.192
On-Site	33	Cadmium	094123-002	mg/kg	0.28		0.0199	0.199
On-Site	33	Cadmium	094124-002	mg/kg	0.30		0.0199	0.199
			Average		**0.33**			
			Std Dev		**0.07**			
			CV (%)		**20.54**			
On-Site	33	Calcium	094122-002	mg/kg	60900.00	N	63.2	192
On-Site	33	Calcium	094123-002	mg/kg	53300.00	N	65.7	199
On-Site	33	Calcium	094124-002	mg/kg	54200.00	N	65.7	199
			Average		**56133.33**			
			Std Dev		**4152.51**			
			CV (%)		**7.40**			
On-Site	33	Chromium	094122-002	mg/kg	8.49		0.192	0.575
On-Site	33	Chromium	094123-002	mg/kg	7.86		0.199	0.598
On-Site	33	Chromium	094124-002	mg/kg	7.23		0.199	0.598

TABLE D-8. Non-radiological Replicate Results for Calendar Year 2013, Soil

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
			Average		**7.86**			
			Std Dev		**0.63**			
			CV (%)		**8.02**			
On-Site	33	Cobalt	094122-002	mg/kg	4.52		0.0575	0.192
On-Site	33	Cobalt	094123-002	mg/kg	4.25		0.0598	0.199
On-Site	33	Cobalt	094124-002	mg/kg	5.10		0.0598	0.199
			Average		**4.62**			
			Std Dev		**0.43**			
			CV (%)		**9.39**			
On-Site	33	Copper	094122-002	mg/kg	7.93		0.0632	0.192
On-Site	33	Copper	094123-002	mg/kg	7.07		0.0657	0.199
On-Site	33	Copper	094124-002	mg/kg	7.36		0.0657	0.199
			Average		**7.45**			
			Std Dev		**0.44**			
			CV (%)		**5.87**			
On-Site	33	Iron	094122-002	mg/kg	8580.00	N	6.32	19.2
On-Site	33	Iron	094123-002	mg/kg	7860.00	N	6.57	19.9
On-Site	33	Iron	094124-002	mg/kg	8200.00	N	6.57	19.9
			Average		**8213.33**			
			Std Dev		**360.19**			
			CV (%)		**4.39**			
On-Site	33	Lead	094122-002	mg/kg	11.90		0.0958	0.383
On-Site	33	Lead	094123-002	mg/kg	12.90		0.0996	0.398
On-Site	33	Lead	094124-002	mg/kg	12.20		0.0996	0.398
			Average		**12.33**			
			Std Dev		**0.51**			
			CV (%)		**4.16**			
On-Site	33	Magnesium	094122-002	mg/kg	4440.00	N	1.92	5.75
On-Site	33	Magnesium	094123-002	mg/kg	3730.00	N	1.99	5.98
On-Site	33	Magnesium	094124-002	mg/kg	4180.00	N	1.99	5.98
			Average		**4116.67**			
			Std Dev		**359.21**			
			CV (%)		**8.73**			
On-Site	33	Manganese	094122-002	mg/kg	302.00	N	1.92	9.58

TABLE D-8. Non-radiological Replicate Results for Calendar Year 2013, Soil

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	33	Manganese	094123-002	mg/kg	323.00	N	1.99	9.96
On-Site	33	Manganese	094124-002	mg/kg	384.00	N	1.99	9.96
			Average		**336.33**			
			Std Dev		**42.59**			
			CV (%)		**12.66**			
On-Site	33	Nickel	094122-002	mg/kg	11.80		0.0958	0.383
On-Site	33	Nickel	094123-002	mg/kg	11.40		0.0996	0.398
On-Site	33	Nickel	094124-002	mg/kg	13.00		0.0996	0.398
			Average		**12.07**			
			Std Dev		**0.83**			
			CV (%)		**6.90**			
On-Site	33	Potassium	094122-002	mg/kg	2230.00	N	15.3	57.5
On-Site	33	Potassium	094123-002	mg/kg	1840.00	N	15.9	59.8
On-Site	33	Potassium	094124-002	mg/kg	1720.00	N	15.9	59.8
			Average		**1930.00**			
			Std Dev		**266.65**			
			CV (%)		**13.82**			
On-Site	33	Selenium	094122-002	mg/kg	0.32	U	0.316	0.958
On-Site	33	Selenium	094123-002	mg/kg	0.33	U	0.329	0.996
On-Site	33	Selenium	094124-002	mg/kg	0.33	U	0.329	0.996
			Average		**0.32**			
			Std Dev		**0.01**			
			CV (%)		**2.31**			
On-Site	33	Silver	094122-002	mg/kg	0.49	U	0.492	2.46
On-Site	33	Silver	094123-002	mg/kg	0.10	U	0.0984	0.492
On-Site	33	Silver	094124-002	mg/kg	0.10	U	0.0971	0.485
			Average		**0.23**			
			Std Dev		**0.23**			
			CV (%)		**99.33**			
On-Site	33	Sodium	094122-002	mg/kg	336.00	N	15.3	47.9
On-Site	33	Sodium	094123-002	mg/kg	171.00	N	15.9	49.8
On-Site	33	Sodium	094124-002	mg/kg	135.00	N	15.9	49.8
			Average		**214.00**			
			Std Dev		**107.18**			

TABLE D-8. Non-radiological Replicate Results for Calendar Year 2013, Soil

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
			CV (%)		**50.08**			
On-Site	33	Thallium	094122-002	mg/kg	0.13	J	0.0575	0.383
On-Site	33	Thallium	094123-002	mg/kg	0.17	J	0.0598	0.398
On-Site	33	Thallium	094124-002	mg/kg	0.19	J	0.0598	0.398
			Average		**0.16**			
			Std Dev		**0.03**			
			CV (%)		**18.03**			
On-Site	33	Vanadium	094122-002	mg/kg	25.50		0.0984	0.492
On-Site	33	Vanadium	094123-002	mg/kg	25.10		0.0984	0.492
On-Site	33	Vanadium	094124-002	mg/kg	24.80		0.0971	0.485
			Average		**25.13**			
			Std Dev		**0.35**			
			CV (%)		**1.40**			
On-Site	33	Zinc	094122-002	mg/kg	45.50		0.383	1.92
On-Site	33	Zinc	094123-002	mg/kg	37.50		0.398	1.99
On-Site	33	Zinc	094124-002	mg/kg	41.30		0.398	1.99
			Average		**41.43**			
			Std Dev		**4.00**			
			CV (%)		**9.66**			
On-Site	53	Aluminum	094082-002	mg/kg	5710.00		2.98	9.92
On-Site	53	Aluminum	094083-002	mg/kg	6620.00		14.9	49.6
On-Site	53	Aluminum	094084-002	mg/kg	6790.00		14.8	49.4
			Average		**6373.33**			
			Std Dev		**580.72**			
			CV (%)		**9.11**			
On-Site	53	Antimony	094082-002	mg/kg	0.32	U	0.324	0.98
On-Site	53	Antimony	094083-002	mg/kg	0.33	U	0.327	0.99
On-Site	53	Antimony	094084-002	mg/kg	0.33	U	0.325	0.984
			Average		**0.33**			
			Std Dev		**0.00**			
			CV (%)		**0.47**			
On-Site	53	Arsenic	094082-002	mg/kg	1.57		0.198	0.992
On-Site	53	Arsenic	094083-002	mg/kg	1.73		0.198	0.992
On-Site	53	Arsenic	094084-002	mg/kg	1.62		0.198	0.988

TABLE D-8. Non-radiological Replicate Results for Calendar Year 2013, Soil

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
			Average		**1.64**			
			Std Dev		**0.08**			
			CV (%)		**4.99**			
On-Site	53	Barium	094082-002	mg/kg	48.10		0.0992	0.397
On-Site	53	Barium	094083-002	mg/kg	55.50		0.0992	0.397
On-Site	53	Barium	094084-002	mg/kg	54.30		0.0988	0.395
			Average		**52.63**			
			Std Dev		**3.97**			
			CV (%)		**7.55**			
On-Site	53	Beryllium	094082-002	mg/kg	0.28		0.0198	0.0992
On-Site	53	Beryllium	094083-002	mg/kg	0.31		0.0198	0.0992
On-Site	53	Beryllium	094084-002	mg/kg	0.30		0.0198	0.0988
			Average		**0.30**			
			Std Dev		**0.02**			
			CV (%)		**5.58**			
On-Site	53	Cadmium	094082-002	mg/kg	0.09	J	0.0198	0.198
On-Site	53	Cadmium	094083-002	mg/kg	0.14	J	0.0198	0.198
On-Site	53	Cadmium	094084-002	mg/kg	0.14	J	0.0198	0.198
			Average		**0.12**			
			Std Dev		**0.02**			
			CV (%)		**19.88**			
On-Site	53	Calcium	094082-002	mg/kg	2900.00		6.55	19.8
On-Site	53	Calcium	094083-002	mg/kg	3390.00		6.55	19.8
On-Site	53	Calcium	094084-002	mg/kg	3270.00		6.52	19.8
			Average		**3186.67**			
			Std Dev		**255.41**			
			CV (%)		**8.01**			
On-Site	53	Chromium	094082-002	mg/kg	5.08		0.198	0.595
On-Site	53	Chromium	094083-002	mg/kg	5.48		0.198	0.595
On-Site	53	Chromium	094084-002	mg/kg	5.67		0.198	0.593
			Average		**5.41**			
			Std Dev		**0.30**			
			CV (%)		**5.57**			
On-Site	53	Cobalt	094082-002	mg/kg	2.40		0.0595	0.198

TABLE D-8. Non-radiological Replicate Results for Calendar Year 2013, Soil

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	53	Cobalt	094083-002	mg/kg	2.65		0.0595	0.198
On-Site	53	Cobalt	094084-002	mg/kg	2.77		0.0593	0.198
			Average		**2.61**			
			Std Dev		**0.19**			
			CV (%)		**7.24**			
On-Site	53	Copper	094082-002	mg/kg	4.00		0.0655	0.198
On-Site	53	Copper	094083-002	mg/kg	5.19		0.0655	0.198
On-Site	53	Copper	094084-002	mg/kg	5.30		0.0652	0.198
			Average		**4.83**			
			Std Dev		**0.72**			
			CV (%)		**14.93**			
On-Site	53	Iron	094082-002	mg/kg	4880.00		6.55	19.8
On-Site	53	Iron	094083-002	mg/kg	5340.00		6.55	19.8
On-Site	53	Iron	094084-002	mg/kg	5620.00		6.52	19.8
			Average		**5280.00**			
			Std Dev		**373.63**			
			CV (%)		**7.08**			
On-Site	53	Lead	094082-002	mg/kg	6.11		0.0992	0.397
On-Site	53	Lead	094083-002	mg/kg	6.37		0.0992	0.397
On-Site	53	Lead	094084-002	mg/kg	7.09		0.0988	0.395
			Average		**6.52**			
			Std Dev		**0.51**			
			CV (%)		**7.78**			
On-Site	53	Magnesium	094082-002	mg/kg	1500.00		1.98	5.95
On-Site	53	Magnesium	094083-002	mg/kg	1580.00		1.98	5.95
On-Site	53	Magnesium	094084-002	mg/kg	1610.00		1.98	5.93
			Average		**1563.33**			
			Std Dev		**56.86**			
			CV (%)		**3.64**			
On-Site	53	Manganese	094082-002	mg/kg	103.00		0.198	0.992
On-Site	53	Manganese	094083-002	mg/kg	115.00		0.198	0.992
On-Site	53	Manganese	094084-002	mg/kg	111.00		0.198	0.988
			Average		**109.67**			
			Std Dev		**6.11**			

TABLE D-8. Non-radiological Replicate Results for Calendar Year 2013, Soil

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
			CV (%)		**5.57**			
On-Site	53	Nickel	094082-002	mg/kg	4.34		0.0992	0.397
On-Site	53	Nickel	094083-002	mg/kg	4.90		0.0992	0.397
On-Site	53	Nickel	094084-002	mg/kg	5.01		0.0988	0.395
			Average		**4.75**			
			Std Dev		**0.36**			
			CV (%)		**7.56**			
On-Site	53	Potassium	094082-002	mg/kg	1340.00		15.9	59.5
On-Site	53	Potassium	094083-002	mg/kg	1410.00		15.9	59.5
On-Site	53	Potassium	094084-002	mg/kg	1430.00		15.8	59.3
			Average		**1393.33**			
			Std Dev		**47.26**			
			CV (%)		**3.39**			
On-Site	53	Selenium	094082-002	mg/kg	0.33	U	0.327	0.992
On-Site	53	Selenium	094083-002	mg/kg	0.33	U	0.327	0.992
On-Site	53	Selenium	094084-002	mg/kg	0.33	U	0.326	0.988
			Average		**0.33**			
			Std Dev		**0.00**			
			CV (%)		**0.18**			
On-Site	53	Silver	094082-002	mg/kg	0.11	J	0.098	0.49
On-Site	53	Silver	094083-002	mg/kg	0.12	J	0.099	0.495
On-Site	53	Silver	094084-002	mg/kg	0.17	J	0.0984	0.492
			Average		**0.14**			
			Std Dev		**0.03**			
			CV (%)		**23.52**			
On-Site	53	Sodium	094082-002	mg/kg	17.20	J	15.9	49.6
On-Site	53	Sodium	094083-002	mg/kg	18.10	J	15.9	49.6
On-Site	53	Sodium	094084-002	mg/kg	15.80	U	15.8	49.4
			Average		**17.03**			
			Std Dev		**1.16**			
			CV (%)		**6.80**			
On-Site	53	Thallium	094082-002	mg/kg	0.07	J	0.0595	0.397
On-Site	53	Thallium	094083-002	mg/kg	0.07	J	0.0595	0.397
On-Site	53	Thallium	094084-002	mg/kg	0.07	J	0.0593	0.395

TABLE D-8. Non-radiological Replicate Results for Calendar Year 2013, Soil

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
			Average		**0.07**			
			Std Dev		**0.00**			
			CV (%)		**2.23**			
On-Site	53	Vanadium	094082-002	mg/kg	15.00		0.098	0.49
On-Site	53	Vanadium	094083-002	mg/kg	14.70		0.099	0.495
On-Site	53	Vanadium	094084-002	mg/kg	17.50		0.0984	0.492
			Average		**15.73**			
			Std Dev		**1.54**			
			CV (%)		**9.77**			
On-Site	53	Zinc	094082-002	mg/kg	14.50		0.397	1.98
On-Site	53	Zinc	094083-002	mg/kg	17.50		0.397	1.98
On-Site	53	Zinc	094084-002	mg/kg	17.60		0.395	1.98
			Average		**16.53**			
			Std Dev		**1.76**			
			CV (%)		**10.66**			
Perimeter	64	Aluminum	094133-002	mg/kg	13600.00		14.8	49.2
Perimeter	64	Aluminum	094134-002	mg/kg	15900.00		14.5	48.4
Perimeter	64	Aluminum	094135-002	mg/kg	15300.00		14.9	49.5
			Average		**14933.33**			
			Std Dev		**1193.04**			
			CV (%)		**7.99**			
Perimeter	64	Antimony	094133-002	mg/kg	0.32	U	0.319	0.967
Perimeter	64	Antimony	094134-002	mg/kg	0.33	U	0.33	1
Perimeter	64	Antimony	094135-002	mg/kg	0.36	J	0.329	0.998
			Average		**0.34**			
			Std Dev		**0.02**			
			CV (%)		**5.83**			
Perimeter	64	Arsenic	094133-002	mg/kg	1.97		0.197	0.984
Perimeter	64	Arsenic	094134-002	mg/kg	1.94		0.194	0.969
Perimeter	64	Arsenic	094135-002	mg/kg	2.06		0.198	0.99
			Average		**1.99**			
			Std Dev		**0.06**			
			CV (%)		**3.14**			
Perimeter	64	Barium	094133-002	mg/kg	105.00		0.0984	0.394

TABLE D-8. Non-radiological Replicate Results for Calendar Year 2013, Soil

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
Perimeter	64	Barium	094134-002	mg/kg	126.00		0.0969	0.388
Perimeter	64	Barium	094135-002	mg/kg	117.00		0.099	0.396
			Average		**116.00**			
			Std Dev		**10.54**			
			CV (%)		**9.08**			
Perimeter	64	Beryllium	094133-002	mg/kg	0.50		0.0197	0.0984
Perimeter	64	Beryllium	094134-002	mg/kg	0.56		0.0194	0.0969
Perimeter	64	Beryllium	094135-002	mg/kg	0.53		0.0198	0.099
			Average		**0.53**			
			Std Dev		**0.03**			
			CV (%)		**5.64**			
Perimeter	64	Cadmium	094133-002	mg/kg	0.34		0.0197	0.197
Perimeter	64	Cadmium	094134-002	mg/kg	0.34		0.0194	0.194
Perimeter	64	Cadmium	094135-002	mg/kg	0.33		0.0198	0.198
			Average		**0.34**			
			Std Dev		**0.01**			
			CV (%)		**1.56**			
Perimeter	64	Calcium	094133-002	mg/kg	26900.00		32.5	98.4
Perimeter	64	Calcium	094134-002	mg/kg	18800.00		32	96.9
Perimeter	64	Calcium	094135-002	mg/kg	26600.00		32.7	99
			Average		**24100.00**			
			Std Dev		**4592.39**			
			CV (%)		**19.06**			
Perimeter	64	Chromium	094133-002	mg/kg	6.44		0.197	0.591
Perimeter	64	Chromium	094134-002	mg/kg	7.42		0.194	0.581
Perimeter	64	Chromium	094135-002	mg/kg	6.98		0.198	0.594
			Average		**6.95**			
			Std Dev		**0.49**			
			CV (%)		**7.07**			
Perimeter	64	Cobalt	094133-002	mg/kg	7.72		0.0591	0.197
Perimeter	64	Cobalt	094134-002	mg/kg	9.85		0.0581	0.194
Perimeter	64	Cobalt	094135-002	mg/kg	9.00		0.0594	0.198
			Average		**8.86**			
			Std Dev		**1.07**			

