Sandia Report
SAND2015-6048R
Unlimited Release
Printed September 2015

2014

ANNUAL SITE ENVIRONMENTAL REPORT

FOR

Sandia National Laboratories,



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

SAND2015-6048R
Unlimited Release
Printed September 2015

2014 Annual Site Environmental Report for Sandia National Laboratories, New Mexico

Produced by
Environmental Programs
Sandia National Laboratories
P.O. Box 5800
Albuquerque, New Mexico 87185-0730

for
Department of Energy
National Nuclear Security Administration
Sandia Field Office

Abstract

Sandia National Laboratories is a multiprogram laboratory managed and operated by Sandia Corporation (Sandia), 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. This Annual Site Environmental Report summarizes data and the compliance status of Sandia's sustainability, environmental protection, and monitoring programs at Sandia National Laboratories, New Mexico, during calendar year 2014. 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 O 231.1B, Change 1, *Environment, Safety, and Health Reporting.*

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

NOTICE: This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government, nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors, or their employees, make any warranty, express or implied, or assume any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represent that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government, any agency thereof, or any of their contractors or subcontractors. The views and opinions expressed herein do not necessarily state or reflect those of the United States Government, any agency thereof, or any of their contractors.

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

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

Telephone: (865) 576-8401
Facsimile: (865) 576-5728
E-mail: reports@osti.gov
Online order: http://www.osti.gov/scitech

Available to the public from
U.S. Department of Commerce
National Technical Information Service
5301 Shawnee Rd
Alexandria, VA 22312

Telephone: (800) 553-6847
Facsimile: (703) 605-6900
E-mail: orders@ntis.gov
Online order: http://www.ntis.gov/search



2014 Annual Site Environmental Report
Sandia National Laboratories, New Mexico
Final approval date: August 2015
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
Environmental Programs

Acknowledgments

We wish to thank the following individuals who provided their time and expertise assisting in the production of the Sandia National Laboratories, New Mexico (SNL/NM) annual report:

Project Lead/Technical Reviewer

Stacy Griffith

DOE/NNSA/SFO Project Lead/Technical Reviewer

Karen Agogino

Document Production and Technical Editing

Angela M. Salas
Nancy White
Alexandra Minitrez
Shirley Coe

Contributing Authors

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

Note to the Reader

The goal of the SNL/NM Annual Site Environmental Report is to present summary environmental data regarding environmental performance and 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 continually strive to improve the quality of the contents as well as to 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.

Contents

Appendices iv
Figures iv
Tables iv
Acronyms and Abbreviations vii
Units of Measure xiii

Executive Summary 1
Environmental Programs 1
Terrestrial Surveillance Program 4
Air Quality Compliance Program 5
Water Quality Program 5
Quality Assurance 6

Chapter 1. Introduction 7
1.1. History 7
1.2. Mission 7
1.2.1 Operating Contract 8
1.3. Location Description 8
1.4. Activities and Facilities at SNL/NM 11
1.4.1 The Technical Areas 11
1.4.2 Other Facilities and Areas 12
1.5. Environmental Setting 12
1.5.1 Geology and Hydrology 12
1.5.2 Ecology 15
1.5.3 Climate 16

Chapter 2. Compliance Summary 19
2.1. Compliance Status with Federal Regulations 19
2.1.1 Comprehensive Environmental Response, Compensation, and Liability Act 20
2.1.2 Emergency Planning and Community Right-to-Know Act 21
2.1.3 Resource Conservation and Recovery Act 22
2.1.4 Federal Facility Compliance Act 24
2.1.5 Atomic Energy Act 24
2.1.6 Clean Air Act 25
2.1.7 Clean Water Act 26
2.1.8 Safe Drinking Water Act 27
2.1.9 Toxic Substances Control Act 28
2.1.10 Federal Insecticide, Fungicide, and Rodenticide Act 28
2.1.11 National Environmental Policy Act 28
2.1.12 Endangered Species Act 28
2.1.13 Cultural Resources Acts 29
2.1.14 Environmental Compliance Executive Orders 30
2.1.15 Department of Energy Directives 31
2.2. Occurrence and Release Reporting in 2014 31
2.2.1 DOE O 232.2 Reportable Occurrences 31
2.2.2 Environmental Releases 32
2.3. Audits and Appraisals in 2014 33
2.4. Summary of Reporting Requirements 34
2.5. Summary of Environmental Permits 35
2.6. Environmental Performance Measures 35

Chapter 3. Environmental Programs Information 37
3.1. Environmental Management System Program 37
3.2. Site Sustainability Plan 38
3.3. Environmental Life-Cycle Management Program 39
3.4. Environmental Restoration Operations 39
3.4.1 Waste Cleanup and Site Closures 39
3.4.2 Mixed Waste Landfill Activities 41
3.5. Long-Term Stewardship Program 42
3.5.1 Compliance Oversight 43
3.5.2 Institutional Controls 46
3.5.3 Community Liaison and Planning, and Stakeholder Involvement 46
3.6. Ecology Program 47
3.7. National Environmental Policy Act Program 47
3.7.1 National Environmental Protection Act Activities in 2014 48
3.7.2 Site-Wide Environmental Impact Statement 48
3.8. Environmental Education Outreach Program 49
3.8.1 Annual Youth Conference on the Environment 49
3.8.2 Environmental Management System Excellence Awards Program 49
3.9. Chemical Information System and Chemical Exchange Program 49
3.10. Waste Management and Material Sustainability and Pollution Prevention 50
3.10.1 Waste Management Units and 2014 Activities 53
3.10.2 Radioactive Waste and Mixed Waste 53
3.10.3 Hazardous Waste and Other Regulated Waste 54
3.10.4 Solid Waste Collection and Recycling Center 55
3.10.5 Materials Sustainability and Pollution Prevention Program 56
3.10.6 Waste Management and Material Sustainability and Pollution Prevention Summary 60

Chapter 4. Terrestrial Surveillance Program 61
4.1. Regulatory Criteria 61
4.2. Sample Locations and Media 61
4.3. Field Methods, Analytical Parameters, and Quality Control Procedures 66
4.4. Sample Result Analysis and Methodology 66
4.4.1 Statistical Analysis and Methodology 66
4.4.2 Other Standards for Comparison 67
4.5. Summary of Terrestrial Surveillance Program Activities and Results in 2014 68
4.5.1 Radiological Results 68
4.5.2 Nonradiological Results 69
4.5.3 Additional Activities and Variances 72

Chapter 5. Meteorological Monitoring and Air Quality Compliance Programs 75
5.1. Meteorological Monitoring Programs 75
5.1.1 Monitoring Towers 75
5.1.2 Meteorological Monitoring Results 77
5.1.3 Wind Analysis 77
5.2. Ambient Air Surveillance Program 81
5.2.1 Monitoring Stations 81
5.2.2 Ambient Air-Monitoring Results for 2014 82
5.3. Radiological Air Emissions 85
5.3.1 Compliance Reporting 85
5.3.2 National Emission Standards for Hazardous Air Pollutants Facilities 85
5.4. Assessment of Potential Dose to the Public 89
5.4.1 National Emission Standards for Hazardous Air Pollutants Dose Assessment 89
5.4.2 Dose Assessment Results 91
5.5. Air Quality Compliance Requirements 92

5.5.1 SNL/NM Air Emission Sources 93
5.5.2 Title V 95

Chapter 6. Water Quality Programs 97
6.1. Wastewater Discharge Program 97
6.1.1 Albuquerque Bernalillo County Water Utility Water Authority Permitting and Reporting 97
6.1.2 Wastewater Monitoring Stations and Sampling Parameters 99
6.1.3 Technical Area V Wastewater Radiological Screening 100
6.1.4 Summary of Wastewater Monitoring Results in 2014 101
6.1.5 Sanitary Sewer System Releases in 2014 101
6.2. Surface Discharge Program 101
6.2.1 Surface Discharge Approvals 101
6.2.2 Activities at Evaporation Lagoons 102
6.2.3 Surface Discharge Releases in 2014 103
6.3. Stormwater Program 104
6.3.1 Storm Drain System 104
6.3.2 National Pollutant Discharge Elimination System Permitting 106
6.3.3 Stormwater Sampling and Parameters 106
6.3.4 Summary of Stormwater Program Activities in 2014 108
6.4. Oil Storage and Spill Control 109

Chapter 7. Quality Assurance 111
7.1. Environmental Monitoring Quality Assurance 111
7.1.1 Sample Management Office 111
7.1.2 Contract Laboratory Selection 111
7.1.3 Quality Control for Samples 112
7.1.4 Data Validation and Records Management 112
7.2. Sample Management Office Activities in 2014 113
7.2.1 Sample Handling and Analyses 113
7.2.2 Laboratory Quality Assurance Assessments and Validation 114
7.2.3 Quality Assurance Audits 114

Chapter 8. Permits, Regulations, and Standards for Environmental Programs 115

Glossary 133

References 143
Executive Orders 148
DOE Directives 148
Code of Federal Regulations 148
Federal Acts and Statutes 149
Applicable Local and State Laws and Regulations for Environmental Programs 150
Water Quality 150
Air Quality 150
Miscellaneous 150
Oil Storage and Spill Containment 150
Waste Management 150
Solid Waste 150

Distribution 151

Appendices

All appendices are located on the CD attached to the back inside cover of this report.

Appendix A. Annual Groundwater Monitoring Report, Calendar Year 2014 ..... (See attached CD)
Appendix B. FY 2015 Site Sustainability Plan ..... (See attached CD)
Appendix C. 2014 Terrestrial Surveillance Results ..... (See attached CD)
Appendix D. 2014 Wastewater Monitoring Results ..... (See attached CD)
Appendix E. 2014 Stormwater Sampling Results ..... (See attached CD)

Figures

Figure 1-1. SNL/NM, including technical areas and permitted areas 9
Figure 1-2. State of New Mexico, including counties 10
Figure 1-3. Faults and hydrogeologically distinct areas 14
Figure 4-1. Terrestrial Surveillance Program on-site and perimeter sampling locations 62
Figure 4-2. Terrestrial Surveillance Program off-site sampling locations 63
Figure 4-3. TLD exposure rates by year and location classification 69
Figure 4-4. Soil samples collected near S-51, December 2014 73
Figure 5-1. Clean air network of meteorological towers and ambient air-monitoring stations 76
Figure 5-2. Annual wind roses at towers CL1, A36, and SC1 79
Figure 5-3. Annual wind roses for daytime and nighttime wind frequency at Tower A36 80
Figure 5-4. Locations of facilities at SNL/NM that provided radionuclide inventories 86
Figure 5-5. Atmospheric releases of argon-41 and tritium from SNL/NM facilities, 2010–2014 89
Figure 6-1. Wastewater monitoring station locations at SNL/NM 98
Figure 6-2. Stormwater sampling point locations at SNL/NM 105

Tables

Table 1-1. Plants and animals commonly identified in various life zones across KAFB 16
Table 2-1. Major environmental regulations and statutes applicable to SNL/NM 20
Table 2-2. EPCRA reporting requirements applicable to SNL/NM, 2014 21
Table 2-3. Threatened and endangered species potentially occurring in Bernalillo County, New Mexico 29
Table 2-4. DOE O 232.2 occurrence reports, 2014 32
Table 2-5. Environmental Program audits and appraisals conducted, 2014 33
Table 2-6. Summary of Sandia reporting requirements to outside agencies (other than DOE) for releases of pollutants or hazardous substances 34
Table 3-1. SNL/NM NEPA reviews submitted to DOE/NNSA/SFO, 2014 48
Table 3-2. Waste shipped by SNL/NM waste management facilities, 2014 51
Table 3-3. Waste recycled by SNL/NM, 2014 52
Table 4-1. On-site terrestrial surveillance locations, sample media, and parameters 64
Table 4-2. Perimeter terrestrial surveillance locations, sample media, and parameters 65
Table 4-3. Off-site terrestrial surveillance locations, sample media, and parameters 65
Table 4-4. Priority decision matrix and actions 66
Table 4-5. Various reference values for metals in soil (all units in mg/kg) 67
Table 4-6. Radiological summary statistics for Priority-2 and Priority-3 sample locations, 2014 68
Table 4-7. TLD exposure rate summary statistics by location classification, 2000–2014 68
Table 4-8. Metals summary statistics for Priority-1, Priority-2, and Priority-3 sample location, 2014 69
Table 4-9. Results for additional sampling event at S-51 for chromium, 2014 (all units in mg/kg) 72
Table 5-1. Annual climatic summary from Tower A36, calendar year 2014 77
Table 5-2. Variations and extremes in meteorological measurements across the tower network, 2014 78
Table 5-3. Final seven-year statistical analysis of CPMS data 81

Table 5-4. Twenty-four-hour averages for PM_{10}, $PM_{2.5}$, lead, and COA maximum monitored data (all units in $\mu g/m^3$) 82
Table 5-5. Monthly and annual averages for PM_{10}, calendar year 2014 (all units in $\mu g/m^3$) 82
Table 5-6. Averaged results of PM_{10} analysis at each station, calendar year 2014 83
Table 5-7. Five-year monthly and annual averages for $PM_{2.5}$ (all units in $\mu g/m^3$) 84
Table 5-8. VOC average concentrations compiled from monthly results at four monitoring stations, calendar year 2014 (all units in ppm bv) 84
Table 5-9. SNL/NM radiological dose reporting, calendar year 2014 85
Table 5-10. Summary of radionuclide releases from NESHAP sources, calendar year 2014 87
Table 5-11. Annual source-specific EDE for off-site receptors, calendar year 2014 90
Table 5-12. Annual source-specific EDE for on-site receptors, calendar year 2014 91
Table 5-13. Calculated dose assessment results for on-site and off-site receptors and for collective populations, calendar year 2014 92
Table 5-14. Boiler fuel usage and emission data, calendar year 2014 93
Table 5-15. Generator hours and emission data, calendar year 2014 94
Table 5-16. Potential emissions from jet fuel burned, 2014 95
Table 6-1. SNL/NM wastewater discharge permits and station characteristics 99
Table 6-2. NMWQCC monitoring and reporting requirements 102
Table 6-3. SNL/NM sites covered under the Multi-Sector General Permit 107
Table 6-4. Multi-Sector General Permit stormwater sampling requirements and benchmark standards 108
Table 8-1. Summary of environmental permits and registrations in effect, 2014 115
Table 8-2. Federal and state air regulations that are applicable or potentially applicable to SNL/NM operations 121
Table 8-3. Summary of compliance history with regard to mixed waste at SNL/NM 122
Table 8-4. Quantity of mixed waste subject to the Federal Facility Compliance Order, end of fiscal year 2014 125
Table 8-5. Derived concentration standards for selected radionuclides 126
Table 8-6. General dose limits to the public from DOE facilities 126
Table 8-7. EPA interim primary drinking water standards 127
Table 8-8. National secondary drinking water regulations 129
Table 8-9. NMWQCC standards for groundwater of 10,000 mg/L total dissolved solid concentration or less 130
Table 8-10. Boilers associated with permits and registrations, 2014 131
Table 8-11. Emergency generators associated with permits and registrations, 2014 132

This page intentionally left blank.

Acronyms and Abbreviations

	Acronym/Abbreviation	Definition
A	AANC	Airworthiness Assurance Nondestructive Inspection Validation Center
	ABCWUA	Albuquerque Bernalillo County Water Utility Authority
	ACGIH	American Conference of Governmental Industrial Hygienists
	ACRR	Annular Core Research Reactor
	AEA	Atomic Energy Act
	AHCU	Auxiliary Hot Cell Unit
	AMPF	Advanced Manufacturing Prototype Facility
	AMPL	Advanced Manufacturing Process Laboratory
	ANOVA	analysis of variance
	AOC	Area of Concern
	AQC	Air Quality Compliance
	ARCOC	analysis request and chain of custody
	ARRA	American Recovery and Reinvestment Act
	ASER	Annual Site Environmental Report
	AST	aboveground storage tank
	AWN	acid waste neutralization
B	bgs	below ground surface
	BMP	best management practice
	BSG	Burn Site Groundwater
C	CAA	Clean Air Act
	CAC	Corrective Action Complete
	CAMU	Corrective Action Management Unit
	CAP88	Clean Air Act Assessment Package-1988
	C&D	Construction and Demolition
	CEP	Chemical Exchange Program
	CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
	CFR	Code of Federal Regulations
	CGP	Construction General Permit
	CINT	Center for Integrated Nanotechnologies
	CIS	Chemical Information System
	CMI	Corrective Measures Implementation
	CMS	Corrective Measures Study
	CO	carbon monoxide
	COA	City of Albuquerque
	COC	contaminant of concern
	CPMS	Criteria Pollutant Monitoring Station
	CSS	CWL sanitary sewer
	CTF	Coyote Test Field
	CWA	Clean Water Act
	CWL	Chemical Waste Landfill

Acronym/Abbreviation		Definition
D	DCS	derived concentration standards
	D&D	decontamination and demolition
	DETS	Dynamic Explosives Test Site
	DOE	U.S. Department of Energy
	DOECAP	DOE Consolidated Audit Program
	DP	discharge permit
	DP-530	Discharge Permit-530
	DQO	data quality objective
E	ECF	Explosives Components Facility
	EDE	effective dose equivalent
	EEANM	Environmental Education Association of New Mexico
	EHD	Environmental Health Department
	EHS	extremely hazardous substance
	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	FAA	Federal Aviation Administration
	FFCA	Federal Facility Compliance Act
	FFCO	Federal Facilities Compliance Order
	FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
	FY	fiscal year
G	GEL	General Engineering Laboratories
	GHG	greenhouse gas
	GSA	General Services Administration
H	HAP	hazardous air pollutant
	HDRV	Historical Disposal Requests Validation
	HE	high explosive
	HERMES-III	High Energy Radiation Megavolt Electron Source-III
	HLW	high-level radioactive waste
	HME	homemade explosive
	HSWA	Hazardous and Solid Waste Amendment
	HWHU	Hazardous Waste Handling Unit

Acronym/Abbreviation		Definition
I	IC	institutional control
	IED	improvised explosive device
	ISMS	Integrated Safety Management System
	ISO	International Organization for Standardization
	IT	information technology
K	KAFB	Kirtland Air Force Base
L	LECS	Liquid Effluent Control System
	LLMW	low-level mixed waste
	LLW	low-level radioactive waste
	LMC	Lockheed Martin Corporation
	LTMMP	Long-Term Monitoring and Maintenance Plan
	LTS	Long-Term Stewardship
M	MAC	Maximum Allowable Concentration
	MAPEP	Mixed Analyte Performance Evaluation Program
	MBTA	Migratory Bird Treaty Act
	MCL	maximum contaminant level
	MDA	minimal detectable activity or minimum measured activity
	MDL	method detection limit
	MEI	maximally exposed individual
	MESA	Microsystems and Engineering Sciences Applications
	Module IV	Hazardous and Solid Waste Amendments Module
	MS4	Middle Rio Grande Watershed-Based Municipal Separate Storm Sewer System
	MSB	Manzano Storage Bunker
	MSGP	Multi-Sector General Permit
	MSP2	Material Sustainability and Pollution Prevention
	MTRU	mixed transuranic
	MWL	Mixed Waste Landfill
N	N/A	not applicable
	NAAQS	National Ambient Air Quality Standards
	ND	not detected
	NDI	nondestructive inspection
	NELAC	National Environmental Laboratory Accreditation Conference
	NEPA	National Environmental Policy Act
	NESHAP	National Emission Standards for Hazardous Air Pollutants
	NGF	Neutron Generation Facility
	NGPF	Neutron Generator Production Facility
	NM	New Mexico
	NMAAQS	New Mexico Ambient Air Quality Standards
	NMAC	New Mexico Administrative Code
	NMED	New Mexico Environment Department
	NMWQCC	New Mexico Water Quality Control Commission

Acronym/Abbreviation		Definition
	NNSA	National Nuclear Security Administration
	NOI	Notice of Intent
	NON	Notice of Noncompliance
	NOV	Notice of Violation
	NO_x	nitrogen oxide
	NPDES	National Pollutant Discharge Elimination System
	NPN	nitrite plus nitrate
	NQA	National Quality Assurance
	NRC	National Response Center
	NSR	New Source Review
O	ODS	ozone-depleting substance
	Order, the	Compliance Order on Consent
P	P2	Pollution Prevention
	P	permit number
	PAH	polycyclic aromatic hydrocarbon
	PCB	polychlorinated biphenyl
	PCCP	Post-Closure Care Permit
	Permit, the	Permit NM5890110518-1
	PETL	Processing and Environmental Technology Laboratory
	PGWS	perched groundwater system
	pH	potential of hydrogen
	$PM_{2.5}$	particulate matter that has a diameter equal to or less than 2.5 microns
	PM_{10}	particulate matter that has a diameter equal to or less than 10 microns
	POTW	Publicly Owned Treatment Works
	PPE	personal protective equipment
	PQL	practical quantitation limit
	PSEL	Photovoltaic Systems Evaluation Laboratory
	PSL	primary subliner
Q	QA	quality assurance
	QAPP	Quality Assurance Project Plan
	QC	quality control
R	R	registration number
	RCRA	Resource Conservation and Recovery Act
	RMWMU	Radioactive and Mixed Waste Management Unit
	RPDP	Radiation Protection Dosimetry Program
	RPICL	Radiation Protection Instrument Calibration Laboratory
	RPSD	Radiation Protection Sample Diagnostics
	RQ	reportable quantity

Acronym/Abbreviation		Definition
S	SA	sustainable acquisition
	Sandia	Sandia Corporation
	SAP	sampling and analysis plan
	SARA	Superfund Amendments and Reauthorization Act
	SD	standard deviation
	SDF	Strategic Defense Facility
	SDS	Safety Data Sheet
	SDWA	Safe Drinking Water Act
	SFO	Sandia Field Office
	SHPO	State Historic Preservation Office
	SME	subject matter expert
	SMI	Sandia Management Information
	SMM	Sandia Management Model
	SMO	Sample Management Office
	SNL	Sandia National Laboratories
	SNL/KTF	Sandia National Laboratories, Kauai Test Facility, Hawaii
	SNL/NM	Sandia National Laboratories, New Mexico
	SNL/TTR	Sandia National Laboratories, Tonopah Test Range, Nevada
	SO_2	sulfur dioxide
	SOW	statement of work
	SPCC	spill prevention, control, and countermeasure
	S&S	Safeguards and Security
	SSL	soil screening level
	SSP	Site Sustainability Plan
	SSPP	Strategic Sustainability Performance Plan
	START	Sandia Tomography and Radionuclide Transport Laboratory
	STP	Site Treatment Plan
	SUWCO	Sewer Use and Wastewater Control Ordinance
	SWCRC	Solid Waste Collection and Recycling Center
	SWEIS	Site-Wide Environmental Impact Statement
	SWMU	Solid Waste Management Unit
	SWPPP	Stormwater Pollution Prevention Plan
	SWRI	Southwest Research Institute
	SWSP	stormwater sampling point
T	TA	Technical Area
	TAG	Tijeras Arroyo Groundwater
	TAL	Target Analyte List
	TAVG	Technical Area V Groundwater
	TCE	trichloroethene
	TCLP	toxicity characteristic leaching procedure
	TCR	Test Capabilities Revitalization
	TDS	total dissolved solids
	TEAMS	Tracking Environmental Actions Management System
	TG	Treatability Group

Acronym/Abbreviation		Definition
	TLD	thermoluminescent dosimeter
	TLV	threshold limit value
	TRI	Toxic Release Inventory
	TRU	transuranic
	TS	Terrestrial Surveillance (Program)
	TSCA	Toxic Substance and Control Act
	TTC	Thermal Test Complex
	TTU	Thermal Treatment Unit
U	U.S.	United States
	USFS	U.S. Forest Service
	USGS	U.S. Geological Survey
	UST	underground storage tank
V	VA	Veterans Administration
	VCA	Voluntary Corrective Action
	VOC	volatile organic compound
	VSA	vertical sensor array
	VZMS	vadose zone monitoring system
W	WIF	Weapons Integration Facility
	WIPP	Waste Isolation Pilot Plant
	WW	wastewater

Units of Measure

Unit	Definition
°C	degree Celsius
Ci/yr	curies per year
cm	centimeter
°F	degrees Fahrenheit
ft	feet
gal	gallon
hp	horsepower
k	kilometer
kg	kilogram
km	kilometer
lb	pound
µCi/ml	microcuries per milliliter
µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter
m^3	cubic meter
mb	millibar
MFL	million fibers per liter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MMBtu/hr	million British thermal units per hour
mph	miles per hour
mR	milliroentgen
mrem	millirem
mrem/yr	millirems per year
mR/yr	milliroentgen per year
m/sec	meters per second
mSv	millisievert
mSv/yr	millisievert per year
pCi/g	picocuries per gram
pCi/L	picocuries per liter
pCi/m^3	picocuries per cubic meter
person-mSv/yr	person-millisievert per year
person-rem/yr	person-roentgen equivalent, man per year
ppm bv	parts per million by volume
rem	roentgen equivalent man
scf	standard cubic feet
sq mi	square mile
Sv	Sievert
t1/2	half life
tpy	tons per year

This page intentionally left blank.



Executive Summary

Sandia National Laboratories (SNL) is one of the nation's multiprogram national security laboratories. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL, New Mexico (SNL/NM) 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 O 231.1B, Change 1, *Environment, Safety, and Health Reporting*.

This ASER summarizes the environmental protection, restoration, and monitoring programs in place at SNL/NM during calendar year 2014. 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 report is a key component of DOE's efforts 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.

The 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, receiving International Organization for Standardization 14001 Certification in 2009 and retaining certification in the 2014 Surveillance Audit.

While all 2014 program activities were performed continuously, they are reported in this ASER on a calendar year basis unless noted otherwise (programs based on the fiscal year operate from October 1 through September 30, annually). The environmental programs and 2014 activities at SNL/NM are summarized here.

Site Sustainability Plan

Sandia defines its sustainability strategies and goals in its annual Site Sustainability Plan. As of fiscal year 2014, Sandia is meeting or exceeding sustainability goals. See Section 3.2 for more information.

Environmental Life-Cycle Management

The Environmental Life-Cycle Management (ELM) Program provides environmental stewardship for past, present, and future activities. The ELM Program's purpose is to promote the long-term stewardship of SNL/NM sites' natural and cultural resources throughout its operational, closure, and post-closure life cycle. See Section 3.3 for more information.

Environmental Restoration Operations

Sandia's Environmental Restoration (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 discernable unit at which solid hazardous waste has been placed at any time, and from which the Department determines there may be a risk of release of hazardous waste or hazardous waste constituents, irrespective of whether the units were intended for the management of solid or hazardous waste." (NMED 2004) See Section 3.4 for more information.

The 2014 status of ER Operations site closures is as follows:

- At the beginning of 2014, 278 SNL/NM SWMUs/AOCs no longer required corrective action, and 35 SWMUs/AOCs required corrective action (Davis 2012).
- As stated in letters from the New Mexico Environment Department (NMED) in 2010 and 2012, 5 of the 35 remaining SWMUs/AOCs required groundwater monitoring as part of the corrective action (Bearzi 2010). SWMUs 8, 58, 68, 149, and 154 required eight quarters of groundwater monitoring, and these requirements were met in 2014.
- Twenty-three SWMUs/AOCs were proposed for grant of Corrective Action Complete status, and a public hearing was held in conjunction with renewal of the RCRA Facility Operating Permit (Permit) for SNL/NM. On December 19, 2014, NMED signed a Final Order issuing the Permit and granting Corrective Action Complete status at all 23 SWMUs/AOCs (NMED 2014).

At the end of 2014, only 12 ER Operations sites require corrective action, including:

- Three groundwater AOCs: Technical Area (TA) V Groundwater (TAVG), Tijeras Arroyo Groundwater (TAG), and Burn Site Groundwater (BSG) have final remedies pending.
- Three SWMUs at active test facilities: SWMUs 83, 84, and 240 have potential soil contamination that will be evaluated at the end of their test operations.
- Five SWMUs suitable for CAC: SWMUs 8, 58, 68, 149, and 154 have met NMED groundwater monitoring requirements and will now be proposed for CAC.
- The Mixed Waste Landfill (MWL): NMED issued a Certification of Completion verifying that corrective action is complete for this SWMU (Cobrain 2014).

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 Program

The Long-Term Stewardship (LTS) Program's mission is the long-term protection of human health and the environment from hazards associated with residual contamination at legacy sites (former ER 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 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 (IC), and community liaison and stakeholder involvement activities. LTS compliance oversight activities include groundwater monitoring and various types of monitoring at the Corrective Action Management Unit (CAMU) and the Chemical Waste Landfill (CWL) to meet NMED

regulatory requirements, along with investigation of any new releases. See Section 3.5 for more information.

Groundwater monitoring at SNL/NM consists of monitoring a network of approximately 78 groundwater-monitoring wells for the presence of constituents of concern at various intervals during the year. Sixty-six of these wells are associated with legacy sites (former ER sites) and 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 99 SNL/NM wells and approximately 80 additional wells owned by other agencies. Monitored wells are maintained or replaced as necessary. All 2014 groundwater monitoring activities, analytical results, hydrographs, and contour maps are provided in the *Annual Groundwater Monitoring Report, Calendar Year 2014*) (Appendix A in this report). A summary of this report is provided in Section 3.5.

Sandia personnel collect groundwater samples at six project areas: CWL, MWL, TAVG, TAG, BSG, and miscellaneous SWMUs. The 2014 water quality results for these six areas were consistent with results from past years.

The LTS Program conducts 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. The LTS Program monitors, inspects, maintains, and repairs the CWL, and then reports annually, in accordance with the CWL Post-Closure Care Permit. In 2014, 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. The CAMU and CWL activities are discussed further in Section 3.5 of this report.

Administrative and physical 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 18 IC site inspections were completed in 2014. No large-scale maintenance requirements or other concerns with physical ICs were identified on legacy sites during the 2014 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 semiannual DOE and U.S. Department of Defense meetings on environmental activities.

Ecology Program

The Ecology Program monitors the biota at SNL/NM as an element of the overall environmental monitoring process. Ecology Program personnel collect ecological data on plants and wildlife to support documentation, land use decisions, and ecological and wildlife awareness campaigns to ensure safe work environments and sustainable decision-making strategies. The Ecology Program helps SNL/NM projects comply with wildlife regulations and laws by providing biological evaluations and surveys in support of site activities. See Section 3.6 for more information.

National Environmental Policy Act Program

The National Environmental Policy Act (NEPA) Program provides the DOE/NNSA/SFO with technical assistance in support of Sandia's compliance with NEPA and the National Historic Preservation Act at all of Sandia's locations: NEPA Program personnel reviewed a total of 1,280 proposed SNL/NM projects in various corporate systems. To support mission activities at SNL/NM, 88 DOE NEPA checklists were transmitted to the DOE/NNSA/SFO for review and determination in 2014. See Section 3.7 for more information.

Sandia undertook two archaeological assessments in 2014. One supported the installation of fiber-optic cable, and the second was the result of bar ditch damage near previously identified archaeological sites.

Also in 2014, Sandia personnel assisted the DOE in the continued development of a new Site-Wide Environmental Impact Statement. As needed, Environmental Programs personnel conferred with experts from various Sandia programmatic missions to review and clarify data on their current and anticipated future operations.

Environmental Education Outreach Program

Sandia's Environmental Education Outreach Program reaches out to the community through various events and provides environmental information to Sandia's personnel. Sandia recognizes that in addition to complying with requirements, it is important to communicate with personnel and the local community to help reduce environmental impacts. Using an integrated approach, Sandia communicates environmental awareness to its personnel via various newsletters, awareness campaigns, and outreach events. In 2014, Outreach Program personnel coordinated the semiannual 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 3.8 for more information.

Chemical Information System and Chemical Exchange Program

The Chemical Information System (CIS) is a comprehensive chemical information management tool that provides workplace chemical container tracking as well as information about the chemical hazards found in associated Safety Data Sheets (SDSs). The SDS library in CIS currently contains over 110,000 SDSs. The Chemical Exchange Program was developed to reduce the amount of usable chemicals disposed as waste, resulting in cost savings for both new acquisitions and disposals. ChemPro, an acquisition request module, was added to improve chemical management by requiring approval to purchase chemicals. See Section 3.9 for more information.

Waste Management Program

Waste at SNL/NM is managed at nine permitted units: the Hazardous Waste Handling Unit, the Thermal Treatment Unit, the Radioactive and Mixed Waste Management Unit, the Auxiliary Hot Cell Unit, and five Manzano Storage Bunkers. Also, the Solid Waste Collection and Recycling Center collects and processes recyclable and nonrecyclable solid waste generated by SNL/NM operations. In March 2014, the NMED conducted an annual Compliance Evaluation Inspection. In August 2014, the NMED issued a Notice of Violation and Resolution. Three violations were adequately addressed with no further action required. No fines or penalties were assessed. In addition, the SNL/NM Reapplication Yard recycles surplus material and equipment that cannot be reapplied, sent for auction, or donated to kindergarten through twelfth-grade schools. See Section 3.10 more information.

Materials Sustainability and Pollution Prevention

The Materials Sustainability and Pollution Prevention (MSP2) Program provides assessment, guidance, and assistance to the workforce at SNL/NM to implement measures that reduce resource use, reduce generated waste, and 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 3.10 for more information.

Terrestrial Surveillance Program

The Terrestrial Surveillance Program conducts sampling activities to detect any potential releases or migration of radiological or nonradiological 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 2014, there was one soil sample with an

elevated value for chromium. The location was resampled, and the results did not warrant further investigation. No vegetation samples were collected in 2014 due to ongoing drought conditions. See Chapter 4 for more information.

Air Quality Compliance Program

The Air Quality Compliance (AQC) Program ensures compliance with air quality regulations, prepares reports related to emergency planning and community right-to-know, and monitors ambient air quality and radionuclide air emissions. See Chapter 5 for more information.

Air Quality Compliance. 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 nonradiological pollutants. AQC Program personnel currently maintain 13 Authority-to-Construct New Source Review permits and 29 New Source Review registrations from the City of Albuquerque.

Ambient Air Monitoring. Sandia measures ambient air quality at six locations throughout SNL/NM for particulate matter (PM_{10} and $PM_{2.5}$) and volatile organic compounds (VOCs). Results of monitoring in 2014 indicate the following: PM_{10}, $PM_{2.5}$, and VOC concentrations are comparable to results from previous years.

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 2014, the primary radionuclides released from SNL/NM facilities were tritium and argon-41. The on-site maximally exposed individual (MEI) was located on KAFB at the Kirtland Storage Facility. The on-site MEI dose of 8.30E-04 mrem/yr resulted primarily from tritium releases at the Neutron Generator Facility (NGF). The off-site MEI was located at the KAFB Eubank Gate area. The off-site MEI dose of 8.32E-04 mrem/yr at the Eubank Gate area also primarily resulted 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 sampling and surveillance activities. See Chapter 6 for more information.

Wastewater. Wastewater from SNL/NM is discharged from six on-site outfalls permitted by the Albuquerque Bernalillo County Water Utility Authority (ABCWUA). Wastewater monitoring is conducted to ensure that all discharges meet the standards set by the ABCWUA's Publicly Owned Treatment Works. In 2014, there was one reportable event, which resulted in the ABCWUA issuing a Notice of Violation. A 24-hour composite wastewater sample collected by the ABCWUA at the Permit 2069-I wastewater monitoring station showed zinc at 7.2 mg/L, which is above the permitted limit of 2.2 mg/L. See Chapter 6 for more information. All discharge parameters at the other permitted locations were met, resulting in Sandia receiving five Gold Pre-Treatment Awards and one Silver Pre-Treatment Award from the ABCWUA for the 2013–2014 treatment year.

Surface Discharge. All water that will be released to the ground surface, either directly or to lined containments, is defined as surface discharge. These discharges must meet State of New Mexico surface discharge standards. All internal discharges approved by Sandia in 2014 met NMED New Mexico Water Quality Control Commission standards. Routine surface discharges are made to two evaporation lagoons that service the SNL/NM pulsed power facilities under an existing discharge permit. In 2014, a new

discharge permit (DP-530) was issued for the lagoons, and all permit requirements were met for both NMED-permitted lagoons. Four accidental surface releases were reported to NMED. See Chapter 6 for more information.

Stormwater. Sandia's Stormwater Program personnel ensured compliance with two EPA National Pollutant Discharge Elimination System (NPDES) permits, the Multi-Sector General Permit and the Construction General Permit. Coverage under a third permit, the Middle Rio Grande Watershed-Based Municipal Separate Storm Sewer System, is pending approval. Compliance with the permits in place in 2014 included the following activities: preparing Stormwater Pollution Prevention Plans, conducting site inspections, and collecting samples for laboratory analysis at the designated SNL/NM stormwater sampling points (including the environmental surveillance sample locations). In 2014, all NPDES monitoring data was reviewed and submitted to the EPA. Stormwater sampling was performed from July 1 through October 31 when there was adequate runoff to collect required samples. There were notable exceedances of benchmark levels for cadmium, lead, and cyanide at five sampling points throughout the season. These exceedances are being reviewed as part of the selection, design, installation, and implementation of stormwater control measures and improvements. Stormwater exceedances for magnesium, aluminum, copper, iron, and zinc were consistent with natural background soil concentrations at SNL/NM.

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, underground storage tanks, and transformers), bulk storage areas (multiple containers), and temporary or portable tanks. Sandia currently operates 47 aboveground storage tanks and 3 underground storage tanks at SNL/NM.

Quality Assurance

All SNL/NM environmental monitoring (which 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. Personnel in various programs collect environmental samples and analyze the samples for radiological and nonradiological 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 O 231.1B, Change 1). This ASER describes the environmental protection programs currently in place at Sandia National Laboratories, New Mexico (SNL/NM). Sandia makes this report 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 at SNL/NM 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 nonproliferation, homeland security, energy and infrastructure, and defense systems and assessments.

While all 2014 program activities were performed continuously, they are reported in this ASER on a calendar year basis unless otherwise noted (programs based on the fiscal year operate from October 1 through September 30, 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 at that time. 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 supporting the nonproliferation 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 between Sandia and the DOE (DE-AC04-94AL85000) 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 as follows:

- DOE O 231.1B, Change 1, *Environment, Safety, and Health Reporting*, ensures that the DOE receives information about the events that have affected or could adversely affect the health, safety, and security of the public or workers, the environment, the operations of DOE facilities, or DOE's credibility. This ASER is prepared in accordance with and as required by this order.
- DOE O 435.1 Change 1, *Radioactive Waste Management,* establishes requirements to manage radioactive waste in a manner that protects the environment and worker and public health and safety. Under this order, DOE contractor-operated facilities are required to plan, document, execute, and evaluate the management of radioactive waste.
- DOE O 458.1 Change 3, *Radiation Protection of the Public and the Environment,* sets radiation protection standards for DOE operations so that radiation exposures to members of the public and the environment are as low as reasonably achievable and maintained within established limits of this order.
- DOE O 232.2 Admin. Change 1, *Occurrence Reporting and Processing of Operations Information,* provides timely notification to the DOE complex of events that could adversely affect: public or DOE worker health and safety, the environment, national security, or DOE's reputation.

1.3. Location Description

The majority of the lands that the DOE or NNSA use for SNL/NM activities are located within the boundaries of KAFB (Figure 1-1). The location, characteristics, and physical setting of SNL/NM are described on a regional basis as follows.

New Mexico is the fifth-largest state in the United States, comprising approximately 121,000 sq mi. Based on recent projections, New Mexico's estimated 2014 population was 2,085,572 (Census 2014b), and it is projected to be approximately 2.1 million by 2030 (Census 2004). The COA is the largest city in the state with approximately 556,495 residents (Census 2014a). The estimated population within a 50-mile radius of SNL/NM's zip code is approximately 962,058 residents (Searchbug 2015). Nine counties are contained or partially included in that radius (Figure 1-2).

KAFB is a military installation that spans 51,559 acres, including 20,486 acres that are 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, KAFB has a mean elevation of 5,384 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 (USAF 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. Isleta Pueblo is located south of the KAFB boundary.

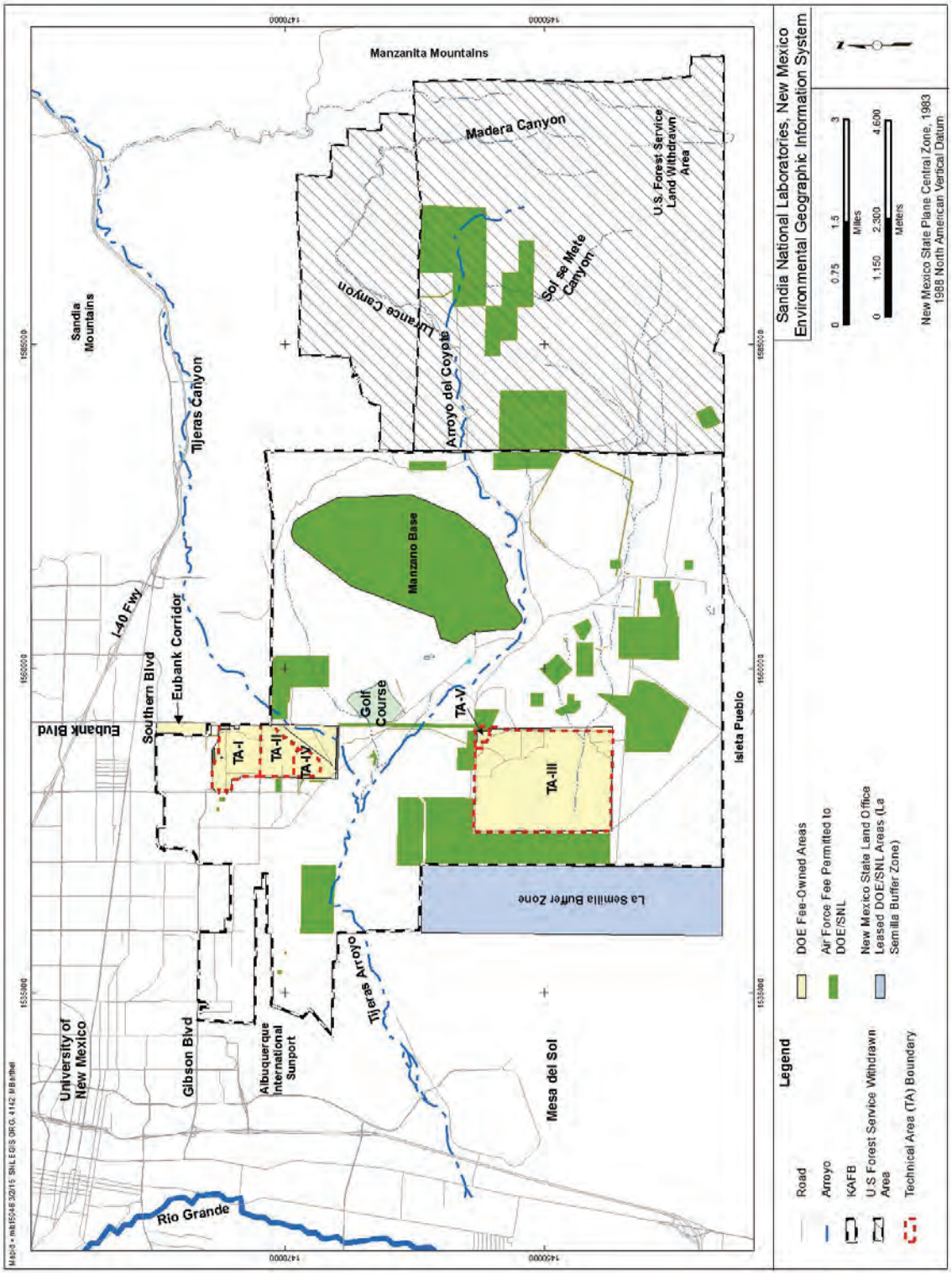


Figure 1-1. SNL/NM, including technical areas and permitted areas

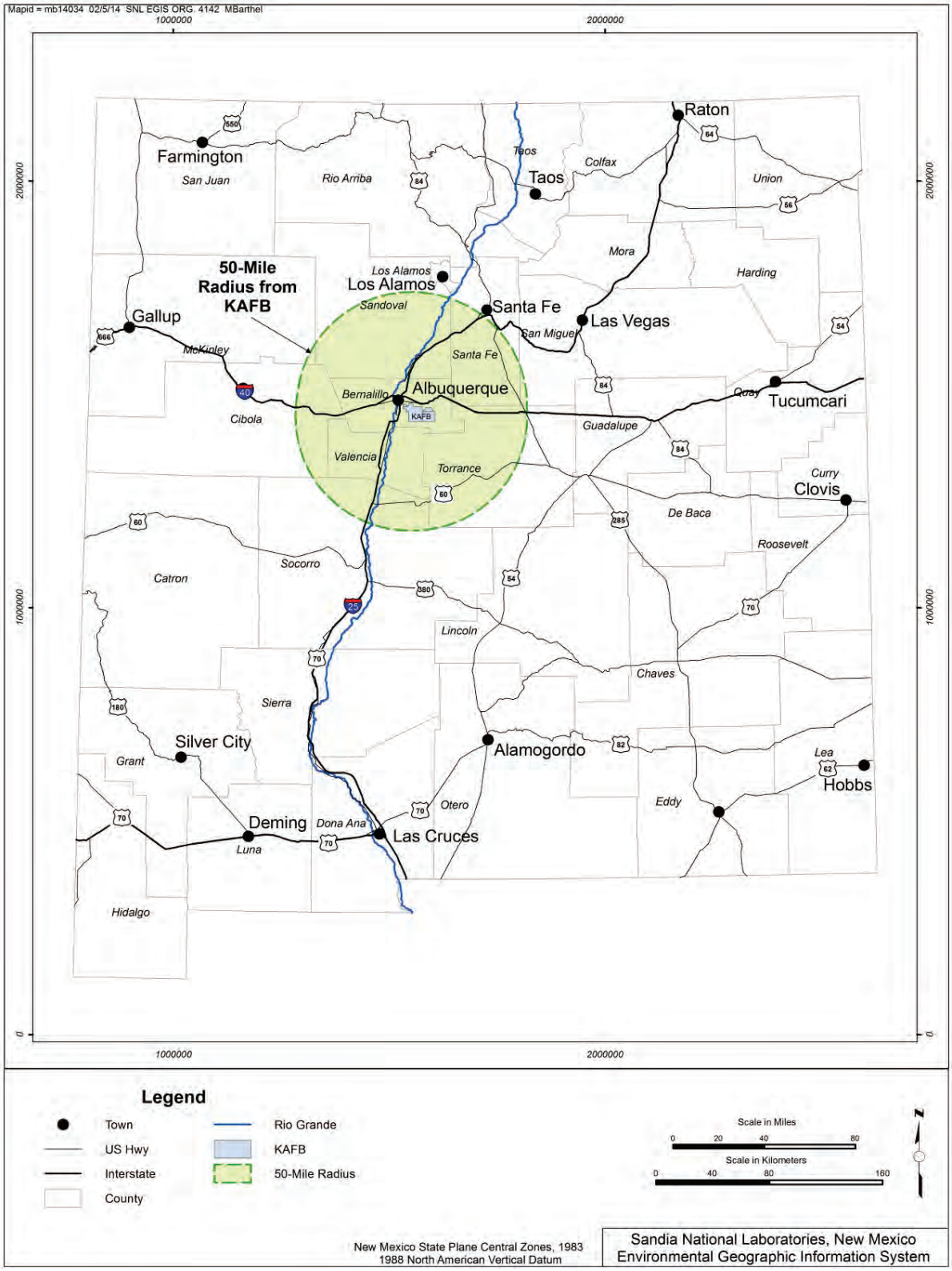


Figure 1-2. State of New Mexico, including counties

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 areas (TAs) (DOE 1999). For non–DOE-owned property, Sandia conducts operations on 5,637 acres of land permitted from the U.S. Air Force, a portion of which are on land withdrawn by the USFS (SNL/NM 2006b). DOE leases approximately 2,750 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.

1.4. Activities and Facilities at SNL/NM

SNL/NM consists of five DOE fee-owned secured TAs (TA-I, TA-II, TA-III, TA-IV, and TA-V); buildings and structures in nonsecured leased areas; and several remote testing areas, which are also on leased land (Figure 1-1). In 2014, the total workforce at SNL/NM was approximately 10,536, and the New Mexico location had approximately 6.58 million gross sq ft of existing facilities (Appendix B).

1.4.1 The Technical Areas

TA-I is located in the northern portion of KAFB, and operations there include Sandia's 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 Ion Beam Laboratory; the main technical library; several assembly and 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, the 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 Explosives Components Facility, the Hazardous Waste Handling Unit, the Solid Waste Collection and Recycling Center, the Construction and Demolition Recycle Center, and the National Infrastructure Simulation and Analysis Center are in TA-II.

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 Unit is located in the southern portion of TA-III. The Mixed Waste Landfill, the Chemical Waste Landfill, and the Corrective Action Management Unit 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, 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 Unit.

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 Canyon, Madera Canyon, and Sol se Mete Canyon (Figure 1-1). The remote test areas are known collectively as the Coyote Test Field and are located in the canyons on the west side of the Manzano Mountains. 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 of 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 following sections. 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 to the east of the COA. 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 Mountains (to the south) by Tijeras Canyon (Figure 1-1).

Tijeras Arroyo is a major 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 10 miles from the west boundary of KAFB.

1.5.1 Geology and Hydrology

SNL/NM and KAFB are situated in a geologic setting that 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; the COA and KAFB are within a rift valley.

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 and by 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). The 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 and 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 total vertical offset is on the order of 4.3 miles. South of KAFB, the basin's eastern boundary is the Hubbell Spring Fault system. The Sandia and Hubbell Spring fault systems are north-trending, down-to-the-west, en echelon normal faults, which are Tertiary in age (63 to 1.8 million years ago) (Lozinsky and Tedford 1991; Woodward 1982; Kelly 1977). The Sandia Fault converges with the Tijeras Fault and the Hubbell Spring Fault system in the region of KAFB, identified as the Tijeras Fault Complex.

The hydrogeological system at KAFB 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, and depths to groundwater range from approximately 44 to 325 ft bgs within the basin. On the west side of the Tijeras Fault Complex, groundwater in the regional aquifer is contained in alluvial sediments, and depths to groundwater range from approximately 451 to 571 ft bgs.

A perched groundwater system (PGWS) overlies the regional aquifer in the north portion of KAFB. The PGWS extends from TA-I south to the Tijeras Arroyo Golf Course. The western extent of the PGWS lies between Wyoming Boulevard and the Albuquerque International Sunport's east–west runway. The eastern extent is just east of the KAFB landfill and may be bounded by the West Sandia Fault. The groundwater gradient within the PGWS is to the southeast, and the depth to groundwater is approximately 269 ft bgs in the west and 350 ft bgs in the east.

Two perennial springs are located on KAFB (Coyote Springs and Sol se Mete Spring). Additionally, one perennial spring (Hubbell Spring) is 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 in the most productive portion of the aquifer on the east side of the Rio Grande. 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 regional groundwater in the KAFB area primarily flowed to the southwest. As a result of groundwater withdrawal, the local water table has dropped by as much as 141 ft (Thorn, McAda, and Kernodle 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.

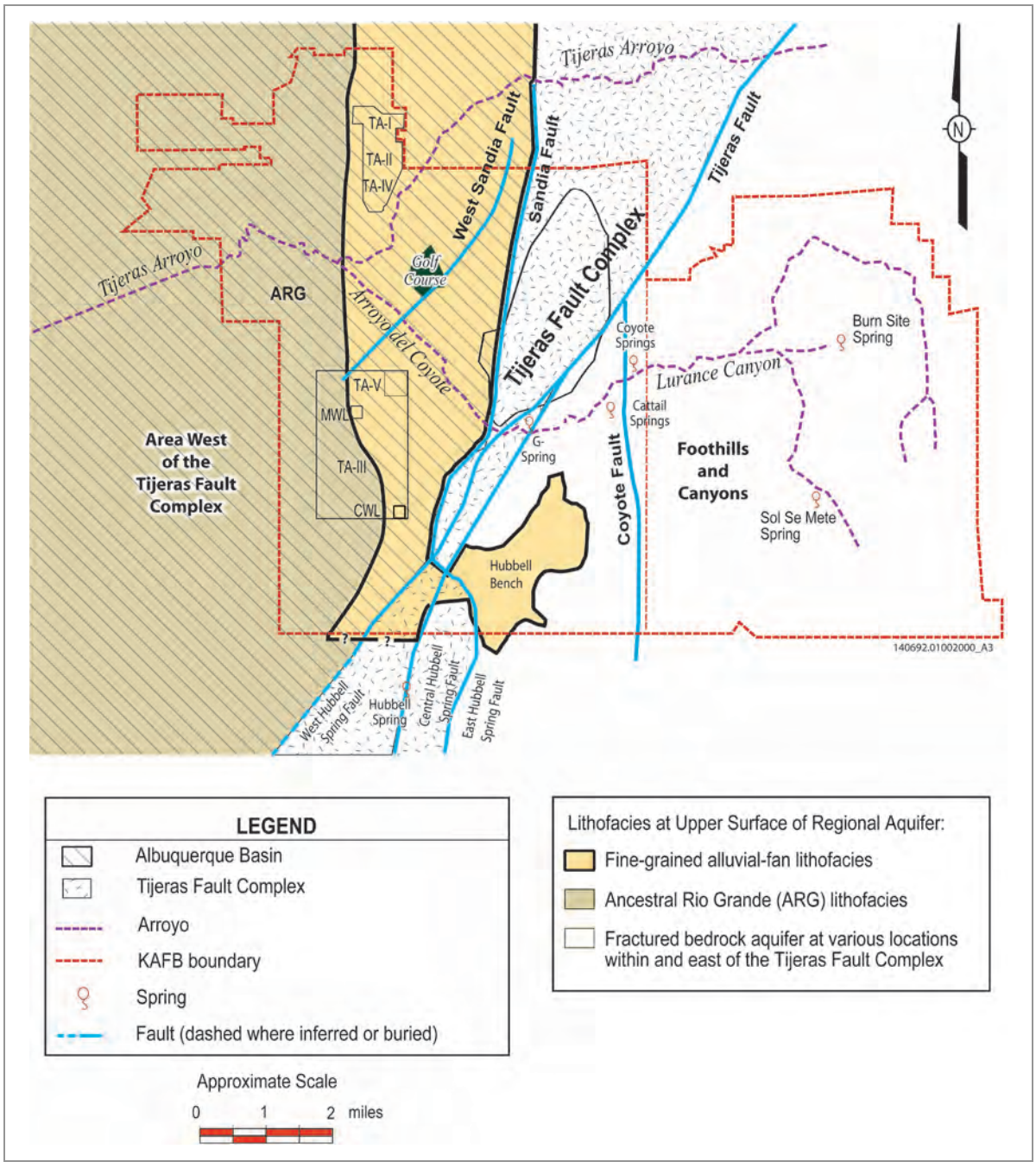


Figure 1-3. Faults and hydrogeologically distinct areas

1.5.2 Ecology

Ecoregions denote areas within ecosystems where the type, quality, and quantity of environmental resources are generally similar. The U.S. Environmental Protection Agency (EPA) has delineated ecoregions into four levels. Level I is the coarsest level, dividing North America into 15 ecological regions, whereas at Level II the continent is subdivided into 50 classes. Level III is a subdivision of Level II and is further subdivided into Level IV regions, allowing more locally defined characteristics to be identified. Two Level III ecoregions cover the SNL/NM and KAFB area: the Arizona/New Mexico Plateau and the Arizona/New Mexico Mountains. The topography at SNL/NM and KAFB ranges from midelevation grasslands to high-elevation coniferous forests.

SNL/NM and KAFB grasslands are included within Level III ecoregion 22, the Arizona/New Mexico Plateau. This ecoregion stretches across much of northern Arizona, into portions of southern Colorado, and covers most of northwestern New Mexico. Ecoregion 22 is a large transitional region that is characterized by semiarid grasslands and desert-scrub species. Grama and galleta grasses, four-wing saltbush, and sand sage are common native plant species in this ecoregion on SNL/NM lands.

SNL/NM and KAFB woodlands are contained within Level III ecoregion 23, the Arizona/New Mexico Mountains. This ecoregion is distinguished from neighboring mountainous ecoregions by lower elevations and by vegetation that is indicative of drier, warmer environments. The Arizona/New Mexico Mountains ecoregion encompasses much of central Arizona, extending into southwest New Mexico and into mountain ranges in northwest, central, and southeast New Mexico. The eastern portion of SNL/NM is located in and bordered by the Manzano Mountains. Vegetation in the steep, rugged Manzano Mountains varies in terms of elevation and aspect. This ecoregion on SNL/NM lands is characterized by piñon pine and juniper woodlands at lower elevations, and by areas of ponderosa pines at the highest elevations. Riparian areas occur along water courses and include cottonwood, willow, and nonnative salt cedar trees.

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.

The KAFB and SNL/NM regional life zones 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.

The Ponderosa Pine Forest or Transition Life Zone (7,000 to 8,000 ft) generally has a closed canopy, dominated by ponderosa pine. Piñon pine, juniper, scrub oak, grassy meadows, streams, marshes, and canyons commonly occur within this zone. The USFS withdrawn area in the eastern portion of KAFB in this zone reaches an elevation of just over 7,900 ft.

The Piñon-Juniper Woodland Zone (6,000 to 7,000 ft) has a mostly open canopy, with piñon pine and juniper sparsely populating this zone of foothills and mesas. Animals typical of this woodland include the deer mouse and piñon jay. Much of the rolling terrain in the USFS withdrawn area at KAFB is comprised of this zone.

The Upper Sonoran Life Zone (below 6,000 ft) has short prairie grass, occurring 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 coyotes, black-tailed jackrabbits, and kangaroo rats. The western portion of KAFB is within this zone.

Table 1-1. Plants and animals commonly identified in various life zones across KAFB

Common Name	Scientific Name	Common Name	Scientific Name
Birds			
Common raven	*Corvus corax*	Horned lark	*Eremophila alpestris*
American kestrel	*Falco sparverius*	Ladder-backed woodpecker	*Picoides scalaris*
Black-chinned hummingbird	*Archilochus alexandris*	Loggerhead shrike	*Lanius ludovicianus*
House finch	*Haemorhous mexicanus*	Mountain bluebird	*Sialia currucoides*
Broad-tailed hummingbird	*Selasphorus platycercus*	Red-tailed hawk	*Buteo jamaicensis*
Dark-eyed junco	*Junco hyemalis*	Spotted towhee	*Pipilo maculatus*
Mammals			
American 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*	Silky pocket mouse	*Perognathus flavus*
Reptiles and Amphibians			
Collared lizard	*Crotaphytus collaris*	Great plains skink	*Eumeces obsoletus*
Chihuahuan spotted whiptail	*Aspidoscelis exsanguis*	New Mexico spadefoot toad	*Spea multiplicata*
Long-nosed snake	*Rhinocheilus lecontei*	Western diamondback rattlesnake	*Crotalus atrox*
New Mexico whiptail	*Aspidoscelis mexicana*	Side-blotched lizard	*Uta stansburiana*
Gopher snake	*Pituophis catenifer*	Short-horned lizard	*Phrynosoma hernandesi*
Plants			
Apache plume	*Fallugia paradoxa*	Blue grama	*Bouteloua gracilis*
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*	Intermediate yucca	*Yucca intermedia*
Galleta	*Pleruaphis jamesii*	Black grama	*Bouteloua eriopoda*

NOTE: KAFB = Kirtland Air Force Base

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 midlatitude dry continental climates, with summer high temperatures in the basin around 90°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 2014, Albuquerque received approximately 8.8 inches of precipitation (NWS 2014). The severe drought conditions that prevailed through most of 2013 were slightly mitigated by the end of 2014.

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 upslope and downslope diurnal wind flow patterns. 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 toward the Rio Grande Valley. These topographically induced wind flows can be enhanced or negated by weather systems that move across the southwestern United States. The strongest winds occur in the spring when monthly wind speeds average 10.3 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 requirements, including U.S. Department of Energy (DOE) directives and Presidential Executive Orders (EOs). As a part of this compliance, Sandia adheres to strict reporting and permitting requirements.

This chapter summarizes Sandia's compliance status with major environmental regulations, statutes, EOs, and DOE directives that are applicable to operations conducted at SNL/NM. Compliance issues, corrective actions, environmental occurrences, and environmental audits and appraisals are also discussed in this chapter.

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

All operations and activities at SNL/NM, including those in the environmental programs, are performed under the corporate Environment, Safety, and Health (ES&H) policy (ESH100), which states:

> It is the policy of Sandia National Laboratories to perform work in a safe and environmentally responsible manner by committing to: maintain a safe workplace, prevent incidents, and protect the public; protect the environment, conserve resources, and prevent pollution; maintain compliance with legal and other requirements; and strive for continual improvement. DOE's Integrated Safety Management System (ISMS) is a key element of the Sandia Management Model (SMM). ISMS provides the framework for managing ES&H activities and functions while integrating them into all SNL operations.

The SMM is used to explain how Sandia is organized and managed. It is a dynamic, interactive resource that is used to support Sandia management and 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 defined by five core functions that provide processes to guide management in identifying and controlling hazards as follows:

- Define the scope of work
- Analyze the hazards
- Develop and implement hazard controls
- Perform work within controls
- Provide feedback and continuous improvement

2.1. Compliance Status with Federal Regulations

Table 2-1 lists the major regulations and statutes applicable to SNL/NM. The following subsections detail the regulations.

Table 2-1. Major environmental regulations and statutes applicable to SNL/NM

Regulation/Statute	Description
Atomic Energy Act	Directs DOE and the U.S. Nuclear Regulatory Commission in the management of nuclear materials and radioactive waste
Clean Air Act and Clean Air Act Amendments	Provides standards to protect the nation's air quality
Clean Water Act	Provides general water quality standards to protect the nation's water sources and byways
Comprehensive Environmental Response, Compensation, and Liability Act	Provides federal funding for cleanup of inactive waste sites on the National Priorities List 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	Provides special protection status for federally listed endangered or threatened species
Executive Orders	Several Executive Orders provide specific protection for wetlands, floodplains, and environmental justice in minority and low-income populations, and encourages leadership in environmental management
Federal Facility Compliance Act	Directs federal agencies regarding environmental compliance
Federal Insecticide, Fungicide, and Rodenticide Act	Controls the distribution and use of various pesticides
Migratory Bird Treaty Act 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	Specifies standards for radionuclide air emissions and other hazardous air releases under the Clean Air Act
National Environmental Policy Act	Requires federal agencies to review all proposed activities so as to include environmental aspects in agency decision-making
Resource Conservation and Recovery Act	Mandates the management of solid and hazardous waste and certain materials stored in underground storage tanks
Safe Drinking Water Act	Enacts specific health standards for drinking water sources
Superfund Amendments and Reauthorization Act	The Superfund Amendments and Reauthorization Act, Title III, also known as the Emergency Planning and Community-Right-to-Know Act, mandates communication standards for hazardous materials over a threshold amount that are stored or used in a community
Toxic Substances Control Act	Specifies rules for the manufacture, processing, distribution, use, and disposal of specific chemical substances and mixtures such as asbestos and polychlorinated biphenyls

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

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 hazardous 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, 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 that any reportable quantity release of hazardous waste be reported. Sandia was in full compliance with CERCLA/SARA in 2014, 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 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 planning committees, which include police, fire, civil defense, and public health professionals. Any inadvertent release above established threshold levels must be reported to appropriate state and local authorities. The four major reporting requirements designated by specific sections of EPCRA are shown in Table 2-2.

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

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

Table 2-2. EPCRA reporting requirements applicable to SNL/NM, 2014

Section	EPCRA Section Title	Requires Reporting?		Description
		Yes	No	
302-303	Emergency Planning	✓		Sandia personnel prepare an annual report that lists chemical inventories above the reportable Threshold Planning Quantities listed in 40 CFR Part 355 (Appendix B), including the location of the chemicals and emergency contacts. The DOE/NNSA/SFO distributes the report to the required entities.
304	Emergency Notification		✓	No reportable quantity releases of an EHS, as defined by CERCLA, were reported in 2014.
311-312	Hazardous Chemical Storage Reporting Requirements	✓		There are two "Community Right-to-Know" reporting requirements: (1) Sandia personnel complete the EPA Tier II forms for all hazardous chemicals present at the SNL/NM facility at any one time in amounts equal to or greater than 10,000 lb and for all EHSs present at the facility in an amount greater than or equal to 500 lb or the Threshold Planning Quantity, whichever is lower, and provide the report to DOE/NNSA/SFO for distribution to the required entities; and (2) Sandia personnel provide Safety Data Sheets for each chemical entry on a Tier II form unless opting to comply with the EPA's alternative Material Safety Data Sheet (which gives relevant chemical information) reporting, which is detailed in 40 CFR Part 370.21.
313	Toxic Chemical Release Forms	✓		Section 313 of EPCRA requires that facilities that release toxic chemicals listed in SARA Title III over a threshold value must submit a TRI report. Sandia personnel provided a TRI report for use of lead and lead compounds above the reporting threshold in 2014.

NOTES: CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CFR = Code of Federal Regulations
DOE = U.S. Department of Energy
EHS = extremely hazardous substance
EPA = U.S. Environmental Protection Agency
EPCRA = Emergency Planning and Community Right-to-Know Act
NNSA = National Nuclear Security Administration
Sandia = Sandia Corporation
SARA = Superfund Amendments and Reauthorization Act
SFO = Sandia Field Office
SNL/NM = Sandia National Laboratories, New Mexico
TRI = Toxic Release Inventory

Toxic Release Inventory Reporting

The Toxic Release Inventory (TRI) Program was established under Section 313 of EPCRA and requires certain facilities in covered industry sectors to file reports of their environmental releases and other waste management quantities of chemicals listed on the EPCRA Section 313 list of toxic chemicals if they manufacture, process, or otherwise use more than established threshold quantities of these chemicals.

In 2014, releases and other waste management quantities at SNL/NM met the threshold that required a TRI report for lead and lead compounds. Sandia reported its chemical use in the *Chemical Inventory Report Calendar Year (CY) 2014* (SNL/NM 2015a), which documents all purchases of chemicals at SNL/NM, Tonopah Test Range, and Kauai Test Facility for 2014. This chemical inventory supports compliance with SARA Title III.

2.1.3 Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) regulates the generation, transportation, treatment, storage, and disposal of hazardous chemical waste and nonhazardous solid waste, and the storage of hazardous or petroleum products in underground storage tanks. Under the authority of the New Mexico Hazardous Waste Act 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 waste component of hazardous and radioactive mixed waste (low-level mixed waste [LLMW]) is subject to the requirements of state and federal regulations for hazardous waste. The radioactive component of LLMW is regulated under the Atomic Energy Act (AEA) of 1946.

Sandia generates hazardous waste and LLMW 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 LLMW through product substitutions, process changes, material reuse, and recycling. For a summary of Sandia's waste management activities during 2014 refer to Chapter 3.

New Mexico Hazardous Waste Act

On April 29, 2004, NMED, DOE, and Sandia entered into the Compliance Order on Consent (NMED 2004). This 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
- Corrective Action Management Unit, under Permit NM5890110518-1, Module IV

On February 6, 2002, Sandia and DOE/NNSA/SFO submitted a comprehensive RCRA Part B permit request to renew the operating permits for these hazardous waste management units. The request also included updated permit applications for nine LLMW management units—the Radioactive and Mixed Waste Management Unit, the High Bay Waste Storage Facility, and seven Manzano Storage Bunkers—and a new application for operation of the Auxiliary Hot Cell Unit. Sandia continued to operate under

the existing permits and under interim status during the permit application and renewal process. The High Bay Waste Storage Facility and two of the seven Manzano Storage Bunkers were withdrawn from the permit application in 2003, and RCRA closure of those units was completed in 2006. Treatment operations were completed at the Corrective Action Management Unit 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 2012b).

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 parties 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 (AOCs). NMED invited public comments on the draft permit and proposed granting of CAC status. DOE/NNSA/SFO, Sandia, and several citizens submitted comments to NMED; many of the comments included requests for a public hearing.

NMED held a public hearing regarding the draft permit and proposed granting of CAC status from May 4–8, 2014. Parties providing technical testimony included Sandia, NMED, Citizen Action New Mexico, Citizens for Alternatives to Radioactive Dumping, Our Endangered Aquifer Working Group, and Agua es Vida Action Team. The Hearing Officer recommended that the NMED issue the permit as proposed and grant CAC status.

On December 19, 2014, the Secretary of the NMED signed an order issuing both the grant of CAC status for 24 Solid Waste Management Units and AOCs, and the permit with revisions. NMED issued the RCRA Facility Operating Permit on January 27, 2015, and it became effective on February 26, 2015.

Post-Closure Care Permit, Chemical Waste Landfill (CWL)

The Chemical Waste Landfill (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 hazardous waste 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 2005b).

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 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 post-closure care activities are detailed in Section 3.4.1.

Technical Area III Classified Waste Landfill

The Technical Area (TA) III Classified Waste Landfill was used to manage solid, nonhazardous classified media (e.g., floppy disks) and components. The landfill received materials from 1989 through 1993. Instead of seeking permit coverage, Sandia and DOE/NNSA/SFO plan to excavate the contents of the landfill and revegetate the area. NMED approved an excavation plan on April 6, 2010. The landfill continues to be managed and reported as a future environmental liability.

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 to DOE and Sandia (NMED 1995). The Federal Facilities Compliance Order 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 and radioactive waste at SNL/NM. A Site Treatment Plan and a schedule for processing the waste were developed. Revision 14 of the Site Treatment Plan (NMED 2014) does not include any 2014 deadlines. In 2014, Sandia continued to characterize and treat LLMW and to package wastes for shipment to permitted off-site facilities for treatment and/or disposal.

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, the U.S. Nuclear Regulatory Commission, and the EPA. Federal regulations control radioactive emissions and the transportation of nuclear materials. The DOE/NNSA/SFO, as governed by DOE directives, retains authority for radioactive waste at SNL/NM. Operations at SNL/NM are subject to the DOE requirements in DOE O 435.1 Change 1, *Radioactive Waste Management,* and DOE O 458.1 Change 3, *Radiation Protection of the Public and the Environment.*

DOE O 435.1 establishes requirements to manage radioactive waste in a manner that protects the environment and worker and public health and safety. Under this order, DOE contractor-operated facilities are required to plan, document, execute, and evaluate the management of radioactive waste (see Chapter 3 for details).

DOE O 458.1 sets radiation protection standards for DOE operations so that radiation exposures to members of the public and the environment are as low as reasonably achievable and are maintained within established limits of this order.

The control and release of property with residual radioactivity is specified in DOE O 458.1. Sandia does not release property (e.g., vehicles, equipment, or other materials) to the public with residual radioactivity above the limits specified in DOE O 458.1. Pursuant to written procedures, items that are potentially contaminated or activated are either surveyed prior to release to the public, or a process knowledge evaluation is conducted to verify that the property has not been exposed to radioactive material or to energy capable of inducing radioactivity in the material. In some cases, both a radiological survey and a process knowledge evaluation are performed. In 2014, Sandia's Radiation Protection Department processed 412 equipment clearance surveys. Using a graded approach, Sandia only keeps track of high-value released items (e.g., those items worth greater than $100,000). In 2014, no such high-value items were released.

DOE issued a moratorium in January 2000 that prohibited the release of volume-contaminated metals, and subsequently suspended the release of metals for recycling purposes from DOE radiological areas in July 2000. No metals subject to the moratorium or the suspension were released from SNL/NM in 2014.

Excess property with residual radioactivity above the limits in DOE O 458.1 is either transferred to other DOE facilities for reuse or transferred to the SNL/NM Radioactive and Mixed Waste Management Unit for disposal as radioactive waste. There were no releases of real property to the public in 2014.

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 Table 8-1. See Chapter 5 for further information on Sandia's compliance with the CAA.

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 for these pollutants.

The EPA program for the attainment and maintenance of National Ambient Air Quality Standards requires local agencies to develop a comprehensive permitting program. The Albuquerque Bernalillo County 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 National Emission Standards for Hazardous Air Pollutants

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. The dose is compared to the EPA standard of 10 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 2014 as detailed in Section 5.4.2.

Fugitive Dust Permitting

The COA enforces 20.11.20 New Mexico Administrative Code (NMAC). This ensures 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 or to 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 reporting of 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 HAPs generates the National Emission Inventory. The COA has not issued a Title V Operating Permit for SNL/NM, and has indicated that this reporting does not require completion until a Title V Operating Permit is issued for SNL/NM.

New Source Review Requirements

The New Source Review permitting program was established as part of the CAA Amendments of 1977. New Source Review 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 Requirements

As part of an effort to control pollution in the U.S., the EPA provides New Source Performance Standard 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. A New Source Performance Standard has been established for a number of individual industrial or source categories, including boilers and generators.