TABLE D-8. Non-radiological Replicate Results for Calendar Year 2013, Soil

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
			CV (%)		**12.11**			
Perimeter	64	Copper	094133-002	mg/kg	11.70		0.065	0.197
Perimeter	64	Copper	094134-002	mg/kg	14.00		0.064	0.194
Perimeter	64	Copper	094135-002	mg/kg	13.10		0.0653	0.198
			Average		**12.93**			
			Std Dev		**1.16**			
			CV (%)		**8.96**			
Perimeter	64	Iron	094133-002	mg/kg	21200.00		32.5	98.4
Perimeter	64	Iron	094134-002	mg/kg	24600.00		32	96.9
Perimeter	64	Iron	094135-002	mg/kg	23600.00		32.7	99
			Average		**23133.33**			
			Std Dev		**1747.38**			
			CV (%)		**7.55**			
Perimeter	64	Lead	094133-002	mg/kg	9.25		0.0984	0.394
Perimeter	64	Lead	094134-002	mg/kg	10.70		0.0969	0.388
Perimeter	64	Lead	094135-002	mg/kg	10.10		0.099	0.396
			Average		**10.02**			
			Std Dev		**0.73**			
			CV (%)		**7.27**			
Perimeter	64	Magnesium	094133-002	mg/kg	7260.00		1.97	5.91
Perimeter	64	Magnesium	094134-002	mg/kg	8270.00		1.94	5.81
Perimeter	64	Magnesium	094135-002	mg/kg	8020.00		1.98	5.94
			Average		**7850.00**			
			Std Dev		**526.02**			
			CV (%)		**6.70**			
Perimeter	64	Manganese	094133-002	mg/kg	723.00		0.984	4.92
Perimeter	64	Manganese	094134-002	mg/kg	816.00		0.969	4.84
Perimeter	64	Manganese	094135-002	mg/kg	803.00		0.99	4.95
			Average		**780.67**			
			Std Dev		**50.36**			
			CV (%)		**6.45**			
Perimeter	64	Nickel	094133-002	mg/kg	9.26		0.0984	0.394
Perimeter	64	Nickel	094134-002	mg/kg	10.80		0.0969	0.388
Perimeter	64	Nickel	094135-002	mg/kg	10.40		0.099	0.396

TABLE D-8. Non-radiological Replicate Results for Calendar Year 2013, Soil

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
			Average		**10.15**			
			Std Dev		**0.80**			
			CV (%)		**7.87**			
Perimeter	64	Potassium	094133-002	mg/kg	2740.00		15.7	59.1
Perimeter	64	Potassium	094134-002	mg/kg	3860.00		15.5	58.1
Perimeter	64	Potassium	094135-002	mg/kg	3250.00		15.8	59.4
			Average		**3283.33**			
			Std Dev		**560.74**			
			CV (%)		**17.08**			
Perimeter	64	Selenium	094133-002	mg/kg	0.33	U	0.325	0.984
Perimeter	64	Selenium	094134-002	mg/kg	0.32	U	0.32	0.969
Perimeter	64	Selenium	094135-002	mg/kg	0.33	U	0.327	0.99
			Average		**0.32**			
			Std Dev		**0.00**			
			CV (%)		**1.11**			
Perimeter	64	Silver	094133-002	mg/kg	0.10	U	0.0967	0.484
Perimeter	64	Silver	094134-002	mg/kg	0.10	U	0.1	0.5
Perimeter	64	Silver	094135-002	mg/kg	0.10	U	0.0998	0.499
			Average		**0.10**			
			Std Dev		**0.00**			
			CV (%)		**1.87**			
Perimeter	64	Sodium	094133-002	mg/kg	62.10		15.7	49.2
Perimeter	64	Sodium	094134-002	mg/kg	60.90		15.5	48.4
Perimeter	64	Sodium	094135-002	mg/kg	58.70		15.8	49.5
			Average		**60.57**			
			Std Dev		**1.72**			
			CV (%)		**2.85**			
Perimeter	64	Thallium	094133-002	mg/kg	0.11	J	0.0591	0.394
Perimeter	64	Thallium	094134-002	mg/kg	0.16	J	0.0581	0.388
Perimeter	64	Thallium	094135-002	mg/kg	0.12	J	0.0594	0.396
			Average		**0.13**			
			Std Dev		**0.03**			
			CV (%)		**21.38**			
Perimeter	64	Vanadium	094133-002	mg/kg	62.30		0.0967	0.484

TABLE D-8. Non-radiological Replicate Results for Calendar Year 2013, Soil

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
Perimeter	64	Vanadium	094134-002	mg/kg	54.30		0.1	0.5
Perimeter	64	Vanadium	094135-002	mg/kg	51.40		0.0998	0.499
			Average		**56.00**			
			Std Dev		**5.65**			
			CV (%)		**10.08**			
Perimeter	64	Zinc	094133-002	mg/kg	75.50		0.394	1.97
Perimeter	64	Zinc	094134-002	mg/kg	89.00		0.388	1.94
Perimeter	64	Zinc	094135-002	mg/kg	82.20		0.396	1.98
			Average		**82.23**			
			Std Dev		**6.75**			
			CV (%)		**8.21**			

NOTES:

*** = Recovery or relative percent difference not within acceptance limits.**
CV = coefficient of variation
J = The associated value is an estimated quantity.
MDL = method detection limit
mg/kg = milligram per kilogram
N = Results associated with a spike analysis were outside control limits.
PQL = Practical quantitation limit.
Std Dev = standard deviation
U = The analyte was analyzed for but not detected.

TABLE D-9. Non-radiological Replicate Results for Calendar Year 2013, Sediment

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
Community	11	Aluminum	094162-002	mg/kg	6450.00		2.86	9.54
Community	11	Aluminum	094163-002	mg/kg	6540.00		2.65	8.85
Community	11	Aluminum	094164-002	mg/kg	7080.00		2.65	8.82
			Average		**6690.00**			
			Std Dev		**340.73**			
			CV (%)		**5.09**			
Community	11	Antimony	094162-002	mg/kg	0.58	J	0.327	0.99
Community	11	Antimony	094163-002	mg/kg	0.30	U	0.301	0.911
Community	11	Antimony	094164-002	mg/kg	0.34	J	0.292	0.883
			Average		**0.41**			
			Std Dev		**0.15**			
			CV (%)		**37.45**			
Community	11	Arsenic	094162-002	mg/kg	1.39		0.191	0.954
Community	11	Arsenic	094163-002	mg/kg	1.62		0.177	0.885
Community	11	Arsenic	094164-002	mg/kg	1.82		0.176	0.882
			Average		**1.61**			
			Std Dev		**0.22**			
			CV (%)		**13.36**			
Community	11	Barium	094162-002	mg/kg	95.00		0.0954	0.382
Community	11	Barium	094163-002	mg/kg	103.00		0.0885	0.354
Community	11	Barium	094164-002	mg/kg	99.50		0.0882	0.353
			Average		**99.17**			
			Std Dev		**4.01**			
			CV (%)		**4.04**			
Community	11	Beryllium	094162-002	mg/kg	0.35		0.0191	0.0954
Community	11	Beryllium	094163-002	mg/kg	0.38		0.0177	0.0885
Community	11	Beryllium	094164-002	mg/kg	0.39		0.0176	0.0882
			Average		**0.37**			
			Std Dev		**0.02**			
			CV (%)		**6.30**			
Community	11	Cadmium	094162-002	mg/kg	0.13	J	0.0191	0.191
Community	11	Cadmium	094163-002	mg/kg	0.14	J	0.0177	0.177
Community	11	Cadmium	094164-002	mg/kg	0.14	J	0.0176	0.176
			Average		**0.14**			
			Std Dev		**0.01**			

TABLE D-9. Non-radiological Replicate Results for Calendar Year 2013, Sediment

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
			CV (%)		**3.71**			
Community	11	Calcium	094162-002	mg/kg	14200.00		31.5	95.4
Community	11	Calcium	094163-002	mg/kg	16700.00		29.2	88.5
Community	11	Calcium	094164-002	mg/kg	15500.00		29.1	88.2
			Average		**15466.67**			
			Std Dev		**1250.33**			
			CV (%)		**8.08**			
Community	11	Chromium	094162-002	mg/kg	4.97		0.191	0.573
Community	11	Chromium	094163-002	mg/kg	5.33		0.177	0.531
Community	11	Chromium	094164-002	mg/kg	5.71		0.176	0.529
			Average		**5.34**			
			Std Dev		**0.37**			
			CV (%)		**6.93**			
Community	11	Cobalt	094162-002	mg/kg	2.42		0.0573	0.191
Community	11	Cobalt	094163-002	mg/kg	2.87		0.0531	0.177
Community	11	Cobalt	094164-002	mg/kg	3.01		0.0529	0.176
			Average		**2.77**			
			Std Dev		**0.31**			
			CV (%)		**11.14**			
Community	11	Copper	094162-002	mg/kg	6.61		0.063	0.191
Community	11	Copper	094163-002	mg/kg	6.88		0.0584	0.177
Community	11	Copper	094164-002	mg/kg	7.66		0.0582	0.176
			Average		**7.05**			
			Std Dev		**0.55**			
			CV (%)		**7.73**			
Community	11	Iron	094162-002	mg/kg	5020.00		6.3	19.1
Community	11	Iron	094163-002	mg/kg	5870.00		5.84	17.7
Community	11	Iron	094164-002	mg/kg	6540.00		5.82	17.6
			Average		**5810.00**			
			Std Dev		**761.77**			
			CV (%)		**13.11**			
Community	11	Lead	094162-002	mg/kg	5.90		0.0954	0.382
Community	11	Lead	094163-002	mg/kg	6.94		0.0885	0.354
Community	11	Lead	094164-002	mg/kg	7.03		0.0882	0.353
			Average		**6.62**			

TABLE D-9. Non-radiological Replicate Results for Calendar Year 2013, Sediment

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
			Std Dev		**0.63**			
			CV (%)		**9.48**			
Community	11	Magnesium	094162-002	mg/kg	2670.00		1.91	5.73
Community	11	Magnesium	094163-002	mg/kg	2620.00		1.77	5.31
Community	11	Magnesium	094164-002	mg/kg	2820.00		1.76	5.29
			Average		**2703.33**			
			Std Dev		**104.08**			
			CV (%)		**3.85**			
Community	11	Manganese	094162-002	mg/kg	177.00		0.954	4.77
Community	11	Manganese	094163-002	mg/kg	305.00		0.885	4.42
Community	11	Manganese	094164-002	mg/kg	230.00		0.882	4.41
			Average		**237.33**			
			Std Dev		**64.31**			
			CV (%)		**27.10**			
Community	11	Nickel	094162-002	mg/kg	5.20		0.0954	0.382
Community	11	Nickel	094163-002	mg/kg	5.85		0.0885	0.354
Community	11	Nickel	094164-002	mg/kg	6.19		0.0882	0.353
			Average		**5.75**			
			Std Dev		**0.50**			
			CV (%)		**8.75**			
Community	11	Potassium	094162-002	mg/kg	1280.00		15.3	57.3
Community	11	Potassium	094163-002	mg/kg	1350.00		14.2	53.1
Community	11	Potassium	094164-002	mg/kg	1540.00		14.1	52.9
			Average		**1390.00**			
			Std Dev		**134.54**			
			CV (%)		**9.68**			
Community	11	Selenium	094162-002	mg/kg	0.32	U	0.315	0.954
Community	11	Selenium	094163-002	mg/kg	0.29	U	0.292	0.885
Community	11	Selenium	094164-002	mg/kg	0.29	U	0.291	0.882
			Average		**0.30**			
			Std Dev		**0.01**			
			CV (%)		**4.54**			
Community	11	Silver	094162-002	mg/kg	0.22	J	0.099	0.495
Community	11	Silver	094163-002	mg/kg	0.23	J	0.0911	0.455
Community	11	Silver	094164-002	mg/kg	0.24	J	0.0883	0.442

TABLE D-9. Non-radiological Replicate Results for Calendar Year 2013, Sediment

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
			Average		**0.23**			
			Std Dev		**0.01**			
			CV (%)		**4.56**			
Community	11	Sodium	094162-002	mg/kg	106.00		15.3	47.7
Community	11	Sodium	094163-002	mg/kg	121.00		14.2	44.2
Community	11	Sodium	094164-002	mg/kg	126.00		14.1	44.1
			Average		**117.67**			
			Std Dev		**10.41**			
			CV (%)		**8.85**			
Community	11	Thallium	094162-002	mg/kg	0.08	J	0.0573	0.382
Community	11	Thallium	094163-002	mg/kg	0.09	J	0.0531	0.354
Community	11	Thallium	094164-002	mg/kg	0.09	J	0.0529	0.353
			Average		**0.09**			
			Std Dev		**0.00**			
			CV (%)		**4.03**			
Community	11	Vanadium	094162-002	mg/kg	11.80		0.099	0.495
Community	11	Vanadium	094163-002	mg/kg	14.20		0.0911	0.455
Community	11	Vanadium	094164-002	mg/kg	11.50		0.0883	0.442
			Average		**12.50**			
			Std Dev		**1.48**			
			CV (%)		**11.84**			
Community	11	Zinc	094162-002	mg/kg	20.50		0.382	1.91
Community	11	Zinc	094163-002	mg/kg	57.20		0.354	1.77
Community	11	Zinc	094164-002	mg/kg	23.60		0.353	1.76
			Average		**33.77**			
			Std Dev		**20.35**			
			CV (%)		**60.28**			
On-Site	74N	Aluminum	094138-002	mg/kg	3880.00		2.61	8.7
On-Site	74N	Aluminum	094139-002	mg/kg	6140.00		2.8	9.33
On-Site	74N	Aluminum	094140-002	mg/kg	4150.00		2.87	9.58
			Average		**4723.33**			
			Std Dev		**1234.27**			
			CV (%)		**26.13**			
On-Site	74N	Antimony	094139-002	mg/kg	1.56	NU	1.56	4.73
On-Site	74N	Antimony	094140-002	mg/kg	1.55	NU	1.55	4.71

TABLE D-9. Non-radiological Replicate Results for Calendar Year 2013, Sediment

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
			Average		**1.56**			
			Std Dev		**0.01**			
			CV (%)		**0.45**			
On-Site	74N	Arsenic	094138-002	mg/kg	0.84	J	0.174	0.87
On-Site	74N	Arsenic	094139-002	mg/kg	1.60		0.187	0.933
On-Site	74N	Arsenic	094140-002	mg/kg	1.12		0.192	0.958
			Average		**1.19**			
			Std Dev		**0.39**			
			CV (%)		**32.53**			
On-Site	74N	Barium	094138-002	mg/kg	55.30		0.087	0.348
On-Site	74N	Barium	094139-002	mg/kg	76.90		0.0933	0.373
On-Site	74N	Barium	094140-002	mg/kg	40.90		0.0958	0.383
			Average		**57.70**			
			Std Dev		**18.12**			
			CV (%)		**31.40**			
On-Site	74N	Beryllium	094138-002	mg/kg	0.31		0.0174	0.087
On-Site	74N	Beryllium	094139-002	mg/kg	0.32		0.0187	0.0933
On-Site	74N	Beryllium	094140-002	mg/kg	0.27		0.0192	0.0958
			Average		**0.30**			
			Std Dev		**0.03**			
			CV (%)		**8.86**			
On-Site	74N	Cadmium	094138-002	mg/kg	0.14	J	0.0174	0.174
On-Site	74N	Cadmium	094139-002	mg/kg	0.20		0.0187	0.187
On-Site	74N	Cadmium	094140-002	mg/kg	0.13	J	0.0192	0.192
			Average		**0.16**			
			Std Dev		**0.04**			
			CV (%)		**24.82**			
On-Site	74N	Calcium	094138-002	mg/kg	28500.00		28.7	87
On-Site	74N	Calcium	094139-002	mg/kg	28700.00		30.8	93.3
On-Site	74N	Calcium	094140-002	mg/kg	25000.00		31.6	95.8
			Average		**27400.00**			
			Std Dev		**2080.87**			
			CV (%)		**7.59**			
On-Site	74N	Chromium	094138-002	mg/kg	3.37		0.174	0.522
On-Site	74N	Chromium	094139-002	mg/kg	5.72		0.187	0.56

TABLE D-9. Non-radiological Replicate Results for Calendar Year 2013, Sediment

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	74N	Chromium	094140-002	mg/kg	5.60		0.192	0.575
			Average		**4.90**			
			Std Dev		**1.32**			
			CV (%)		**27.03**			
On-Site	74N	Cobalt	094138-002	mg/kg	3.25		0.0522	0.174
On-Site	74N	Cobalt	094139-002	mg/kg	4.64		0.056	0.187
On-Site	74N	Cobalt	094140-002	mg/kg	3.43		0.0575	0.192
			Average		**3.77**			
			Std Dev		**0.76**			
			CV (%)		**20.03**			
On-Site	74N	Copper	094138-002	mg/kg	4.49	N	0.0574	0.174
On-Site	74N	Copper	094139-002	mg/kg	7.78	N	0.0616	0.187
On-Site	74N	Copper	094140-002	mg/kg	6.06	N	0.0632	0.192
			Average		**6.11**			
			Std Dev		**1.65**			
			CV (%)		**26.93**			
On-Site	74N	Iron	094138-002	mg/kg	7660.00		5.74	17.4
On-Site	74N	Iron	094139-002	mg/kg	12100.00		30.8	93.3
On-Site	74N	Iron	094140-002	mg/kg	8040.00		6.32	19.2
			Average		**9266.67**			
			Std Dev		**2461.08**			
			CV (%)		**26.56**			
On-Site	74N	Lead	094138-002	mg/kg	3.73	N	0.087	0.348
On-Site	74N	Lead	094139-002	mg/kg	6.66	N	0.0933	0.373
On-Site	74N	Lead	094140-002	mg/kg	3.84	N	0.0958	0.383
			Average		**4.74**			
			Std Dev		**1.66**			
			CV (%)		**35.01**			
On-Site	74N	Magnesium	094138-002	mg/kg	2150.00		1.74	5.22
On-Site	74N	Magnesium	094139-002	mg/kg	3850.00		1.87	5.6
On-Site	74N	Magnesium	094140-002	mg/kg	2510.00		1.92	5.75
			Average		**2836.67**			
			Std Dev		**895.84**			
			CV (%)		**31.58**			
On-Site	74N	Manganese	094138-002	mg/kg	168.00		0.174	0.87