Reciprocating Internal Combustion Engine 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 Reciprocating Internal Combustion Engine 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 one of the following:

- 100 tpy or greater of any criteria pollutant
- 10 tpy of any HAP
- 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:

- The Albuquerque Bernalillo County Water Utility Authority (ABCWUA) administers regulations for sanitary sewer discharges based on federal pretreatment standards.
- The EPA and the NMED administer regulations concerning oil storage and surface discharges.
- The EPA has authority over National Pollutant Discharge Elimination System (NPDES) permits.

National Pollutant Discharge Elimination System and New Mexico Surface Water Quality Standards

EPA Region 6 is the constituent agency responsible for regulating stormwater discharges under the NPDES in New Mexico. NPDES permitting requirements apply to "Waters of the U.S." as defined in the CWA and to "Surface Waters of the State" as defined in New Mexico's "Standards for Interstate and

Intrastate Surface Waters" (20.6.4 NMAC). Stormwater that is discharged from SNL/NM flows to state and federal waters. Processes are in place to evaluate stormwater discharges for coverage and compliance with their respective NPDES permit(s). For additional information, refer to Section 6.3.

While the NMED Surface Water Quality Bureau lacks primacy of permitting and enforcement authority, it is responsible for adopting water quality standards, developing antidegradation rules, and conducting a triennial review. New Mexico has enacted "Standards for Interstate and Intrastate Surface Waters" (20.6.4 NMAC) and has developed the §303(d)/§305(b) *Integrated List and Report* to protect the quality of the state's surface waters. The NMED also assists EPA Region 6 by performing inspections, tracking compliance, and serving as a local point of contact for permit holders.

Albuquerque Bernalillo County Water Utility Authority Sewer Discharge Regulations

Six wastewater monitoring stations, or outfalls, are operating under the ABCWUA permits at SNL/NM. During 2014, one reported event 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 12 one-time internal surface discharge permits in 2014. Sandia also investigated four accidental 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 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 pulsed power accelerators. All permit conditions for the TA-IV permitted lagoons were met in 2014; 2014 activities are discussed in Section 6.2.2. In addition, DP-530 was reissued September 5, 2014, and expires September 5, 2019.

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. The EPA promulgates these standards as primary and secondary drinking water regulations. Specific drinking water quality criteria are established to protect human health, which limits the maximum contaminant level 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. The system derives its water from deep groundwater wells. KAFB routinely samples its water and conducts analyses to establish that its water quality conforms to EPA's maximum contaminant level 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. This same information is provided to DOE and Sandia employees.

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

http://www.epa.gov/safewater

KAFB publishes specific water quality data and system performance 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 manufacture, processing, distribution, use, and disposal of specific chemical substances and/or mixtures. At SNL/NM, compliance with TSCA primarily involves the handling and disposal of polychlorinated biphenyls. Details related to TSCA are in Section 3.10.

2.1.10 Federal Insecticide, Fungicide, and Rodenticide Act

The 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 licensed pest control applicators. Sandia was in full compliance with FIFRA in 2014.

2.1.11 National Environmental Policy Act

The National Environmental Policy Act (NEPA) of 1969 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 10 CFR Part 1021, *National Environmental Policy Act Implementing Procedures*). 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 that is 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.

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 taking, possessing, killing, transporting, or importing migratory birds, their eggs, parts, or nests. At SNL/NM, the MBTA is coordinated through NEPA reviews and the Ecology Program.

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				
Mammals				
Spotted bat	*Euderma maculatum*	—	Threatened	
Pale Townsend's big-eared bat	*Plecotus townsendii pallescens*	SOC	—	
New Mexican jumping mouse	*Zapus hudsonius luteus*	Endangered	Endangered	
Fish				
Rio Grande silvery minnow	*Hybognathus amarus*	Endangered	Endangered	
Reptiles				
Desert massasauga	*Sistrurus catenatus ssp. edwardsii*	Under Review	—	✓
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*	Threatened	—	
Broad-billed hummingbird	*Cynanthus latirostris*	—	Threatened	
Southwest willow flycatcher	*Empidonax traillii extimus*	Endangered	Endangered	
Aplomado falcon	*Falco femoralis*	Endangered	Endangered	
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	
Mexican spotted owl	*Strix occidentalis lucida*	Threatened	—	
Bell's vireo	*Vireo bellii*	—	Threatened	✓
Gray vireo	*Vireo vicinior*	—	Threatened	✓

NOTES: There are no listed endangered or threatened plant, reptile, or amphibian species in Bernalillo County for 2014.
— = no designation
KAFB = Kirtland Air Force Base
SOC = species of concern
Migratory Bird Treaty Act

2.1.13 Cultural Resources Acts

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

- National Historic Preservation Act
- Archaeological Resources Protection Act
- 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 the National Historic Preservation Act and its implementing regulations, include both archaeological sites and historic buildings and structures. Historic buildings and structures may include structures 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 at SNL/NM. However, archaeological sites do exist on and in close proximity to DOE/NNSA-permitted property and ER sites in the area. These areas are located on U.S. Air Force property and on portions of the Cibola National Forest in the U.S. Forest Service withdrawn area. Sandia activities are planned to avoid potential impacts to these cultural resource sites. DOE/NNSA/SFO 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 2014, Sandia provided historic building surveys in response to 16 actions on 15 properties at SNL/NM. DOE/NNSA/SFO undertook consultation with the New Mexico State Historic Preservation Office (SHPO) on actions at 5 of the properties. In three cases, the actions were found to have no adverse effect on cultural resources. Two of the consultations are ongoing. SFO did not consult on the other 11 actions based on the results of previous consultations.

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 the NM SHPO on the recommendation. As properties face renovation, DOE/NNSA/SFO consults with SHPO; in 2014, consultations were on the five properties mentioned previously. As the cumulative effect of actions taken since the 2010 survey resulted in changes to the built environment, Sandia revisited and will revise the survey in 2015. 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 until final determination is made. Documentation continues on buildings previously determined to be eligible for the National Register of Historic Places.

Archaeological Assessment

In 2014, Sandia undertook two archaeological assessments in the Coyote Test Field. One was in support of the installation of fiber-optic cable for improved communication. The second was a result of bar ditch damage near previously identified archaeological sites. SFO consultation with SHPO is ongoing for both.

2.1.14 Environmental Compliance Executive Orders

The following environmental compliance EOs are applicable at SNL/NM.

EO 11988, Floodplain Management

As amended, EO 11988 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.

EO 11990, Protection of Wetlands

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, mudflats, 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 U.S. Air Force 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.

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

As amended, EO 12898 requires each federal agency to make environmental justice part of its mission, and sets responsibilities for agencies, including developing a strategy to identify and address environmental justice concerns. 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.

EO 13423, Strengthening Federal Environmental, Energy, and Transportation Management

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.

EO 13514, Federal Leadership in Environmental, Energy, and Economic Performance

Issued in October 2009, EO 13514 establishes an integrated strategy toward sustainability to safeguard the health of our environment and make the reduction of greenhouse gas emissions a priority for all federal agencies. EO 13514 sets goals in the areas of promoting electronics stewardship, preventing pollution, increasing renewable energy, reducing waste, recycling, and reducing fossil fuel usage.

2.1.15 Department of Energy Directives

DOE directives on the Management and Operating Contract that pertain to environmental protection and management are discussed in Section 1.2.1, "Operating Contract." In 2014, Sandia met all requirements stated in these DOE directives.

2.2. Occurrence and Release Reporting in 2014

Under DOE O 232.2 Admin. Change 1, 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 O 232.2, or determined to be recurring through performance analysis, are considered occurrences." There are environmental releases that may not meet DOE O 232.2 reporting thresholds; however, they are still reportable to outside agencies.

2.2.1 DOE O 232.2 Reportable Occurrences

All 2014 occurrences at SNL/NM that meet DOE O 232.2 criteria defined previously 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 the following groups (as defined by DOE O 232.2):

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

During 2014, there were 36 occurrences at SNL/NM. Five of these occurrences met the query criteria for reporting, as described in Table 2-4, and all five were categorized as Significance Category 4 (the lowest level occurrence).

Table 2-4. DOE O 232.2 occurrence reports, 2014

Reporting Criteria	Month	Significance Category	Report Number and Title
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).	January	SC4	**NA—SS-SNL-NMFAC-2014-0001** Notice of Violation for Wastewater Discharge Permit No 2069-1 See Section 6.1.5
	March	SC4	**NA—SS-SNL-NMFAC-2014-0002** Notification to an Outside Agency, KAFB Reportable to an Outside Agency, (KAFB) Damage to an Archaeological Site See Section 2.1.13
	August	SC4	**NA—SS-SNL-4000-2014-0002** NMED Notice of Violation and Resolution: Hazardous Waste Management Regulations, EPA identification number NM5890110518 See Table 2-5
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.	May	SC4	**NA—SS-SNL-NMFAC-2014** Cooling Tower Overflowed at Building 823 Due to a Plugged Drain See Section 6.2.3
	July	SC4	**NA—SS-SNL-NMFAC-2014-0004** Cooling Tower Overflowed at Building 858N Due to a Switch Failure See Section 6.2.3

NOTES: DOE = U.S. Department of Energy
EPA = U.S. Environmental Protection Agency
KAFB = Kirtland Air Force Base
NMED = New Mexico Environment Department
SC = Significance Category

2.2.2 Environmental Releases

In 2014, there were four accidental surface discharge releases that were reportable to NMED. Two of these were also categorized as a DOE O 232.2 occurrence. The surface discharges are summarized in Section 6.2.3.

2.3. Audits and Appraisals in 2014

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 2014 are listed in Table 2-5.

Table 2-5. Environmental Program audits and appraisals conducted, 2014

Appraising Agency	Title	Date	Summary
ABCWUA	ABCWUA inspected facilities within Flow Basins 2069A, 2069F, 2069G, 2069I, 2069K and 2238A.	Inspected facilities during March, April, October, and November	No findings or observations resulted from these inspections.
NMED (Hazardous Waste Bureau)	Compliance Evaluation Inspection (annual)	March 31 through April 3	On August 5, 2014, received a Notice of Violation and Resolution identifying three violations that had been adequately addressed with no further action required. No fines or penalties were assessed.
NQA	ISO 14001 Surveillance Audit	May 13	Observations: 1
Internal and Independent Audits and Appraisals			
00857 Internal Audit: ES&H, S&S, and IT Operations Department	Sandia National Laboratories, California Environmental Management System Program 2014-ES-0025	January 7	Findings: 1 Observations: 3 Remarks: 1 Noteworthy practices: 3
00857 Internal Audit: ES&H, S&S, and IT Operations Department	Sandia National Laboratories, New Mexico Environmental Management System Program 2014-ES-0005	March 27	Findings: 4 Observations: 1 Remarks: 4 Noteworthy practices: 2
00857 Internal Audit: ES&H, S&S, and IT Operations Department	Air Emissions 2014-ES-0009	April 24	Findings: 2 Remarks: 2 Noteworthy practices: 3
00857 Internal Audit: ES&H, S&S, and IT Operations Department	Release of Radioactive Material 2014-ES-0018	July 21	Findings: 1 Observations: 8 Remarks: 2 Noteworthy practices: 3
00857 Internal Audit: ES&H, S&S, and IT Operations Department	Sanitary Sewer Discharges 2014-ES 0012	August 16	Findings: 2 Observations: 1 Remarks: 2 Noteworthy practices: 3
00857 Internal Audit: ES&H, S&S, and IT Operations Department	Biosafety 2014-ES-0011	August 23	Findings: 2 Observations: 2 Remarks: 1

NOTES: ABCWUA = Albuquerque Bernalillo County Water Utility Authority
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 nonroutine 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.

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	CERCLA and EPCRA require RQ release reporting to the NRC and state and local emergency response commissions. CERCLA and EPCRA are discussed in Section 2.1.1 and Section 2.1.2 of this report.	EPA 40 CFR 355, Subpart C
TRI Report	EPCRA, Section 313, requires a TRI report to be filed by facilities conducting specifically listed industrial activities and using listed toxic chemicals in quantities above the reporting threshold. Operations at SNL/NM during 2014 triggered 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. This reporting shall be an oral notification as soon as possible after learning of such a discharge, but in no event more than 24 hours thereafter. 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. Four surface discharge releases occurred at SNL/NM in 2014. 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 its Wastewater Utility Division of any accidental or 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 2014 there were no accidental or slug discharges. However, there was one reportable sanitary sewer system release resulting in a Notice of Violation issued by the ABCWUA to Sandia in January 2014. A sample collected by the ABCWUA revealed zinc concentrations above permitted levels. An investigation determined that the source of zinc was commercial floor-care wax products. See Section 6.1.4.	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 = National Response Center
POTW = Publicly Owned Treatment Works
RQ = reportable quantity
Sandia = Sandia Corporation
SNL/NM = Sandia National Laboratories, New Mexico
TRI = Toxic Release Inventory

2.5. Summary of Environmental Permits

Table 8-1 lists all environmental permits and registrations that were in effect at SNL/NM in 2014. 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 Assurance Dashboard, the SNL Corporate Performance Scorecard, 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 agreement between DOE/NNSA/SFO and Sandia. On the basis of the Performance Evaluation Plan, DOE/NNSA/SFO prepares an annual Performance Evaluation Report that assesses Sandia's performance for the fiscal year. For fiscal year 2014, Sandia had performance ratings of very good to excellent in Mission; good in Mission Support; and very good in Contractor Leadership.

This page intentionally left blank.



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 Department monitors and surveils air, water, soil, and biota. These environmental program activities 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 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 current environmental programs and focus areas include:

- EMS Program
- Site Sustainability Plan (SSP)
- 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 additional environmental programs are presented in separate chapters:

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

3.1. Environmental Management System Program

Sandia takes the responsibility of protecting the environment seriously and requires employees, contractors, and visitors to prevent pollution and conserve natural resources by adhering to the corporate ES&H policy. To help personnel fulfill their responsibility, Sandia has a robust EMS in place that supports environmental compliance and sustainability practices. The scope of this EMS encompasses all activities, products, and services at all of Sandia's numerous locations that have the

potential to interact with the environment. Specifically, the EMS is a set of interrelated elements used to establish policy, objectives, and targets that enable Sandia to reduce environmental impacts and increase operating efficiency through a continuing cycle of planning, implementing, evaluating, and improving processes.

DOE O 436.1, *Departmental Sustainability,* was established to ensure that the EMS and site sustainability are at the forefront of environmental excellence. At Sandia, the intent of this order is implemented for an International Organization for Standardization (ISO) 14001-certified (ISO 2004) EMS. SNL/NM and SNL, California (SNL/CA) received initial ISO 14001 certifications in June 2009 and September 2006, respectively, with recertification occurring every three years. These independent certifications will be combined in 2015 to streamline Sandia's processes and maximize the efficient use of corporate resources.

Sandia has multiple environmental aspects and impacts across its mission areas. An *environmental aspect* is defined as an element of Sandia's activities, products, or services that can interact with the environment. An *environmental impact* is defined as any change to the environment, whether adverse or beneficial, wholly or partially, resulting from Sandia's activities, products, or services.

Sandia's EMS has a process in place to evaluate what aspects and impacts relate to specific activities and how they may interact with the environment. The EMS coordination team and appropriate subject matter experts (SMEs) review these aspects and impacts annually. For fiscal year 2014, the top three significant aspects were natural resource use, hazardous materials, and hazardous waste.

When significant aspects and negative impacts have been identified, Sandia establishes objectives and measurable targets—at both the division and corporate levels—which helps efforts toward minimizing those aspects and impacts. Sandia's management tracks and reviews this progress. Additional information can be found on Sandia's external EMS website:

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

3.2. Site Sustainability Plan

Sandia defines its sustainability strategies and goals in its annual SSP, and many of these efforts have been adopted as EMS corporate objectives and targets. See Appendix B, *FY2015 Site Sustainability Plan*. Each DOE site is required to prepare an annual SSP that articulates the site's performance status and planned actions for meeting DOE's Strategic Sustainability Performance Plan (SSPP) (DOE 2014) 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. Further information on Sandia's progress toward meeting the SSP goals is provided in *FY 2015 Program Implementation Plan Sustainability* (DOE/NNSA 2015). As of fiscal year 2014, Sandia is meeting or exceeding sustainability goals in several key areas, including the following:

- Reduce Scope 1 and Scope 2 greenhouse gas emissions.
- Reduce energy and potable water intensity.
- Improve Energy Independence and Security Act, Section 432, energy and water evaluations.
- Reduce fleet petroleum consumption.
- Purchase light-duty alternative fuel vehicles.
- Divert nonhazardous solid waste and construction and demolition debris.
- Purchase electronics that meet Electronic Product Environmental Assessment Tool (EPEAT) standards.
- Use energy from renewable sources.

3.3. Environmental Life-Cycle Management Program

The Sandia ELM Program provides 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. The environmental programs described in this document support that stewardship.

The ELM Program's 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 ELM Program's objectives are to do the following:

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

Using Sandia's NEPA process, the ELM Program reviews all proposed projects and activities that have the potential to impact the environment.

3.4. 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).

Additional AOCs at SNL/NM that are not regulated as SWMUs (primarily closed-out septic systems) have been investigated as part of ER Operations. These AOCs were not identified at the time of issuance of the HSWA Module (Module IV) of the RCRA Part B Operating Permit (Permit NM5890110518-1 [the Permit]); however, they were identified by the New Mexico Environment Department (NMED) as requiring investigation (Bleakly 1996).

Sandia, DOE, and NMED negotiated a Compliance Order on Consent (the Order), which was signed in 2004 (NMED 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 Permit will remain as the enforceable document.

3.4.1 Waste Cleanup and Site Closures

The initial identification of ER sites at SNL/NM was completed in 1987. At that time, 117 sites were identified under Sandia's jurisdiction in the initial *Comprehensive Environmental Assessment and Response Program (CEARP) Phase I: Installation Assessment* (DOE/AL 1987); those sites at SNL/NM were also identified in subsequent years and were incorporated into the list of sites that were subject to the RCRA corrective action requirements in Module IV of the Permit (EPA 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, the ER Project (now ER 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 sites, other sites included in the original scope of Sandia's ER Operations were SNL/CA, the Kauai Test Facility, Hawaii (SNL/KTF), and the Tonopah Test Range, Nevada (SNL/TTR). 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 include acceptable levels of risk to human health and the environment presented by the contaminants at the site.

After NMED grants CAC status to an ER site, DOE and Sandia submit a request for a Class III modification to Module IV of the Permit to have 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 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 EPA and NMED guidelines. The remaining level of contamination and the appropriate land-use category (i.e., industrial, residential, or recreational use) are combined 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 2014 status of ER Operations site closures is as follows:

- At the beginning of 2014, 278 SNL/NM SWMUs/AOCs no longer required corrective action, and 35 SWMUs/AOCs required corrective action (Davis 2012).
- As stated in letters from NMED in 2010 and 2012, 5 of the 35 remaining SWMUs/AOCs required groundwater monitoring as part of the corrective action (Bearzi 2010). SWMUs 8, 58, 68, 149, and 154 required eight quarters of groundwater monitoring, and these requirements were met in 2014.
- Twenty-three SWMUs/AOCs were proposed for final completion of corrective action in conjunction with renewal of the hazardous waste operating permit for SNL/NM. On December 19, 2014, NMED signed a Final Order issuing a permit and approving the completion of corrective action at all 23 SWMUs/AOCs (NMED 2014).

At the end of 2014, only 12 ER Operations sites require corrective action, including:

- Three groundwater AOCs: Technical Area (TA) V Groundwater (TAVG), Tijeras Arroyo Groundwater (TAG), and Burn Site Groundwater (BSG) have final remedies pending.
- Three SWMUs at active test facilities: SWMUs 83, 84, and 240 have potential soil contamination that will be evaluated at the end of their test operations.
- Five SWMUs suitable for CAC: SWMUs 8, 58, 68, 149, and 154 have met NMED groundwater monitoring requirements and will now be proposed for CAC.
- The Mixed Waste Landfill (MWL): NMED issued a letter stating that corrective action is complete for this SWMU (Cobrain 2014). Additional details are provided in the following section.

3.4.2 Mixed Waste Landfill Activities

Sandia's MWL is a 2.6 acre SWMU located in the north-central part of TA-III, which is undergoing corrective action in accordance with Module IV of the Permit and the Order (NMED 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 ft bgs at the MWL, has been monitored since 1990. More than 20 years of data indicate that groundwater has not been contaminated by the MWL (SNL/NM 2002a; SNL/NM 2012a; SNL/NM 2013a).

Corrective Measures Implementation Plan and Report

A Phase 2 RCRA Facility Investigation was conducted from 1992 to 1995 and confirmed that tritium was the primary contaminant of concern at the MWL (SNL/NM 2002b). As directed by NMED, the MWL Corrective Measures Study (CMS) Report (SNL/NM 2003a) was submitted to NMED in May 2003. 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 from December 8 to December 9, 2004. On May 26, 2005, the Secretary of NMED issued a Final Order on the MWL (NMED 2005), which 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. Sandia submitted its MWL CMI Plan (SNL/NM 2005a) to NMED in November 2005, and NMED conditionally approved the plan in December 2008 (Bearzi 2008). The MWL ET Cover construction was completed from May through September 2009. Sandia submitted the MWL CMI Report, documenting ET Cover construction in accordance with the CMI Plan, to NMED in 2010 (SNL/NM 2010b). NMED approved the MWL CMI Plan on October 14, 2011 (Bearzi 2011) after a 90-day NMED public comment period (November 29, 2010, through February 28, 2011), which included a public meeting on December 14, 2010.

Long-Term Monitoring and Maintenance Plan

The MWL Long-Term Monitoring and Maintenance Plan (LTMMP) previously submitted in September 2007 was revised and submitted to NMED in March 2012 (SNL/NM 2012a) within 180 days of the CMI Report approval, as required by the NMED Final Order on the MWL. A 150-day public comment period was completed from September 14, 2012, through February 11, 2013, which included a public meeting on October 16, 2012. NMED approved the revised MWL LTMMP on January 8, 2014, and directed DOE and Sandia to implement LTMMP monitoring, maintenance, and reporting requirements, including deployment of all LTMMP monitoring systems (Blaine 2014a). DOE and Sandia implemented the associated monitoring, inspection, maintenance and repair, and reporting requirements as requested and submitted the installation work plan for three multiport soil-vapor monitoring wells (SNL/NM 2014g) required to complete the LTMMP monitoring systems on January 15, 2014. NMED approved the installation work plan (Blaine 2014b), and the drilling and installation field work was completed in July 2014. DOE and Sandia submitted the Soil-Vapor Monitoring Well Installation Report (SNL/NM 2014e), which NMED approved on September 25, 2014 (Kieling 2014a). Subsequently, DOE and Sandia requested a Certification of Completion for the MWL (Beausoleil 2014a). On October 8, 2014, NMED determined that all LTMMP monitoring systems are deployed for long-term controls, and provided a Certificate of CAC with Controls (Cobrain 2014).

On October 20, 2014, DOE and Sandia submitted a request to NMED for a Class III Permit modification for CAC with Controls for the MWL (Beausoleil 2014b). The request and associated legal notice initiated a DOE and Sandia 60-day public comment period, which will be complete on January 5, 2015, and included a public meeting, which was held on November 18, 2014.

A separate, comprehensive MWL Long-Term Monitoring and Maintenance Annual Report must be submitted to NMED by June 30 of each year, and must document all monitoring, inspection, and

maintenance activities. The reporting year defined in the LTMMP is April 1 through March 31 of the following year. Sandia submitted the first MWL Long-Term Monitoring and Maintenance Annual Report for the initial implementation reporting period of January 8 through March 31, 2014, to NMED on June 18, 2014 (SNL/NM 2014f, and NMED approved the report on August 6, 2014 (Kieling 2014c).

Groundwatering Monitoring

The groundwater monitoring network at the MWL consists of seven wells. Four of these wells were installed in 2008 (MWL-MW2, MWL-MW7, MWL-MW8, and MWL-MW9) and comprise the MWL groundwater compliance 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 ft 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 deposits.

In 2014, semiannual groundwater monitoring was performed at the MWL in April (with resampling of MWL-MW8 for volatile organic compounds [VOCs] only in June) and October in accordance with the MWL LTMMP (SNL/NM 2012a). All groundwater samples were analyzed for VOCs; Target Analyte List (TAL) metals, including cadmium, chromium, nickel, and uranium; specific radionuclides by gamma spectroscopy; gross alpha and beta; tritium; and radon-222. No analytes were detected at concentrations exceeding the EPA maximum contaminant levels (MCLs). Additional sampling and maintenance outside the scope of the MWL LTMMP was performed during 2014 at monitoring well MWL-MW4 to address elevated unfiltered metals results reported in 2013 (SNL/NM 2014d; SNL/NM 2014a). This nonroutine monitoring and maintenance provided conclusive evidence confirming that the February 2013 unfiltered metals results were anomalous and related to corrosion of the dedicated stainless steel pump. Analytical results for MWL groundwater monitoring are summarized in the *Annual Groundwater Monitoring Report, Calendar Year 2014* (Appendix A of this report) along with additional site background information.

Maintenance Activities

In addition to annual groundwater monitoring, ET Cover maintenance activities (i.e., weed removal, discrete application of herbicides, and supplemental watering) were performed from March through October 2014. To address the final remaining condition associated with NMED approval of the CMI Plan (Bearzi 2008), the nine-acre MWL Borrow Pit area (the source of clean soil fill material used to construct the MWL ET Cover) was reclaimed from May through August 2013. NMED personnel inspected the Borrow Pit on June 4, 2014, and provided DOE and Sandia with a letter stating the work was complete and acceptable on June 26, 2014 (Kieling 2014b). DOE and Sandia continue to perform the routine monitoring, inspections, maintenance and repairs, and annual reporting as stipulated in the MWL LTMMP (SNL/NM 2012a).

3.5. Long-Term Stewardship Program

The LTS Program's mission 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 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.

3.5.1 Compliance Oversight

LTS compliance oversight activities include groundwater monitoring and various types of monitoring at the Chemical Waste Landfill (CWL), the MWL, and the Corrective Action Management Unit (CAMU) to meet NMED regulatory requirements. Monitoring wells are maintained as needed. 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 78 wells for the presence of COCs at various intervals during the year. Sixty-six 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 approximately 75 wells owned by other agencies. Monitored wells are maintained or replaced as necessary.

Sandia personnel collect groundwater samples at the following project areas: CWL, MWL, TAVG, TAG, BSG, and SWMUs 8/58, 49, 68, 116, 149, and 154 (66 wells). The 2014 water quality results for these study areas were consistent with results from past years, and the groundwater analytical results are provided in the *Annual Groundwater Monitoring Report, Calendar Year 2014* (Appendix A in this report). The report also provides information on the Groundwater Monitoring Program's overall objectives, regulatory drivers, DOE directives that govern the program, and program-related activities that occurred during 2014.

All 2014 groundwater analytical results were below applicable MCLs at the CWL and the MWL. At TAVG, several analytical results exceeded the MCLs for trichloroethene (TCE) and nitrite plus nitrate (NPN): TCE exceeded the MCL of 5 μg/L in five wells, with a maximum concentration of 22.4 μg/L; and NPN exceeded the MCL of 10 mg/L in three wells, with a maximum concentration of 14.6 mg/L. At TAG, several analytical results exceeded the MCLs for TCE and NPN: TCE exceeded the MCL in one well, with a maximum concentration of 10.5 μg/L; and NPN exceeded the MCL in five wells, with a maximum concentration of 32.8 mg/L. At BSG, NPN exceeded the MCL in seven wells, with a maximum concentration of 41.7 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 TAVG, TAG, BSG, and the groundwater AOCs were below established MCLs.

The LTS Program also performs a general surveillance of water quality from a network of wells not directly associated with legacy sites. In 2014 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 (HEs). 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 A 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 A of this report.

Chemical Waste Landfill

The CWL is a remediated, closed, regulated unit undergoing post-closure care in accordance with the CWL Post-Closure Care Permit (PCCP) (NMED 2009). The site is approximately two 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 2010a), which was submitted to NMED on September 27, 2010, and approved on June 2, 2011 (Kieling 2011). The CWL PCCP became effective in June 2011 (Kieling 2011), and the LTS Program has performed all monitoring, inspections, maintenance and repairs, and annual reporting in accordance with its requirements.

The groundwater monitoring network at the CWL consists of four wells. In 2014, CWL groundwater monitoring was performed in January and July (two semiannual sampling events) in accordance with CWL PCCP requirements. All monitoring activities and results are detailed in the *Annual Groundwater Monitoring Report, Calendar Year 2014* (Appendix A in this report), 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 were 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 and repair activities, which are documented and reported for each calendar year in annual post-closure care reports. The 2014 soil-gas monitoring results continue to indicate that the residual VOC soil-gas plume beneath the CWL is slowly dissipating in the vadose zone. ET Cover maintenance activities (i.e., weed removal, discrete application of herbicides, and supplemental watering) were performed from April through October 2014. The CWL ET Cover continues to meet PCCP-defined criteria for successful revegetation. Only minor 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 and repair requirements were met for 2014 and are documented in the *Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2014* (SNL/NM 2015b).

Regulatory activities in 2014 included submitting the *Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2013* to NMED (SNL/NM 2014b) and updating reference documents (Todd 2014) cited in the CWL PCCP.

Corrective Action Management Unit

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

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, which include the primary subliner (PSL), a vertical sensor array (VSA), and the CWL sanitary sewer (CSS) line. The PSL, VSA, and CSS monitoring subsystems are monitored quarterly for the composition of soil vapors and soil moisture content.

In 2014, 336 gal of leachate (a listed hazardous waste) were removed from the collection system. This is a slight reduction from the 398 gal of leachate removed in 2013. Leachate is pumped from the containment cell leachate collection system on a weekly basis, containerized in 55 gal poly drums, and stored in an RCRA 90-Day Storage Area. Waste is characterized by drawing a composite sample, transporting it to the SNL/NM Hazardous Waste Handling Unit (HWHU), and subsequently shipping it to an off-site hazardous waste facility for analysis and treatment.

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

The 2014 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 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 the soil temperature is cooler. The VOC concentrations are not attributed to the material in the CAMU containment cell.

The 2014 soil moisture monitoring results remained consistent with the baseline data for the PSL and VSA monitoring subsystems. Slight increases at two of the CSS monitoring subsystem locations (recorded 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 into the sanitary sewer system (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 *Corrective Action Management Unit Vadose Zone Monitoring System Annual Monitoring Results Report* (SNL/NM 2014c) and in *Corrective Action Management Unit Report of Post-Closure Care Activities July–December 2014* (SNL/NM 2015c).

Solid Waste Management Unit 502 (Building 9938) Surface Discharge Site

As reported in the *Calendar Year 2013 Annual Site Environmental Report for Sandia National Laboratories, Albuquerque, New Mexico* (SNL/NM 2013b), a surface discharge of wastewater occurred in December 2012 at 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 NMED of this newly identified or suspected SWMU by letter in December 2012. A January 2013 inspection of the discharge area was 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 along with surface and subsurface soil sampling. Soil samples were analyzed for HE compounds, perchlorate, TAL metals, VOCs, semivolatile organic compounds, and NPN.

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

- 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 2013c) submitted to NMED in October 2013. Final determination by NMED is pending.

3.5.2 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 for CAC with controls. These sites are inspected periodically and are maintained when necessary. A total of 18 site inspections were conducted in 2014. No large-scale maintenance requirements or other concerns with physical ICs were identified on legacy sites during the 2014 annual inspections. Signs needed minor repairs at six SWMUs and AOCs; two repairs were completed in 2014, and the remaining four repairs will be completed in early 2015. Based upon the inspections performed and site conditions observed, the administrative and physical institutional controls in place at the SWMUs and AOCs are effectively providing continued protection of human health and the environment.

3.5.3 Community Liaison and Planning, and Stakeholder Involvement

It is important that the public be made aware of the work Sandia conducts 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 semiannual 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 (the University of New Mexico's Zimmerman Library) and in its electronic documents Lobo Vault collection:

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

3.6. Ecology Program

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

- Collect biological inventory data to support site activities and maintain regulatory compliance while preserving ecological resources. Data are collected on plant, mammal, reptile, amphibian, bird, and insect species that currently inhabit SNL/NM. Data collected include information on species diversity, abundance, and land-use patterns. These data are used to support NEPA documentation, land-use decisions, and ecological and wildlife awareness campaigns, and to ensure safe work environments and sustainable decision-making strategies. Table 1-1 in Chapter 1 lists some of the more common plant and animal species identified at SNL/NM and Kirtland Air Force Base (KAFB).
- Collect data on plant and animal species to advance the understanding of on-site ecological processes.
- Collect biota contaminant data on an as-needed basis in support of site projects and regulatory compliance. No data on wildlife has been collected with respect to contaminant radionuclides and metals since 2001, as no significantly elevated levels of radionuclides or metals have been observed in soil or vegetation samples taken by the Terrestrial Surveillance Program.
- Assist SNL/NM projects with wildlife compliance regulations and laws. Provide biological evaluations and surveys in support of site activities. In 2014, Ecology Program personnel wrote 166 evaluations and conducted 223 surveys.
- Educate the SNL/NM community regarding ecological conservation.
- Provide support when biological issues arise, i.e., injured wildlife, nesting birds, snake relocation, and/or other wildlife encounter concerns. In 2014, the Ecology Program responded to 159 wildlife-related issues.

3.7. National Environmental Policy Act Program

The SNL/NM NEPA Program provides the DOE/National Nuclear Security Administration (NNSA)/Sandia Field Office (SFO) with technical assistance in support of Sandia's compliance with NEPA and the National Historic Preservation Act at all of Sandia's locations: SNL/NM, SNL/CA, SNL/TTR, SNL/KTF, and other remote locations as needed. The SNL/NM NEPA team reviews projects for conformance with existing DOE NEPA documents and determinations. Sandia's NEPA team uses NEPA Docs software, which facilitates NEPA reviews and quality assurance activities by providing a consistent framework for reporting and by making NEPA documentation readily available for reference.

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
- Is not covered by existing Sandia NEPA documentation
- 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 SNL/NM NEPA reviews that were completed in 2014.

Table 3-1. SNL/NM NEPA reviews submitted to DOE/NNSA/SFO, 2014

NEPA Reviews	Review Breakouts		Quantity
Corporate NEPA Docs software system	Reviews completed by SNL/NM NEPA team		177
	Reviews completed by DOE/NNSA/SFO		***88***
Other corporate NEPA reviews	Reviews completed by SNL/NM NEPA team		1,001
DOE/USAF NEPA documents	New land-use permit reviews	*0*	
	Land-use permit renewal reviews	*7*	
	Land-use permit termination reviews	*0*	
	Project-specific reviews	*7*	
	Environmental assessments under USAF activities	*0*	
	Subtotal for reviews completed by DOE/USAF NEPA		***14***
Total NEPA Reviews			**1,280**
Percentage of Total NEPA Reviews Requiring Submittal to DOE[a]			**8%**

NOTES: [a]Total DOE reviews (88 + 14 = 102) divided by total NEPA reviews (1,280) = 8%
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

3.7.1 National Environmental Protection Act Activities in 2014

The Sandia NEPA team participated in or completed the following environmental activities in 2014:

- Completed redevelopment of the Tracking Environmental Actions Management System (TEAMS) software within the NEPA system. TEAMS is now a new, state of the art, secure, and more reliable environmental review process that allows for internal department coordination and review in support of project-related environmental aspects compliance and completion of NEPA checklists.
- Completed a five-year effort to record historic building descriptions and large-format photography of SNL/NM for additional cultural resource documentation in support of the Site-Wide Environmental Impact Statement (SWEIS).
- Initiated the effort to develop new, and augment existing, map layers of archaeological surveys of SNL/NM.
- Contributed to the completion of an archaeological survey at SNL/NM for the installation of fiber-optic cable. The survey was conducted along Coyote Canyon (the New Mexico Coyote Canyon Archaeological Survey) in order to extend fiber-optic cable to the Lurance Canyon Burn Site and the Aerial Cable Facility.

In addition to these activities, the Sandia NEPA team reviewed a total of 1,280 proposed projects in various corporate systems. To support mission activities, 88 DOE NEPA checklists were transmitted to the DOE/NNSA/SFO for review and determination.

3.7.2 Site-Wide Environmental Impact Statement

During 2014, Sandia personnel assisted the DOE in the continued development of a new SWEIS. As needed, Environmental Programs personnel conferred with SMEs from various Sandia programmatic missions to review and clarify data on their current and anticipated future operations.

3.8. Environmental Education Outreach Program

Sandia's Environmental Education Outreach Program reaches out to the community through various events and provides environmental information to Sandia's personnel. Sandia recognizes that in addition to complying with requirements, it is important to communicate with personnel and the local community to help reduce environmental impacts at work and at home. Sandia has an integrated approach to communicating environmental awareness to its personnel via various newsletters, awareness campaigns, and outreach events. Sandia also collaborates with numerous 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 annually. Events conducted in 2014 included the Annual Youth Conference on the Environment and the annual EMS Excellence Awards Program. Sandia also coordinates the semiannual 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 such as local air quality, landfills, groundwater, and watersheds. The outreach team encourages personnel and the community to provide feedback and to ask questions about Sandia's environmental programs.

3.8.1 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 2014, approximately 160 students attended the conference and learned about urban farming, water conservation, and composting. Sandia, the EEANM, and the COA sponsored the event.

3.8.2 Environmental Management System Excellence Awards Program

The annual EMS Excellence Awards Program recognizes personnel 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 217 nominations for individuals and teams that are contributing to Sandia's vision of environmental excellence.

3.9. Chemical Information System and Chemical Exchange Program

The CIS is a comprehensive chemical information management tool that tracks workplace chemical containers. The primary drivers for the CIS are state and federal regulations, among them the Emergency Planning and Community Right-to-Know Act. Thus the intent of the CIS is to classify potential chemical hazards, and then communicate information concerning hazards and appropriate protective measures.

Beyond regulatory compliance, the CIS provides an inventory control and safety management system. It includes a chemical or product name, location, and quantity, along with information about who is responsible for the chemical. Chemical hazards are reported on Safety Data Sheets (SDSs); the CIS currently contains over 110,000 SDSs in its library. This electronic inventory helps chemical users and their managers assess and manage workplace hazards. Easy access to this inventory facilitates quick availability searches, sharing of chemicals, and source reduction, and minimizes chemical purchases and waste disposal expenses.

At the end of 2014, ChemPro was added as an acquisition request module in CIS to improve chemical management. ChemPro helps determine whether a requested chemical is allowed to be used and stored in a given location. Prior to purchasing a chemical, purchasers must provide the chemical approval number when placing an order.

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 of as waste and instead make them available for reuse, lowering the cost for both new acquisitions and disposal. The program has been through multiple transformations since its inception, and in 2008 the CEP was introduced as a module within CIS. The CIS/CEP team continues to develop a more user-friendly, web-based interactive tool for using the CEP.

The CEP tool allows personnel to submit chemicals, browse inventory, and request chemicals. Once a chemical order has been requested and accepted, the searchable inventory of available chemicals is updated. After six months, the current owner of the chemicals is notified automatically via email. If another individual requests the chemical at that time, CEP personnel arrange transportation to the new owner. In 2014, CEP delivered 54 lb of excess chemicals to new users.

3.10. 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 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 mixed waste [LLMW] and mixed transuranic [MTRU] waste)
- Hazardous waste
- Toxic Substance and Control Act (TSCA) regulated waste
- Other regulated wastes, including special waste and industrial solid waste
- Construction and demolition waste
- 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: collecting, screening, sorting, baling, repackaging, treating, and storing.

Types of waste handled and shipped in 2014 are summarized in Table 3-2. Wastes recycled in 2014 are summarized in Table 3-3.

Table 3-2. Waste shipped by SNL/NM waste management facilities, 2014

Waste Categories	2014 Waste Shipped (kg)	(lb)
Radioactive Waste		
Low-level radioactive waste	27,370	60,339
Transuranic waste	0	0
Subtotal	**27,370**	**60,339**
Mixed Radioactive and Hazardous Waste		
Mixed low-level waste	74,561	164,377
Mixed transuranic waste	0	0
Subtotal	**74,561**	**164,377**
Resource Conservation and Recovery Act		
Hazardous waste	60,816	134,074
Subtotal	**60,816**	**134,074**
Toxic Substances Control Act		
PCBs	899[a]	1,981
PCBs and hazardous waste mixture	0	0
Subtotal	**899**	**1,981**
Other Regulated Wastes		
Infectious waste	781	1,722
Asbestos	16,593	36,580
Chemical waste (includes special waste and industrial solid waste)	243,027	535,778
Used oil (not recycled)	9,666	21,309
Subtotal	**270,067**	**595,389**
Commercial Solid Waste		
Solid waste collection and recycling center dry waste	635,520	1,401,067
Off-site office waste (Sandia Science and Technology Park)	50,440	111,200
Cafeteria wet waste	19,940	43,960
Construction and demolition waste	510,000	1,124,346
Subtotal	**1,215,900**	**2,680,573**
2014 Total Waste Shipped	**1,649,613**	**3,636,733**

NOTES: All wastes were shipped off-site for treatment and/or disposal unless noted otherwise.

Wastes that were 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).

Waste containers are included in the quantities of wastes shipped off-site, and some containers (e.g., containers with lead shielding for radiation protection) may significantly increase the quantity.

[a]The weight shown includes the weight of the PCB-containing equipment

PCB = polychlorinated biphenyl SNL/NM = Sandia National Laboratories, New Mexico

Table 3-3. Waste recycled by SNL/NM, 2014

Recycle Categories	Waste Recycled (kg)	Waste Recycled (lb)
Regulated or Chemical Waste Recycled		
Batteries	41,784	92,117
Capacitors	2,394	5,278
Computer electronics	236,691	521,808
Lead	1,332	2,937
Light ballasts (non-PCB)	4,776	10,529
Lightbulbs	10,718	23,630
Mercury-containing items	808	1,781
Oil, grease, and fuel	33,735	74,372
Refrigerant	17	37
Soil	426	939
Toner and ink cartridges	10,044	22,143
Subtotal	**342,725**	**755,571**
Commercial, Construction, and Demolition Solid Waste Recycled		
Asphalt	4,210,993	9,283,423
Batteries	1,234	2,720
Binder exchange program	484	1,067
Cardboard	171,124	377,260
Chairs	22,526	49,660
Compost (food, green, paper, plywood, and gypsum)	114,791	253,069
Concrete	2,382,461	5,252,374
Fencing	617	1,360
Food grease	2,359	5,200
Frito-Lay snack bags	22	49
Gravel	54,432	120,000
Metals	871,707	1,921,766
Paper (mixed and white)	123,573	272,428
Plastics	13,836	30,503
Solar panels	886	1,953
Tires	8,709	19,200
Wood	28,087	61,920
Subtotal	**8,007,841**	**17,653,952**
2014 Total Waste Recycled	**8,350,566**	**18,409,523**

NOTES: PCB = polychlorinated biphenyl SNL/NM = Sandia National Laboratories, New Mexico

3.10.1 Waste Management Units and 2014 Activities

Wastes are managed at several SNL/NM units as follows: the Radioactive and Mixed Waste Management Unit (RMWMU), five Manzano Storage Bunkers (MSBs), the Auxiliary Hot Cell Unit (AHCU), the HWHU, the Thermal Treatment Unit (TTU), 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 of at SNL/NM. Waste management activities at individual facilities during 2014 are summarized as follows:

- Activities at the RMWMU 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, or physical treatment (volume reduction).
- Activities at the MSBs consisted of storage.
- Wastes were generated at the AHCU during material management activities.
- Activities at the HWHU included screening, sorting, repackaging, and storage.
- During 2014, Sandia operated the TTU 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 included screening of commercial waste.

3.10.2 Radioactive Waste and Mixed Waste

SNL/NM manages LLW and mixed waste that are generated through a variety of processes, including production, research, and waste management activities. SNL/NM also manages TRU and MTRU wastes, which are generated through research and waste management activities. During 2014, 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, or curium.

Mixed waste 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 mixed waste and MTRU are similar to those in LLW or TRU waste at SNL/NM.

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, mixed waste, TRU, and MTRU generators are instructed to contact the Radioactive Waste Program to obtain approval before generating waste; this promotes waste minimization and allows a pathway to be developed 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.

As discussed in Section 2.1.4, Sandia manages mixed waste that is subject to the Federal Facilities Compliance Order (FFCO) (NMED 1995). The requirements include: (1) deadlines for processing and/or disposing of various types of waste as specified in the annual Site Treatment Plan (STP) and (2) instructions for providing an annual update of activities and a current inventory of stored waste still on-site. During 2014, DOE/NNSA/SFO and Sandia met all regulatory deadlines and provided an annual update of mixed waste activities (SNL/NM 2015d). During 2014, DOE/NNSA/SFO managed 0.02 cubic meters of MTRU waste subject to the FFCO. Table 8-4 lists the quantities of mixed waste subject to the FFCO at the end of fiscal year 2014. In December 2014, NMED approved Revision 14 to the STP, establishing new compliance deadlines and ensuring continuity of the STP requirements.

3.10.3 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.

Certain types of explosive wastes generated at SNL/NM are treated at the RMWMU or TTU. 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 the 1993 Permit NM5890110518, and beginning in February 2015 in accordance with Section 2.5 of the renewed Hazardous Waste Facility Operating Permit (NMED 2014), 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 support and technical assistance from MSP2 (see Section 3.10.5).

Industrial Solid and Special Wastes

Industrial solid waste and special waste generated at SNL/NM include 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.

Sandia recycles many categories of nonhazardous waste, including alkaline batteries, fluorescent lamps, oils, and ballasts not containing polychlorinated biphenyl (PCB). Waste minimization efforts promoted throughout SNL/NM are not limited to hazardous waste, but also include nonhazardous waste, as discussed in Section 3.10.5.

Polychlorinated Biphenyl and Asbestos Wastes

PCBs are a class of organic chemicals that were widely used in the past in industrial applications due to their practical, physical, and chemical properties. PCBs were used in 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. Six units of PCB-containing equipment remain in use at SNL/NM. There are also six discrete areas of existing PCB spill contamination on concrete floors (from old electrical transformers that have since been removed from service), which are being actively managed in compliance with an EPA/TSCA use authorization. Table 3-2 summarizes the PCB waste generated and shipped by SNL/NM in 2014.

Asbestos-containing materials are present in older buildings at SNL/NM, and abatement is ongoing. Asbestos material is only removed 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 nonfriable form (which poses no inhalation risk), these items are allowed to remain in service, or are redistributed through the Property Management and Reapplication Department. Table 3-2 summarizes the quantities of asbestos waste generated and shipped by SNL/NM in 2014.

3.10.4 Solid Waste Collection and Recycling Center

The SWCRC collects and processes recyclable and nonrecyclable solid waste generated by SNL/NM operations in compliance with all applicable regulations. The SWCRC 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 vendors.

Solid Waste Collection and Recycling Center Operations

The SWCRC screens 100 percent of commercial solid waste for prohibited materials, which are removed when identified. Screening the solid waste is not a regulatory requirement, but it is a best management practice implemented to prevent prohibited materials from inadvertently being sent to a landfill. The solid waste is also screened for bagged recyclables and large pieces of cardboard, and these are removed for recycling. The solid waste is then compressed, bailed, weighed, tracked, and transported to a local landfill. Table 3-2 summarizes the solid waste generated by SNL/NM in 2014.

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 and other metals. 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 the DOE/NNSA/SFO.

In support of small SNL/NM construction and renovation 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). SWCRC personnel assist construction contractors who bring recyclables to the SWCRC when loading roll-off containers and hoppers with cardboard, wood, various scrap metals, and C&D debris. Table 3-3 summarizes the wastes recycled by SNL/NM in 2014.

SWCRC personnel also support the collection of C&D debris and C&D recyclables by delivering 20-, 30-, and 40-cubic yard roll-off containers upon request to numerous locations at SNL/NM. When requested, 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.

The SWCRC will also deliver and pick up roll-off containers of green waste for composting. In 2014, Sandia composted 253,069 lb of food, green waste, pulverized paper, plywood, and gypsum through local outlets. KAFB has a mulching program at their C&D landfill, and Sandia delivered over 33,000 lb of wood and branches to it. In return, KAFB makes the processed mulch available to tenants of KAFB for no cost.

3.10.5 Materials Sustainability and Pollution Prevention Program

The MSP2 Program provides guidance and technical support on reducing waste generation and increasing green purchasing at SNL/NM. The program strives for continuous improvement by setting targets and associated activities for reuse, sustainable acquisitions (SAs), waste reduction, electronics stewardship, and recycling. The MSP2 Program is directed and guided by multiple federal requirements, the DOE Strategic Sustainability Performance Plan (DOE 2014) in particular.

The MSP2 team partners with numerous organizations at SNL/NM, including Logistics Operations (e.g., Shipping, Property Management and Reapplication, and Fleet Services), Facilities Management and Operations Center, Procurement, Human Resources and Communications, and Environmental Programs. Activities include researching waste reduction technologies and strategies applicable to Sandia work processes, seeking avenues to reuse and recycle waste streams currently incinerated in a landfill, and leading or assisting with cost-effective implementation of new waste reduction or recycling initiatives.

Awareness and Outreach

MSP2 personnel conduct awareness programs and outreach activities that promote and teach MSP2 strategies and technologies to reduce waste generation. MSP2 personnel also submit nominations for federal recognition (i.e., DOE and EPA) and other award programs (which are discussed in the following section). Internal articles and notices regularly showcase MSP2 activities, accomplishments, and awards. MSP2 information and successes can be found at the following website:

http://p2.sandia.gov

The MSP2 Program supports numerous environmental awareness events every year. Sandia's Earth Day event in April 2014 was combined with the Take Our Sons and Daughters to Work event. A booth that promoted composting and recycling opportunities at work and at home was well received by the youth and their parents.

In addition, MSP2 personnel hosted 17 Zero Waste events with cooperation and support from catering contractors. This is an increase from 7 events in 2013. The events teach participants that it is possible to eliminate waste by using recyclable materials. The events were held in conjunction with non-environmentally oriented activities, such as the Hispanic Heritage and Diversity Awareness Event, department potlucks, and Sandia's Family Day. The Family Day event was the first in five years and was attended by approximately 11,500 Sandia personnel and their family members. The MSP2 team also hosts an annual booth at the main cafeteria for November's America Recycle Day and New Mexico's Recycling Awareness Month.

The MSP2 team has been promoting the concept of Zero Waste for a number of years and has helped Sandia make steady progress in diverting waste from the local landfill. However, the effort has plateaued with an average of approximately 65 percent of waste being diverted from a landfill in the last three years. In 2014, the team hired a consultant to prepare a Zero Waste Strategic Plan. The effort involved reaching out to existing and prospective partners to learn about the burden of waste and the Zero Waste concept, and to provide feedback on what is working and what needs improvement at Sandia in order to achieve a goal of Zero Waste by 2025 (which would entail a diversion of more than 90 percent of Sandia's waste from the landfill and/or incineration). The MSP2 team assisted the consultant in interviewing seven focus groups that comprised a cross section of the SNL/NM work entities. The Zero Waste Strategic Plan

was developed, and presentations were well received. One recommendation, begun in 2014, was the development of a Zero Waste communication plan, as it was readily apparent that personnel need to be educated and energized via modern communication methods if Sandia is to achieve the performance metric of Zero Waste by 2025.

MSP2 Program personnel give presentations at conferences, professional society meetings, and other organized events to disseminate and share Sandia-specific MSP2 knowledge and experience. In 2014, MSP2 Program presentations included:

- Internal customized training presentations to specific departments such as Procurement, center office administrative assistants, and new hire classes
- The New Mexico Recycling Coalition Bi-annual Conference in September (three sessions)
- An overview of the Zero Waste by 2025 Initiative for the Sandia Corporate Environmental Management Systems Management Advisory Board

Awards

In recognition of efforts by the MSP2 team in collaboration with others internally, Sandia National Laboratories was awarded the 2014 DOE/NNSA Best-in-Class Sustainability Award in the Innovation and Holistic Approach category. DOE's Sustainability Awards recognize exemplary individual and team performance in advancing sustainability objectives through innovative and effective programs and projects that increase energy, water, and fleet efficiency, and reduce greenhouse gases, pollution, and waste. The Innovation and Holistic Approach category recognizes methods and cross-disciplinary research at the site level that apply innovative ideas to tackle broad-based sustainability issues.

Sandia's award recognized the MSP2 Program's development of several data management systems designed to increase productivity for the MSP2 team and its customers. The data systems have helped reduce paper use, boosted employee productivity and customer satisfaction, and reduced the need to drive to remote locations to verify and view inventory.

The MSP2 Program funded the development of the data management systems using revenues from the site-wide recycling program at SNL/NM. Brief descriptions of the new data systems and how they have enhanced Sandia's sustainability goals follow.

Solid Waste Collection and Recycle Center Online Requests

For more than a decade, when Sandia personnel needed waste or recycling support from the SWCRC, they would call a hotline number and describe their needs, which would be transcribed onto a form that a person or team would pick up and then act upon. Virtually no communication occurred with the customer after the initial request regardless of the outcome. That manually based system has been replaced with an online dynamic request form that the customer fills out and which is available on Sandia's internal website. The highly efficient electronic process has led to a substantial reduction in paper use and freed SWCRC personnel to accomplish other work. The data system has significantly enhanced interactions between SWCRC personnel and its customer throughout the entire life-cycle of the request.

Microsoft SharePoint Waste Minimization Library

In an innovative application of SharePoint capabilities, the MSP2 Program developed a library of projects that demonstrate waste minimization. The SharePoint tool makes it easier to document evidence of efforts and results of hazardous waste minimization in laboratory processes, which is a requirement within the Corporate Policy System. Additionally, the tool has proved to be an excellent method for sharing waste minimization efforts and success stories to get ideas for applying lessons learned to an existing process. The projects are categorized as hazardous and nonhazardous solid waste, radioactive waste, chemicals reduced, energy conservation, water conservation, and other reductions. Topics in the

library include capturing evaporated liquid helium for reuse, eliminating mercury waste, reusing ethanol, returning granulated activated carbon to the manufacturer, changing waste diesel to fuel, extending machining coolant life, and reducing waste.

Lead Bank Web Workflow

To make the Lead Bank Program more accessible and efficient for its potential customers, the physical paperwork process was eliminated, and the inventory was photographed and displayed online with a shopping cart. An online workflow was developed to gather only necessary information, with as much of that being autopopulated from the corporate databases as possible. Automated emails are generated, letting specific individuals know when they must do a task in the workflow. Reports are programmed to track the amount of lead distributed for reuse and the amount taken in when no longer needed, allowing more efficient access to the data than previous hand tallying did.

Solid Waste and Recycling Information Management System

As Sandia has diversified to an incredible number of material streams going to numerous destinations and vendors through different shipping methods, the ability to keep track of it all was insufficient in an aging spreadsheet. To improve data quality and gain work efficiencies, a custom inventory and shipping system was implemented. This system has greatly sped up the quarterly data reporting cycle by only needing to go to one source report for many data points, where previously 10 or more different sources were queried and manually combined.

Sustainable Acquisition Program

Through the SA Program, the MSP2 team works to integrate products with reduced environmental impact into purchase agreements and ongoing operations and maintenance across SNL/NM. Products with high recyclable content percentages, with renewable bio-based source materials, and 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 by communicating with the Sandia procurement department, purchasers, and end users, Sandia is helping to pull many markets toward products that are better for human health and the environment.

Increasingly, SA is being addressed as early as the request-for-quotation stage so that a supplier's environmental stance becomes a component in the contract award process. Construction specifications are one means of identifying green products, and the MSP2 team works with facilities groups to include item-specific language in purchasing contracts. Personnel from the MSP2 and Procurement teams write green purchasing requirements into applicable contracts that are renewed or rebid annually. The ultimate goal is to provide products with sustainable alternatives as a first choice to Sandia by contractual obligation.

Waste Reduction

The MSP2 Program has continued its contract with a local composting company to divert food waste from on-site cafeterias that serve up to 1,200 customers per day and from catered events. During 2014, 41,359 lb of food waste, approximately 55 percent of the total cafeteria solid waste, was diverted from the landfill. In addition, Sandia has joined TerraCycle and established a Brigade, coordinating with Frito-Lay to collect and recycle Frito-Lay brand chip and snack bags (the majority of the snack bags sold at SNL). In 2014, 49 lb of Frito-Lay snack bags (4,619 bags) were diverted to recycling bins placed in each cafeteria. This serves as an example of the efforts to make recycling a part of daily work activities.

In other waste reduction efforts, 134,718 lb of mixed paper was diverted and recycled in 2014, which was an increase from approximately 103,700 lb in 2013. This significant increase was due to an expanding partnership with Custodial Services to support what was previously a volunteer-based effort. Table 3-3 lists other recycled waste materials.

Electronics Stewardship

Electronics stewardship encompasses the life-cycle impacts of information technology equipment, and it is now routinely addressed by DOE and the federal government. The impacts of electronics use include energy use and generation of toxic metal waste streams. "E-cycling" provides an opportunity to reuse high-value materials in the manufacture of new equipment. Electronics life-cycle management is divided into three stages: purchase, operation, and end-of-life management. The MSP2 group is tasked with monitoring and facilitating improvements to Sandia's performance at all three of these stages.

Sandia follows a comprehensive approach to reducing the environmental impacts of electronics assets ownership. One part of this approach is to use EPEAT when purchasing recyclable electronic equipment. Executive Orders required EPEAT to be integrated into computer equipment purchasing contracts, which Sandia adopted in fiscal year 2008. In 2014, 99 percent of all SNL/NM purchases of computing devices (towers, workstations, and laptops), monitors, and imaging equipment were EPEAT registered. In addition, 95 percent of all those purchases met the EPEAT Gold level (the highest level of environmental attributes). This computing equipment is recyclable, uses zero or negligible toxic metals, and is more energy efficient. MSP2 and Procurement personnel team with vendors to keep the contractual EPEAT requirements current. All EPEAT-certified equipment is Energy Star compliant, and it is up to each user to take advantage of energy-saving features when operating the equipment.

End-of-life management for computer equipment may involve assigning the equipment to another individual for reuse, placing the equipment into the Property Management and Reapplication system, or preparing it for recycling. When recycling equipment, the MSP2 team coordinates a shipment to a certified domestic electronics recycler that dismantles and segregates the material for distribution to the manufacturing industry or the raw materials market. Sandia recycles 100 percent of its excess electronic equipment (e-scrap). 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. Sandia personnel recycled over 235,000 lb of e-scrap in 2014. To avoid producing e-scrap in the future, two ongoing computer equipment reduction initiatives are in effect:

- Server virtualization. Since 2010, server virtualization has reduced the number of actual servers on-site and hosted virtual desktops. This has reduced the volume of physical hardware required, the associated purchasing costs and energy use, and the amount of scrap to be disposed of or recycled.
- Networked copy machines. These fleet multifunction devices can produce duplex copies and duplex print jobs, and serve as full-color scanners and fax machines. Over time, this can eliminate purchases of individual printers, scanners, and fax machines. Sandia has made an agreement with its imaging equipment supplier to consolidate choices from approximately 20 printer and scanner models to 8 models, with plans to promote the purchase and use of fleet multifunction devices.

Recycling

Sandia accounts for and reports its recycling in two separate categories: solid waste recycling and C&D waste recycling. In 2014, 63 percent of Sandia's solid waste and 80 percent of its C&D waste was recycled. Table 3-3 summarizes recycled waste materials in 2014.

While the majority of recycling operations are conducted at the SWCRC and HWHU, MSP2 personnel manage several other recycling functions. In 2014, additional recycle streams were developed to include solar panels, Frito-Lay snack bags, and coffee pods.

3.10.6 Waste Management and Material Sustainability and Pollution Prevention Summary

In summary, the MSP2 Program made further progress in 2014 in its new focus area of Zero Waste, which relies heavily on sustainable acquisitions, waste reduction, electronics stewardship, reuse and recycling, and education and awareness. The vision continues to incorporate materials sustainability practices into daily work activities.



Chapter 4. Terrestrial Surveillance Program

The Terrestrial Surveillance (TS) Program at Sandia National Laboratories, New Mexico (SNL/NM) collects and analyzes surface soil, arroyo and river sediment, and vegetation samples annually to determine whether there has been a radiological or nonradiological release to the environment due to SNL/NM operations. In addition to collecting environmental media (soil, sediment, and vegetation), ambient external gamma radiation levels are measured quarterly using environmental thermoluminescent dosimeters (TLDs). Samples are collected from and TLDs are placed at designated on-site (within Kirtland Air Force Base [KAFB] boundaries), perimeter, and off-site locations.

Environmental radiological surveillance began at SNL/NM in 1959. Nonradiological surveillance sampling began in 1993 with the implementation of the TS Program and the collection of soil samples for metal analyses. In 2000, SNL/NM contracted with a single analytical laboratory with lower detection capabilities for many of the metals. The same database has been used for statistical analysis from 2000 to the present.

4.1. Regulatory Criteria

The TS Program is designed and conducted to address the requirements of DOE O 458.1 Change 3, *Radiation Protection of the Public and the Environment*, which establishes standards and requirements to protect the public and the environment from undue risk from radiation. The TS Program is also conducted to satisfy Sandia Corporation's (Sandia's) Environmental Management System, which is certified to the International Organization for Standardization 14001 standard. Reporting is done in accordance with DOE O 231.1B, Change 1, *Environment, Safety and Health Reporting*.

4.2. Sample Locations and Media

The TS Program uses three sample location classifications: on-site, perimeter, and off-site (the latter previously referred to as community locations). Sampling locations have been selected based on several factors. The on-site sample locations (Figure 4-1) are in areas of known contamination (Environmental Restoration sites), areas of potential release (sites with current outdoor testing activities), and areas where contamination may be naturally concentrated (arroyos and river banks). Perimeter sample locations (Figure 4-1) are located around the boundaries of KAFB. Off-site sample locations (Figure 4-2) are located within a 25-mile radius of KAFB. Off-site sample results are used for comparison to the on-site and the perimeter sample results.

The various environmental sample media that are collected include surface soil (less than 2 inches deep), arroyo and river sediment samples, and vegetation. Vegetation samples are collected from native grasses and small leafy plants. Vegetation is collected to monitor the potential uptake of radioactive materials from the soil. Table 4-1, Table 4-2, and Table 4-3 list the sampling locations and the type of media that is collected at the on-site, perimeter, and off-site locations, respectively.

Environmental TLDs are used to measure the cumulative ambient external radiation dose, and to closely approximate the dose potentially received from natural and nonnatural sources.

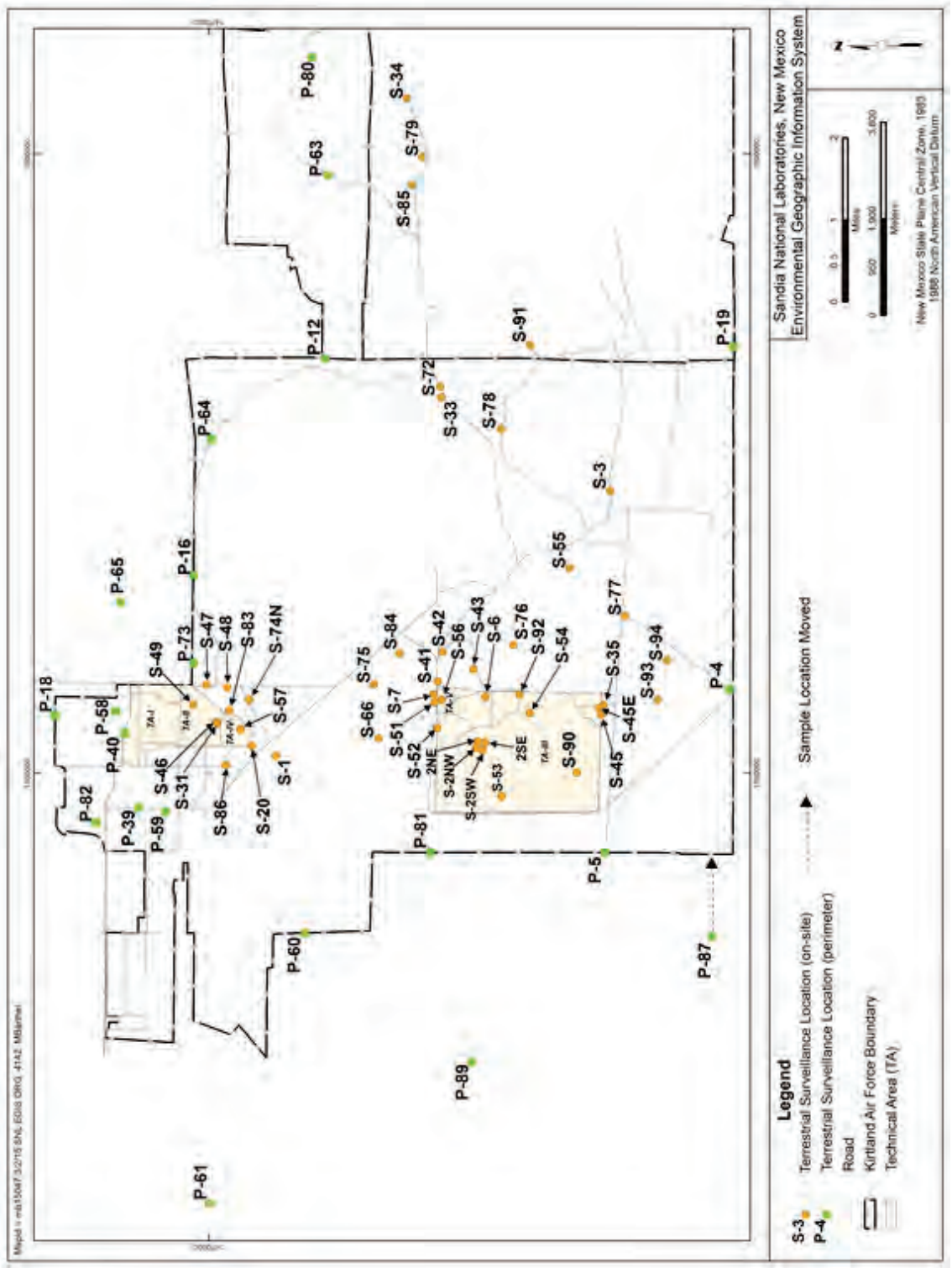


Figure 4-1. Terrestrial Surveillance Program on-site and perimeter sampling locations

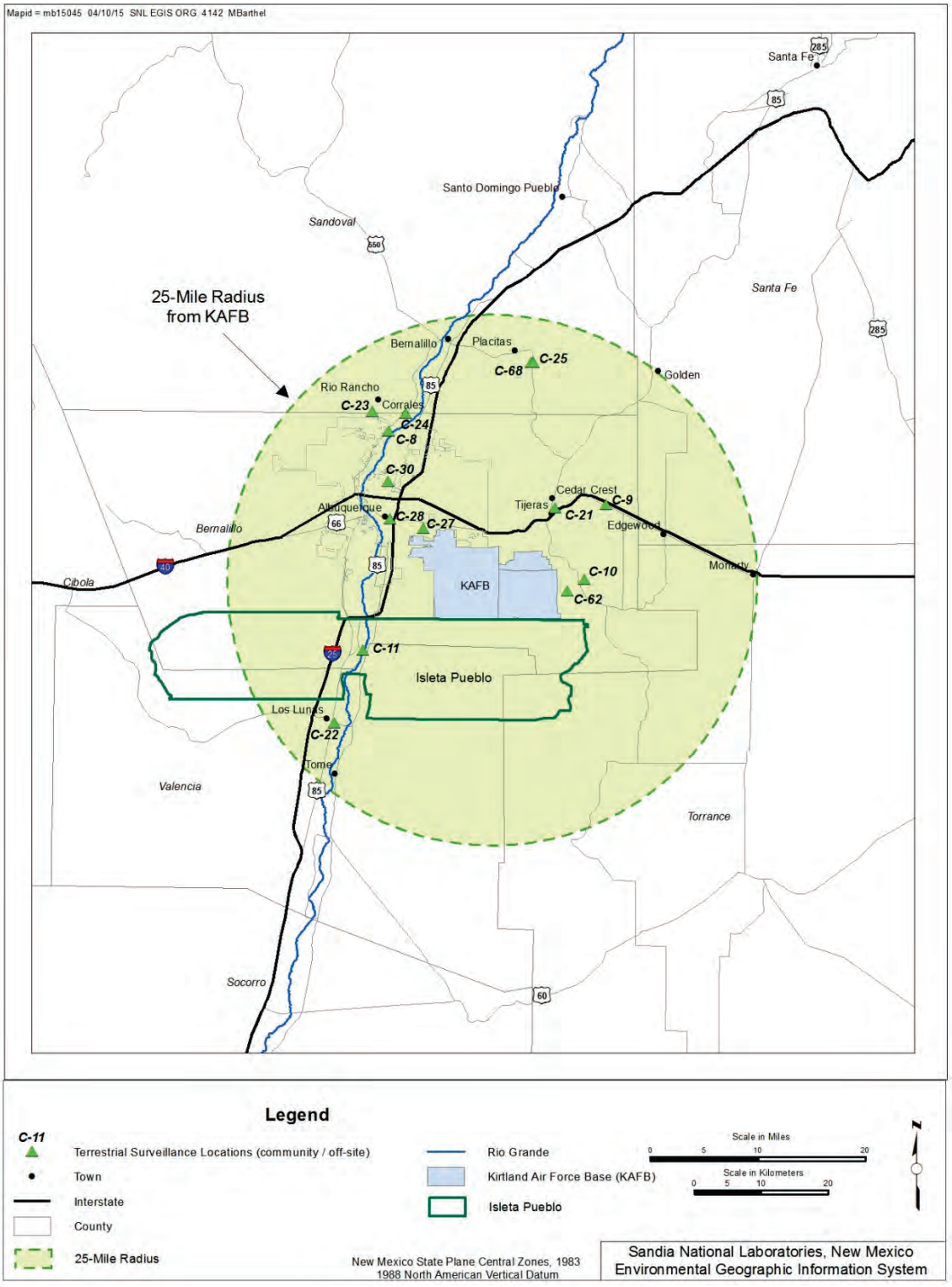


Figure 4-2. Terrestrial Surveillance Program off-site sampling locations

Table 4-1. On-site terrestrial surveillance locations, sample media, and parameters

Location Number	Sampling Location	Soil[a]	Sediment[a]	Vegetation[b]	TLD[c]
S-1	Pennsylvania Avenue	X			X
S-2NE	MWL (northeast)	X		X	
S-2NW	MWL (northwest)	X		X	X
S-2SE	MWL (southeast)	X			
S-2SW	MWL (southwest)	X			
S-3	Coyote Canyon control	X[d]			X
S-6	TA-III (east of water tower)	X		X	X
S-7	Unnamed arroyo (north of TA-V)	X[d]			X
S-20	TA-IV (southwest)				X
S-31	TA-II west				X
S-33	Coyote Springs	X		X	
S-34	Lurance Canyon Burn Site	X		X	
S-35	Chemical Waste Landfill	X		X	
S-41	TA-V (northeast fence)	X			X
S-42	TA-V (east fence)	X[e]		X	X
S-43	TA-V (southeast fence)	X[e]		X	X
S-45	RMWMU, TA-III (northwest corner)	X		X	X
S-45E	RMWMU				X
S-46	TA-II (south corner)	X[e]		X	X
S-47	Tijeras Arroyo (east of TA-IV)				X
S-48	Tijeras Arroyo (east of TA-II)				X
S-49	Near the Explosives Components Facility	X[e]		X	
S-51	TA-V (north of culvert)	X		X	
S-52	TA-III, northeast of buildings 6716 and 6717	X		X	
S-53	TA-III, south of Long Sled Track	X[f]			
S-54	TA-III, Building 6630	X			
S-55	Large Melt Facility, Building 9939	X		X	
S-56	TA-V, Building 6588 (west corner)	X			
S-57	TA-IV, Building 970 (northeast corner)	X			
S-66	Kirtland Air Force Base facility	X[e]			X
S-72	Arroyo del Coyote (midstream)		X		
S-74N	TA-IV, Tijeras Arroyo (midstream)		X		
S-75	Arroyo del Coyote (downstream)		X		
S-76	Thunder Range (north)	X[e]			
S-77	Thunder Range (south)	X[e]			
S-78	Schoolhouse Mesa	X[e]			
S-79	Arroyo del Coyote (upstream)		X		
S-83	Tijeras Arroyo Groundwater well		X		
S-84	Stormwater sampling point (SP-10)		X		
S-85	Arroyo del Coyote cable site		X		
S-86	Corner of Wyoming and S streets	X[e]		X[e]	X
S-90	TA-III Land mine test site	X[d,g]			
S-91	Background Arroyo near SWMU-87		X[e]		
S-92	TA-III Classified Waste Landfill	X			
S-93	Thunder Range explosive test area	X[h]			
S-94	Thunder Range, southeast of Range 5	X[h]			

NOTES: [a]Soil and sediments samples are collected annually (except as noted) and analyzed for Target Analyte List (TAL) metals, radionuclides, and tritium.