TABLE D-9. Non-radiological Replicate Results for Calendar Year 2013, Sediment

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	74N	Manganese	094139-002	mg/kg	290.00		0.933	4.66
On-Site	74N	Manganese	094140-002	mg/kg	172.00		0.192	0.958
			Average		**210.00**			
			Std Dev		**69.31**			
			CV (%)		**33.01**			
On-Site	74N	Nickel	094138-002	mg/kg	4.05		0.087	0.348
On-Site	74N	Nickel	094139-002	mg/kg	6.81		0.0933	0.373
On-Site	74N	Nickel	094140-002	mg/kg	4.57		0.0958	0.383
			Average		**5.14**			
			Std Dev		**1.47**			
			CV (%)		**28.51**			
On-Site	74N	Potassium	094138-002	mg/kg	1020.00		13.9	52.2
On-Site	74N	Potassium	094139-002	mg/kg	2120.00		14.9	56
On-Site	74N	Potassium	094140-002	mg/kg	1280.00		15.3	57.5
			Average		**1473.33**			
			Std Dev		**574.92**			
			CV (%)		**39.02**			
On-Site	74N	Selenium	094138-002	mg/kg	0.29	U	0.287	0.87
On-Site	74N	Selenium	094139-002	mg/kg	0.31	U	0.308	0.933
On-Site	74N	Selenium	094140-002	mg/kg	0.32	U	0.316	0.958
			Average		**0.30**			
			Std Dev		**0.01**			
			CV (%)		**4.93**			
On-Site	74N	Silver	094138-002	mg/kg	0.09	U	0.0904	0.452
On-Site	74N	Silver	094139-002	mg/kg	0.09	U	0.0947	0.473
On-Site	74N	Silver	094140-002	mg/kg	0.09	U	0.0942	0.471
			Average		**0.09**			
			Std Dev		**0.00**			
			CV (%)		**2.53**			
On-Site	74N	Sodium	094138-002	mg/kg	43.90		13.9	43.5
On-Site	74N	Sodium	094139-002	mg/kg	49.50		14.9	46.6
On-Site	74N	Sodium	094140-002	mg/kg	42.30	J	15.3	47.9
			Average		**45.23**			
			Std Dev		**3.78**			
			CV (%)		**8.36**			

TABLE D-9. Non-radiological Replicate Results for Calendar Year 2013, Sediment

Location Type	Location	Analyte	Sample Identification	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	74N	Thallium	094138-002	mg/kg	0.05	J	0.0522	0.348
On-Site	74N	Thallium	094139-002	mg/kg	0.12	J	0.056	0.373
On-Site	74N	Thallium	094140-002	mg/kg	0.07	J	0.0575	0.383
			Average		**0.08**			
			Std Dev		**0.04**			
			CV (%)		**46.35**			
On-Site	74N	Vanadium	094138-002	mg/kg	17.70	N	0.0904	0.452
On-Site	74N	Vanadium	094139-002	mg/kg	53.70	N	0.0947	0.473
On-Site	74N	Vanadium	094140-002	mg/kg	43.50	N	0.0942	0.471
			Average		**38.30**			
			Std Dev		**18.55**			
			CV (%)		**48.45**			
On-Site	74N	Zinc	094138-002	mg/kg	20.90		0.348	1.74
On-Site	74N	Zinc	094139-002	mg/kg	35.00		0.373	1.87
On-Site	74N	Zinc	094140-002	mg/kg	22.60		0.383	1.92
			Average		**26.17**			
			Std Dev		**7.70**			
			CV (%)		**29.42**			

NOTES:

*** = Recovery or relative percent difference not within acceptance limits.**
CV = coefficient of variation
J = The associated value is an estimated quantity.
MDL = method detection limit
mg/kg = milligram per kilogram
N = Results associated with a spike analysis were outside control limits.
PQL = Practical quantitation limit.
Std Dev = standard deviation
U = The analyte was analyzed for but not detected.

TABLE D-10. High Explosive Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	90	Amino-2,6-dinitrotoluene, 4-	µg/kg	49.5	U	49.5	149
On-Site	90	Amino-4,6-dinitrotoluene, 2-	µg/kg	49.5	U	49.5	149
On-Site	90	Dinitrobenzene, 1,3-	µg/kg	49.5	U	49.5	149
On-Site	90	Dinitrotoluene, 2,4-	µg/kg	49.5	U	49.5	149
On-Site	90	Dinitrotoluene, 2,6-	µg/kg	49.5	U	49.5	149
On-Site	90	HMX	µg/kg	49.5	U	49.5	149
On-Site	90	Nitro-benzene	µg/kg	49.5	U	49.5	149
On-Site	90	Nitrotoluene, 2-	µg/kg	49.5	U	49.5	149
On-Site	90	Nitrotoluene, 3-	µg/kg	49.5	U	49.5	149
On-Site	90	Nitrotoluene, 4-	µg/kg	49.5	U	49.5	149
On-Site	90	Pentaerythritol tetranitrate	µg/kg	81.7	U	81.7	495
On-Site	90	RDX	µg/kg	49.5	U	49.5	149
On-Site	90	Tetryl	µg/kg	49.5	U	49.5	149
On-Site	90	Trinitrobenzene, 1,3,5-	µg/kg	49.5	U	49.5	149
On-Site	90	Trinitrotoluene, 2,4,6-	µg/kg	49.5	U	49.5	149
On-Site	93	Amino-2,6-dinitrotoluene, 4-	µg/kg	49.5	U	49.5	149
On-Site	93	Amino-4,6-dinitrotoluene, 2-	µg/kg	49.5	U	49.5	149
On-Site	93	Dinitrobenzene, 1,3-	µg/kg	49.5	U	49.5	149
On-Site	93	Dinitrotoluene, 2,4-	µg/kg	49.5	U	49.5	149
On-Site	93	Dinitrotoluene, 2,6-	µg/kg	49.5	U	49.5	149
On-Site	93	HMX	µg/kg	49.5	U	49.5	149
On-Site	93	Nitro-benzene	µg/kg	49.5	U	49.5	149
On-Site	93	Nitrotoluene, 2-	µg/kg	49.5	U	49.5	149
On-Site	93	Nitrotoluene, 3-	µg/kg	49.5	U	49.5	149
On-Site	93	Nitrotoluene, 4-	µg/kg	49.5	U	49.5	149
On-Site	93	Pentaerythritol tetranitrate	µg/kg	81.7	U	81.7	495
On-Site	93	RDX	µg/kg	49.5	U	49.5	149
On-Site	93	Tetryl	µg/kg	49.5	U	49.5	149
On-Site	93	Trinitrobenzene, 1,3,5-	µg/kg	49.5	U	49.5	149
On-Site	93	Trinitrotoluene, 2,4,6-	µg/kg	49.5	U	49.5	149
On-Site	94	Amino-2,6-dinitrotoluene, 4-	µg/kg	50	U	50	150
On-Site	94	Amino-4,6-dinitrotoluene, 2-	µg/kg	50	U	50	150

TABLE D-10. High Explosive Results by Location for Calendar Year 2013, Soil

Location Type	Location	Analyte	Units	Result	Laboratory Data Qualifiers	Decision Level (MDL)	Detection Limit (PQL)
On-Site	94	Dinitrobenzene, 1,3-	µg/kg	50	U	50	150
On-Site	94	Dinitrotoluene, 2,4-	µg/kg	50	U	50	150
On-Site	94	Dinitrotoluene, 2,6-	µg/kg	50	U	50	150
On-Site	94	HMX	µg/kg	50	U	50	150
On-Site	94	Nitro-benzene	µg/kg	50	U	50	150
On-Site	94	Nitrotoluene, 2-	µg/kg	50	U	50	150
On-Site	94	Nitrotoluene, 3-	µg/kg	50	U	50	150
On-Site	94	Nitrotoluene, 4-	µg/kg	50	U	50	150
On-Site	94	Pentaerythritol tetranitrate	µg/kg	82.5	U	82.5	500
On-Site	94	RDX	µg/kg	50	U	50	150
On-Site	94	Tetryl	µg/kg	50	U	50	150
On-Site	94	Trinitrobenzene, 1,3,5-	µg/kg	50	U	50	150
On-Site	94	Trinitrotoluene, 2,4,6-	µg/kg	50	U	50	150

NOTES:

MDL = method detection limit
µg/kg = microgram per kilogram
PQL = Practical quantitation limit
U = The analyte was analyzed for but not detected.

APPENDIX E

2013 STORMWATER SAMPLING RESULTS

TABLE E-1. Stormwater Monitoring for Calendar Year 2013

Monitoring Point	Sample Date	Analayte	Amount Detected	Error	Method Detection Limit	Units	Sample Preparation	NMWQCC Surface Water Standard - Public Water Supply*
SWMP-11	8-Jul-2013	Aluminum	0.0578	NA	0.015	mg/L	Filtered	5.0 mg/L
SWMP-11	8-Jul-2013	Antimony	<.001	NA	0.001	mg/L	Filtered	0.006 mg/L
SWMP-11	8-Jul-2013	Arsenic	0.00578	NA	0.0017	mg/L	Filtered	0.010 mg/L
SWMP-11	8-Jul-2013	Barium	0.115	NA	0.0006	mg/L	Filtered	2 mg/L
SWMP-11	8-Jul-2013	Beryllium	<.0002	NA	0.0002	mg/L	Filtered	2 mg/L
SWMP-11	8-Jul-2013	Cadmium	<.00011	NA	0.00011	mg/L	Filtered	0.005 mg/L
SWMP-11	8-Jul-2013	Chromium	<.002	NA	0.002	mg/L	Filtered	0.011 mg/L
SWMP-11	8-Jul-2013	Cobalt	0.00259	NA	0.0001	mg/L	Filtered	0.05 mg/L
SWMP-11	8-Jul-2013	Copper	0.0198	NA	0.00035	mg/L	Filtered	0.200 mg/L
SWMP-11	8-Jul-2013	Lead	<.0005	NA	0.0005	mg/L	Filtered	0.015 mg/L
SWMP-11	8-Jul-2013	Manganese	0.252	NA	0.005	mg/L	Filtered	1.650 mg/L
SWMP-11	8-Jul-2013	Mercury	<.000067	NA	0.000067	mg/L	Filtered	0.00077 mg/L
SWMP-11	8-Jul-2013	Nickel	0.00617	NA	0.0005	mg/L	Filtered	0.700 mg/L
SWMP-11	8-Jul-2013	Selenium	<.0015	NA	0.0015	mg/L	Filtered	0.005 mg/L
SWMP-11	8-Jul-2013	Silver	<.0002	NA	0.0002	mg/L	Filtered	0.0032 mg/L
SWMP-11	8-Jul-2013	Thallium	<.00045	NA	0.00045	mg/L	Filtered	0.002 mg/L
SWMP-11	8-Jul-2013	Vanadium	0.0174	NA	0.001	mg/L	Filtered	0.100 mg/L
SWMP-11	8-Jul-2013	Zinc	0.0037	NA	0.0035	mg/L	Filtered	10.5 mg/L
SWMP-25	8-Jul-2013	Aluminum	0.111	NA	0.015	mg/L	Filtered	5.0 mg/L
SWMP-25	8-Jul-2013	Antimony	0.0126	NA	0.001	mg/L	Filtered	0.006 mg/L
SWMP-25	8-Jul-2013	Arsenic	0.00478	NA	0.0017	mg/L	Filtered	0.010 mg/L
SWMP-25	8-Jul-2013	Barium	0.059	NA	0.0006	mg/L	Filtered	2 mg/L
SWMP-25	8-Jul-2013	Beryllium	<.0002	NA	0.0002	mg/L	Filtered	2 mg/L
SWMP-25	8-Jul-2013	Cadmium	<.00011	NA	0.00011	mg/L	Filtered	0.005 mg/L
SWMP-25	8-Jul-2013	Chromium	<.002	NA	0.002	mg/L	Filtered	0.011 mg/L
SWMP-25	8-Jul-2013	Cobalt	0.000164	NA	0.0001	mg/L	Filtered	0.05 mg/L
SWMP-25	8-Jul-2013	Copper	0.00693	NA	0.00035	mg/L	Filtered	0.200 mg/L
SWMP-25	8-Jul-2013	Lead	<.0005	NA	0.0005	mg/L	Filtered	0.015 mg/L
SWMP-25	8-Jul-2013	Manganese	0.00411	NA	0.001	mg/L	Filtered	1.650 mg/L
SWMP-25	8-Jul-2013	Mercury	<.000067	NA	0.000067	mg/L	Filtered	0.00077 mg/L
SWMP-25	8-Jul-2013	Nickel	0.00137	NA	0.0005	mg/L	Filtered	0.700 mg/L

TABLE E-1. Stormwater Monitoring for Calendar Year 2013

Monitoring Point	Sample Date	Analayte	Amount Detected	Error	Method Detection Limit	Units	Sample Preparation	NMWQCC Surface Water Standard - Public Water Supply*
SWMP-25	8-Jul-2013	Selenium	<.0015	NA	0.0015	mg/L	Filtered	0.005 mg/L
SWMP-25	8-Jul-2013	Silver	<.0002	NA	0.0002	mg/L	Filtered	0.0032 mg/L
SWMP-25	8-Jul-2013	Thallium	<.00045	NA	0.00045	mg/L	Filtered	0.002 mg/L
SWMP-25	8-Jul-2013	Vanadium	0.00551	NA	0.001	mg/L	Filtered	0.100 mg/L
SWMP-25	8-Jul-2013	Zinc	0.00711	NA	0.0035	mg/L	Filtered	10.5 mg/L
SWMP-26	8-Jul-2013	Aluminum	0.0515	NA	0.015	mg/L	Filtered	5.0 mg/L
SWMP-26	8-Jul-2013	Antimony	0.00207	NA	0.001	mg/L	Filtered	0.006 mg/L
SWMP-26	8-Jul-2013	Arsenic	0.00257	NA	0.0017	mg/L	Filtered	0.010 mg/L
SWMP-26	8-Jul-2013	Barium	0.0607	NA	0.0006	mg/L	Filtered	2 mg/L
SWMP-26	8-Jul-2013	Beryllium	<.0002	NA	0.0002	mg/L	Filtered	2 mg/L
SWMP-26	8-Jul-2013	Cadmium	<.00011	NA	0.00011	mg/L	Filtered	0.005 mg/L
SWMP-26	8-Jul-2013	Chromium	0.00231	NA	0.002	mg/L	Filtered	0.011 mg/L
SWMP-26	8-Jul-2013	Cobalt	0.00016	NA	0.0001	mg/L	Filtered	0.05 mg/L
SWMP-26	8-Jul-2013	Copper	0.00771	NA	0.00035	mg/L	Filtered	0.200 mg/L
SWMP-26	8-Jul-2013	Lead	<.0005	NA	0.0005	mg/L	Filtered	0.015 mg/L
SWMP-26	8-Jul-2013	Manganese	0.00256	NA	0.001	mg/L	Filtered	1.650 mg/L
SWMP-26	8-Jul-2013	Mercury	<.000067	NA	0.000067	mg/L	Filtered	0.00077 mg/L
SWMP-26	8-Jul-2013	Nickel	0.00102	NA	0.0005	mg/L	Filtered	0.700 mg/L
SWMP-26	8-Jul-2013	Selenium	<.0015	NA	0.0015	mg/L	Filtered	0.005 mg/L
SWMP-26	8-Jul-2013	Silver	<.0002	NA	0.0002	mg/L	Filtered	0.0032 mg/L
SWMP-26	8-Jul-2013	Thallium	<.00045	NA	0.00045	mg/L	Filtered	0.002 mg/L
SWMP-26	8-Jul-2013	Vanadium	0.0101	NA	0.001	mg/L	Filtered	0.100 mg/L
SWMP-26	8-Jul-2013	Zinc	0.00618	NA	0.0035	mg/L	Filtered	10.5 mg/L
SWMP-28	8-Jul-2013	Aluminum	<.015	NA	0.015	mg/L	Filtered	5.0 mg/L
SWMP-28	8-Jul-2013	Antimony	<.001	NA	0.001	mg/L	Filtered	0.006 mg/L
SWMP-28	8-Jul-2013	Arsenic	0.00464	NA	0.0017	mg/L	Filtered	0.010 mg/L
SWMP-28	8-Jul-2013	Barium	0.128	NA	0.0006	mg/L	Filtered	2 mg/L
SWMP-28	8-Jul-2013	Beryllium	<.0002	NA	0.0002	mg/L	Filtered	2 mg/L
SWMP-28	8-Jul-2013	Cadmium	<.00011	NA	0.00011	mg/L	Filtered	0.005 mg/L
SWMP-28	8-Jul-2013	Chromium	<.002	NA	0.002	mg/L	Filtered	0.011 mg/L
SWMP-28	8-Jul-2013	Cobalt	0.00142	NA	0.0001	mg/L	Filtered	0.05 mg/L