[b]Vegetation samples are collected annually (except as noted) and analyzed for TAL metals, radionuclides, and tritium.

[c]TLDs are analyzed for gamma radiation.

[d]Samples are collected and analyzed for TAL metals biennially (sampled in 2014).

[e]TAL metals are not included in the analysis.

[f]Perchlorate is included in the sample analysis.

[g]High explosives are included in the sample analysis.

[h]Radionuclides and tritium are not included in the analysis.

MWL = Mixed Waste Landfill
RMWMU = Radioactive and Mixed Waste Management Unit
SWMU = Solid Waste Management Unit
TA = technical area
TLD = thermoluminescent dosimeter

Table 4-2. Perimeter terrestrial surveillance locations, sample media, and parameters

Location Number	Sampling Location	Soil[a]	Sediment[a]	Vegetation[b]	TLD[c]
P-4	Isleta Reservation gate	X		X	X
P-5	McCormick gate	X[d]		X[d]	X
P-12	Northeast perimeter	X		X	
P-16	Four Hills	X		X	X
P-18	North perimeter road				X
P-19	USGS seismic center gate	X			X
P-39	Northwest DOE complex				X
P-40	TA-I, northeast				X
P-58	North KAFB housing	X		X[d]	
P-59	Zia Park (southeast)	X[d]			
P-60	Tijeras Arroyo (downstream)		X		
P-61	Albuquerque International Sunport	X			
P-63	No Sweat Boulevard	X[d]			
P-64	North Manzano base	X			
P-65	Tijeras Arroyo (upstream)		X		
P-73	Tijeras Arroyo (upstream)		X		
P-80	Madera Canyon	X			
P-81	KAFB (west fence)	X			X
P-82	Commissary	X		X	
P-87	Mesa del Sol, south KAFB gate	X			
P-88	Mesa del Sol, middle (deleted in 2014)	X			
P-89	Mesa del Sol, north	X			

NOTES: [a]Soil and sediments samples are collected annually (except as noted) and analyzed for Target Analyte List (TAL) metals, radionuclides, and tritium.
[b]Vegetation samples are collected annually (except as noted) and analyzed for TAL metals, radionuclides, and tritium.
[c]TLDs are analyzed for gamma radiation.
[d]Samples are collected and analyzed for TAL metals biennially (sampled in 2014).
DOE = U.S. Department of Energy
KAFB = Kirtland Air Force Base
TLD = thermoluminescent dosimeter
USGS = U.S. Geological Survey

Table 4-3. Off-site terrestrial surveillance locations, sample media, and parameters

Location Number[a]	Sampling Location	Soil[b]	Sediment[b]	Vegetation[c]	TLD[d]
C-8	Rio Grande, Corrales Bridge (upstream)		X[e]		
C-9	Sedillo Hill, Interstate 40	X		X	
C-10	Oak Flats	X[e]		X[e]	
C-11	Rio Grande, Isleta Pueblo (downstream)	X			X
C-21	Bernalillo Fire Station 10, Tijeras				X
C-22	Los Lunas Fire Station				X
C-23	Rio Rancho Fire Station, 19th Avenue				X
C-24	Corrales Fire Station				X
C-25	Placitas Fire Station	X		X	X
C-26	Albuquerque Fire Station 9, Menaul Boulevard NE				X
C-27	Albuquerque Fire Station 11, Southern Avenue SE				X
C-30	Albuquerque Fire Station 6, Griegos Road NW				X
C-62	East resident	X		X	
C-68	Las Huertas Creek		X		

NOTES: [a]Off-site samples were previously called community, thus the C label in the location number (maintained for the database).
[b]Soil and sediments samples are collected annually (except as noted) and analyzed for Target Analyte List (TAL) metals, radionuclides, and tritium.
[c]Vegetation samples are collected annually (except as noted) and analyzed for TAL metals, radionuclides, and tritium.
[d]TLDs are analyzed for gamma radiation.
[e]Samples are collected and analyzed for TAL metals biennially (sampled in 2014).
NE = northeast
NW = northwest
SE = southeast
TAL = Target Analyte List
TLD = thermoluminescent dosimeter

4.3. Field Methods, Analytical Parameters, and Quality Control Procedures

All samples were collected in accordance with applicable SNL/NM field operating procedures for soil and vegetation sampling activities and with the *Quality Assurance Project Plan for Terrestrial Surveillance at Sandia National Laboratories, New Mexico* (SNL/NM 2013d).

Off-site laboratories analyzed all samples in accordance with applicable U.S. Environmental Protection Agency (EPA) analytical methods. All chemical data was reviewed and qualified in accordance with Administrative Operation Procedure 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL/NM 2011). Samples were analyzed (by media type and locations, as specified in Table 4-1, Table 4-2, and Table 4-3) for the following parameters: Target Analyte List (TAL) metals, high explosives (HEs), perchlorate, tritium, and radionuclides.

Environmental TLDs are owned, issued, and processed by the Radiation Protection Dosimetry Program (RPDP) at SNL/NM. The technical basis for the environmental TLD 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 RPDP protocols.

Field quality control samples included duplicate and equipment blank samples. These samples were prepared in accordance with applicable field operating procedures. Laboratory quality control samples are prepared and analyzed as specified in Chapter 7.

4.4. Sample Result Analysis and Methodology

No regulatory limits are available to directly compare concentrations of some radiological or nonradiological constituents in surface soils, vegetation, or sediments. Sandia personnel conduct statistical analyses to compare the results from on-site and perimeter samples to off-site results, and to establish trends that may indicate the possible release of contaminants.

4.4.1 Statistical Analysis and Methodology

Samples are collected from specified locations to effectively enable statistical comparisons with results from previous years. Statistical analyses are performed to determine whether a specific on-site or perimeter sample result differs from off-site sample results and to identify trends at a specific sampling location.The results of the statistical analyses are used to prioritize sample results for possible follow-up actions, such as resampling, additional investigation, and/or notifications to applicable entities.

A decision-making tool (Table 4-4) is used to help determine the appropriate level of concern for each sample result. The statistical analysis prioritization methodology (Shyr, Herrera, and Haaker 1998) is based on a matrix of four priority levels.

Table 4-4. Priority decision matrix and actions

Priority[a]	Are Results Higher Than Off-Site?	Is There an Increasing Trend?	Action
1	Yes	Yes	Immediate attention needed. Specific investigation planned and/or notifications made to applicable entities.
2	Yes	No	Some concern is warranted. Further investigation and/or notifications may be necessary.
3	No	Yes	A minor concern. Further investigation and/or notifications may be necessary.
4	No	No	No concern. No investigation required.

NOTE: [a]Based on a statistical analysis prioritization methodology (Shyr, Herrera, and Haaker 1998).

4.4.2 Other Standards for Comparison

In addition to the statistical analysis, sample results for metals in soil and sediment may be compared to values in the following references (presented in Table 4-5):

- Local and regional soil concentrations (Dragun and Chekiri 2005)
- New Mexico Environment Department (NMED) soil screening levels (NMED 2012)
- U.S. surface soil surface concentrations (Kabata-Pendias 2000)

Table 4-5. Various reference values for metals in soil (all units in mg/kg)

Analyte	NM Background Soil Concentrations[a]		NMED Soil Screening Levels[b]		U.S. Background Soil Concentrations[c]	
	Lower Limit	Upper Limit	Residential	Industrial	Lower Limit	Upper Limit
Aluminum	5,000	100,000	78,000	1,290,000	4,500	100,000
Antimony	0.2	1.3	31.3	519	0.25	0.6
Arsenic	2.5	19	3.9	17.7	0.1	30
Barium	230	1,800	15,600	255,000	20	1,500
Beryllium	1	2.3	156	2,580	0.04	2.54
Cadmium	ND	11	70.5	1,110	0.08	0.47
Calcium	600	320,000	N/A	N/A	N/A	N/A
Chromium III	N/A	N/A	117,000	1,950,000	N/A	N/A
Chromium, total	7.6	42	96.6	505	7	1,500
Cobalt	2.1	11	N/A	N/A	3	50
Copper	2.1	30	3,130	51,900	1	70
Iron	1,000	100,000	54,800	908,000	5,000	45,000
Lead	7.8	21	400	800	10	70
Magnesium	300	100,000	N/A	N/A	N/A	N/A
Manganese	30	5,000	10,500	160,000	20	3,000
Nickel	2.8	19	1,560	25,700	5	150
Potassium	1,900	63,000	N/A	N/A	N/A	N/A
Selenium	0.2	0.8	391	6,490	0.1	4
Silver	0.5	5	391	6,490	0.2	3.2
Sodium	500	100,000	N/A	N/A	N/A	N/A
Thallium	N/A	N/A	0.782	13	0.02	2.8
Vanadium	15	94	394	6,530	0.7	98
Zinc	18	84	23,500	389,000	5	164

NOTES: [a]Dragun, J., and K. Chekiri. 2005. *Elements in North American Soils*. Hazardous Materials Control Resources Institute. (Used *San Juan Basin: A Horizon* to determine values.) Amherst, MA: Amherst Scientific Publishers.

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

[c]Kabata-Pendias, A. 2000. *Trace Elements in Soils and Plants*, 3rd ed. Boca Raton, FL: CRC Press, Inc.

N/A = not applicable NMED = New Mexico Environment Department
ND = not detected NM = New Mexico U.S. = United States

In some instances, a qualitative inspection of the data may be augmented by the graphical evaluation methodology described and documented in *Chemical Analyses of Soil Samples Collected from the Sandia National Laboratories, New Mexico Environs, 1993–2005* (SNL/NM 2006a). Results in 2014 did not warrant this type of evaluation. Environmental TLD data is compared to the annual radiation dose from natural background sources estimated equivalent of 70 mrem (NCRP 2009). Background radiation levels in the Albuquerque area are elevated when compared to much of the U.S. due to the higher elevation and the presence of radionuclides in the soil and rock. The local annual radiation dose from natural background sources (indoor radon not included) estimated equivalent is 140 mrem (Brookins 1992).

4.5. Summary of Terrestrial Surveillance Program Activities and Results in 2014

The following TS Program activities occurred in 2014:

- The annual sampling of soil and sediment occurred in May 2014 at designated locations.
- No vegetation samples were collected due to the ongoing drought (causing a lack of vegetation).
- Environmental TLDs were exchanged and analyzed at designated locations quarterly.

The analytical results for radiological (including environmental TLDs) and nonradiological parameters for the 2014 sampling event are summarized here, and the data are provided in Appendix C.

4.5.1 Radiological Results

Radiological analyses were performed on soil and sediment samples. The results of the statistical analysis identified one location as Priority-2 and two locations as Priority-3 for cesium-137 (Table 4-6). There were no Priority-1 soil or sediment samples. (See the decision matrix in Table 4-4.)

Table 4-6. Radiological summary statistics for Priority-2 and Priority-3 sample locations, 2014

Priority	Analyte	Location	Sample Matrix	Average (pCi/g)	SD (pCi/g)	Minimum (pCi/g)	Maximum (pCi/g)	2014 Result (pCi/g)
Priority-2	Cesium-137	P-12	Soil	1.00	0.46	0.07	1.82	0.937
Priority-3	Cesium-137	P-61	Soil	0.16	0.16	0.015	0.51	0.17
		S-85	Sediment	0.025	0.015	-0.008	0.045	0.045

NOTES: Data presented is for 15 years (2000–2014).
P = perimeter S = on-site SD = standard deviation

Cesium-137

One perimeter location (P-12 soil) continues (from 2013 to 2014) to be identified as Priority-2 for cesium-137 in surface soils with a value of 0.937 pCi/g. Location P-12 is located on the U.S. Forest Service withdrawn area (Figure 4-1). This location is at a slightly higher elevation than other sampling locations, thus receiving greater precipitation and slightly higher cesium-137 levels from fallout than the lower areas. Cesium-137 is prevalent in surface soils worldwide as a result of historical nuclear weapons testing. The values for cesium-137 at this location have ranged from 0.07 to 1.82 pCi/g. Two locations (P-61 soil and S-85 sediment) were identified as Priority-3 for cesium-137 in surface soils (Table 4-6). However, these levels are not cause for concern.

Thermoluminescent Dosimeter

TLD exposure rates by quarter for 2014 are provided in Appendix C. Data for 2000 through 2014 were analyzed to determine whether any statistical differences were observed for either location classification or year. In 2014, 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 2014. Figure 4-3 shows the TLD exposure rates by year and location classification.

Table 4-7. TLD exposure rate summary statistics by location classification, 2000–2014

Location Classification	Number of Observations	Mean (mR/yr)	Median (mR/yr)	Standard Deviation (mR/yr)	Minimum (mR/yr)	Maximum (mR/yr)	2014 Mean Results (mR/yr)
On-site	205	99.6	100	9.21	80.9	120	105.1
Perimeter	117	101	102	11.4	78.5	132	108.4
Off-site	169	99.3	98.4	14.5	73.2	148	110.5

NOTE: TLD = thermoluminescent dosimeter

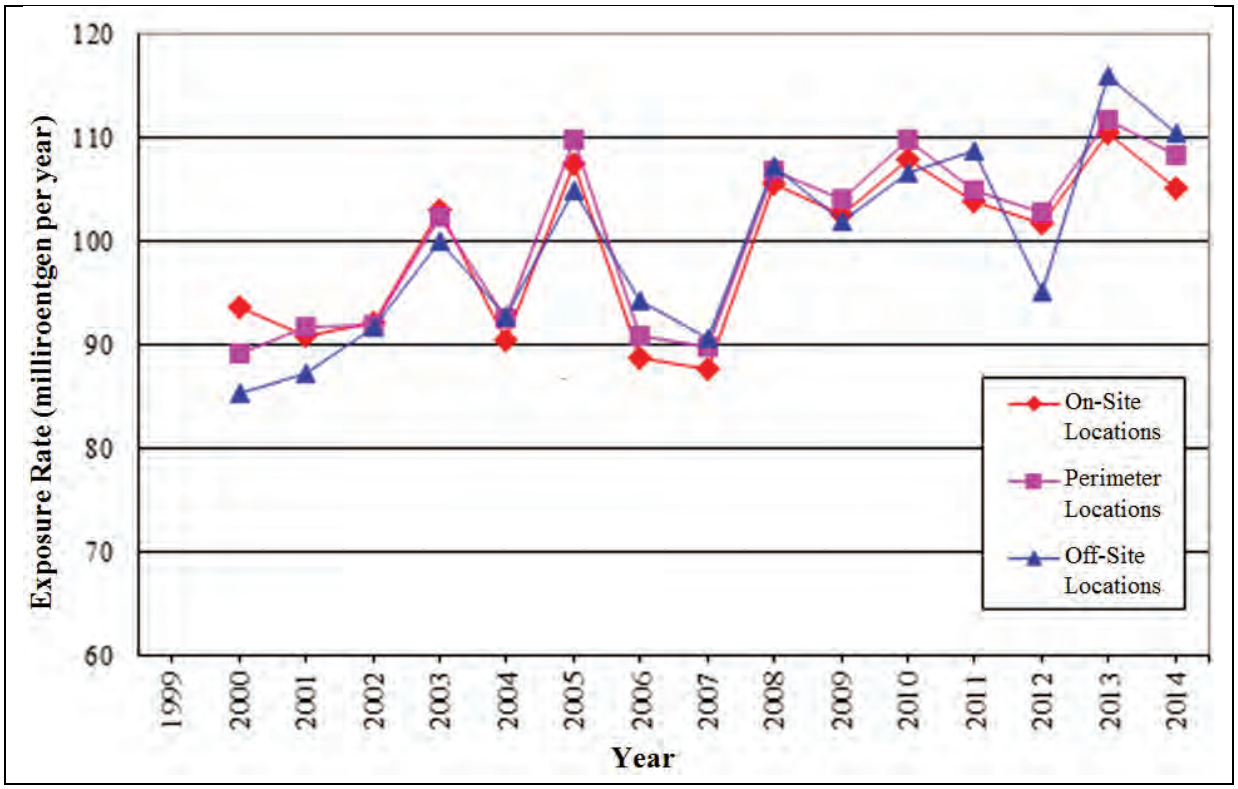


Figure 4-3. TLD exposure rates by year and location classification

4.5.2 Nonradiological Results

Nonradiological parameters include TAL metals and HE compounds. In addition to the statistical analysis, all results may also be compared to values from the references listed in Section 4.4.2 and provided in Table 4-5. The results of the statistical analysis for metals (Table 4-8) identified one location as Priority-1, four locations as Priority-2, and eight locations as Priority-3. Details for each parameter and location are provided in Table 4-8. All remaining soil and sediment samples were identified as Priority-4.

Table 4-8. Metals summary statistics for Priority-1, Priority-2, and Priority-3 sample location, 2014

Priority	Analyte	Location	Sample Matrix (mg/kg)	Average (mg/kg)	SD (mg/kg)	Min. (mg/kg)	Max. (mg/kg)	NMED Soil Screening Level[a]		2014 Result (mg/kg)
								Residential (mg/kg)	Industrial (mg/kg)	
Priority-1	Chromium, total	S-51	Soil	37.67	19.05	6.92	69.5	96.6	505	69.5
Priority-2	Arsenic	S-33	Soil	10.99	8.26	4.02	32.7	3.9	17.7	7.83
	Beryllium	S-33	Soil	1.11	0.28	0.79	1.59	156	2,580	1.12
	Cobalt	P-64	Soil	64	0.755	7.3	9.4	N/A	N/A	7.38
	Copper	S-6	Soil	6	16.9	7.42	55.8	3,130	51,900	7.42
	Magnesium	P-64	Soil	64	603	5,930	8,180	N/A	N/A	5,930
	Manganese	P-64	Soil	1	106	511	905	10,500	160,000	511
	Potassium	S-1	Soil	64	1,263	1,020	6,050	N/A	N/A	4,850

See notes at end of table.

Table 4-8. Metals summary statistics for Priority-1, Priority-2, and Priority-3 sample locations, 2014 (continued)

Priority	Analyte	Location	Sample Matrix	Average (mg/kg)	SD (mg/kg)	Min. (mg/kg)	Max. (mg/kg)	NMED Soil Screening Level[a]		2014 Result (mg/kg)
								Residential (mg/kg)	Industrial (mg/kg)	
Priority-3	Aluminum	S-1	Soil	13,307	3,431	4,380	17,100	78,000	1,290,000	17,000
		C-62	Soil	17,740	5,050	10,800	25,100			23,200
		C-68	Sediment	6,166	1,661	3,940	8,760			8,760
	Barium	S-85	Sediment	135	29.3	85.4	170	15,600	255,000	160
	Beryllium	S-85	Sediment	0.466	0.11	0.24	0.61	156	2,580	0.61
	Cobalt	S-85	Sediment	4.45	0.95	2.33	5.3	N/A	N/A	5.3
	Copper	S-85	Sediment	8.00	2.73	3.17	11.4	3,130	51,900	10.3
	Iron	S-85	Sediment	11,231	1,652	7,680	13,000	54,800	908,000	12,900
	Lead	S-85	Sediment	10.74	1.74	8.01	12.8	400	800	11.3
	Magnesium	S-85	Sediment	3,686	719	2,700	4,940	N/A	N/A	4,940
	Manganese	S-1	Soil	409	92.6	193	536	10,500	160,000	536
	Nickel	S-2NW	Soil	5.69	1.17	3.72	7.33	1,560	25,700	5.37
		S-1	Soil	11.01	2.68	4.61	16.10			12.5
		S-85	Sediment	10.78	1.88	8.15	13.6			12.6
	Potassium	S-85	Sediment	1,863	554	529	2,400	N/A	N/A	2,400
		C-68	Sediment	1,224	316	675	1,700			1,640
		S-7	Sediment	2,128	618	872	3,340			2,300
		C-10	Soil	2,411	395	1,580	2,800			2,680
	Zinc	S-6	Soil	44.67	12.1	30.6	64.0	23,500	389,000	30.6
		S-85	Sediment	33.73	7.02	24.9	41.7			41.6

NOTES: Statistical data is for 2000–2014.

[a]New Mexico Environment Department (NMED). 2012. *Risk Assessment Guidance for Site Investigations and Remediation.* NMED Hazardous Waste Bureau and the Ground Water Quality Bureau Voluntary Remediation Program, Table A-1 updated December 2014. Santa Fe, NM: NMED.

C = off-site location
Min. = minimum
Max. = maximum
N/A = not applicable
NMED = New Mexico Environment Department
P = perimeter location
S = on-site location
SD = standard deviation

Aluminum

One on-site location (S-1 soil) and two off-site locations (C-62 soil and C-68 sediment) were identified as Priority-3 for aluminum, but all were below NMED soil screening levels (SSLs) for residential use. The concentrations at all locations were within the range of background values for aluminum in New Mexico surface soils.

Arsenic

One on-site location (S-33 soil) was identified as Priority-2 for arsenic in surface soils and slightly higher than the NMED SSLs for residential use. The concentrations at all locations were within the range of background values for arsenic in New Mexico surface soils.

Barium

One on-site location (S-85 sediment) was identified as Priority-3 for barium in surface soils, but was below the NMED SSLs for residential use. The concentrations at all locations were below the range of background values for barium in New Mexico surface soils.

Beryllium

One on-site location (S-33 soil) was identified as Priority-2 for beryllium in surface soils. One on-site location (S-85 sediment) was identified as Priority-3 for beryllium in surface soils. Both of these were less than the NMED SSLs for residential use. The concentrations at all locations were within the range of background values for beryllium in New Mexico surface soils.

Total Chromium
One on-site location (S-51 soil) was identified as Priority-1 for total chromium in surface soils and was below the NMED SSLs for residential use. The concentration at this location was higher than the range of background values for total chromium in New Mexico surface soils and was identified as Priority-1. Therefore, additional evaluation was required (see Section 4.5.3 for details).

Cobalt
One perimeter location (P-64 soil) was identified as Priority-2 for cobalt in surface soils (there is no NMED SSL for cobalt). One on-site location (S-85 sediment) was identified as Priority-3 for cobalt in surface soils. The concentrations at all locations were within the range of background values for cobalt in New Mexico surface soils.

Copper
One on-site location (S-6 soil) was identified as Priority-2 for copper in surface soils. One on-site location (S-85 sediment) was identified as Priority-3 for copper in surface soils. Both values were below NMED SSLs for residential use. The concentrations at all locations were within the range of background for copper in New Mexico surface soils.

Iron
One on-site location (S-85 sediment) was identified as Priority-3 for iron in surface soils and was below the NMED SSLs for residential use. The concentrations at all locations were within the range of background values for iron in New Mexico surface soils.

Lead
One on-site location (S-85 sediment) was identified as Priority-3 for lead in surface soils and was below the NMED SSLs for residential use. This soil concentration was within the range of background values for lead in New Mexico surface soils.

Magnesium
One perimeter location (P-64 soil) was identified as Priority-2 for magnesium in surface soils. One on-site location (S-85 sediment) was identified as Priority-3 for magnesium in surface soils. Both values were below NMED SSLs for residential use. The concentrations at all locations were within the range of background values for magnesium in New Mexico surface soils.

Manganese
One perimeter location (P-64 soil) was identified as Priority-2 for manganese in surface soils. One on-site location (S-1 soil) was identified as Priority-3 for manganese in surface soils. Both values were below NMED SSLs for residential use. The concentrations at all locations were within the range of background for manganese in New Mexico surface soils.

Nickel
Three on-site locations (S-2NW soil, S-1 soil, and S-85 sediment) were identified as Priority-3 for nickel in surface soils. Both values were below NMED SSLs for residential use. The concentrations at all locations were within background values for nickel in New Mexico surface soils.

Potassium
One on-site location (S-1 soil) was identified as Priority-2 for potassium in surface soils (there is no NMED SSL for potassium). Two on-site locations (S-7 sediment and S-85 sediment) and two off-site locations (C-10 soil and C-68 sediment) were identified as Priority-3 for potassium in surface soils. The concentrations at all locations were within the range of background values for potassium in New Mexico surface soils.

Zinc

Two on-site locations (S-6 soil and S-85 sediment) were identified as Priority-3 for zinc in surface soils. Both values are below NMED SSLs for residential use. These soil concentrations were within the range of background values for zinc in New Mexico surface soils.

High Explosives

Soil samples were collected at three on-site locations (S-90, S-93, and S-94) and analyzed for HE compounds. There were no detections above the method detection limit (MDL) for any HE compounds.

Perchlorate

A soil sample was collected at on-site location S-53 and analyzed for perchlorate; perchlorate was not detected above the MDL.

4.5.3 Additional Activities and Variances

Vegetation samples were to be collected at 15 locations (Table 4-5). However, the vegetation at these locations was very sparse due to the ongoing drought. Therefore, no vegetation samples were collected in 2014.

Sample locations P-87 and P-88 are in an area with tall, dry grasses, and accessing the locations presents a fire hazard. Therefore, location P-87 has been moved as indicated on Figure 4-1. Location P-88 was not sampled in 2014 and has been removed from the sampling list for all future sampling events.

Additional activities that occurred in 2014 include soil sampling at S-51 due to the Priority-1 total chromium result. Seven soil samples were collected in the vicinity of S-51 in December 2014; the locations are shown in Figure 4-4. The samples were analyzed for total chromium and chromium (VI). The presence of chromium (VI) can indicate an anthropogenic source and is considered more systemically toxic than chromium (III). A chromium (III) value was calculated by subtracting the chromium (IV) result from the total chromium result. The analytical and calculated results are provided in Table 4-9.

The analytical results for chromium indicate that the majority of chromium present is chromium (III), the least problematic and most commonly encountered naturally occurring type of chromium. All results are within soil concentrations identified in New Mexico soils and are below the initial result. Accordingly, no further action or investigation is warranted. Sampling will continue at S-51 on an annual basis.

Table 4-9. Results for additional sampling event at S-51 for chromium, 2014 (all units in mg/kg)

Location Number	Total Chromium	Chromium (VI)	Chromium (III)[a]
S-51A	20.96	0.66	20.30
S-51B	5.56	0.15	5.41
S-51C	6.06	0.28	5.78
S-51D	6.74	0.22	6.52
S-51E	6.98	ND	6.98
S-51F	8.42	0.19	8.23
S-51G	7.99	0.27	7.72

NOTES: [a]Chromium (III) is calculated by subtracting chromium (VI) from total chromium.
ND = not detected at laboratory method detection limit
S = on-site

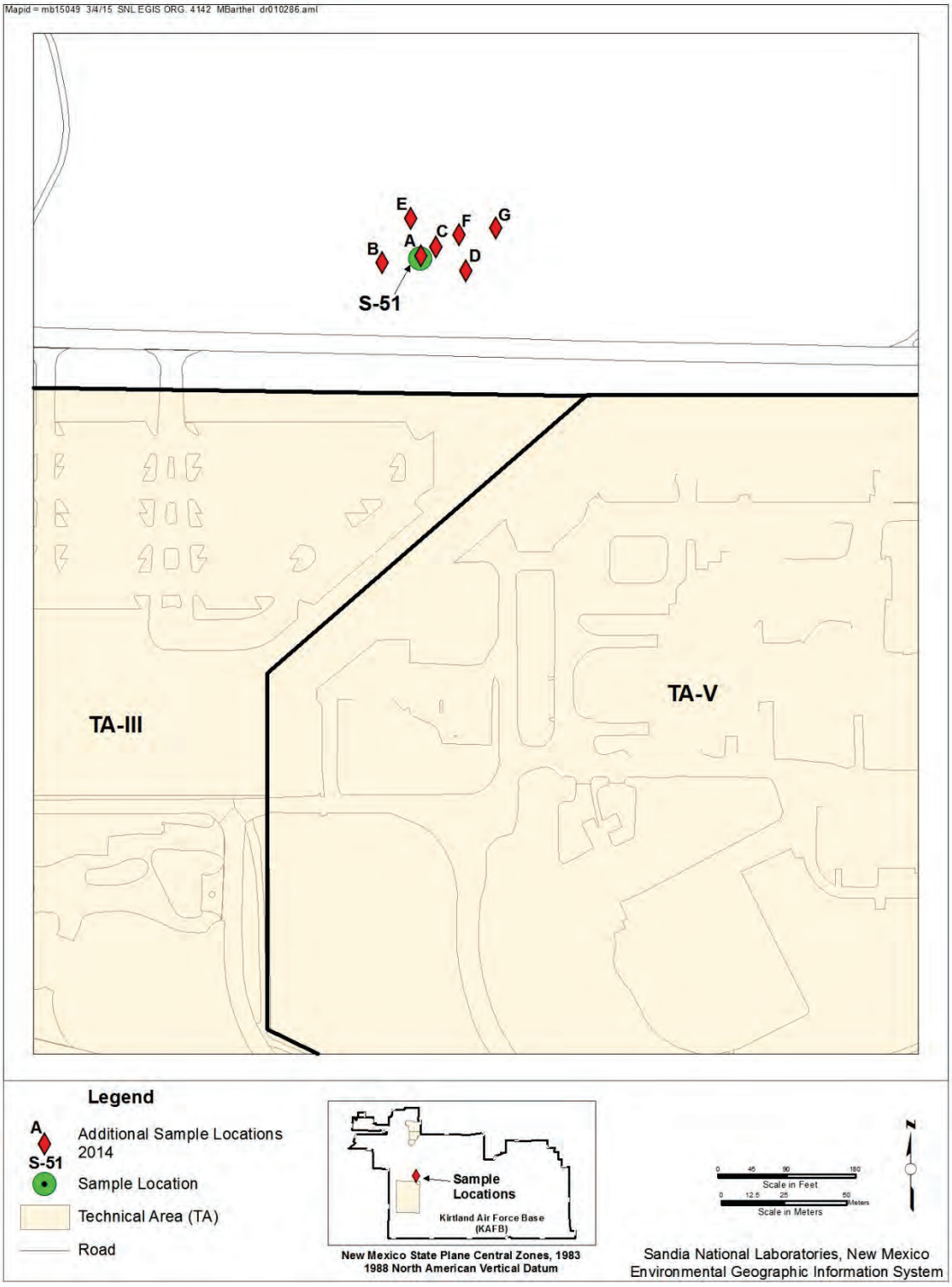


Figure 4-4. Soil samples collected near S-51, December 2014

This page intentionally left blank.



Chapter 5. Meteorological Monitoring and Air Quality Compliance Programs

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

- The Meteorological Program conducts meteorological monitoring (Section 5.1) and ambient air surveillance (Section 5.2).
- The National Emission Standards for Hazardous Air Pollutants (NESHAP) Program coordinates with facility owners to meet radiological air emission regulations (Section 5.3 and Section 5.4).
- The Air Quality Compliance Program performs ambient air surveillance activities (Section 5.2) and ensures that all nonradiological 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 Programs

The Meteorological Program provides various mission support services for SNL/NM. The program's main objective is to collect, analyze, and distribute site-specific information to support Sandia Corporation (Sandia) activities that require representative meteorological data. Data are used to model air dispersion and transport, 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 Program are listed in Chapter 8 (DOE Directives).

5.1.1 Monitoring Towers

The meteorological-monitoring towers at SNL/NM are described in this section.

Tower and Network Instrumentation

Sandia conducts meteorological monitoring through a network of eight meteorological towers located throughout Kirtland Air Force Base (KAFB) in New Mexico. All towers are on or near SNL/NM property, and the network includes six 10-meter towers, one 30-meter tower, and ne 60-meter tower

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

Meteorological Monitoring Towers

All meteorological towers are instrumented to measure temperature and wind velocity at 3- and 10-meter levels. Temperature and wind velocity are also measured at the top of the two tallest towers (30 meters and 60 meters). In addition, relative humidity is measured at the 3-meter level. Rainfall is measured at the 1-meter level at towers A36, A21, and SC1. Barometric pressure is measured at the 2-meter level at towers A36 and A21.

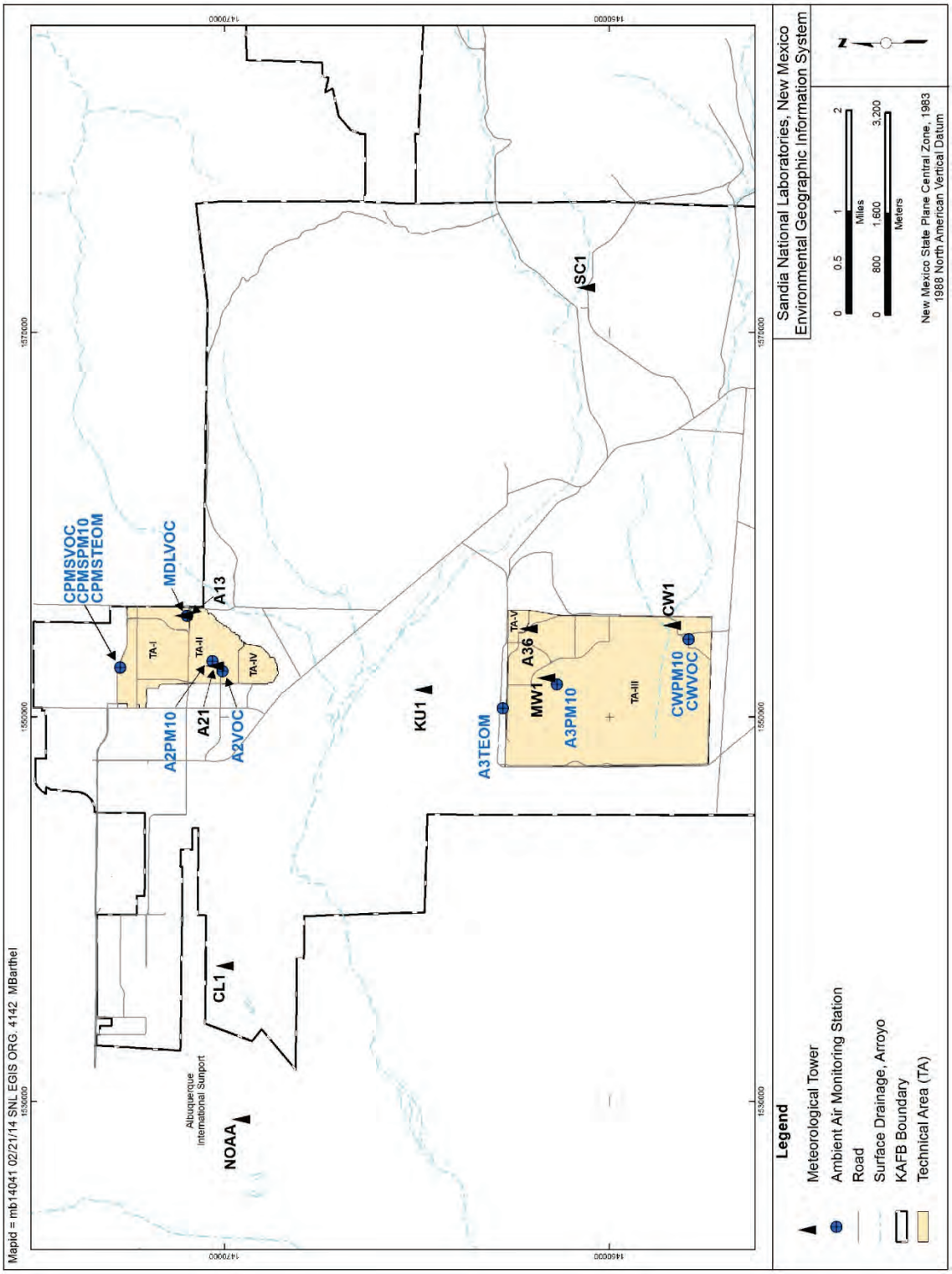


Figure 5-1. Clean air network of meteorological towers and ambient air-monitoring stations

5.1.2 Meteorological Monitoring Results

The A36 60-meter tower is used to describe general meteorology at SNL/NM due to the tower being centrally positioned on-site geographically and being instrumented at all levels. The 2014 annual climatic summary for Tower A36 is shown in Table 5-1.

Table 5-1. Annual climatic summary from Tower A36, calendar year 2014

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Temperature (°C)													
Average daily high	10.06	13.61	16.05	20.09	24.73	32.42	31.49	28.52	27.33	22.33	13.82	8.54	20.75
Average daily low	-3.07	1.00	2.18	5.36	10.27	17.28	18.14	15.97	15.16	9.02	1.02	-1.61	7.56
Monthly mean	4.05	7.53	9.45	13.04	17.71	25.37	24.50	22.39	20.80	16.02	7.64	3.75	14.35
Extremes (°C)													
High	19.20	20.32	23.06	26.21	32.47	36.53	36.19	32.61	34.25	26.93	21.86	15.66	36.53
Low	-11.54	-7.74	-2.01	-2.09	1.60	11.98	13.26	13.20	9.50	4.24	-7.19	-12.50	-12.50
Relative Humidity (%)													
	35.55	39.10	34.54	26.13	25.90	18.36	42.54	49.14	51.67	40.17	40.88	62.59	38.88
Precipitation (cm)													
Monthly	0.00	0.20	0.76	0.36	0.76	0.13	5.26	3.63	0.33	0.53	0.86	3.07	15.90
24-hour maximum	0.00	0.13	0.30	0.36	0.53	0.13	2.79	1.32	0.10	0.43	0.69	0.81	2.79
Wind (m/sec)													
Monthly	3.54	3.30	4.05	4.71	4.28	4.47	4.04	3.35	3.75	3.19	3.28	2.98	3.75
24-hour maximum	9.67	6.82	6.63	8.55	7.28	9.24	8.67	5.51	7.90	7.39	7.41	12.15	12.15
Maximum gust	20.18	21.90	26.02	26.26	23.90	30.06	23.70	19.42	20.10	22.86	21.82	24.06	30.06
Barometric Pressure (mb)													
	836.0	832.3	833.2	831.6	833.5	832.2	837.2	836.8	835.9	836.0	835.7	834.9	834.60

NOTE: Intermittent precipitation data signals increased the uncertainty of measurements between August and October2014. Precipitation may be underestimated during these periods.

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.

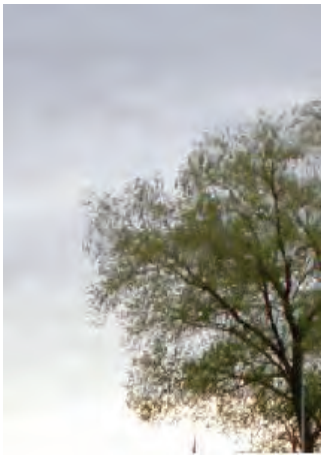
5.1.3 Wind Analysis

Annual wind roses for three locations across SNL/NM are illustrated in Figure 5-2 and Figure 5-3. A wind rose is a graphical representation of wind speed and direction frequency distribution. Wind direction is reported by the direction in which it originates. As shown in Figure 5-2 and Figure 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.

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

http://132.175.200.42/

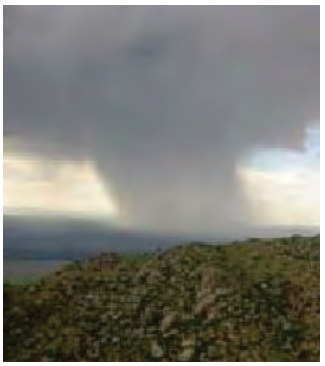
Table 5-2. Variations and extremes in meteorological measurements across the tower network, 2014



Wind Speed	Minimum (m/sec)	Maximum (m/sec)	Spread (m/sec)
Average annual wind speed	3.59 Tower KU1	3.98 Tower CW1	-0.39
Greatest difference in average wind speed over 24 hours	9.91 Tower SC1	15.00 Tower A13	5.09
Greatest difference in daily maximum wind gust	11.56 Tower A21	25.69 Tower MW1	14.13
Average difference in daily wind speed variations	0.99 all towers		



Temperature	Minimum (°C)	Maximum (°C)	Spread (°C)
Average annual temperature	-14.06 Tower SC1	14.68 Tower A13	0.62
Network annual extremes	-13.63 Tower MW1	37.99 Tower CL1	51.62
Greatest difference in daily minimum temperature	1.50 Tower CW1	9.15 Tower SC1	7.65
Greatest difference in average daily temperature	-0.31 Tower SC1	1.53 Tower CW1	1.85
Greatest difference in daily maximum temperature	11.44 Tower A36	14.88 Tower CL1	3.44



Precipitation	Minimum (cm)	Maximum (cm)	Spread (cm)
Annual precipitation (extremes)	15.90 Tower A36	24.61 Tower A21	8.71
24-hour rainfall variation	0.41 Tower A36	3.09 Tower A36	2.68
Greatest monthly precipitation difference	4.42 Tower SC1	9.19 Tower A21	4.77
Greatest in monthly rainfall		9.19 Tower A21	

NOTE: Winter precipitation that falls as snow may be underestimated (mostly at the SC1 tower).

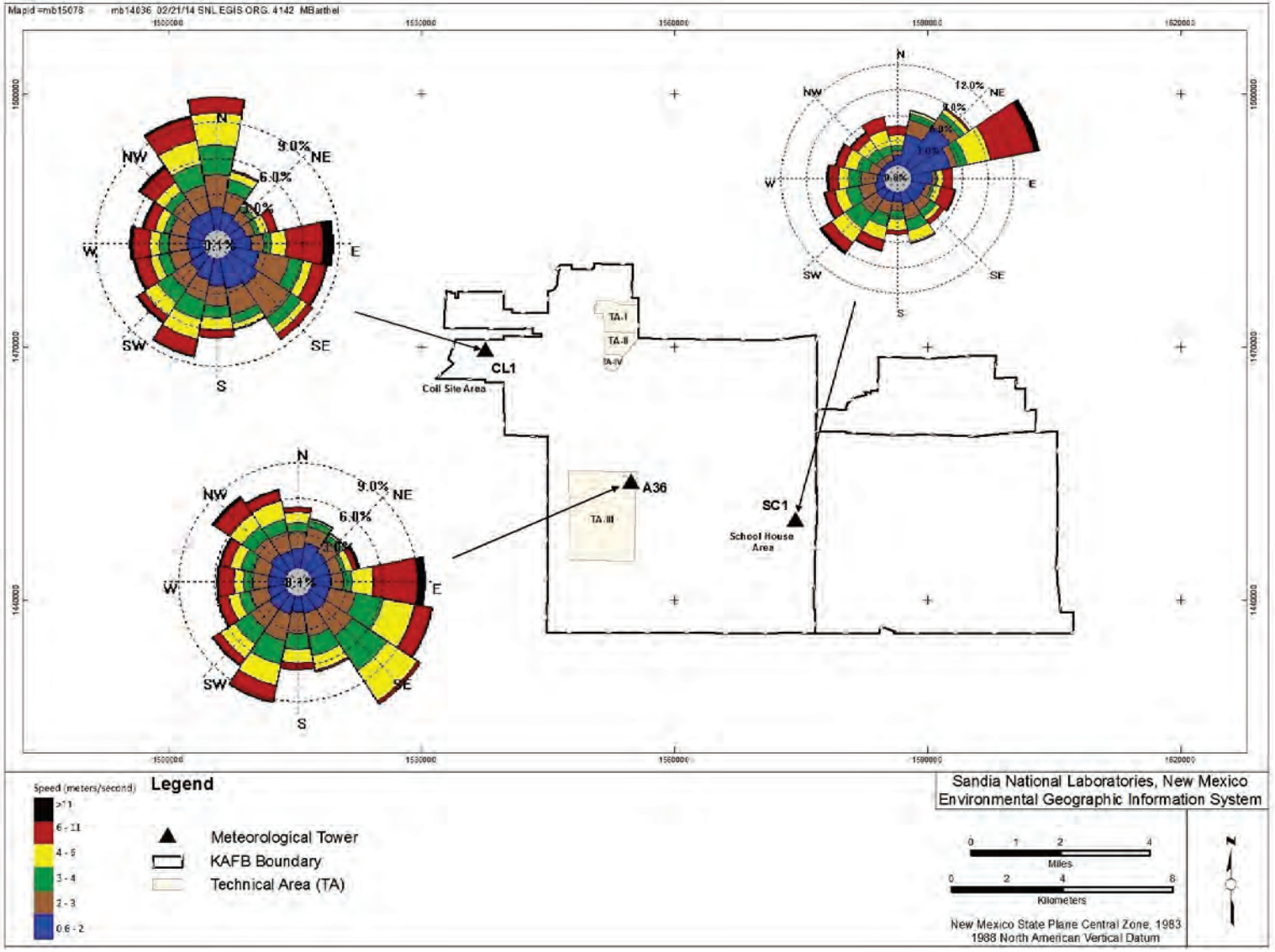


Figure 5-2. Annual wind roses at towers CL1, A36, and SC1

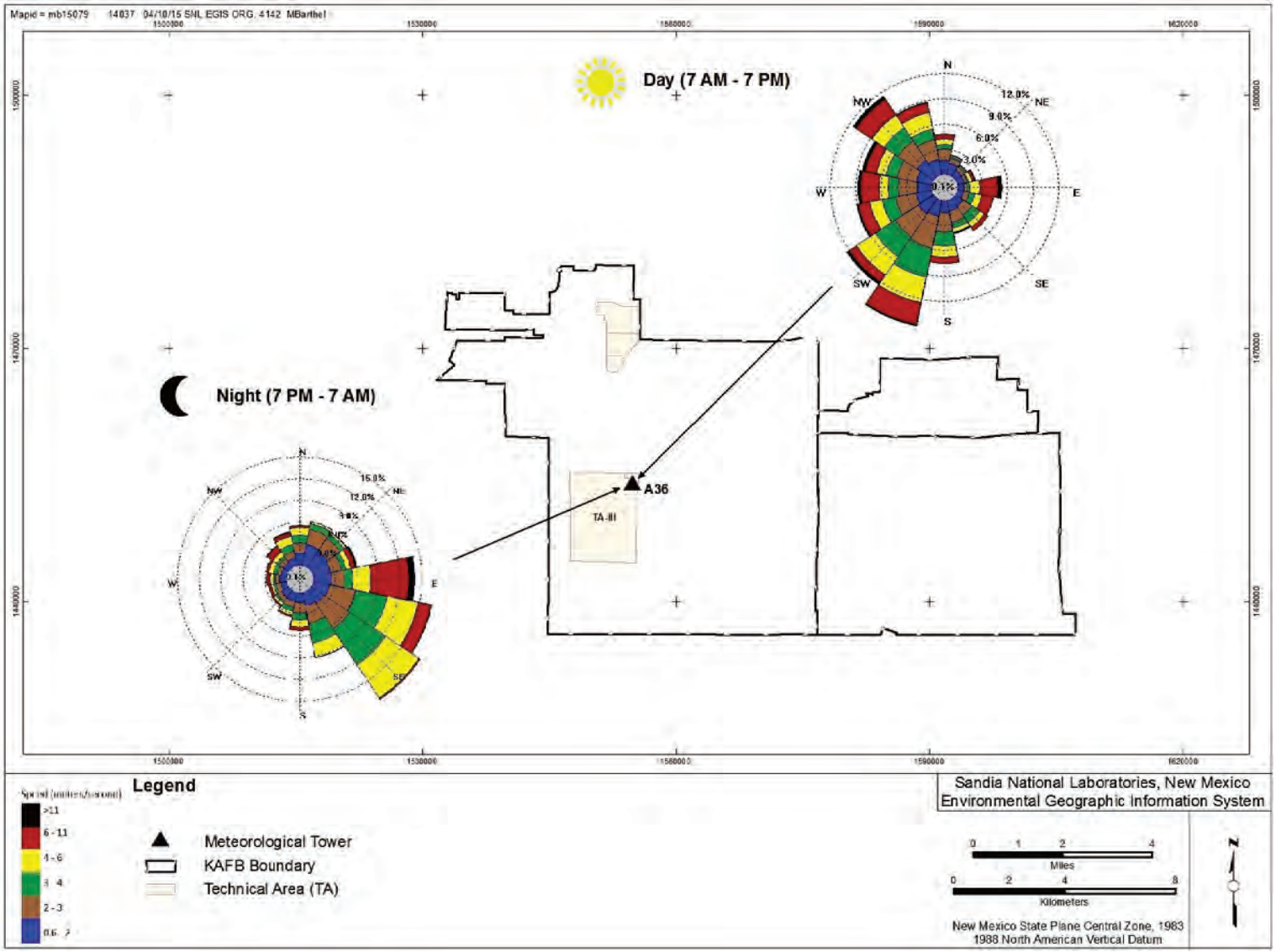


Figure 5-3. Annual wind roses for daytime and nighttime wind frequency at Tower A36

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). Currently, the six stations include monitors for volatile organic compounds (VOCs), particulate matter that has a diameter equal to or less than 10 microns (PM_{10}), and particulate matter that has a diameter equal to or less than 2.5 microns ($PM_{2.5}$). The Ambient Air Surveillance Program's primary objective is to provide an indication of the concentration of contaminants in the ambient air at and around SNL/NM.

It is a U.S. Environmental Protection Agency (EPA) requirement that the City of Albuquerque (COA) monitor the ambient air in Bernalillo County to determine compliance with the National Ambient Air Quality Standards and New Mexico Ambient Air Quality Standards. This monitoring is essential to the COA Environmental Health Department in planning and issuing 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 whether the permit can be issued and the permitted source can be installed.

5.2.1 Monitoring Stations

The types of ambient air-monitoring stations (past and present) at SNL/NM are described in this section.

Criteria Pollutant Monitoring Station

The Ambient Air Surveillance Program began as a means to determine the ambient air quality around SNL/NM. At the time, the COA monitoring program was in its infancy, and data did not exist for comparison purposes. The lack of data was of particular concern because of the need to monitor Sandia's Steam Plant Facility, which prompted Sandia to install the Criteria Pollutant Monitoring Station (CPMS) in 1996. The Steam Plant was subsequently decommissioned and demolished in 2009.

The CPMS was in operation for 16 years, with 2012 being the final year of data collection. Personnel compiled a statistical report of the final seven years of data (Table 5-3). A number of changes in operations have occurred over the past decade; however, the resulting criteria pollutant sampling data has remained consistent from year to year. CPMS data will not be presented in future reports.

Table 5-3. Final seven-year statistical analysis of CPMS data

Criteria Pollutant	Averaging Time	NAAQS (ppm)	NMAAQS (ppm)	2012 Results (ppm)	2011 Results (ppm)	2010 Results (ppm)	2009 Results (ppm)	2008 Results (ppm)	2007 Results (ppm)	2006 Results (ppm)	SD	Average (ppm)
Carbon monoxide	1 hour	35	13.1	1.8	11.9	12.2	2.1	8.8	3.6	13.1	4.7	7.6
	8 hours	9	8.7	0.8	1.9	2.4	1.3	3.3	2.3	8.7	2.5	3.0
Nitrogen dioxide	1 hour	0.1	—	0.05	0.05	0.05	—	—	—	—	2.4E-02	4.9E-02
	Annual	0.053	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.05	1.4E-02	1.5E-02
Sulfur dioxide	3 hours	0.5	—	0.009	0.006	0.07	0.01	0.02	0.01	—	2.1E-02	1.9E-02
	24 hours	0.14	0.1	0.004	0.003	0.009	0.002	0.003	0.002	0.100	3.4E-02	1.8E-02
	Annual	0.03	0.02	0.001	0.001	0.001	0.001	0.001	0.0005	0.0200	6.8E-03	3.5E-03
Ozone	1 hour	0.12	—	0.079	0.076	0.073	0.068	0.069	0.071	0.120	1.7E-02	7.9E-02
	8 hours	0.075	—	0.05	0.05	0.04	0.04	0.04	0.04	0.080	1.3E-02	4.9E-02

NOTES: — = not available
CPMS = Criteria Pollutant Monitoring Station
NAAQS = National Ambient Air Quality Standards
NMAAQS = New Mexico Ambient Air Quality Standards
SD = standard deviation

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

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

PM_{10} stations. PM_{10} is measured at four monitoring locations (CPMSPM10, A2PM10, A3PM10, and CWPM10) at SNL/NM. The air is sampled for a 24-hour period, starting and ending at midnight, every six days. This schedule is consistent with the National Air Sampling Program. Filters are weighed manually and then analyzed at a laboratory. Samples are analyzed for metals and are 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 weighed manually with this system or sent to a laboratory for chemical analysis. The monitoring station contains a built-in microprocessor that measures the mass. $PM_{2.5}$ and PM_{10} measurements are made with different instruments and should not be compared quantitatively.

5.2.2 Ambient Air-Monitoring Results for 2014

Ambient air monitor results are presented in this section.

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 A3PM site. A PM_{10} concentration of 20.2 µg/m^3 occurred at A3PM in February 2014. The 24-hour average PM_{10} and lead data are displayed in Table 5-4, and are compared to data collected by the COA monitors. The monthly and annual averages for PM_{10} are provided in Table 5-5. The annual particulate matter concentrations for 2014 are comparable to the results for 2013.

Table 5-4. Twenty-four-hour averages for PM_{10}, $PM_{2.5}$, lead, and COA maximum monitored data (all units in µg/m^3)

Criteria Pollutant	2014	
	SNL/NM Data	COA Data
PM_{10}	20.2	163
$PM_{2.5}$	24.8	34.4
Lead	0.005	0.006

NOTES: COA = City of Albuquerque
$PM_{2.5}$ = 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}, calendar year 2014 (all units in µg/m^3)

Sample Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
A2PM10	10.00	8.20	9.50	9.80	6.20	6.00	5.80	5.60	5.00	13.33	11.00	7.67	8.18
A3PM10	3.40	20.20	5.00	6.25	5.60	4.40	5.00	3.75	3.40	6.75	5.00	6.33	6.26
CPMSPM10	8.60	11.20	12.40	12.20	6.50	7.80	3.20	4.20	4.80	10.83	11.75	11.17	8.72
CWPM10	5.40	5.20	7.80	5.75	11.20	3.00	8.40	1.75	3.25	6.20	4.60	5.60	5.68

NOTE: 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 undergo metals analyses. Filters are collected every sixth day and are consolidated into monthly composites for analysis. In 2014, monthly composites varied from five 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 at each station. 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.

Table 5-6. Averaged results of PM_{10} analysis at each station, calendar year 2014

Analyte	Units	Station A2PM10	Station A3PM10	Station CPMSPM10	Station CWPM10	TLV
Aluminum	µg/m^3	1.89E-01	5.29E-02	6.64E-02	6.61E-02	2000
Antimony	µg/m^3	8.21E-04	3.49E-04	2.49E-04	1.64E-04	500
Barium	µg/m^3	6.70E-03	1.62E-03	4.09E-03	1.73E-03	50
Calcium	µg/m^3	1.15E+00	1.78E-01	2.32E-01	3.10E-01	2000
Chromium	µg/m^3	5.42E-04	2.29E-04	3.56E-04	3.31E-04	10
Cobalt	µg/m^3	2.38E-04	3.90E-05	1.56E-04	1.24E-04	20
Copper	µg/m^3	1.87E-02	8.95E-03	1.21E-02	6.76E-03	1000
Iron	µg/m^3	2.47E-01	6.79E-02	1.00E-01	8.41E-02	5000
Lead	µg/m^3	4.19E-04	5.81E-04	1.07E-03	4.81E-04	150
Magnesium	µg/m^3	1.12E-01	3.19E-02	3.77E-02	3.95E-02	10000
Manganese	µg/m^3	6.36E-03	1.79E-03	2.38E-03	2.26E-03	200
Nickel	µg/m^3	2.78E-04	2.26E-04	2.10E-04	1.33E-04	50
Potassium	µg/m^3	7.96E-02	3.13E-02	4.03E-02	3.54E-02	2000
Silver	µg/m^3	4.77E-05	4.43E-05	1.36E-05	1.32E-05	10
Sodium	µg/m^3	9.63E-02	3.19E-02	6.08E-02	3.25E-02	5000
Zinc	µg/m^3	6.98E-03	3.12E-03	8.02E-03	1.98E-03	10
Uranium	µg/m^3	1.47E-06	ND	2.86E-06	ND	200
Actinium-228	pCi/m^3	4.00E-03	2.91E-03	3.63E-03	ND	100
Alpha, gross	pCi/m^3	4.93E-03	2.16E-03	2.93E-03	1.68E-03	0
Americium-241	pCi/m^3	3.47E-04	ND	ND	ND	—
Beryllium-7	pCi/m^3	2.46E-01	1.78E-01	1.36E-01	1.39E-01	40000
Beta, gross	pCi/m^3	2.18E-02	2.06E-02	1.63E-02	1.36E-02	0
Bismuth-212	pCi/m^3	1.31E-02	1.68E-03	1.15E-02	3.20E-03	700
Bismuth-214	pCi/m^3	2.25E-03	1.42E-03	1.32E-03	1.15E-03	2000
Cesium-137	pCi/m^3	6.54E-04	9.26E-04	ND	ND	400
Cobalt-60	pCi/m^3	9.55E-04	ND	3.46E-04	ND	80
Lead-212	pCi/m^3	2.03E-04	8.10E-04	1.83E-03	5.42E-04	80
Lead-214	pCi/m^3	1.81E-03	1.69E-03	6.27E-03	1.73E-03	2000
Neptunium-237	pCi/m^3	ND	ND	2.84E-05	ND	0
Potassium-40	pCi/m^3	9.28E-03	1.17E-02	8.13E-03	5.54E-03	900
Radium-223	pCi/m^3	7.85E-03	1.26E-02	ND	ND	—
Radium-224	pCi/m^3	8.94E-03	2.94E-02	2.65E-02	9.04E-03	4
Radium-226	pCi/m^3	2.33E-02	1.06E-02	ND	1.15E-02	1
Radium-228	pCi/m^3	4.00E-03	2.91E-03	3.63E-03	ND	3
Sodium-22	pCi/m^3	ND	ND	9.84E-04	ND	—
Thorium-227	pCi/m^3	4.00E-03	6.98E-04	ND	3.31E-04	0.7
Thorium-231	pCi/m^3	7.72E-03	ND	5.32E-03	2.65E-03	—
Thorium-234	pCi/m^3	3.71E-02	ND	ND	2.43E-02	400
Uranium-235	pCi/m^3	3.84E-03	6.63E-03	7.76E-03	ND	0.1
Uranium-238	pCi/m^3	3.71E-02	ND	ND	2.43E-02	0.1

NOTES: — = not available ND = not detected
ACGIH = American Conference of Governmental Industrial Hygienists
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 2011)

An analysis of variance (ANOVA) was performed to determine whether statistical differences existed between stations for metals. The ANOVA results indicated no statistical difference between the stations for metals.

$PM_{2.5}$

Both monitors for $PM_{2.5}$ (CPMSTEOM and A3TEOM) were replaced in 2014. The CPMSTEOM began collecting data in August 2014, and the A3TEOM monitor began collecting data in November 2014. The monthly and annual averages for $PM_{2.5}$ are listed in Table 5-7, with values replaced by five-year averages to account for missing data.

Table 5-7. Five-year monthly and annual averages for $PM_{2.5}$ (all units in $\mu g/m^3$)

Sample Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
CPMSTEOM	6.39	5.80	6.60	8.44	9.46	13.80	9.67	7.38	7.27	7.12	6.37	6.24	7.88
TA3TEOM	5.33	5.42	6.94	7.76	8.22	12.19	8.86	7.34	7.21	6.48	5.61	5.74	7.26

NOTES: New monitors were installed in late 2014. The data presented are five-year averages from 2010 through 2014.
$PM_{2.5}$ = particulate matter (diameter equal to or less than 2.5 microns)

Volatile Organic Compounds

Generally, the VOCs observed at SNL/NM are products or by-products of fossil fuels or from laboratory operations. In 2014, the sample recovery for VOC monitoring was greater than 99 percent. Monthly VOC samples were analyzed for VOC species plus total nonmethane hydrocarbon. Table 5-8 shows the compiled results for compounds detected at four stations.

Table 5-8. VOC average concentrations compiled from monthly results at four monitoring stations, calendar year 2014 (all units in ppm bv)

Compound	Station CPMSVOC	Station CWVOC	Station MDLVOC	Station TA-II VOC	TLV
1-Butene/isobutene	0.12	1.09	0.14	0.08	—
Acetone	3.45	2.89	4.19	2.42	500,000
Benzene	0.22	0.14	0.18	0.17	500
Butane, N-	0.67	0.41	0.60	0.53	—
Butanone, 2-	0.31	0.30	0.44	0.20	—
Carbon tetrachloride	0.10	0.10	0.09	0.10	5,000
Chloromethane	0.50	0.50	0.55	0.51	50,000
Dichlorodifluoromethane	0.47	0.48	0.47	0.47	1,000,000
Hexane, N-	ND	ND	0.37	ND	—
Hydrocarbons, total non-methane	17.91	12.65	15.85	13.16	—
Methylbutane, 2-	0.81	0.27	0.35	0.93	—
Pentane, N-	0.50	0.29	0.33	0.39	—
Toluene	0.39	0.18	0.24	0.24	50,000
Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.07	0.06	0.06	0.07	—
Trichloroethene	ND	ND	0.19	ND	50,000
Trichlorofluoromethane	0.24	0.24	0.23	0.23	1,000,000
Trimethylpentane,2,2,4-	0.07	0.07	0.05	0.04	300
Undecane	0.27	ND	ND	ND	—

NOTES: — = not available
ACGIH = American Conference of Governmental Industrial Hygienists
ND = not detected
TA = Technical Area
TLV = threshold limit value; TLVs are guidelines and not legal standards; TLV guidelines assist in the control of occupational health hazards (ACGIH 2011)
VOC = volatile organic compound; VOCs may be shown as separate species as well as in combination with another analyte

An ANOVA was performed to determine whether statistical differences existed between stations. The ANOVA results indicated that the concentrations of 2,2,4-trimethylpentane at the CPMSVOC and CWVOC stations were statistically different and slightly higher than at the other sites; however, the concentrations were well below the TLV.

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 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 5-9. SNL/NM radiological dose reporting, calendar year 2014

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	8.32E-04	8.32E-06	8.30E-04	8.30E-06	0.0008	4.23E-02	4.23E-04	—	—
Water	0	0	0	0	0	0	0	—	—
Other pathways	0	0	0	0	0	0	0	—	—
All pathways	8.32E-04	8.32E-06	8.30E-04	8.30E-06	0.0008	4.23E-02	4.23E-04	2.83E+05	2.83E+03

Radiological Atmospheric Releases for 2014 (in Curies)							
Tritium	Noble Gases (t1/2 <40 days)	Fission and Activation Products (t1/2 <3 hour)	Fission and Activation Products (t1/2 >3 hour)	Total Radio-strontium	Total Uranium	Other Actinides	Other
1.38E+01	5.57E+00	1.68E-04	1.56E-07	4.47E-10	2.88E-10	2.39E-06	0

NOTES: — = not available
DOE = U.S. Department of Energy
SNL/NM = Sandia National Laboratories, New Mexico

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. Details can be found in *NESHAP Annual Report for Calendar Year (CY) 2014, SNL/NM* (SNL/NM 2015e).

5.3.2 National Emission Standards for Hazardous Air Pollutants Facilities

Currently at SNL/NM all potential NESHAP facilities are defined as point emission sources (Figure 5-4). 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 2014.

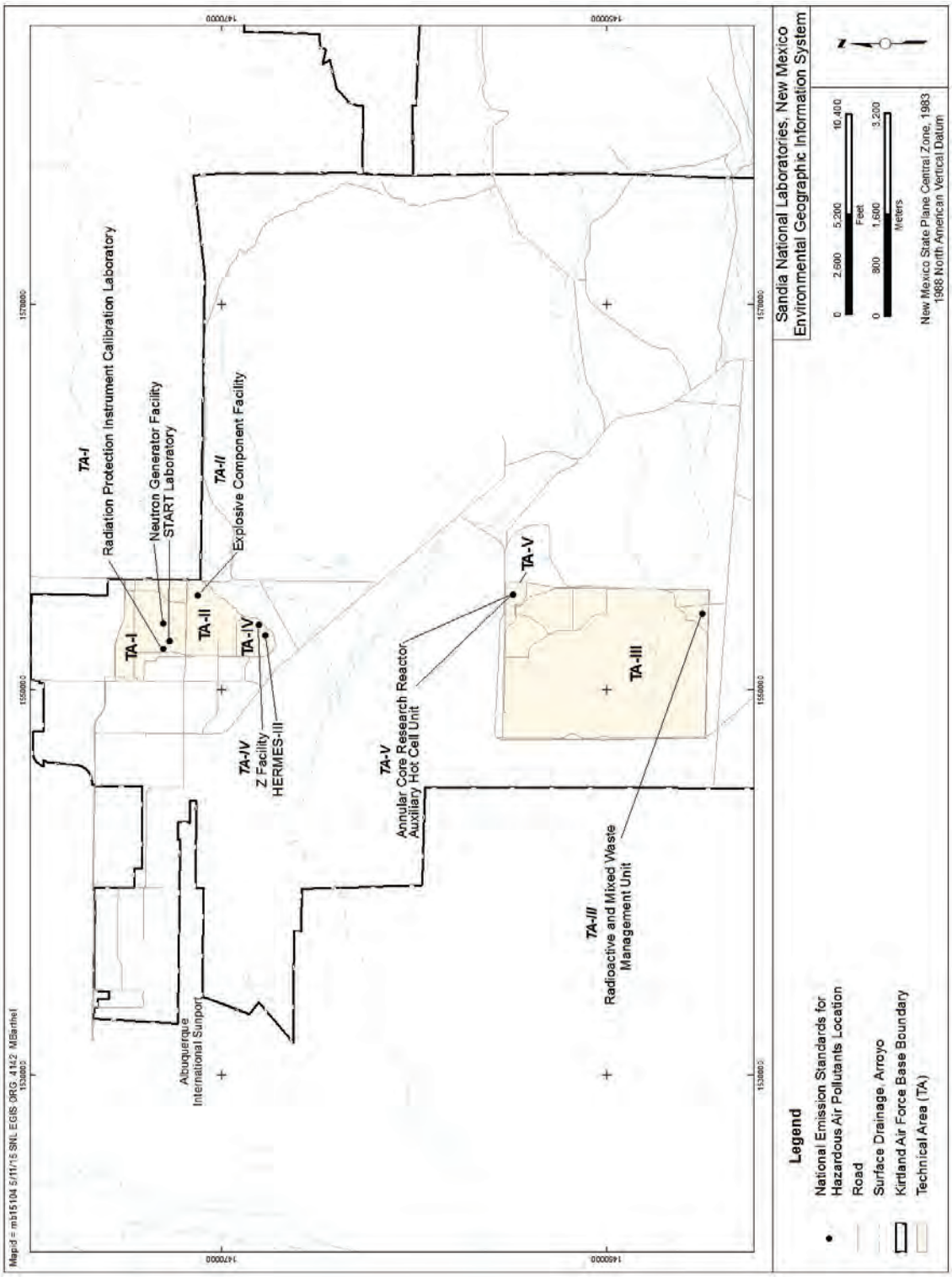


Figure 5-4. Locations of facilities at SNL/NM that provided radionuclide inventories

Table 5-10. Summary of radionuclide releases from NESHAP sources, calendar year 2014

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	5.57
AHCU, TA-V	Used to identify, sort, characterize, and repackage legacy nuclear materials and 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 Americium-241 Plutonium-238 Plutonium-241	5.86E-10 4.47E-10 7.76E-10 3.12E-10 2.37E-09
ECF, TA-II	Facility used for testing neutron generator design and manufacturing	Point	Calculation	Tritium	1.27E-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	1.53E-04 1.50E-05
NGF, TA-I	Principal production facility for neutron generators, Tritium Envelope North Wing	Point	Continuous	Tritium	13.0
RMWMU, TA-III	Facility used to handle radioactive and mixed waste	Point	Continuous	Tritium (oxide) Tritium (elemental) Americium-241 Cesium-137	4.43E-01 3.13E-01 2.39E-06 6.61E-08
RPICL, TA-I	Laboratory used to perform radiation detection equipment calibration	Point	Calculation	Tritium	3.63E-05
START, TA-I	Small-scale laboratory operation	Point	Calculation	Technetium-99	1.60E-15
Z Accelerator, TA-IV	Experimental facility for research on light-ion inertial confinement fusion	Point	Calculation	Tritium	1.45E-03

NOTES: Monitoring methods: periodic is based on periodic measurements; calculation is calculated from known parameters; continuous is based on continuous air monitoring results.
ACRR =Annular Core Research Reactor
AHCU = Auxiliary Hot Cell Unit
ECF = Explosives Components Facility
HERMES-III = High Energy Radiation Megavolt Electron Source-III
NESHAP = National Emission Standards for Hazardous Air Pollutants
NGF = Neutron Generator Facility
RMWMU = Radioactive and Mixed Waste Management Unit
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-I Sources

Neutron Generator Facility (NGF). The NGF is the nation's principal production facility for neutron generators. This facility currently can 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).

Radiation Protection Instrument Calibration Laboratory (RPICL). Calibration on radiation detection equipment at this laboratory 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

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

TA-III Sources

Radioactive and Mixed Waste Management Unit (RMWMU). The RMWMU 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 RMWMU as a BMP.

TA-IV Sources

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

Z Accelerator. The Z Accelerator is 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 be released occasionally.

Auxiliary Hot Cell Unit (AHCU). The AHCU 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 be released occasionally.

5.4. Assessment of Potential Dose to the Public

In general, the radiation dose a person receives is dependent on the person's 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 Table 8-6).

5.4.1 National Emission Standards for Hazardous Air Pollutants Dose Assessment

To assess compliance, all NESHAP facilities must submit annual facility emission data for Sandia personnel. The emissions are modeled using EPA's Clean Air Act (CAA) Assessment Package-1988 (CAP88) (EPA 2013) to estimate the annual dose to each of the identified public receptors.

Emission Sources

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 2014, the highest emissions were from tritium. Historically, tritium and argon-41 have been the most significant contributors to the effective dose equivalent (EDE) of the MEI at SNL/NM. Figure 5-5 shows the annual reported release of tritium and argon-41 for 2010 through 2014. 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. Emissions vary from year to year based on the operations conducted at the various facilities.

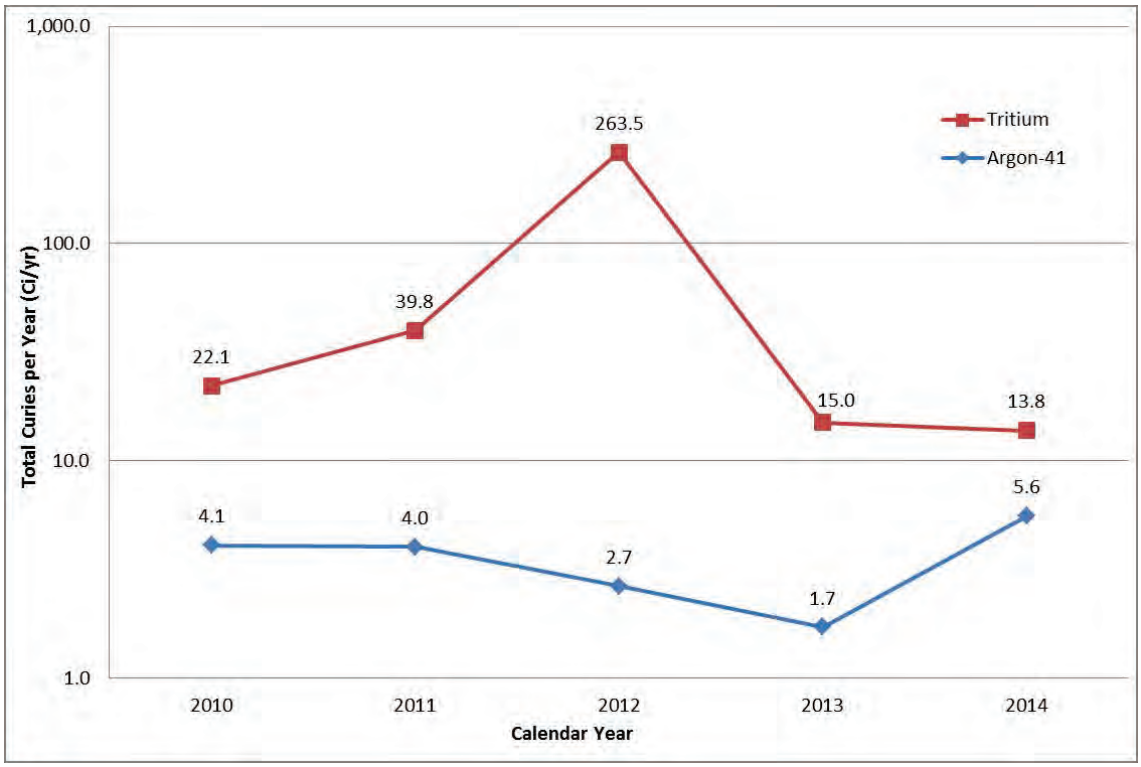


Figure 5-5. Atmospheric releases of argon-41 and tritium from SNL/NM facilities, 2010–2014

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 2014a). The beef and dairy cattle numbers and the food crop area fraction were calculated using 2007 agricultural statistics. The statistics were supplied by the New Mexico Department of Agriculture (NMDOA 2013).