TABLE E-1. Stormwater Monitoring for Calendar Year 2013

Monitoring Point	Sample Date	Analayte	Amount Detected	Error	Method Detection Limit	Units	Sample Preparation	NMWQCC Surface Water Standard - Public Water Supply*
SWMP-28	8-Jul-2013	Copper	0.00162	NA	0.00035	mg/L	Filtered	0.200 mg/L
SWMP-28	8-Jul-2013	Lead	<.0005	NA	0.0005	mg/L	Filtered	0.015 mg/L
SWMP-28	8-Jul-2013	Manganese	0.163	NA	0.005	mg/L	Filtered	1.650 mg/L
SWMP-28	8-Jul-2013	Mercury	<.000067	NA	0.000067	mg/L	Filtered	0.00077 mg/L
SWMP-28	8-Jul-2013	Nickel	0.00215	NA	0.0005	mg/L	Filtered	0.700 mg/L
SWMP-28	8-Jul-2013	Selenium	<.0015	NA	0.0015	mg/L	Filtered	0.005 mg/L
SWMP-28	8-Jul-2013	Silver	<.0002	NA	0.0002	mg/L	Filtered	0.0032 mg/L
SWMP-28	8-Jul-2013	Thallium	<.00045	NA	0.00045	mg/L	Filtered	0.002 mg/L
SWMP-28	8-Jul-2013	Vanadium	0.0101	NA	0.001	mg/L	Filtered	0.100 mg/L
SWMP-28	8-Jul-2013	Zinc	<.0035	NA	0.0035	mg/L	Filtered	10.5 mg/L
SWMP-24	15-Jul-2013	Aluminum	0.0201	NA	0.015	mg/L	Filtered	5.0 mg/L
SWMP-24	15-Jul-2013	Antimony	0.00551	NA	0.001	mg/L	Filtered	0.006 mg/L
SWMP-24	15-Jul-2013	Arsenic	0.00564	NA	0.0017	mg/L	Filtered	0.010 mg/L
SWMP-24	15-Jul-2013	Barium	0.0377	NA	0.0006	mg/L	Filtered	2 mg/L
SWMP-24	15-Jul-2013	Beryllium	<.0002	NA	0.0002	mg/L	Filtered	2 mg/L
SWMP-24	15-Jul-2013	Cadmium	<.00011	NA	0.00011	mg/L	Filtered	0.005 mg/L
SWMP-24	15-Jul-2013	Chromium	<.002	NA	0.002	mg/L	Filtered	0.011 mg/L
SWMP-24	15-Jul-2013	Cobalt	0.000159	NA	0.0001	mg/L	Filtered	0.05 mg/L
SWMP-24	15-Jul-2013	Copper	0.00734	NA	0.00035	mg/L	Filtered	0.200 mg/L
SWMP-24	15-Jul-2013	Lead	<.0005	NA	0.0005	mg/L	Filtered	0.015 mg/L
SWMP-24	15-Jul-2013	Manganese	<.001	NA	0.001	mg/L	Filtered	1.650 mg/L
SWMP-24	15-Jul-2013	Mercury	<.000067	NA	0.000067	mg/L	Filtered	0.00077 mg/L
SWMP-24	15-Jul-2013	Nickel	0.00108	NA	0.0005	mg/L	Filtered	0.700 mg/L
SWMP-24	15-Jul-2013	Selenium	<.0015	NA	0.0015	mg/L	Filtered	0.005 mg/L
SWMP-24	15-Jul-2013	Silver	<.0002	NA	0.0002	mg/L	Filtered	0.0032 mg/L
SWMP-24	15-Jul-2013	Thallium	<.00045	NA	0.00045	mg/L	Filtered	0.002 mg/L
SWMP-24	15-Jul-2013	Vanadium	0.00322	NA	0.001	mg/L	Filtered	0.100 mg/L
SWMP-24	15-Jul-2013	Zinc	0.0156	NA	0.0035	mg/L	Filtered	10.5 mg/L
SWMP-09	22-Jul-2013	Aluminum	0.423	NA	0.015	mg/L	Filtered	5.0 mg/L
SWMP-09	22-Jul-2013	Antimony	0.00357	NA	0.001	mg/L	Filtered	0.006 mg/L
SWMP-09	22-Jul-2013	Arsenic	0.00267	NA	0.0017	mg/L	Filtered	0.010 mg/L

TABLE E-1. Stormwater Monitoring for Calendar Year 2013

Monitoring Point	Sample Date	Analayte	Amount Detected	Error	Method Detection Limit	Units	Sample Preparation	NMWQCC Surface Water Standard - Public Water Supply*
SWMP-09	22-Jul-2013	Barium	0.0727	NA	0.0006	mg/L	Filtered	2 mg/L
SWMP-09	22-Jul-2013	Beryllium	<.0002	NA	0.0002	mg/L	Filtered	2 mg/L
SWMP-09	22-Jul-2013	Cadmium	<.00011	NA	0.00011	mg/L	Filtered	0.005 mg/L
SWMP-09	22-Jul-2013	Chromium	<.002	NA	0.002	mg/L	Filtered	0.011 mg/L
SWMP-09	22-Jul-2013	Cobalt	0.00548	NA	0.0001	mg/L	Filtered	0.05 mg/L
SWMP-09	22-Jul-2013	Copper	0.00393	NA	0.00035	mg/L	Filtered	0.200 mg/L
SWMP-09	22-Jul-2013	Lead	<.0005	NA	0.0005	mg/L	Filtered	0.015 mg/L
SWMP-09	22-Jul-2013	Manganese	0.0147	NA	0.001	mg/L	Filtered	1.650 mg/L
SWMP-09	22-Jul-2013	Mercury	<.000067	NA	0.000067	mg/L	Filtered	0.00077 mg/L
SWMP-09	22-Jul-2013	Nickel	0.00272	NA	0.0005	mg/L	Filtered	0.700 mg/L
SWMP-09	22-Jul-2013	Selenium	<.0015	NA	0.0015	mg/L	Filtered	0.005 mg/L
SWMP-09	22-Jul-2013	Silver	<.0002	NA	0.0002	mg/L	Filtered	0.0032 mg/L
SWMP-09	22-Jul-2013	Thallium	<.00045	NA	0.00045	mg/L	Filtered	0.002 mg/L
SWMP-09	22-Jul-2013	Uranium-238	10	1.5	0.094	pCi/L	Unfiltered	NE, < MDL
SWMP-09	22-Jul-2013	Vanadium	0.00746	NA	0.001	mg/L	Filtered	0.100 mg/L
SWMP-09	22-Jul-2013	Zinc	0.00632	NA	0.0035	mg/L	Filtered	10.5 mg/L
SWMP-09	22-Aug-2013	Alpha, gross	109	23.8	7.23	pCi/L	Unfiltered	15 pCi/L
SWMP-09	22-Aug-2013	Aluminum	0.648	NA	0.015	mg/L	Filtered	5.0 mg/L
SWMP-09	22-Aug-2013	Antimony	0.00159	NA	0.001	mg/L	Filtered	0.006 mg/L
SWMP-09	22-Aug-2013	Arsenic	<.0017	NA	0.0017	mg/L	Filtered	0.010 mg/L
SWMP-09	22-Aug-2013	Barium	0.0773	NA	0.0006	mg/L	Filtered	2 mg/L
SWMP-09	22-Aug-2013	Beryllium	<.0002	NA	0.0002	mg/L	Filtered	2 mg/L
SWMP-09	22-Aug-2013	Beta, gross	137	25.5	4.12	pCi/L	Unfiltered	NE, < MDL
SWMP-09	22-Aug-2013	Cadmium	<.00011	NA	0.00011	mg/L	Filtered	0.005 mg/L
SWMP-09	22-Aug-2013	Chromium	<.002	NA	0.002	mg/L	Filtered	0.011 mg/L
SWMP-09	22-Aug-2013	Cobalt	0.000902	NA	0.0001	mg/L	Filtered	0.05 mg/L
SWMP-09	22-Aug-2013	Copper	0.00652	NA	0.00035	mg/L	Filtered	0.200 mg/L
SWMP-09	22-Aug-2013	Lead	0.000864	NA	0.0005	mg/L	Filtered	0.015 mg/L
SWMP-09	22-Aug-2013	Manganese	0.0123	NA	0.001	mg/L	Filtered	1.650 mg/L
SWMP-09	22-Aug-2013	Mercury	<.000067	NA	0.000067	mg/L	Filtered	0.00077 mg/L
SWMP-09	22-Aug-2013	Nickel	0.00363	NA	0.0005	mg/L	Filtered	0.700 mg/L

TABLE E-1. Stormwater Monitoring for Calendar Year 2013

Monitoring Point	Sample Date	Analayte	Amount Detected	Error	Method Detection Limit	Units	Sample Preparation	NMWQCC Surface Water Standard - Public Water Supply*
SWMP-09	22-Aug-2013	Selenium	<.0015	NA	0.0015	mg/L	Filtered	0.005 mg/L
SWMP-09	22-Aug-2013	Silver	<.0002	NA	0.0002	mg/L	Filtered	0.0032 mg/L
SWMP-09	22-Aug-2013	Thallium	<.00045	NA	0.00045	mg/L	Filtered	0.002 mg/L
SWMP-09	22-Aug-2013	Uranium-238	1.95	0.408	0.0987	pCi/L	Unfiltered	NE, < MDL
SWMP-09	22-Aug-2013	Vanadium	0.00763	NA	0.001	mg/L	Filtered	0.100 mg/L
SWMP-09	22-Aug-2013	Zinc	0.00633	NA	0.0035	mg/L	Filtered	10.5 mg/L
SWMP-25	26-Aug-2013	Aluminum	0.0261	NA	0.015	mg/L	Filtered	5.0 mg/L
SWMP-25	26-Aug-2013	Antimony	0.00198	NA	0.001	mg/L	Filtered	0.006 mg/L
SWMP-25	26-Aug-2013	Arsenic	0.00266	NA	0.0017	mg/L	Filtered	0.010 mg/L
SWMP-25	26-Aug-2013	Barium	0.0631	NA	0.0006	mg/L	Filtered	2 mg/L
SWMP-25	26-Aug-2013	Beryllium	<.0002	NA	0.0002	mg/L	Filtered	2 mg/L
SWMP-25	26-Aug-2013	Cadmium	<.00011	NA	0.00011	mg/L	Filtered	0.005 mg/L
SWMP-25	26-Aug-2013	Chromium	<.002	NA	0.002	mg/L	Filtered	0.011 mg/L
SWMP-25	26-Aug-2013	Cobalt	0.000149	NA	0.0001	mg/L	Filtered	0.05 mg/L
SWMP-25	26-Aug-2013	Copper	0.0138	NA	0.00035	mg/L	Filtered	0.200 mg/L
SWMP-25	26-Aug-2013	Lead	<.0005	NA	0.0005	mg/L	Filtered	0.015 mg/L
SWMP-25	26-Aug-2013	Manganese	0.00165	NA	0.001	mg/L	Filtered	1.650 mg/L
SWMP-25	26-Aug-2013	Mercury	<.000067	NA	0.000067	mg/L	Filtered	0.00077 mg/L
SWMP-25	26-Aug-2013	Nickel	0.00286	NA	0.0005	mg/L	Filtered	0.700 mg/L
SWMP-25	26-Aug-2013	Selenium	<.0015	NA	0.0015	mg/L	Filtered	0.005 mg/L
SWMP-25	26-Aug-2013	Silver	<.0002	NA	0.0002	mg/L	Filtered	0.0032 mg/L
SWMP-25	26-Aug-2013	Thallium	<.00045	NA	0.00045	mg/L	Filtered	0.002 mg/L
SWMP-25	26-Aug-2013	Vanadium	0.00397	NA	0.001	mg/L	Filtered	0.100 mg/L
SWMP-25	26-Aug-2013	Zinc	0.0226	NA	0.0035	mg/L	Filtered	10.5 mg/L
SWMP-07	11-Sep-2013	Aluminum	5.24	NA	0.015	mg/L	Filtered	5.0 mg/L
SWMP-07	11-Sep-2013	Antimony	0.00125	NA	0.001	mg/L	Filtered	0.006 mg/L
SWMP-07	11-Sep-2013	Arsenic	0.00235	NA	0.0017	mg/L	Filtered	0.010 mg/L
SWMP-07	11-Sep-2013	Barium	0.146	NA	0.0006	mg/L	Filtered	2 mg/L
SWMP-07	11-Sep-2013	Beryllium	0.000256	NA	0.0002	mg/L	Filtered	2 mg/L
SWMP-07	11-Sep-2013	Cadmium	0.00117	NA	0.00011	mg/L	Filtered	0.005 mg/L
SWMP-07	11-Sep-2013	Chromium	0.0041	NA	0.002	mg/L	Filtered	0.011 mg/L

TABLE E-1. Stormwater Monitoring for Calendar Year 2013

Monitoring Point	Sample Date	Analayte	Amount Detected	Error	Method Detection Limit	Units	Sample Preparation	NMWQCC Surface Water Standard - Public Water Supply*
SWMP-07	11-Sep-2013	Cobalt	0.00535	NA	0.0001	mg/L	Filtered	0.05 mg/L
SWMP-07	11-Sep-2013	Copper	0.0122	NA	0.00035	mg/L	Filtered	0.200 mg/L
SWMP-07	11-Sep-2013	Lead	0.00386	NA	0.0005	mg/L	Filtered	0.015 mg/L
SWMP-07	11-Sep-2013	Manganese	0.155	NA	0.001	mg/L	Filtered	1.650 mg/L
SWMP-07	11-Sep-2013	Mercury	<.000067	NA	0.000067	mg/L	Filtered	0.00077 mg/L
SWMP-07	11-Sep-2013	Nickel	0.0111	NA	0.0005	mg/L	Filtered	0.700 mg/L
SWMP-07	11-Sep-2013	Selenium	<.0015	NA	0.0015	mg/L	Filtered	0.005 mg/L
SWMP-07	11-Sep-2013	Silver	<.0002	NA	0.0002	mg/L	Filtered	0.0032 mg/L
SWMP-07	11-Sep-2013	Thallium	<.00045	NA	0.00045	mg/L	Filtered	0.002 mg/L
SWMP-07	11-Sep-2013	Vanadium	0.0127	NA	0.001	mg/L	Filtered	0.100 mg/L
SWMP-07	11-Sep-2013	Zinc	0.022	NA	0.0035	mg/L	Filtered	10.5 mg/L
SWMP-09	11-Sep-2013	Alpha, gross	28.2	8.53	4.36	pCi/L	Unfiltered	15 pCi/L
SWMP-09	11-Sep-2013	Aluminum	0.584	NA	0.015	mg/L	Filtered	5.0 mg/L
SWMP-09	11-Sep-2013	Antimony	0.0018	NA	0.001	mg/L	Filtered	0.006 mg/L
SWMP-09	11-Sep-2013	Arsenic	<.0017	NA	0.0017	mg/L	Filtered	0.010 mg/L
SWMP-09	11-Sep-2013	Barium	0.0476	NA	0.0006	mg/L	Filtered	2 mg/L
SWMP-09	11-Sep-2013	Beryllium	<.0002	NA	0.0002	mg/L	Filtered	2 mg/L
SWMP-09	11-Sep-2013	Beta, gross	40.4	8.11	2.71	pCi/L	Unfiltered	NE, < MDL
SWMP-09	11-Sep-2013	Cadmium	<.00011	NA	0.00011	mg/L	Filtered	0.005 mg/L
SWMP-09	11-Sep-2013	Chromium	<.002	NA	0.002	mg/L	Filtered	0.011 mg/L
SWMP-09	11-Sep-2013	Cobalt	0.000368	NA	0.0001	mg/L	Filtered	0.05 mg/L
SWMP-09	11-Sep-2013	Copper	0.00322	NA	0.00035	mg/L	Filtered	0.200 mg/L
SWMP-09	11-Sep-2013	Lead	<.0005	NA	0.0005	mg/L	Filtered	0.015 mg/L
SWMP-09	11-Sep-2013	Manganese	0.0103	NA	0.001	mg/L	Filtered	1.650 mg/L
SWMP-09	11-Sep-2013	Mercury	<.000067	NA	0.000067	mg/L	Filtered	0.00077 mg/L
SWMP-09	11-Sep-2013	Nickel	0.00432	NA	0.0005	mg/L	Filtered	0.700 mg/L
SWMP-09	11-Sep-2013	Selenium	<.0015	NA	0.0015	mg/L	Filtered	0.005 mg/L
SWMP-09	11-Sep-2013	Silver	<.0002	NA	0.0002	mg/L	Filtered	0.0032 mg/L
SWMP-09	11-Sep-2013	Thallium	<.00045	NA	0.00045	mg/L	Filtered	0.002 mg/L
SWMP-09	11-Sep-2013	Vanadium	0.00615	NA	0.001	mg/L	Filtered	0.100 mg/L
SWMP-09	11-Sep-2013	Zinc	0.00437	NA	0.0035	mg/L	Filtered	10.5 mg/L

TABLE E-1. Stormwater Monitoring for Calendar Year 2013

Monitoring Point	Sample Date	Analayte	Amount Detected	Error	Method Detection Limit	Units	Sample Preparation	NMWQCC Surface Water Standard - Public Water Supply*
SWMP-20	11-Sep-2013	Aluminum	5.87	NA	0.015	mg/L	Filtered	5.0 mg/L
SWMP-20	11-Sep-2013	Antimony	<.001	NA	0.001	mg/L	Filtered	0.006 mg/L
SWMP-20	11-Sep-2013	Arsenic	0.00282	NA	0.0017	mg/L	Filtered	0.010 mg/L
SWMP-20	11-Sep-2013	Barium	0.172	NA	0.0006	mg/L	Filtered	2 mg/L
SWMP-20	11-Sep-2013	Beryllium	0.000302	NA	0.0002	mg/L	Filtered	2 mg/L
SWMP-20	11-Sep-2013	Cadmium	0.000131	NA	0.00011	mg/L	Filtered	0.005 mg/L
SWMP-20	11-Sep-2013	Chromium	0.00511	NA	0.002	mg/L	Filtered	0.011 mg/L
SWMP-20	11-Sep-2013	Cobalt	0.00218	NA	0.0001	mg/L	Filtered	0.05 mg/L
SWMP-20	11-Sep-2013	Copper	0.0117	NA	0.00035	mg/L	Filtered	0.200 mg/L
SWMP-20	11-Sep-2013	Lead	0.0043	NA	0.0005	mg/L	Filtered	0.015 mg/L
SWMP-20	11-Sep-2013	Manganese	0.125	NA	0.001	mg/L	Filtered	1.650 mg/L
SWMP-20	11-Sep-2013	Mercury	<.000067	NA	0.000067	mg/L	Filtered	0.00077 mg/L
SWMP-20	11-Sep-2013	Nickel	0.00621	NA	0.0005	mg/L	Filtered	0.700 mg/L
SWMP-20	11-Sep-2013	Selenium	<.0015	NA	0.0015	mg/L	Filtered	0.005 mg/L
SWMP-20	11-Sep-2013	Silver	<.0002	NA	0.0002	mg/L	Filtered	0.0032 mg/L
SWMP-20	11-Sep-2013	Thallium	<.00045	NA	0.00045	mg/L	Filtered	0.002 mg/L
SWMP-20	11-Sep-2013	Vanadium	0.0148	NA	0.001	mg/L	Filtered	0.100 mg/L
SWMP-20	11-Sep-2013	Zinc	0.0272	NA	0.0035	mg/L	Filtered	10.5 mg/L
SWMP-21	11-Sep-2013	Aluminum	0.172	NA	0.015	mg/L	Filtered	5.0 mg/L
SWMP-21	11-Sep-2013	Antimony	<.001	NA	0.001	mg/L	Filtered	0.006 mg/L
SWMP-21	11-Sep-2013	Arsenic	<.0017	NA	0.0017	mg/L	Filtered	0.010 mg/L
SWMP-21	11-Sep-2013	Barium	0.0453	NA	0.0006	mg/L	Filtered	2 mg/L
SWMP-21	11-Sep-2013	Beryllium	<.0002	NA	0.0002	mg/L	Filtered	2 mg/L
SWMP-21	11-Sep-2013	Cadmium	<.00011	NA	0.00011	mg/L	Filtered	0.005 mg/L
SWMP-21	11-Sep-2013	Chromium	<.002	NA	0.002	mg/L	Filtered	0.011 mg/L
SWMP-21	11-Sep-2013	Cobalt	0.000203	NA	0.0001	mg/L	Filtered	0.05 mg/L
SWMP-21	11-Sep-2013	Copper	0.00922	NA	0.00035	mg/L	Filtered	0.200 mg/L
SWMP-21	11-Sep-2013	Lead	<.0005	NA	0.0005	mg/L	Filtered	0.015 mg/L
SWMP-21	11-Sep-2013	Manganese	0.00618	NA	0.001	mg/L	Filtered	1.650 mg/L
SWMP-21	11-Sep-2013	Mercury	<.000067	NA	0.000067	mg/L	Filtered	0.00077 mg/L
SWMP-21	11-Sep-2013	Nickel	0.00597	NA	0.0005	mg/L	Filtered	0.700 mg/L

TABLE E-1. Stormwater Monitoring for Calendar Year 2013

Monitoring Point	Sample Date	Analayte	Amount Detected	Error	Method Detection Limit	Units	Sample Preparation	NMWQCC Surface Water Standard - Public Water Supply*
SWMP-21	11-Sep-2013	Selenium	<.0015	NA	0.0015	mg/L	Filtered	0.005 mg/L
SWMP-21	11-Sep-2013	Silver	<.0002	NA	0.0002	mg/L	Filtered	0.0032 mg/L
SWMP-21	11-Sep-2013	Thallium	<.00045	NA	0.00045	mg/L	Filtered	0.002 mg/L
SWMP-21	11-Sep-2013	Vanadium	0.00187	NA	0.001	mg/L	Filtered	0.100 mg/L
SWMP-21	11-Sep-2013	Zinc	0.0079	NA	0.0035	mg/L	Filtered	10.5 mg/L
SWMP-24	11-Sep-2013	Aluminum	0.0345	NA	0.015	mg/L	Filtered	5.0 mg/L
SWMP-24	11-Sep-2013	Antimony	0.00265	NA	0.001	mg/L	Filtered	0.006 mg/L
SWMP-24	11-Sep-2013	Arsenic	<.0017	NA	0.0017	mg/L	Filtered	0.010 mg/L
SWMP-24	11-Sep-2013	Barium	0.0178	NA	0.0006	mg/L	Filtered	2 mg/L
SWMP-24	11-Sep-2013	Beryllium	<.0002	NA	0.0002	mg/L	Filtered	2 mg/L
SWMP-24	11-Sep-2013	Cadmium	<.00011	NA	0.00011	mg/L	Filtered	0.005 mg/L
SWMP-24	11-Sep-2013	Chromium	<.002	NA	0.002	mg/L	Filtered	0.011 mg/L
SWMP-24	11-Sep-2013	Cobalt	0.000267	NA	0.0001	mg/L	Filtered	0.05 mg/L
SWMP-24	11-Sep-2013	Copper	0.00471	NA	0.00035	mg/L	Filtered	0.200 mg/L
SWMP-24	11-Sep-2013	Lead	<.0005	NA	0.0005	mg/L	Filtered	0.015 mg/L
SWMP-24	11-Sep-2013	Manganese	0.0017	NA	0.001	mg/L	Filtered	1.650 mg/L
SWMP-24	11-Sep-2013	Mercury	<.000067	NA	0.000067	mg/L	Filtered	0.00077 mg/L
SWMP-24	11-Sep-2013	Nickel	0.00291	NA	0.0005	mg/L	Filtered	0.700 mg/L
SWMP-24	11-Sep-2013	Selenium	<.0015	NA	0.0015	mg/L	Filtered	0.005 mg/L
SWMP-24	11-Sep-2013	Silver	<.0002	NA	0.0002	mg/L	Filtered	0.0032 mg/L
SWMP-24	11-Sep-2013	Thallium	<.00045	NA	0.00045	mg/L	Filtered	0.002 mg/L
SWMP-24	11-Sep-2013	Vanadium	0.0029	NA	0.001	mg/L	Filtered	0.100 mg/L
SWMP-24	11-Sep-2013	Zinc	0.012	NA	0.0035	mg/L	Filtered	10.5 mg/L
SWMP-25	11-Sep-2013	Aluminum	0.0339	NA	0.015	mg/L	Filtered	5.0 mg/L
SWMP-25	11-Sep-2013	Antimony	<.001	NA	0.001	mg/L	Filtered	0.006 mg/L
SWMP-25	11-Sep-2013	Arsenic	<.0017	NA	0.0017	mg/L	Filtered	0.010 mg/L
SWMP-25	11-Sep-2013	Barium	0.0232	NA	0.0006	mg/L	Filtered	2 mg/L
SWMP-25	11-Sep-2013	Beryllium	<.0002	NA	0.0002	mg/L	Filtered	2 mg/L
SWMP-25	11-Sep-2013	Cadmium	<.00011	NA	0.00011	mg/L	Filtered	0.005 mg/L
SWMP-25	11-Sep-2013	Chromium	<.002	NA	0.002	mg/L	Filtered	0.011 mg/L
SWMP-25	11-Sep-2013	Cobalt	0.000155	NA	0.0001	mg/L	Filtered	0.05 mg/L

TABLE E-1. Stormwater Monitoring for Calendar Year 2013

Monitoring Point	Sample Date	Analayte	Amount Detected	Error	Method Detection Limit	Units	Sample Preparation	NMWQCC Surface Water Standard - Public Water Supply*
SWMP-25	11-Sep-2013	Copper	0.00441	NA	0.00035	mg/L	Filtered	0.200 mg/L
SWMP-25	11-Sep-2013	Lead	<.0005	NA	0.0005	mg/L	Filtered	0.015 mg/L
SWMP-25	11-Sep-2013	Manganese	0.00163	NA	0.001	mg/L	Filtered	1.650 mg/L
SWMP-25	11-Sep-2013	Mercury	<.000067	NA	0.000067	mg/L	Filtered	0.00077 mg/L
SWMP-25	11-Sep-2013	Nickel	0.0027	NA	0.0005	mg/L	Filtered	0.700 mg/L
SWMP-25	11-Sep-2013	Selenium	<.0015	NA	0.0015	mg/L	Filtered	0.005 mg/L
SWMP-25	11-Sep-2013	Silver	<.0002	NA	0.0002	mg/L	Filtered	0.0032 mg/L
SWMP-25	11-Sep-2013	Thallium	<.00045	NA	0.00045	mg/L	Filtered	0.002 mg/L
SWMP-25	11-Sep-2013	Vanadium	0.00133	NA	0.001	mg/L	Filtered	0.100 mg/L
SWMP-25	11-Sep-2013	Zinc	0.00428	NA	0.0035	mg/L	Filtered	10.5 mg/L
SWMP-07	16-Sep-2013	Alpha, gross	5.93	2.1	1.16	pCi/L	Unfiltered	15 pCi/L
SWMP-07	16-Sep-2013	Beta, gross	10.9	2.05	0.484	pCi/L	Unfiltered	NE, < MDL
SWMP-07	16-Sep-2013	Uranium-238	0.61	0.173	0.0663	pCi/L	Unfiltered	NE, < MDL
SWMP-11	16-Sep-2013	Aluminum	4.25	NA	0.015	mg/L	Filtered	5.0 mg/L
SWMP-11	16-Sep-2013	Antimony	<.001	NA	0.001	mg/L	Filtered	0.006 mg/L
SWMP-11	16-Sep-2013	Arsenic	0.00351	NA	0.0017	mg/L	Filtered	0.010 mg/L
SWMP-11	16-Sep-2013	Barium	0.132	NA	0.0006	mg/L	Filtered	2 mg/L
SWMP-11	16-Sep-2013	Beryllium	0.000226	NA	0.0002	mg/L	Filtered	2 mg/L
SWMP-11	16-Sep-2013	Cadmium	0.00095	NA	0.00011	mg/L	Filtered	0.005 mg/L
SWMP-11	16-Sep-2013	Chromium	0.0086	NA	0.002	mg/L	Filtered	0.011 mg/L
SWMP-11	16-Sep-2013	Cobalt	0.00202	NA	0.0001	mg/L	Filtered	0.05 mg/L
SWMP-11	16-Sep-2013	Copper	0.0306	NA	0.00035	mg/L	Filtered	0.200 mg/L
SWMP-11	16-Sep-2013	Lead	0.00377	NA	0.0005	mg/L	Filtered	0.015 mg/L
SWMP-11	16-Sep-2013	Manganese	0.085	NA	0.001	mg/L	Filtered	1.650 mg/L
SWMP-11	16-Sep-2013	Mercury	<.000067	NA	0.000067	mg/L	Filtered	0.00077 mg/L
SWMP-11	16-Sep-2013	Nickel	0.0153	NA	0.0005	mg/L	Filtered	0.700 mg/L
SWMP-11	16-Sep-2013	Selenium	<.0015	NA	0.0015	mg/L	Filtered	0.005 mg/L
SWMP-11	16-Sep-2013	Silver	0.00276	NA	0.0002	mg/L	Filtered	0.0032 mg/L
SWMP-11	16-Sep-2013	Thallium	<.00045	NA	0.00045	mg/L	Filtered	0.002 mg/L
SWMP-11	16-Sep-2013	Vanadium	0.0167	NA	0.001	mg/L	Filtered	0.100 mg/L
SWMP-11	16-Sep-2013	Zinc	0.02	NA	0.0035	mg/L	Filtered	10.5 mg/L

TABLE E-1. Stormwater Monitoring for Calendar Year 2013

Monitoring Point	Sample Date	Analayte	Amount Detected	Error	Method Detection Limit	Units	Sample Preparation	NMWQCC Surface Water Standard - Public Water Supply*
SWMP-12	16-Sep-2013	Alpha, gross	28.8	9.39	5.17	pCi/L	Unfiltered	15 pCi/L
SWMP-12	16-Sep-2013	Beta, gross	27.8	6.55	2.16	pCi/L	Unfiltered	NE, < MDL
SWMP-20	16-Sep-2013	Alpha, gross	12.9	3.01	1.09	pCi/L	Unfiltered	15 pCi/L
SWMP-20	16-Sep-2013	Beta, gross	14.6	2.85	0.478	pCi/L	Unfiltered	NE, < MDL
SWMP-20	16-Sep-2013	Uranium-238	3.44	0.553	0.0651	pCi/L	Unfiltered	NE, < MDL
SWMP-21	16-Sep-2013	Alpha, gross	42.3	9.11	2.96	pCi/L	Unfiltered	15 pCi/L
SWMP-21	16-Sep-2013	Beta, gross	34.4	6.17	1.26	pCi/L	Unfiltered	NE, < MDL
SWMP-21	16-Sep-2013	Uranium-238	4.96	0.847	0.105	pCi/L	Unfiltered	NE, < MDL
SWMP-26	16-Sep-2013	Aluminum	<.015	NA	0.015	mg/L	Filtered	5.0 mg/L
SWMP-26	16-Sep-2013	Antimony	0.0862	NA	0.001	mg/L	Filtered	0.006 mg/L
SWMP-26	16-Sep-2013	Arsenic	0.0111	NA	0.0017	mg/L	Filtered	0.010 mg/L
SWMP-26	16-Sep-2013	Barium	0.0555	NA	0.0006	mg/L	Filtered	2 mg/L
SWMP-26	16-Sep-2013	Beryllium	<.0002	NA	0.0002	mg/L	Filtered	2 mg/L
SWMP-26	16-Sep-2013	Cadmium	0.000344	NA	0.00011	mg/L	Filtered	0.005 mg/L
SWMP-26	16-Sep-2013	Chromium	<.002	NA	0.002	mg/L	Filtered	0.011 mg/L
SWMP-26	16-Sep-2013	Cobalt	<.0001	NA	0.0001	mg/L	Filtered	0.05 mg/L
SWMP-26	16-Sep-2013	Copper	0.00587	NA	0.00035	mg/L	Filtered	0.200 mg/L
SWMP-26	16-Sep-2013	Lead	<.0005	NA	0.0005	mg/L	Filtered	0.015 mg/L
SWMP-26	16-Sep-2013	Manganese	0.00697	NA	0.001	mg/L	Filtered	1.650 mg/L
SWMP-26	16-Sep-2013	Mercury	<.000067	NA	0.000067	mg/L	Filtered	0.00077 mg/L
SWMP-26	16-Sep-2013	Nickel	0.00199	NA	0.0005	mg/L	Filtered	0.700 mg/L
SWMP-26	16-Sep-2013	Selenium	<.0015	NA	0.0015	mg/L	Filtered	0.005 mg/L
SWMP-26	16-Sep-2013	Silver	<.0002	NA	0.0002	mg/L	Filtered	0.0032 mg/L
SWMP-26	16-Sep-2013	Thallium	<.00045	NA	0.00045	mg/L	Filtered	0.002 mg/L
SWMP-26	16-Sep-2013	Vanadium	0.00413	NA	0.001	mg/L	Filtered	0.100 mg/L
SWMP-26	16-Sep-2013	Zinc	0.02	NA	0.0035	mg/L	Filtered	10.5 mg/L
SWMP-27	16-Sep-2013	Aluminum	0.0413	NA	0.015	mg/L	Filtered	5.0 mg/L
SWMP-27	16-Sep-2013	Antimony	<.001	NA	0.001	mg/L	Filtered	0.006 mg/L
SWMP-27	16-Sep-2013	Arsenic	0.0026	NA	0.0017	mg/L	Filtered	0.010 mg/L
SWMP-27	16-Sep-2013	Barium	0.0882	NA	0.0006	mg/L	Filtered	2 mg/L
SWMP-27	16-Sep-2013	Beryllium	<.0002	NA	0.0002	mg/L	Filtered	2 mg/L

TABLE E-1. Stormwater Monitoring for Calendar Year 2013

Monitoring Point	Sample Date	Analayte	Amount Detected	Error	Method Detection Limit	Units	Sample Preparation	NMWQCC Surface Water Standard - Public Water Supply*
SWMP-27	16-Sep-2013	Cadmium	<.00011	NA	0.00011	mg/L	Filtered	0.005 mg/L
SWMP-27	16-Sep-2013	Chromium	<.002	NA	0.002	mg/L	Filtered	0.011 mg/L
SWMP-27	16-Sep-2013	Cobalt	0.00036	NA	0.0001	mg/L	Filtered	0.05 mg/L
SWMP-27	16-Sep-2013	Copper	0.00703	NA	0.00035	mg/L	Filtered	0.200 mg/L
SWMP-27	16-Sep-2013	Lead	<.0005	NA	0.0005	mg/L	Filtered	0.015 mg/L
SWMP-27	16-Sep-2013	Manganese	0.00104	NA	0.001	mg/L	Filtered	1.650 mg/L
SWMP-27	16-Sep-2013	Mercury	<.000067	NA	0.000067	mg/L	Filtered	0.00077 mg/L
SWMP-27	16-Sep-2013	Nickel	0.00205	NA	0.0005	mg/L	Filtered	0.700 mg/L
SWMP-27	16-Sep-2013	Selenium	<.0015	NA	0.0015	mg/L	Filtered	0.005 mg/L
SWMP-27	16-Sep-2013	Silver	<.0002	NA	0.0002	mg/L	Filtered	0.0032 mg/L
SWMP-27	16-Sep-2013	Thallium	<.00045	NA	0.00045	mg/L	Filtered	0.002 mg/L
SWMP-27	16-Sep-2013	Vanadium	0.0112	NA	0.001	mg/L	Filtered	0.100 mg/L
SWMP-27	16-Sep-2013	Zinc	<.0035	NA	0.0035	mg/L	Filtered	10.5 mg/L
SWMP-28	16-Sep-2013	Aluminum	0.0689	NA	0.015	mg/L	Filtered	5.0 mg/L
SWMP-28	16-Sep-2013	Antimony	<.001	NA	0.001	mg/L	Filtered	0.006 mg/L
SWMP-28	16-Sep-2013	Arsenic	0.00226	NA	0.0017	mg/L	Filtered	0.010 mg/L
SWMP-28	16-Sep-2013	Barium	0.0844	NA	0.0006	mg/L	Filtered	2 mg/L
SWMP-28	16-Sep-2013	Beryllium	<.0002	NA	0.0002	mg/L	Filtered	2 mg/L
SWMP-28	16-Sep-2013	Cadmium	<.00011	NA	0.00011	mg/L	Filtered	0.005 mg/L
SWMP-28	16-Sep-2013	Chromium	<.002	NA	0.002	mg/L	Filtered	0.011 mg/L
SWMP-28	16-Sep-2013	Cobalt	0.000551	NA	0.0001	mg/L	Filtered	0.05 mg/L
SWMP-28	16-Sep-2013	Copper	0.0034	NA	0.00035	mg/L	Filtered	0.200 mg/L
SWMP-28	16-Sep-2013	Lead	<.0005	NA	0.0005	mg/L	Filtered	0.015 mg/L
SWMP-28	16-Sep-2013	Manganese	0.00289	NA	0.001	mg/L	Filtered	1.650 mg/L
SWMP-28	16-Sep-2013	Mercury	<.000067	NA	0.000067	mg/L	Filtered	0.00077 mg/L
SWMP-28	16-Sep-2013	Nickel	0.00197	NA	0.0005	mg/L	Filtered	0.700 mg/L
SWMP-28	16-Sep-2013	Selenium	<.0015	NA	0.0015	mg/L	Filtered	0.005 mg/L
SWMP-28	16-Sep-2013	Silver	<.0002	NA	0.0002	mg/L	Filtered	0.0032 mg/L
SWMP-28	16-Sep-2013	Thallium	<.00045	NA	0.00045	mg/L	Filtered	0.002 mg/L
SWMP-28	16-Sep-2013	Vanadium	0.00949	NA	0.001	mg/L	Filtered	0.100 mg/L
SWMP-28	16-Sep-2013	Zinc	<.0035	NA	0.0035	mg/L	Filtered	10.5 mg/L