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, 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.

Meteorology

Data from two meteorological towers (A36 and A21) in the proximity of NESHAP emission sources were used in 2014. 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 were compiled into a normalized distribution from which all wind and stability frequency-of-occurrence data were derived.

Table 5-11. Annual source-specific EDE for off-site receptors, calendar year 2014

Facility	ACRR Emission (mrem/yr)	NGF Emission (mrem/yr)	RMWMU Emission (mrem/yr)	Z Accelerator Emission (mrem/yr)	TOTAL (mrem/yr)
COA EHD Bio-Disease	1.50E-04	5.60E-04	1.50E-05	4.70E-08	7.25E-04
Eubank Gate area (Building 8895)	8.20E-05	7.40E-04	9.80E-06	5.10E-08	8.32E-04
Four Hills resident	8.60E-05	5.50E-04	9.70E-05	4.50E-08	7.33E-04
Isleta Casino	1.90E-05	5.40E-04	9.30E-06	4.20E-08	5.68E-04
La Luz Childcare	7.00E-05	6.20E-04	9.50E-06	4.80E-08	7.00E-04
Mesa del Sol Housing Development	8.40E-05	5.40E-04	1.40E-05	8.36E-03	6.38E-04
NM School for the Blind and Visually Impaired	6.20E-05	6.00E-04	9.30E-06	4.70E-08	6.71E-04
USGS	2.30E-05	5.30E-04	9.30E-06	4.20E-08	5.62E-04
VA hospital	7.20E-05	5.80E-04	1.00E-05	4.80E-08	6.62E-04
Willow Wood	6.60E-05	6.00E-04	9.40E-06	4.70E-08	6.75E-04
TOTAL	**7.14E-04**	**5.86E-03**	**1.93E-04**	**8.36E-03**	**6.77E-03**

NOTES: ACRR = Annular Core Research Reactor
COA = City of Albuquerque
EDE = effective dose equivalent
EHD = Environmental Health Department
NGF = Neutron Generator Facility
NM = New Mexico
RMWMU = Radioactive and Mixed Waste Management Unit
USGS = U.S. Geological Survey
VA = Veterans Administration

Table 5-12. Annual source-specific EDE for on-site receptors, calendar year 2014

Facility	ACRR Emission (mrem/yr)	NGF Emission (mrem/yr)	RMWMU Emission (mrem/yr)	Z Accelerator Emission (mrem/yr)	TOTAL (mrem/yr)
AFRL Cryocooler Characterization Lab (Building 30136)	1.70E-04	8.70E-06	7.10E-06	1.70E-09	1.86E-04
Armed Forces Reserve Center	1.80E-04	5.20E-05	5.10E-06	5.40E-08	2.37E-04
Chestnut Site	1.70E-04	6.90E-06	7.10E-05	1.20E-09	2.48E-04
Child Development Center at Maxwell Housing Center	8.30E-05	2.30E-05	3.40E-06	3.20E-09	1.09E-04
Golf Course Club House	4.50E-04	2.30E-05	7.80E-06	6.60E-09	4.81E-04
Homeland Security Building (1008)	1.10E-04	2.60E-04	4.30E-06	1.60E-08	3.74E-04
Honeywell Systems\Support Site	1.20E-04	2.50E-04	4.00E-06	1.80E-08	3.74E-04
Lovelace Respiratory Research Institute	6.00E-05	5.30E-06	6.40E-06	8.30E-10	7.17E-05
KAFB Fire Station	9.30E-05	1.10E-04	3.50E-06	9.90E-09	2.07E-04
KAFB Landfill	1.60E-04	4.30E-05	5.30E-06	1.50E-08	2.08E-04
Kirtland Elementary	8.10E-05	2.20E-05	3.40E-06	3.00E-09	1.06E-04
Kirtland Family Housing	6.20E-05	9.70E-05	3.20E-06	7.60E-09	1.62E-04
Kirtland Storage Facility	8.00E-04	2.00E-05	1.00E-05	5.90E-09	8.30E-04
Manzano Offices (Fire Station)	2.10E-04	1.30E-05	8.60E-06	1.50E-09	2.32E-04
Maxwell Housing (southeast corner)	8.80E-05	2.50E-05	3.50E-06	3.40E-09	1.17E-04
Richard W. Davis Advanced Laser Facility (formally Airport Building)	1.80E-04	6.70E-05	5.30E-06	9.30E-09	2.52E-04
Sandia Elementary School	5.90E-05	8.20E-05	3.10E-06	6.80E-09	1.44E-04
TA-IV Cafeteria	1.50E-04	5.70E-05	5.20E-06	7.70E-08	2.12E-04
Wherry Elementary	8.10E-05	6.40E-05	4.10E-06	7.00E-09	1.49E-04
TOTAL	**3.31E-03**	**1.23E-03**	**1.64E-04**	**2.48E-07**	**4.70E-03**

NOTES: ACRR = Annular Core Research Reactor
AFRL = Air Force Research Laboratory
Bldg. = building
EDE = Effective Dose Equivalent
KAFB = Kirtland Air Force Base
NGF = Neutron Generator Facility
RMWMU = Radioactive and Mixed Waste Management Unit
TA = Technical Area

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 Table 5-11 and Table 5-12, respectively. Dose assessment results are summarized in Table 5-13.

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 regulates radionuclide air emissions from DOE/NNSA facilities, with the exception of naturally occurring radon. In 2014, the primary radionuclides released from SNL/NM facilities were tritium and argon-41. In 2014, the on-site MEI was located on KAFB at the Kirtland Storage Facility. The on-site MEI dose of 8.30E-04 mrem/yr resulted primarily from tritium releases at the NGF. The off-site MEI was located at the KAFB Eubank Gate area. The off-site MEI dose of 8.32E-04 mrem/yr at the Eubank Gate area also primarily resulted from tritium releases at the NGF. Both doses are well below the 10 mrem/yr EPA standard. By comparison, the average person in the U.S. receives 311 mrem/yr from natural background radiation (NCRP 2009).

Table 5-13. Calculated dose assessment results for on-site and off-site receptors and for collective populations, calendar year 2014

Dose to Receptor	Location	2014 Calculated Dose	NESHAP Standard
Individual Dose			
On-site receptor EDE to the MEI	Kirtland storage facility	8.30E-04 mrem/yr (8.30E-06 mSv/yr)	10 mrem/yr (0.1 mSv/yr)
Off-site receptor EDE to the MEI	Eubank Gate area	8.32E-04 mrem/yr (8.32E-06 mSv/yr)	10 mrem/yr (0.1 mSv/yr)
Collective Dose			
Collective regional population	Residents within a 50-mile radius	4.23E-02 person-rem/yr (4.23E-04 person-mSv/yr)	No standard available
Collective KAFB population	KAFB housing	4.52E-04 person-rem/yr (4.52E-06 person-mSv/yr)	No standard available

NOTES: EDE = effective dose equivalent
KAFB = Kirtland Air Force Base
MEI = maximally exposed individual
NESHAP = National Emissions Standards for Hazardous Air Pollutants

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, a collective calculation 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 2014 was 4.23E-02 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.

Kirtland Air Force Base

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 on a total residential population of 3,466. The 2014 calculation resulted in an estimated population dose of 4.52E-04 person-rem/yr.

5.5. Air Quality Compliance Requirements

The CAA requires the EPA to establish health-based national air quality standards, and the states are responsible for developing enforceable implementation plans to meet the standards. In Bernalillo County, the COA has this responsibility to meet national and state standards. As part of the COA's implementation plan, the COA Air Quality Program establishes permit requirements to ensure that the standards are met and monitors the ambient air in Bernalillo County to document the county's compliance. Air quality permits include requirements that facilities maintain records and monitor their operations to ensure compliance with regulations, emission limits, and other conditions of the permit. DOE/NNSA/SFO and Sandia have met the conditions of the SNL/NM permits and registrations.

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 (Air Quality).

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, particulate matter, and lead. For these criteria and other pollutants, the EPA does the following:

- Sets ambient air quality standards based on the latest science
- Requires state or local implementation plans to achieve and maintain air quality per the standards
- Establishes emissions control technologies for new or expanded sources
- Establishes hazardous air pollutant (HAP) standards and control programs

EPA standards for criteria pollutants are established in 40 CFR 50, *National Primary and Secondary Ambient Air Quality Standard*; and New Mexico Ambient Air Quality Standards are incorporated into the COA-Bernalillo County regulations in 20.11.8 New Mexico Administrative Code (NMAC). DOE/NNSA/SFO has been issued air quality permits and/or registrations for the following sources at SNL/NM.

Boilers

Table 5-14 provides the annual boiler fuel usage and associated emissions for 2014. The boilers associated with the permits and registrations are shown in Table 8-10.

Table 5-14. Boiler fuel usage and emission data, calendar year 2014

Permit or Registration Number	Fuel Usage (scf)	Emissions (tpy)				
		NO_x	CO	PM_{10}	SO_2	VOC
P374-M2	7,662,394	0.1916	0.3218	0.0291	0.0069	0.0211
R547-RV1	5,607,862	0.2804	0.2355	0.0213	0.0017	0.0154
P925-M2	11,552,424	0.5776	0.4852	0.0439	0.0104	0.0318
R1406-M1	2,853,178	0.0713	0.1198	0.0108	0.0009	0.0078
P1725-M1	8,032,969	0.4016	0.3374	0.0305	0.0024	0.0221
P1820-M1	69,761,900	1.7440	2.9300	0.2651	0.0628	0.1918
R1823	8,840,520	0.4420	0.3713	0.0336	0.0027	0.0243
R1888-RV1	22,470,897	1.1235	0.9438	0.0854	0.0067	0.0618
R1902-RV1	2,463,504	0.1232	0.1035	0.0094	0.0007	0.0068
R2109	3,677,282	0.0919	0.1544	0.0140	0.0033	0.0101
R2110	5,576,004	0.1394	0.2342	0.0212	0.0050	0.0153
R2111	2,505,300	0.0626	0.1052	0.0095	0.0023	0.0069
R2112	4,133,991	0.1033	0.1736	0.0157	0.0037	0.0114
R2113	4,584,334	0.1146	0.1925	0.0174	0.0041	0.0126
R2114	2,553,172	0.0638	0.1072	0.0097	0.0023	0.0070
R2115	1,600,483	0.0400	0.0672	0.0061	0.0014	0.0044
R2116	6,403,422	0.1601	0.2689	0.0243	0.0058	0.0176
R2117	3,329,525	0.0832	0.1398	0.0127	0.0030	0.0092
R2118	2,296,892	0.0574	0.0965	0.0087	0.0021	0.0063
R2119	1,996,494	0.0499	0.0839	0.0076	0.0018	0.0055
R2120	9,588,698	0.2397	0.4027	0.0364	0.0086	0.0264
R2121	8,896,080	0.2224	0.3736	0.0338	0.0080	0.0245
R2122	2,293,084	0.0573	0.0963	0.0087	0.0021	0.0063
R2169	761,940	0.0381	0.0320	0.0029	0.0002	0.0021
R2170	1,652,053	0.0826	0.0694	0.0063	0.0005	0.0045
R2171	1,534,442	0.0767	0.0644	0.0058	0.0005	0.0042
R2172-RV1	2,835,352	0.1418	0.1191	0.0108	0.0009	0.0078
R2173	ND[a]	1.0606	0.8909	0.0806	0.0064	0.0583
R2174-RV1	5,290,238	0.2645	0.2222	0.0201	0.0016	0.0145
R2175	3,347,206	0.1674	0.1406	0.0127	0.0010	0.0092
R3111	6,528,288	0.1632	0.2742	0.0248	0.0020	0.0180

NOTES: [a]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)
ND = not detected
SO_2 = sulfur dioxide
VOC = volatile organic compound

Emergency Generators

Table 5-15 provides the annual hours of operation and associated emissions for permitted and registered generators for 2014. There are 10 emergency generators associated with the permits and registrations (Table 8-11).

Table 5-15. Generator hours and emission data, calendar year 2014

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]	11	0.0991	0.0263	0.0018	0.0125	0.0028
	13					
	12					
	12					
415-M2	27	0.0803	0.0173	0.0057	0.0053	0.0064
924	8	0.0860	0.0197	0.0025	0.0290	0.0025
925-M1	7	0.0753	0.0172	0.0022	0.0254	0.0022
1725	27	0.2203	0.0505	0.0064	0.0743	0.0065
1820-M1	22	0.3647	0.0969	0.0353	0.0330	0.0410
	16	0.3364	0.0893	0.0326	0.0305	0.0378
1828	8.6	0.0774	0.0177	0.0023	0.0261	0.0023
1900	2.8	0.0035	0.0030	0.0002	0.0011	N/A
1930	2.2	0.0013	0.0009	0.0001	0.0001	N/A
2097	11	0.0106	0.0012	0.0000	0.0038	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.

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
VOC = volatile organic compound

Chemical Usage

Registration number 1901-RV1, issued by the COA on October 24, 2011, includes all HAP and VOC emissions from general laboratory research and development uses. During 2014, SNL/NM purchased a total of 9 tons of HAP chemicals, with the potential airborne release amounting to 1.8 tons. This number is below the registration number 1901-RV1 and major HAP thresholds of 25 tpy.

Vehicles

The General Services Administration (GSA) owns and manages the majority of government vehicles at SNL/NM. All GSA vehicles must comply with the same emission standards set for all personal and nonpersonal 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 applicable vehicles.

Miscellaneous New Source Review Permits

The SNL/NM document disintegrator is an industrial-size classified document shredder. The only pollutant of concern at this source is particulate matter. The document disintegrator operated 225 hours in 2014, which resulted in an estimated 0.6 tons of total suspended particulate.

The Thermal Test Complex is an enclosed research and development fire test complex and an important element in revitalizing SNL/NM test capabilities needed for test article qualification, development, surveillance, investigation, and modeling. The facility burned some jet fuel during 2014 and conducted some methanol fuel testing, resulting in the potential emissions shown in Table 5-16. All emissions were well below permitted limits for the facility.

Table 5-16. Potential emissions from jet fuel burned, 2014

Pollutant	Emissions (tpy)
Carbon monoxide	5.9E-02
Nitrogen dioxide	4.9E-02
Sulfur dioxide	4.5E-03
PM_{10}	3.5E-04
Hazardous air pollutant	1.02E-02
Volatile organic compound	3.2E-03

NOTE: PM_{10} = particulate matter (diameter equal to or less than 10 microns)

Open Burn Permits

Open burn permits are required for:

- Treating explosive waste by open burning (hazardous waste treatment)
- Conducting research and development activities (no limit)
- Detonating explosives aboveground (over 20 lb)
- Disposing of explosives by burning, to avoid transport or handling hazards (no limit)
- Igniting rocket motors (greater than 4,000 lb of fuel)

A list of 2014 permits can be found in 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 more than three-quarters of an acre of soil. For a list of 2014 permits, refer to Table 8-1.

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 a stationary source or group of stationary sources that emit or have the potential to emit the following: 100 tpy or greater of any criteria pollutant, 10 tpy of any single HAP, and/or 25 tpy of any combination of HAPs.

Background

The DOE/NNSA/SFO submitted Operating Permit application 515 (DOE 2002) to COA 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 greenhouse gas (GHG) emissions that define when permits under the New Source Review (NSR) Prevention of Significant Deterioration and Title V Operating Permit programs are required for new and existing industrial facilities.

On June 23, 2014, the U.S. Supreme Court determined that the EPA cannot require a source to obtain a Prevention of Significant Deterioration or Title V permit on the sole basis of its potential GHG emissions. In a memorandum (EPA 2014) dated July 24, 2014, the EPA notified the Regional Administrators that "while the EPA will no longer apply or enforce the requirement that a source

obtain a Title V permit solely because it emits or has the potential to emit greenhouse gases above major source thresholds, the agency does not read the Supreme Court decision to affect other grounds on which a Title V permit may be required or the applicable requirements that must be addressed in Title V permits."

Major stationary sources that emit at least 100,000 tpy carbon dioxide equivalent will need to include GHGs in their Title V permit applications.

During 2014, SNL/NM emitted a total of 148,404 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 facilities include the COA NSR permitted and registered sources, as summarized in 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 2014, a fee of $14,643 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 when servicing equipment; establishing requirements for recycling and recovery equipment, technicians, and reclaimers; repairing substantial leaks in refrigeration equipment containing greater than 50 lb of refrigerant; and establishing 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.



Chapter 6. Water Quality Programs

Sandia Corporation (Sandia) personnel conduct effluent monitoring through wastewater, surface water, and stormwater sampling and surveillance programs. Sandia's Water Quality Programs comply with water quality regulations established by local, state, and federal agencies. The New Mexico Environment Department (NMED) and the Albuquerque Bernalillo County Water Utility Authority (ABCWUA) implement U.S. Environmental Protection Agency (EPA) standards at the state and local level. Currently, EPA Region 6 implements stormwater regulations under the National Pollutant Discharge Elimination System (NPDES). Sandia also adheres to the water quality guidelines contained in DOE O 458.1 Change 3, *Radiation Protection of the Public and the Environment*.

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 implementing Toxic Organic Management Plans, general good housekeeping, and engineering practices. The regulatory drivers for the SNL/NM Wastewater Program are provided in Chapter 8.

6.1.1 Albuquerque Bernalillo County Water Utility Water Authority Permitting and Reporting

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). Wastewater effluent discharged from any of the six outfalls must meet the ABCWUA's Sewer Use and Wastewater Control Ordinance (SUWCO) requirements. Wastewater permits are listed in Table 6-1. Information on the ABCWUA SUWCO can be found at:

www.abcwua.org/Legislation___Ordinances.aspx

Sandia personnel and DOE/National Nuclear Security Administration (NNSA)/Sandia Field Office (SFO) personnel are required to report exceedances to the ABCWUA within 24 hours. In addition, Sandia submits semiannual wastewater reports to the ABCWUA.

The ABCWUA presents Wastewater Compliance Awards, and Sandia received five Gold Pre-Treatment Awards and one Silver Pre-Treatment Award for the 2013 to 2014 reporting year (November 2013 through November 2014). A Gold Pre-Treatment Award is given based on a facility's 100 percent compliance (90 percent compliance for a silver award) with reporting requirements and discharge limits set in its permits or for exceptional source reduction and pollution prevention.

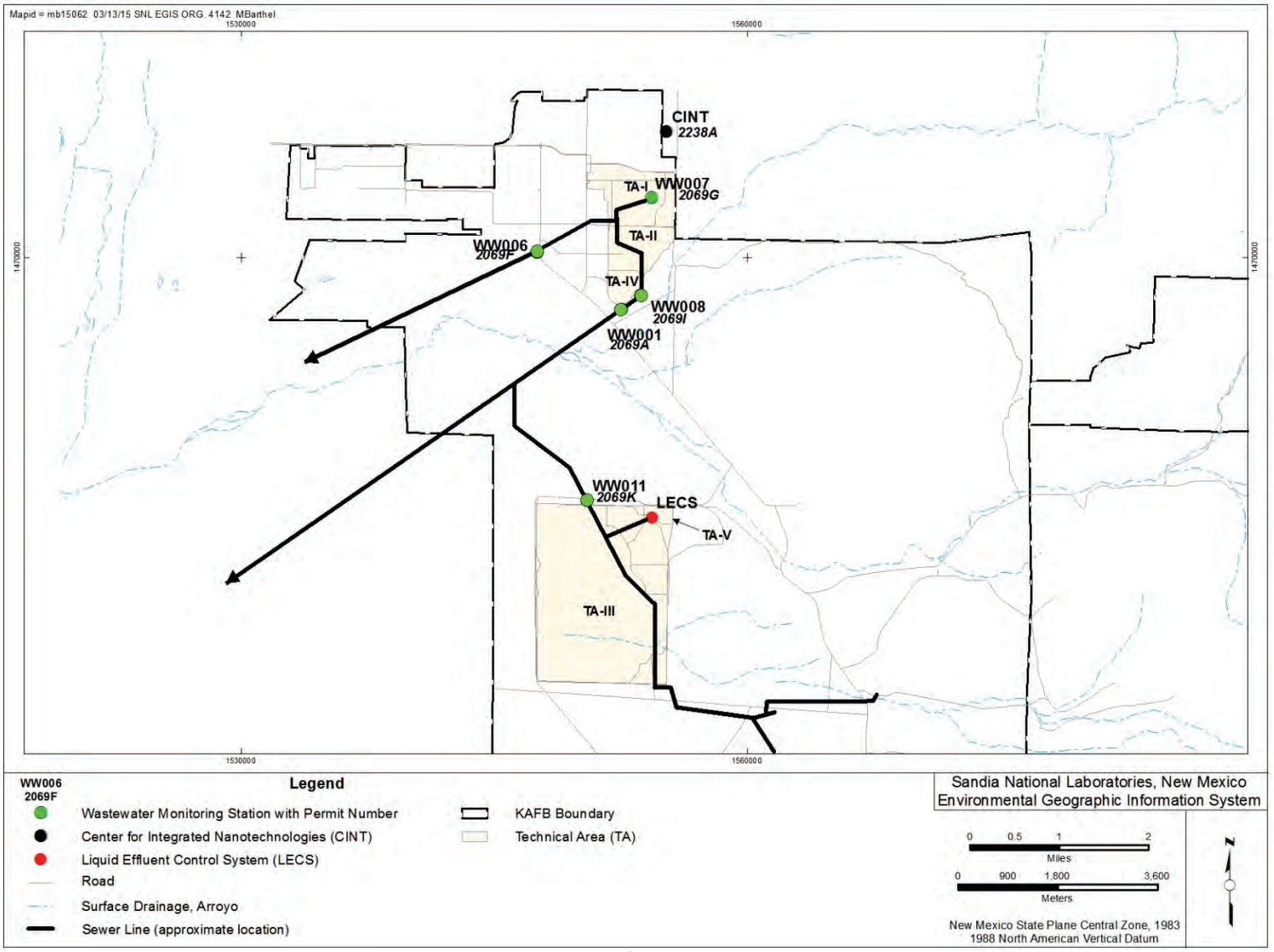


Figure 6-1. Wastewater monitoring station locations at SNL/NM

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 whether the effluent will meet regulatory criteria. Once approved, a facility is issued an internal 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.

Table 6-1. SNL/NM wastewater discharge permits and station characteristics

Permit	Station	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 MESA 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 Nanotechnologies
LECS = Liquid Effluent Control System
MESA = Microsystems and Engineering Sciences Applications
SNL/NM = Sandia National Laboratories, New Mexico
TA-V = Technical Area V
WW = wastewater

6.1.2 Wastewater Monitoring Stations and Sampling Parameters

SNL/NM has six on-site monitoring stations permitted by the ABCWUA (Figure 6-1). 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. Station WW007 (Permit 2069G) at the Microsystems and Engineering Sciences Applications (MESA) Complex is upstream of the final discharge location, Station WW001 (Permit 2069A). Wastewater monitoring station characteristics are listed in Table 6-1.

The EPA has established categorical pretreatment standards for specified classes of industrial discharges. Station WW007 (Permit 2069G) monitors the wastewater discharged from the acid waste neutralization (AWN) system within the Microelectronics Development Laboratory in Technical Area (TA) I. Laboratory discharges from the MESA Complex may also be configured to discharge to this AWN system. In addition, the CINT facility utilizes an AWN system for pretreating 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 continuous automatic sampling units and with pH sensors that continuously monitor wastewater. An auto-dialer notifies Sandia personnel before a pH regulatory limit is reached. Sandia notifies DOE/NNSA/SFO personnel when a pH limit is exceeded. DOE/NNSA/SFO personnel are required to report the exceedance limit to the ABCWUA within 24 hours.

ABCWUA personnel sample wastewater from SNL/NM permitted outfalls on a regular basis (usually twice a year) to determine compliance with permit requirements. NMED is notified when sampling is scheduled to occur and is offered the opportunity to obtain split samples for analysis. All samples are obtained as 24-hour flow proportional or time-weighted composites. In addition, Sandia personnel collect samples (sample splits) during the ABCWUA sampling event and send these 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 as follows:

- 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, semivolatile organic compounds, soluble fluoride, and volatile organic compounds

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.

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.

6.1.3 Technical Area 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 nonreactor wastewater. Nonreactor wastewater is water from restrooms and nonradioactive 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 constituents within the Liquid Effluent Control System (LECS) (Figure 6-1). 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. 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 (a treatment processor). 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 that 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 discharged safely to the public sewer system. Discharges to the sanitary sewer from LECS and other SNL/NM activities did not exceed standards for radionuclides at any of SNL/NM's wastewater monitoring stations in 2014.

6.1.4 Summary of Wastewater Monitoring Results in 2014

During 2014, Sandia personnel collected wastewater samples (sample splits) during the ABCWUA and the NMED sampling events. Laboratory analytical results for these split wastewater samples, based on the parameters shown in Section 6.1.2, confirmed that Sandia was in compliance with all NMED and ABCWUA regulations for permits 2069A, 2069F, 2069G, 2069K, and 2238A. One Notice of Violation (NOV) was issued in 2014 when analytical results revealed that levels of zinc at monitoring station WW008 (Permit 2069I) exceeded limits set in the ABCWUA Wastewater Discharge Ordinance (see Section 6.1.5 for details). In addition, the ABCWUA industrial waste engineer conducted day-long inspections of individual laboratory operations within the permitted flow basins during the months of April, May, August, October, and December 2014. All water discharged from LECS in 2014 met federal regulatory standards and DOE directives for radiological levels in wastewater. With the exception of the NOV at WW008, all analytical results from sampling conducted in 2014 met ABCWUA discharge requirements. Analytical results are provided in Appendix D.

6.1.5 Sanitary Sewer System Releases in 2014

During 2014, there was one reportable sanitary sewer system release. On January 27, 2014, the ABCWUA issued an NOV for levels of zinc that were above the permitted limit of 2.2 mg/L. The zinc level was 7.2 mg/L from a sample collected by the ABCWUA at the Permit 2069I wastewater monitoring station on October 30, 2013.

Upon receipt of the NOV, an investigation began by evaluating the chemical inventory and the waste streams resulting from zinc-containing compounds in buildings 905, 965, 970, and 1008, which drain to the Permit 2069I wastewater monitoring station. Operations in buildings 965 and 1008 do not utilize zinc. In buildings 970 and 905, the zinc-containing materials in inventory are used in a manner that does contact wastewater, and the materials are not above permitted limits. A review of the chemicals used by Custodial Services found the source of the zinc to be in a commercial floor-care wax product that was being used in Building 905 during the same time frame as the sampling.

An independent causal analysis team was formed to evaluate and determine corrective actions for this event. The following corrective actions have been implemented:

- Eliminated the use of zinc-containing wax products site-wide
- Initiated the use of zinc-free wax products site-wide
- Developed a methodology for determining the amount of zinc-containing wax product that can be removed without violating the permitted limit. Using this methodology, all zinc-containing wax was removed from the floors in the buildings that drain to the Permit 2069I wastewater monitoring station and replaced with a zinc-free wax product.

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 state's groundwater and surface water. The applicable regulations are provided 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 Sandia's Surface Discharge Program. Proposed discharges are evaluated for potential contaminants to determine whether the

discharge complies with NMED regulations for surface releases. If any discharges do not meet surface water quality standards, alternative methods of disposal are found.

Surface discharge requests are 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 2014, 12 individual surface discharge requests were made; all NMED standards were met.

6.2.2 Activities at Evaporation Lagoons

Sandia personnel with the Surface Discharge Program report on water quality results from routine sampling events at two surface discharge lagoons in TA-IV. Both lagoons are permitted through NMED in Discharge Permit-530 (DP-530). The two surface discharge lagoons (Lagoon 1 and Lagoon 2) are 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 removed prior to discharge to the TA-IV lagoons.

The original DP-530 was issued on March 8, 1988, for discharges from the pulsed power facilities located in TA-IV to lagoons 1 and 2. DP-530 was submitted pursuant to New Mexico Administrative Code (NMAC) 20.6.2.3106 of NMWQCC regulations, and it 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. On September 5, 2014, a new DP-530 was issued, which expires on September 5, 2019. The monitoring and reporting requirements are listed in Table 6-2.

Samples were collected from Lagoon 1 and Lagoon 2 on September 26, 2014. Sample fractions were collected for the parameters specified in DP-530. All samples were transported with sample custody documentation to the analytical laboratory. Although there were no discharges to Lagoon 2 in 2014, it was sampled to ensure that no residual or outside contamination had occurred. Laboratory analysis results indicated that all detected constituents met ABCWUA discharge requirements. During 2014, monthly inspections were performed on both lagoons.

Also, during 2014, Lagoon 1 was drained to the sanitary sewer system after sampling and analysis results indicated the water met the ABCWUA's discharge standards. After being drained and cleaned, the Lagoon 1 liner was inspected; no signs of cracking or damage were identified.

Table 6-2. NMWQCC monitoring and reporting requirements

Action	Frequency	Reporting
Inspect lagoons	Monthly	Documented in checklists
Drain, clean, and inspect lagoon and liner	Annually	Annually
Read water levels	Monthly	Annually
Inspect sump stations and clean as needed	Quarterly	Annually
Collect samples to analyze major cations, anions, and TDS	Biennially	Biennially
Collect samples to analyze purgeable organics using EPA Method 8240	Biennially	Biennially
Collect samples to analyze 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

6.2.3 Surface Discharge Releases in 2014

The Surface Discharge Program must be contacted in the event of an accidental release or spill to the ground surface. In 2014, four releases met the reporting requirements established by NMED. These releases are summarized as follows:

1. On Monday, April 28, 2014, Sandia maintenance personnel responded to a report of water overflowing from a cooling tower on the roof of Building 823 located in TA-I. The discharge was discovered at approximately 6:30 a.m. The duration of the discharge is unknown, but it is estimated that 12,000 gal of water mixed with a corrosion inhibitor and biocide overflowed from the cooling tower and was discharged to the ground surface. The overflow was caused by a misconfiguration of control valves in the cooling tower system. Maintenance personnel turned off the pumping system upon arrival and stopped the release.
2. On Monday, July 14, 2014, Sandia maintenance personnel responded to a report of water overflowing from a cooling tower at Building 858N located in TA-I. The discharge was discovered at approximately 6:30 a.m. The discharge occurred intermittently over a period of 31 hours. The discharge of cooling tower water to the storm drain system began at approximately 1:00 a.m. on Sunday, July 13, 2014, north of Building 858N. The discharge was caused by the failure of a water level switch, which resulted in a false low level indication to the control system. It is estimated that 53,000 gal of water mixed with a corrosion inhibitor and biocide overflowed from the cooling tower and was discharged to the storm sewer system. Maintenance personnel turned off the system and repairs were made.
3. On Monday, August 18, 2014, Sandia maintenance personnel responded to a report of a potable water main leak that began at approximately 11:00 a.m. in TA-III and continued for approximately 30 minutes. The release occurred along the TA-III perimeter road. An estimated volume of 170,000 gal was discharged onto the road. The water flowed north approximately 5,100 ft into the existing earthen storm channels. Maintenance personnel turned off the system and repairs were made.
4. On Tuesday, November 25, 2014, Sandia maintenance personnel responded to a reported wastewater release from a holding tank at Building 9960 located in Coyote Test Field. The release was discovered at approximately 4:15 p.m., and the majority was contained inside a secondary containment structure. The release was caused by a broken valve at the base of a 5,000 gal polyethylene holding tank. It is estimated that 5,000 gal of filtered wastewater containing residual amounts of high explosive (HE) compounds was released to the secondary containment. A sample of the wastewater was collected and submitted for laboratory analysis of HE compounds; the results revealed HE compounds at 5.1 parts per million. A small amount of wastewater was released to the soil. Soil sample analyses revealed levels of HE compounds that were below NMED residential screening limits (NMED 2012). The wastewater in the holding tank secondary containment structure was refiltered to lower the levels of HE compounds below ABCWUA wastewater discharge limits and then was discharged to the sanitary sewer system.

6.3. Stormwater Program

Sandia's Stormwater Program is responsible for Sandia's compliance with NPDES stormwater permits, which includes helping line organizations comply with permit conditions and regulatory requirements. Sandia's compliance with NPDES permits reduces the impact of Sandia's construction, industrial, and municipal 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, including sediment. The Stormwater Program coordinates with other Sandia programs and organizations to implement stormwater control measures and install best management practices (BMPs) to prevent or reduce potential contaminants from being transported in stormwater runoff. Stormwater contaminants such as oil, solvents, vehicle residues, chemicals, metals, sediments, building materials, hazardous materials, fertilizers, pesticides, herbicides, and sanitary waste may derive from construction, industrial, and municipal activities.

Potential stormwater contaminants are controlled by minimizing stormwater exposure to chemicals and materials; performing good housekeeping practices; implementing a spill prevention, control, and countermeasure (SPCC) plan; installing and maintaining erosion and sediment controls; managing postconstruction stormwater runoff; training employees on how their job may impact stormwater quality; controlling non-stormwater discharges; implementing solid waste management and recycling programs; and stabilizing construction sites. In addition, some facilities, such as the Hazardous Waste Handling Unit (HWHU) and the Radioactive and Mixed Waste Management Unit (RMWMU), have lined catchment basins. Stormwater that collects in these catchment basins is evaluated for potential contaminants.

The State of New Mexico has defined "surface water(s) 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, sand flats, 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 man-made 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 [Clean Water Act] 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 New Mexico's surface waters, even if those waters are not "waters of the United States" 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 approximately 8 miles to its discharge point at the Rio Grande. The arroyo is a significant topographic feature across KAFB, where erosion of unconsolidated basin sediments has resulted in a channel width of over 0.5 miles in some areas. Tijeras Arroyo and its named tributary, Arroyo de Coyote, are both designated as "waters of the United States."

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. Sandia also conducts various activities in TA-V and remote mountain and canyon areas in the Arroyo del Coyote watershed. Arroyo del Coyote flows into Tijeras Arroyo northwest of the Tijeras Arroyo Golf Course. Discharges from the majority of TA-III and Coyote Test Field flow to playa lakes west of the KAFB boundary. These lakes are not designated "waters of the United States," but they are considered "surface waters of the state." Activities in all these SNL/NM defined drainage areas (Figure 6-2) are evaluated for NPDES permit applicability and compliance.

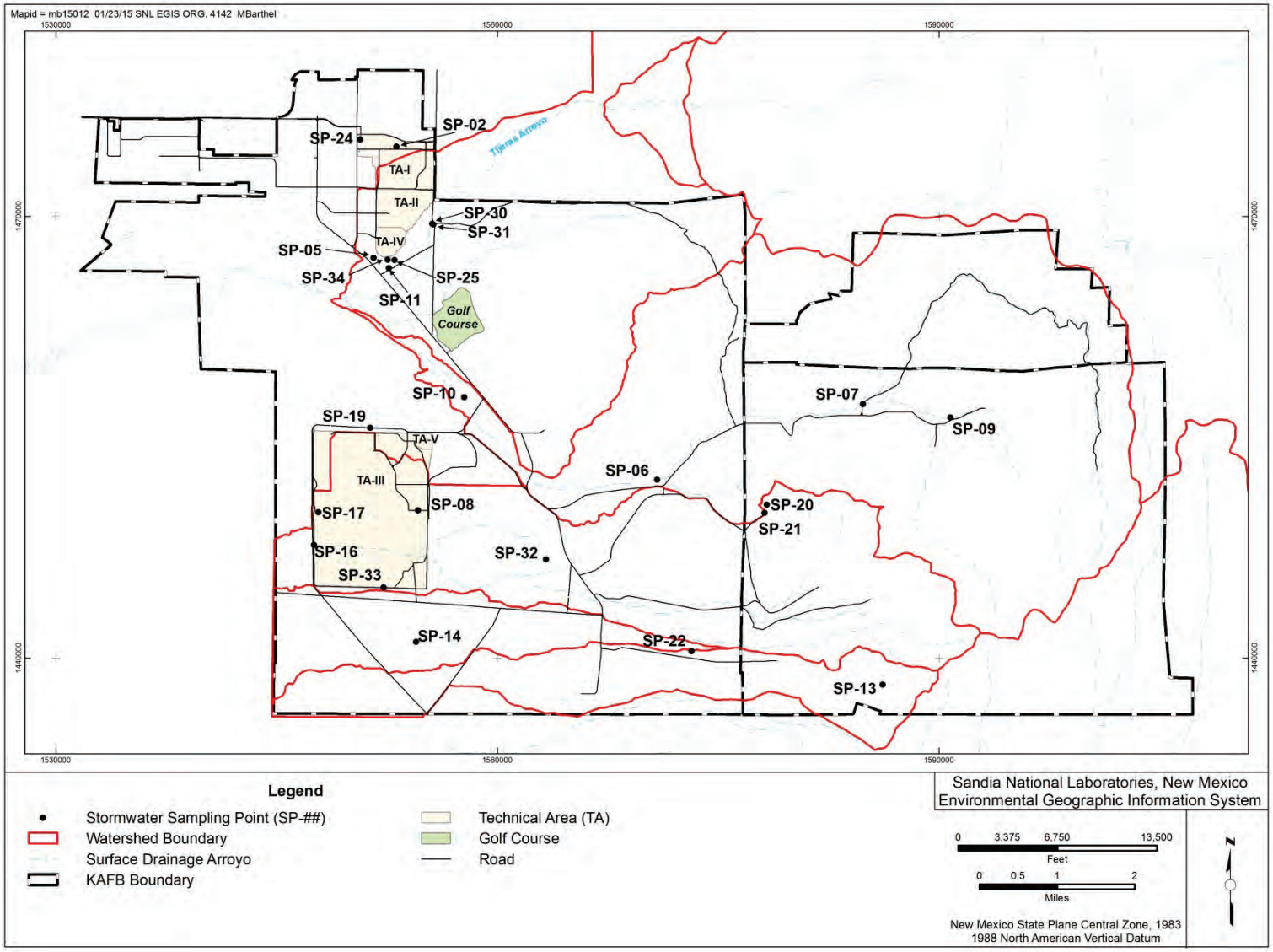


Figure 6-2. Stormwater sampling point locations at SNL/NM

6.3.2 National Pollutant Discharge Elimination System Permitting

The EPA retains authority for NPDES permits in New Mexico. Sandia has obtained coverage under two NPDES permits (pending a third), as listed here.

Multi-Sector General Permit (MSGP). The MSGP is intended to regulate stormwater quality associated with industrial operations or activities. Operators are required to develop a site-specific Stormwater Pollution Prevention Plan (SWPPP), submit a Notice of Intent (NOI), implement control measures, conduct site inspections, and sample stormwater runoff for comparison to national benchmark values.

An NOI was submitted to the EPA for coverage under the 2008 MSGP, and it was approved in 2009. Both Sandia and DOE are declared operators for this permit. The MSGP SWPPP was modified in 2014 to change the sampling period, add a site, and address sector-specific controls and requirements. Sites and activities covered under the MSGP are listed in Table 6-3. The 2008 MSGP expired on September 29, 2013, and it is administratively continued pending reissuance by the EPA. Routine site inspections and stormwater sampling are conducted, and stormwater control measures have been implemented as necessary to maintain compliance with the MSGP.

Construction General Permit (CGP). The CGP is intended to regulate stormwater quality during and after construction activities. Operators are required to develop a SWPPP, submit an NOI, install BMPs, implement pollution prevention measures, conduct site inspections, and stabilize all disturbed areas of the site upon completion of the project.

NOIs are submitted to the EPA for coverage under the 2012 CGP for every construction project anticipated to disturb one or more acres of land, following development of a site-specific SWPPP. During 2014, SNL/NM had 17 active NOIs, which are listed in Table 8-1. To maintain compliance with the CGP, SWPPPs are updated and modified as necessary, site inspections are conducted on a routine basis and after storm events, and pollution prevention measures are implemented until sites are stabilized.

Middle Rio Grande Watershed-Based Municipal Separate Storm Sewer System (MS4). This MS4 permit establishes requirements to reduce pollution carried by stormwater runoff and restore portions of the Middle Rio Grande River. The MS4 was effective upon publication in the Federal Register on December 22, 2014. Sandia's Stormwater Management Program Plan and NOI are due for submission to the EPA in June 2015. Sandia and DOE will be permittees.

6.3.3 Stormwater Sampling and Parameters

The MSGP is the only permit Sandia holds that requires quarterly stormwater sampling. Given that SNL/NM is located in an arid/semiarid region of the Southwest where stormwater runoff is irregular, the sampling quarters have been adjusted to accommodate the wet season. SNL/NM's historical meteorological data shows that approximately 60 percent of the annual rainfall occurs in four months of the year (July, August, September, and October). Therefore, the defined wet season for stormwater sampling at SNL/NM is July 1 through October 31. In addition to collecting monthly stormwater samples, performing visual assessments allows for the observation of color, odor, clarity, solids, oils, and foam that may indicate the presence of a pollutant.

Table 6-3. SNL/NM sites covered under the Multi-Sector General Permit

Sector Title	Permitted SNL/NM Sites	Sector Label
Scrap recycling facilities	• Reapplication Yard • Solid Waste Transfer Station • TA-III Borrow Pit	N1
Hazardous waste treatment, storage, or disposal facilities	• AHCU • AMPL • CAMU • CINT • CWL • HWHU • Manzano Storage Bunkers • Outdoor Mixed Waste Storage Lot • RMWMU • TTU • SWMUs (see list in Notes)	K
Electronic, electrical, photographic, and optical goods	• Building 858 Complex • NGF	AC
Mineral and mining dressing and sand and gravel mining materials	• TA-III Borrow Pit	J1
Landfills	• Classified Waste Landfill	L1

NOTES: AHCU = Auxiliary Hot Cell Unit
AMPL = Advanced Manufacturing Process Laboratory
CAMU = Corrective Action Management Unit
CINT = Center for Integrated Nanotechnologies
CWL = Chemical Waste Landfill
HWHU = Hazardous Waste Handling Unit
NGF = Neutron Generation Facility
RMWMU = Radioactive and Mixed Waste Management Unit
SNL/NM = Sandia National Laboratories, New Mexico
SWMU = Solid Waste Management Unit (in 2014, the following SWMUs were covered under the MSGP):

- Coyote Canyon Blast Area (two sites)
- Gun Facility (Building 6570)
- Lead Firing Range–Thunder Range
- Liquid Waste Disposal System surface impoundments
- Long Sled Track
- Mine Shaft
- Mixed Waste Landfill
- Old Acid Waste Line Outfall
- Old Burn Site
- Short Sled Track
- Stormwater System outfalls 233 and 234 (TA-IV above Tijeras Arroyo)
- Surface Discharge Site
- TA-V 6597 Cistern

TA = technical area
TTU = Thermal Treatment Unit

Figure 6-2 illustrates the stormwater sampling point (SWSP) locations associated with the MSGP permit (SWSPs 5, 6, 8, 10, 11, 13, 14, 16, 17, 19, 22, 32, 33, and 34). Using the MSGP site locations, along with the watershed boundaries and flow patterns, the stormwater sampling points were located at positions that were best suited to collect a representative sample of stormwater runoff. Figure 6-2 also includes numerous environmental surveillance stormwater sampling points (SWSPs 2, 7, 9, 20, 21, 24, 25, 30, and 31).

Table 6-4 provides the analytical parameters to be sampled for in each industry sector, with the exception of Sector AC, as stormwater sampling is not required by the 2008 MSGP.

Table 6-4. Multi-Sector General Permit stormwater sampling requirements and benchmark standards

Parameter	MSGP Sector and/or Subsector	Benchmark Standards (mg/L)
Total recoverable arsenic	K	0.15
Total recoverable cadmium	K	0.0029[a]
Total cyanide	K	0.022
Total recoverable lead	N1, K	0.122[a]
Total recoverable mercury	K	0.0014
Total recoverable magnesium	K	0.064
Total recoverable selenium	K	0.005
Total recoverable Silver	K	0.0065[a]
Total recoverable aluminum	N1	0.75
Total recoverable copper	N1	0.0189[a]
Total recoverable iron	N1	1.0
Total recoverable zinc	N1	0.16[a]
Chemical oxygen demand	K, N1	120
Ammonia	K	2.14
Nitrate plus nitrite (as nitrogen)	J1	0.68
Total suspended solids	L1, N1, J1	100

NOTES: [a]The benchmark standard value of metal is hardness dependent. The value presented in the table is based on the water hardness of the receiving water in the Middle Rio Grande (125–150 mg/L).
MSGP = Multi-Sector General Permit

6.3.4 Summary of Stormwater Program Activities in 2014

Stormwater sampling data from July 1, 2013, through October 31, 2014, identified the following notable benchmark standard exceedances: cadmium at sampling points associated with three Solid Waste Management Units (SWMUs) (SP-06, SP-13, and SP-17), and lead at sampling points associated with two SWMUs (SP-06 and SP-14). Where cadmium and silver exceeded benchmark standards at SP-11 (SWMU 46) in 2013, these analytes were below benchmark standards for the 2014 SP-11 sample, while cyanide still exceeded benchmark standards. Magnesium exceeded benchmark standards at every Sector K sampling point, but it has been found in background soil samples and may be derived from local dolomite bedrock. Exceedances in chemical oxygen demand, total suspended solids, and magnesium can be attributed to a heavy sediment load typical of local monsoon rains. Exceedances in aluminum, iron, copper, and zinc at SP-05 were consistent with natural background concentrations at SNL/NM.

Since September 28, 2010, stormwater at SWSP-11 (located at SWMU 46 and the TA-IV escarpment) has 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 SWSP-11. Erosion and sediment controls were installed on the TA-IV escarpment in 2010, but monsoon storm events in 2013 damaged the controls. In 2013, BMPs were reevaluated and a corrective action plan was developed to address the erosion on the escarpment. In late 2014, five substantial check dams were installed in the escarpment's channels, and a sediment basin (designed to capture a 24-hour, 25-year rain event) was installed upstream of the SWSP-11 outfall. The analytical results, as submitted to the EPA, are provided in Appendix E.

Stormwater was assessed visually when there was adequate runoff to collect a sample. Settled or suspended sediment is common in samples throughout SNL/NM and is likely a result of sediment displaced from heavy summer precipitation events that have collected from areas of channelized flow. Observations from site inspections did not indicate that erosion is occurring as a result of permitted activities.

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 3 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, double-wall tanks, sloped pads, trenches, and containment pallets. Two 20,000 gal fiberglass USTs and one 10,000 gal UST are currently in operation and registered with NMED. Forty-seven ASTs are currently in operation, of which four ASTs at SNL/NM are registered with NMED. Table 8-1 provides the permit numbers for those tanks that are registered with NMED. Sandia's State of New Mexico owner identification number is 14109.

An SPCC Plan is required under the CWA. Sandia's SPCC Plan was revised in 2011 to incorporate changes to 40 Code of Federal Regulations (CFR) 112 and 20.5 NMAC. The SPCC Plan must be updated at least every five years.

Sandia'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 having the following types of oil-containing equipment: ASTs (e.g., tanks and transformers), USTs, container storage areas, or portable equipment.

This page intentionally left blank.



Chapter 7. Quality Assurance

Sandia Corporation (Sandia) takes responsibility and accountability for implementing quality assurance (QA) for all its operations as specified in International Organization for Standard 9001 (ISO 2008), the Contractor Requirements Document of the U.S. Department of Energy (DOE) Order 414.1D (DOE O 414.1D), *Quality Assurance*, and 10 Code of Federal Regulations (CFR) 830 (10 CFR 830), Subpart A, "Quality Assurance," via policy statements, processes, and procedures, and by executing the actions specified in those processes and procedures. Sandia management is responsible for ensuring the quality of the company's products; for assessing its operations, programs, projects, and business systems; and for identifying deficiencies and effecting continuous improvements.

7.1. Environmental Monitoring Quality Assurance

Environmental monitoring (which includes sampling) is conducted in accordance with program-specific sampling and analysis plans (SAPs), work plans, or Quality Assurance Plans, which contain applicable QA elements. These documents meet appropriate federal, state, and local regulatory guidelines for conducting sampling and analysis activities. Personnel in various programs collect environmental samples and analyze the samples for radiological and nonradiological constituents. Some sampling is specifically mandated by regulations to meet compliance, while other sampling activities are carried out in accordance with DOE directives.

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

7.1.1 Sample Management Office

The Sample Management Office (SMO) packages, ships, and tracks environmental samples to off-site (contracted) laboratories. The Sandia National Laboratories, New Mexico (SNL/NM) Radiation Protection Sample Diagnostics (RPSD) laboratory processes and analyzes some samples for radiological constituents in accordance with RPSD procedures. SMO personnel are responsible for QA and QC once field team members relinquish the samples to the SMO.

SMO personnel provide guidance and sample management support for field activities. However, program leads are responsible for each distinct program's overall adherence to and compliance with any sampling and analysis activity performed.

7.1.2 Contract Laboratory Selection

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 Sample Management Office* (SNL/NM 2013f). All laboratories must employ U.S. Environmental Protection Agency (EPA) test procedures whenever 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) for Analytical Laboratories SNL/NM (SNL/NM 2011). All calibrations and detection limits must be verified before sample analysis and data reporting. Once a laboratory has passed an initial appraisal and has been awarded a contract, the SMO is responsible for continuously monitoring laboratory performance to ensure that the laboratory meets its contractual requirements during annual audits.

SMO contract laboratories perform work in compliance with the Sandia SOW for Analytical Laboratories (SNL/NM 2013g). 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). Contract laboratories also participate in commercial vendor programs designed to meet the evaluation requirements given in the proficiency testing section (Chapter II) of the National Environmental Laboratory Accreditation Conference (NELAC) Standard.

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 data's quality and final usability. Errors, some of which are unavoidable, that can be introduced into the sampling process include potential sample contamination in the field or during 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. The contract laboratory also determines the analytical accuracy, precision, contamination, and matrix effects associated with each analytical measurement.

QC sample results are compared either to statistically established control criteria or to 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.

The Radiation Protection Dosimetry Program (RPDP) at SNL/NM owns, issues, and processes thermoluminescent dosimeters used to measure gamma radiation. The technical basis for the environmental dosimeter monitoring program is provided in *Description and Procedures of the Environment 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/NM 2013f). Automated dosimeter equipment is used to manage environmental dosimeters. The RPDP external dosimetry technical staff perform data reduction and dose calculations.

7.1.4 Data Validation and Records Management

Sample collection, analysis request and chain of custody (ARCOC) documentation, and measurement data are reviewed and validated for each sample collected. Analytical data reported by contract laboratories are reviewed to assess laboratory and field precision, accuracy, completeness, representativeness, and comparability with respect to the particular program's method of compliance and DQOs.

The following sources are reviewed and the data validated at a minimum of three levels:

- The analytical laboratory validates data according to the laboratory's QA plan, standard operating procedures, and client-specific requirements.
- Sandia's SMO personnel review the analytical reports and corresponding sample collection and ARCOC documentation for completeness and laboratory contract compliance.
- A Sandia program lead reviews program objectives, regulatory compliance, and project-specific data quality requirements, and makes the final decision regarding the data's usability and reporting.

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. Sample Management Office Activities in 2014

SMO activities in 2014 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 2014, the SMO processed a total of 4,229 samples, including QC samples, in support of Sandia programs and projects. Of these, 3,908 samples (including QC) were for the first five programs and projects listed here. A total of 1,141 samples were submitted as field and analytical QC samples to assist with data validation and decision making. The following programs provided samples:

- Air Quality Compliance
- Water Quality
- Terrestrial Surveillance
- Long-Term Stewardship
- Environmental Restoration Operation
- Waste Management
- Decontamination and Demolition

During 2014, Sandia employed the following contract laboratories to analyze SNL/NM samples:

- General Engineering Laboratories (GEL) in Charleston, South Carolina
- Test America Inc. in St. Louis, Missouri; Costa Mesa, California; Austin, Texas; and 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
- Cape Fear Analytical in Wilmington, North Carolina

7.2.2 Laboratory Quality Assurance Assessments and Validation

In 2014, SMO personnel continued independent, on-site assessments and validation at the NELAC-approved laboratories used by Sandia. Specific checks were made for documentation completeness, proper equipment calibration, proper laboratory practices, and batch QC data. These assessments focused on data defensibility and regulatory compliance requirements specific to SNL/NM work.

7.2.3 Quality Assurance Audits

The DOE Consolidated Audit Program (DOECAP) conducted audits in 2014 at the primary SMO contract laboratories using DOECAP Quality Systems Analytical Services requirements. The audit reports, laboratory responses, and closure letters are all posted and tracked through the DOECAP website. The SMO worked closely with the contract laboratories to expeditiously resolve audit findings. Decisions regarding sample distribution to contract laboratories were based on audit information, including outstanding corrective actions.

No findings for SNL/NM samples were issued in 2014 in either the DOECAP audit or the MAPEP audit.



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

Table 8-1 through Table 8-11 summarize various permits, regulations, and standards that define environmental programs at Sandia National Laboratories, New Mexico (SNL/NM) and the corporation's compliance with those requirements.

Table 8-1. Summary of environmental permits and registrations in effect, 2014

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	4/1/2014	3/31/2019	ABCWUA
MESA	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	9/1/2014	7/31/2019	ABCWUA
General	WW011 Station Manhole, north of TA-III (includes TA-III and TA-V, and Coyote Test Field sewer lines)	2069 K	11/1/2014	9/30/2019	ABCWUA
CINT	CINT	2238A	5/25/2011	4/30/2016	ABCWUA
Surface Discharge					
Pulsed Power Development Facilities (Discharge Plan)	TA-IV, Lagoon I and Lagoon II	DP-530	9/5/2014	9/5/2019	NMED
Underground Storage Tanks					
UST (10,000 gal)	TA-I	2418	6/1/2013	6/1/2014	NMED
UST (20,000 gal)	TA-I	2416	6/1/2013	6/1/2014	NMED
UST (20,000 gal)	TA-I	2417	6/1/2013	6/1/2014	NMED
Aboveground Storage Tanks					
AST (2,000 gal)	TA-I	1998	6/1/2013	6/1/2014	NMED
AST / (4,500 gal)	TA-IV	2001	6/1/2013	6/1/2014	NMED
AST (5,000 gal)	TA-III	1999	6/1/2013	6/1/2014	NMED
AST (5,500 gal)	CTF	2000	6/1/2013	6/1/2014	NMED
Stormwater					
NPDES Industrial Permits					
NPDES MSGP	SNL/NM industrial discharge locations	DOE NMR05GP29 Sandia NMR05GQ63	10/15/2009	MSGP expired 9/29/2013; EPA pending reissuance	EPA
NPDES MSGP	FAA/AANC/NDI Validation Center	DOE NMR05GL16 Sandia NMR05GL17	6/1/2009	MSGP expired 9/29/2013; EPA pending reissuance	EPA

Notes at end of table.

Table 8-1. Summary of environmental permits and registrations in effect, 2014 (continued)

Permit Type and/or Facility Name	Location	Permit Number	Issue Date	Expiration Date	Regulatory Agency
NPDES Construction Permits					
4169 Volt Feeder	Coyote Test Field	SNL/NM–NMR12AQ28	12/24/2013	CGP expires 2/16/2017	EPA
Building 704	TA-I	SNL/NM–NMR12A806	7/11/2012	NOI terminated 9/25/2014	EPA
Building 730	TA-I	SNL/NM–NMR12AG75	4/3/2013	NOI terminated 7/10/2014	EPA
DETS Thunder Range	Thunder Range	SNL/NM–NMR12A228 DOE/SFO–NMR12A230	6/13/2012	CGP expires 2/16/2017	EPA
DETS North	Thunder Range	SNL/NM–NMR12A222 DOE/SFO–NMR12A224	6/13/2012	CGP expires 2/16/2017	EPA
Mixed Waste Landfill and Borrow Pit	TA-III	SNL/NM–NMR12A183 DOE/SFO– NMR12A190	6/13/2012	CGP expires 2/16/2017	EPA
National Solar Thermal Test	Coyote Test Field	SNL/NM–NMR12AB09	10/16/2012	NOI terminated 4/16/2014	EPA
TA-II Corporate Storage Building	TA-II	SNL/NM–NMR12N91	10/23/2013	CGP expires 2/16/2017	EPA
Telecommunications Cable Installation to Building 9972	Coyote Test Field	SNL/NM–NM12AH77	4/30/2013	CGP expires 2/16/2017	EPA
TCR Phase II	TA-III	SNL/NM–NMR12A044	4/1/2010	NOI terminated 2/19/14	EPA
PSEL	TA-I	SNL/NM–NMR12AW94	7/24/2014	NOI terminated 10/2/2014	EPA
B6644 Repaving Project	TA-III	SNL/NM–NMR12AS23	3/3/2014	NOI terminated 5/20/2014	EPA
Building 705	TA-I	SNL/NM–NMR12AW90	8/13/2014	CGP expires 2/16/2017	EPA
6000 Igloos	6000 Igloos	SNL/NM–NMR12AV98	7/3/2014	CGP expires 2/16/2017	EPA
TA-III Road Replacement	TA-III	SNL/NM–NMR12AU80	6/3/2014	CGP expires 2/16/2017	EPA
887 Sanitary Sewer Replacement	TA-I	SNL/NM–NMR12AY05	8/28/2014	CGP expires 2/16/2017	EPA
TA-IV Escarpment BMPs	TA-IV	SNL/NM–NMR12AZ96	11/12/2014	CGP expires 2/16/2017	EPA
Ecological					
New Mexico Department of Game and Fish for Scientific/Educational Purposes Authorization for Taking of Protected Wildlife	Site-Wide Ecological Monitoring Activity	2931	3/12/2014	12/31/2016	New Mexico Department of Game and Fish
U.S. Fish and Wildlife Service Special Purpose–Salvage	Site-Wide Ecological Monitoring Activity	MB02907A-0	4/1/2013	3/31/2016	U.S. Fish and Wildlife Service
U.S. Fish and Wildlife Service Special Purpose	Site-Wide Ecological Monitoring Activity	MB02872A-2	4/30/2013	3/31/2016	U.S. Fish and Wildlife Service

Notes at end of table.

Table 8-1. Summary of environmental permits and registrations in effect, 2014 (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 new permit takes effect	NMED
Module IV, Special Conditions Pursuant to the 1984 HSWA to RCRA	Solid Waste Management Units and Areas of Concern	NM5890110518	8/26/1993	9/20/2002, remains in effect until new permit takes effect	NMED
Class III Permit Modification for the Management of Hazardous Remediation Waste in the CAMU, TA-III	CAMU	NM5890110518	9/25/1997	9/20/2002, remains in effect until new permit takes effect	NMED
RCRA Part A Permit Application for Hazardous Waste Management Units	RMWMU; 5 Manzano Bunkers; Auxiliary Hot Cell Facility	NM5890110518	First submitted 8/1990; rev. 5/4/2012	No expiration date; remains in effect until new permit takes effect	NMED
RCRA Facility Operating Permit	• Hazardous Waste Handling Unit • TTU • RMWMU • Auxiliary Hot Cell Unit • Manzano Storage Bunkers (5) • CAMU	NM5890110518	Final Order signed 12/19/2014 Issued 1/27/2015; effective 2/26/2015	2/26/2025	NMED
Open Burn Permits[a]					
Propellant Applications–Terminal Ballistics Facility	Building 6750	14-0010	1/3/14	12/31/14	COA
Explosive Applications–Terminal Ballistics Facility	Building 6750	14-0008	1/3/14	12/31/14	COA
Explosive Applications–Terminal Ballistics Facility	Building 6750	14-0009	1/3/14	12/31/14	COA
Thermite Applications–Terminal Ballistics Facility	Building 6750	14-0011	1/3/14	12/31/14	COA
Explosives Testing	Thunder Range	14-0012	1/3/14	12/31/14	COA
TTU	TTU[a]	14-0013	1/3/14	12/31/14	COA
Explosives Testing	Buildings 9920, 9930, and 9939 test sites	14-0005	1/3/14	12/31/14	COA
Explosives Testing	Building 9920 test site	14-0003	1/3/14	12/31/14	COA
Carbon Fiber Epoxy Burn Tests	Burn site	14-0038	7/11/14	12/31/14	COA
Explosives Training and Testing	DETS	14-0007	1/3/14	12/31/14	COA
IED and HME Explosives Testing and Training	Building 9930 Test Site	14-0004	1/3/14	12/31/14	COA

Notes at end of table.

Table 8-1. Summary of environmental permits and registrations in effect, 2014 (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	TA-I	Permit 374-M2	12/6/2010	N/A	COA
Standby Diesel Generators at Building 862	TA-I	Permit 402	5/07/1996	N/A	COA
RMWMU	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
PETL Emergency Generator	TA-I	Permit 925-M2	4/11/2012	N/A	COA
Advanced Manufacturing Prototype Facility	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
CINT	Sandia Science and Technology Park	Permit 1725-M1	4/12/2012	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 TA-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
Site-wide 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-M2	1/20/2014	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
Building 894 Boiler Registration	TA-I	Registration 2121	11/30/2010	N/A	COA

Notes at end of table.

Table 8-1. Summary of environmental permits and registrations in effect, 2014 (continued)

Permit Type and/or Facility Name	Location	Permit Number	Issue Date	Expiration Date	Regulatory Agency
Air (Permits and Registrations) (continued)					
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[b] (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	12/16/2014	12/16/2019	COA
Thunder Range–Range 4 Programmatic	Remote	P09-0022	12/16/2014	12/16/2019	COA
DETS Complex/ Building 9940 (Modification/Expansion) Programmatic	Remote	P09-0014	6/23/2014	6/23/2019	COA
DETS–East Programmatic	Remote	P09-0016	6/23/2014	6/23/2019	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-I	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 TTU	Remote	10-564-4405	10/20/2010	10/20/2015	COA
TCR Phase II	TA-III	5356-C	3/20/2012	8/31/2013	COA
Building 704 Construction	TA-I	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–Building 9972	Remote	5983-C	4/29/2013	4/29/2014	COA
Corporate and IT Storage Building Construction	TA-II	6263-C	9/24/2013	9/24/2015	COA
Assembly Building at Thunder Range	Remote	6303-C	10/9/2013	10/9/2015	COA

Notes at end of table.

Table 8-1. Summary of environmental permits and registrations in effect, 2014 (continued)

Permit Type and/or Facility Name	Location	Permit Number	Issue Date	Expiration Date	Regulatory Agency
Fugitive Dust Control and Demolition Permit File[b] (Permits) (continued)					
Building 6642 Pavement Reconstruction	TA-III	6353-C	11/18/2013	11/18/2015	COA
Reconstruct East Roadway in TA-III	TA-III	6623-C	5/15/2014	5/23/2016	COA
Regional Test Center Construction	TA-I	6751-C	7/17/14	7/7/2015	COA
Building 705 Construction	TA-I	6771-C	8/5/2014	8/5/2019	COA
26002 Igloos Erosion Protection Installation	Remote	6682-C	6/13/2014	6/13/2016	COA
Building 887 Sanitary Sewer Replacement	TA-I	6772-C	8/6/2014	8/6/2019	COA
Reconstruct N Avenue Parking Lots	N/A	6716-C	6/24/2014	6/24/2016	COA
TA-IV South Escarpment Stabilization	TA-IV	6895-C	10/10/2014	10/10/2019	COA

NOTES: [a]COA issues Open Burn Permits for no more than a year at any one time.
[b]General contractors obtain permits directly from COA.

AANC = Airworthiness Assurance Nondestructive Inspection Validation Center
ABCWUA = Albuquerque Bernalillo County Water Utility Authority
ARRA = American Recovery and Reinvestment Act
AST = aboveground storage tank
BMP = best management practice
CAMU = Corrective Action Management Unit
CGP = Construction General Permit
CINT = Center for Integrated Nanotechnologies
COA = City of Albuquerque
CTF = Coyote Test Field
DETS = Dynamic Explosives Test Site
DOE = U.S. Department of Energy
DP = discharge permit
EPA = U.S. Environmental Protection Agency
FAA = Federal Aviation Administration
HAP = hazardous air pollutant
HME = homemade explosive
HSWA = Hazardous and Solid Waste Amendments
IED = improvised explosive device
IT = information technology
MESA = Microsystems and Engineering Sciences Applications
MSGP = Multi-Sector General Permit
N/A = not applicable
NM = New Mexico
NMED = New Mexico Environment Department
NOI = Notice of Intent
NPED = National Pollution Discharge Elimination System
P2 = Pollution Prevention
PETL = Processing and Environmental Technology Laboratory
PSEL = Photovoltaic Systems Evaluation Laboratory
RCRA = Resource Conservation and Recovery Act
RWMMU = Radioactive and Mixed Waste Management Unit
SFO = Sandia Field Office
SNL/NM = Sandia National Laboratories, New Mexico
TA= technical area
TCR = Test Capabilities Revitalization
TTU = Thermal Treatment Unit
U.S. = United States
UST = underground storage tank
WW = wastewater

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
	114	40 CFR 98		Mandatory Greenhouse Gas Reporting
	110-116	40 CFR 52	N/A	Permit Fees
		40 CFR 52	20.11.05 NMAC	Visible Air Contaminants
		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
		40 CFR 51	20.11.100 NMAC	Motor Vehicle Inspection: Decentralized
		40 CFR 60 40 CFR 63	20.11.65 NMAC	Volatile Organic Compounds
		40 CFR 60	20.11.66 NMAC	Process Equipment
		40 CFR 60	20.11.22 NMAC	Wood Burning
		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
		40 CFR 51	20.11.103 NMAC	Motor Vehicle Visible Emissions
	160-169	40 CFR 52	20.11.61 NMAC	Prevention of Significant Deterioration
	111	40 CFR 60	20.11.63 NMAC	New Source Performance Standards
II	211	40 CFR 80	20.11.102 NMAC	Oxygenated Fuels
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
N/A = not applicable
NMAC = New Mexico Administrative Code
SNL/NM = Sandia National Laboratories, New Mexico

Table 8-3. Summary of compliance history with regard to mixed waste at SNL/NM

Date	Milestone	Comment
Nov 1984	1984 HSWA to RCRA	Extended storage became an issue after HSWA established land disposal restrictions and a prohibition on storage of wastes for more than one year.
Aug 1990	RCRA Part A interim status permit application	Submitted the RCRA Part A interim status permit application to NMED for mixed waste storage. Later revisions to the interim status application were added to the proposed mixed waste treatment processes.
Oct 1992	FFCA passed	The FFCA allows storage of mixed waste that does not meet the applicable treatment standard beyond the one-year RCRA time limit. This requires DOE to submit a site treatment plan for mixed waste.
Dec 1992	NON issued	The U.S. Environmental Protection Agency issued a NON for storage of RCRA-regulated mixed waste over the one-year maximum period.
Oct 1993	Conceptual STP submitted	DOE submitted a conceptual STP for mixed waste to NMED; other drafts followed.
Mar 1995	Final STP submitted	DOE submitted a final STP for mixed waste to NMED.
Jun 1995	HDRV Project initiated	The HDRV Project was initiated to characterize and sort legacy mixed waste. The project continued into 1997, when it was replaced with new sorting procedures.
Oct 1995	FFCO signed	The FFCO, an agreement between NMED, DOE, and Sandia, details specific actions required with regard to mixed waste management, including the requirement to develop an STP, to be updated annually.
Mar 1996	STP milestones met	Updated the STP to reflect fiscal year 1995 activities.
Sep 1996	First mixed waste shipment FFCO Amendment No. 1	The first mixed waste shipment was made; mixed waste was sent to Perma-Fix/Diversified Scientific Services, Inc., for treatment. The FFCO was amended.
Dec 1996	Revisions to proposed treatment methods	DOE and Sandia resubmitted the Part A and B permit application to reflect revisions to proposed on-site treatment methods.
May 1997	FFCO Amendment No. 2	The FFCO was amended.
Dec 1997	On-site MW treatment	On-site treatment of mixed waste began at the SNL/NM Radioactive and Mixed Waste Management Unit 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 the STP annually to reflect activities and changes to proposed treatment technologies. NMED approved revisions 1 through 5 to the STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
May 2001	FFCO Amendment No. 3	The FFCO was amended.
Feb 2002	Revisions to permit application	DOE and Sandia submitted the 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.
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 the STP annually to reflect activities and changes to proposed treatment technologies. NMED approved revisions 6 and 7 to the STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
Apr 2003, Nov 2003	Revisions to permit application	DOE and Sandia revised the Part A and Part B permit application in response to NMED comments.

Notes at end of table.

Table 8-3. Summary of compliance history with regard to mixed waste at SNL/NM (continued)

Date	Milestone	Comment
Apr 2004	FFCO Amendment No. 4	The FFCO was amended.
Nov 2004	Revisions to permit application	DOE and Sandia revised the 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 the STP annually to reflect activities and changes to proposed treatment technologies. NMED approved revisions 8 and 9 to the 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 the 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 the STP annually to reflect activities and changes to proposed treatment technologies. NMED approved revisions 10 and 11 to the STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
Mar 2007	Revisions to permit application	DOE and Sandia revised the Part A and Part B permit application to reflect changes in waste management operations.
Aug 2007	Draft permit issued	NMED issued a 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 the 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 the STP annually to reflect activities and changes to proposed treatment technologies. NMED approved Revision 12 to the STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
Oct 2009, Nov 2010	Revisions to permit application	DOE and Sandia revised the Part B permit application to reflect changes in waste management operations.
Dec 2010	FFCO Amendment No. 5	The FFCO was 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 the STP to reflect fiscal year 2010 activities.
Oct 2011, May 2012	Revisions to permit application	DOE and Sandia revised the Part A and Part B permit application to reflect changes in waste management operations.
Sep 2012	Draft permit issued	NMED issued a 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 the 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/ disposal facilities in compliance with regulatory requirements. Requested Revision 14 to STP to establish new deadlines and provide continuity.

Notes at end of table.

Table 8-3. Summary of compliance history with regard to mixed waste at SNL/NM (continued)

Date	Milestone	Comment
2014	No STP milestones	Treated wastes on-site and shipped mixed wastes to off-site treatment and disposal facilities in compliance with regulatory requirements. Updated the STP to reflect 2014 waste management activities.
Dec 2014	No STP milestones	NMED approved Revision 14 to the STP, revising waste volumes and establishing new deadlines.
Dec 2014	N/A	NMED signed the Final Order for renewal of the RCRA Facility Operating Permit for SNL/NM.

NOTES: DOE = U.S. Department of Energy
FFCA = Federal Facilities Compliance Act
FFCO = Federal Facility Compliance Order
HDRV = Historical Disposal Requests Validation
HSWA = Hazardous and Solid Waste) Amendments
N/A = not applicable
NMED = New Mexico Environment Department
NON = Notice of Noncompliance
RCRA = Resource Conservation and Recovery Act
Sandia = Sandia Corporation
SNL/NM = Sandia National Laboratories, New Mexico
STP = Site Treatment Plan

Table 8-4. Quantity of mixed waste subject to the Federal Facility Compliance Order, end of fiscal year 2014

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	N/A
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
MTRU	0.02	MTRU	Stored at SNL/NM; awaiting shipment to WIPP

NOTES: N/A = not applicable
SNL/NM = Sandia National Laboratories, New Mexico
TCLP = toxicity characteristic leaching procedure
TG = Treatability Group
MTRU = mixed transuranic
WIPP = Waste Isolation Pilot Plant

Radiation Protection

The U.S. Department of Energy (DOE), National Nuclear Security Administration has established standards to protect the public by controlling and limiting radiation doses resulting from activities at DOE facilities. A public area is defined as any location that is accessible to non-DOE facility employees, such as Kirtland Air Force Base personnel and the surrounding community (this would exclude Sandia Corporation employees and contractors). Radiation protection standards are provided in DOE O 458.1 Change 3, *Radiation Protection of the Public and the Environment*. In addition to these quantitative standards, the overriding DOE policy is that exposures to the public shall be maintained "as low as reasonably achievable."

DOE O 458.1 Change 3, *Radiation Protection of the Public and the Environment*, 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 mrem/yr. DOE O 458.1 lists the derived concentration standards (DCSs) for radionuclides in water and air that could be continuously consumed or inhaled (365 days a 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 and air pathway guidelines are as follows:

- **Water pathways.** DOE drinking water guidelines are based on an annual EDE not to exceed 4 mrem/yr. Guideline values for drinking water are calculated at 4 percent of ingested water using DCS values for specific nuclides.
- **Air pathways.** DOE facilities are required to comply with U.S. Environmental Protection Agency standards for radiation protection as given in National Emission Standards for Hazardous Air Pollutants, 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.