TABLE E-1. Stormwater Monitoring for Calendar Year 2013

Monitoring Point	Sample Date	Analayte	Amount Detected	Error	Method Detection Limit	Units	Sample Preparation	NMWQCC Surface Water Standard - Public Water Supply*
SWMP-29	16-Sep-2013	Aluminum	0.0846	NA	0.015	mg/L	Filtered	5.0 mg/L
SWMP-29	16-Sep-2013	Antimony	<.001	NA	0.001	mg/L	Filtered	0.006 mg/L
SWMP-29	16-Sep-2013	Arsenic	<.0017	NA	0.0017	mg/L	Filtered	0.010 mg/L
SWMP-29	16-Sep-2013	Barium	0.0531	NA	0.0006	mg/L	Filtered	2 mg/L
SWMP-29	16-Sep-2013	Beryllium	<.0002	NA	0.0002	mg/L	Filtered	2 mg/L
SWMP-29	16-Sep-2013	Cadmium	<.00011	NA	0.00011	mg/L	Filtered	0.005 mg/L
SWMP-29	16-Sep-2013	Chromium	<.002	NA	0.002	mg/L	Filtered	0.011 mg/L
SWMP-29	16-Sep-2013	Cobalt	0.000294	NA	0.0001	mg/L	Filtered	0.05 mg/L
SWMP-29	16-Sep-2013	Copper	0.00164	NA	0.00035	mg/L	Filtered	0.200 mg/L
SWMP-29	16-Sep-2013	Lead	<.0005	NA	0.0005	mg/L	Filtered	0.015 mg/L
SWMP-29	16-Sep-2013	Manganese	0.00149	NA	0.001	mg/L	Filtered	1.650 mg/L
SWMP-29	16-Sep-2013	Mercury	<.000067	NA	0.000067	mg/L	Filtered	0.00077 mg/L
SWMP-29	16-Sep-2013	Nickel	0.00138	NA	0.0005	mg/L	Filtered	0.700 mg/L
SWMP-29	16-Sep-2013	Selenium	<.0015	NA	0.0015	mg/L	Filtered	0.005 mg/L
SWMP-29	16-Sep-2013	Silver	<.0002	NA	0.0002	mg/L	Filtered	0.0032 mg/L
SWMP-29	16-Sep-2013	Thallium	<.00045	NA	0.00045	mg/L	Filtered	0.002 mg/L
SWMP-29	16-Sep-2013	Vanadium	0.0101	NA	0.001	mg/L	Filtered	0.100 mg/L
SWMP-29	16-Sep-2013	Zinc	<.0035	NA	0.0035	mg/L	Filtered	10.5 mg/L
SWMP-09	23-Sep-2013	Uranium-238	3.57	0.674	0.158	pCi/L	Unfiltered	NE, < MDL
SWMP-12	23-Sep-2013	Uranium-238	0.466	0.129	0.0596	pCi/L	Unfiltered	NE, < MDL

NOTES:

*** Where there was no drinking water supply standard the lowest numeric criteria was used.**
MDL = method detection limit
mg/L = milligram per liter
NA = not applicable
NE = not established
NMWQCC = New Mexico Water Quality Control Comission
pCi/L = picocurie per liter

TABLE E-2. MSGP Storm Water Monitoring Results for Calendar Year 2013

Monitoring Point	Analyte	Sample Date	Results	Units
SWMP-06	Aluminum, Total Recoverable	07/02/13	180	mg/L
SWMP-06	Ammonia	07/02/13	5.85	mg/L
SWMP-06	Arsenic, Total Recoverable	07/02/13	0.0415	mg/L
SWMP-06	Cadmium, Total Recoverable	07/02/13	0.00458	mg/L
SWMP-06	Copper, Total Recoverable	07/02/13	0.212	mg/L
SWMP-06	Iron, Total Recoverable	07/02/13	159	mg/L
SWMP-06	Lead, Total Recoverable	07/02/13	1.06	mg/L
SWMP-06	Magnesium, Total Recoverable	07/02/13	80.8	mg/L
SWMP-06	Mercury, Total Recoverable	07/02/13	0.00047	mg/L
SWMP-06	Selenium, Total Recoverable	07/02/13	<.0015	mg/L
SWMP-06	Silver, Total Recoverable	07/02/13	0.0012	mg/L
SWMP-06	Zinc, Total Recoverable	07/02/13	0.675	mg/L
SWMP-10	Aluminum, Total Recoverable	07/02/13	21	mg/L
SWMP-10	Ammonia	07/02/13	1.18	mg/L
SWMP-10	Arsenic, Total Recoverable	07/02/13	0.00694	mg/L
SWMP-10	Cadmium, Total Recoverable	07/02/13	0.000944	mg/L
SWMP-10	Chemical Oxygen Demand	07/02/13	356	mg/L
SWMP-10	Copper, Total Recoverable	07/02/13	0.0523	mg/L
SWMP-10	Cyanide, total	07/02/13	<.00167	mg/L
SWMP-10	Iron, Total Recoverable	07/02/13	15.5	mg/L
SWMP-10	Lead, Total Recoverable	07/02/13	0.164	mg/L
SWMP-10	Magnesium, Total Recoverable	07/02/13	9.66	mg/L
SWMP-10	Mercury, Total Recoverable	07/02/13	0.000135	mg/L
SWMP-10	Selenium, Total Recoverable	07/02/13	<.0015	mg/L
SWMP-10	Silver, Total Recoverable	07/02/13	<.0002	mg/L
SWMP-10	Zinc, Total Recoverable	07/02/13	0.109	mg/L
SWMP-11	Aluminum, Total Recoverable	07/08/13	0.0578	mg/L
SWMP-11	Aluminum, Total Recoverable	07/08/13	191	mg/L
SWMP-11	Ammonia	07/08/13	0.869	mg/L
SWMP-11	Arsenic, Total Recoverable	07/08/13	0.00578	mg/L
SWMP-11	Arsenic, Total Recoverable	07/08/13	0.0449	mg/L
SWMP-11	Cadmium, Total Recoverable	07/08/13	0.0136	mg/L
SWMP-11	Cadmium, Total Recoverable	07/08/13	<.00011	mg/L
SWMP-11	Chemical Oxygen Demand	07/08/13	64.7	mg/L
SWMP-11	Copper, Total Recoverable	07/08/13	0.0198	mg/L
SWMP-11	Copper, Total Recoverable	07/08/13	0.268	mg/L
SWMP-11	Cyanide, total	07/08/13	0.0338	mg/L
SWMP-11	Iron, Total Recoverable	07/08/13	0.113	mg/L
SWMP-11	Iron, Total Recoverable	07/08/13	146	mg/L
SWMP-11	Lead, Total Recoverable	07/08/13	0.131	mg/L
SWMP-11	Lead, Total Recoverable	07/08/13	<.0005	mg/L
SWMP-11	Magnesium, Total Recoverable	07/08/13	3.98	mg/L
SWMP-11	Magnesium, Total Recoverable	07/08/13	69.2	mg/L
SWMP-11	Mercury, Total Recoverable	07/08/13	0.000296	mg/L
SWMP-11	Mercury, Total Recoverable	07/08/13	<.000067	mg/L
SWMP-11	Selenium, Total Recoverable	07/08/13	<.0015	mg/L

TABLE E-2. MSGP Storm Water Monitoring Results for Calendar Year 2013

Monitoring Point	Analyte	Sample Date	Results	Units
SWMP-11	Silver, Total Recoverable	07/08/13	0.0199	mg/L
SWMP-11	Silver, Total Recoverable	07/08/13	<.0002	mg/L
SWMP-11	Solids, total suspended	07/08/13	160	mg/L
SWMP-11	Zinc, Total Recoverable	07/08/13	0.0037	mg/L
SWMP-11	Zinc, Total Recoverable	07/08/13	0.565	mg/L
SWMP-14	Aluminum, Total Recoverable	07/08/13	127	mg/L
SWMP-14	Ammonia	07/08/13	1.88	mg/L
SWMP-14	Arsenic, Total Recoverable	07/08/13	0.0254	mg/L
SWMP-14	Cadmium, Total Recoverable	07/08/13	0.00338	mg/L
SWMP-14	Chemical Oxygen Demand	07/08/13	116	mg/L
SWMP-14	Copper, Total Recoverable	07/08/13	0.0921	mg/L
SWMP-14	Iron, Total Recoverable	07/08/13	85.6	mg/L
SWMP-14	Lead, Total Recoverable	07/08/13	0.295	mg/L
SWMP-14	Magnesium, Total Recoverable	07/08/13	38.3	mg/L
SWMP-14	Mercury, Total Recoverable	07/08/13	0.000193	mg/L
SWMP-14	Selenium, Total Recoverable	07/08/13	<.0015	mg/L
SWMP-14	Silver, Total Recoverable	07/08/13	0.000742	mg/L
SWMP-14	Zinc, Total Recoverable	07/08/13	0.395	mg/L
SWMP-15	Aluminum, Total Recoverable	07/08/13	3	mg/L
SWMP-15	Ammonia	07/08/13	0.346	mg/L
SWMP-15	Arsenic, Total Recoverable	07/08/13	0.00322	mg/L
SWMP-15	Cadmium, Total Recoverable	07/08/13	<.00011	mg/L
SWMP-15	Chemical Oxygen Demand	07/08/13	103	mg/L
SWMP-15	Copper, Total Recoverable	07/08/13	0.0058	mg/L
SWMP-15	Cyanide, total	07/08/13	<.00167	mg/L
SWMP-15	Iron, Total Recoverable	07/08/13	1.98	mg/L
SWMP-15	Lead, Total Recoverable	07/08/13	0.00303	mg/L
SWMP-15	Magnesium, Total Recoverable	07/08/13	2.56	mg/L
SWMP-15	Mercury, Total Recoverable	07/08/13	<.000067	mg/L
SWMP-15	Selenium, Total Recoverable	07/08/13	<.0015	mg/L
SWMP-15	Silver, Total Recoverable	07/08/13	<.0002	mg/L
SWMP-15	Zinc, Total Recoverable	07/08/13	0.0266	mg/L
SWMP-19	Aluminum, Total Recoverable	07/08/13	9.24	mg/L
SWMP-19	Ammonia	07/08/13	0.425	mg/L
SWMP-19	Arsenic, Total Recoverable	07/08/13	0.00516	mg/L
SWMP-19	Cadmium, Total Recoverable	07/08/13	0.000152	mg/L
SWMP-19	Chemical Oxygen Demand	07/08/13	66.8	mg/L
SWMP-19	Copper, Total Recoverable	07/08/13	0.00774	mg/L
SWMP-19	Cyanide, total	07/08/13	<.00167	mg/L
SWMP-19	Iron, Total Recoverable	07/08/13	5.93	mg/L
SWMP-19	Lead, Total Recoverable	07/08/13	0.00511	mg/L
SWMP-19	Magnesium, Total Recoverable	07/08/13	5.59	mg/L
SWMP-19	Mercury, Total Recoverable	07/08/13	<.000067	mg/L
SWMP-19	Selenium, Total Recoverable	07/08/13	<.0015	mg/L
SWMP-19	Silver, Total Recoverable	07/08/13	<.0002	mg/L
SWMP-19	Zinc, Total Recoverable	07/08/13	0.0267	mg/L

TABLE E-2. MSGP Storm Water Monitoring Results for Calendar Year 2013

Monitoring Point	Analyte	Sample Date	Results	Units
SWMP-25	Aluminum, Total Recoverable	07/08/13	0.111	mg/L
SWMP-25	Arsenic, Total Recoverable	07/08/13	0.00478	mg/L
SWMP-25	Cadmium, Total Recoverable	07/08/13	<.00011	mg/L
SWMP-25	Copper, Total Recoverable	07/08/13	0.00693	mg/L
SWMP-25	Iron, Total Recoverable	07/08/13	0.108	mg/L
SWMP-25	Lead, Total Recoverable	07/08/13	<.0005	mg/L
SWMP-25	Magnesium, Total Recoverable	07/08/13	1.65	mg/L
SWMP-25	Mercury, Total Recoverable	07/08/13	<.000067	mg/L
SWMP-25	Selenium, Total Recoverable	07/08/13	<.0015	mg/L
SWMP-25	Silver, Total Recoverable	07/08/13	<.0002	mg/L
SWMP-25	Zinc, Total Recoverable	07/08/13	0.00711	mg/L
SWMP-26	Aluminum, Total Recoverable	07/08/13	0.0515	mg/L
SWMP-26	Arsenic, Total Recoverable	07/08/13	0.00257	mg/L
SWMP-26	Cadmium, Total Recoverable	07/08/13	<.00011	mg/L
SWMP-26	Copper, Total Recoverable	07/08/13	0.00771	mg/L
SWMP-26	Iron, Total Recoverable	07/08/13	0.0654	mg/L
SWMP-26	Lead, Total Recoverable	07/08/13	<.0005	mg/L
SWMP-26	Magnesium, Total Recoverable	07/08/13	2.13	mg/L
SWMP-26	Mercury, Total Recoverable	07/08/13	<.000067	mg/L
SWMP-26	Selenium, Total Recoverable	07/08/13	<.0015	mg/L
SWMP-26	Silver, Total Recoverable	07/08/13	<.0002	mg/L
SWMP-26	Zinc, Total Recoverable	07/08/13	0.00618	mg/L
SWMP-28	Aluminum, Total Recoverable	07/08/13	<.015	mg/L
SWMP-28	Arsenic, Total Recoverable	07/08/13	0.00464	mg/L
SWMP-28	Cadmium, Total Recoverable	07/08/13	<.00011	mg/L
SWMP-28	Copper, Total Recoverable	07/08/13	0.00162	mg/L
SWMP-28	Iron, Total Recoverable	07/08/13	0.0754	mg/L
SWMP-28	Lead, Total Recoverable	07/08/13	<.0005	mg/L
SWMP-28	Magnesium, Total Recoverable	07/08/13	3.58	mg/L
SWMP-28	Mercury, Total Recoverable	07/08/13	<.000067	mg/L
SWMP-28	Selenium, Total Recoverable	07/08/13	<.0015	mg/L
SWMP-28	Silver, Total Recoverable	07/08/13	<.0002	mg/L
SWMP-28	Zinc, Total Recoverable	07/08/13	<.0035	mg/L
SWMP-16	Aluminum, Total Recoverable	07/09/13	141	mg/L
SWMP-16	Ammonia	07/09/13	1.06	mg/L
SWMP-16	Arsenic, Total Recoverable	07/09/13	0.0296	mg/L
SWMP-16	Cadmium, Total Recoverable	07/09/13	0.00322	mg/L
SWMP-16	Chemical Oxygen Demand	07/09/13	81.7	mg/L
SWMP-16	Copper, Total Recoverable	07/09/13	0.0852	mg/L
SWMP-16	Cyanide, total	07/09/13	<.00167	mg/L
SWMP-16	Iron, Total Recoverable	07/09/13	98.2	mg/L
SWMP-16	Lead, Total Recoverable	07/09/13	0.124	mg/L
SWMP-16	Magnesium, Total Recoverable	07/09/13	43	mg/L
SWMP-16	Mercury, Total Recoverable	07/09/13	0.000127	mg/L
SWMP-16	Selenium, Total Recoverable	07/09/13	<.0015	mg/L
SWMP-16	Silver, Total Recoverable	07/09/13	0.000685	mg/L

TABLE E-2. MSGP Storm Water Monitoring Results for Calendar Year 2013

Monitoring Point	Analyte	Sample Date	Results	Units
SWMP-16	Zinc, Total Recoverable	07/09/13	0.436	mg/L
SWMP-17	Aluminum, Total Recoverable	07/09/13	24.2	mg/L
SWMP-17	Ammonia	07/09/13	0.327	mg/L
SWMP-17	Arsenic, Total Recoverable	07/09/13	0.00459	mg/L
SWMP-17	Cadmium, Total Recoverable	07/09/13	0.000473	mg/L
SWMP-17	Chemical Oxygen Demand	07/09/13	41.3	mg/L
SWMP-17	Copper, Total Recoverable	07/09/13	0.016	mg/L
SWMP-17	Cyanide, total	07/09/13	<.00167	mg/L
SWMP-17	Iron, Total Recoverable	07/09/13	15.4	mg/L
SWMP-17	Lead, Total Recoverable	07/09/13	0.0165	mg/L
SWMP-17	Magnesium, Total Recoverable	07/09/13	7.41	mg/L
SWMP-17	Mercury, Total Recoverable	07/09/13	<.000067	mg/L
SWMP-17	Selenium, Total Recoverable	07/09/13	<.0015	mg/L
SWMP-17	Silver, Total Recoverable	07/09/13	<.0002	mg/L
SWMP-17	Zinc, Total Recoverable	07/09/13	0.0647	mg/L
SWMP-02	Aluminum, Total Recoverable	07/15/13	6.5	mg/L
SWMP-02	Ammonia	07/15/13	0.674	mg/L
SWMP-02	Arsenic, Total Recoverable	07/15/13	0.00262	mg/L
SWMP-02	Cadmium, Total Recoverable	07/15/13	0.0002	mg/L
SWMP-02	Chemical Oxygen Demand	07/15/13	75.3	mg/L
SWMP-02	Copper, Total Recoverable	07/15/13	0.0104	mg/L
SWMP-02	Cyanide, total	07/15/13	<.00167	mg/L
SWMP-02	Iron, Total Recoverable	07/15/13	5.23	mg/L
SWMP-02	Lead, Total Recoverable	07/15/13	0.0102	mg/L
SWMP-02	Magnesium, Total Recoverable	07/15/13	3	mg/L
SWMP-02	Mercury, Total Recoverable	07/15/13	<.000067	mg/L
SWMP-02	Nitrate	07/15/13	0.588	mg/L
SWMP-02	Selenium, Total Recoverable	07/15/13	<.0015	mg/L
SWMP-02	Silver, Total Recoverable	07/15/13	<.0002	mg/L
SWMP-02	Solids, total suspended	07/15/13	161	mg/L
SWMP-02	Zinc, Total Recoverable	07/15/13	0.0834	mg/L
SWMP-04	Aluminum, Total Recoverable	07/15/13	1.48	mg/L
SWMP-04	Arsenic, Total Recoverable	07/15/13	0.00548	mg/L
SWMP-04	Cadmium, Total Recoverable	07/15/13	0.000229	mg/L
SWMP-04	Chemical Oxygen Demand	07/15/13	122	mg/L
SWMP-04	Copper, Total Recoverable	07/15/13	0.0123	mg/L
SWMP-04	Iron, Total Recoverable	07/15/13	1.15	mg/L
SWMP-04	Lead, Total Recoverable	07/15/13	0.00231	mg/L
SWMP-04	Magnesium, Total Recoverable	07/15/13	5.1	mg/L
SWMP-04	Mercury, Total Recoverable	07/15/13	<.000067	mg/L
SWMP-04	Selenium, Total Recoverable	07/15/13	<.0015	mg/L
SWMP-04	Silver, Total Recoverable	07/15/13	<.0002	mg/L
SWMP-04	Solids, total suspended	07/15/13	43.4	mg/L
SWMP-04	Zinc, Total Recoverable	07/15/13	0.0217	mg/L
SWMP-05	Aluminum, Total Recoverable	07/15/13	2.23	mg/L
SWMP-05	Ammonia	07/15/13	0.76	mg/L