Table 8-5. Derived concentration standards for selected radionuclides

Radionuclide	Ingested Water		Inhaled Air	
	DCS (µCi/ml)	f_1 Value[a]	DCS (µCi/ml)	Solubility Class
Tritium (water)	1.9×10^{-3}	1	2.1×10^{-7}	Slow
Cesium-137	3×10^{-6}	1	8.8×10^{-10}	Fast
Uranium, total (U_{tot})	7.5×10^{-7}	4×10^{-2}	1.3×10^{-12}	Medium

NOTES: Source: Table 5, "Derived Concentration Technical Standards," DOE-STD-1196-2011 (DOE 2011).
[a]f_1 value is the gastrointestinal absorption factor. Listed DCSs for U_{tot} are based on U_{238} listing in DOE-STD-1196-2011 (DOE 2011).
DCS = derived concentration standard DOE = U.S. Department of Energy

Table 8-6. General dose limits to the public from DOE facilities

Pathway	Equivalent EDE Limit	Comments
All pathways[a]	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[b]	10 mrem/yr 0.10 mSv/yr	Sandia calculates doses resulting from all potential air depositions and direct inhalation (e.g., emissions, ground shine, or food crops).

NOTES: [a]DOE O 458.1 Change 3, *Radiation Protection of the Public and the Environment*.
[b]40 CFR 61, Subpart H for radionuclides, National Emission Standards for Hazardous Air Pollutants.
CFR = Code of Federal Regulations EDE = effective dose equivalent
DOE = U.S. Department of Energy Sandia = Sandia Corporation

Table 8-7. EPA interim primary drinking water standards

Contaminant	Maximum Contaminant Level	Unit
Inorganic Chemicals		
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[a]	mg/L
Cyanide (free cyanide)	0.2	mg/L
Fluoride	4.0	mg/L
Lead	0.015[a]	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		
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	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

Notes at end of table.

Table 8-7. EPA interim primary drinking water standards (continued)

Contaminant	Maximum Contaminant Level	Unit
Organic Chemicals (continued)		
Hexachlorobenzene	0.001	mg/L
Hexachlorocyclopentadiene	0.05	mg/L
Lindane	0.0002	mg/L
Methoxychlor	0.04	mg/L
Oxamyl (Vydate)	0.2	mg/L
Polychlorinated biphenyls	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		
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: Source: 40 CFR 265, Appendix III.
[a]Action level concentrations that trigger systems into taking treatment steps if 10 percent of tap water samples exceed the value.
EPA = U.S. Environmental Protection Agency

Table 8-8. National secondary drinking water regulations

Contaminant	Secondary Maximum Contaminant Level
Aluminum	0.05 to 0.2 mg/L
Chloride	250 mg/L
Color	15 color units
Copper	1.0 mg/L
Corrosivity	Noncorrosive
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 to 8.5
Silver	0.1 mg/L
Sulfate	250 mg/L
Total dissolved solids	500 mg/L
Zinc	5 mg/L

NOTES: Source: 40 CFR 143.
pH = potential of hydrogen

Table 8-9. NMWQCC standards for groundwater of 10,000 mg/L total dissolved solid 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
Mercury, total	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	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
Xylenes, total	0.62	mg/L
Methylene chloride	0.1	mg/L
Chloroform	0.1	mg/L
1,1 –dichloroethane	0.025	mg/L
Ethylene dibromide	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
Dissolved solids, total	1,000.0	mg/L
Zinc	10.0	mg/L
pH	Between 6 and 9	
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: NMWQCC = New Mexico Water Quality Control Commission
PAH = polycyclic aromatic hydrocarbon pH = potential of hydrogen

Table 8-10. Boilers associated with permits and registrations, 2014

Permit or Registration Number	Description	Quantity	Size (MMBtu/hr)
P374-M2	NGPF boilers used to heat the facility	6	2
R547-RV1	ECF boilers used to heat the facility	2	4.3437
P925-M2	PETL boilers used to heat the facility	10	1.4
R1406-M1	AMPF boilers used to heat the facility	2	1.8
P1712-RV1	TTC boilers used to heat the facility	2	1.8
P1725-M1	CINT boilers used to heat the facility	2	6
P1820-M1	MESA Complex boilers used for activity-specific process and to heat the facility	2 1 8	20.412 10.206 2.0
R1823-RV1	WIF boilers used to heat the facility	2 1	8.17 3.68
R1888-RV1	Building 878 boilers used to heat the facility	13	2
R1902-RV1	Building 865 boilers used to heat the facility	2 2	0.28 1.3
P1930-RV1	Building 962 boilers used to heat the facility	4	2.0
R2109	Building 802 boilers used to heat the facility	3	2
R2110	Building 804 boilers used to heat the facility	4	2
R2111	Building 810 boilers used to heat the facility	3	2
R2112	Building 823 boilers used to heat the facility	3	2
R2113	Building 840 boilers used to heat the facility	4	2
R2114	Building 857 boilers used to heat the facility	2 2	1.3 1.1001
R2115	Building 860 boilers used to heat the facility	2	1.3
R2116	Building 880 boilers used to heat the facility	4 2	2 0.28
R2117	Building 890 boilers used to heat the facility	3	2
R2118	Building 887 boilers used to heat the facility	3	2
R2119	Building 891 boilers used to heat the facility	3	2
R2120	Building 892 boilers used to heat the facility	3	2
R2121	Building 894 boilers used to heat the facility	3 2 2	2 1.001 1.3
R2122	Building 897 boilers used to heat the facility	3	2
R2169	Building 960 boilers used to heat the facility	2	1.5
R2170	Building 895 boilers used to heat the facility	3	2.0
R2171	Building 800 boilers used to heat the facility	2	1.44
R2172-RV1	Building 6585 boilers used to heat the facility	2	5.0
R2173	Building 6597 boilers used to heat the facility	1	2.47
R2174-RV1	Building 6580 boilers used to heat the facility	4	2.0
R2175	Building 981 boilers used to heat the facility	2	1.8
R3111	Building 983 boilers used to heat the facility	2	1.3

NOTES: The fuel type in all cases is natural gas.

AMPF = Advanced Manufacturing Prototype Facility
CINT = Center for Integrated Nanotechnologies
ECF = Explosives Components Facility
MESA = Microsystems and Engineering Sciences Applications
NGPF =Neutron Generator Production Facility
P = permit number
PETL = Processing and Environmental Technology Laboratory
R = registration number
TTC = Thermal Test Complex
WIF = Weapons Integration Facility

Table 8-11. Emergency generators associated with permits and registrations, 2014

Permit or Registration Number	Description	Quantity	Size (hp)
P374-M2	NGF emergency generator provides emergency power during unplanned power outages	1	469
P402	Emergency Generator Plant provides backup power to various buildings in TA-I of SNL/NM	4	805
P415-M2	RMWMU emergency generator provides emergency power during unplanned power outage	1	192
P924-RV1	TA-I East L Avenue emergency generator provides emergency power during unplanned power outages	1	896
P925-M2	PETL emergency generator provides emergency power during unplanned power outages	1	896
P1725-M1	CINT emergency generator provides emergency power during unplanned power outages	1	680
P1820-M1	MESA Complex emergency generators provide emergency power during unplanned power outages	1 1	999 1609
P1828	Southeast TA-I backup generator provides backup power during unplanned power outages	1	750
P1900	SDF backup generator provides backup power during unplanned power outages	1	380
P1930-RV1	Building 962 backup generator provides backup power to the operations housed in Building 962	1	99

NOTES: The fuel type in all cases is diesel.

CINT = Center for Integrated Nanotechnologies
MESA = Microsystems and Engineering Sciences Application
NGF = Neutron Generator Facility
P = permit number
PETL = Processing Environmental Technologies Laboratory
R = registration number
RMWMU = Radioactive Mixed Waste Management Unit
SDF = Strategic Defense Facility
SNL/NM = Sandia National Laboratories, New Mexico
TA = technical area



Glossary

A

abatement The act of reducing the degree or intensity of, or eliminating, pollution.
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 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 flameproofing compounds, paint, semiconductor devices, and ceramic products.
appraisal A documented activity performed according to written procedures and specified criteria to evaluate an organization's compliance and conformance with programs, standards, and other requirements contained in orders, laws, and regulations or in other requirements invoked by Sandia.
aquifer An underground geological formation, or a 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, which ranges 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 method or practice 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 designed 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, or 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 the surfaces of objects, buildings, and various household and agricultural use products.

corrective action (1) EPA requirements for treatment, storage, and disposal facilities handling hazardous waste to undertake corrective actions to clean up spills resulting from failure to follow hazardous waste management procedures or from other mistakes. The process includes cleanup procedures designed to guide treatment, storage, and disposal facilities in avoiding spills. (2) An action identified to correct a finding that, when completed, fixes a problem or prevents its recurrence.

D

data quality objective (DQO) A strategic, systematic process for planning scientific data collection efforts.

decontamination The 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 storm drains, accidental or intentional spilling, and leaking, pumping, pouring, emitting, emptying, or dumping any material or substance on or into any land or water.

discharge limit 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 the 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 human organs or tissues; can be used to estimate the health-effects risk of an 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) A set of criteria in eight different electronics 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 The act of coating or covering with a thin layer of metal by electrodeposition.

environment The sum of all external conditions affecting an organism's life, development, and survival.

Environment, Safety and Health (ES&H) A program designed to protect and preserve the environment and to ensure the safety and health of the organization's employees, contractors, and visitors and the public.

environmental assessment An environmental analysis prepared pursuant to NEPA to determine whether a federal action would significantly affect the environment and thus require a more detailed environmental impact statement.

environmental impact statement A document required of federal agencies by NEPA for major projects or legislative proposals that significantly affect the environment. A tool for decision making, it describes an undertaking's positive and negative effects 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 assessing and, if necessary, remediating inactive waste sites.

Environmental Restoration (ER) site Any location listed on the 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 Sandia operations. Contaminants may be chemicals, radioactive material, or both.

environmental surveillance A program that includes soil and vegetation surveys, water sampling, and analysis in an attempt to identify and quantify long-term effects of pollutants resulting from Sandia operations.

ephemeral spring A spring that flows only briefly in the immediate locality.

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 the earth's crust shifting or dislodging, after 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.

fungicide An agent that destroys fungi or inhibits their growth.

G

gamma radiation Very high-energy and 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 earth's origin, history, and structure.

groundwater Water that is present beneath the earth's surface in soil pore spaces and in the fractures of rock formations.

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 the EPA requires 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.

herbicide A chemical pesticide designed to control or destroy plants, weeds, or grasses.

high-level radioactive waste (HLW) Waste generated in the core fuel of a nuclear reactor, found at nuclear reactors or by nuclear fuel reprocessing; a serious threat to anyone who comes near the waste without shielding.

I

implementation plan A plan developed by an Operational Readiness Review or a Readiness Assessment team that describes the team's specific approach, schedule, methodology, members and their qualifications, and reporting requirements.

industrial discharge 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 pellet core's temperature and density 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.

insecticide A pesticide compound specifically used to kill or prevent the growth of insects.

Integrated Safety Management System (ISMS) A set of guidelines that systematically integrate safety into management and work practices at all levels so missions are accomplished while protecting the worker, the public, and the environment.

L

lagoon (1) A shallow pond where sunlight, bacterial action, and oxygen work to purify wastewater; also used for storing wastewater. (2) A shallow body of water, often separated from the sea by coral reefs or sandbars.

landfill (1) A sanitary landfill, which is a disposal site for nonhazardous solid wastes spread in layers, compacted to the smallest practical volume, and covered by material applied at the end of each operating day. (2) A secure chemical landfill, which is a disposal site for hazardous waste, selected and designed to minimize the chance of releasing 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, or landfills, and may result in hazardous substances entering surface water, groundwater, or soil.

legacy site A former Environmental Restoration site.

legacy waste Waste originally generated between 1990 and 1998.

low-level radioactive waste (LLW) Wastes less hazardous than most of those associated with a nuclear reactor; generated by hospitals, research laboratories, and certain industries.

M

Materials Sustainability and Pollution Prevention (MSP2) Program Facilitates the use and reuse of materials in the most productive and sustainable manner across their entire life cycle. MSP2 emphasizes purchasing sustainable products, using less, reducing waste and toxicity, recovering more of the materials that are used, slowing climate change, and assuring sufficient resources to meet society's needs today and in the future.

maximally exposed individual (MEI) A member of the public who is located in an area that receives or has the potential to receive the maximum radiological dose from air emissions of a 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) A DOE quality assurance tool for environmental analytical services. 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; also a hazardous component subject to the Resource Conservation and Recovery Act, as amended.

N

National Ambient Air Quality Standards (NAAQS) Ambient air quality standards set by the EPA to meet the Clean Air Act requirements for pollutants considered harmful to public health and the environment.

National Emissions Standards for Hazardous Air Pollutants (NESHAP) Emissions standards set by the 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 are designed to protect public welfare (e.g., building facades, visibility, crops, and domestic animals).

National Environmental Policy Act (NEPA) The basic national charter for protecting the environment. It establishes policy, sets goals, and provides means for carrying out the Act.

National Pollutant Discharge Elimination System (NPDES) A provision of the Clean Water Act that prohibits discharge of pollutants into waters of the United States unless a special permit is issued by the EPA, a state, or, where delegated, a tribal government on an Indian reservation.

natural resource Resource (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 feedlots, agricultural fertilizers, manure, industrial wastewaters, sanitary landfills, and garbage dumps.

nitrite (1) An intermediate in the process of nitrification. (2) Nitrous oxide salts used in food preservation.

nonradiological contaminant A source of contamination that has no radiological components.

nuclear energy The energy released by a nuclear reaction.

nuclear particle acceleration A method for imparting large kinetic energy to electrically charged subatomic nuclear particles (e.g., protons, deuterons, or electrons) by applying electrical potential differences for the purpose of physics experiments.

O

outfall The place where effluent is discharged into receiving waters.

ozone (O_3) A colorless gas 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 a periodic spring.

PM_{10} Particulate matter (with a diameter equal to or less than 10 microns).

$PM_{2.5}$ Respirable particulate matter (with a 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, or factory smokestack.

point source discharge 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) Program 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) A chemical term limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances that contain such material. Because of their persistence, toxicity, and ecological damage via water pollution, the manufacture of PCBs was discontinued in the United States in 1976.

potable water Water free from impurities present in quantities sufficient to cause disease or harmful physiological effects.

pulsed power Technology 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) A system used to determine analytical accuracy, precision, and contamination when samples are collected and to assess the data's quality and usability.

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 contaminant A radioactive material deposited in any place where it is not desired, particularly where its presence may be harmful.

radionuclide A radioactive particle, man-made (anthropogenic) or natural, with a distinct atomic weight number.

radon A colorless, naturally occurring, radioactive, inert gas formed by the radioactive decay of radium atoms in soil or rocks.

reportable quantity (RQ) A quantity of material or product compound or contaminant that is reportable to a regulatory agency when released to the environment.

rodenticide A chemical or agent used to destroy rats or other rodent pests, or to prevent them from damaging food or crops.

S

sample management office (SMO) A Sandia office that manages environmental analytical laboratory contracts and assists with processing and tracking samples undergoing chemical and radiochemical analyses performed at these laboratories.

sampling and analysis plan (SAP) A plan that contains various criteria required for conducting sampling activities.

Sandia Management Model (SMM) A web-based, interactive description of Sandia, describing activities, responsibilities, and success rates. This model is a high-level depiction intended to be viewed by a broad audience for a comprehensible and dynamic experience in understanding how Sandia operates.

sanitary discharge The portion of liquid effluent exclusive of industrial wastewater and stormwater. It includes the liquid discharges from restrooms 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.

semivolatile organic compound An organic compound that volatilizes slowly at ordinary room temperature.

Site-Wide Environmental Impact Statement (SWEIS) A detailed public document, for which a federal agency is responsible, that analyzes the expected impacts of a proposed action on the human environment and alternatives to the proposed action.

solid waste (1) Any garbage, refuse, or sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility. (2) Any discarded material—including solid, liquid, semisolid, or contained gaseous material—resulting from industrial, commercial, mining, or agricultural operations or from community activities.

statement of work (SOW) A comprehensive description of the goods, services, or combination of goods and services for which Sandia 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 used in many industrial processes, especially the manufacture of sulfuric acid.

surface discharge Liquid that is spilled, leaked, pumped, poured, emitted, emptied, or dumped 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 radiation dose and the skin radiation dose to which a person has been exposed during the course of work. Can also measure environmental exposure rates.

threatened and endangered species A species present in such small numbers that it is at risk of extinction.

time-weighted composite 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 The sum of all hydrocarbon air pollutants except methane; a significant precursor to ozone formation.

toxic chemical Any chemical listed in EPA rules under "Emergency Planning and Community Right-to-Know Act of 1986–Section 313: Guidance for Reporting Toxic Chemicals."

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 nanocuries per gram.

tritium A radioactive hydrogen isotope with an atomic mass of 3 and a half-life of 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 any 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 any underground pipes connected thereto, is 10 percent or more beneath the surface of the ground.

upstream (1) In the direction opposite to the flow of a stream. (2) In or to a position within the production stream closer to manufacturing processes.

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.

U.S. Environmental Protection Agency (EPA) A government agency tasked with protecting human health and the environment.

U.S. Forest Service (USFS) withdrawal area A portion of Kirtland Air Force Base consisting of land within the Cibola National Forest that has been withdrawn from public access for use by the U.S. Air Force and the DOE.

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.

volatile organic compound (VOC) An organic compound that has a high vapor pressure and evaporates at ordinary room temperature.

W

waste characterization The identification of a waste material's chemical and microbiological constituents.

waste management A method for dealing with the waste from humans and organisms, including minimizing, handling, processing, storing, recycling, transporting, 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.

watershed The land area that drains into a stream; the watershed for a major river may encompass a number of smaller watersheds that ultimately combine at a common point.

water table The level of groundwater.

wetland An area that is saturated by surface water or groundwater, having vegetation adapted for life under those soil conditions, such as swamps, bogs, fens, marshes, and estuaries.

wind rose A graphical presentation of wind speed and direction frequency distribution.

This page intentionally left blank.



References

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

Bearzi, J. P. (New Mexico Environment Department). 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.

——. 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.

——. 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.

——. 2014a. Letter to J. E. Kieling (New Mexico Environment Department Hazardous Waste Bureau). "Department of Energy/National Nuclear Security Administration Sandia Corporation Request for Certificate of Completion for the Mixed Waste Landfill at Sandia National Laboratories, New Mexico." September 25, 2014.

——. 2014b. Letter to J. E. Kieling (New Mexico Environment Department Hazardous Waste Bureau). "Request for Class 3 Modification to Module IV of Hazardous Waste Permit for Sandia National Laboratories, New Mexico, EPA ID NM5890110518, New Mexico." October 17, 2014.

Blaine, T. (New Mexico Environment Department). 2014a. Letter to G. Beausoleil (U.S. Department of Energy NNSA/Sandia Site Office) and P. B. Davies (Sandia National Laboratories, New Mexico). "Approval, Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan, March 2012, Sandia National Laboratories, EPA ID #NM5890110518, HWB-SNL-12-007." January 8, 2014.

——. 2014b. Letter to G. Beausoleil (U.S. Department of Energy NNSA/Sandia Site Office) and S. A. Orrell (Sandia National Laboratories, New Mexico). "Approval, Work Plan for the Installation of Three Soil-Vapor Monitoring Wells (MWL-SV03, MWL-SV04, and MWL-SV05) at the Mixed Waste Landfill, January 2014, Sandia National Laboratories, EPA ID #NM5890110518, HWB-SNL-14-001." February 14, 2014.

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

Brookins, D. G. 1992. "Background Radiation in the Albuquerque, New Mexico, U.S.A. Area." *Environmental Geology and Water Sciences* 19 (1): 11–15.

Census (U.S. Census Bureau). 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.

———. 2014a. *Annual Estimates of the Resident Population for Incorporated Places Over 50,000, Ranked by July 1, 2012 Population: April 1, 2010 to July 1, 2013—United States—Places Over 50,000 Population*, accessed through http://www.census.gov/popest/data/cities/totals/2013/index.html.

———. 2014b. *National, State, and Puerto Rico Commonwealth Totals Datasets: Population change: April 1, 2010 to July 1, 2014*, accessed through http://www.census.gov/popest/data/state/totals/2014/index.html.

Cobrain, D. (New Mexico Environment Department). 2014. Letter to G. Beausoleil (U.S. Department of Energy NNSA/Sandia Site Office) and S. A. Orrell (Sandia National Laboratories, New Mexico). "Certificate of Completion for the Mixed Waste Landfill, September 25, 2014, Sandia National Laboratories, EPA #ID NM5890110518, HWB-SNL-14-MISC." October 8, 2014.

Davis, J. H. (New Mexico Environment Department). 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 (U.S. Department of Energy). 1999. *Final Site-Wide Environmental Impact Statement for Sandia National Laboratories/New Mexico,* DOE/EIS-0281. Albuquerque, NM: DOE, Albuquerque Operations Office, Record of Decision.

———. 2002. *Title V Operating Permit Application No. 515,* 2002 update, vol. 1 for Sandia National Laboratories. Albuquerque, NM: DOE/Sandia Site Office.

———. 2011. "DOE Standard Derived Concentration Technical Standard," DOE-STD-1196-2011. Washington, D.C.: DOE.

———. 2014. *U.S. Department of Energy 2014 Strategic Sustainability Performance Plan*. Washington, D.C.: DOE.

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

DOE/NNSA (U.S. Department of Energy/National Nuclear Security Administration). 2015. *FY 2015 Program Implementation Plan Sustainability*. Washington, D.C.: DOE/NNSA.

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

EPA (U.S. Environmental Protection Agency). 1985. 50 FR 28702. *Hazardous Waste Management System: Final Codification Rule* (p. 28712).

———. 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. EPA Region VI. Santa Fe, NM: EPA.

———. 2002. *Consolidated Emissions Reporting*, Federal Register, 67 FR 39602, June 10, 2002.

———. 2013. *Radiation Risk Assessment Software (CAP88-PC)*, version 3.0. http://www.epa.gov/radiation/assessment/CAP88/index.html.

——. 2014. Memorandum to Regional Administrators, Regions 1-10 from Janet G. McCabe, Acting Assistant Administrator, Office of Air and Radiation, and Cynthia Giles, Assistant Administrator, Office of Enforcement and Compliance Assurance. "Next Steps and Preliminary Views on the Application of Clean Air Act Permitting Programs to Greenhouse Gases Following the Supreme Court's Decision in *Utility Air Regulatory Group v. Environmental Protection Agency*." July 14, 2014.

Grant, P. R., Jr. 1982. "Geothermal Potential in the Albuquerque Area, New Mexico." In *Guidebook: New Mexico Geological Society*, vol. 33, 325–331. Albuquerque, NM: New Mexico Geological Society.

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

——. 2008. ISO 9001. *Quality Management Systems–Requirements*. Geneva, Switzerland: ISO.

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

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

Kieling, J. E. (New Mexico Environment Department). 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.

——. 2014a. Letter to G. Beausoleil (U.S. Department of Energy NNSA/Sandia Site Office) and P. B. Davies (Sandia National Laboratories, New Mexico). "Approval, Installation of Three FLUTe™ Soil-Vapor Monitoring Wells (MWL-SV03, MWL-SV04, and MWL-SV05) at the Mixed Waste Landfill, September 2014, Sandia National Laboratories, EPA ID #NM5890110518, HWB-SNL-14-012." September 25, 2014.

——. 2014b. Letter to G. Beausoleil (U.S. Department of Energy NNSA/Sandia Site Office) and P. B. Davies (Sandia National Laboratories, New Mexico). "Reclamation of Mixed Waste Landfill Borrow Pit, Letter of December 9, 2013, Sandia National Laboratories, EPA ID #NM5890110518, HWB-SNL-MISC." June 26, 2014.

——. 2014c. Letter to G. Beausoleil (U.S. Department of Energy NNSA/Sandia Site Office) and M. Hazen (Sandia National Laboratories, New Mexico). "Approval, Mixed Waste Landfill Annual Long-Term Monitoring and Maintenance Report, January–March 2014, June 2014, Sandia National Laboratories, EPA #ID NM5890110518, HWB-SNL-14-010." August 6, 2014.

Lozinsky, R., and R. H. Tedford. 1991. *Geology and Paleontology of the Santa Fe Group, Southwestern Albuquerque Basin, Valencia County, New Mexico*. Socorro, NM: New Mexico Bureau of Mines and Mineral Resources, New Mexico Institute of Mining and Technology.

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

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

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

——. 2004. "Compliance Order on Consent, Pursuant to the New Mexico Hazardous Waste Act § 74 4 10." Santa Fe, NM: NMED Hazardous Waste Bureau.

——. 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." Santa Fe, NM: NMED Hazardous Waste Bureau.

——. 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." Santa Fe, NM: NMED Hazardous Waste Bureau.

——. 2012. *Risk Assessment Guidance for Site Investigations and Remediation*. Table A-1, updated June 2012. Santa Fe, NM: NMED Hazardous Waste Bureau and the Ground Water Quality Bureau Voluntary Remediation Program.

——. 2014. "Final Order, State of New Mexico Before the Secretary of the Environment in the Matter of the Renewal of Hazardous Waste Permit EPA ID Number NM5890110518 and Granting of Corrective Action Complete Status for Certain Solid Waste Management Units and Areas of Concern at Sandia National Laboratories. No. HWB 14-01(P)." New Mexico Environment Department, Santa Fe, NM: NMED.

Searchbug. 2015. "50.0 Mile Radius around ZIP Code 87123." http://www.searchbug.com/tools/zip-radius.aspx?afid=sbug&zipcode=87123&radius=50&submit=Search.

Shyr, L., H. Herrera, and R. Haaker. 1998. *The Role of Data Analysis in Sampling Design of Environmental Monitoring*, SAND98-0612. Albuquerque, NM: Sandia National Laboratories.

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

——. 2002a. *Mixed Waste Landfill Groundwater Report, 1990 through 2001, Sandia National Laboratories, Albuquerque, New Mexico*, SAND2002-4098. Albuquerque, NM: SNL/NM.

——. 2002b. *Report of the Mixed Waste Landfill Phase 2 RCRA Facility Investigation, Sandia National Laboratories, Albuquerque, New Mexico*, SAND2002-2997. Albuquerque, NM: SNL/NM.

——. 2003a. *Mixed Waste Landfill Corrective Measures Study*. Albuquerque, NM: SNL/NM.

——. 2003b. *Resource Conservation and Recovery Act Closure Report for the Corrective Action Management Unit, Technical Area III*. Albuquerque, NM: SNL/NM.

——. 2004. *Chemical Waste Landfill Corrective Measures Study Report*. Albuquerque, NM: SNL/NM.

——. 2005a. *Mixed Waste Landfill Corrective Measures Implementation Plan*. Albuquerque, NM: SNL/NM.

——. 2005b. *Post-Closure Plan for the Chemical Waste Landfill, Technical Area III*. Albuquerque, NM: SNL/NM.

——. 2006a. *Chemical Analyses of Soil Samples Collected from the Sandia National Laboratories, New Mexico Environs, 1993–2005*, SAND2006-1468. Albuquerque, NM: SNL/NM.

——. 2006b. *Long-Range Development Plan*. Albuquerque, NM: SNL/NM.

——. 2010a. *Chemical Waste Landfill Final Resource Conservation and Recovery Act (RCRA) Closure Report*. Albuquerque, NM: SNL/NM.

——. 2010b. *Mixed Waste Landfill Corrective Measures Implementation Report, Revision 1*. Albuquerque, NM: SNL/NM.

——. 2011. *Data Validation Procedure for Chemical and Radiochemical Data*. Administrative Operating Procedure (AOP) 00-03, Revision 3. Albuquerque, NM: SNL/NM Sample Management Office.

——. 2012a. *Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan*. Albuquerque, NM: SNL/NM.

——. 2012b. "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, NM: SNL/NM.

——. 2013a. *Annual Groundwater Monitoring Report, Calendar Year 2012*, SAND2013-4700P. Albuquerque, NM: SNL/NM.

——. 2013b. *Calendar Year 2013 Annual Site Environmental Report for Sandia National Laboratories, Albuquerque, New Mexico*. SAND2014-15817R. Albuquerque, NM: SNL/NM.

——. 2013c. *Investigation Report for Voluntary Corrective Action at Solid Waste Management Unit 502 Building 9938 Surface Discharge Site*. Albuquerque, NM: SNL/NM.

——. 2013d. *Quality Assurance Project Plan for Terrestrial Surveillance at Sandia National Laboratories, New Mexico*, Revision 07, QUA 94-04. Albuquerque, NM: SNL/NM.

——. 2013e. *Quality Assurance Project Plan (QAPP) for the Sample Management Office*, Revision 3, SMO-QAPP. Albuquerque, NM: SNL/NM.

——. 2013f. *Radiation Protection Dosimetry Program (RPDP) Quality Plan (RPDP-00-01), Revision 7*. Albuquerque, NM: SNL/NM.

——. 2013g. "Sandia National Laboratories/New Mexico Statement of Work for Analytical Laboratories, Revision 6." Albuquerque, NM: SNL/NM.

——. 2014a. *Annual Groundwater Monitoring Report, Calendar Year 2013*, SAND2013-4700P. Albuquerque, NM: SNL/NM.

——. 2014b. *Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2013*. Albuquerque, NM: SNL/NM.

——. 2014c. *Corrective Action Management Unit Vadose Zone Monitoring System Annual Monitoring Results Report*. Albuquerque, NM: SNL/NM.

——. 2014d. *ER Mixed Waste Landfill Groundwater Monitoring Report, MWL-MW4 Metals Data, Calendar Year 2014*. Albuquerque, NM: SNL/NM.

——. 2014e. *Installation of Three FLUTe™ Soil-Vapor Monitoring Wells (MWL-SV03, MWL-SV04, and MWL-SV05) at the Mixed Waste Landfill, Environmental Restoration Operations*. Albuquerque, NM: SNL/NM.

——. 2014f. *Mixed Waste Landfill Annual Long-Term Monitoring and Maintenance Report, January–March 2014*. Albuquerque, NM: SNL/NM.

——. 2014g. "Work Plan for the Installation of Three Soil-Vapor Monitoring Wells (MWL-SV03, MWL-SV04, and MWL-SV05) at the Mixed Waste Landfill." Albuquerque, NM: SNL/NM.

——. 2015a. *Chemical Inventory Report, Calendar Year 2014*. Albuquerque, NM: SNL/NM.

——. 2015b. *Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2014*. Albuquerque, NM: SNL/NM.

——. 2015c. *Corrective Action Management Unit Report of Post-Closure Care Activities July–December 2014*. Albuquerque, NM: SNL/NM.

——. 2015d. *Site Treatment Plan for Mixed Waste, Fiscal Year 2014 Update*. Albuquerque, NM: SNL/NM.

——. 2015e. *U.S. Department of Energy/National Nuclear Security Administration/Sandia Field Office NESHAP Annual Report CY 2014, Sandia National Laboratories, New Mexico*, SAND2014-3260P.

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. Albuquerque, NM: U.S. Geological Survey.

Todd, J. W. 2014. "Submittal of Updated Reference Documents 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." U.S. Department of Energy, July 8, 2014.

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

USAF (U.S. Air Force). 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, Kirtland Air Force Base, Albuquerque, NM, signed November 2012.

U.S. National Weather Service (NWS) 2014. "Weather Highlights, Temperature and Precipitation: Albuquerque." Weather Forecast Office, Albuquerque, NM. http://www.srh.noaa.gov/abq/?n=climonhigh2013annual-hydrodrought.

Woodward, L. A. 1982. "Tectonic Framework of Albuquerque Country." In *Albuquerque Country II*: *New Mexico Geological Society 33rd Annual Field Conference Guidebook*. Edited by S. G. Wells, J. A. Grambling, and J. F. Callendar. Albuquerque, NM: New Mexico Geological Society.

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 O 231.1B, Change 1. *Environment, Safety and Health Reporting*. 2012.

DOE O 232.2, Admin. Change 1. *Occurrence Reporting and Processing of Operations Information*. 2014.

DOE O 414.1D. *Quality Assurance*. 2011.

DOE O 435.1, Change 1. *Radioactive Waste Management*. 2001.

DOE O 436.1. *Departmental Sustainability*. 2011.

DOE O 458.1, Change 3. *Radiation Protection of the Public and the Environment*. 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. *National Emission Standards for Hazardous Air Pollutants (NESHAP)*. Subpart H. "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities."

40 CFR 63. *National 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 143. *National Secondary Drinking Water Regulations*.

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

- 21.17.50 NMAC, *Pesticides.*
- NMSA 76-4-1 et seq. *New Mexico Pesticide Control Act.*

Oil Storage and Spill Containment

- 20.5 NMAC, *Petroleum Storage Tanks.*

Waste Management

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

Solid Waste

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



Distribution

UNLIMITED RELEASE DISTRIBUTION

U.S. Department of Energy

U.S. Department of Energy
National Nuclear Security Administration
Albuquerque Complex
NNSA/AC, NA-533
Attn: Steven R. Black (1*/1**)
P.O. Box 5400
Albuquerque, NM 87185-5400

U.S. Department of Energy
National Nuclear Security Administration
Sandia Field Office (SFO/ENG)
Attn: Karen Agogino (5*/12**)
P.O. Box 5400, MS 0184
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, D.C. 20585

New Mexico Environment Department

New Mexico Environment Department
DOE Oversight Bureau
Attn: Susan Lucas Kamat (1*/1**)
P.O. Box 5400, Mail Stop 1396
Albuquerque, NM 87185-5400

New Mexico Environment Department
DOE Oversight Bureau Chief
Attn: Kathryn Roberts (1**)
1190 St. Francis Drive, Suite N4O5O
Santa Fe, NM 87505

New Mexico Environment Department
Hazardous Waste Bureau
Albuquerque Group Manager
Attn: William Moats (1*)
121 Tijeras Avenue NE
Albuquerque, NM 87102

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

UNLIMITED RELEASE DISTRIBUTION (continued)
United States Air Force—Kirtland

United States Air Force
Attn: Victoria R. Branson (1*)
Kirtland IST/AFCEC CZO, Bldg. 20685
2050 Wyoming Blvd. SE
Kirtland AFB, NM 87117-5270

United States Air Force
Attn: Rebecca Clines (1*)
377 MSG/CEIE, Bldg. 20685
2050 Wyoming Blvd. SE
Kirtland AFB, NM 87117-5270

United States Air Force
Attn: Andria Cuevas (1*)
377 MSG/CEIE, Bldg. 20685
2050 Wyoming Blvd. SE
Kirtland AFB, NM 87117-5270

United States Air Force
377 Civil Engineering Division
Attn: Mark Dalzell (1*)
377 MSG/CEUW, Bldg. 20370
2050 Wyoming Blvd. SE
Kirtland AFB, NM 87117-5270

United States Air Force
Attn: John Pike (1**/1***)
377 MSG/CEI, Bldg. 20685
2050 Wyoming Blvd. SE
Kirtland AFB, NM 87117-5270

UNLIMITED RELEASE DISTRIBUTION (continued)
Universities and Colleges

Anderson School of Management (1*)
1 University of New Mexico, MSC05 3090
Albuquerque, NM 87131-0001

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

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
Los Alamos Branch Campus (1**)
4000 University Drive
Los Alamos, NM 87544

University of New Mexico
Valencia Campus (1**)
280 La Entrada
Los Lunas, NM 87031

UNLIMITED RELEASE DISTRIBUTION (continued)
Federal, State, and Other Agencies

Albuquerque Bernalillo County Water Utility Authority
Environmental Compliance Division Industrial Pretreatment
Industrial Waste Engineer
Attn: Jane Rael, P.E. (1**)
4201 Second Street, SW
Albuquerque, NM 87105

Albuquerque Bernalillo County Water Utility Authority
Water Resources Section
Water Quality Hydrologist
Attn: Rick Shean (1*)
P.O. Box 568
Albuquerque, NM 87103

Argonne National Laboratory
Attn: Theresa Davis (1*)
9700 South Cass Avenue
Building 200, Room B-11
Argonne, Illinois 60439

Bernalillo County Natural Resource Services
Water Resources Specialist
Attn: Sara Chudnoff (1*)
2400 Broadway Blvd., SE
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

City of Albuquerque Air Quality Division
Environmental Health Division
Attn: Mary Lou Leonard (1*)
1 Civic Plaza
Albuquerque, NM 87102

Lockheed-Martin Corporation
Corporate Energy, Environment, Safety & Health
Attn: Jeff Thomas (2**)
6801 Rockledge Drive
Bethesda, MD 20817
Office: Bldg Code: MD/1CC
Mail Drop: CCT-246, Room: 246-26

Lovelace Respiratory Research Institute
Director, ES&H
Attn: Penny H. Holeman (1*)
2425 Ridgecrest Dr. SE
Albuquerque, NM 87108

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

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

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

Sandia National Laboratories Distribution		
Address	**Name**	**Quantity**
MS 0101	J. Hruby, 00001	1**
MS 0141	A. Blumberg, 11100	1*
MS 0143	M. Hazen, 4000	1**
MS 0725	T. Lewandowski, 4140	1**
MS 0725	J. Moya, 4100	1*
MS 0729	C. Green, 4140	1*
MS 0730	S. Griffith, 4143	15**
MS 0730	A. Minitrez, 4143	1**
MS 0730	A. Salas, 4143	1**
MS 0730	N. White, 3654	1**
MS 0774	S. Coe, 3654	1**
MS 0899	Technical Library, 9536	email pdf
MS 1043	ES&H Library, 4135	2**

NOTES: *Requires a CD copy of this report.
**Requires a hard copy of this report.
***Requires a CD copy of this report and a hard copy of the *Annual Groundwater Monitoring Report* (Appendix A).



Appendix A
Calendar Year 2014 Annual Groundwater Monitoring Report

Appendix A presents the Annual Groundwater Monitoring Report for calendar year 2014.



Appendix A
Calendar Year 2014 Annual Groundwater Monitoring Report

Appendix A presents the Annual Groundwater Monitoring Report for calendar year 2014.

SANDIA REPORT
Unlimited Release
SAND2015-4261 R
Printed June 2015

Calendar Year 2014

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
SAND2015-4261 R
Printed June 2015

Annual Groundwater Monitoring Report
Calendar Year 2014

Long-Term Stewardship Consolidated Groundwater Monitoring Program
Sandia National Laboratories, New Mexico
June 2015

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, 2014: Burn Site Groundwater Area of Concern (AOC); Chemical Waste Landfill; Mixed Waste Landfill; Solid Waste Management Units 8/58, 49, 68, 116, 149, and 154; Technical Area-V Groundwater AOC; and the Tijeras Arroyo Groundwater AOC. 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 3-8

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 4-3
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 4-6

4.2 Regulatory Criteria 4-6
4.3 Scope of Activities 4-8
4.4 Field Methods and Measurements 4-9
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 Metals 4-10
4.6.3 Radiological Parameters 4-10
4.6.4 Water Quality Parameters 4-10

4.7 Quality Control Results 4-10

4.7.1 Field Quality Control Samples 4-10

4.7.1.1 Duplicate Environmental Samples 4-10
4.7.1.2 Equipment Blank Samples 4-11
4.7.1.3 Field Blank Samples 4-11
4.7.1.4 Trip Blank Samples 4-11

4.7.2 Laboratory Quality Control Samples 4-11

4.8 Variances and Nonconformances 4-11
4.9 Summary and Conclusions 4-12
4.10 Monitoring Well MWL-MW4 Metals Sampling and Maintenance Results 4-12
4.11 References 4-13

5.0 TECHNICAL AREA-V GROUNDWATER AREA OF CONCERN 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 5-8
5.1.5 Summary of Calendar Year 2014 Activities 5-8
5.1.6 Summary of Future Activities 5-10
5.1.7 Current Conceptual Model 5-10

5.1.7.1 Regional Hydrogeologic Conditions 5-11
5.1.7.2 Hydrologic Conditions at TA-V 5-11
5.1.7.3 Local Direction of Flow 5-12
5.1.7.4 Contaminant Sources 5-15
5.1.7.5 Contaminant Distribution and Transport in Groundwater 5-17

5.2 Regulatory Criteria 5-21
5.3 Scope of Activities 5-25
5.4 Field Methods and Measurements 5-28
5.5 Analytical Methods 5-28
5.6 Summary of Analytical Results 5-28
5.7 Quality Control Results 5-29
5.8 Variances and Nonconformances 5-32
5.9 Summary and Conclusions 5-32
5.10 References 5-34

6.0 TIJERAS ARROYO GROUNDWATER AREA OF CONCERN 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 2014 Activities 6-7
6.1.6 Summary of Future Activities 6-7
6.1.7 Conceptual Model 6-10

6.1.7.1 Regional Hydrogeologic Conditions 6-12
6.1.7.2 Hydrologic Conditions at the TAG AOC 6-12
6.1.7.3 Local Direction of Flow 6-17
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 6-29
6.10 References 6-30

7.0 BURN SITE GROUNDWATER AREA OF CONCERN 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 7-6
7.1.4 Current Monitoring Network 7-9
7.1.5 Summary of Calendar Year 2014 Activities 7-9
7.1.6 Summary of Future Activities 7-10
7.1.7 Conceptual Site Model 7-10

7.1.7.1 Regional Hydrogeologic Conditions 7-10
7.1.7.2 Hydrogeologic Conditions at the BSG AOC 7-11
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 7-13

7.2 Regulatory Criteria 7-14
7.3 Scope of Activities 7-16
7.4 Field Methods and Measurements 7-16
7.5 Analytical Methods 7-16
7.6 Summary of Analytical Results 7-16
7.7 Quality Control Results 7-20
7.8 Variances and Nonconformances 7-21
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 2014 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 8-12

8.1.7.4 Contaminant Sources 8-14
8.1.7.5 Contaminant Distribution and Transport in Groundwater 8-14

8.2 Regulatory Criteria 8-14
8.3 Scope of Activities 8-15
8.4 Field Methods and Measurements 8-15
8.5 Groundwater Elevation 8-17
8.6 Analytical Methods 8-17
8.7 Summary of Analytical Results 8-17
8.8 Quality Control Results 8-18

8.8.1 Field Quality Control Samples 8-18

8.8.1.1 Duplicate Environmental Samples 8-18
8.8.1.2 Equipment Blank Samples 8-18
8.8.1.3 Trip Blank Samples 8-19
8.8.1.4 Field Blank Samples 8-19

8.8.2 Laboratory Quality Control Samples 8-20

8.9 Variances and Nonconformances 8-20
8.10 Summary and Conclusions 8-20
8.11 References 8-21

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 9-4
9.1.5 Summary of Calendar Year 2014 Activities 9-4
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 9-5
9.1.7.3 Local Direction of Flow 9-6
9.1.7.4 Contaminant Sources 9-7
9.1.7.5 Contaminant Distribution and Transport in Groundwater 9-7

9.2 Regulatory Criteria 9-7
9.3 Scope of Activities 9-7
9.4 Field Methods and Measurements 9-8
9.5 Analytical Methods 9-8

9.6 Summary of Analytical Results 9-8
9.7 Quality Control Results 9-9
9.8 Variances and Nonconformances 9-10
9.9 Summary and Conclusions 9-10
9.10 References 9-10

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 10-8
10.1.4 Current Monitoring Network 10-8
10.1.5 Summary of Calendar Year 2014 Activities 10-8
10.1.6 Summary of Future Activities 10-8
10.1.7 Current Conceptual Model 10-8

10.1.7.1 Regional Hydrogeologic Conditions 10-8
10.1.7.2 Hydrogeologic Conditions at SWMU 68 10-9
10.1.7.3 Conceptual Site Model for SWMU 68 10-13
10.1.7.4 Contaminant Sources 10-13
10.1.7.5 Contaminant Distribution and Transport in Groundwater 10-13

10.2 Regulatory Criteria 10-14
10.3 Scope of Activities 10-14
10.4 Field Methods and Measurements 10-16
10.5 Groundwater Elevation 10-16
10.6 Analytical Methods 10-16
10.7 Summary of Analytical Results 10-16
10.8 Quality Control Results 10-17

10.8.1 Field Quality Control Samples 10-17

10.8.1.1 Duplicate Environmental Samples 10-18
10.8.1.2 Equipment Blank Samples 10-18
10.8.1.3 Trip Blank Samples 10-18
10.8.1.4 Field Blank Samples 10-19

10.8.2 Laboratory Control Samples 10-19

10.9 Variances and Nonconformances 10-19
10.10 Summary and Conclusions 10-19
10.11 References 10-20

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 2014 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 11-3
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 11-7
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 2014 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 12-10
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 12-13
12.8.1.3 Trip Blank Samples 12-13
12.8.1.4 Field Blank Samples 12-13

12.8.2 Laboratory Control Samples 12-13

12.9 Variances and Nonconformances 12-13
12.10 Summary and Conclusions 12-14
12.11 References 12-14

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 2014 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 13-9
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 13-12
13.5 Groundwater Elevation 13-12
13.6 Analytical Methods 13-12

13.7 Summary of Analytical Results 13-13
13.8 Quality Control Results 13-14

13.8.1 Field Quality Control Samples 13-14

13.8.1.1 Duplicate Environmental Samples 13-14
13.8.1.2 Equipment Blank Samples 13-14
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 13-15
13.10 Summary and Conclusions 13-15
13.11 References 13-16

ATTACHMENT 2A Long-Term Stewardship Consolidated Groundwater Monitoring Program Analytical Results Tables 2A-1
ATTACHMENT 2B Long-Term Stewardship Consolidated Groundwater Monitoring Program Hydrographs and Charts 2B-1
ATTACHMENT 2C Long-Term Stewardship Consolidated Groundwater Monitoring Program Plots 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 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 2014 1-9

1-2 Summary of SNL/NM Groundwater Monitoring Results for Calendar Year 2014..... 1-10

1-3 Summary of Exceedances for SNL/NM Groundwater Monitoring Wells Sampled During Calendar Year 2014 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 2013 and 2014..... 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 2014 Compliance Activities..... 3-5

3-2 Analytical Parameters for the CWL Monitoring Wells, Calendar Year 2014 3-7

4-1 MWL Monitoring Well Network and Calendar Year 2014 Compliance Activities..... 4-5

4-2 Analytical Parameters for the MWL Monitoring Wells, Calendar Year 2014 4-8

5-1 Historical Timeline of the TA-V Groundwater AOC 5-3

5-2 Groundwater Monitoring Wells at the TA-V Groundwater AOC 5-10

5-3 Wastewater Disposal History at TA-V 5-15

5-4 Groundwater Monitoring Well Network and Sampling Dates for the TA-V Groundwater AOC, Calendar Year 2014..... 5-26

Chapter Tables (continued)

5-5 Parameters Sampled at TA-V Wells for Each Sampling Event, Calendar Year 2014 5-27

6-1 Historical Timeline of the TAG AOC 6-4

6-2 Groundwater Monitoring Wells in the TAG AOC 6-9

6-3 Comparison of the Perched Groundwater System and the Regional Aquifer in the Tijeras Arroyo Groundwater Area of Concern (SNL November 2005) 6-13

6-4 Groundwater Monitoring Well Network and Sampling Dates for the TAG AOC, Calendar Year 2014 6-24

6-5 Parameters Sampled at TAG AOC Wells for Each Sampling Event, Calendar Year 2014 6-25

7-1 Historical Timeline of the Burn Site Groundwater Area of Concern 7-3

7-2 Groundwater Monitoring Wells at the Burn Site Groundwater Area of Concern 7-6

7-3 Summary of Historical Nitrate Concentrations in Groundwater Monitoring Wells that Exceed the MCL at the Burn Site Groundwater Area of Concern 7-13

7-4 Groundwater Monitoring Well Network and Sampling Dates for the Burn Site Groundwater Area of Concern, Calendar Year 2014 7-17

7-5 Parameters Sampled at Burn Site Groundwater Study Area Wells for Each Sampling Event, Calendar Year 2014 7-17

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 2014 8-16

8-4 Parameters Sampled at SWMUs 8/58 for Each Sampling Event, Calendar Year 2014 8-16

9-1 Historical Timeline of SWMU 49 9-3

9-2 Lithologic and Hydrogeologic Elevation Data for Monitoring Well CYN-MW5 at SWMU 49 9-6

Chapter Tables (continued)

9-3 Groundwater Monitoring Well Network and Sampling Date for SWMU 49, Calendar Year 2014 9-8

9-4 Parameters Sampled at SWMU 49 9-8

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 2014 10-15

10-4 Parameters Sampled at SWMU 68 for Each Sampling Event, Calendar Year 2014 10-15

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 2014 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 2014 12-9

12-4 Parameters Sampled at SWMU 149 for Each Sampling Event, Calendar Year 2014 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 2014 13-11

13-4 Parameters Sampled at SWMU 154 for Each Sampling Event, Calendar Year 2014 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 2014 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 2014 4-7

4-4 Photograph of the Stainless Steel Bennett™ Sampling Pump After Removal from MWL-MW4 on December 16, 2014 Showing Substantial Corrosion 4-13

5-1 Location of SNL/NM and TA-V 5-2

5-2 TAVG Monitoring Well Locations (16 Active Groundwater Monitoring Wells) 5-9

5-3 TAVG AOC Potentiometric Surface Map (October 2014) 5-13

5-4 Distribution of TCE in Groundwater at TAVG AOC, October/November 2014 5-19

5-5 Distribution of Nitrate plus Nitrite in Groundwater at TAVG AOC, October/November 2014 5-23

Chapter Figures (continued)

6-1 Location of the TAG AOC 6-2

6-2 TAG Investigation Monitoring Well Locations 6-8

6-3 TAG Conceptual Model Illustration (Van Hart June 2003) 6-11

6-4 Tijeras Arroyo Groundwater Investigation Potentiometric Surface Map for the Perched Groundwater System (October 2014) 6-15

6-5 Tijeras Arroyo Groundwater Investigation Potentiometric Surface Map for the Regional Aquifer (October 2014) 6-19

7-1 Location of the Burn Site Groundwater Area of Concern 7-2

7-2 Burn Site Groundwater Area of Concern Potentiometric Surface Map (November 2014) 7-8

7-3 Nitrate plus Nitrite Concentration Contour Map for the Burn Site Groundwater Area of Concern 7-19

8-1 Location of SWMUs 8/58 8-2

8-2 Groundwater Monitoring Wells CCBA-MW1 and CCBA-MW2 Installed at SWMUs 8/58 and Potentiometric Surface Map (October 2014) 8-4

8-3 Piper Trilinear Diagram of Major Ion Chemistry for Monitoring Wells CCBA-MW1 and CCBA-MW2 at SWMUs 8/58, CY 2014 8-13

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 and Potentiometric Surface Map (October 2014) 10-7

10-3 Piper Trilinear Diagram of Major Ion Chemistry for Monitoring Wells OBS-MW1, OBS-MW2, and OBS-MW3 at SWMU 68, CY 2014 10-12

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 2014) 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 2014) 13-5

Table

1 Inventory of Groundwater Monitoring and Production Wells Located at SNL/NM and Surrounding Areas

2 CY 2014 Base-Wide AGMR Groundwater Levels, updated 13 April 2015

Plate

1 SNL/NM Monitoring Well Locations and Base-Wide Potentiometric Surface Map of the Regional Aquifer for the Kirtland Air Force Base Vicinity, 2014

Abbreviations and Acronyms

°C	degree(s) Celsius
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 (AOC)
$CaCO_3$	calcium carbonate
CAC	Corrective Action Complete
CCBA	Coyote Canyon Blast Area
CFR	Code of Federal Regulations
CME	Corrective Measures Evaluation
CMI	Corrective Measures Implementation
CMS	Corrective Measures Study
COA	City of Albuquerque
COC	constituent of concern
CTF	Coyote Test Field
CWL	Chemical Waste Landfill
CY	Calendar Year
DCG	Derived Concentration Guide
DI	deionized
DO	dissolved oxygen
DOE	U.S. Department of Energy
DRO	diesel range organics
DSS	Drain and Septic System
dup	duplicate
EB	equipment blank
EDMS	Environmental Data Management System
EHD	Environmental Health Department
EMS	Environmental Management System
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
ET	evapotranspirative
FB	field blank
Final Closure Plan	*Chemical Waste Landfill Final Closure Plan and Postclosure Permit Application*
FIP	Field Implementation Plan
FOP	Field Operating Procedure
FY	Fiscal Year
GEL	GEL Laboratories LLC
GMP	Groundwater Monitoring Program
GRO	gasoline range organics
HASL	Health and Safety Laboratory
HE	high explosive

Abbreviations and Acronyms (continued)

HPT	High Performing Team
HSWA	Hazardous and Solid Waste Amendments
HMX	octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
ID	identification
IMWP	Interim Measures Work Plan
IT	International Technology Corporation
JP-4	jet propellant, fuel grade 4
JP-8	jet propellant, fuel grade 8
KAFB	Kirtland Air Force Base
LCS	laboratory control sample
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
MW	monitoring well
MWL	Mixed Waste Landfill
N/A	not applicable
NE	not established
NFA	No Further Action
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMOSE	New Mexico Office of the State Engineer
NMWQCC	New Mexico Water Quality Control Commission
NNSA	National Nuclear Security Administration
No.	number
NOD	Notice of Disapproval/Notice of Deficiency
NPN	nitrate plus nitrite
OB	Oversight Bureau
ORP	oxidation-reduction potential
PCCP	Post-Closure Care Permit
Permit	Resource Conservation and Recovery Act Facility Operating Permit
PGWS	perched groundwater system
PQL	practical quantitation limit
QC	quality control
RCRA	Resource Conservation and Recovery Act
RDX	hexahydro-1,3,5-trinitro-1,3,5-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

Abbreviations and Acronyms (concluded)

SFO	Sandia Field Office
SM	standard method
SMO	Sample Management Office
SNL/NM	Sandia National Laboratories, New Mexico
SVOC	semivolatile organic compound
SW	southwest/solid waste
SWMU	Solid Waste Management Unit
TA	Technical Area
TAG	Tijeras Arroyo Groundwater (AOC)
TAL	Target Analyte List
TAV	Technical Area
TAVG	Technical Area-V Groundwater (AOC)
TB	trip blank
TCE	trichloroethene (equivalent to trichlorethylene)
tetryl	methyl 2,4,6-trinitrophenylnitramine
the Consent Order	the Compliance Order on Consent
TJA	Tijeras Arroyo
TOC	total organic carbon
TOX	total organic halogens
TPH	total petroleum hydrocarbons
UCS	Underground Conduit System
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USGS	U.S. Geological Survey
VA	Veterans Administration
VCM	voluntary corrective measure
VE	Vapor Extraction
VOC	volatile organic compound
WL	water level
WQ	water quality
WYO	Wyoming

Units

%	percent
µg/L	microgram(s) per liter
µmhos/cm	micromhos per centimeter(s)
ft	foot (feet)
ft/day	feet per day
ft/ft	feet per foot
ft/min	feet per minute
ft/yr	feet per year
gal.	gallon(s)
gpm	gallon(s) per minute
in/yr	inches per year
Ma	Mega Annum
mg/L	milligram(s) per liter
mrem/yr	millirem(s) per year
mV	millivolt(s)
NTU	nephelometric turbidity units
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
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

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) 2014. This report has been prepared to meet the environmental reporting requirements for the CY 2014 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 Groundwater (TAVG) Area of Concern (AOC) (Chapter 5.0); Tijeras Arroyo Groundwater (TAG) AOC (Chapter 6.0); Burn Site Groundwater (BSG) AOC (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, 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

- TAVG AOC
- TAG AOC
- BSG AOC
- 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, TAVG AOC, TAG AOC, BSG AOC; 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 in the CWL PCCP Attachment 2, Groundwater Sampling and Analysis Plan.

Groundwater Quality Monitoring Activities and Results

During CY 2014, 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. 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 discusses the annual groundwater surveillance monitoring activities conducted during January, February, and April 2014 at wells that are part of the SNL/NM GMP. GMP well locations are scattered throughout and along the perimeter of the base in areas that are not specifically affiliated with SWMUs or AOCs. There is a site-wide Environmental Management System at SNL/NM. During CY 2014, groundwater elevations were measured in approximately 180 wells and groundwater samples were collected from 12 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), and one surface water sample from Coyote Springs. Groundwater samples were analyzed for Safe Drinking Water Act list volatile organic compounds (VOCs), total organic halogens, total phenols, nitrate plus nitrite (NPN), general chemistry, Target Analyte List (TAL) metals plus uranium, mercury, total cyanide, gross alpha/beta activity, radionuclides by gamma spectroscopy, radium-226, and radium-228. Additional samples were collected at selected monitoring wells for analysis of high explosive (HE) compounds and

isotopic uranium. No analytes were detected at concentrations exceeding the associated MCLs or MACs, except for beryllium and fluoride. Fluoride was detected above the 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 1.66 to 2.69 mg/L, which are similar to historical concentrations. Beryllium was detected above the MCL of 0.004 mg/L in the surface water sample from Coyote Springs at a concentration of 0.00737 mg/L, which is similar to historical concentrations and is considered to be of natural origin.

Water levels were measured at monitoring wells by SNL/NM personnel either quarterly or annually depending on the response characteristics of the groundwater system. The water levels 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.

Chemical Waste Landfill

Chapter 3.0 discusses the semiannual groundwater monitoring activities conducted during January and July 2014 at the CWL. The site is a 1.9-acre interim status landfill located in the southeastern corner of TA-III. The site was operational from 1962 until 1981, and was used for the disposal of chemical, radioactive, and solid waste generated by SNL/NM research activities. The site was remediated during two voluntary corrective measures (VCMs)--the Vapor Extraction VCM and Landfill Excavation VCM. The CWL is a remediated, closed, regulated unit undergoing post-closure care in accordance with the CWL Post-Closure Care Permit since June 2, 2011. During CY 2014, groundwater elevations were measured and groundwater samples were collected from four monitoring wells (CWL-BW5, CWL-MW9, CWL-MW10, and CWL-MW11). Groundwater samples during the January sampling event were analyzed for trichloroethene (TCE), 1,1,2-trichloro-1,2,2-trifluoroethane, tetrachloroethene, 1,1-dichloroethene, chloroform, trichlorofluoromethane, nickel, and chromium; groundwater samples during the July sampling event were analyzed for TCE, nickel, and chromium. No analytes were detected at concentrations exceeding the associated MCLs in any of the CWL groundwater samples. The analytical results are comparable to historical values. Other activities conducted at the CWL during CY 2014 include site inspections, cover maintenance, and soil-vapor sampling.

Mixed Waste Landfill

Chapter 4.0 discusses the semiannual groundwater monitoring activities conducted in April (associated resampling of one well in June), and October 2014 at the MWL (SWMU 76). The 2.6-acre site is located in the north-central portion of TA-III. The site was operational from March 1959 through December 1988 and consisted of classified and unclassified areas that received low-level radioactive and mixed waste. The NMED selected a final remedy, an evapotranspirative vegetative soil cover with a biointrusion barrier, which was installed in 2009. Activities at this site are regulated under the requirements of the MWL Long-Term Monitoring and Maintenance Plan (LTMMP) since January 8, 2014. During CY 2014, groundwater elevations were measured in seven wells (MWL-BW2, MWL-MW4, MWL-MW5, MWL-MW6, MWL-MW7, MWL-MW8, and MWL-MW9), and groundwater samples were collected from the four compliance monitoring wells (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) and analyzed for VOCs, metals (cadmium, chromium, nickel, and uranium), radionuclides by gamma spectroscopy, gross alpha/beta activity, tritium, and radon-222. No analytes were detected at concentrations exceeding the associated MCLs, and the analytical results are comparable to historical values. Other activities conducted at the MWL during CY 2014 include pumping, sampling, and maintenance at well MWL-MW4; cover maintenance; installation of soil-vapor monitoring wells; soil-vapor sampling; inspections; and other monitoring required by the MWL LTMMP. A “Class 3 Permit modification request for a determination of corrective action complete with controls” was initiated on October 20, 2014. Activities associated with the Permit modification request are ongoing.

Technical Area-V Groundwater Area of Concern

Chapter 5.0 discusses the quarterly groundwater monitoring activities conducted during February-March, April-May, July-August-September, and October-November, 2014 at the TAVG AOC. The site is located in the northeast corner of TA-III. Several wastewater facilities were used at the site from the 1960s to the early 1990s. Both TCE and nitrate have been identified as constituents of concern in groundwater at the TAVG AOC based on detections above the MCLs. Activities at this site are regulated under the requirements of the Order. During CY 2014, groundwater elevations were measured and groundwater samples were collected from 16 monitoring wells (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). Groundwater samples were analyzed for VOCs, total organic carbon, NPN, general chemistry, metals (iron and manganese) or TAL metals plus uranium, sulfides, gross alpha/beta activity, radionuclides by gamma spectroscopy, and tritium. No analytes were detected at concentrations exceeding the associated MCLs except for nitrate and TCE. Nitrate concentrations exceeded the MCL of 10 mg/L in samples from monitoring wells LWDS-MW1, TAV-MW10, and AVN-1 with a maximum concentration of 14.6 mg/L in the sample from monitoring well TAV-MW10 collected in August. TCE concentrations exceeded the MCL of 5 micrograms per liter (µg/L) in samples from monitoring wells LWDS-MW1, TAV-MW6, TAV-MW10, TAV-MW12, and TAV-MW14 with a maximum concentration of 22.4 µg/L in the sample from monitoring well LWDS-MW1 collected in March. The analytical results of TCE in the other eleven monitoring wells are below the MCL and are consistent with historical concentrations. Other activities conducted at TAVG AOC during CY 2014 include preparation of documents related to the Corrective Measures Evaluation studies.

Tijeras Arroyo Groundwater Area of Concern

Chapter 6.0 discusses the quarterly groundwater monitoring activities conducted during March, May-June, August-September, and November-December 2014 at the TAG AOC. This site is located in the north-central portion of KAFB and includes TA-I, TA-II, and TA-IV. Groundwater in the area has been impacted since the late 1940s and includes numerous potential SNL/NM and non-SNL/NM wastewater sources. Activities at this site are regulated under the requirements of the Order. During CY 2014, groundwater elevations were measured in 31 wells and groundwater samples were collected from 22 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, TA2-SW1-320, TA2-W-01, TA2-W-19, TA2-W-26, TA2-W-27, TA2-W-28, TJA-2, TJA-3, TJA-4, TJA-6, TJA-7, WYO-3, and WYO-4). Groundwater samples were analyzed for VOCs, NPN, general chemistry, TAL metals plus uranium, gross alpha/beta activity, radionuclides by gamma spectroscopy, and tritium. No analytes were detected at concentrations exceeding the associated MCLs except for nitrate and TCE. Nitrate concentrations exceeded the MCL of 10 mg/L in samples from monitoring wells TA2-SW1-320, TA2-W-28 (replacement well for TA2-SW1-320), TA2-W-19, TJA-2, TJA-4, and TJA-7, with a maximum concentration of 32.8 mg/L in the sample from monitoring well TJA-4 collected in September. Nitrate concentrations in monitoring wells TA2-SW1-320 (and replacement well TA2-W-28), TJA-4, and TJA-7 have generally exceeded the MCL for the life of the wells, whereas nitrate concentrations occasionally have exceeded the MCL in samples from monitoring wells TJA-2 and TA2-W-19. TCE concentrations exceeded the MCL of 5 µg/L in samples from monitoring well WYO-4 with a maximum concentration of 10.5 µg/L in the sample collected in November. The analytical results for the other 15 wells are consistent with historical concentrations. Other activities conducted at the TAG AOC during CY 2014 include the installation of a replacement monitoring well (TA2-W-28) and the decommissioning of well TA2-SW1-320.

Burn Site Groundwater Area of Concern

Chapter 7.0 discusses the semiannual groundwater monitoring activities conducted in June and December, 2014 at the BSG AOC. This site is located around the active Lurance Canyon Burn Site facility in the far eastern portion of KAFB. The site was used in the 1960s through 1980s for explosives tests and burn tests, and groundwater investigations were initiated in 1997 at the request of the NMED after elevated

nitrate levels were discovered in the Burn Site Production Well. Activities at this site are regulated under the requirements of the Order. During CY 2014, groundwater elevations were measured in 13 wells and groundwater samples were collected from 10 wells (CYN-MW4, CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, CYN-MW13, CYN-MW14A, and CYN-MW15). Samples were analyzed for VOCs, HE compounds, total petroleum hydrocarbons (TPH)-diesel range organics, TPH-gasoline range organics, NPN, general chemistry, TAL metals plus uranium, perchlorate (at the two new wells only), gross alpha/beta activity, radionuclides by gamma spectroscopy, isotopic uranium, and tritium. No analytes were detected at concentrations exceeding the associated MCLs, except for nitrate. Nitrate concentrations exceeded the MCL of 10 mg/L in samples from seven monitoring wells CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, CYN-MW13, CYN-MW14A, and CYN-MW15 with a maximum concentration of 41.7 mg/L in the sample from monitoring well CYN-MW9 collected in June. The nitrate in these wells is from sources that have been tentatively identified, and concentration trends have increased slightly over the past year. Other activities conducted at the BSG AOC include the installation of two new groundwater monitoring wells CYN-MW14A and CYN-MW15, and the removal of the submersible pump from the Burn Site Well.

Solid Waste Management Units 8/58

Chapter 8.0 discusses the quarterly groundwater monitoring activities conducted during January, April, July, and October 2014 at SWMUs 8/58 (the Coyote Canyon Blast Area). This site is located in the Arroyo del Coyote watershed that captures runoff from the western flank of the Manzanita Mountains in the eastern portion of KAFB. The site was used in the 1950s and 1960s for ground level or aboveground explosive detonations and earth penetration tests. Activities at this site are regulated under the general requirements of the Order and the specific corrective action requirements stated in an April 2010 letter from the NMED. During CY 2014, groundwater elevations were measured and groundwater samples were collected from two wells (CCBA-MW1 and CCBA-MW2). Samples were analyzed for VOCs, SVOCs, HE compounds, NPN, general chemistry, TAL metals plus uranium, perchlorate, total cyanide, gross alpha/beta activity, and radionuclides by gamma spectroscopy. No analytes were detected at concentrations exceeding the associated MCLs, except for fluoride. Fluoride concentrations exceeded the MCL of 4.0 mg/L in samples from monitoring well CCBA-MW1 at concentrations ranging from 4.68 to 5.02 mg/L. The elevated fluoride concentration is due to naturally occurring fluorite deposits, not SNL/NM activities. No other activities were conducted at SWMUs 8/58 during CY 2014. The regulatory requirements at SWMUs 8/58 have been met; therefore, the SWMUs 8/58 monitoring wells will no longer be sampled.

Solid Waste Management Unit 49

Chapter 9.0 discusses the annual groundwater monitoring activities conducted during January 2014 at SWMU 49 (the Building 9820 Drains). The site is located in Lurance Canyon and consists of a surface discharge area associated with a former trailer and the area around a drainpipe outfall from Building 9820. The trailer was used as a darkroom in the late 1950s through late 1980s. Activities at this site are regulated under the general requirements of the Order and the specific corrective action requirements stated in an April 2010 letter from the NMED. During CY 2014, groundwater elevations were measured and groundwater samples were collected from one well (CYN-MW5). Samples were analyzed for VOCs, HE compounds, NPN, general chemistry, TAL metals plus uranium, perchlorate, total cyanide, gross alpha/beta activity, and radionuclides by gamma spectroscopy. No analytes were detected at concentrations exceeding the associated MCLs and the analytical results are comparable to historical concentrations. No other activities were conducted at SWMU 49 during CY 2014. The regulatory requirements at SWMU 49 have been met; therefore, the SWMU 49 monitoring well will no longer be sampled.

Solid Waste Management Unit 68

Chapter 10.0 discusses the quarterly groundwater monitoring activities conducted during January, April, July, and October 2014 at SWMU 68 (the Old Burn Site). The site is located in Coyote Test Field and was used from mid-1960s to the late-1970s for pool fire tests (using mostly jet fuel) to study the effects of fire on weapons components during transportation accidents. Activities at this site are regulated under the general requirements of the Order and the specific corrective action requirements stated in an April 2010 letter from the NMED. During CY 2014, groundwater elevations were measured and groundwater samples were collected from three wells (OBS-MW1, OBS-MW2, and OBS-MW3). Samples were analyzed for VOCs, SVOCs, HE compounds, NPN, general chemistry, TAL metals plus uranium, perchlorate, total cyanide, hexavalent chromium, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium. No analytes were detected at concentrations exceeding the associated MCLs and the analytical results are comparable to historical concentrations. No other activities were conducted at SWMU 68 during CY 2014. The regulatory requirements at SWMU 68 have been met; therefore, the SWMU 68 monitoring wells will no longer be sampled.

Solid Waste Management Unit 116

Chapter 11.0 discusses the annual groundwater monitoring activities conducted during January 2014 at SWMU 116 (the Building 9990 Septic System). This site is located on the western margin of the Manzanita Mountain foothills and includes the immediate area surrounding the five seepage pits and a septic tank located south of Building 9990. Building 9990 is an electroexplosive research facility that was used as an explosive test facility from the late-1960s to the mid-1980s. Activities at this site are regulated under the general requirements of the Order and the specific corrective action requirements stated in an April 2010 letter from the NMED. During CY 2014, groundwater elevations were measured and groundwater samples were collected from one well (CTF-MW1). Samples were analyzed for VOCs, HE compounds, NPN, general chemistry, TAL metals plus uranium, perchlorate, and total cyanide. No analytes were detected at concentrations exceeding the associated MCLs and the analytical results are comparable to historical concentrations. No other activities were conducted at SWMU 116 during CY 2014. The regulatory requirements at SWMU 116 have been met; therefore, the SWMU 116 monitoring well will no longer be sampled.

Solid Waste Management Unit 149

Chapter 12.0 discusses the quarterly groundwater monitoring activities conducted during March, June, and September 2014 at SWMU 149 (the Building 9930 Septic System). The site is located in the Coyote Test Field and includes the area surrounding a septic system that serviced a darkroom, laboratory, shop, bathroom, and compressor room from the early-1960s to early-1990s. Activities at this site are regulated under the general requirements of the Order and the specific corrective action requirements stated in an April 2010 letter from the NMED. During CY 2014, groundwater elevations were measured and groundwater samples were collected from one well (CTF-MW3). Samples were analyzed for VOCs, NPN, general chemistry, TAL metals, and perchlorate. No analytes were detected at concentrations exceeding the associated MCLs and the analytical results are comparable to historical concentrations. No other activities were conducted at SWMU 149 during CY 2014. The regulatory requirements at SWMU 149 have been met; therefore, the SWMU 149 monitoring well will no longer be sampled.

Solid Waste Management Unit 154

Chapter 13.0 discusses the quarterly groundwater monitoring activities conducted during March, June, and September 2014 at SWMU 154 (the Building 9960 Septic Systems). The site is located in Coyote Test Field and includes the area surrounding an eastern septic system and a western system consisting of two HE seepage pits that both serviced Building 9960. Activities at this site are regulated under the general requirements of the Order and the specific corrective action requirements stated in an April 2010 letter from the NMED. During CY 2014, groundwater elevations were measured and groundwater samples were collected from one well (CTF-MW2). Samples were analyzed for VOCs, SVOCs, HE

compounds, NPN, general chemistry, TAL total metals plus uranium, perchlorate, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium. No analytes were detected at concentrations exceeding the associated MCLs except for arsenic. Arsenic was detected above the MCL of 0.010 mg/L at concentrations ranging from 0.0261 to 0.0458 mg/L, with a maximum concentration of 0.0458 mg/L in the sample collected in September. These slightly elevated arsenic concentrations are attributed to naturally occurring minerals in bedrock. No other analytes were detected at concentrations exceeding MCLs and the analytical results are comparable to historical concentrations. No other activities were conducted at SWMU 154 during CY 2014. The regulatory requirements at SWMU 154 have been met; therefore, the SWMU 154 monitoring well will no longer be sampled.

Future Groundwater Monitoring Events

The groundwater monitoring events conducted on a site-wide basis as part of the SNL/NM GMP and at CWL, MWL, TAVG AOC, TAG AOC, and BSG AOC will continue on a quarterly, semiannual, annual, and biennial basis during CY 2015, as specified by regulatory guidance. The results for these monitoring events will be presented in the Annual Groundwater Monitoring Report for CY 2015. The regulatory groundwater monitoring requirements for SWMUs 8/58, 49, 68, 116, 149, and 154 have been met and these sites no longer require active monitoring programs. The Annual Groundwater Monitoring Report for CY 2015 will not include specific discussions for SWMUs 8/58, 49, 68, 116, 149, and 154.

This page intentionally left blank.

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) 2014. 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 Groundwater (TAVG) Area of Concern (AOC) (Chapter 5.0); Tijeras Arroyo Groundwater (TAG) AOC (Chapter 6.0); Burn Site Groundwater (BSG) AOC (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 an average 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).

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 9.45 inches (National Oceanic and Atmospheric Administration National Weather Service station). Half of this precipitation occurs from June through August in the form of brief, 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.

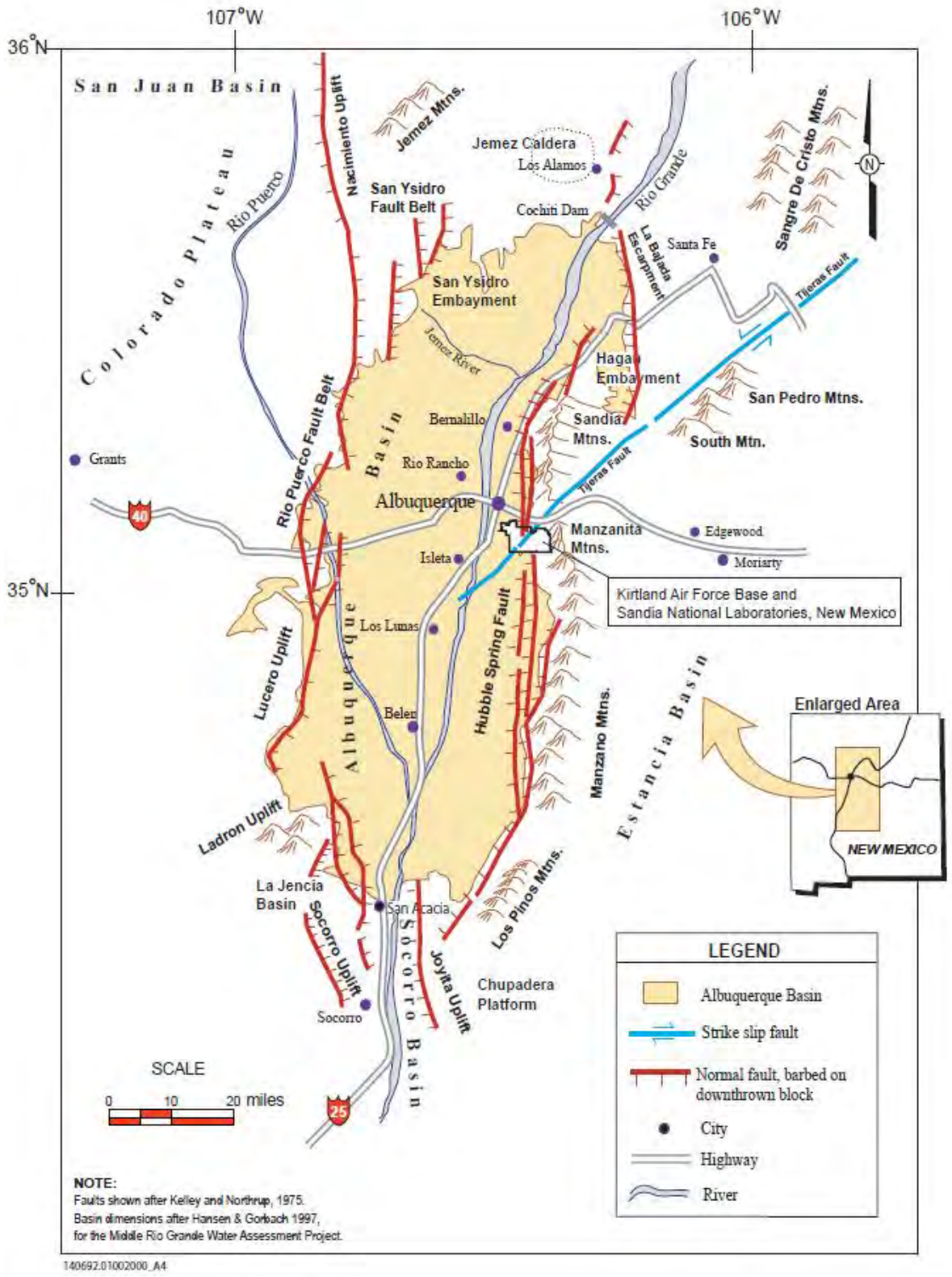


Figure 1-1. Albuquerque Basin, North-Central New Mexico

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 to 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.

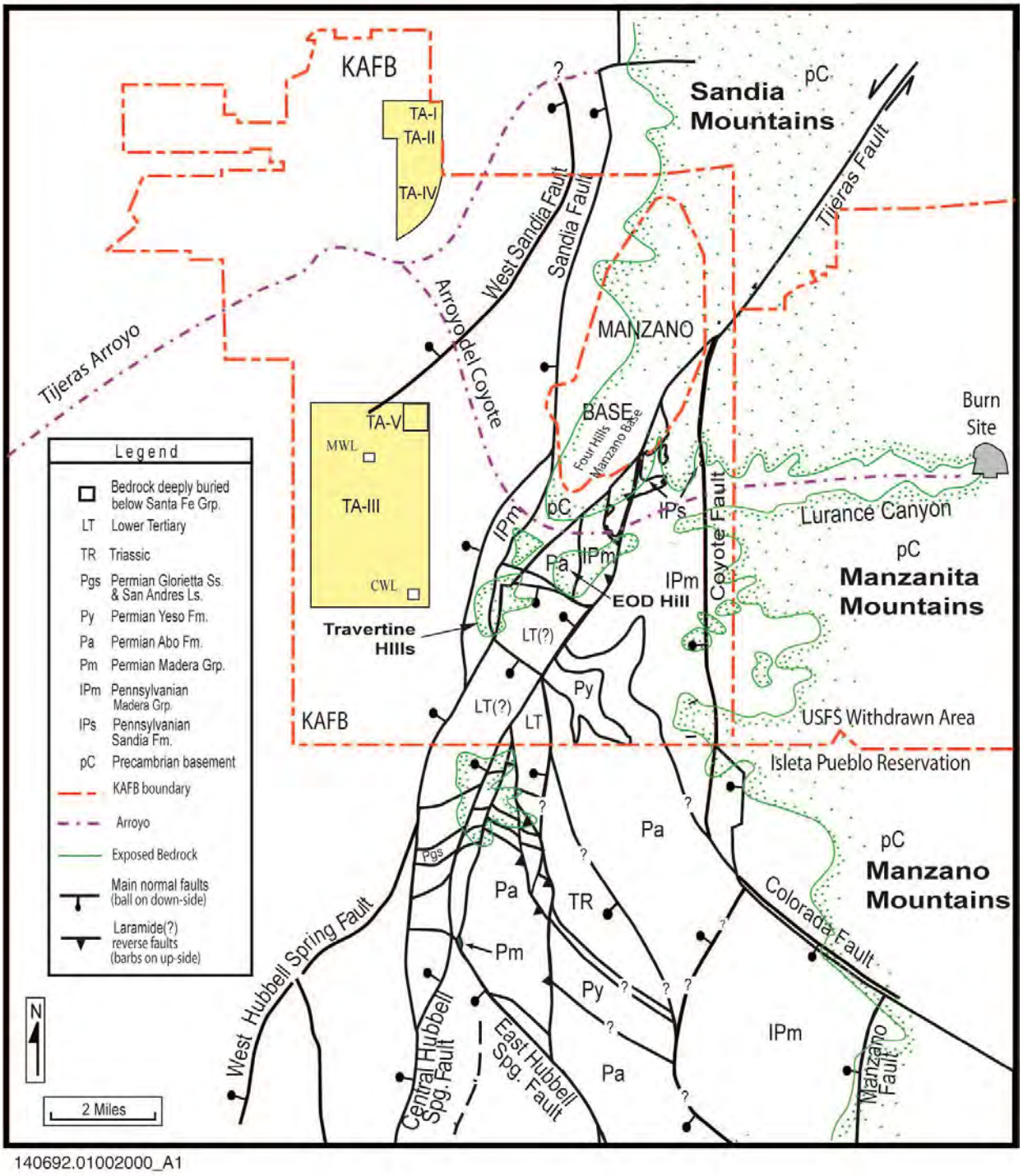


Figure 1-2. Generalized Geology in the Vicinity of SNL/NM and KAFB (Van Hart 2003)

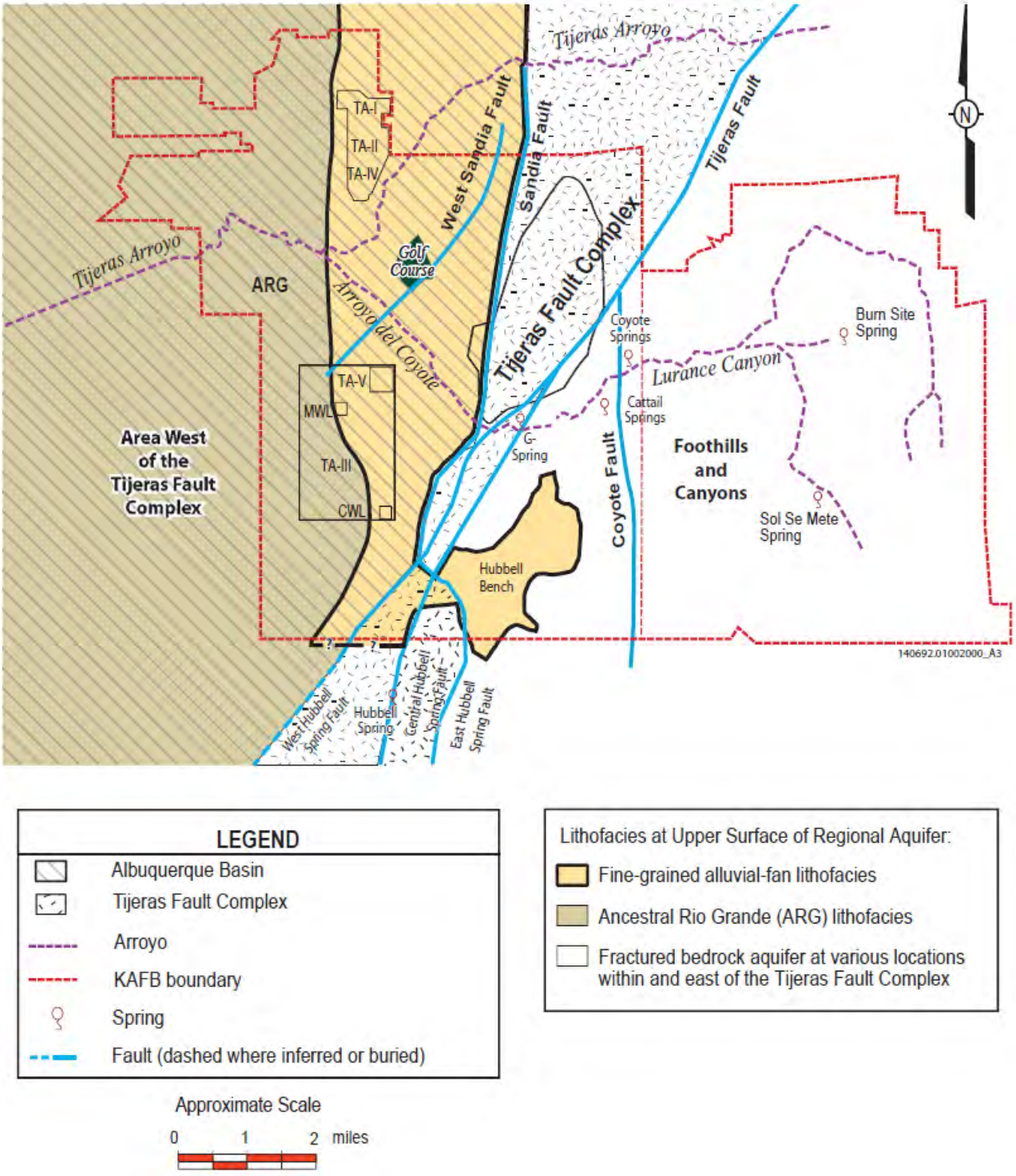


Figure 1-3. Hydrogeologically Distinct Areas Primarily Controlled by Faults (Modified from SNL 1995)

1.1.3 Hydrogeology

Figure 1-3 shows 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) lies above the regional aquifer in the vicinity of TA-I, TA-II, and TA-IV in the TAG 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 (feet of vertical change per foot of horizontal distance). The change in the groundwater elevation is 350 ft over 15,840 ft in crossing the Tijeras fault complex from east to west. 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. 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 approximately 2.2 million cubic feet per year (50-acre feet per year [ft/yr]) (SNL February 1998). The best estimate for the groundwater recharge associated with Arroyo del Coyote is 0.4 million cubic feet per year (9.2-acre ft/yr). 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 (SNL February 1998).

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 2014 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 2014 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 Consent Order) between the New Mexico Environment Department (NMED), Sandia, and the DOE, as specified in Section III.A of the Consent Order (NMED April 2004).

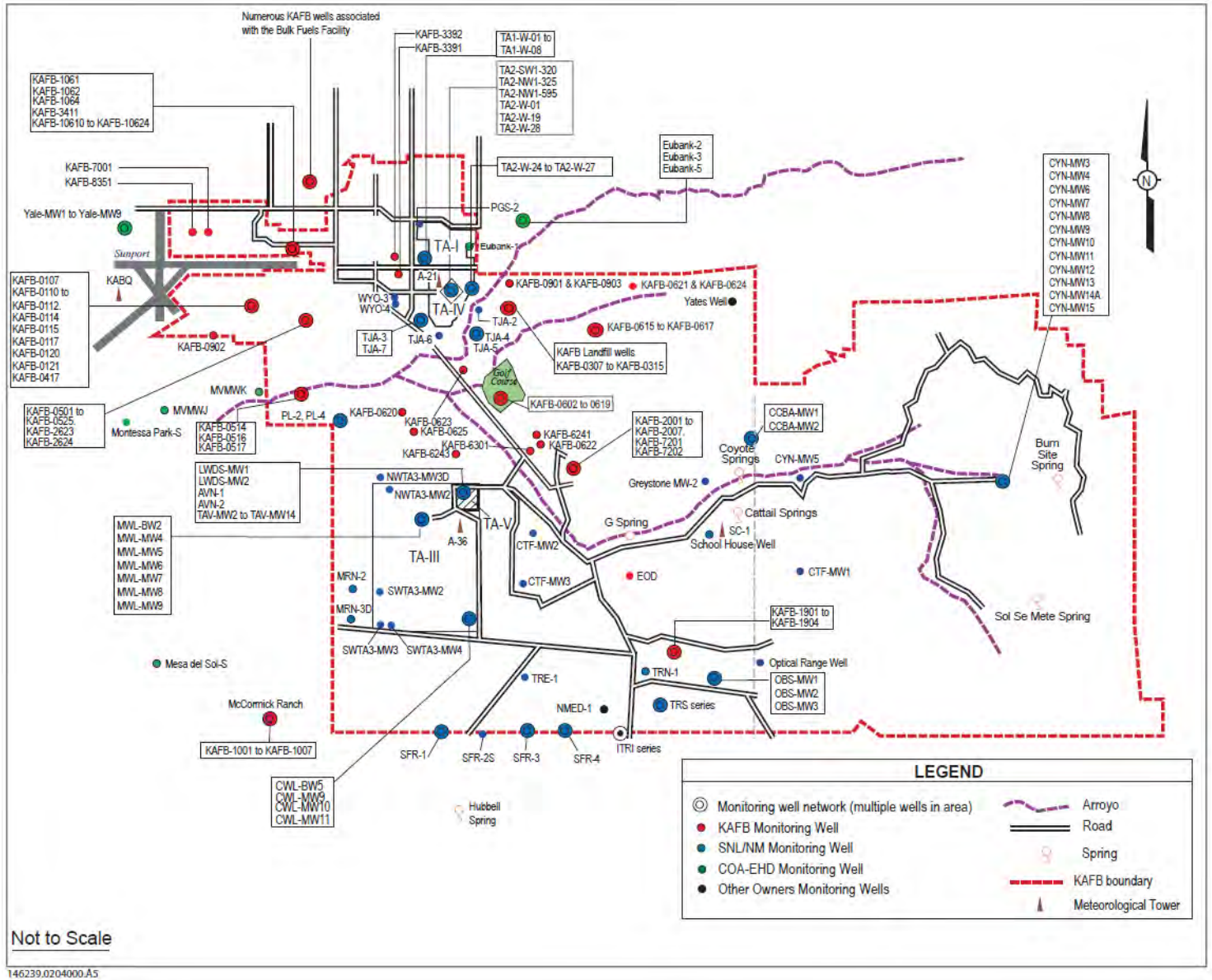


Figure 1-4. Wells and Springs within SNL/NM and KAFB

Table 1-1. Sample Collection Events for Groundwater Quality Monitoring at SNL/NM from January through December 2014

2014 Sampling Event	GMP	CWL	MWL	TAVG	TAG	BSG	SWMUs 8/58	SWMU 49	SWMU 68	SWMU 116	SWMU 149	SWMU 154
January	√	√					√	√	√	√		
February	√			√								
March				√	√						√	√
April	√		√	√			√		√			
May				√	√							
June			√		√	√					√	√
July		√		√			√		√			
August				√	√							
September				√	√						√	√
October			√	√			√		√			
November				√	√							
December					√	√						

NOTES:
BSG = Burn Site Groundwater (Area of Concern).
CWL = Chemical Waste Landfill.
GMP = Groundwater Monitoring Program.
MWL = Mixed Waste Landfill.
SNL/NM = Sandia National Laboratories, New Mexico.
SWMU = Solid Waste Management Unit.
TAG = Tijeras Area Groundwater (Area of Concern).
TAVG = Technical Area-V Groundwater (Area of Concern).

Table 1-2. Summary of SNL/NM Groundwater Monitoring Results for Calendar Year 2014

	SNL/NM Groundwater Monitoring
Number of Active Wells Monitored	78
Number of Analyses Performed	19,825
Percent of Non-detected Results	80

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	180	0	5.58	8.09	7.3973	0.3791	NE
Specific Conductivity in μmhos/cm	180	0	275.5	3316.1	694.1	481.9	NE
Temperature in °C	180	0	11.82	27.61	19.049	2.702	NE
Turbidity in NTU	180	0	0.11	12.3	1.19	1.826	NE
Detected Organic Compounds in μg/L							
Acetone	3	184	2.54	2.95	2.747	0.205	NE
Bromodichloromethane	5	198	0.400	0.590	0.490	0.0846	NE
Carbon Disulfide	1	186	1.74	1.74	1.74	N/A	NE
Chloroform	15	193	0.320	0.940	0.6707	0.1843	NE
Dibromochloromethane	3	200	0.320	0.490	0.430	0.0954	NE
Dichloroethane, 1,1-	14	189	0.380	1.18	0.6493	0.2813	NE
Dichloroethene, 1,1-	3	205	0.600	1.05	0.897	0.257	7.0
Dichloroethene, cis-1,2-	42	161	0.310	4.01	1.442	1.180	70
Diesel Range Organics	2	18	69.6	74.7	72.15	3.61	NE
RDX	3	46	0.208	0.340	0.2717	0.0661	NE
Tetrachloroethene	12	196	0.300	1.63	0.724	0.404	5.0
Toluene	2	201	0.820	1.41	1.115	0.417	1,000
Trichloro-1,2,2-trifluoroethane, 1,1,2-	2	178	13.6	13.9	13.75	0.212	NE
1,2,3-Trichlorobenzene	1	190	0.520	0.520	0.520	N/A	NE
1,2,4-Trichlorobenzene	1	190	0.360	0.360	0.360	N/A	70
Trichloroethene	76	137	0.310	22.4	5.643	5.571	5.0
m-,p-Xylene	1	190	0.330	0.330	0.330	N/A	10,000

Refer to footnotes on page 1-12.

Table 1-2. Summary of SNL/NM Groundwater Monitoring Results for Calendar Year 2014 *(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	52	89	0.016	2.74	0.143	0.4153	NE
Arsenic	15	126	0.00179	0.0458	0.02066	0.01736	0.010
Barium	139	2	0.00193	0.206	0.05594	0.03436	2.0
Beryllium	16	125	0.000222	0.00737	0.001844	0.001775	0.004
Cadmium	8	143	0.000113	0.000328	0.000218	0.000069	0.005
Calcium	219	0	37.4	381	93.22	71.35	NE
Chromium	21	140	0.00203	0.0268	0.01029	0.01057	0.100
Cobalt	106	35	0.0001	0.0105	0.000989	0.002527	NE
Copper	87	54	0.000351	0.0551	0.001604	0.005909	NE
Iron	157	31	0.0477	2.71	0.3324	0.5556	NE
Lead	1	140	0.00209	0.00209	0.00209	N/A	NE
Magnesium	219	0	3.75	84.6	21.18	15.24	NE
Manganese	58	130	0.001	2.98	0.432	0.996	NE
Nickel	153	8	0.00057	0.0367	0.003513	0.006065	NE
Potassium	219	0	1.18	49.6	5.242	8.482	NE
Selenium	110	31	0.00153	0.0304	0.007477	0.009225	0.050
Silver	4	137	0.000367	0.00157	0.000879	0.000505	NE
Sodium	219	0	14.4	1170	73.87	115.94	NE
Thallium	8	133	0.00117	0.00154	0.001335	0.000109	0.002
Uranium	118	0	0.000248	0.0278	0.007058	0.006290	0.030
Vanadium	95	42	0.00105	0.0107	0.005188	0.002204	NE
Zinc	49	92	0.0037	0.832	0.0485	0.1294	NE

Refer to footnotes on page 1-12.

Table 1-2. Summary of SNL/NM Groundwater Monitoring Results for Calendar Year 2014 *(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	196	5	0.263	41.7	7.927	7.814	10
Bromide	102	6	0.138	3.04	0.6235	0.5958	NE
Chloride	156	0	9.46	481	61.3	85.01	NE
Fluoride	106	2	0.204	5.02	1.463	1.124	4.0
Sulfate	156	0	14.9	2010	105.3	187.3	NE
Acid Soluble Sulfides	3	63	1.13	1.40	1.2433	0.1401	NE
Total Organic Halogens	8	7	0.0041	0.0363	0.01775	0.01184	NE
Total Organic Carbon #1	42	24	0.366	2.62	0.6923	0.4614	NE
Total Organic Carbon #2	49	17	0.382	2.66	0.7323	0.4357	NE
Total Organic Carbon #3	49	17	0.338	2.78	0.6818	0.4487	NE
Total Organic Carbon #4	51	15	0.355	2.69	0.6678	0.4407	NE
Total Organic Carbon Average	49	17	0.352	2.69	0.6871	0.4405	NE
Total Phenols	1	14	0.0152	0.0152	0.0152	N/A	NE
Alkalinity as $CaCO_3$	156	0	64.6	1540	219.9	225.5	NE
Detected Radiochemistry Activities in pCi/L (unless noted otherwise)							
Alpha, gross (corrected) [a]	112	0	-21.05	13.74	2.132	4.331	15.0[b]
Beta, gross	96	16	1.52	65.2	7.37	11.47	4 mrem/yr[c]
Cobalt-60	1	111	-5.00	-5.00	-5.00	N/A	NE
Potassium-40	5	93	41.4	94.8	65.6	25.1	NE
Radium-226	7	8	0.559	1.50	0.749	0.335	5.0[d]
Radium-228	4	11	0.571	0.722	0.6367	0.0637	5.0[d]
Radon-222	12	0	110	427	245.0	125.7	NE
Uranium-233/234	35	0	0.49	62.1	22.04	15.11	NE
Uranium-235/236	33	2	0.114	0.761	0.3338	0.1805	NE
Uranium-238	35	0	0.096	8.86	3.904	2.060	NE

NOTES:

[a] Gross alpha results reported as corrected values (uranium activities subtracted out).

[b] The 15.0 pCi/L MCL is for corrected gross alpha activity

[c] Any combination of beta- and/or gamma-emitting radionuclides (as dose rate).

[d] The 5.0 pCi/L MCL is for combined Radium-226 and Radium-228.

°C = Degree(s) Celsius.
µg/L = Microgram(s) per liter.
µmhos/cm = Micromhos per centimeter.
$CaCO_3$ = Calcium carbonate.
EPA = U.S. Environmental Protection Agency.
MCL = Maximum contaminant level. Established by the EPA National Office of Water, National Primary Drinking Water Standards (EPA May 2009).
mg/L = Milligram(s) per liter.
mrem/yr = Millirem(s) 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 2014

Analyte	Well (Relevant Chapter)	Exceedance	Date
Arsenic MCL = 0.010 mg/L	CTF-MW2 (Ch. 13)	0.0365 mg/L	March 2014
		0.0365 mg/L[a]	
		0.0341 mg/L	June 2014
		0.0261 mg/L[a]	
		0.0458 mg/L	September 2014
		0.0398 mg/L[a]	
	CTF-MW2 (Duplicate) (Ch. 13)	0.0355 mg/L	March 2014
		0.0329 mg/L[a]	
Beryllium MCL = 0.004 mg/L	Coyote Springs (Ch. 2)	0.00737 mg/L	January 2014
Fluoride MCL = 4 mg/L	CCBA-MW1 (Ch. 8)	4.68 mg/L	January 2014
		4.97 mg/L	April 2014
		4.99 mg/L	July 2014
		4.81 mg/L	October 2014
	CCBA-MW1 (Duplicate) (Ch. 8)	4.74 mg/L	January 2014
		5.02 mg/L	July 2014
Nitrate plus Nitrite (as Nitrogen) MCL = 10.0 mg/L	AVN-1 (Ch. 5)	10.6 mg/L	October 2014
	CYN-MW9 (Ch. 7)	41.7 mg/L	June 2014
		39.9 mg/L	December 2014
	CYN-MW9 (Duplicate) (Ch. 7)	40.6 mg/L	December 2014
	CYN-MW10 (Ch. 7)	14.0 mg/L	December 2014
	CYN-MW10 (Reanalysis) (Ch. 7)	13.6 mg/L	
	CYN-MW10 (Duplicate) (Ch. 7)	10.7 mg/L	
	CYN-MW10 (Duplicate Reanalysis) (Ch. 7)	13.6 mg/L	
	CYN-MW11 (Ch. 7)	17.8 mg/L	December 2014
	CYN-MW11 (Reanalysis) (Ch. 7)	17.9 mg/L	
	CYN-MW12 (Ch. 7)	16.5 mg/L	June 2014
		14.7 mg/L	December 2014
	CYN-MW12 (Duplicate) (Ch. 7)	15.2 mg/L	June 2014
	CYN-MW13 (Ch. 7)	39.5 mg/L	June 2014
	CYN-MW14A (Ch. 7)	14.8 mg/L	December 2014
	CYN-MW15 (Ch. 7)	18.7 mg/L	December 2014
	LWDS-MW1 (Ch. 5)	12.3 mg/L	March 2014
		11.9 mg/L	May 2014
		11.5 mg/L	August 2014
		12.7 mg/L	November 2014
	LWDS-MW1 (Duplicate) (Ch. 5)	12.3 mg/L	November 2014
	TA2-SW1-320 (Ch. 6)	21.7 mg/L	March 2014
		22.3 mg/L	June 2014
		19.6 mg/L	August 2014
	TA2-W-19 (Ch. 6)	10.8 mg/L	March 2014
		11.7 mg/L	August 2014
		10.9 mg/L	November 2014
	TA2-W-28 (Ch. 6)	21.8 mg/L	December 2014
	TJA-2 (Ch. 6)	10.9 mg/L	March 2014
		11.2 mg/L	June 2014
		10.9 mg/L	September 2014
		12.0 mg/L	November 2014

Refer to footnotes on page 1-14

Table 1-3. Summary of Exceedances for SNL/NM Groundwater Monitoring Wells Sampled During Calendar Year 2014 *(Concluded)*

Analyte	Well (Relevant Chapter)	Exceedance	Date
Nitrate plus Nitrite (as Nitrogen) MCL = 10.0 mg/L	TJA-4 (Ch. 6)	28.4 mg/L	March 2014
		31.2 mg/L	June 2014
		32.8 mg/L	September 2014
		31.0 mg/L	November 2014
	TJA-7 (Ch. 6)	24.8 mg/L	March 2014
		22.9 mg/L	June 2014
		20.8 mg/L	September 2014
		22.4 mg/L	December 2014
	TJA-7 (Duplicate) (Ch. 6)	24.6 mg/L	December 2014
	TAV-MW10 (Ch. 5)	12.0 mg/L	March 2014
		12.0 mg/L	May 2014
		14.6 mg/L	August 2014
		13.1 mg/L	November 2014
	TAV-MW10 (Duplicate) (Ch. 5)	13.1 mg/L	March 2014
Trichloroethene MCL = 5.0 µg/L	LWDS-MW1 (Ch. 5)	22.4 µg/L	March 2014
		17.7 µg/L	May 2014
		16.0 µg/L	August 2014
		16.9 µg/L	November 2014
	LWDS-MW1 (Duplicate) (Ch. 5)	17.5 µg/L	November 2014
	TAV-MW6 (Ch. 5)	18.8 µg/L	March 2014
		14.3 µg/L	May 2014
		13.1 µg/L	August 2014
	TAV-MW10 (Ch. 5)	16.8 µg/L	March 2014
		14.1 µg/L	May 2014
		13.0 µg/L	August 2014
		12.9 µg/L	November 2014
	TAV-MW10 (Duplicate) (Ch. 5)	17.5 µg/L	March 2014
	TAV-MW12 (Ch. 5)	11.9 µg/L	March 2014
		9.40 µg/L	May 2014
		6.43 µg/L	August 2014
		9.05 µg/L	November 2014
	TAV-MW14 (Ch. 5)	8.43 µg/L	February 2014
		6.94 µg/L	May 2014
		6.43 µg/L	November 2014
	TAV-MW14 (Duplicate) (Ch. 5)	7.11 µg/L	May 2014
		6.53 µg/L	November 2014
	WYO-4 (Ch. 6)	9.85 µg/L	March 2014
		6.75 µg/L	June 2014
		10.5 µg/L	November 2014
	WYO-4 (Duplicate) (Ch. 6)	6.85 µg/L	June 2014

NOTES:

[a]Analytical result for filtered groundwater sample. All other analytical results are for unfiltered groundwater samples.

µg/L = Microgram(s) per liter.
AVN Area V (North).
CCBA = Coyote Canyon Blast Area.
Ch. = Chapter.
CTF = Coyote Test Field.
CYN = Canyons.
LWDS = Liquid Waste Disposal System.
MCL = Maximum contaminant level.
mg/L = Milligram(s) per liter.
MW = Monitoring well.
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.
W = Well.

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, TAVG AOC, TAG AOC, BSG AOC, 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 231.1B, *Environment, Safety, and Health Reporting* (DOE 2011). 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 Consent Order between the NMED, Sandia, and the DOE became effective in 2004 and specified that corrective actions for releases of hazardous waste or hazardous constituents were to be conducted under the Consent 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 Consent Order is no longer effective.

The MWL, TAVG AOC, TAG AOC, and BSG AOC are undergoing corrective action in accordance with the Consent Order (NMED April 2004). In addition to the Consent Order, groundwater monitoring requirements for the MWL are further defined in the MWL Long-Term Monitoring and Maintenance Plan (SNL March 2012) that was approved by NMED on January 8, 2014 (Blaine January 2014). Each of the TAVG, TAG, and BSG AOCs must comply with requirements set forth in the Consent Order for site characterization and the development of a Corrective Measures Evaluation for each AOC. The NMED is the regulatory agency responsible for enforcing the requirements identified in the Consent Order for each of the three Corrective Measures Evaluations (SNL 2004a, 2004b, and 2004c). The Consent 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 Consent Order and 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 additional monitoring of groundwater on a quarterly or annual basis. As of CY 2014, all regulatory requirements of NMED's April 2010 letter have been met and sampling will be discontinued at these SWMUs.

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 year. As required by the PCCP, the *CWL Annual Post-Closure Care Report for Calendar Year 2013* was submitted to the NMED in March 2014 (SNL March 2014). The CWL Annual Post-Closure Care Report for CY 2014 will be submitted to NMED in March 2015.

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 2014, 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 (ORP), 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, ORP, DO, and pH were measured using a YSI™ EXO1 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 Customer Funded Record 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, Revision 3 and Revision 4* (SNL May 2011, SNL June 2014).

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 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]
Alkalinity (total, bicarbonate, carbonate)	SM2320B
Anions	SW846-9056
Filtered Metals (including Cations)	SW846-6010/6020/7470
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	SW846-9012B
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]**Analytical Method**

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.

EPA 1999 (and updates), *Perchlorate in Drinking Water Using Ion Chromatography,* EPA 815/R-00-014.

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.

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 = 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]
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]**Analytical Method**

EPA 1980. *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*, EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.

DOE 1990. *EML Procedures Manual,* 27th ed., Vol. 1, Rev. 1992, HASL-300, Environmental Measurements Laboratory.

DOE = U.S. Department of Energy.
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, Revision 3 and Revision 4* (SNL May 2011, SNL June 2014). 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 is retained per the Sandia Records Retention and Disposition Schedule.

Table 1-7. Quality Control Sample Types for Groundwater Sampling and Analysis

QC Sample Type	Description
Field QC	
Equipment blanks	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 and analytical 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:

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, field blank, 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 prepared to determine potential contamination introduced by the laboratory processes and methodologies. These are used to assist with data validation and data defensibility. These samples included laboratory control samples, replicates, matrix spikes, matrix spike duplicates, and surrogate spike samples. Internal laboratory QC samples were analyzed concurrently with all environmental samples. All chemical data were reviewed and qualified in accordance with AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data, Revision 3 and Revision 4* (SNL May 2011, SNL June 2014). Laboratory data qualifiers are provided with the analytical results in the tables attached to Chapters 2.0 through 13.0.

1.4 References

Blaine January 2014 Blaine, T. (New Mexico Environment Department), January 2014. Letter to G. Beausoleil (U.S. Department of Energy NNSA/Sandia Site Office) and P.B. Davies (Sandia National Laboratories, New Mexico), *Approval, Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan, March 2012, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-12-007.* January 8, 2014.

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 2011 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 1998 U.S. Environmental Protection Agency (EPA), 1998. *Standard Methods for the Examination of Water and Wastewater*, 20th Edition, Method 2320B.

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 June 2014 Sandia National Laboratories, New Mexico (SNL/NM), June 2014. *Data Validation Procedure for Chemical and Radiochemical Data*, AOP 00-03, Revision 4, Sample Management Office, Sandia National Laboratories, New Mexico, June 16, 2014.

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

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 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 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 February 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) 2014 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 perennial spring. As part of the activities, SNL/NM personnel used groundwater elevation data from 171 monitoring wells. Groundwater elevation measurements were obtained either quarterly or annually 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 Corporation (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 August 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 has a site-wide Environmental Management System (EMS). 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 U.S. Department of Energy (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 groundwater protection goals.

In April 2004, the Compliance Order on Consent (the Consent Order) (New Mexico Environment Department [NMED] April 2004) became effective between the DOE, Sandia, and the NMED. Among other sampling requirements primarily affecting ER sites for a variety of potential contaminants, the Consent 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 Consent 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 May 2009)
NMWQCC[a] Standards for Groundwater (20 6.2.3103A NMAC Human Health Standards) (NMED January 2001)	MAC	NMWQCC (NMED January 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 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 Consent Order (NMED April 2004).

2.3 Scope of Activities

2.3.1 Groundwater Quality Surveillance Monitoring

Annual sampling of groundwater was conducted during the period from January 30 to April 18, 2014. 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 of volatile organic compounds (VOCs)
- Total organic halogens (TOX)
- Total phenols
- Total alkalinity
- Nitrate plus nitrite (NPN)
- Total cyanide
- High explosives (HE), select 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 at the sampling location using in-line filters of 0.45-micron pore size, except those for VOC, HE, and mercury fractions. Analysis for HE compounds was only conducted on the 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. Duplicate environmental samples from monitoring wells MRN-3D and NWTA3-MW3D were submitted for all analyses.

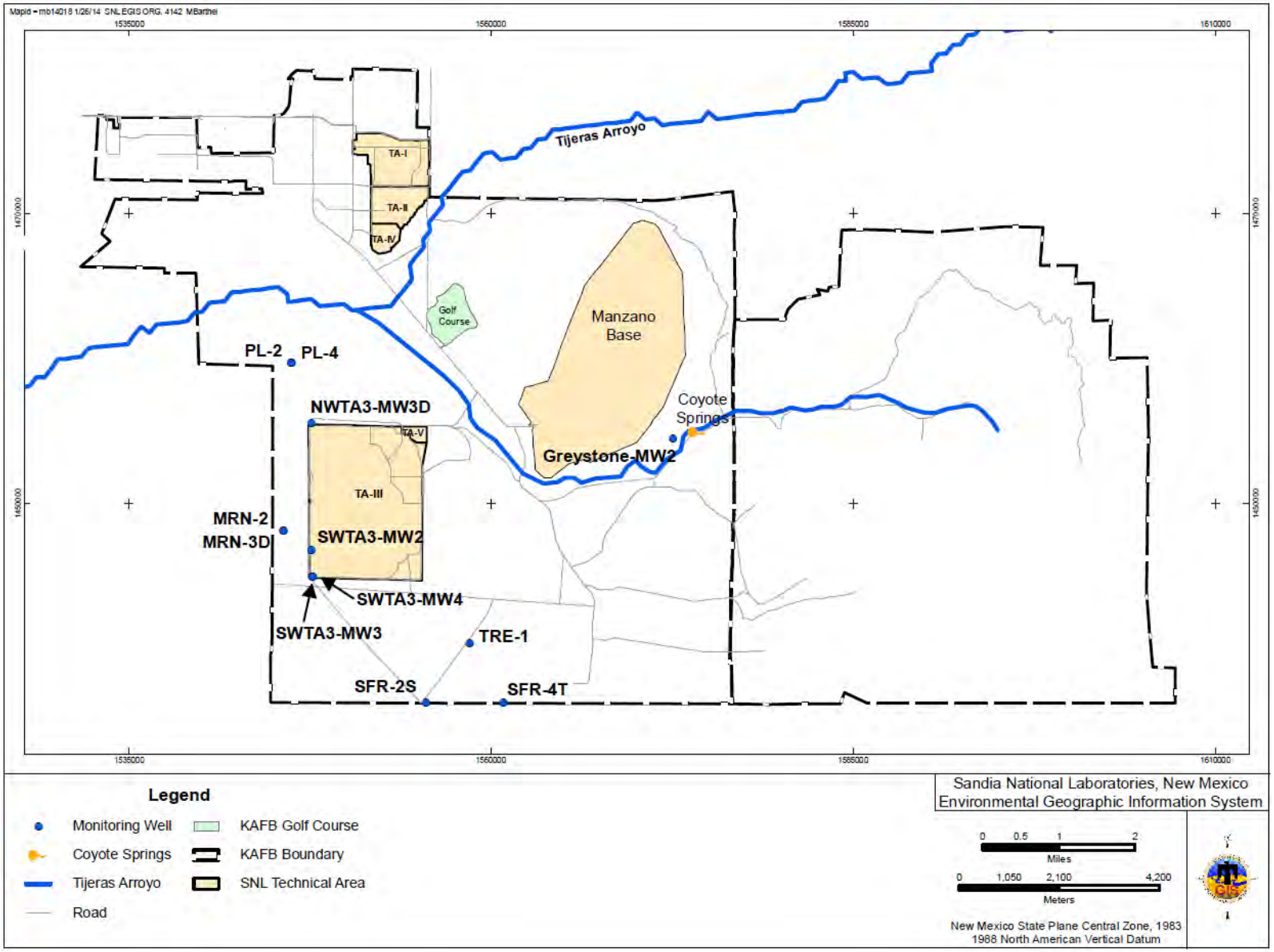


Figure 2-1. Groundwater Monitoring Program Water Quality Monitoring Network

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), and U.S. Geological Service (USGS) (Figure 1-4 and Plate 1). Groundwater elevations in wells were measured quarterly or annually during CY 2014, 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. Precipitation measurements can be used as an indirect estimate of potential groundwater recharge. Available precipitation also impacts the demand on groundwater withdrawal. Specific results for annual precipitation, water production, and the impact on the groundwater elevations are discussed in Section 2.6.2.

2.3.2 Monitoring Well Installation

No new monitoring wells were installed by the GMP during CY 2014.

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 2014 was used to develop the potentiometric surface map presented in Plate 1 and the hydrographs presented on Figures 2B-1 through 2B-6 (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 May 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 January 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 2014. 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 m,p-xylenes and chloroform. The compound m,p-xylene was detected below the MAC of 620 micrograms per liter (µg/L) in SWTA3-MW2 at a concentration of 0.330 µg/L. Chloroform was detected below the MAC of 100 µg/L in TRE-1 at a concentration of 0.540 µg/L. 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 0.263 to 5.22 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 1.66 to 2.69 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 such as fluorite. 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 eight sampling locations. TOX was qualified as not detected during data validation at two locations of the samples because TOX was reported at concentrations less than the values reported in associated blank samples. The detected TOX were mostly "J" values (estimated values), at concentrations ranging from 0.0041 to 0.0363 mg/L.

Total phenol was not detected at 12 of the sample locations, but was detected at 0.0152 mg/L at SWTA3-MW3. SNL/NM personnel resampled Coyote Spring for total phenol because the original result was not comparable to historical values, and the associated reanalysis was performed outside analytical hold times. All total phenol 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 0.00737 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, isotopic uranium, 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 Coyote Springs, MRN-2, MRN-3D, SFR-4T, and TRE-1 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 radiological screening tool and in accordance with 40 Code of Federal Regulations; Parts 9, 141, and 142; and Table I-4, should not include uranium. Naturally occurring uranium is measured independently (i.e., total uranium concentration determined by metals analysis described above) and the gross alpha activity measurements are corrected by subtracting the total uranium activity from the uncorrected gross alpha activity results. Radiological results are further reviewed by an SNL/NM Health Physicist to assure that the samples are nonradioactive. The corrected gross alpha activity results are all below the MCL of 15 picocuries per liter (pCi/L), with a maximum value of 5.12 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, temperature, specific conductance, oxidation-reduction potential, and dissolved oxygen.

2.6.2 Groundwater Elevation Measurements

Construction details for monitoring wells located on or near KAFB are listed in Table 1. During CY 2014, 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 (water level meter). Data were also available for 75 additional monitoring wells owned by KAFB, COA, and NMOSE. The groundwater elevation data are maintained in the Sandia EDMS. Groundwater elevation data for CY 2014 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 potential recharge from precipitation and groundwater withdrawals by production wells.

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 2014, the wettest months were July and August.

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, and Burn Site Groundwater
68	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

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.
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) (the rain gauge at A36 had intermittent data capture problems; therefore, there is increased uncertainty of August through October data);
- 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 2014 at the four locations is shown in Table 2-3. Data for CY 2013 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 8.81 inches of precipitation measured at the Albuquerque International Sunport (KABQ) during CY 2014 is 0.51 inches less than the corresponding period for the previous year; and it is 0.64 inches below the 30-year (1981-2010) norm of 9.45 inches. Monthly distribution of precipitation during CY 2014 at the four locations is shown on Figure 2B-7 (Attachment 2B). Figure 2B-8 shows the annual distribution of precipitation at these four locations for the period from January 2004 to December 2014.

Table 2-3. Precipitation Data for Kirtland Air Force Base, Calendar Years 2013 and 2014

Year	Meteorological Station			
	A21	A36	SC1	KABQ
CY 2013	11.46	12.11	11.00	9.32
CY 2014	9.69	6.26	9.60	8.81

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 2014, KAFB pumped groundwater primarily from six water supply wells.

KAFB supplies all the water for SNL/NM and other DOE/NNSA facilities located on KAFB. Figure 2B-9 (Attachment 2B) shows the CY 2014 monthly production for KAFB water supply wells. The highest level of production was in July at 118,471,000 gallons (gal.); the lowest occurred in December at 38,998,000 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-10 shows the CY 2014 monthly production for each KAFB water supply well. Figure 2B-11 shows the trend of total annual groundwater production at KAFB for all wells, beginning in 2004. Table 2-4 provides a comparison of water pumped during CY 2014 to the previous year.

Table 2-4. Total Kirtland Air Force Base Groundwater Well Production

Units	CY 2013	CY 2014
Million gallons	826	879
Acre feet	2,534	2,697

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, USGS, and NMOSE were used to construct the base-wide CY 2014 potentiometric surface map of the regional aquifer as shown on Plate 1. Water level measurements for June/October/November/December 2014 were used for interpreting the groundwater elevation data and constructing the contours (Table 2). Even though various well owners measure water levels on differing schedules, the use of several 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 production well fields 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 elevations 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 of the PGWS 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-1 through 2B-6). The groundwater elevation data for these wells are considered to be representative of groundwater across KAFB. Historical data from quarterly and annual groundwater elevation measurements through CY 2014 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-1)**—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-2)**—Declining trend up until early 2011; since then groundwater elevations have stabilized.

- **NWTA3-MW3D, PL-2, and PL-4 (Figure 2B-3)**—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-4)**—Slight to moderate declining trend since 2004.

- **SFR-4T (Figure 2B-5)**—Cyclical pattern with yearly fluctuations of 20 to 30 ft since 2001, but less pronounced cyclical pattern in 2011 through 2014.

- **SWTA3-MW2, SWTA3-MW3, and SWTA3-MW4 (Figure 2B-6)**—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 to estimate the overall reproducibility of the sampling and analytical process. Duplicates from monitoring wells MRN-3D and NWTA3-MW3D were analyzed for all parameters, and a duplicate from monitoring well SWTA3-MW4 was analyzed for VOCs only. 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 35 for inorganic analyses) for all calculated parameters. No organic parameters were detected above laboratory MDLs.

EB samples were collected prior to well purging and sampling at monitoring wells MRN-3D, NWTA3-MW3D, and SWTA3-MW4 and submitted for all analyses.

Barium, bromodichloromethane, bromoform, chloride, chloroform, chromium, copper, dibromochloromethane, NPN, and TOX were detected in EB samples. No corrective action was required for barium, bromodichloromethane, bromoform, chloride, chloroform, chromium, dibromochloromethane, NPN, or TOX because these parameters were not detected in associated environmental samples, or were detected at concentrations greater than five times the blank result. Copper was detected in EB samples at concentrations greater than the associated environmental samples; therefore, copper was qualified as not detected in MRN-3D and NWTA3-MW3D samples during data validation. Total phenol was detected in the EB at a concentration less than five times 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 16 trip blanks were submitted with the CY 2014 samples. No VOCs were detected above associated laboratory MDLs.

Four 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, MRN-2, SFR-2S, and SWTA3-MW3 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 in every FB sample. 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:

- Original total phenol analysis for Coyote Springs was qualified as unusable during data validation because the result could not be verified with reanalysis or resample results.

- The potassium-40 activities in samples from Coyote Springs, MRN-2, MRN-3D, SFR-4T, and TRE-1 were qualified as unusable during data validation because GEL was unable to meet minimum peak identification criteria.

2.8 Variances and Nonconformances

No variances or non-conformances of field activities from requirements in the GMP Mini-Sampling and Analysis Plan (SAP) (SNL January 2014) were identified during CY 2014 sampling activities.

2.9 Summary and Conclusions

The annual groundwater surveillance monitoring sampling event was conducted between January 30 and April 18, 2014. 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.

NPN was detected in all well samples above associated MDLs, and ranged from 0.263 to 5.22 mg/L. All NPN results are below the MCL/MAC of 10 mg/L.

Total phenol was not detected at 12 of the sample locations, but was detected at 0.0152 mg/L at SWTA3-MW3. SNL/NM personnel resampled Coyote Spring for total phenol because the original result was not comparable to historical values and the associated reanalysis was performed outside analytical hold times.

Fluoride was detected above the MAC of 1.6 mg/L (NMED January 2001) in samples from Coyote Springs and monitoring wells SFR-2S, SFR-4T, and TRE-1 at concentrations ranging from 1.66 to 2.69 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 0.00737 mg/L.

Groundwater elevations were obtained during CY 2014 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 (Table 2) were used to construct a base-wide potentiometric surface map of the regional aquifer. Overall, 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 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 May 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.

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.

NMED January 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 August 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 January 2014 Sandia National Laboratories, New Mexico (SNL/NM), 2014. *LTS Consolidated Groundwater Monitoring Program Mini-SAP for FY14 Groundwater Surveillance Task*, Sandia National Laboratories, Albuquerque, New Mexico, January.

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.

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 2014 ..... 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 2014 ..... 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 2014 ..... 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 2014 ..... 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 2014 ..... 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 2014 ..... 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 2014 ..... 2A-28

2A-8 Summary of Field Water Quality Measurements, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 2A-33

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 2014

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-MW2 07-Feb-14	m,p-Xylenes	0.330	0.300	2.00	10000	620	J		095276-001	SW846-8260
TRE-1 03-Feb-14	Chloroform	0.540	0.300	1.00	NE	100	J		095259-001	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 2014

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	0.0829–0.0874	SW846-8321A
4-Isopropyltoluene	0.300	SW846-8260	1,3-Dinitrobenzene	0.0829–0.0874	SW846-8321A
Benzene	0.300	SW846-8260	2,4,6-Trinitrotoluene	0.0829–0.0874	SW846-8321A
Bromobenzene	0.300	SW846-8260	2,4-Dinitrotoluene	0.0829–0.0874	SW846-8321A
Bromochloromethane	0.300	SW846-8260	2,6-Dinitrotoluene	0.0829–0.0874	SW846-8321A
Bromodichloromethane	0.300	SW846-8260	2-Amino-4,6-dinitrotoluene	0.0829–0.0874	SW846-8321A
Bromoform	0.300	SW846-8260	2-Nitrotoluene	0.0850–0.0896	SW846-8321A
Carbon tetrachloride	0.300	SW846-8260	3-Nitrotoluene	0.0829–0.0874	SW846-8321A
Chlorobenzene	0.300	SW846-8260	4-Amino-2,6-dinitrotoluene	0.0829–0.0874	SW846-8321A
Chloroethane	0.300	SW846-8260	4-Nitrotoluene	0.155–0.164	SW846-8321A
Chloroform	0.300	SW846-8260	HMX	0.0829–0.0874	SW846-8321A
Chloromethane	0.300	SW846-8260	Nitro-benzene	0.0829–0.0874	SW846-8321A
Dibromochloromethane	0.300	SW846-8260	Pentaerythritol tetranitrate	0.104–0.109	SW846-8321A
Dibromomethane	0.300	SW846-8260	RDX	0.0829–0.0874	SW846-8321A
Dichlorodifluoromethane	0.300	SW846-8260	Tetryl	0.0829–0.0874	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 2014

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 Spring 31-Jan-14	Nitrate plus nitrite	0.485	0.017	0.050	10.0			095572-018	EPA 353.2
Greystone-MW2 30-Jan-14	Nitrate plus nitrite	4.74	0.170	0.500	10.0			095255-018	EPA 353.2
MRN-2 12-Feb-14	Nitrate plus nitrite	4.23	0.170	0.500	10.0			095288-018	EPA 353.2
MRN-3D 13-Feb-14	Nitrate plus nitrite	2.40	0.170	0.500	10.0			095292-018	EPA 353.2
MRN-3D (Duplicate) 13-Feb-14	Nitrate plus nitrite	2.47	0.170	0.500	10.0			095293-018	EPA 353.2
NWTA3-MW3D 06-Feb-14	Nitrate plus nitrite	1.00	0.017	0.050	10.0			095273-018	EPA 353.2
NWTA3-MW3D (Duplicate) 06-Feb-14	Nitrate plus nitrite	1.01	0.017	0.050	10.0			095274-018	EPA 353.2
PL-2 17-Feb-14	Nitrate plus nitrite	2.95	0.170	0.500	10.0			095266-018	EPA 353.2
PL-4 14-Feb-14	Nitrate plus nitrite	5.22	0.170	0.500	10.0			095269-018	EPA 353.2
SFR-2S 04-Feb-14	Nitrate plus nitrite	0.894	0.170	0.500	10.0			095262-018	EPA 353.2
SFR-4T 05-Feb-14	Nitrate plus nitrite	0.263	0.017	0.050	10.0			095264-018	EPA 353.2
SWTA3-MW2 07-Feb-14	Nitrate plus nitrite	0.830	0.085	0.250	10.0			095276-018	EPA 353.2
SWTA3-MW3 10-Feb-14	Nitrate plus nitrite	0.585	0.085	0.250	10.0			095279-018	EPA 353.2
SWTA3-MW4 11-Feb-14	Nitrate plus nitrite	1.06	0.085	0.250	10.0			095284-018	EPA 353.2
TRE-1 03-Feb-14	Nitrate plus nitrite	2.19	0.170	0.500	10.0			095259-018	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 2014

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 Spring 31-Jan-14	Total Organic Halogens	0.0237	0.00333	0.010	NE	NE		J	095257-003	SW846 9020
	Bromide	0.143	0.067	0.200	NE	NE	J		095257-016	SW846 9056
	Chloride	481	6.70	20.0	NE	NE			095257-016	SW846 9056
	Fluoride	**1.69**	0.033	0.100	4.0	1.60			095257-016	SW846 9056
	Sulfate	129	13.3	40.0	NE	NE			095257-016	SW846 9056
	Alkalinity as CaCO3	1120	0.725	1.00	NE	NE			095257-022	SM2320B
	Total Phenol	0.550	0.00834	0.025	NE	NE		R	095257-026	SW846 9066
	Total Phenol (reanalysis)	ND	0.00167	0.005	NE	NE	H, h, U	R	095257-R26	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	095257-027	SW846 9012
Coyote Spring (resample) 18-Apr-14	Total Phenol	ND	0.00167	0.005	NE	NE	U		095835-026	SW846 9066
Greystone-MW2 30-Jan-14	Total Organic Halogens	0.0259	0.00333	0.010	NE	NE		J	095255-003	SW846 9020
	Bromide	0.637	0.067	0.200	NE	NE			095255-016	SW846 9056
	Chloride	113	1.68	5.00	NE	NE			095255-016	SW846 9056
	Fluoride	0.862	0.033	0.100	4.0	1.60			095255-016	SW846 9056
	Sulfate	52.1	3.33	10.0	NE	NE			095255-016	SW846 9056
	Alkalinity as CaCO3	461	0.725	1.00	NE	NE			095255-022	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	UJ	095255-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	095255-027	SW846 9012
MRN-2 12-Feb-14	Total Organic Halogens	ND	0.00333	0.010	NE	NE	U		095288-003	SW846 9020
	Bromide	0.153	0.067	0.200	NE	NE	J		095288-016	SW846 9056
	Chloride	13.4	0.335	1.00	NE	NE			095288-016	SW846 9056
	Fluoride	0.523	0.033	0.100	4.0	1.60			095288-016	SW846 9056
	Sulfate	51.7	0.665	2.00	NE	NE			095288-016	SW846 9056
	Alkalinity as CaCO3	146	0.725	1.00	NE	NE			095288-022	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	UJ	095288-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	095288-027	SW846 9012
MRN-3D 13-Feb-14	Total Organic Halogens	0.00466	0.00333	0.010	NE	NE	J	0.044U	095292-003	SW846 9020
	Bromide	0.148	0.067	0.200	NE	NE	J		095292-016	SW846 9056
	Chloride	14.3	0.335	1.00	NE	NE			095292-016	SW846 9056
	Fluoride	0.389	0.033	0.100	4.0	1.60			095292-016	SW846 9056
	Sulfate	76.1	0.665	2.00	NE	NE			095292-016	SW846 9056
	Alkalinity as CaCO3	155	0.725	1.00	NE	NE			095292-022	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	UJ	095292-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	095292-027	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 2014

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 (Duplicate)	Total Organic Halogens	0.00466	0.00333	0.010	NE	NE	J	0.044U	095293-003	SW846 9020
13-Feb-14	Bromide	0.174	0.067	0.200	NE	NE	J		095293-016	SW846 9056
	Chloride	14.3	0.335	1.00	NE	NE			095293-016	SW846 9056
	Fluoride	0.395	0.033	0.100	4.0	1.60			095293-016	SW846 9056
	Sulfate	75.6	0.665	2.00	NE	NE			095293-016	SW846 9056
	Alkalinity as CaCO3	156	0.725	1.00	NE	NE			095293-022	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	UJ	095293-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	095293-027	SW846 9012
NWTA3-MW3D	Total Organic Halogens	ND	0.00333	0.010	NE	NE	U		095273-003	SW846 9020
06-Feb-14	Bromide	0.140	0.067	0.200	NE	NE	J		095273-016	SW846 9056
	Chloride	10.8	0.335	1.00	NE	NE			095273-016	SW846 9056
	Fluoride	0.752	0.033	0.100	4.0	1.60			095273-016	SW846 9056
	Sulfate	52.5	0.665	2.00	NE	NE			095273-016	SW846 9056
	Alkalinity as CaCO3	140	0.725	1.00	NE	NE			095273-022	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	UJ	095273-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	095273-027	SW846 9012
NWTA3-MW3D	Total Organic Halogens	ND	0.00333	0.010	NE	NE	U		095274-003	SW846 9020
(Duplicate)	Bromide	0.149	0.067	0.200	NE	NE	J		095274-016	SW846 9056
06-Feb-14	Chloride	10.7	0.335	1.00	NE	NE			095274-016	SW846 9056
	Fluoride	0.762	0.033	0.100	4.0	1.60			095274-016	SW846 9056
	Sulfate	51.3	0.665	2.00	NE	NE			095274-016	SW846 9056
	Alkalinity as CaCO3	144	0.725	1.00	NE	NE			095274-022	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	UJ	095274-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	095274-027	SW846 9012
PL-2	Total Organic Halogens	0.00442	0.00333	0.010	NE	NE	J		095266-003	SW846 9020
17-Feb-14	Bromide	0.170	0.067	0.200	NE	NE	J		095266-016	SW846 9056
	Chloride	14.4	0.335	1.00	NE	NE			095266-016	SW846 9056
	Fluoride	0.424	0.033	0.100	4.0	1.60			095266-016	SW846 9056
	Sulfate	74.1	0.665	2.00	NE	NE			095266-016	SW846 9056
	Alkalinity as CaCO3	145	0.725	1.00	NE	NE			095266-022	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	UJ	095266-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	095266-027	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 2014

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	Total Organic Halogens	ND	0.00333	0.010	NE	NE	U		095269-003	SW846 9020
14-Feb-14	Bromide	0.215	0.067	0.200	NE	NE			095269-016	SW846 9056
	Chloride	15.7	0.335	1.00	NE	NE			095269-016	SW846 9056
	Fluoride	0.282	0.033	0.100	4.0	1.60			095269-016	SW846 9056
	Sulfate	69.7	0.665	2.00	NE	NE			095269-016	SW846 9056
	Alkalinity as CaCO3	164	0.725	1.00	NE	NE			095269-022	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	UJ	095269-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	095269-027	SW846 9012
SFR-2S	Total Organic Halogens	0.0208	0.00333	0.010	NE	NE		J	095262-003	SW846 9020
04-Feb-14	Bromide	0.658	0.067	0.200	NE	NE			095262-016	SW846 9056
	Chloride	127	1.68	5.00	NE	NE			095262-016	SW846 9056
	Fluoride	**1.68**	0.033	0.100	4.0	1.60			095262-016	SW846 9056
	Sulfate	72.7	3.33	10.0	NE	NE			095262-016	SW846 9056
	Alkalinity as CaCO3	382	0.725	1.00	NE	NE			095262-022	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	UJ	095262-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	095262-027	SW846 9012
SFR-4T	Total Organic Halogens	0.0363	0.00333	0.010	NE	NE		J	095264-003	SW846 9020
05-Feb-14	Bromide	1.57	0.067	0.200	NE	NE			095264-016	SW846 9056
	Chloride	201	13.4	40.0	NE	NE			095264-016	SW846 9056
	Fluoride	**2.69**	0.033	0.100	4.0	1.60			095264-016	SW846 9056
	Sulfate	2010	26.6	80.0	NE	NE			095264-016	SW846 9056
	Alkalinity as CaCO3	106	0.725	1.00	NE	NE			095264-022	SM2320B
	Total Phenol	0.00409	0.00167	0.005	NE	NE	B, J	0.0092UJ	095264-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	095264-027	SW846 9012
SWTA3-MW2	Total Organic Halogens	0.0055	0.00333	0.010	NE	NE	J		095276-003	SW846 9020
07-Feb-14	Bromide	0.154	0.067	0.200	NE	NE	J		095276-016	SW846 9056
	Chloride	16.0	0.335	1.00	NE	NE			095276-016	SW846 9056
	Fluoride	1.03	0.033	0.100	4.0	1.60			095276-016	SW846 9056
	Sulfate	59.2	0.665	2.00	NE	NE			095276-016	SW846 9056
	Alkalinity as CaCO3	163	0.725	1.00	NE	NE			095276-022	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	UJ	095276-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	095276-027	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 2014

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	ND	0.00333	0.010	NE	NE	U		095279-003	SW846 9020
10-Feb-14	Bromide	0.144	0.067	0.200	NE	NE	J		095279-016	SW846 9056
	Chloride	13.6	0.335	1.00	NE	NE			095279-016	SW846 9056
	Fluoride	1.18	0.033	0.100	4.0	1.60			095279-016	SW846 9056
	Sulfate	65.0	0.665	2.00	NE	NE			095279-016	SW846 9056
	Alkalinity as CaCO3	156	0.725	1.00	NE	NE			095279-022	SM2320B
	Total Phenol	0.0152	0.00167	0.005	NE	NE			095279-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	095279-027	SW846 9012
SWTA3-MW4	Total Organic Halogens	0.0041	0.00333	0.010	NE	NE	J		095284-003	SW846 9020
11-Feb-14	Bromide	0.210	0.067	0.200	NE	NE			095284-016	SW846 9056
	Chloride	17.7	0.335	1.00	NE	NE			095284-016	SW846 9056
	Fluoride	1.57	0.033	0.100	4.0	1.60			095284-016	SW846 9056
	Sulfate	52.6	0.665	2.00	NE	NE			095284-016	SW846 9056
	Alkalinity as CaCO3	169	0.725	1.00	NE	NE			095284-022	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	UJ	095284-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	095284-027	SW846 9012
TRE-1	Total Organic Halogens	0.0213	0.00333	0.010	NE	NE		J	095259-003	SW846 9020
03-Feb-14	Bromide	0.747	0.067	0.200	NE	NE			095259-016	SW846 9056
	Chloride	135	1.68	5.00	NE	NE			095259-016	SW846 9056
	Fluoride	**1.66**	0.033	0.100	4.0	1.60			095259-016	SW846 9056
	Sulfate	102	3.33	10.0	NE	NE			095259-016	SW846 9056
	Alkalinity as CaCO3	475	0.725	1.00	NE	NE			095259-022	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	UJ	095259-026	SW846 9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U	UJ	095259-027	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 2014

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 Spring 31-Jan-14	ND	0.000067	0.0002	0.002	U		095257-010	SW846 7470A
Greystone-MW2 30-Jan-14	ND	0.000067	0.0002	0.002	U		095255-010	SW846 7470A
MRN-2 12-Feb-14	ND	0.000067	0.0002	0.002	U		095288-010	SW846 7470A
MRN-3D 13-Feb-14	ND	0.000067	0.0002	0.002	U		095292-010	SW846 7470A
MRN-3D (Duplicate) 13-Feb-14	ND	0.000067	0.0002	0.002	U		095293-010	SW846 7470A
NWTA3-MW3D 06-Feb-14	ND	0.000067	0.0002	0.002	U		095273-010	SW846 7470A
NWTA3-MW3D (Duplicate) 06-Feb-14	ND	0.000067	0.0002	0.002	U		095274-010	SW846 7470A
PL-2 17-Feb-14	ND	0.000067	0.0002	0.002	U		095266-010	SW846 7470A
PL-4 14-Feb-14	ND	0.000067	0.0002	0.002	U		095269-010	SW846 7470A
SFR-2S 04-Feb-14	ND	0.000067	0.0002	0.002	U		095262-010	SW846 7470A
SFR-4T 05-Feb-14	ND	0.000067	0.0002	0.002	U		095264-010	SW846 7470A
SWTA3-MW2 07-Feb-14	ND	0.000067	0.0002	0.002	U		095276-010	SW846 7470A
SWTA3-MW3 10-Feb-14	ND	0.000067	0.0002	0.002	U		095279-010	SW846 7470A
SWTA3-MW4 11-Feb-14	ND	0.000067	0.0002	0.002	U		095284-010	SW846 7470A
TRE-1 03-Feb-14	ND	0.000067	0.0002	0.002	U		095259-010	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 2014

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 Spring	Aluminum	0.227	0.015	0.050	NE	NE			095257-009	SW846 6020
31-Jan-14	Antimony	ND	0.001	0.003	0.006	NE	U		095257-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		095257-009	SW846 6020
	Barium	0.0448	0.0006	0.002	2.00	1.00			095257-009	SW846 6020
	Beryllium	**0.00737**	0.0002	0.0005	0.004	NE			095257-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		095257-009	SW846 6020
	Calcium	297	0.600	2.00	NE	NE			095257-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	0.050	U		095257-009	SW846 6020
	Cobalt	0.0103	0.0001	0.001	NE	NE			095257-009	SW846 6020
	Copper	0.00211	0.00035	0.001	NE	NE		J-	095257-009	SW846 6020
	Iron	0.624	0.033	0.100	NE	NE			095257-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		095257-009	SW846 6020
	Magnesium	61.0	0.050	0.150	NE	NE			095257-009	SW846 6020
	Manganese	1.48	0.005	0.025	NE	NE		J	095257-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		095257-009	SW846 7470
	Nickel	0.0314	0.0005	0.002	NE	NE			095257-009	SW846 6020
	Potassium	27.9	0.080	0.300	NE	NE			095257-009	SW846 6020
	Selenium	0.00191	0.0015	0.005	0.050	0.050	J		095257-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		095257-009	SW846 6020
	Sodium	390	0.800	2.50	NE	NE		J	095257-009	SW846 6020
	Thallium	0.00128	0.00045	0.002	0.002	NE	J		095257-009	SW846 6020
	Uranium	0.00759	0.000067	0.0002	0.03	0.03			095257-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	NE	U		095257-009	SW846 6010
	Zinc	0.0478	0.0035	0.010	NE	NE			095257-009	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 2014

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		095255-009	SW846 6020
30-Jan-14	Antimony	ND	0.001	0.003	0.006	NE	U		095255-009	SW846 6020
	Arsenic	0.00397	0.0017	0.005	0.010	0.100	J		095255-009	SW846 6020
	Barium	0.140	0.0006	0.002	2.00	1.00			095255-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		095255-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		095255-009	SW846 6020
	Calcium	155	0.600	2.00	NE	NE	B		095255-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	0.050	U		095255-009	SW846 6020
	Cobalt	0.000453	0.0001	0.001	NE	NE	J		095255-009	SW846 6020
	Copper	0.000794	0.00035	0.001	NE	NE	J	J-	095255-009	SW846 6020
	Iron	0.393	0.033	0.100	NE	NE			095255-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		095255-009	SW846 6020
	Magnesium	29.2	0.010	0.030	NE	NE			095255-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		095255-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		095255-009	SW846 7470
	Nickel	0.00247	0.0005	0.002	NE	NE		J-	095255-009	SW846 6020
	Potassium	5.56	0.080	0.300	NE	NE			095255-009	SW846 6020
	Selenium	0.0017	0.0015	0.005	0.050	0.050	J		095255-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		095255-009	SW846 6020
	Sodium	96.1	0.800	2.50	NE	NE		J	095255-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		095255-009	SW846 6020
	Uranium	0.00726	0.000067	0.0002	0.03	0.03			095255-009	SW846 6020
	Vanadium	0.00298	0.001	0.005	NE	NE	J		095255-009	SW846 6010
	Zinc	0.00511	0.0035	0.010	NE	NE	B, J	0.018U	095255-009	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 2014

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		095288-009	SW846 6020
12-Feb-14	Antimony	ND	0.001	0.003	0.006	NE	U		095288-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		095288-009	SW846 6020
	Barium	0.0502	0.0006	0.002	2.00	1.00			095288-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		095288-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		095288-009	SW846 6020
	Calcium	49.1	0.060	0.200	NE	NE			095288-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	0.050	U		095288-009	SW846 6020
	Cobalt	0.000101	0.0001	0.001	NE	NE	J		095288-009	SW846 6020
	Copper	0.00078	0.00035	0.001	NE	NE	J		095288-009	SW846 6020
	Iron	0.240	0.033	0.100	NE	NE	B	0.44U	095288-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		095288-009	SW846 6020
	Magnesium	14.8	0.010	0.030	NE	NE			095288-009	SW846 6020
	Manganese	0.00251	0.001	0.005	NE	NE	B, J	0.0096U	095288-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		095288-009	SW846 7470
	Nickel	0.0015	0.0005	0.002	NE	NE	J		095288-009	SW846 6020
	Potassium	3.18	0.080	0.300	NE	NE			095288-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	0.050	U		095288-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		095288-009	SW846 6020
	Sodium	22.5	0.080	0.250	NE	NE			095288-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		095288-009	SW846 6020
	Uranium	0.00312	0.000067	0.0002	0.03	0.03			095288-009	SW846 6020
	Vanadium	0.00778	0.001	0.005	NE	NE			095288-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	NE	U		095288-009	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 2014

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		095292-009	SW846 6020
13-Feb-14	Antimony	ND	0.001	0.003	0.006	NE	U		095292-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		095292-009	SW846 6020
	Barium	0.106	0.0006	0.002	2.00	1.00			095292-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		095292-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		095292-009	SW846 6020
	Calcium	59.7	0.600	2.00	NE	NE			095292-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	0.050	U		095292-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	NE	U		095292-009	SW846 6020
	Copper	0.000707	0.00035	0.001	NE	NE	J	0.0052U	095292-009	SW846 6020
	Iron	0.119	0.033	0.100	NE	NE	B	0.44U	095292-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		095292-009	SW846 6020
	Magnesium	14.0	0.010	0.030	NE	NE			095292-009	SW846 6020
	Manganese	0.00187	0.001	0.005	NE	NE	B, J	0.0096U	095292-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		095292-009	SW846 7470
	Nickel	0.00155	0.0005	0.002	NE	NE	J		095292-009	SW846 6020
	Potassium	4.43	0.080	0.300	NE	NE			095292-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	0.050	U		095292-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		095292-009	SW846 6020
	Sodium	27.7	0.080	0.250	NE	NE			095292-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		095292-009	SW846 6020
	Uranium	0.00403	0.000067	0.0002	0.03	0.03			095292-009	SW846 6020
	Vanadium	0.00558	0.001	0.005	NE	NE			095292-009	SW846 6010
	Zinc	0.0576	0.0035	0.010	NE	NE			095292-009	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 2014

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		095293-009	SW846 6020
(Duplicate)	Antimony	ND	0.001	0.003	0.006	NE	U		095293-009	SW846 6020
13-Feb-14	Arsenic	0.00196	0.0017	0.005	0.010	0.100	J		095293-009	SW846 6020
	Barium	0.106	0.0006	0.002	2.00	1.00			095293-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		095293-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		095293-009	SW846 6020
	Calcium	60.2	0.600	2.00	NE	NE			095293-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	0.050	U		095293-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	NE	U		095293-009	SW846 6020
	Copper	0.000676	0.00035	0.001	NE	NE	J	0.0052U	095293-009	SW846 6020
	Iron	0.106	0.033	0.100	NE	NE	B	0.44U	095293-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		095293-009	SW846 6020
	Magnesium	13.7	0.010	0.030	NE	NE			095293-009	SW846 6020
	Manganese	0.00149	0.001	0.005	NE	NE	B, J	0.0096U	095293-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		095293-009	SW846 7470
	Nickel	0.00137	0.0005	0.002	NE	NE	J		095293-009	SW846 6020
	Potassium	4.22	0.080	0.300	NE	NE			095293-009	SW846 6020
	Selenium	0.00153	0.0015	0.005	0.050	0.050	J		095293-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		095293-009	SW846 6020
	Sodium	26.6	0.080	0.250	NE	NE			095293-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		095293-009	SW846 6020
	Uranium	0.00407	0.000067	0.0002	0.03	0.03			095293-009	SW846 6020
	Vanadium	0.00508	0.001	0.005	NE	NE			095293-009	SW846 6010
	Zinc	0.0613	0.0035	0.010	NE	NE			095293-009	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 2014

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		095273-009	SW846 6020
06-Feb-14	Antimony	ND	0.001	0.003	0.006	NE	U		095273-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		095273-009	SW846 6020
	Barium	0.0912	0.0006	0.002	2.00	1.00			095273-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		095273-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		095273-009	SW846 6020
	Calcium	38.8	0.060	0.200	NE	NE			095273-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	0.050	U		095273-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	NE	U		095273-009	SW846 6020
	Copper	0.000658	0.00035	0.001	NE	NE	J	0.0063U	095273-009	SW846 6020
	Iron	0.0703	0.033	0.100	NE	NE	J		095273-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		095273-009	SW846 6020
	Magnesium	8.80	0.010	0.030	NE	NE		J	095273-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		095273-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		095273-009	SW846 7470
	Nickel	0.00125	0.0005	0.002	NE	NE	J		095273-009	SW846 6020
	Potassium	3.26	0.080	0.300	NE	NE			095273-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	0.050	U		095273-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		095273-009	SW846 6020
	Sodium	40.1	0.080	0.250	NE	NE			095273-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		095273-009	SW846 6020
	Uranium	0.00414	0.000067	0.0002	0.03	0.03			095273-009	SW846 6020
	Vanadium	0.00783	0.001	0.005	NE	NE			095273-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	NE	U		095273-009	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 2014