TABLE E-2. MSGP Storm Water Monitoring Results for Calendar Year 2013

Monitoring Point	Analyte	Sample Date	Results	Units
SWMP-05	Arsenic, Total Recoverable	07/15/13	<.0017	mg/L
SWMP-05	Cadmium, Total Recoverable	07/15/13	0.000169	mg/L
SWMP-05	Chemical Oxygen Demand	07/15/13	77.5	mg/L
SWMP-05	Copper, Total Recoverable	07/15/13	0.0116	mg/L
SWMP-05	Cyanide, total	07/15/13	<.00167	mg/L
SWMP-05	Iron, Total Recoverable	07/15/13	1.79	mg/L
SWMP-05	Lead, Total Recoverable	07/15/13	0.00437	mg/L
SWMP-05	Magnesium, Total Recoverable	07/15/13	1.46	mg/L
SWMP-05	Mercury, Total Recoverable	07/15/13	<.000067	mg/L
SWMP-05	Selenium, Total Recoverable	07/15/13	<.0015	mg/L
SWMP-05	Silver, Total Recoverable	07/15/13	<.0002	mg/L
SWMP-05	Solids, total suspended	07/15/13	50.6	mg/L
SWMP-05	Zinc, Total Recoverable	07/15/13	0.0553	mg/L
SWMP-24	Aluminum, Total Recoverable	07/15/13	0.0201	mg/L
SWMP-24	Arsenic, Total Recoverable	07/15/13	0.00564	mg/L
SWMP-24	Cadmium, Total Recoverable	07/15/13	<.00011	mg/L
SWMP-24	Copper, Total Recoverable	07/15/13	0.00734	mg/L
SWMP-24	Iron, Total Recoverable	07/15/13	0.0493	mg/L
SWMP-24	Lead, Total Recoverable	07/15/13	<.0005	mg/L
SWMP-24	Magnesium, Total Recoverable	07/15/13	0.85	mg/L
SWMP-24	Mercury, Total Recoverable	07/15/13	<.000067	mg/L
SWMP-24	Selenium, Total Recoverable	07/15/13	<.0015	mg/L
SWMP-24	Silver, Total Recoverable	07/15/13	<.0002	mg/L
SWMP-24	Zinc, Total Recoverable	07/15/13	0.0156	mg/L
SWMP-08	Solids, total suspended	07/22/13	185	mg/L
SWMP-09	Aluminum, Total Recoverable	07/22/13	0.423	mg/L
SWMP-09	Arsenic, Total Recoverable	07/22/13	0.00267	mg/L
SWMP-09	Cadmium, Total Recoverable	07/22/13	<.00011	mg/L
SWMP-09	Copper, Total Recoverable	07/22/13	0.00393	mg/L
SWMP-09	Iron, Total Recoverable	07/22/13	0.375	mg/L
SWMP-09	Lead, Total Recoverable	07/22/13	<.0005	mg/L
SWMP-09	Magnesium, Total Recoverable	07/22/13	2.09	mg/L
SWMP-09	Mercury, Total Recoverable	07/22/13	<.000067	mg/L
SWMP-09	Selenium, Total Recoverable	07/22/13	<.0015	mg/L
SWMP-09	Silver, Total Recoverable	07/22/13	<.0002	mg/L
SWMP-09	Zinc, Total Recoverable	07/22/13	0.00632	mg/L
SWMP-09	Aluminum, Total Recoverable	08/22/13	0.648	mg/L
SWMP-09	Arsenic, Total Recoverable	08/22/13	<.0017	mg/L
SWMP-09	Cadmium, Total Recoverable	08/22/13	<.00011	mg/L
SWMP-09	Copper, Total Recoverable	08/22/13	0.00652	mg/L
SWMP-09	Iron, Total Recoverable	08/22/13	0.578	mg/L
SWMP-09	Lead, Total Recoverable	08/22/13	0.000864	mg/L
SWMP-09	Magnesium, Total Recoverable	08/22/13	2.08	mg/L
SWMP-09	Mercury, Total Recoverable	08/22/13	<.000067	mg/L
SWMP-09	Selenium, Total Recoverable	08/22/13	<.0015	mg/L
SWMP-09	Silver, Total Recoverable	08/22/13	<.0002	mg/L

TABLE E-2. MSGP Storm Water Monitoring Results for Calendar Year 2013

Monitoring Point	Analyte	Sample Date	Results	Units
SWMP-09	Zinc, Total Recoverable	08/22/13	0.00633	mg/L
SWMP-23	Aluminum, Total Recoverable	08/26/13	33.6	mg/L
SWMP-23	Arsenic, Total Recoverable	08/26/13	0.00918	mg/L
SWMP-23	Cadmium, Total Recoverable	08/26/13	0.00047	mg/L
SWMP-23	Copper, Total Recoverable	08/26/13	0.0223	mg/L
SWMP-23	Iron, Total Recoverable	08/26/13	22.1	mg/L
SWMP-23	Lead, Total Recoverable	08/26/13	0.0182	mg/L
SWMP-23	Magnesium, Total Recoverable	08/26/13	14.4	mg/L
SWMP-23	Mercury, Total Recoverable	08/26/13	<.000067	mg/L
SWMP-23	Selenium, Total Recoverable	08/26/13	<.0015	mg/L
SWMP-23	Silver, Total Recoverable	08/26/13	<.0002	mg/L
SWMP-23	Zinc, Total Recoverable	08/26/13	0.119	mg/L
SWMP-25	Aluminum, Total Recoverable	08/26/13	0.0261	mg/L
SWMP-25	Arsenic, Total Recoverable	08/26/13	0.00266	mg/L
SWMP-25	Cadmium, Total Recoverable	08/26/13	<.00011	mg/L
SWMP-25	Copper, Total Recoverable	08/26/13	0.0138	mg/L
SWMP-25	Iron, Total Recoverable	08/26/13	0.0522	mg/L
SWMP-25	Lead, Total Recoverable	08/26/13	<.0005	mg/L
SWMP-25	Magnesium, Total Recoverable	08/26/13	2.33	mg/L
SWMP-25	Mercury, Total Recoverable	08/26/13	<.000067	mg/L
SWMP-25	Selenium, Total Recoverable	08/26/13	<.0015	mg/L
SWMP-25	Silver, Total Recoverable	08/26/13	<.0002	mg/L
SWMP-25	Zinc, Total Recoverable	08/26/13	0.0226	mg/L
SWMP-02	Aluminum, Total Recoverable	09/11/13	1.05	mg/L
SWMP-02	Ammonia	09/11/13	0.323	mg/L
SWMP-02	Arsenic, Total Recoverable	09/11/13	<.0017	mg/L
SWMP-02	Cadmium, Total Recoverable	09/11/13	<.00011	mg/L
SWMP-02	Chemical Oxygen Demand	09/11/13	81.3	mg/L
SWMP-02	Copper, Total Recoverable	09/11/13	0.00603	mg/L
SWMP-02	Cyanide, total	09/11/13	<.00167	mg/L
SWMP-02	Iron, Total Recoverable	09/11/13	0.744	mg/L
SWMP-02	Lead, Total Recoverable	09/11/13	0.00182	mg/L
SWMP-02	Magnesium, Total Recoverable	09/11/13	1.5	mg/L
SWMP-02	Mercury, Total Recoverable	09/11/13	<.000067	mg/L
SWMP-02	Nitrate	09/11/13	0.478	mg/L
SWMP-02	Selenium, Total Recoverable	09/11/13	<.0015	mg/L
SWMP-02	Silver, Total Recoverable	09/11/13	<.0002	mg/L
SWMP-02	Solids, total suspended	09/11/13	18	mg/L
SWMP-02	Solids, total suspended	09/11/13	22.9	mg/L
SWMP-02	Zinc, Total Recoverable	09/11/13	0.0468	mg/L
SWMP-04	Aluminum, Total Recoverable	09/11/13	2.55	mg/L
SWMP-04	Arsenic, Total Recoverable	09/11/13	<.0017	mg/L
SWMP-04	Cadmium, Total Recoverable	09/11/13	0.000231	mg/L
SWMP-04	Chemical Oxygen Demand	09/11/13	65.6	mg/L
SWMP-04	Copper, Total Recoverable	09/11/13	0.00877	mg/L
SWMP-04	Iron, Total Recoverable	09/11/13	1.69	mg/L

TABLE E-2. MSGP Storm Water Monitoring Results for Calendar Year 2013

Monitoring Point	Analyte	Sample Date	Results	Units
SWMP-04	Lead, Total Recoverable	09/11/13	0.00337	mg/L
SWMP-04	Magnesium, Total Recoverable	09/11/13	2.32	mg/L
SWMP-04	Mercury, Total Recoverable	09/11/13	<.000067	mg/L
SWMP-04	Selenium, Total Recoverable	09/11/13	<.0015	mg/L
SWMP-04	Silver, Total Recoverable	09/11/13	<.0002	mg/L
SWMP-04	Solids, total suspended	09/11/13	52	mg/L
SWMP-04	Zinc, Total Recoverable	09/11/13	0.0333	mg/L
SWMP-05	Aluminum, Total Recoverable	09/11/13	1.14	mg/L
SWMP-05	Ammonia	09/11/13	0.458	mg/L
SWMP-05	Arsenic, Total Recoverable	09/11/13	<.0017	mg/L
SWMP-05	Cadmium, Total Recoverable	09/11/13	<.00011	mg/L
SWMP-05	Chemical Oxygen Demand	09/11/13	63.6	mg/L
SWMP-05	Copper, Total Recoverable	09/11/13	0.00874	mg/L
SWMP-05	Cyanide, total	09/11/13	<.00167	mg/L
SWMP-05	Iron, Total Recoverable	09/11/13	0.806	mg/L
SWMP-05	Lead, Total Recoverable	09/11/13	0.00215	mg/L
SWMP-05	Magnesium, Total Recoverable	09/11/13	1.26	mg/L
SWMP-05	Mercury, Total Recoverable	09/11/13	<.000067	mg/L
SWMP-05	Selenium, Total Recoverable	09/11/13	<.0015	mg/L
SWMP-05	Silver, Total Recoverable	09/11/13	<.0002	mg/L
SWMP-05	Solids, total suspended	09/11/13	18.4	mg/L
SWMP-05	Solids, total suspended	09/11/13	24	mg/L
SWMP-05	Zinc, Total Recoverable	09/11/13	0.0553	mg/L
SWMP-07	Aluminum, Total Recoverable	09/11/13	5.24	mg/L
SWMP-07	Arsenic, Total Recoverable	09/11/13	0.00235	mg/L
SWMP-07	Cadmium, Total Recoverable	09/11/13	0.00117	mg/L
SWMP-07	Copper, Total Recoverable	09/11/13	0.0122	mg/L
SWMP-07	Iron, Total Recoverable	09/11/13	3.77	mg/L
SWMP-07	Lead, Total Recoverable	09/11/13	0.00386	mg/L
SWMP-07	Magnesium, Total Recoverable	09/11/13	3.69	mg/L
SWMP-07	Mercury, Total Recoverable	09/11/13	<.000067	mg/L
SWMP-07	Selenium, Total Recoverable	09/11/13	<.0015	mg/L
SWMP-07	Silver, Total Recoverable	09/11/13	<.0002	mg/L
SWMP-07	Zinc, Total Recoverable	09/11/13	0.022	mg/L
SWMP-09	Aluminum, Total Recoverable	09/11/13	0.584	mg/L
SWMP-09	Arsenic, Total Recoverable	09/11/13	<.0017	mg/L
SWMP-09	Cadmium, Total Recoverable	09/11/13	<.00011	mg/L
SWMP-09	Copper, Total Recoverable	09/11/13	0.00322	mg/L
SWMP-09	Iron, Total Recoverable	09/11/13	0.564	mg/L
SWMP-09	Lead, Total Recoverable	09/11/13	<.0005	mg/L
SWMP-09	Magnesium, Total Recoverable	09/11/13	1.62	mg/L
SWMP-09	Mercury, Total Recoverable	09/11/13	<.000067	mg/L
SWMP-09	Selenium, Total Recoverable	09/11/13	<.0015	mg/L
SWMP-09	Silver, Total Recoverable	09/11/13	<.0002	mg/L
SWMP-09	Zinc, Total Recoverable	09/11/13	0.00437	mg/L
SWMP-15	Aluminum, Total Recoverable	09/11/13	17.6	mg/L

TABLE E-2. MSGP Storm Water Monitoring Results for Calendar Year 2013

Monitoring Point	Analyte	Sample Date	Results	Units
SWMP-15	Ammonia	09/11/13	0.992	mg/L
SWMP-15	Arsenic, Total Recoverable	09/11/13	0.00353	mg/L
SWMP-15	Cadmium, Total Recoverable	09/11/13	0.00241	mg/L
SWMP-15	Chemical Oxygen Demand	09/11/13	120	mg/L
SWMP-15	Copper, Total Recoverable	09/11/13	0.0184	mg/L
SWMP-15	Cyanide, total	09/11/13	<.00167	mg/L
SWMP-15	Iron, Total Recoverable	09/11/13	12.4	mg/L
SWMP-15	Lead, Total Recoverable	09/11/13	0.0134	mg/L
SWMP-15	Magnesium, Total Recoverable	09/11/13	6.5	mg/L
SWMP-15	Mercury, Total Recoverable	09/11/13	<.000067	mg/L
SWMP-15	Selenium, Total Recoverable	09/11/13	<.0015	mg/L
SWMP-15	Silver, Total Recoverable	09/11/13	<.0002	mg/L
SWMP-15	Zinc, Total Recoverable	09/11/13	0.0984	mg/L
SWMP-20	Aluminum, Total Recoverable	09/11/13	5.87	mg/L
SWMP-20	Arsenic, Total Recoverable	09/11/13	0.00282	mg/L
SWMP-20	Cadmium, Total Recoverable	09/11/13	0.000131	mg/L
SWMP-20	Copper, Total Recoverable	09/11/13	0.0117	mg/L
SWMP-20	Iron, Total Recoverable	09/11/13	4.15	mg/L
SWMP-20	Lead, Total Recoverable	09/11/13	0.0043	mg/L
SWMP-20	Magnesium, Total Recoverable	09/11/13	3.98	mg/L
SWMP-20	Mercury, Total Recoverable	09/11/13	<.000067	mg/L
SWMP-20	Selenium, Total Recoverable	09/11/13	<.0015	mg/L
SWMP-20	Silver, Total Recoverable	09/11/13	<.0002	mg/L
SWMP-20	Zinc, Total Recoverable	09/11/13	0.0272	mg/L
SWMP-21	Aluminum, Total Recoverable	09/11/13	0.172	mg/L
SWMP-21	Arsenic, Total Recoverable	09/11/13	<.0017	mg/L
SWMP-21	Cadmium, Total Recoverable	09/11/13	<.00011	mg/L
SWMP-21	Copper, Total Recoverable	09/11/13	0.00922	mg/L
SWMP-21	Iron, Total Recoverable	09/11/13	0.15	mg/L
SWMP-21	Lead, Total Recoverable	09/11/13	<.0005	mg/L
SWMP-21	Magnesium, Total Recoverable	09/11/13	0.925	mg/L
SWMP-21	Mercury, Total Recoverable	09/11/13	<.000067	mg/L
SWMP-21	Selenium, Total Recoverable	09/11/13	<.0015	mg/L
SWMP-21	Silver, Total Recoverable	09/11/13	<.0002	mg/L
SWMP-21	Zinc, Total Recoverable	09/11/13	0.0079	mg/L
SWMP-22	Chemical Oxygen Demand	09/11/13	124	mg/L
SWMP-24	Aluminum, Total Recoverable	09/11/13	0.0345	mg/L
SWMP-24	Arsenic, Total Recoverable	09/11/13	<.0017	mg/L
SWMP-24	Cadmium, Total Recoverable	09/11/13	<.00011	mg/L
SWMP-24	Copper, Total Recoverable	09/11/13	0.00471	mg/L
SWMP-24	Iron, Total Recoverable	09/11/13	0.0556	mg/L
SWMP-24	Lead, Total Recoverable	09/11/13	<.0005	mg/L
SWMP-24	Magnesium, Total Recoverable	09/11/13	0.441	mg/L
SWMP-24	Mercury, Total Recoverable	09/11/13	<.000067	mg/L
SWMP-24	Selenium, Total Recoverable	09/11/13	<.0015	mg/L
SWMP-24	Silver, Total Recoverable	09/11/13	<.0002	mg/L