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		095274-009	SW846 6020
(Duplicate)	Antimony	ND	0.001	0.003	0.006	NE	U		095274-009	SW846 6020
06-Feb-14	Arsenic	ND	0.0017	0.005	0.010	0.100	U		095274-009	SW846 6020
	Barium	0.0888	0.0006	0.002	2.00	1.00			095274-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		095274-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		095274-009	SW846 6020
	Calcium	37.4	0.060	0.200	NE	NE			095274-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	0.050	U		095274-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	NE	U		095274-009	SW846 6020
	Copper	0.00064	0.00035	0.001	NE	NE	J	0.0063U	095274-009	SW846 6020
	Iron	0.0625	0.033	0.100	NE	NE	J		095274-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		095274-009	SW846 6020
	Magnesium	8.25	0.010	0.030	NE	NE		J	095274-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		095274-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		095274-009	SW846 7470
	Nickel	0.0013	0.0005	0.002	NE	NE	J		095274-009	SW846 6020
	Potassium	3.39	0.080	0.300	NE	NE			095274-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	0.050	U		095274-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		095274-009	SW846 6020
	Sodium	39.6	0.080	0.250	NE	NE			095274-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		095274-009	SW846 6020
	Uranium	0.00404	0.000067	0.0002	0.03	0.03			095274-009	SW846 6020
	Vanadium	0.00822	0.001	0.005	NE	NE			095274-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	NE	U		095274-009	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 2014

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		095266-009	SW846 6020
17-Feb-14	Antimony	ND	0.001	0.003	0.006	NE	U		095266-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		095266-009	SW846 6020
	Barium	0.081	0.0006	0.002	2.00	1.00			095266-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		095266-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		095266-009	SW846 6020
	Calcium	59.6	0.300	1.00	NE	NE			095266-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	0.050	U		095266-009	SW846 6020
	Cobalt	0.000111	0.0001	0.001	NE	NE	J		095266-009	SW846 6020
	Copper	0.000844	0.00035	0.001	NE	NE	J		095266-009	SW846 6020
	Iron	0.159	0.033	0.100	NE	NE			095266-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		095266-009	SW846 6020
	Magnesium	8.81	0.010	0.030	NE	NE		J	095266-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		095266-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		095266-009	SW846 7470
	Nickel	0.00393	0.0005	0.002	NE	NE			095266-009	SW846 6020
	Potassium	3.08	0.080	0.300	NE	NE			095266-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	0.050	U		095266-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		095266-009	SW846 6020
	Sodium	24.4	0.400	1.25	NE	NE			095266-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		095266-009	SW846 6020
	Uranium	0.00391	0.000067	0.0002	0.03	0.03			095266-009	SW846 6020
	Vanadium	0.00675	0.001	0.005	NE	NE			095266-009	SW846 6010
	Zinc	0.0156	0.0035	0.010	NE	NE			095266-009	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 2014

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		095269-009	SW846 6020
14-Feb-14	Antimony	ND	0.001	0.003	0.006	NE	U		095269-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		095269-009	SW846 6020
	Barium	0.0651	0.0006	0.002	2.00	1.00			095269-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		095269-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		095269-009	SW846 6020
	Calcium	72.2	0.300	1.00	NE	NE	B		095269-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	0.050	U		095269-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	NE	U		095269-009	SW846 6020
	Copper	0.000485	0.00035	0.001	NE	NE	J		095269-009	SW846 6020
	Iron	0.118	0.033	0.100	NE	NE			095269-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		095269-009	SW846 6020
	Magnesium	11.8	0.010	0.030	NE	NE			095269-009	SW846 6020
	Manganese	0.00292	0.001	0.005	NE	NE	J		095269-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		095269-009	SW846 7470
	Nickel	0.000967	0.0005	0.002	NE	NE	J		095269-009	SW846 6020
	Potassium	4.50	0.080	0.300	NE	NE		J	095269-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	0.050	U		095269-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		095269-009	SW846 6020
	Sodium	21.1	0.080	0.250	NE	NE		J	095269-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		095269-009	SW846 6020
	Uranium	0.00358	0.000067	0.0002	0.03	0.03			095269-009	SW846 6020
	Vanadium	0.00396	0.001	0.005	NE	NE	J		095269-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	NE	U		095269-009	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 2014

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		095262-009	SW846 6020
04-Feb-14	Antimony	ND	0.001	0.003	0.006	NE	U		095262-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		095262-009	SW846 6020
	Barium	0.0609	0.0006	0.002	2.00	1.00			095262-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		095262-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		095262-009	SW846 6020
	Calcium	133	0.600	2.00	NE	NE			095262-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	0.050	U		095262-009	SW846 6020
	Cobalt	0.000466	0.0001	0.001	NE	NE	J		095262-009	SW846 6020
	Copper	0.00165	0.00035	0.001	NE	NE			095262-009	SW846 6020
	Iron	0.229	0.033	0.100	NE	NE			095262-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		095262-009	SW846 6020
	Magnesium	35.2	0.010	0.030	NE	NE		J	095262-009	SW846 6020
	Manganese	0.00174	0.001	0.005	NE	NE	J		095262-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		095262-009	SW846 7470
	Nickel	0.0175	0.0005	0.002	NE	NE			095262-009	SW846 6020
	Potassium	7.06	0.080	0.300	NE	NE			095262-009	SW846 6020
	Selenium	0.00212	0.0015	0.005	0.050	0.050	J		095262-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		095262-009	SW846 6020
	Sodium	86.2	0.800	2.50	NE	NE			095262-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		095262-009	SW846 6020
	Uranium	0.019	0.000067	0.0002	0.03	0.03			095262-009	SW846 6020
	Vanadium	0.00335	0.001	0.005	NE	NE	J		095262-009	SW846 6010
	Zinc	0.0045	0.0035	0.010	NE	NE	J		095262-009	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 2014

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		095264-009	SW846 6020
05-Feb-14	Antimony	ND	0.001	0.003	0.006	NE	U		095264-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		095264-009	SW846 6020
	Barium	0.0102	0.0006	0.002	2.00	1.00			095264-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		095264-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		095264-009	SW846 6020
	Calcium	61.6	0.600	2.00	NE	NE			095264-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	0.050	U		095264-009	SW846 6020
	Cobalt	0.000107	0.0001	0.001	NE	NE	J		095264-009	SW846 6020
	Copper	0.00407	0.00035	0.001	NE	NE			095264-009	SW846 6020
	Iron	0.118	0.033	0.100	NE	NE			095264-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		095264-009	SW846 6020
	Magnesium	3.75	0.010	0.030	NE	NE		J	095264-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		095264-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		095264-009	SW846 7470
	Nickel	0.00328	0.0005	0.002	NE	NE			095264-009	SW846 6020
	Potassium	2.50	0.080	0.300	NE	NE			095264-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	0.050	U		095264-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		095264-009	SW846 6020
	Sodium	1170	8.00	25.0	NE	NE			095264-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		095264-009	SW846 6020
	Uranium	0.000248	0.000067	0.0002	0.03	0.03			095264-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	NE	U		095264-009	SW846 6010
	Zinc	0.0217	0.0035	0.010	NE	NE			095264-009	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 2014

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		095276-009	SW846 6020
07-Feb-14	Antimony	ND	0.001	0.003	0.006	NE	U		095276-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		095276-009	SW846 6020
	Barium	0.0682	0.0006	0.002	2.00	1.00			095276-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		095276-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		095276-009	SW846 6020
	Calcium	42.3	0.060	0.200	NE	NE			095276-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	0.050	U		095276-009	SW846 6020
	Cobalt	0.000112	0.0001	0.001	NE	NE	J		095276-009	SW846 6020
	Copper	0.000784	0.00035	0.001	NE	NE	J		095276-009	SW846 6020
	Iron	0.0956	0.033	0.100	NE	NE	J		095276-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		095276-009	SW846 6020
	Magnesium	12.3	0.010	0.030	NE	NE		J	095276-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		095276-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		095276-009	SW846 7470
	Nickel	0.00126	0.0005	0.002	NE	NE	J		095276-009	SW846 6020
	Potassium	3.75	0.080	0.300	NE	NE			095276-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	0.050	U		095276-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		095276-009	SW846 6020
	Sodium	32.9	0.080	0.250	NE	NE			095276-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		095276-009	SW846 6020
	Uranium	0.00356	0.000067	0.0002	0.03	0.03			095276-009	SW846 6020
	Vanadium	0.00702	0.001	0.005	NE	NE			095276-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	NE	U		095276-009	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 2014

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		095279-009	SW846 6020
10-Feb-14	Antimony	ND	0.001	0.003	0.006	NE	U		095279-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		095279-009	SW846 6020
	Barium	0.0549	0.0006	0.002	2.00	1.00			095279-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		095279-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		095279-009	SW846 6020
	Calcium	39.3	0.060	0.200	NE	NE			095279-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	0.050	U		095279-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	NE	U		095279-009	SW846 6020
	Copper	0.000851	0.00035	0.001	NE	NE	J		095279-009	SW846 6020
	Iron	0.0868	0.033	0.100	NE	NE	B, J	0.44U	095279-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		095279-009	SW846 6020
	Magnesium	10.6	0.010	0.030	NE	NE			095279-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		095279-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		095279-009	SW846 7470
	Nickel	0.00113	0.0005	0.002	NE	NE	J		095279-009	SW846 6020
	Potassium	4.65	0.080	0.300	NE	NE			095279-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	0.050	U		095279-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		095279-009	SW846 6020
	Sodium	47.8	0.080	0.250	NE	NE			095279-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		095279-009	SW846 6020
	Uranium	0.00241	0.000067	0.0002	0.03	0.03			095279-009	SW846 6020
	Vanadium	0.00796	0.001	0.005	NE	NE			095279-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	NE	U		095279-009	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 2014

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		095284-009	SW846 6020
11-Feb-14	Antimony	ND	0.001	0.003	0.006	NE	U		095284-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		095284-009	SW846 6020
	Barium	0.0476	0.0006	0.002	2.00	1.00			095284-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	NE	U		095284-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		095284-009	SW846 6020
	Calcium	37.5	0.060	0.200	NE	NE			095284-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	0.050	U		095284-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	NE	U		095284-009	SW846 6020
	Copper	0.000482	0.00035	0.001	NE	NE	J		095284-009	SW846 6020
	Iron	0.0704	0.033	0.100	NE	NE	B, J	0.44U	095284-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		095284-009	SW846 6020
	Magnesium	10.3	0.010	0.030	NE	NE			095284-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		095284-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		095284-009	SW846 7470
	Nickel	0.000968	0.0005	0.002	NE	NE	J		095284-009	SW846 6020
	Potassium	4.32	0.080	0.300	NE	NE			095284-009	SW846 6020
	Selenium	0.00155	0.0015	0.005	0.050	0.050	J		095284-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		095284-009	SW846 6020
	Sodium	56.9	0.800	2.50	NE	NE			095284-009	SW846 6020
	Thallium	0.000565	0.00045	0.002	0.002	NE	J	0.003U	095284-009	SW846 6020
	Uranium	0.00249	0.000067	0.0002	0.03	0.03			095284-009	SW846 6020
	Vanadium	0.00845	0.001	0.005	NE	NE			095284-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	NE	U		095284-009	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 2014

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		095259-009	SW846 6020
03-Feb-14	Antimony	ND	0.001	0.003	0.006	NE	U		095259-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	0.100	U		095259-009	SW846 6020
	Barium	0.0428	0.0006	0.002	2.00	1.00			095259-009	SW846 6020
	Beryllium	0.000222	0.0002	0.0005	0.004	NE	J		095259-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		095259-009	SW846 6020
	Calcium	171	0.600	2.00	NE	NE			095259-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	0.050	U		095259-009	SW846 6020
	Cobalt	0.000345	0.0001	0.001	NE	NE	J		095259-009	SW846 6020
	Copper	0.000889	0.00035	0.001	NE	NE	J		095259-009	SW846 6020
	Iron	0.265	0.033	0.100	NE	NE			095259-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		095259-009	SW846 6020
	Magnesium	36.0	0.010	0.030	NE	NE		J	095259-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		095259-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		095259-009	SW846 7470
	Nickel	0.00445	0.0005	0.002	NE	NE			095259-009	SW846 6020
	Potassium	6.40	0.080	0.300	NE	NE			095259-009	SW846 6020
	Selenium	0.00244	0.0015	0.005	0.050	0.050	J		095259-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		095259-009	SW846 6020
	Sodium	118	0.800	2.50	NE	NE			095259-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	NE	U		095259-009	SW846 6020
	Uranium	0.021	0.000067	0.0002	0.03	0.03			095259-009	SW846 6020
	Vanadium	0.00274	0.001	0.005	NE	NE	J		095259-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	NE	U		095259-009	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 2014

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 Spring	Americium-241	-1.77 ± 8.73	8.93	4.38	NE	NE	U	BD	095257-033	EPA 901.1
31-Jan-14	Cesium-137	-1.87 ± 2.97	3.04	1.47	NE	NE	U	BD	095257-033	EPA 901.1
	Cobalt-60	-5.0 ± 3.62	3.05	1.45	NE	NE	U	BD	095257-033	EPA 901.1
	Potassium-40	45.3 ± 41.9	28.1	13.2	NE	NE	X	R	095257-033	EPA 901.1
	Gross Alpha	-21.05	NA	NA	15 pCi/L	NE	NA	None	095257-034	EPA 900.0
	Gross Beta	29.3 ± 8.03	9.71	4.72	4mrem/yr	NE			095257-034	EPA 900.0
	Uranium-233/234	11.3 ± 1.48	0.0611	0.0259	NE	NE			095257-035	HASL-300
	Uranium-235/236	0.114 ± 0.0482	0.0321	0.0104	NE	NE			095257-035	HASL-300
	Uranium-238	2.20 ± 0.326	0.0428	0.0168	NE	NE			095257-035	HASL-300
	Radium-226	0.809 ± 0.592	0.826	0.332	5 pCi/L	30 pCi/L	U	BD	095257-038	EPA 903.1
	Radium-228	0.571 ± 0.363	0.496	0.219	5 pCi/L	30 pCi/L		J	095257-039	EPA 904.0
Greystone-MW2	Americium-241	16.8 ± 17.0	23.8	11.8	NE	NE	U	BD	095255-033	EPA 901.1
30-Jan-14	Cesium-137	3.10 ± 3.11	4.09	1.98	NE	NE	U	BD	095255-033	EPA 901.1
	Cobalt-60	-4.15 ± 4.36	4.20	2.01	NE	NE	U	BD	095255-033	EPA 901.1
	Potassium-40	5.12 ± 41.6	53.1	25.6	NE	NE	U	BD	095255-033	EPA 901.1
	Gross Alpha	-2.10	NA	NA	15 pCi/L	NE	NA	None	095255-034	EPA 900.0
	Gross Beta	9.88 ± 2.69	3.19	1.55	4mrem/yr	NE			095255-034	EPA 900.0
	Uranium-233/234	10.1 ± 1.31	0.0571	0.0242	NE	NE			095255-035	HASL-300
	Uranium-235/236	0.189 ± 0.0595	0.030	0.00968	NE	NE			095255-035	HASL-300
	Uranium-238	2.61 ± 0.372	0.040	0.0157	NE	NE			095255-035	HASL-300
	Radium-226	0.695 ± 0.355	0.387	0.158	5 pCi/L	30 pCi/L		J	095255-038	EPA 903.1
	Radium-228	0.209 ± 0.293	0.493	0.222	5 pCi/L	30 pCi/L	U	BD	095255-039	EPA 904.0
MRN-2	Americium-241	7.00 ± 12.7	19.3	9.44	NE	NE	U	BD	095288-033	EPA 901.1
12-Feb-14	Cesium-137	-0.546 ± 3.56	3.95	1.90	NE	NE	U	BD	095288-033	EPA 901.1
	Cobalt-60	0.928 ± 2.25	4.02	1.89	NE	NE	U	BD	095288-033	EPA 901.1
	Potassium-40	37.4 ± 46.6	36.6	17.1	NE	NE	X	R	095288-033	EPA 901.1
	Gross Alpha	2.70	NA	NA	15 pCi/L	NE	NA	None	095288-034	EPA 900.0
	Gross Beta	2.45 ± 0.716	0.643	0.303	4mrem/yr	NE		J	095288-034	EPA 900.0
	Radium-226	0.639 ± 0.406	0.544	0.221	5 pCi/L	30 pCi/L		J	095288-038	EPA 903.1
	Radium-228	0.261 ± 0.305	0.500	0.222	5 pCi/L	30 pCi/L	U	BD	095288-039	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 2014

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-3D	Americium-241	-5.21 ± 9.80	16.8	8.20	NE	NE	U	BD	095292-033	EPA 901.1
13-Feb-14	Cesium-137	-0.752 ± 1.70	2.77	1.32	NE	NE	U	BD	095292-033	EPA 901.1
	Cobalt-60	0.072 ± 1.68	3.08	1.44	NE	NE	U	BD	095292-033	EPA 901.1
	Potassium-40	38.1 ± 38.5	28.1	13.1	NE	NE	X	R	095292-033	EPA 901.1
	Gross Alpha	1.97	NA	NA	15 pCi/L	NE	NA	None	095292-034	EPA 900.0
	Gross Beta	4.54 ± 1.24	1.47	0.718	4mrem/yr	NE		J	095292-034	EPA 900.0
	Radium-226	0.277 ± 0.308	0.497	0.203	5 pCi/L	30 pCi/L		BD	095292-038	EPA 903.1
	Radium-228	0.641 ± 0.372	0.501	0.227	5 pCi/L	30 pCi/L		J	095292-039	EPA 904.0
MRN-3D	Americium-241	-1.86 ± 10.5	16.2	7.93	NE	NE	U	BD	095293-033	EPA 901.1
(Duplicate)	Cesium-137	-2.58 ± 3.69	3.72	1.80	NE	NE	U	BD	095293-033	EPA 901.1
13-Feb-14	Cobalt-60	-2.17 ± 3.01	3.65	1.73	NE	NE	U	BD	095293-033	EPA 901.1
	Potassium-40	0.660 ± 38.5	43.3	20.7	NE	NE	U	BD	095293-033	EPA 901.1
	Gross Alpha	5.12	NA	NA	15 pCi/L	NE	NA	None	095293-034	EPA 900.0
	Gross Beta	3.38 ± 0.909	0.991	0.477	4mrem/yr	NE		J	095293-034	EPA 900.0
	Radium-226	0.0994 ± 0.218	0.402	0.164	5 pCi/L	30 pCi/L	U	BD	095293-038	EPA 903.1
	Radium-228	0.105 ± 0.280	0.487	0.227	5 pCi/L	30 pCi/L	U	BD	095293-039	EPA 904.0
NWTA3-MW3D	Americium-241	-4.5 ± 13.9	23.7	11.6	NE	NE	U	BD	095273-033	EPA 901.1
06-Feb-14	Cesium-137	-1.38 ± 1.99	3.07	1.47	NE	NE	U	BD	095273-033	EPA 901.1
	Cobalt-60	0.949 ± 1.76	3.17	1.48	NE	NE	U	BD	095273-033	EPA 901.1
	Potassium-40	-13 ± 43.8	47.5	22.6	NE	NE	U	BD	095273-033	EPA 901.1
	Gross Alpha	1.36	NA	NA	15 pCi/L	NE	NA	None	095273-034	EPA 900.0
	Gross Beta	2.66 ± 0.836	0.997	0.474	4mrem/yr	NE		J	095273-034	EPA 900.0
	Radium-226	0.0671 ± 0.263	0.513	0.206	5 pCi/L	30 pCi/L	U	BD	095273-038	EPA 903.1
	Radium-228	0.412 ± 0.323	0.495	0.231	5 pCi/L	30 pCi/L	U	BD	095273-039	EPA 904.0
NWTA3-MW3D	Americium-241	-5.14 ± 10.9	16.3	7.98	NE	NE	U	BD	095274-033	EPA 901.1
(Duplicate)	Cesium-137	2.29 ± 2.49	4.02	1.95	NE	NE	U	BD	095274-033	EPA 901.1
06-Feb-14	Cobalt-60	0.729 ± 2.42	3.69	1.75	NE	NE	U	BD	095274-033	EPA 901.1
	Potassium-40	17.4 ± 49.6	32.9	15.5	NE	NE	U	BD	095274-033	EPA 901.1
	Gross Alpha	4.05	NA	NA	15 pCi/L	NE	NA	None	095274-034	EPA 900.0
	Gross Beta	3.85 ± 0.963	0.999	0.480	4mrem/yr	NE		J	095274-034	EPA 900.0
	Radium-226	0.320 ± 0.325	0.513	0.203	5 pCi/L	30 pCi/L	U	BD	095274-038	EPA 903.1
	Radium-228	-0.158 ± 0.260	0.497	0.230	5 pCi/L	30 pCi/L	U	BD	095274-039	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 2014

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-2	Americium-241	2.84 ± 12.7	19.6	9.60	NE	NE	U	BD	095266-033	EPA 901.1
17-Feb-14	Cesium-137	-0.265 ± 3.40	4.09	1.97	NE	NE	U	BD	095266-033	EPA 901.1
	Cobalt-60	-0.802 ± 2.24	3.81	1.79	NE	NE	U	BD	095266-033	EPA 901.1
	Potassium-40	-6.83 ± 39.9	48.1	22.8	NE	NE	U	BD	095266-033	EPA 901.1
	Gross Alpha	-0.27	NA	NA	15 pCi/L	NE	NA	None	095266-034	EPA 900.0
	Gross Beta	5.41 ± 1.64	2.09	1.02	4mrem/yr	NE		J	095266-034	EPA 900.0
	Radium-226	0.394 ± 0.398	0.637	0.260	5 pCi/L	30 pCi/L	U	BD	095266-038	EPA 903.1
	Radium-228	0.166 ± 0.287	0.489	0.227	5 pCi/L	30 pCi/L	U	BD	095266-039	EPA 904.0
PL-4	Americium-241	-6.6 ± 14.1	21.1	10.3	NE	NE	U	BD	095269-033	EPA 901.1
14-Feb-14	Cesium-137	-0.634 ± 2.90	3.24	1.55	NE	NE	U	BD	095269-033	EPA 901.1
	Cobalt-60	0.286 ± 1.92	3.54	1.65	NE	NE	U	BD	095269-033	EPA 901.1
	Potassium-40	-50.2 ± 45.9	45.9	21.8	NE	NE	U	BD	095269-033	EPA 901.1
	Gross Alpha	0.99	NA	NA	15 pCi/L	NE	NA	None	095269-034	EPA 900.0
	Gross Beta	3.82 ± 1.04	1.21	0.584	4mrem/yr	NE		J	095269-034	EPA 900.0
	Radium-226	0.597 ± 0.377	0.508	0.207	5 pCi/L	30 pCi/L		J	095269-038	EPA 903.1
	Radium-228	0.118 ± 0.275	0.486	0.218	5 pCi/L	30 pCi/L	U	BD	095269-039	EPA 904.0
SFR-2S	Americium-241	3.54 ± 12.1	18.8	9.20	NE	NE	U	BD	095262-033	EPA 901.1
04-Feb-14	Cesium-137	-1.67 ± 4.37	3.90	1.88	NE	NE	U	BD	095262-033	EPA 901.1
	Cobalt-60	0.746 ± 2.26	4.05	1.91	NE	NE	U	BD	095262-033	EPA 901.1
	Potassium-40	22.0 ± 51.9	37.1	17.4	NE	NE	U	BD	095262-033	EPA 901.1
	Gross Alpha	2.86	NA	NA	15 pCi/L	NE	NA	None	095262-034	EPA 900.0
	Gross Beta	8.54 ± 2.32	2.17	1.04	4mrem/yr	NE		J	095262-034	EPA 900.0
	Uranium-233/234	15.5 ± 2.00	0.0596	0.0253	NE	NE			095262-035	HASL-300
	Uranium-235/236	0.325 ± 0.0841	0.0314	0.0101	NE	NE			095262-035	HASL-300
	Uranium-238	4.22 ± 0.580	0.0418	0.0164	NE	NE			095262-035	HASL-300
	Radium-226	0.675 ± 0.410	0.546	0.222	5 pCi/L	30 pCi/L		J	095262-038	EPA 903.1
	Radium-228	0.0867 ± 0.288	0.497	0.237	5 pCi/L	30 pCi/L	U	BD	095262-039	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 2014

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	3.50 ± 6.16	9.31	4.55	NE	NE	U	BD	095264-033	EPA 901.1
05-Feb-14	Cesium-137	3.05 ± 2.32	3.45	1.66	NE	NE	U	BD	095264-033	EPA 901.1
	Cobalt-60	1.22 ± 1.92	3.46	1.63	NE	NE	U	BD	095264-033	EPA 901.1
	Potassium-40	36.6 ± 46.8	32.1	15.1	NE	NE	X	R	095264-033	EPA 901.1
	Gross Alpha	-9.29	NA	NA	15 pCi/L	NE	NA	None	095264-034	EPA 900.0
	Gross Beta	-2.65 ± 4.76	8.49	4.07	4mrem/yr	NE	U	BD	095264-034	EPA 900.0
	Uranium-233/234	0.489 ± 0.102	0.0592	0.0251	NE	NE			095264-035	HASL-300
	Uranium-235/236	0.00817 ± 0.0196	0.0312	0.010	NE	NE	U	BD	095264-035	HASL-300
	Uranium-238	0.0959 ± 0.0402	0.0415	0.0163	NE	NE		J	095264-035	HASL-300
	Radium-226	0.580 ± 0.397	0.551	0.224	5 pCi/L	30 pCi/L		J	095264-038	EPA 903.1
	Radium-228	-0.0334 ± 0.284	0.497	0.239	5 pCi/L	30 pCi/L	U	BD	095264-039	EPA 904.0
SWTA3-MW2	Americium-241	-13.3 ± 8.61	9.50	4.65	NE	NE	U	BD	095276-033	EPA 901.1
07-Feb-14	Cesium-137	1.23 ± 1.75	2.80	1.35	NE	NE	U	BD	095276-033	EPA 901.1
	Cobalt-60	1.48 ± 1.62	2.85	1.34	NE	NE	U	BD	095276-033	EPA 901.1
	Potassium-40	9.10 ± 39.4	25.9	12.1	NE	NE	U	BD	095276-033	EPA 901.1
	Gross Alpha	0.63	NA	NA	15 pCi/L	NE	NA	None	095276-034	EPA 900.0
	Gross Beta	8.60 ± 1.86	1.71	0.838	4mrem/yr	NE		J	095276-034	EPA 900.0
	Radium-226	0.668 ± 0.555	0.830	0.338	5 pCi/L	30 pCi/L	U	BD	095276-038	EPA 903.1
	Radium-228	0.372 ± 0.317	0.496	0.232	5 pCi/L	30 pCi/L	U	BD	095276-039	EPA 904.0
SWTA3-MW3	Americium-241	-4.82 ± 15.3	23.1	11.3	NE	NE	U	BD	095279-033	EPA 901.1
10-Feb-14	Cesium-137	-0.616 ± 2.92	3.42	1.64	NE	NE	U	BD	095279-033	EPA 901.1
	Cobalt-60	-2.97 ± 4.29	3.31	1.55	NE	NE	U	BD	095279-033	EPA 901.1
	Potassium-40	2.17 ± 52.1	34.5	16.2	NE	NE	U	BD	095279-033	EPA 901.1
	Gross Alpha	0.81	NA	NA	15 pCi/L	NE	NA	None	095279-034	EPA 900.0
	Gross Beta	4.55 ± 1.35	1.73	0.845	4mrem/yr	NE		J	095279-034	EPA 900.0
	Radium-226	0.103 ± 0.124	0.196	0.0597	5 pCi/L	30 pCi/L	U	BD	095279-038	EPA 903.1
	Radium-228	0.124 ± 0.286	0.495	0.230	5 pCi/L	30 pCi/L	U	BD	095279-039	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 2014

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	10.3 ± 16.3	25.3	12.3	NE	NE	U	BD	095284-033	EPA 901.1
11-Feb-14	Cesium-137	2.39 ± 2.87	3.17	1.51	NE	NE	U	BD	095284-033	EPA 901.1
	Cobalt-60	0.792 ± 1.93	3.58	1.68	NE	NE	U	BD	095284-033	EPA 901.1
	Potassium-40	-14.2 ± 35.7	44.1	20.9	NE	NE	U	BD	095284-033	EPA 901.1
	Gross Alpha	0.71	NA	NA	15 pCi/L	NE	NA	None	095284-034	EPA 900.0
	Gross Beta	2.46 ± 0.779	0.964	0.463	4mrem/yr	NE		J	095284-034	EPA 900.0
	Radium-226	0.559 ± 0.339	0.451	0.184	5 pCi/L	30 pCi/L		J	095284-038	EPA 903.1
	Radium-228	0.722 ± 0.386	0.489	0.219	5 pCi/L	30 pCi/L		J	095284-039	EPA 904.0
TRE-1	Americium-241	9.85 ± 17.1	26.2	12.8	NE	NE	U	BD	095259-033	EPA 901.1
03-Feb-14	Cesium-137	-0.358 ± 1.92	3.40	1.63	NE	NE	U	BD	095259-033	EPA 901.1
	Cobalt-60	0.356 ± 2.02	3.71	1.74	NE	NE	U	BD	095259-033	EPA 901.1
	Potassium-40	43.2 ± 47.4	32.9	15.3	NE	NE	X	R	095259-033	EPA 901.1
	Gross Alpha	-5.16	NA	NA	15 pCi/L	NE	NA	None	095259-034	EPA 900.0
	Gross Beta	2.84 ± 2.06	3.18	1.54	4mrem/yr	NE	U	BD	095259-034	EPA 900.0
	Uranium-233/234	23.1 ± 2.95	0.0838	0.0355	NE	NE			095259-035	HASL-300
	Uranium-235/236	0.670 ± 0.150	0.0441	0.0142	NE	NE			095259-035	HASL-300
	Uranium-238	5.89 ± 0.803	0.0587	0.023	NE	NE			095259-035	HASL-300
	Radium-226	1.50 ± 0.561	0.551	0.224	5 pCi/L	30 pCi/L		J	095259-038	EPA 903.1
	Radium-228	0.613 ± 0.364	0.489	0.220	5 pCi/L	30 pCi/L		J	095259-039	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 2014

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
Coyote Spring	31-Jan-14	11.82	2225.2	237.8	6.10	1.01	15.6	1.67
Greystone-MW2	30-Jan-14	16.12	920.1	294.6	7.11	0.31	70.9	6.96
MRN-2	12-Feb-14	16.83	341.8	256.1	7.77	0.82	71.3	6.86
MRN-3D	13-Feb-14	20.06	405.2	133.5	7.66	1.22	50.3	4.57
NWTA3-MW3D	06-Feb-14	17.96	311.4	138.4	7.88	0.99	45.7	4.31
PL-2	17-Feb-14	19.20	386.2	90.4	7.82	0.70	69.0	6.35
PL-4	14-Feb-14	19.76	412.1	298.1	7.52	2.19	82.2	7.51
SFR-2S	04-Feb-14	15.04	860.9	167.7	6.96	5.32	77.0	7.73
SFR-4T	05-Feb-14	15.06	3301.8	30.1	8.09	0.56	7.8	0.77
SWTA3-MW2	07-Feb-14	17.27	358.4	276.4	7.77	0.84	50.1	4.83
SWTA3-MW3	10-Feb-14	20.08	385.2	137.5	7.84	1.19	52.5	4.74
SWTA3-MW4	11-Feb-14	17.81	374.8	247.8	7.89	0.72	55.2	5.11
TRE-1	03-Feb-14	15.88	1050.0	317.9	6.79	0.11	70.4	6.94

Refer to footnotes on page 2A-35.

This page intentionally left blank.

Footnotes for Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task 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 method detection limit). Activities of zero or less are considered to be not detected.

[b]MDL or MDA

The MDL applies to Table 2A-1 through 2A-6. MDA applies to Table 2A-7.

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 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, January 2001.
MCL	= Maximum contaminant level. MCLs were established by the EPA Office of Water, National Primary Water Standards (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- 15 pCi/L = Gross alpha particle activity, excluding total uranium (40 CFR Parts 9, 141, and 142, Table 1-4).
- 4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (as dose rate).

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.

B = The analyte was found in the blank above the effective MDL.
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.
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 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 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., Standard 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, Environmental Measurements Laboratory.

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, U.S. Environmental protection Agency, Cincinnati, Ohio.

EPA, *1986* (and updates), *"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* SW-846, 3rd ed., U.S. Environmental Protection Agency, Washington, D.C.

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
Hydrographs and Charts

This page intentionally left blank.

Attachment 2B Hydrographs and Charts

2B-1 GMP Study Wells (1 of 6) 2B-5

2B-2 GMP Study Wells (2 of 6) 2B-6

2B-3 GMP Study Wells (3 of 6) 2B-7

2B-4 GMP Study Wells (4 of 6) 2B-8

2B-5 GMP Study Wells (5 of 6) 2B-9

2B-6 GMP Study Wells (6 of 6) 2B-10

2B-7 Precipitation Data for SNL/NM, CY2014 ..... 2B-11

2B-8 Annual Precipitation Data for SNL/NM, January 2004 to December 2014 ..... 2B-12

2B-9 Monthly Groundwater Pumped by KAFB Water Supply Wells, CY2014 ..... 2B-13

2B-10 Groundwater Pumped by KAFB Water Supply Wells, CY2014 ..... 2B-14

2B-11 Annual Groundwater Pumped by KAFB Water Supply Wells, 2004 to 2014 ..... 2B-15

This page intentionally left blank.

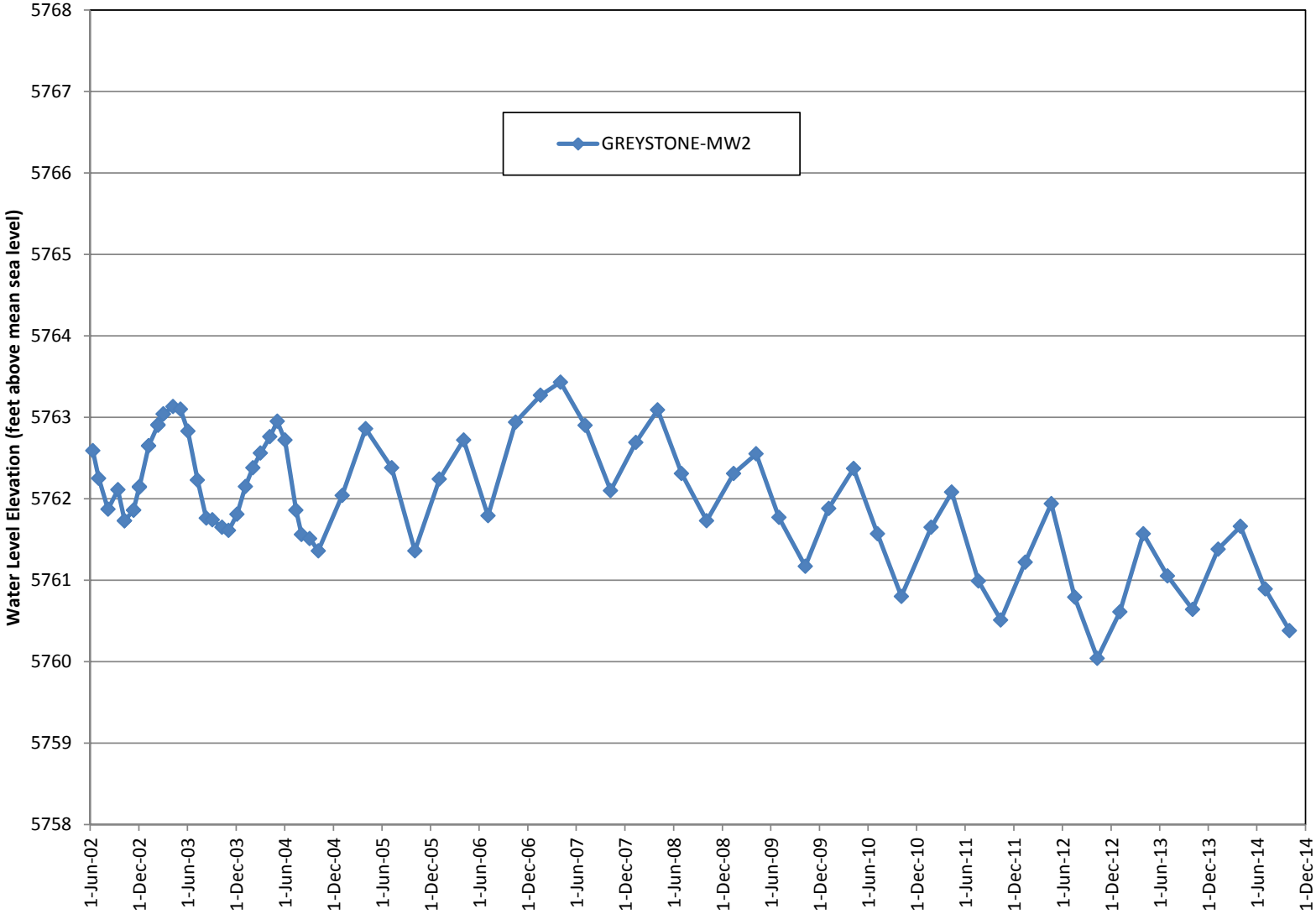


Figure 2B-1. GMP Study Wells (1 of 6)

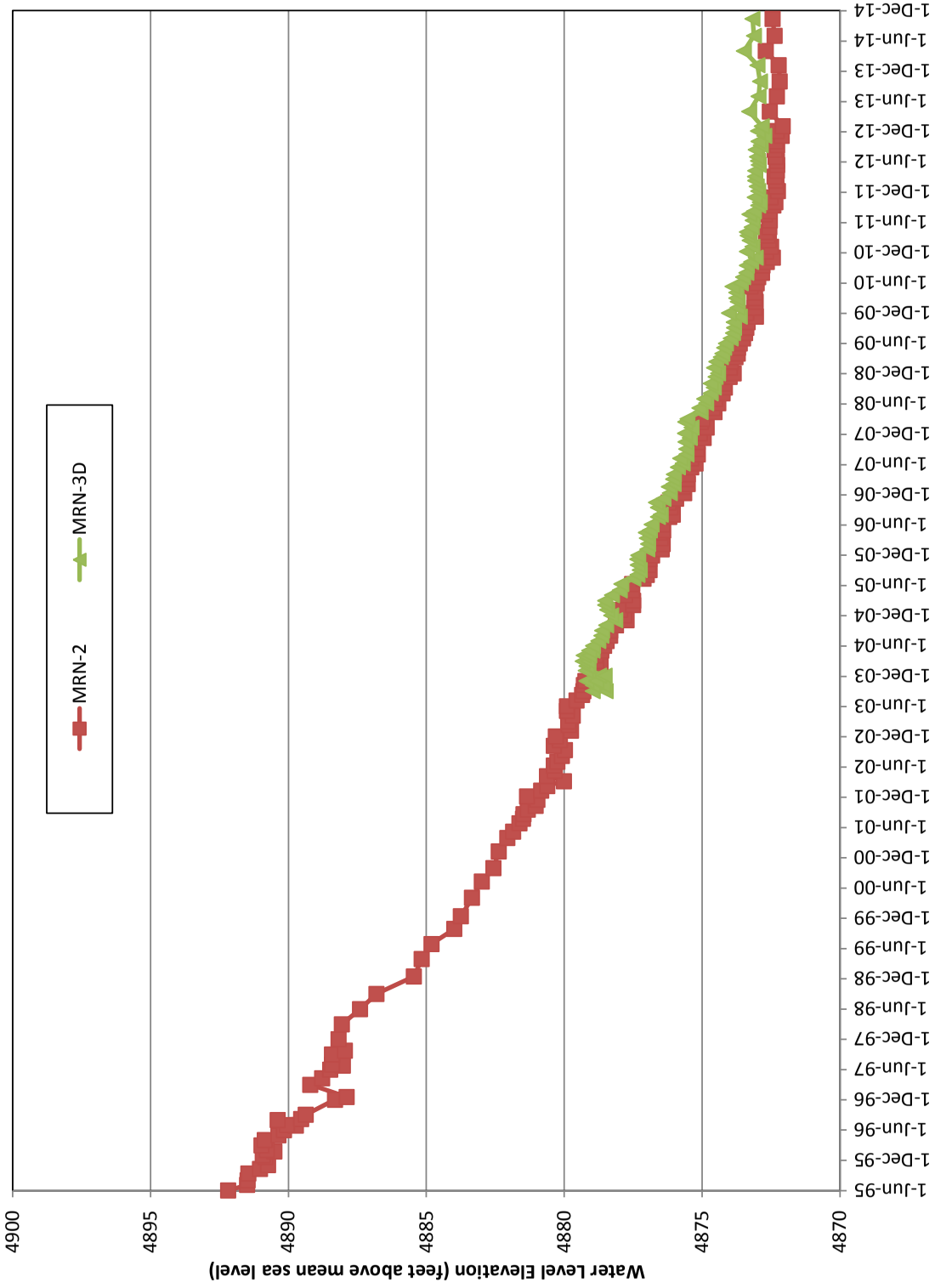


Figure 2B-2. GMP Study Wells (2 of 6)

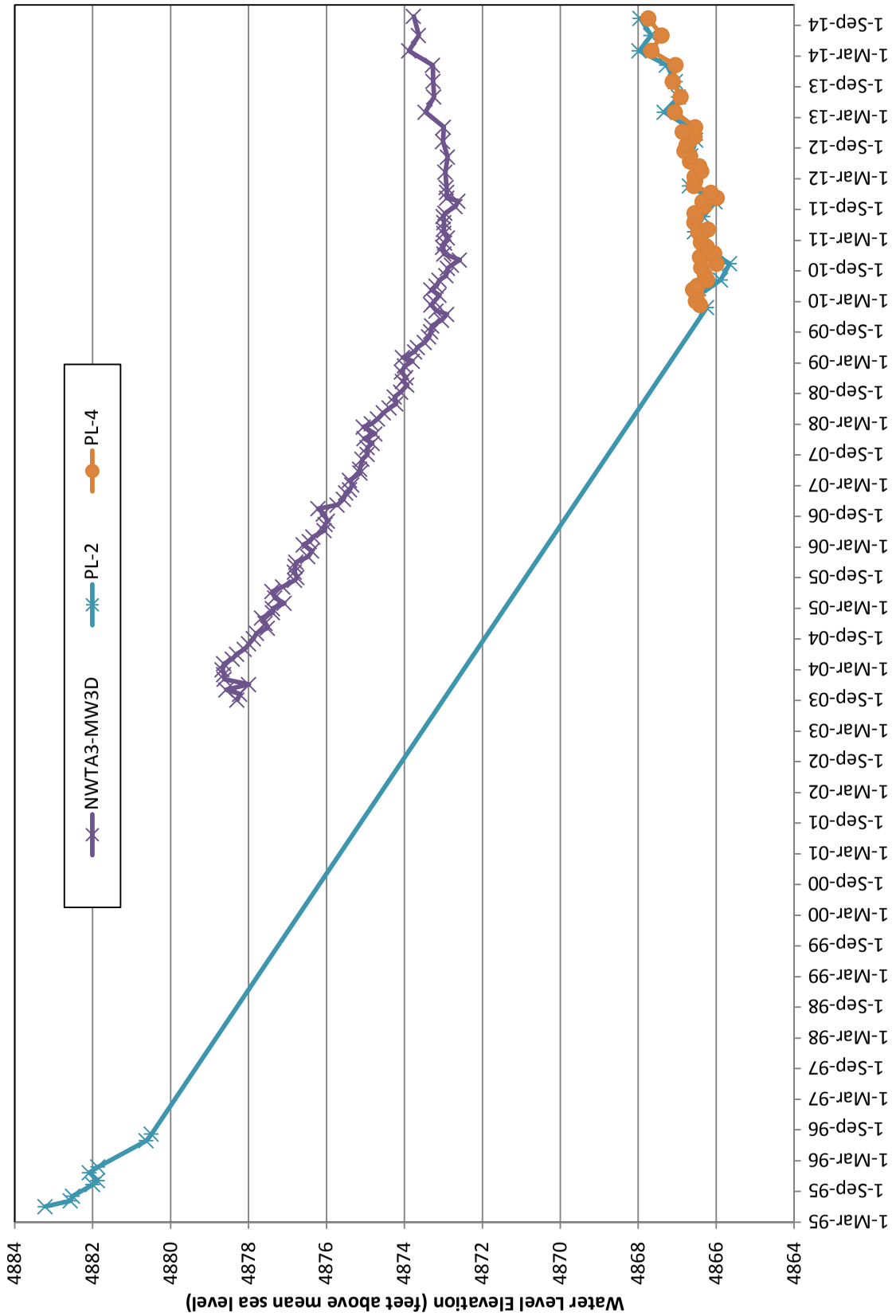


Figure 2B-3. GMP Study Wells (3 of 6)

Figure 2B-4. GMP Study Wells (4 of 6)

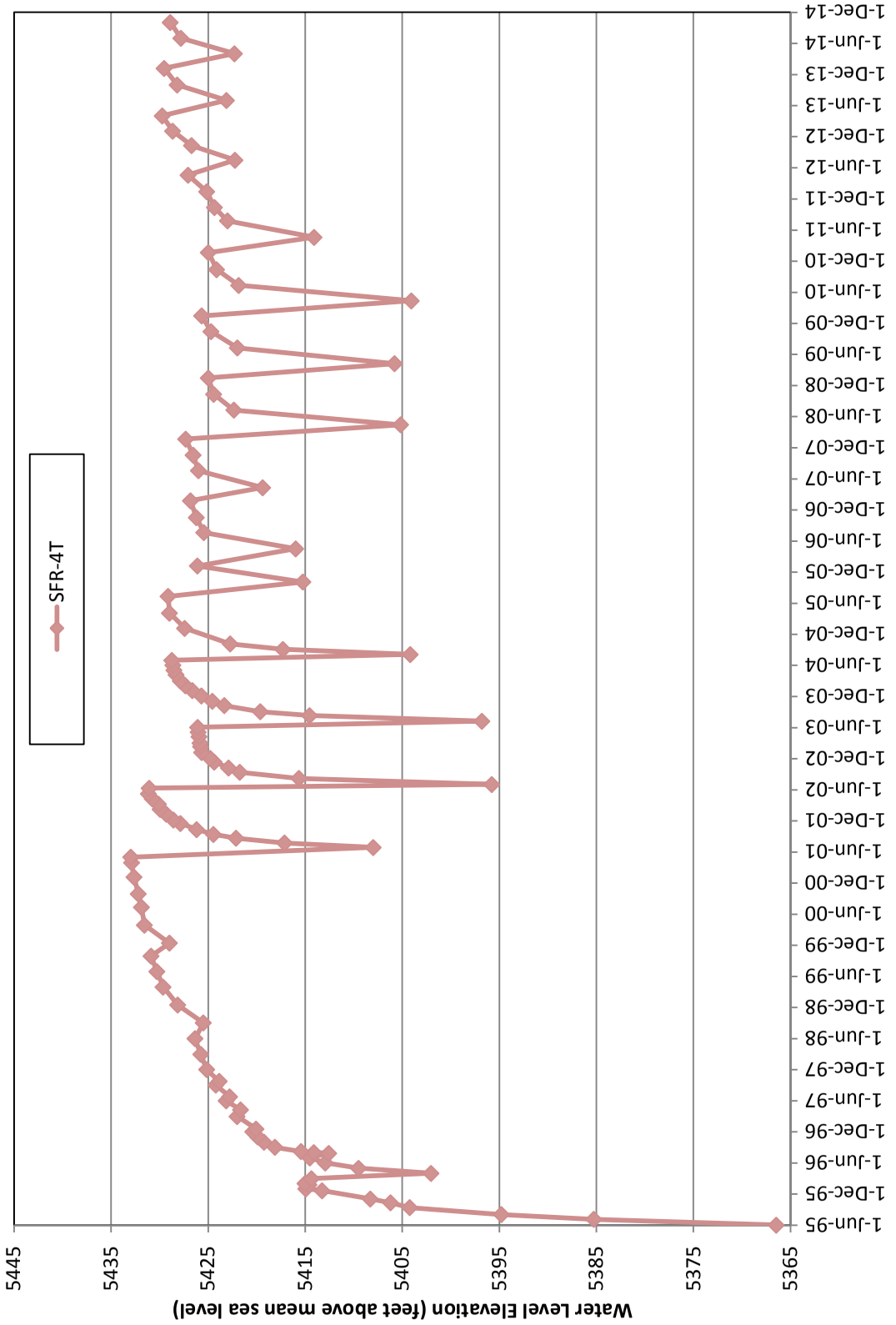


Figure 2B-5. GMP Study Wells (5 of 6)

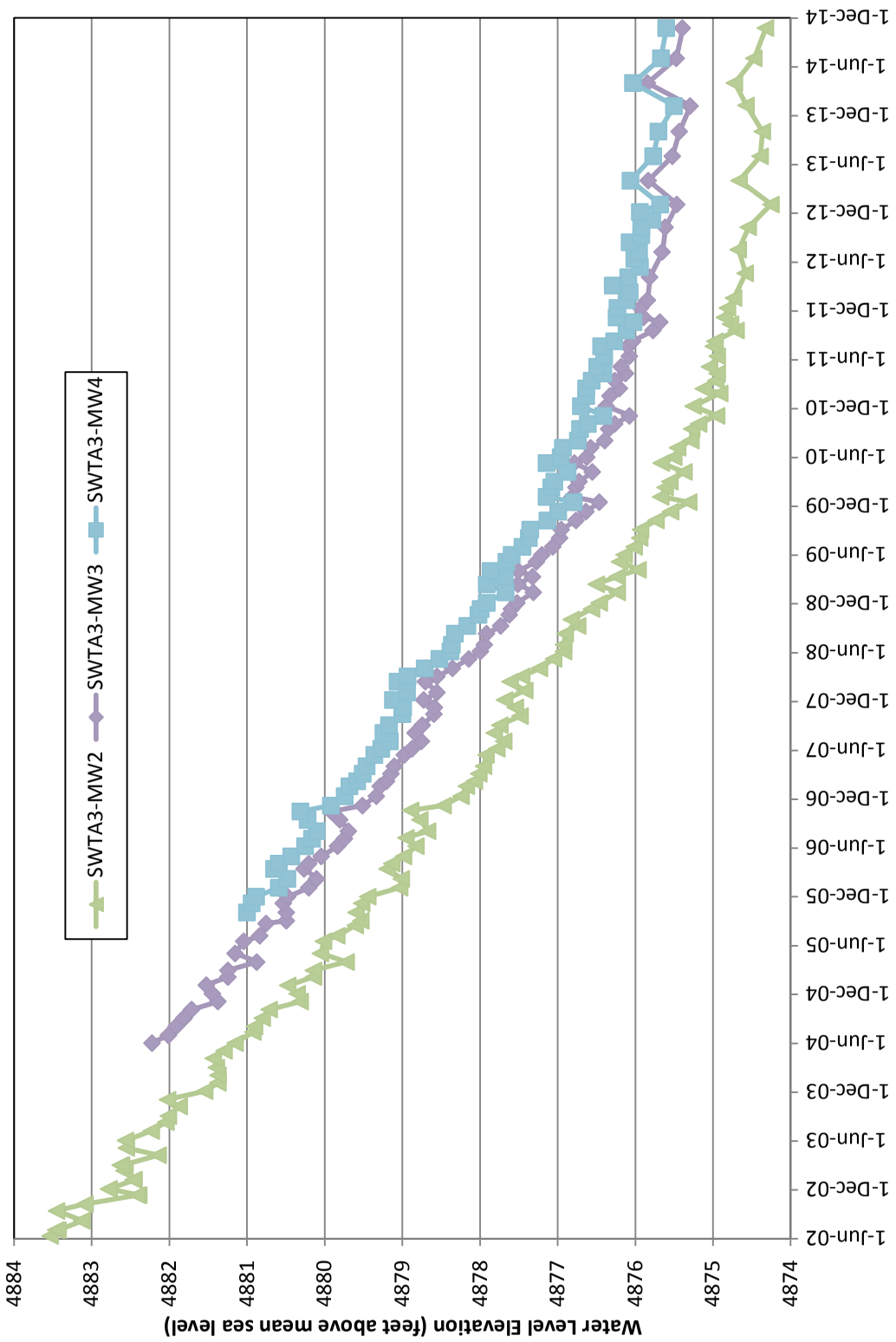


Figure 2B-6. GMP Study Wells (6 of 6)

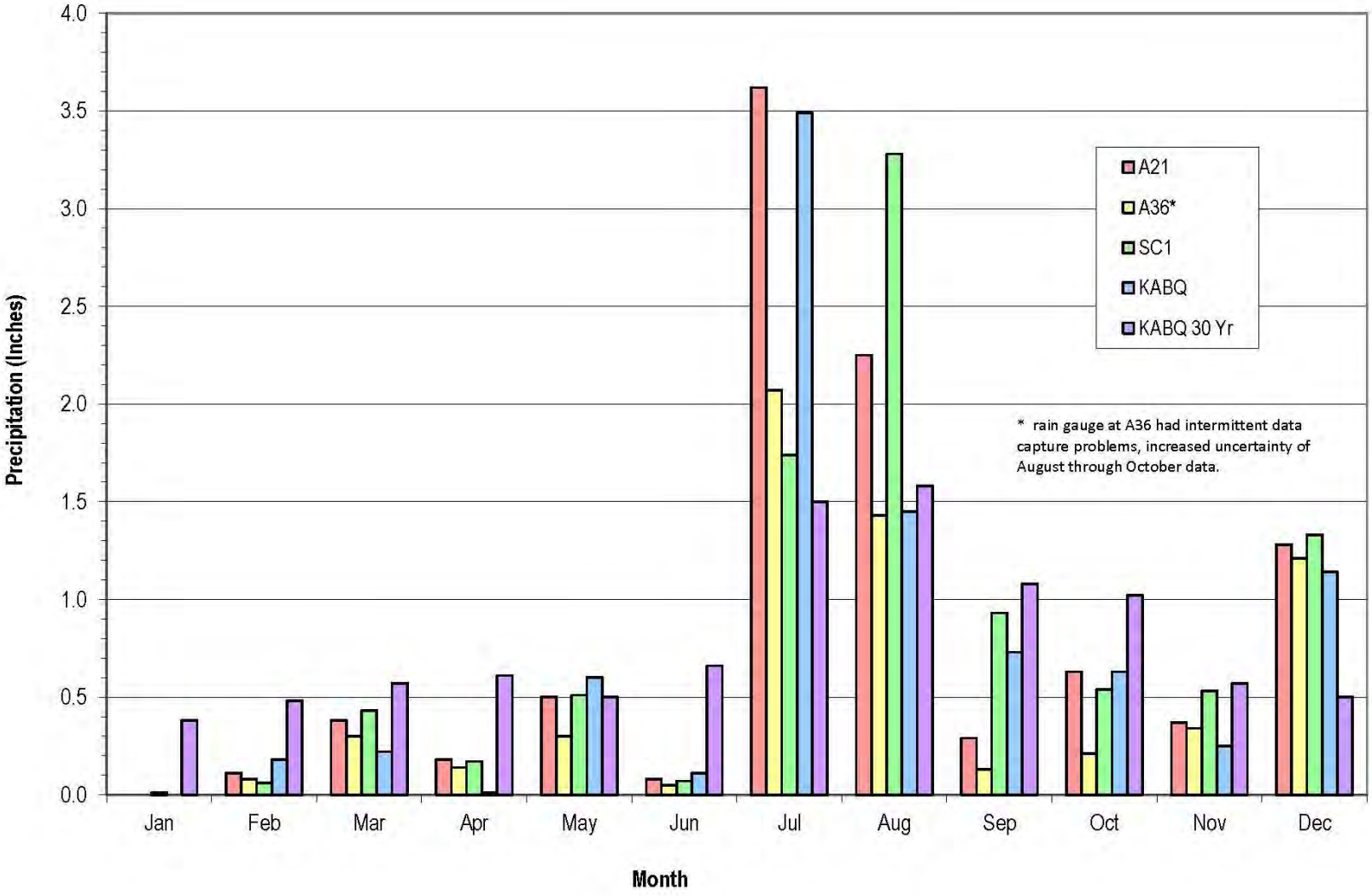


Figure 2B-7. Precipitation Data for SNL/NM, CY2014

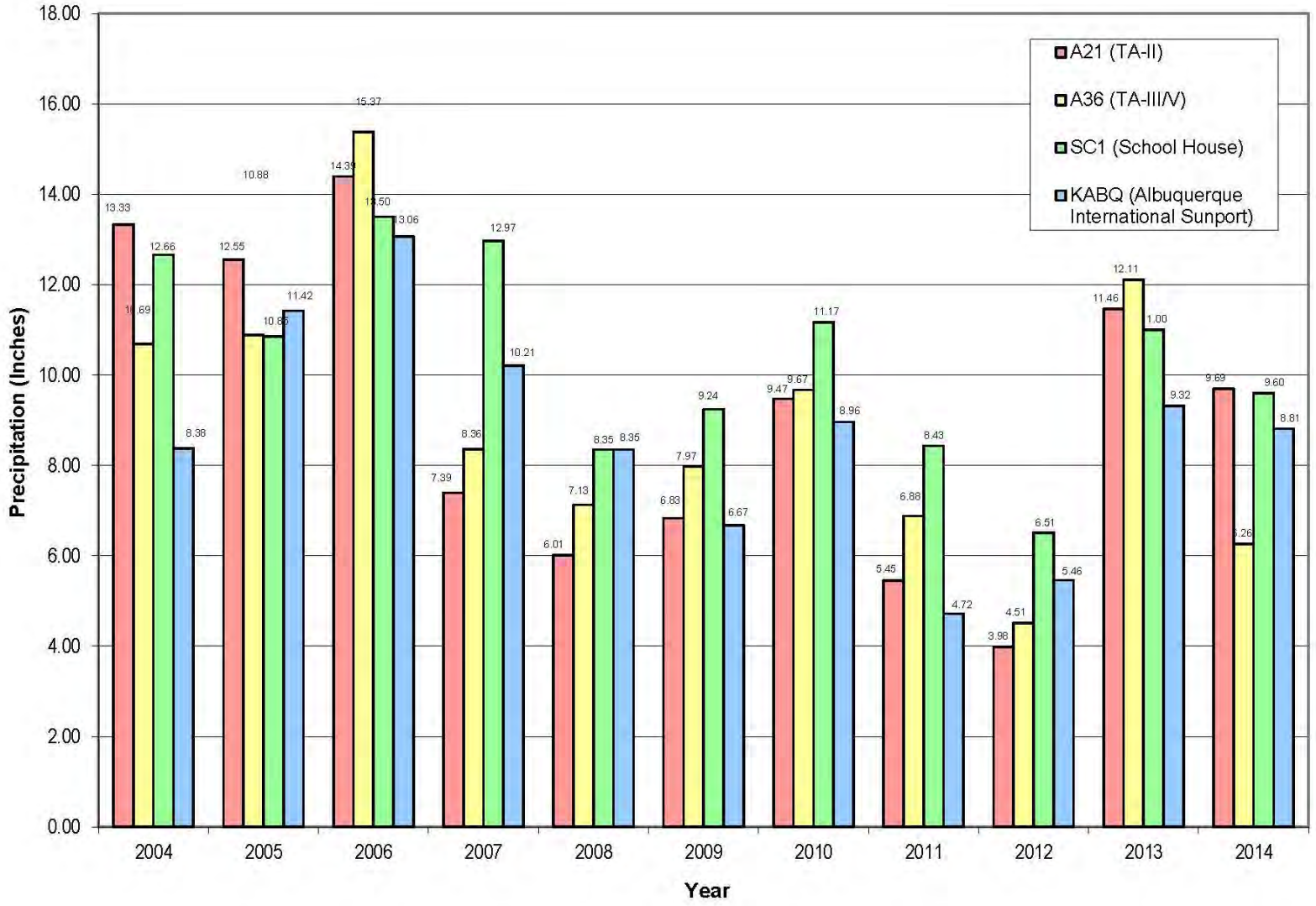


Figure 2B-8. Annual Precipitation Data for SNL/NM, January 2004 to December 2014

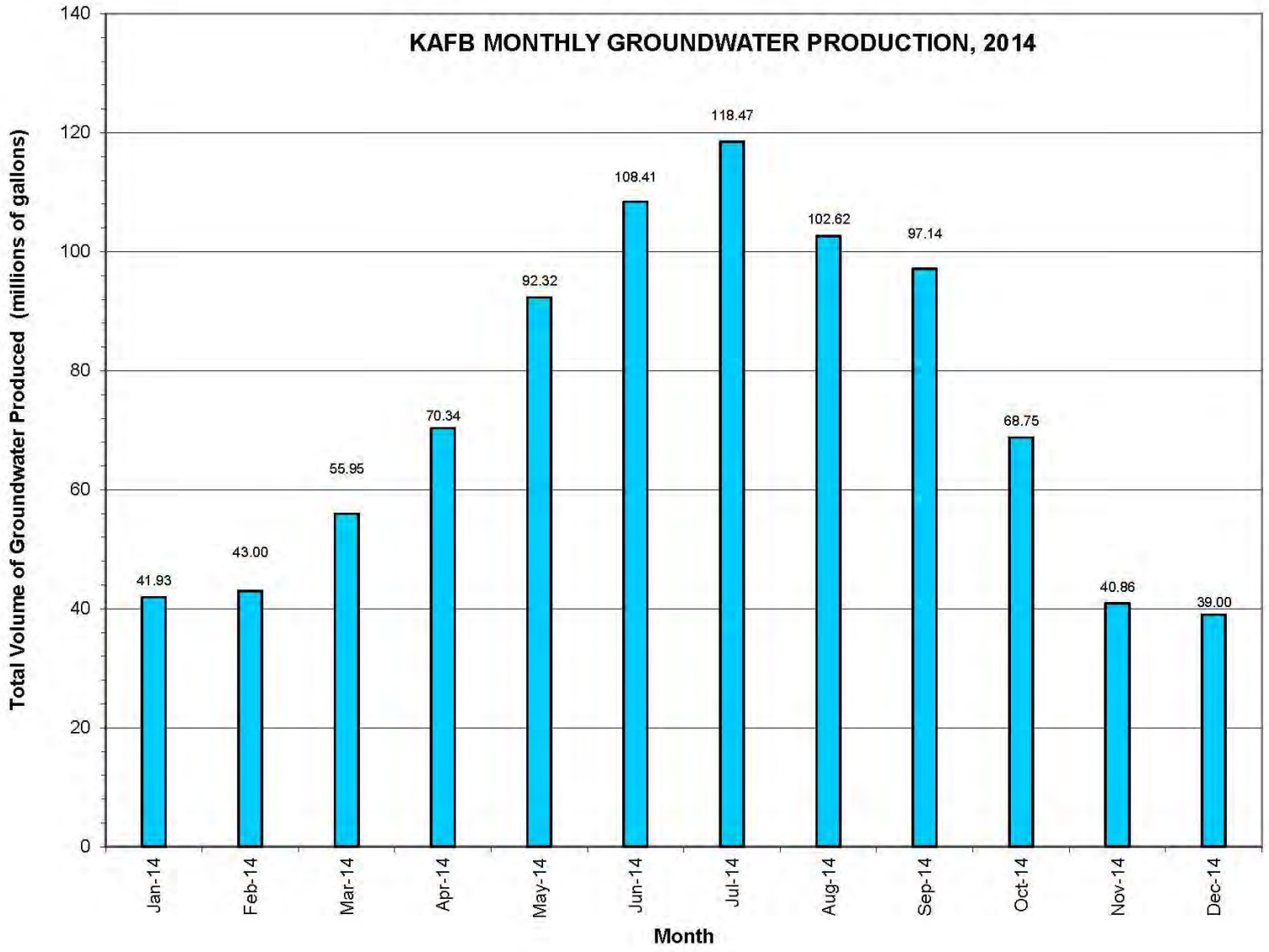


Figure 2B-9. Monthly Groundwater Pumped by KAFB Water Supply Wells, CY2014

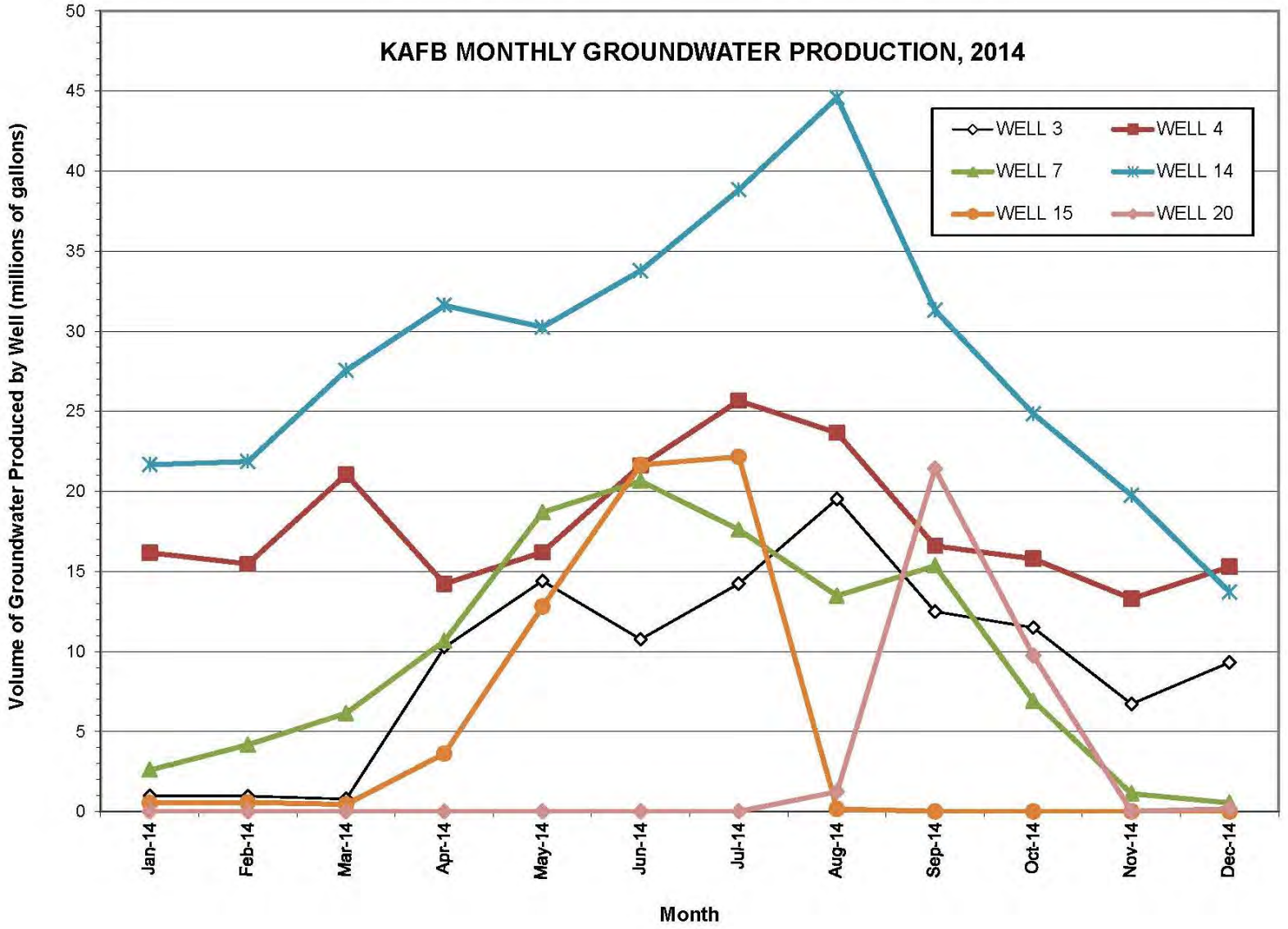


Figure 2B-10. Groundwater Pumped by KAFB Water Supply Wells, CY2014

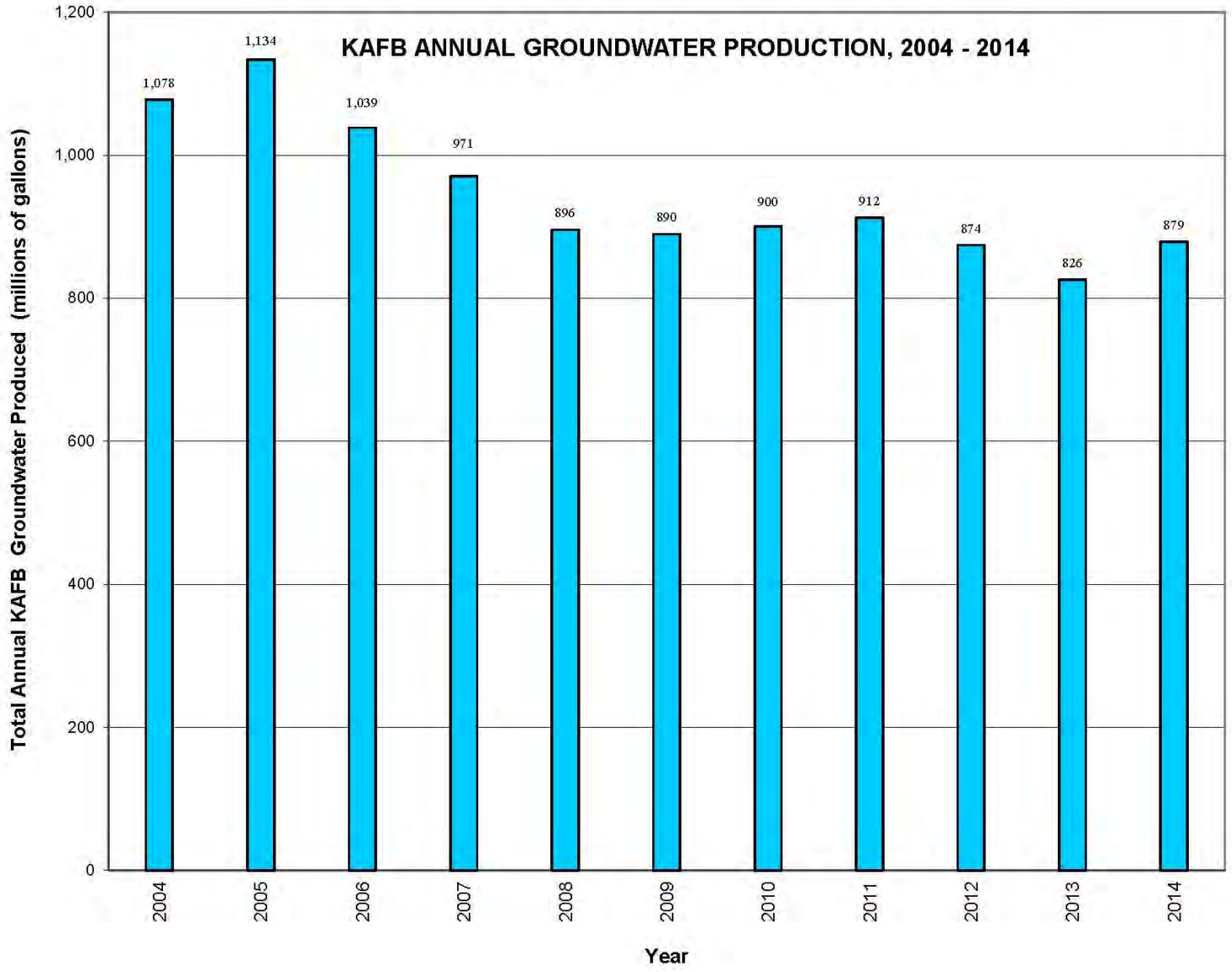


Figure 2B-11. Annual Groundwater Pumped by KAFB Water Supply Wells, 2004 to 2014

This page intentionally left blank.

Attachment 2C
Long-Term Stewardship
Consolidated Groundwater Monitoring Program
Plots

This page intentionally left blank.

Attachment 2C Plots

2C-1 Fluoride Concentrations, Coyote Springs 2C-5

2C-2 Fluoride Concentrations, SFR-2S 2C-6

2C-3 Fluoride Concentrations, SFR-4T 2C-7

2C-4 Fluoride Concentrations, TRE-1 ..... 2C-8

2C-5 Beryllium Concentrations, Coyote Springs 2C-9

This page intentionally left blank.