TABLE E-2. MSGP Storm Water Monitoring Results for Calendar Year 2013

Monitoring Point	Analyte	Sample Date	Results	Units
SWMP-24	Solids, total suspended	09/11/13	18	mg/L
SWMP-24	Zinc, Total Recoverable	09/11/13	0.012	mg/L
SWMP-25	Aluminum, Total Recoverable	09/11/13	0.0339	mg/L
SWMP-25	Arsenic, Total Recoverable	09/11/13	<.0017	mg/L
SWMP-25	Cadmium, Total Recoverable	09/11/13	<.00011	mg/L
SWMP-25	Copper, Total Recoverable	09/11/13	0.00441	mg/L
SWMP-25	Iron, Total Recoverable	09/11/13	<.033	mg/L
SWMP-25	Lead, Total Recoverable	09/11/13	<.0005	mg/L
SWMP-25	Magnesium, Total Recoverable	09/11/13	0.763	mg/L
SWMP-25	Mercury, Total Recoverable	09/11/13	<.000067	mg/L
SWMP-25	Selenium, Total Recoverable	09/11/13	<.0015	mg/L
SWMP-25	Silver, Total Recoverable	09/11/13	<.0002	mg/L
SWMP-25	Zinc, Total Recoverable	09/11/13	0.00428	mg/L
SWMP-32	Aluminum, Total Recoverable	09/11/13	0.525	mg/L
SWMP-32	Ammonia	09/11/13	0.225	mg/L
SWMP-32	Arsenic, Total Recoverable	09/11/13	<.0017	mg/L
SWMP-32	Cadmium, Total Recoverable	09/11/13	<.00011	mg/L
SWMP-32	Chemical Oxygen Demand	09/11/13	59.7	mg/L
SWMP-32	Copper, Total Recoverable	09/11/13	0.00587	mg/L
SWMP-32	Cyanide, total	09/11/13	<.00167	mg/L
SWMP-32	Iron, Total Recoverable	09/11/13	0.38	mg/L
SWMP-32	Lead, Total Recoverable	09/11/13	0.000561	mg/L
SWMP-32	Magnesium, Total Recoverable	09/11/13	2.36	mg/L
SWMP-32	Mercury, Total Recoverable	09/11/13	<.000067	mg/L
SWMP-32	Selenium, Total Recoverable	09/11/13	<.0015	mg/L
SWMP-32	Silver, Total Recoverable	09/11/13	<.0002	mg/L
SWMP-32	Zinc, Total Recoverable	09/11/13	0.0261	mg/L
SWMP-06	Aluminum, Total Recoverable	09/16/13	18.1	mg/L
SWMP-06	Ammonia	09/16/13	0.255	mg/L
SWMP-06	Arsenic, Total Recoverable	09/16/13	0.00495	mg/L
SWMP-06	Cadmium, Total Recoverable	09/16/13	0.000566	mg/L
SWMP-06	Chemical Oxygen Demand	09/16/13	41.7	mg/L
SWMP-06	Copper, Total Recoverable	09/16/13	0.0189	mg/L
SWMP-06	Cyanide, total	09/16/13	<.00167	mg/L
SWMP-06	Iron, Total Recoverable	09/16/13	14.8	mg/L
SWMP-06	Lead, Total Recoverable	09/16/13	0.0279	mg/L
SWMP-06	Magnesium, Total Recoverable	09/16/13	7.22	mg/L
SWMP-06	Mercury, Total Recoverable	09/16/13	<.000067	mg/L
SWMP-06	Selenium, Total Recoverable	09/16/13	<.0015	mg/L
SWMP-06	Silver, Total Recoverable	09/16/13	<.0002	mg/L
SWMP-06	Zinc, Total Recoverable	09/16/13	0.0808	mg/L
SWMP-10	Aluminum, Total Recoverable	09/16/13	17.2	mg/L
SWMP-10	Ammonia	09/16/13	0.197	mg/L
SWMP-10	Arsenic, Total Recoverable	09/16/13	0.00399	mg/L
SWMP-10	Cadmium, Total Recoverable	09/16/13	0.000661	mg/L
SWMP-10	Chemical Oxygen Demand	09/16/13	53.7	mg/L

TABLE E-2. MSGP Storm Water Monitoring Results for Calendar Year 2013

Monitoring Point	Analyte	Sample Date	Results	Units
SWMP-10	Copper, Total Recoverable	09/16/13	0.0124	mg/L
SWMP-10	Cyanide, total	09/16/13	<.00167	mg/L
SWMP-10	Iron, Total Recoverable	09/16/13	14	mg/L
SWMP-10	Lead, Total Recoverable	09/16/13	0.014	mg/L
SWMP-10	Magnesium, Total Recoverable	09/16/13	6.94	mg/L
SWMP-10	Mercury, Total Recoverable	09/16/13	<.000067	mg/L
SWMP-10	Selenium, Total Recoverable	09/16/13	<.0015	mg/L
SWMP-10	Silver, Total Recoverable	09/16/13	<.0002	mg/L
SWMP-10	Zinc, Total Recoverable	09/16/13	0.0781	mg/L
SWMP-11	Aluminum, Total Recoverable	09/16/13	4.25	mg/L
SWMP-11	Aluminum, Total Recoverable	09/16/13	39.9	mg/L
SWMP-11	Ammonia	09/16/13	0.697	mg/L
SWMP-11	Arsenic, Total Recoverable	09/16/13	0.00351	mg/L
SWMP-11	Arsenic, Total Recoverable	09/16/13	0.0137	mg/L
SWMP-11	Cadmium, Total Recoverable	09/16/13	0.00095	mg/L
SWMP-11	Cadmium, Total Recoverable	09/16/13	0.0305	mg/L
SWMP-11	Chemical Oxygen Demand	09/16/13	61.7	mg/L
SWMP-11	Copper, Total Recoverable	09/16/13	0.0306	mg/L
SWMP-11	Copper, Total Recoverable	09/16/13	0.247	mg/L
SWMP-11	Cyanide, total	09/16/13	0.317	mg/L
SWMP-11	Iron, Total Recoverable	09/16/13	3.24	mg/L
SWMP-11	Iron, Total Recoverable	09/16/13	38.3	mg/L
SWMP-11	Lead, Total Recoverable	09/16/13	0.00377	mg/L
SWMP-11	Lead, Total Recoverable	09/16/13	0.0815	mg/L
SWMP-11	Magnesium, Total Recoverable	09/16/13	4.35	mg/L
SWMP-11	Magnesium, Total Recoverable	09/16/13	21.3	mg/L
SWMP-11	Mercury, Total Recoverable	09/16/13	0.000275	mg/L
SWMP-11	Mercury, Total Recoverable	09/16/13	<.000067	mg/L
SWMP-11	Selenium, Total Recoverable	09/16/13	<.0015	mg/L
SWMP-11	Silver, Total Recoverable	09/16/13	0.00276	mg/L
SWMP-11	Silver, Total Recoverable	09/16/13	0.0277	mg/L
SWMP-11	Solids, total suspended	09/16/13	6100	mg/L
SWMP-11	Zinc, Total Recoverable	09/16/13	0.02	mg/L
SWMP-11	Zinc, Total Recoverable	09/16/13	0.269	mg/L
SWMP-12	Aluminum, Total Recoverable	09/16/13	43.3	mg/L
SWMP-12	Arsenic, Total Recoverable	09/16/13	0.0111	mg/L
SWMP-12	Cadmium, Total Recoverable	09/16/13	0.00108	mg/L
SWMP-12	Copper, Total Recoverable	09/16/13	0.0238	mg/L
SWMP-12	Iron, Total Recoverable	09/16/13	33	mg/L
SWMP-12	Lead, Total Recoverable	09/16/13	0.0407	mg/L
SWMP-12	Magnesium, Total Recoverable	09/16/13	12.8	mg/L
SWMP-12	Mercury, Total Recoverable	09/16/13	<.000067	mg/L
SWMP-12	Selenium, Total Recoverable	09/16/13	<.0015	mg/L
SWMP-12	Silver, Total Recoverable	09/16/13	<.0002	mg/L
SWMP-12	Zinc, Total Recoverable	09/16/13	0.138	mg/L
SWMP-17	Aluminum, Total Recoverable	09/16/13	5.04	mg/L

TABLE E-2. MSGP Storm Water Monitoring Results for Calendar Year 2013

Monitoring Point	Analyte	Sample Date	Results	Units
SWMP-17	Ammonia	09/16/13	0.0993	mg/L
SWMP-17	Arsenic, Total Recoverable	09/16/13	<.0017	mg/L
SWMP-17	Cadmium, Total Recoverable	09/16/13	0.000139	mg/L
SWMP-17	Chemical Oxygen Demand	09/16/13	23.7	mg/L
SWMP-17	Copper, Total Recoverable	09/16/13	0.00427	mg/L
SWMP-17	Cyanide, total	09/16/13	<.00167	mg/L
SWMP-17	Iron, Total Recoverable	09/16/13	3.07	mg/L
SWMP-17	Lead, Total Recoverable	09/16/13	0.00463	mg/L
SWMP-17	Magnesium, Total Recoverable	09/16/13	2.67	mg/L
SWMP-17	Mercury, Total Recoverable	09/16/13	<.000067	mg/L
SWMP-17	Selenium, Total Recoverable	09/16/13	<.0015	mg/L
SWMP-17	Silver, Total Recoverable	09/16/13	<.0002	mg/L
SWMP-17	Zinc, Total Recoverable	09/16/13	0.0348	mg/L
SWMP-19	Aluminum, Total Recoverable	09/16/13	12.8	mg/L
SWMP-19	Ammonia	09/16/13	0.137	mg/L
SWMP-19	Arsenic, Total Recoverable	09/16/13	0.00389	mg/L
SWMP-19	Cadmium, Total Recoverable	09/16/13	0.000229	mg/L
SWMP-19	Chemical Oxygen Demand	09/16/13	43.7	mg/L
SWMP-19	Copper, Total Recoverable	09/16/13	0.00959	mg/L
SWMP-19	Cyanide, total	09/16/13	<.00167	mg/L
SWMP-19	Iron, Total Recoverable	09/16/13	8.02	mg/L
SWMP-19	Lead, Total Recoverable	09/16/13	0.00899	mg/L
SWMP-19	Magnesium, Total Recoverable	09/16/13	5.87	mg/L
SWMP-19	Mercury, Total Recoverable	09/16/13	<.000067	mg/L
SWMP-19	Selenium, Total Recoverable	09/16/13	<.0015	mg/L
SWMP-19	Silver, Total Recoverable	09/16/13	<.0002	mg/L
SWMP-19	Zinc, Total Recoverable	09/16/13	0.0769	mg/L
SWMP-23	Aluminum, Total Recoverable	09/16/13	10.9	mg/L
SWMP-23	Ammonia	09/16/13	0.135	mg/L
SWMP-23	Arsenic, Total Recoverable	09/16/13	0.00337	mg/L
SWMP-23	Cadmium, Total Recoverable	09/16/13	0.000196	mg/L
SWMP-23	Chemical Oxygen Demand	09/16/13	45.7	mg/L
SWMP-23	Copper, Total Recoverable	09/16/13	0.00695	mg/L
SWMP-23	Cyanide, total	09/16/13	<.00167	mg/L
SWMP-23	Iron, Total Recoverable	09/16/13	6.53	mg/L
SWMP-23	Lead, Total Recoverable	09/16/13	0.00707	mg/L
SWMP-23	Magnesium, Total Recoverable	09/16/13	5.41	mg/L
SWMP-23	Mercury, Total Recoverable	09/16/13	<.000067	mg/L
SWMP-23	Selenium, Total Recoverable	09/16/13	<.0015	mg/L
SWMP-23	Silver, Total Recoverable	09/16/13	<.0002	mg/L
SWMP-23	Zinc, Total Recoverable	09/16/13	0.0517	mg/L
SWMP-26	Aluminum, Total Recoverable	09/16/13	<.015	mg/L
SWMP-26	Arsenic, Total Recoverable	09/16/13	0.0111	mg/L
SWMP-26	Cadmium, Total Recoverable	09/16/13	0.000344	mg/L
SWMP-26	Copper, Total Recoverable	09/16/13	0.00587	mg/L
SWMP-26	Iron, Total Recoverable	09/16/13	<.033	mg/L

TABLE E-2. MSGP Storm Water Monitoring Results for Calendar Year 2013

Monitoring Point	Analyte	Sample Date	Results	Units
SWMP-26	Lead, Total Recoverable	09/16/13	<.0005	mg/L
SWMP-26	Magnesium, Total Recoverable	09/16/13	1.28	mg/L
SWMP-26	Mercury, Total Recoverable	09/16/13	<.000067	mg/L
SWMP-26	Selenium, Total Recoverable	09/16/13	<.0015	mg/L
SWMP-26	Silver, Total Recoverable	09/16/13	<.0002	mg/L
SWMP-26	Zinc, Total Recoverable	09/16/13	0.02	mg/L
SWMP-27	Aluminum, Total Recoverable	09/16/13	0.0413	mg/L
SWMP-27	Arsenic, Total Recoverable	09/16/13	0.0026	mg/L
SWMP-27	Cadmium, Total Recoverable	09/16/13	<.00011	mg/L
SWMP-27	Copper, Total Recoverable	09/16/13	0.00703	mg/L
SWMP-27	Iron, Total Recoverable	09/16/13	0.0504	mg/L
SWMP-27	Lead, Total Recoverable	09/16/13	<.0005	mg/L
SWMP-27	Magnesium, Total Recoverable	09/16/13	3.25	mg/L
SWMP-27	Mercury, Total Recoverable	09/16/13	<.000067	mg/L
SWMP-27	Selenium, Total Recoverable	09/16/13	<.0015	mg/L
SWMP-27	Silver, Total Recoverable	09/16/13	<.0002	mg/L
SWMP-27	Zinc, Total Recoverable	09/16/13	<.0035	mg/L
SWMP-28	Aluminum, Total Recoverable	09/16/13	0.0689	mg/L
SWMP-28	Arsenic, Total Recoverable	09/16/13	0.00226	mg/L
SWMP-28	Cadmium, Total Recoverable	09/16/13	<.00011	mg/L
SWMP-28	Copper, Total Recoverable	09/16/13	0.0034	mg/L
SWMP-28	Iron, Total Recoverable	09/16/13	0.0664	mg/L
SWMP-28	Lead, Total Recoverable	09/16/13	<.0005	mg/L
SWMP-28	Magnesium, Total Recoverable	09/16/13	2.7	mg/L
SWMP-28	Mercury, Total Recoverable	09/16/13	<.000067	mg/L
SWMP-28	Selenium, Total Recoverable	09/16/13	<.0015	mg/L
SWMP-28	Silver, Total Recoverable	09/16/13	<.0002	mg/L
SWMP-28	Zinc, Total Recoverable	09/16/13	<.0035	mg/L
SWMP-29	Aluminum, Total Recoverable	09/16/13	0.0846	mg/L
SWMP-29	Arsenic, Total Recoverable	09/16/13	<.0017	mg/L
SWMP-29	Cadmium, Total Recoverable	09/16/13	<.00011	mg/L
SWMP-29	Copper, Total Recoverable	09/16/13	0.00164	mg/L
SWMP-29	Iron, Total Recoverable	09/16/13	0.0664	mg/L
SWMP-29	Lead, Total Recoverable	09/16/13	<.0005	mg/L
SWMP-29	Magnesium, Total Recoverable	09/16/13	2.24	mg/L
SWMP-29	Mercury, Total Recoverable	09/16/13	<.000067	mg/L
SWMP-29	Selenium, Total Recoverable	09/16/13	<.0015	mg/L
SWMP-29	Silver, Total Recoverable	09/16/13	<.0002	mg/L
SWMP-29	Zinc, Total Recoverable	09/16/13	<.0035	mg/L
SWMP-13	Aluminum, Total Recoverable	09/19/13	21.9	mg/L
SWMP-13	Ammonia	09/19/13	0.418	mg/L
SWMP-13	Arsenic, Total Recoverable	09/19/13	0.0057	mg/L
SWMP-13	Cadmium, Total Recoverable	09/19/13	0.000621	mg/L
SWMP-13	Chemical Oxygen Demand	09/19/13	133	mg/L
SWMP-13	Copper, Total Recoverable	09/19/13	0.0382	mg/L
SWMP-13	Cyanide, total	09/19/13	<.00167	mg/L

TABLE E-2. MSGP Storm Water Monitoring Results for Calendar Year 2013

Monitoring Point	Analyte	Sample Date	Results	Units
SWMP-13	Iron, Total Recoverable	09/19/13	15.8	mg/L
SWMP-13	Lead, Total Recoverable	09/19/13	0.161	mg/L
SWMP-13	Magnesium, Total Recoverable	09/19/13	5.5	mg/L
SWMP-13	Mercury, Total Recoverable	09/19/13	0.000114	mg/L
SWMP-13	Selenium, Total Recoverable	09/19/13	<.0015	mg/L
SWMP-13	Silver, Total Recoverable	09/19/13	0.000497	mg/L
SWMP-13	Zinc, Total Recoverable	09/19/13	0.111	mg/L
SWMP-16	Aluminum, Total Recoverable	09/19/13	25.7	mg/L
SWMP-16	Arsenic, Total Recoverable	09/19/13	0.0055	mg/L
SWMP-16	Cadmium, Total Recoverable	09/19/13	0.00075	mg/L
SWMP-16	Copper, Total Recoverable	09/19/13	0.0212	mg/L
SWMP-16	Iron, Total Recoverable	09/19/13	18.3	mg/L
SWMP-16	Lead, Total Recoverable	09/19/13	0.0256	mg/L
SWMP-16	Magnesium, Total Recoverable	09/19/13	9.43	mg/L
SWMP-16	Mercury, Total Recoverable	09/19/13	<.000067	mg/L
SWMP-16	Selenium, Total Recoverable	09/19/13	<.0015	mg/L
SWMP-16	Silver, Total Recoverable	09/19/13	<.0002	mg/L
SWMP-16	Zinc, Total Recoverable	09/19/13	0.393	mg/L

NOTES:
mg/L = milligram per liter