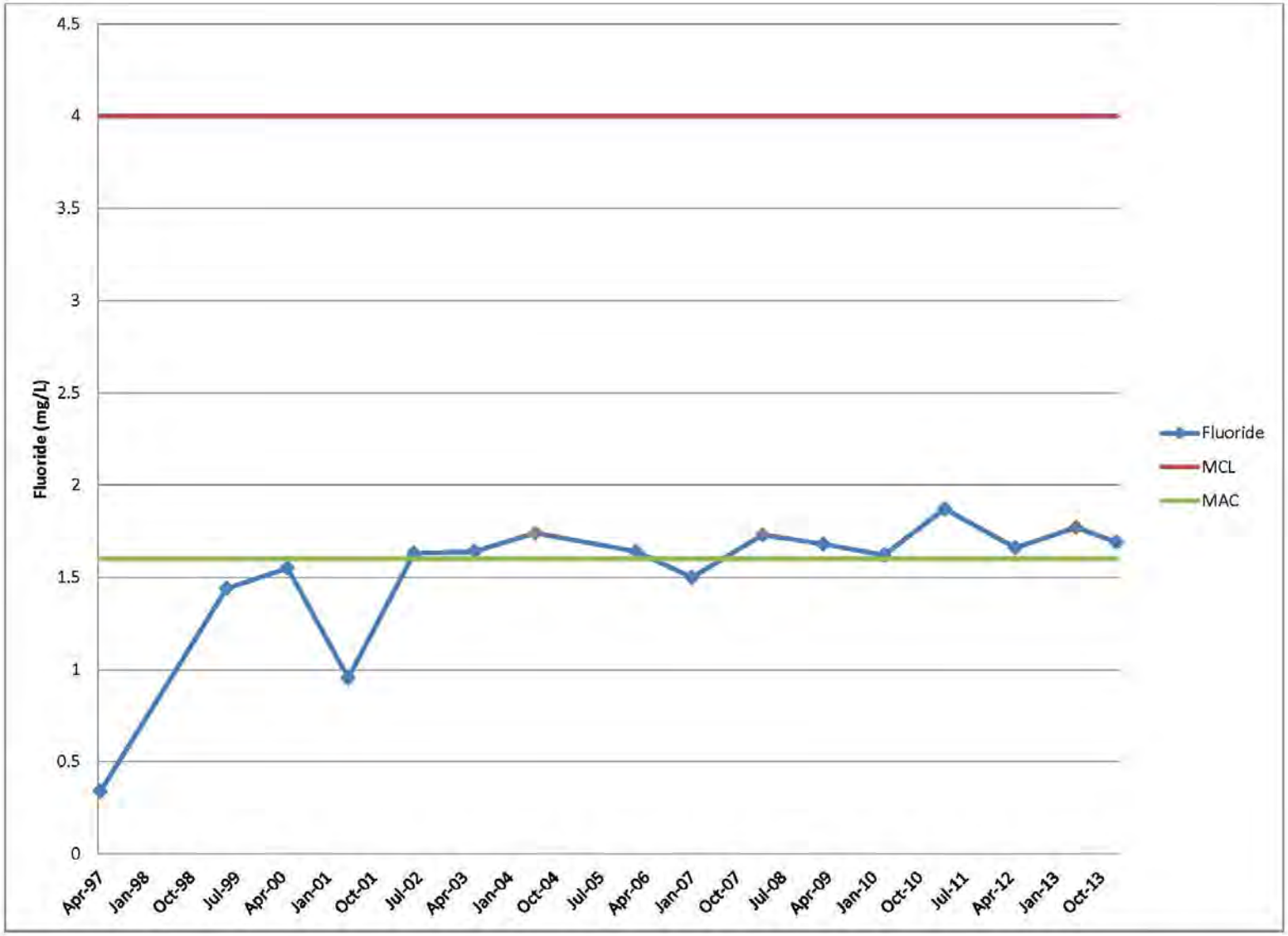


Figure 2C-1. Fluoride Concentrations, Coyote Springs

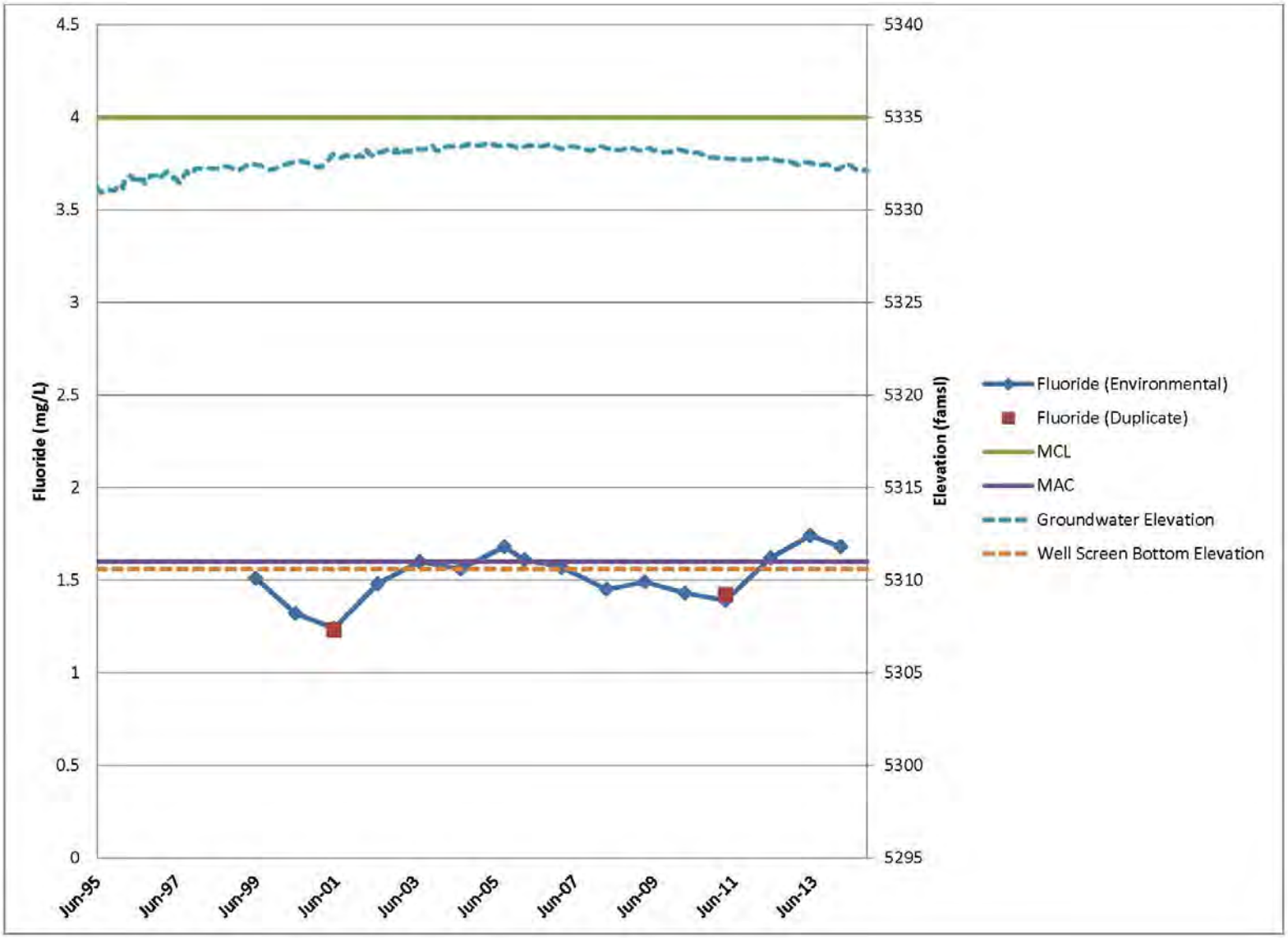


Figure 2C-2. Fluoride Concentrations, SFR-2S

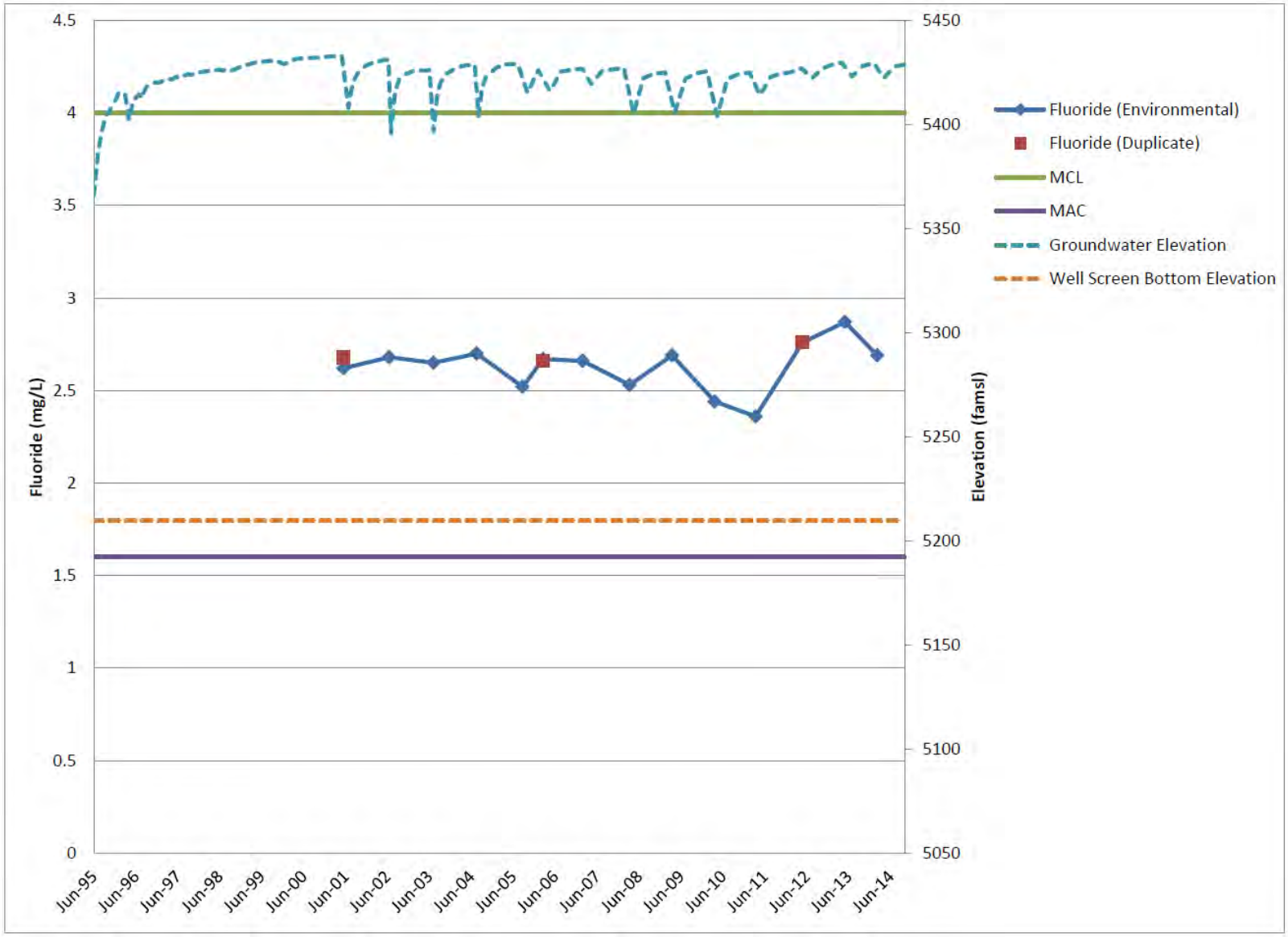


Figure 2C-3. Fluoride Concentrations, SFR-4T

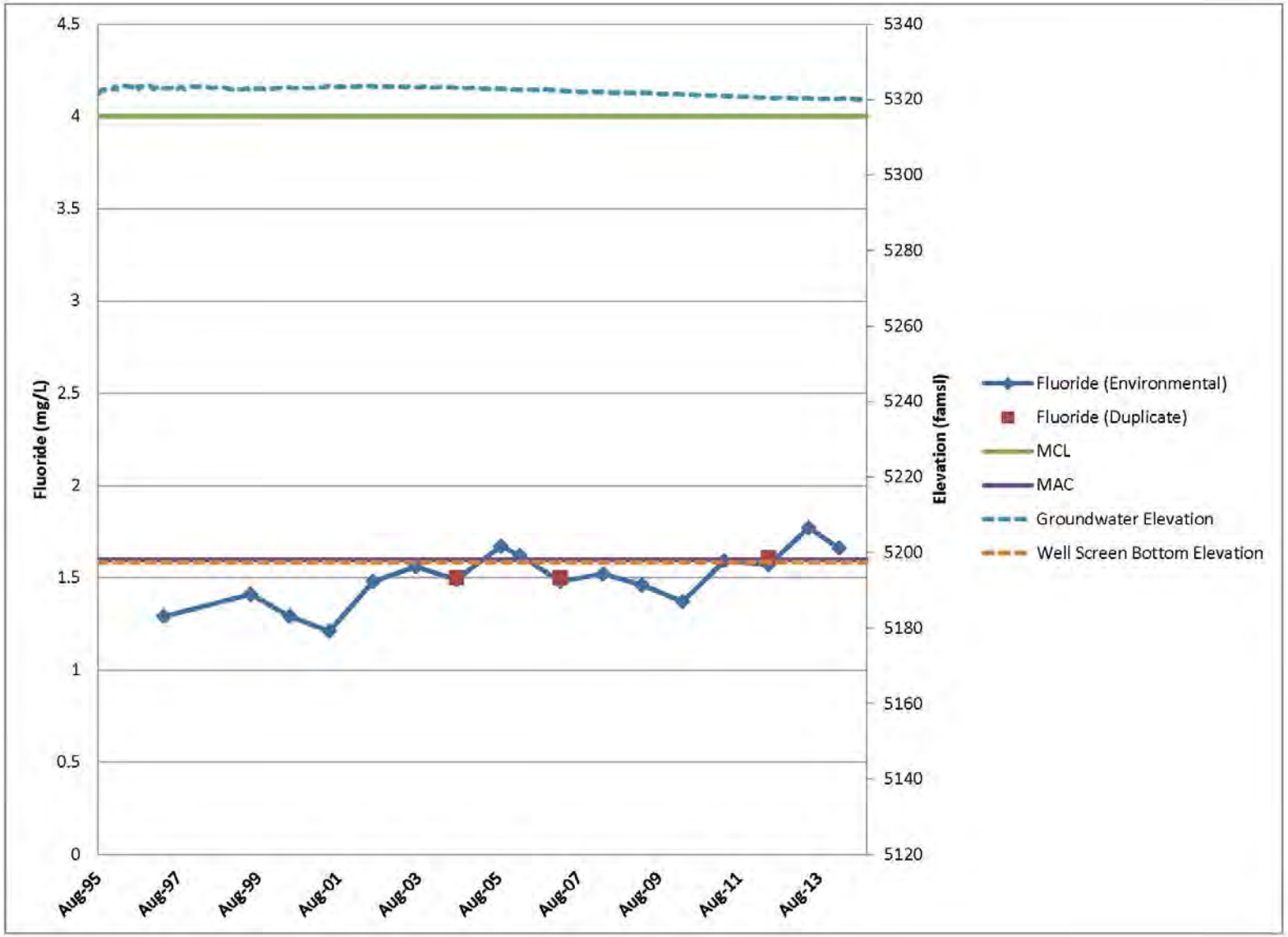


Figure 2C-4. Fluoride Concentrations, TRE-1

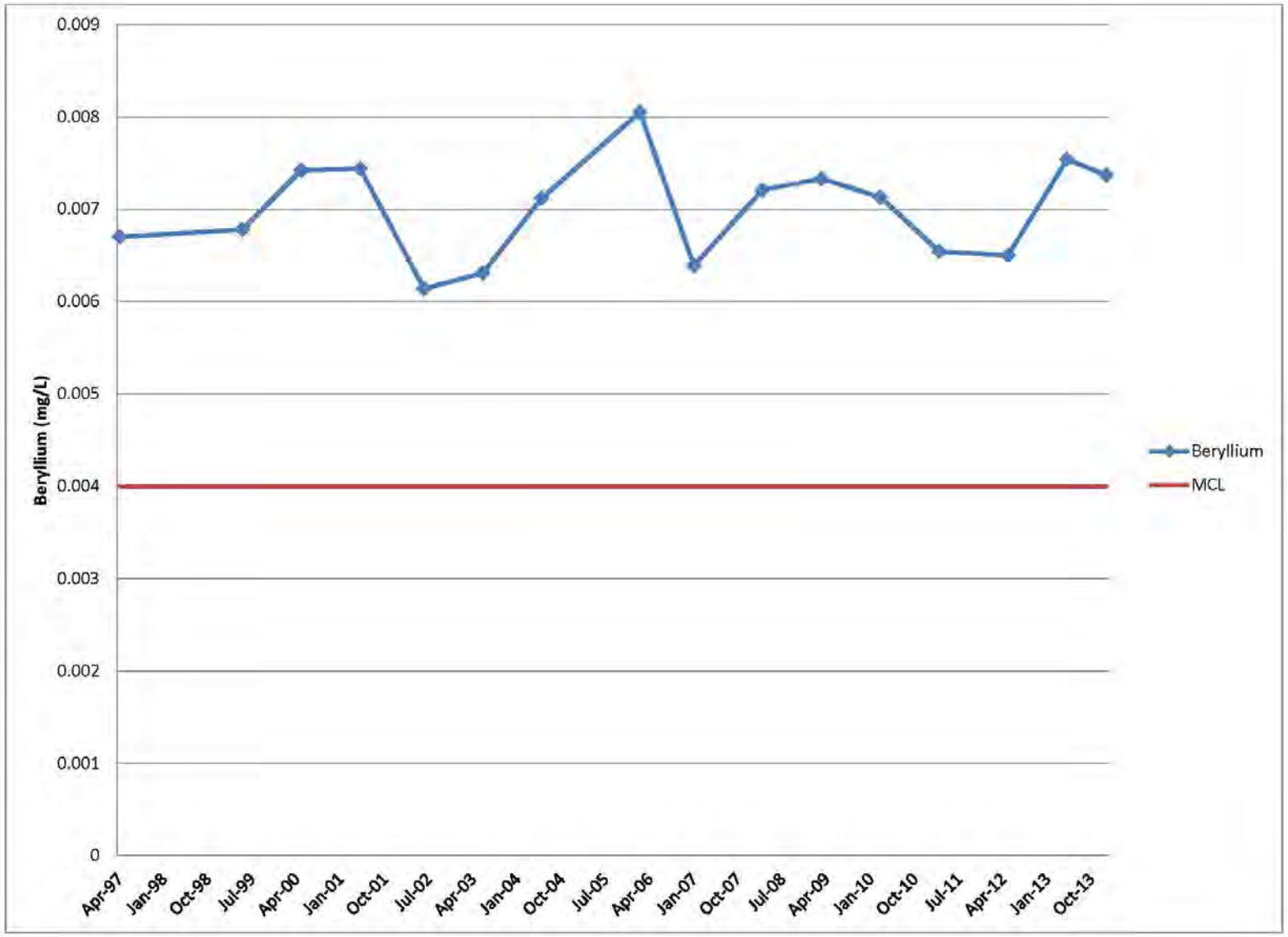


Figure 2C-5. Beryllium Concentrations, Coyote Springs

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 the 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 4 feet (ft) 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 NMED on September 27, 2010 (SNL September 2010).

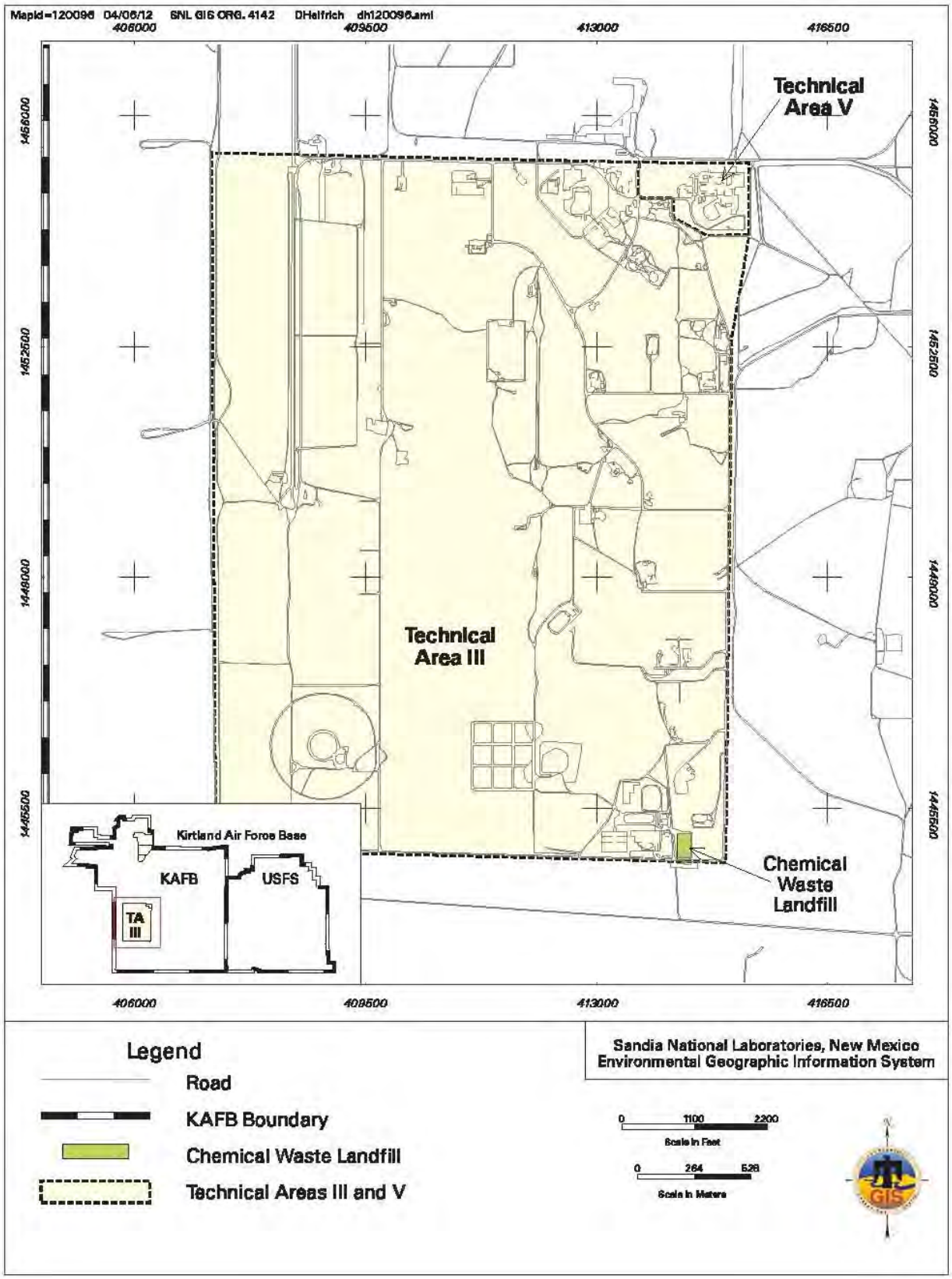


Figure 3-1. Location of the Chemical Waste Landfill within Technical Area III

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 2013 (SNL March 2014) was submitted to the NMED in March 2014. As of December 31, 2014 the CY 2013 Annual Post-Closure Care Report had not been approved by NMED. The *Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2014* will be submitted to NMED in March 2015.

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 2014 semiannual groundwater monitoring activities for the CWL were performed during January and July 2014 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 2014.

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 2014* that will be submitted to the NMED in March 2015.

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).

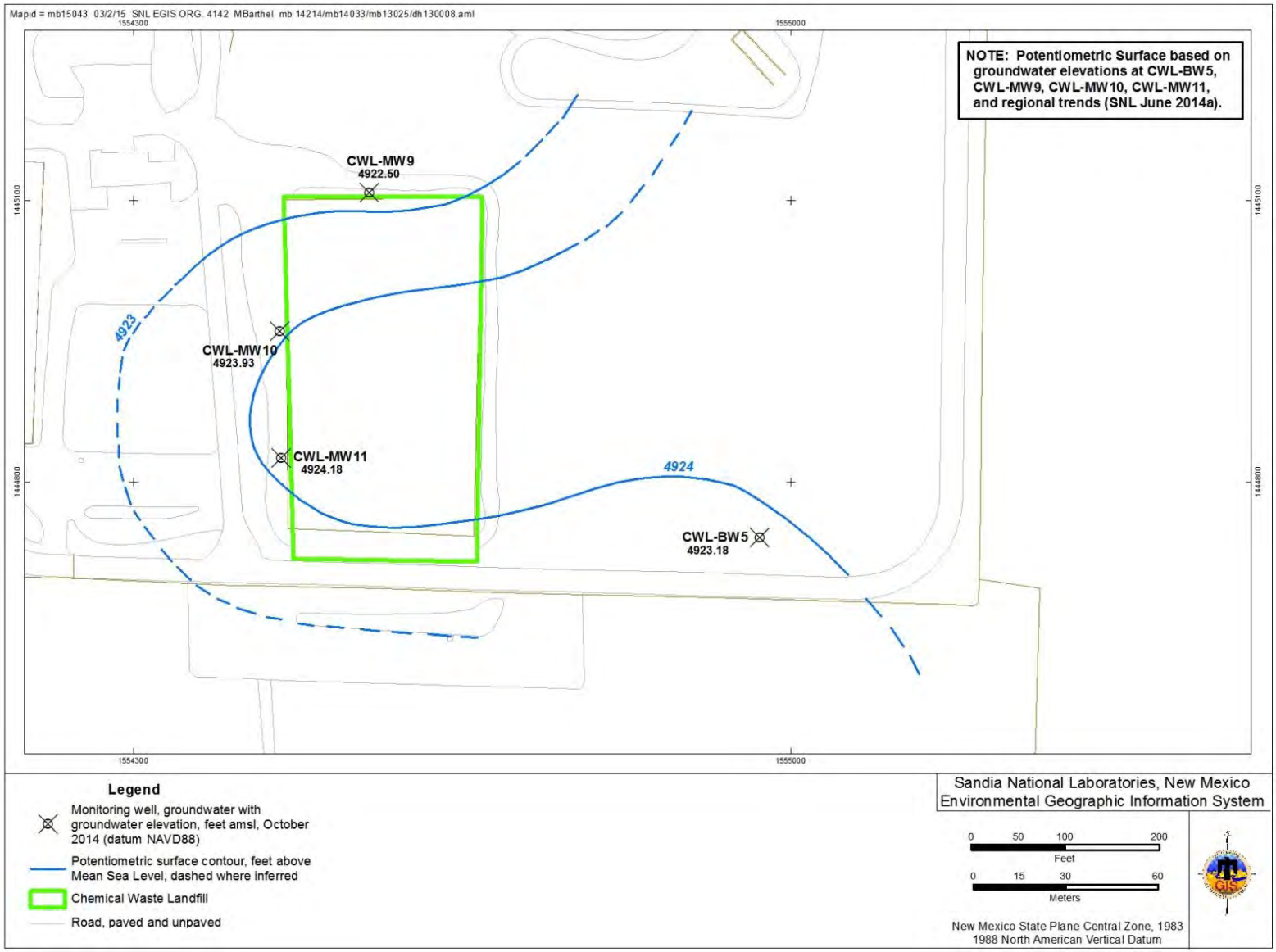


Figure 3-2. Chemical Waste Landfill Monitoring Well Locations and Potentiometric Surface Map, October 2014

Table 3-1. CWL Post-Closure Care Permit Monitoring Well Network and Calendar Year 2014 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 WQ sampling and WL measurements were performed during January and July 2014 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 semiannual basis. One of the two semiannual events must include analyses for the enhanced list of VOCs, chromium, and nickel. The other semiannual event must include only analyses for 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 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 2013 and October 2014 at the CWL wells ranged from 0.38 (CWL-MW11) to 0.85 (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 2014 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 westward deflection of the potentiometric surface is a localized salient in the potentiometric surface of the regional aquifer

beneath the CWL (Figure 3-2) that reflects site-specific geologic controls (i.e., lateral and vertical changes in the hydraulic conductivity of the saturated, anisotropic, Santa Fe Group alluvial-fan sediments that were predominantly 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, lower permeability 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 potentiometric surface (i.e. water table) declines and groundwater flows from the east to the west, the central part of the site (i.e., in the vicinity of CWL-MW10) 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).

Based on the potentiometric surface map, the horizontal gradient at the CWL was approximately 0.011 ft/ft in October 2014. Groundwater velocities were calculated using:

- The current potentiometric surface gradient,
- The hydraulic conductivity range (i.e., high and low values) from slug tests conducted on 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. Estimated 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 2014 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 May 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 2014

Parameters	CY 2014 Semiannual Event	CWL Monitoring Wells
Volatile Organic Compounds: TCE; 1,1,2-Trichloro-1,2,2-trifluoroethane; Tetrachloroethene; 1,1-Dichloroethene; Chloroform; and Trichlorofluoromethane	January	CWL-BW5, CWL-BW5 dup, CWL-MW9, CWL-MW10, and CWL-MW11
Metals: Chromium and Nickel		
Volatile Organic Compounds: TCE	July	CWL-BW5, CWL-MW9, CWL-MW9 dup, CWL-MW10, and CWL-MW11
Metals: Chromium, and Nickel		

NOTES:

BW = Background Well. dup = Duplicate.
CWL = Chemical Waste Landfill. MW = Monitoring Well.
CY = Calendar Year. 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™ EXO1 Water Quality Meter during the purging process. Turbidity was measured with a Hach™ Model 2100Q 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 2014 are presented in Attachment 3B, Figure 3B-1.

The minimum purging volume requirement was satisfied at three of the four monitoring wells (CWL-BW5, CWL-MW9, and CWL-MW11). 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 16.5 gallons were purged from CWL-MW10 prior to the well going dry. The average flow rate for the entire purging event was 0.14 gallons per minute (gpm), and the estimated flow rate during the final four gallons was 0.12 gpm (equivalent to 0.53 and 0.45 liters per minute, respectively). During July, approximately 18 gallons were purged from CWL-MW10 prior to the well going dry. The average flow rate for the entire purging event was 0.078 gpm, and the estimated flow rate during the final four gallons was 0.065 gpm (equivalent to 0.30 and 0.25 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 Record 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 2014 analytical results were compared with established EPA MCLs where applicable. However, as stipulated in the CWL PCCP (NMED 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 2014 groundwater monitoring results will be presented in the CWL Annual Post-Closure Care Report for CY 2014 (to be submitted to NMED in March 2015). For both of the CY2014 sampling events, 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 3A1-1. TCE was the only VOC detected above the laboratory MDL; it was detected in both samples from monitoring well CWL-MW10. TCE was detected in the January and July environmental samples at concentrations of 2.75 and 1.12 µg/L, respectively. Both 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 not detected above the laboratory MDL of 0.002 milligrams per liter (mg/L) in any of the CY 2014 environmental samples (all results also below the MCL of 0.10 mg/L in all samples). Nickel was detected in each sample at concentrations ranging from 0.00142 mg/L to 0.00311 mg/L. 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 June 2014b). 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-BW5 in January and one duplicate sample was collected from monitoring well CWL-MW9 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-BW5 in January, nickel was the only detected parameter with an RPD of 1. The RPD value for the environmental duplicate sample pair collected at CWL-MW9 in July likewise shows good correlation with an RPD value of 8 for nickel. The agreement between duplicate environmental and environmental sample results are within the acceptable range for RPD values of 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 for chloroform in the two January FB samples, and TCE in the field blank sample collected in July at the CWL-MW11 location. No corrective action was required because chloroform and TCE were not detected in any of the associated 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. No VOCs were detected above laboratory MDLS in any of the trip blank 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 was detected in the January EB sample. No corrective action was necessary because chloroform was not detected in the environmental sample associated with the EB sample (i.e., CWL-BW5 sample). No constituents were detected in the July EB sample.

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 June 2014b). 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 Record Center. There were no significant issues identified with the laboratory QC sample results associated with the January and July sampling events.

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 2014 sampling activities at the CWL.

3.9 Summary and Conclusions

During CY 2014, 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 2014 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 May 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 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 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.

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 No. NM5890110518, HWB-SNL-04-027*, September 22, 2004.

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 No. 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 June 2014a Sandia National Laboratories, New Mexico (SNL/NM), June 2014. *Calendar Year 2013 Annual Groundwater Monitoring Report*, SAND2014-15438R, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2014b Sandia National Laboratories, New Mexico (SNL/NM), June 2014. *Data Validation Procedure for Chemical and Radiochemical Data,* AOP 00-03, Revision 4, Sandia National Laboratories, Albuquerque, New Mexico.

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

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 2014 ..... 3A-5

3A-2 Summary of Chromium and Nickel Results, Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 3A-7

3A-3 Summary of Field Water Quality Measurements, Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 3A-8

Footnotes for Chemical Waste Landfill Groundwater Analytical Results 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 2014

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 09-Jan-14	1,1-Dichloroethene	ND	0.300	1.00	7.00	U		095107-001	SW846-8260B
	Chloroform	ND	0.300	1.00	NE	U		095107-001	SW846-8260B
	Tetrachloroethene	ND	0.300	1.00	5.00	U		095107-001	SW846-8260B
	Trichloroethene	ND	0.300	1.00	5.00	U		095107-001	SW846-8260B
	Trichlorofluoromethane	ND	0.300	1.00	NE	U		095107-001	SW846-8260B
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	1.50	5.00	NE	U		095107-001	SW846-8260B
CWL-BW5 (Duplicate) 09-Jan-14	1,1-Dichloroethene	ND	0.300	1.00	7.00	U		095108-001	SW846-8260B
	Chloroform	ND	0.300	1.00	NE	U		095108-001	SW846-8260B
	Tetrachloroethene	ND	0.300	1.00	5.00	U		095108-001	SW846-8260B
	Trichloroethene	ND	0.300	1.00	5.00	U		095108-001	SW846-8260B
	Trichlorofluoromethane	ND	0.300	1.00	NE	U		095108-001	SW846-8260B
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	1.50	5.00	NE	U		095108-001	SW846-8260B
CWL-MW9 10-Jan-14	1,1-Dichloroethene	ND	0.300	1.00	7.00	U		095112-001	SW846-8260B
	Chloroform	ND	0.300	1.00	NE	U		095112-001	SW846-8260B
	Tetrachloroethene	ND	0.300	1.00	5.00	U		095112-001	SW846-8260B
	Trichloroethene	ND	0.300	1.00	5.00	U		095112-001	SW846-8260B
	Trichlorofluoromethane	ND	0.300	1.00	NE	U		095112-001	SW846-8260B
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	1.50	5.00	NE	U		095112-001	SW846-8260B
CWL-MW10 15-Jan-14	1,1-Dichloroethene	ND	0.300	1.00	7.00	U		095121-001	SW846-8260B
	Chloroform	ND	0.300	1.00	NE	U		095121-001	SW846-8260B
	Tetrachloroethene	ND	0.300	1.00	5.00	U		095121-001	SW846-8260B
	Trichloroethene	2.75	0.300	1.00	5.00			095121-001	SW846-8260B
	Trichlorofluoromethane	ND	0.300	1.00	NE	U		095121-001	SW846-8260B
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	1.50	5.00	NE	U		095121-001	SW846-8260B
CWL-MW11 13-Jan-14	1,1-Dichloroethene	ND	0.300	1.00	7.00	U		095116-001	SW846-8260B
	Chloroform	ND	0.300	1.00	NE	U		095116-001	SW846-8260B
	Tetrachloroethene	ND	0.300	1.00	5.00	U		095116-001	SW846-8260B
	Trichloroethene	ND	0.300	1.00	5.00	U		095116-001	SW846-8260B
	Trichlorofluoromethane	ND	0.300	1.00	NE	U		095116-001	SW846-8260B
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	1.50	5.00	NE	U		095116-001	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 2014

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 07-Jul-14	Trichloroethene	ND	0.300	1.00	5.00	U		096179-001	SW846-8260B
CWL-MW9 08-Jul-14	Trichloroethene	ND	0.300	1.00	5.00	U		096184-001	SW846-8260B
CWL-MW9 (Duplicate) 08-Jul-14	Trichloroethene	ND	0.300	1.00	5.00	U		096185-001	SW846-8260B
CWL-MW10 11-Jul-14	Trichloroethene	1.12	0.300	1.00	5.00			096195-001	SW846-8260B
CWL-MW11 09-Jul-14	Trichloroethene	ND	0.300	1.00	5.00	U		096190-001	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 2014

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		095107-015	SW846-6020
09-Jan-14	Nickel	0.00267	0.0005	0.002	NE			095107-015	SW846-6020
CWL-BW5 (Duplicate)	Chromium	ND	0.002	0.010	0.100	U		095108-015	SW846-6020
09-Jan-14	Nickel	0.0027	0.0005	0.002	NE			095108-015	SW846-6020
CWL-MW9	Chromium	ND	0.002	0.010	0.100	U		095112-015	SW846-6020
10-Jan-14	Nickel	0.00187	0.0005	0.002	NE	J	J-	095112-015	SW846-6020
CWL-MW10	Chromium	ND	0.002	0.010	0.100	U		095121-015	SW846-6020
15-Jan-14	Nickel	0.00311	0.0005	0.002	NE			095121-015	SW846-6020
CWL-MW11	Chromium	ND	0.002	0.010	0.100	U		095116-015	SW846-6020
13-Jan-14	Nickel	0.00284	0.0005	0.002	NE			095116-015	SW846-6020
CWL-BW5	Chromium	ND	0.002	0.010	0.100	U		096179-015	SW846-6020
07-Jul-14	Nickel	0.00166	0.0005	0.002	NE	J	J-	096179-015	SW846-6020
CWL-MW9	Chromium	ND	0.002	0.010	0.100	U		096184-015	SW846-6020
08-Jul-14	Nickel	0.0015	0.0005	0.002	NE	J	J-	096184-015	SW846-6020
CWL-MW9 (Duplicate)	Chromium	ND	0.002	0.010	0.100	U		096185-015	SW846-6020
08-Jul-14	Nickel	0.00162	0.0005	0.002	NE	J	J-	096185-015	SW846-6020
CWL-MW10	Chromium	ND	0.002	0.010	0.100	U		096195-015	SW846-6020
11-Jul-14	Nickel	0.00239	0.0005	0.002	NE			096195-015	SW846-6020
CWL-MW11	Chromium	ND	0.002	0.010	0.100	U		096190-015	SW846-6020
09-Jul-14	Nickel	0.00142	0.0005	0.002	NE	J	J-	096190-015	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 2014

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	09-Jan-14	19.20	935.0	263.1	6.99	0.94	76.9	7.07
CWL-MW9	10-Jan-14	19.16	829.0	103.7	7.07	0.29	25.5	2.36
CWL-MW10	15-Jan-14	17.13	742.5	64.4	7.17	1.90	21.1	2.03
CWL-MW11	13-Jan-14	18.04	844.9	240.9	7.07	0.87	51.9	4.95
CWL-BW5	07-Jul-14	25.66	1135.9	279.4	6.90	0.30	84.7	6.88
CWL-MW9	08-Jul-14	25.91	1029.6	183.1	6.95	0.21	38.8	3.14
CWL-MW10	11-Jul-14	25.05	964.9	-18.1	7.05	1.76	34.9	2.87
CWL-MW11	09-Jul-14	27.61	1105.8	300.2	6.94	0.36	65.9	5.18

Refer to footnotes on page 3A-9.

Footnotes for Chemical Waste Landfill Groundwater Analytical Results Tables

% = Percent.
BW = Background well.
CWL = Chemical Waste Landfill.
EPA = U.S. Environmental Protection Agency.
ID = Identifier.
µg/L = Micrograms per liter.
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 Drinking Water Standards (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.
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.

[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.

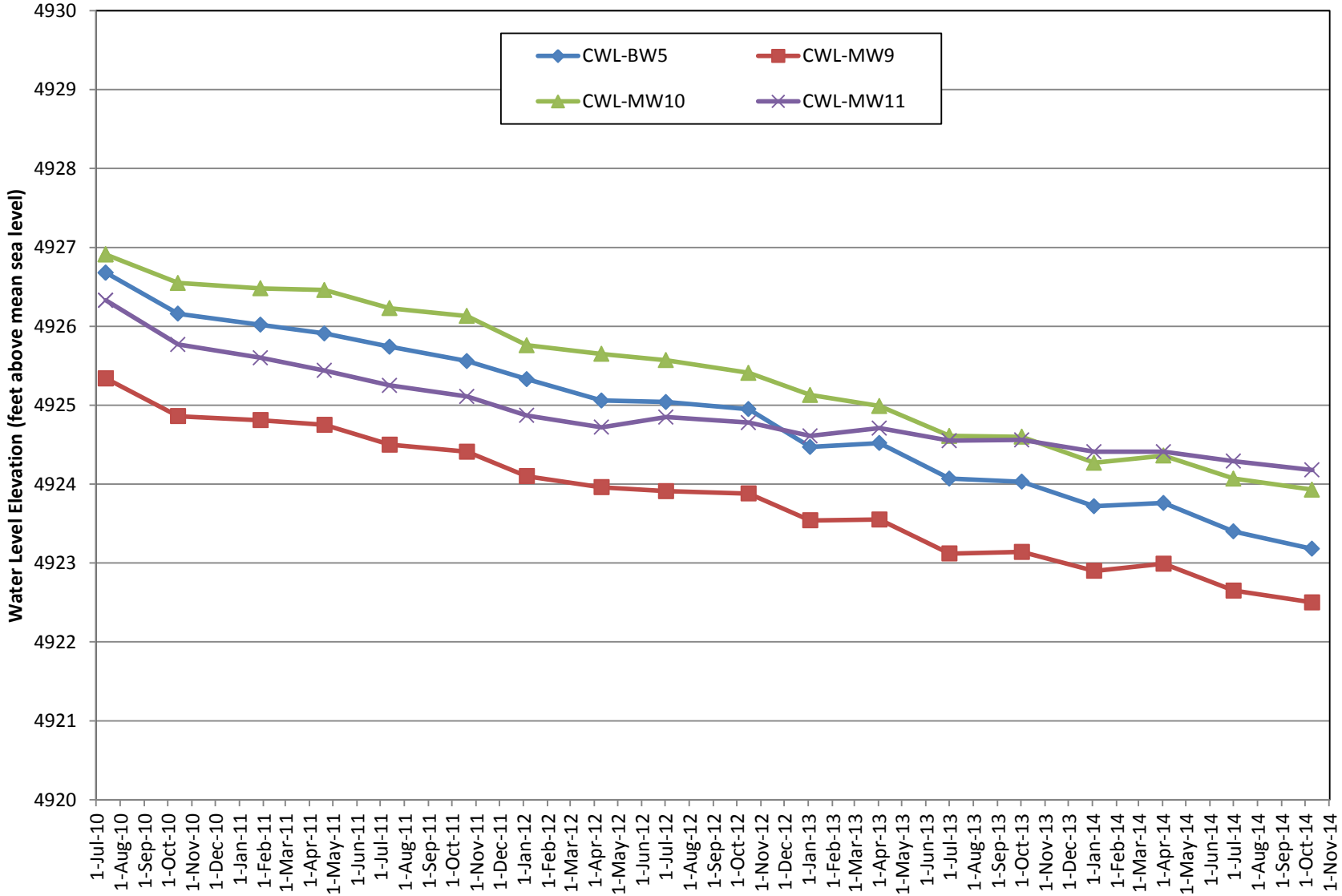


Figure 3B-1. CWL Study Area Wells

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) 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 (SNL March 2012) and submitted to the NMED in March 2012. NMED approved the revised LTMMP after conducting a 150-day public comment period (September 14, 2012 through February 11, 2013) that included a public meeting on October 16, 2012. NMED approved the revised MWL LTMMP on January 8, 2014 and directed U.S. Department of Energy (DOE) and Sandia Corporation (Sandia) to implement LTMMP monitoring, maintenance, and reporting requirements; including deployment of all LTMMP monitoring systems (Blaine January 2014). DOE and Sandia implemented the associated monitoring, inspection, maintenance/repair, and reporting requirements as requested and submitted the installation work plan for three multi-port soil-vapor monitoring wells (SNL January 2014) required to complete the LTMMP monitoring systems on January 15, 2014. The installation work plan was approved by NMED (Blaine February 2014) and the drilling and installation field work was completed in July 2014. DOE and Sandia submitted the Soil-Vapor Monitoring Well Installation Report (SNL September 2014a) that was approved by NMED on September 25, 2014 (Kieling September 2014). Subsequently, DOE and Sandia requested a Certification of Completion for the MWL (Beausoliel September 2014). On October 8, 2014, NMED determined that all LTMMP monitoring systems are deployed for long-term controls and provided a Certificate of Corrective Action Complete with Controls (Cobrain October 2014).

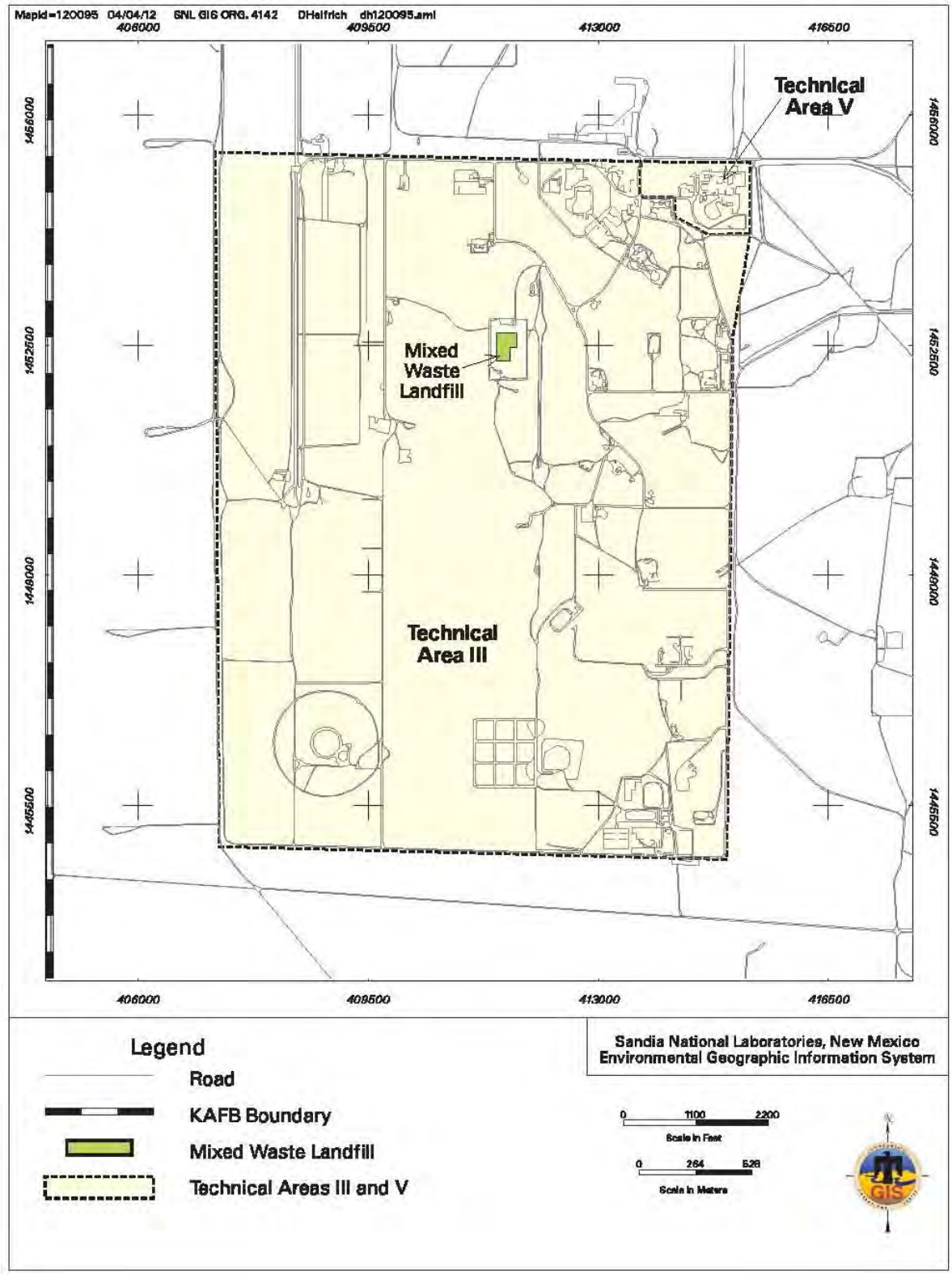


Figure 4-1. Location of the Mixed Waste Landfill within Technical Area III

On October 20, 2014, DOE and Sandia submitted a request to NMED for a Class 3 Permit Modification for Corrective Action Complete with Controls at the MWL (Beausoleil October 2014). The request and associated legal notice initiated the DOE and Sandia 60-day public comment period that will be completed on January 5, 2015, and included a public meeting held on November 18, 2014.

A separate, comprehensive MWL Annual Long-Term Monitoring and Maintenance Report must be submitted to NMED by June 30th of each year that documents all monitoring, inspection, and maintenance activities. The "reporting year" defined in the LTMMP is April 1st through March 31st. The first MWL Annual Long-Term Monitoring and Maintenance Report for the initial implementation reporting period of January 8 through March 31, 2014 was submitted to NMED on June 18, 2014 (SNL June 2014a) and was approved by NMED on August 6, 2014 (Kieling August 2014).

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. The upper screened interval of MWL-MW4 is within the interfingering, fine-grained, Santa Fe Group alluvial-fan deposits. The lower screen interval of MWL-MW4 is completed within the coarse-grained Ancestral Rio Grande (ARG) deposits. References 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. 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 below the top of the regional water table in the coarse-grained ARG deposits.

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 are completed within the interfingering, fine-grained, Santa Fe Group alluvial-fan deposits and comprise the MWL compliance groundwater monitoring network for the uppermost part of the regional aquifer (Bearzi October 2008 and January 2009; Blaine January 2014).

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, June 2013, May 2014, and June 2014b).

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.



Figure 4-2. Location of Groundwater Monitoring Wells at the Mixed Waste Landfill

Table 4-1. MWL Monitoring Well Network and Calendar Year 2014 Compliance Activities

Well ID	Installation Year	WQ [a]	WL [a]	Comment [b]
MWL-BW2	2008	✓	✓	Compliance well, sampled semiannually
MWL-MW4 [c]	1993		✓	Groundwater elevation only
MWL-MW5	2000		✓	Groundwater elevation only
MWL-MW6	2000		✓	Groundwater elevation only
MWL-MW7	2008	✓	✓	Compliance well, sampled semiannually
MWL-MW8	2008	✓	✓	Compliance well, sampled semiannually
MWL-MW9	2008	✓	✓	Compliance well, sampled semiannually

NOTES:
[a]Check marks in the WQ and WL columns indicate WQ sampling and WL measurements were completed.
[b]Requirements defined in the MWL Long-Term Monitoring and Maintenance Plan (SNL March 2012). Semiannual groundwater monitoring of compliance wells was conducted in April and October. Monitoring well MWL-MW8 resampled in June for VOCs only.
[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.
SNL = Sandia National Laboratories.
VOC = Volatile organic compound.
WL = Water level.
WQ = Water quality.

Four of these wells comprise the MWL compliance groundwater monitoring network for the uppermost part of the regional aquifer (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) and are sampled semiannually for various constituents in accordance with the MWL LTMMP (SNL March 2012). The other three groundwater monitoring wells (MWL-MW4, MWL-MW5, and MWL-MW6) are retained for monitoring the groundwater elevation; sampling of these wells is not required under the MWL LTMMP.

4.1.3 Summary of Activities

Semiannual groundwater sampling was conducted in April (resampling of MWL-MW8 for VOCs only in June) and October 2014 at the MWL as summarized in Table 4-1. Groundwater samples were collected from four monitoring wells (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) and analyzed for VOCs; metals including cadmium, chromium, nickel, and uranium; specific radionuclides by gamma spectroscopy; gross alpha and beta; tritium; and radon-222. Duplicate environmental samples were collected at monitoring well MWL-BW2 (April), MWL-MW8 (June resampling), and MWL-MW7 (October). All calendar year (CY) 2014 sampling was conducted in accordance with MWL LTMMP requirements (SNL March 2012). Attachment 4A provides summary tables for the CY 2014 analytical results.

Additional sampling and maintenance outside the scope of the MWL LTMMP was performed during 2014 at monitoring well MWL-MW4 to address elevated unfiltered metals results reported in CY 2013 (SNL May 2014 and June 2014b). This non-routine monitoring and maintenance is detailed in a separate report that will be submitted to NMED in February 2015, and is summarized in Section 4.10.

4.1.4 Summary of Future Activities

All MWL LTMMP monitoring, inspection, and maintenance requirements were implemented as of January 8, 2014 after NMED approval (Blaine January 2014). Under the LTMMP, the groundwater monitoring frequency is semiannual for the four compliance wells only. A separate, comprehensive MWL Annual Long-Term Monitoring and Maintenance Report must be submitted to NMED by June 30th of

each year that documents all monitoring, inspection, and maintenance activities. 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 interfingering, 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 2014 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. Since 2009, the rate of groundwater elevation decline in all wells except MWL-MW4 has been relatively slow and constant, and less than 2 ft overall (Figures 4B-1 and 4B-2 of Attachment 4B). The rate of groundwater elevation decline in the upper screen interval of MWL-MW4 has stabilized since April 2010. 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 *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act §74-4-10: Sandia National Laboratories Consent Order* (the Consent Order) in April 2004, which transferred the regulatory authority for corrective action at the MWL to the Consent Order (NMED April 2004). Groundwater monitoring requirements for the MWL are defined in the MWL LTMMP (SNL March 2012) that was approved by NMED on January 8, 2014 (Blaine January 2014). This report has been formatted to address the content criteria set forth in the Consent Order (NMED April 2004) for Periodic Monitoring Reports.

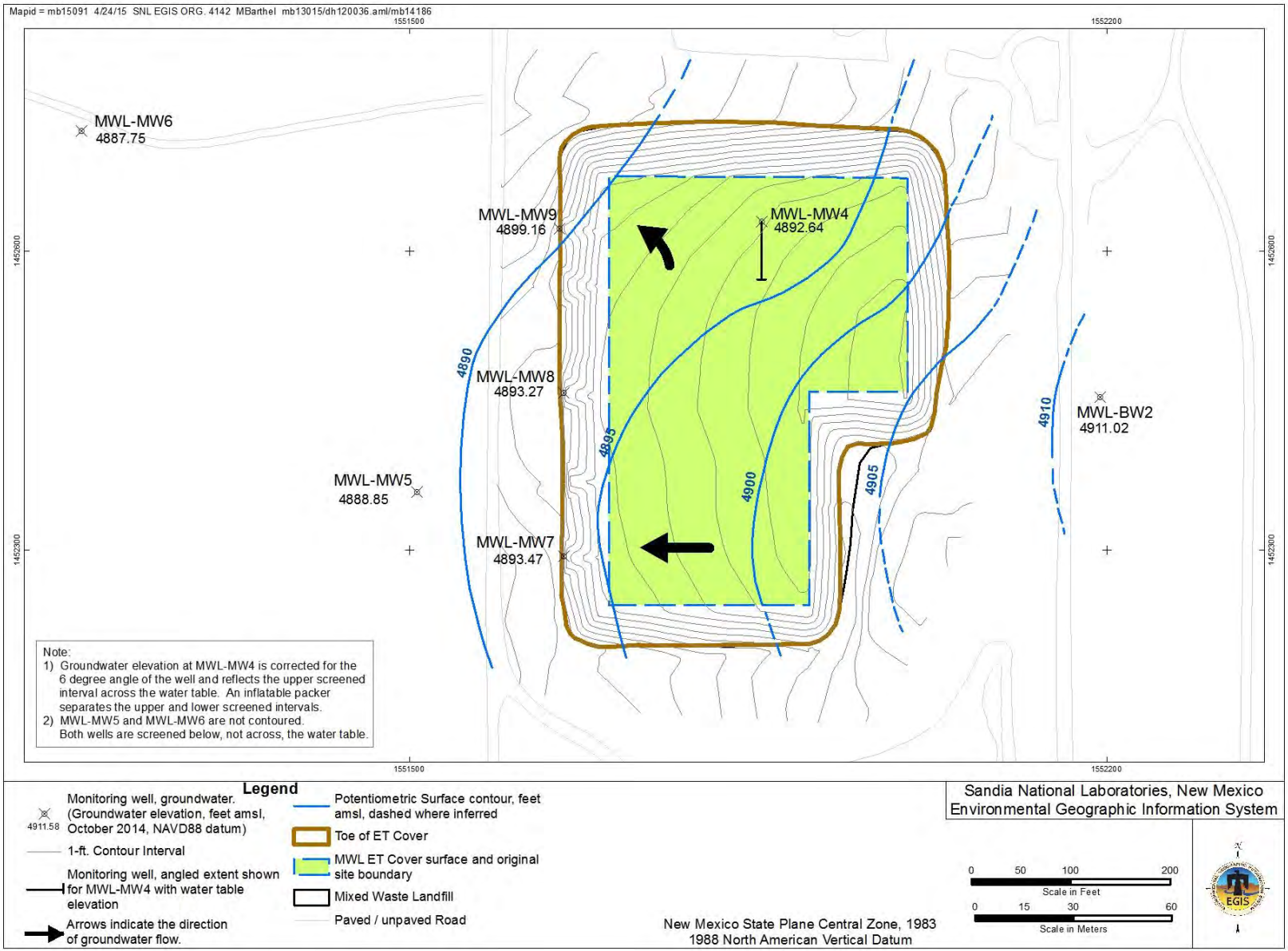


Figure 4-3. Localized Potentiometric Surface of the Basin Fill Aquifer at the Mixed Waste Landfill, October 2014

Although radionuclides are being monitored and screened at the MWL, the information related to radionuclides is provided voluntarily by the DOE/National Nuclear Security Administration (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 Consent Order (NMED April 2004).

4.3 Scope of Activities

The CY 2014 semiannual 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 in April (with resampling of MWL-MW8 in June) and October. Groundwater sampling activities were conducted in conformance with the MWL LTMMP (SNL March 2012) and procedures outlined in the *Mixed Waste Landfill Groundwater Monitoring, Mini-Sampling and Analysis Plan for Fiscal Year 2014, 3rd Quarter Sampling* (SNL March 2014) and the *Mixed Waste Landfill Groundwater Monitoring, Mini-Sampling and Analysis Plan for Fiscal Year 2015,1st Quarter Sampling* (SNL September 2014b).

Table 4-2. Analytical Parameters for the MWL Monitoring Wells, Calendar Year 2014

Analytical Parameter	Calendar Year 2014[a]	
	April & June Resample	October
Volatile Organic Compounds	MWL-BW2 MWL-BW2 (dup in April) MWL-MW7 MWL-MW8 MWL-MW8 (dup in June) MWL-MW9	MWL-BW2 MWL-MW7 (dup in October) MWL-MW8 MWL-MW9
Metals (Cadmium, Chromium, Nickel, and Uranium)		
Radionuclides: Gamma-Emitting Radionuclides Gross Alpha Activity Gross Beta Activity Tritium Radon-222		

NOTES:
[a]Semiannual groundwater sampling was conducted in April (with resampling of MWL-MW8 for VOCs only in June) and October.
BW = Background well.
dup = Duplicate.
MW = Monitoring well.
MWL = Mixed Waste Landfill.
VOC = Volatile organic compound.

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 May 2009). The analytical results and laboratory detection limits are summarized in Attachment 4A, Tables 4A-1 through 4A-4.

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 EXO1 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 Plans* (SNL March 2014 and September 2014b), which are consistent with the methods described in Section 1.3 and the requirements of the MWL LTMMP (SNL March 2012). Field water quality parameters are presented in Table 4A-5 (Attachment 4A) and current CY 2014 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 four monitoring wells. Minimum purge requirements were satisfied at monitoring wells. In accordance with the MWL LTMMP, a new portable Bennett™ sampling system was used that is equipped with a flow meter valve and small diameter tubing to decrease the purging flow rate to as low as reasonably achievable given the equipment. The purging volume requirement was achieved for all of the monitoring wells during CY 2014 sampling activities.

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 the off-site laboratory 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 VOCs, metals, and radiological constituents are presented in Attachment 4A, Tables 4A-1, 4A-3, and 4A-4, respectively. Attachment 4A, Table 4A-2 presents the laboratory method detection limits (MDLs) for the VOCs. Field water quality measurements are presented in Attachment 4A, Table 4A-5. Analytical results that are above the analytical laboratory MDL, but below the practical quantitation limit (PQL) are qualified as estimated values and designated with a "J" qualifier in Tables 4A-1, 4A3, and 4A-4. 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 CY 2014 analytical results were compared with established EPA MCLs where applicable. None of the detected constituents exceed the respective MCLs. The analytical results are discussed in greater detail in the following sections.

4.6.1 Volatile Organic Compounds

Of the four monitoring wells sampled, only well MWL-MW8 yielded groundwater samples that contained detectable VOCs at concentrations above the laboratory MDLs, but below the PQLs and respective MCLs for both the April and June MWL-MW8 samples. In the MWL-MW8 April sample, tetrachloroethene and tricholoroethene were detected at concentrations of 0.450 J and 0.380 J micrograms per liter (µg/L), respectively. The MCL for both of these VOCs is 5 µg/L. No VOCs were detected in any of the other April groundwater samples. Another groundwater sample and duplicate sample were collected from well MWL-MW8 in June as a best management practice to verify the April sample detections (i.e., resampling not required). In the June resamples, only tetrachloroethene was detected at a concentration of 0.370 J µg/L (environmental sample) and 0.390 J µg/L (duplicate sample). No VOCs were detected in the October samples from the four monitoring wells, including the sample from well MWL-MW8. VOC data are presented in Attachment 4A; Table 4A-1 contains analytical results and Table 4A-2 presents the laboratory MDLs for VOCs.

4.6.2 Metals

Unfiltered (or total metals) samples are collected without filtering. Table 4A-3 (Attachment 4A) summarizes the metal results for cadmium, chromium, nickel, and total uranium for the samples collected during the CY 2014 semiannual monitoring events at the MWL. Samples were analyzed for these specific metals according to EPA Methods 6020 (EPA 1986) in accordance with the MWL LTMMP (SNL March 2012).

No metal concentrations were reported above established MCLs in any groundwater samples and all results were consistent with historical ranges.

4.6.3 Radiological Parameters

Groundwater samples from the MWL monitoring wells were screened for gamma-emitting radionuclides, gross alpha/beta activity, radon-222, and tritium (Table 4A-4, Attachment 4A) and the analytical results are compared with the established EPA MCLs (MCL have only been established for gross alpha and gross beta).

Gross alpha activity is measured as a radiological screening tool and in accordance with 40 Code of Federal Regulations; Parts 9, 141, and 142; and Table I-4 should not include uranium. Naturally occurring uranium is measured independently (i.e., total uranium concentration determined by metals analysis described above) and the gross alpha activity measurements are corrected by subtracting the total uranium activity from the uncorrected gross alpha activity results. Radiological results are further reviewed by an SNL/NM Health Physicist to assure that the samples are nonradioactive. Corrected gross alpha activity results are all below the MCL of 15 picocuries per liter (pCi/L) and range from -0.10 to 4.98 pCi/L. Gross beta results did not exceed the established MCL of 4 millirems per year. Tritium and short-list gamma spectroscopy radionuclides activities were below the laboratory minimum detectable activity levels in all groundwater samples. Radon-222 results ranged from 110 to 427 pCi/L. All radiological parameter results are summarized in Table 4A-4 (Attachment 4A).

4.6.4 Water Quality Parameters

The field water quality parameters measured immediately before sampling are presented in Attachment 4A, Table 4A-5. 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 June 2014c). 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-BW2 (April) and MWL-MW7 (October) and analyzed for all constituents. A duplicate sample was collected from well MWL-MW8 during the June resampling event; the June environmental and duplicate pair was analyzed for VOCs only. The results for the environmental sample were compared to the results for the

corresponding environmental duplicate sample. The relative percent difference was calculated for constituents that were detected above the laboratory MDL in both samples.

CY 2014 duplicate environmental sample results show good correlation, with calculated RPD values ranging from less than 1 to 5. All calculated relative percent difference values are less than 20 for organic compounds and less than 35 for metals for all calculated parameters.

4.7.1.2 Equipment Blank Samples

One EB sample (also referred to as a rinsate blank) associated with monitoring well MWL-BW2 (April) and one EB sample associated with monitoring well MWL-MW7 (October) were collected during the CY 2014 sampling events and submitted for all analyses. One additional EB sample associated with resampling of monitoring well MWL-MW7, for radon-222 only, was also collected during the October sampling event.

Various constituents detected in EB samples at low concentrations included bromodichloromethane, chloroform, dibromochloromethane, nickel, and toluene. No corrective action was required for bromodichloromethane, chloroform, dibromochloromethane, and toluene because these analytes were not detected in associated environmental samples. Two nickel results associated with the April environmental samples from monitoring well MWL-BW2 (environmental and duplicate pair) were qualified during data validation as not detected (i.e., "U" qualified). These very low detections were above the laboratory MDL, but below the PQL, and were less than five times the reported concentration in the associated EB sample.

4.7.1.3 Field Blank Samples

A total of nine FB samples were collected during the CY 2014 sampling events and submitted for VOC analysis. Acetone, bromodichloromethane, 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 13 TB samples were submitted with the CY 2014 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 June 2014c).

No significant data quality problems were noted for any CY 2014 MWL groundwater monitoring samples. Data validation reports are filed in the SNL/NM Customer Funded Record Center.

4.8 Variances and Nonconformances

All analytical and field methods were performed according to the requirements specified in the MWL LTMMP (SNL March 2012), the *Mixed Waste Landfill Groundwater Monitoring, Mini-Sampling and Analysis Plan for Fiscal Year 2014, 3rd Quarter Sampling* (SNL March 2014), and the *Mixed Waste Landfill Groundwater Monitoring, Mini-Sampling and Analysis Plan for Fiscal Year 2015,1st Quarter Sampling* (SNL September 2014b). There were no variances and/or nonconformances from requirements during CY 2014 sampling activities.

4.9 Summary and Conclusions

During CY 2014, groundwater samples were collected from the four MWL compliance groundwater monitoring wells (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9). Sample parameters included VOCs; metals including cadmium, chromium, nickel, and uranium; specific radionuclides by gamma spectroscopy; gross alpha and beta; tritium; and radon-222. Groundwater monitoring results were compared with established EPA MCLs for drinking water (EPA May 2009). No parameters were detected above established MCLs.

Based on the field and laboratory QC sample and data validation results, the CY 2014 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 Monitoring Well MWL-MW4 Metals Sampling and Maintenance Results

On May 20, 2014, the DOE and Sandia submitted a report titled *Mixed Waste Landfill Groundwater Monitoring Report, Monitoring Well MWL-MW4 Metals Data, Calendar Year 2013* to the NMED. The report presents filtered and unfiltered metals results for annual groundwater samples collected in January-February 2013 from monitoring well MWL-MW4, as well as historic filtered and unfiltered metals results for monitoring well MWL-MW4 samples (SNL May 2014). This information was also presented in the *CY 2013 Annual Groundwater Monitoring Report* (SNL June 2014b). The 2013 unfiltered groundwater sample results for chromium, cobalt, copper, iron, and nickel showed a significant increase in concentration relative to historic results. For these metal constituents, the 2013 unfiltered sample results were the highest concentrations historically reported for well MWL-MW4. Based on the evaluation presented in the May 2014 report (SNL May 2014), the most likely source of the significant increases in 2013 of unfiltered metals concentrations was corrosion of the dedicated stainless steel sampling pump in monitoring well MWL-MW4. Because this monitoring well was constructed at an incline and with two well screens, a dedicated pump had been installed. The well is constructed of polyvinyl chloride casing and screen.

From September 8 through September 29, 2014, pumping/purging and sampling of MWL-MW4 was conducted to remove sediment and corrosion particles from the well in accordance with recommendations provided by NMED (Kieling July 2014). Monitoring well MWL-MW4 was pumped/purged a total of 15 times over a 3-week period, a total of 7 environmental samples and 1 duplicate sample were collected, and a total of 233 gallons of groundwater were removed from the upper screen interval. Table 4A-6 presents a summary of the seven September 2014 groundwater sampling results for unfiltered metals. For comparison, the February 2013 unfiltered sample results are also included along with established MCLs.

All September 2014 unfiltered metals concentrations were significantly lower than the February 2013 results, including the initial sample results collected on September 9, 2014. The September 2014 unfiltered results show an overall decreasing trend, with all chromium, copper, cobalt, iron, and nickel results for the final two sampling events within or close to historic concentration ranges.

On December 16, 2014, SNL/NM staff and drilling subcontractor personnel removed the dedicated Bennett™ sampling pump, Baski™ packer, and associated tubing from MWL-MW4. The Bennett™ sampling pump was inspected and photographed to document the corrosion (Figure 4-4).



Figure 4-4. Photograph of the Stainless Steel Bennett™ Sampling Pump After Removal from MWL-MW4 on December 16, 2014 Showing Substantial Corrosion

The overall decreasing trend of field turbidity measurements, along with unfiltered metals analytical results, demonstrate that the September 2014 pumping/purging effort was effective at removing loose sediment and corrosion particles from the well casing and the dedicated sampling equipment. The subsequent removal and inspection of the stainless steel pump on December 16, 2014 provided conclusive evidence of substantial corrosion capable of causing elevated, anomalous metals results in groundwater samples (i.e., a source within the well).

Together these results confirm the February 2013 unfiltered metals results are anomalous and related to corrosion of the dedicated stainless steel pump. The video camera log, run while the dedicated equipment was out of the well, demonstrated MWL-MW4 is in reasonable condition and will continue to be used for groundwater elevation monitoring in accordance with the MWL LTMMP (SNL March 2012). Only the packer was reinstalled between the two well screens on December 16, 2014 after the video camera log was completed. A more detailed report, including trend plots and data tables, will be submitted to the NMED in February 2015.

4.11 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 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.

Beausoleil October 2014 Beausoleil, G. L. (U.S. Department of Energy), October 2014. Letter to J.E. Kieling (New Mexico Environment Department Hazardous Waste Bureau), *Request for Class 3 Modification to Module IV of Hazardous Waste Permit for Sandia National Laboratories/New Mexico, EPA ID NM5890110518, New Mexico*, October 17, 2014.

Beausoleil September 2014 Beausoleil, G. L. (U.S. Department of Energy), September 2014. Letter to J.E. Kieling (New Mexico Environment Department Hazardous Waste Bureau), *Department of Energy/National Nuclear Security Administration Sandia Corporation Request for Certificate of Completion for the Mixed Waste Landfill at Sandia National Laboratories, New Mexico*, September 25, 2014.

Blaine February 2014 Blaine, T. (New Mexico Environment Department), February 2014. Letter to G. Beausoleil (U.S. Department of Energy NNSA/Sandia Site Office) and S.A. Orrell (Sandia National Laboratories, New Mexico), *Approval, Work Plan for the Installation of Three Soil-Vapor Monitoring Wells (MWL-SV03, MWL-SV04, and MWL-SV05) at the Mixed Waste Landfill, January 2014, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-14-001.* February 14, 2014.

Blaine January 2014 Blaine, T. (New Mexico Environment Department), January 2014. Letter to G. Beausoleil (U.S. Department of Energy NNSA/Sandia Site Office) and P.B. Davies (Sandia National Laboratories, New Mexico), *Approval, Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan, March 2012, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-12-007.* January 8, 2014.

Cobrain October 2014 Cobrain, D. (New Mexico Environment Department), October 2014. Letter to G. Beausoleil (U.S. Department of Energy NNSA/Sandia Site Office) and S.A. Orrell (Sandia National Laboratories, New Mexico), *Certificate of Completion for the Mixed Waste Landfill, September 25, 2014, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-14-MISC.* October 8, 2014.

EPA May 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.

Kieling September 2014 Kieling, J.E. (New Mexico Environment Department), September 2014. Letter to G. Beausoleil (U.S. Department of Energy NNSA/Sandia Site Office) and P.B. Davies (Sandia National Laboratories, New Mexico), *Approval, Installation of Three FLUTe™ Soil-Vapor Monitoring Wells (MWL-SV03, MWL-SV04, and MWL-SV05) at the Mixed Waste Landfill, September 2014, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-14-012.* September 25, 2014.

Kieling August 2014 Kieling, J.E. (New Mexico Environment Department), August 2014. Letter to G. Beausoleil (U.S. Department of Energy NNSA/Sandia Site Office) and M. Hazen (Sandia National Laboratories, New Mexico), *Approval, Mixed Waste Landfill Annual Long-Term Monitoring and Maintenance Report, January – March 2014, June 2014, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-14-010.* August 6, 2014.

Kieling July 2014 Kieling, J.E. (New Mexico Environment Department), July 2014. Letter to G. Beausoleil (U.S. Department of Energy NNSA/Sandia Site Office) and P. Davies (Sandia National Laboratories, New Mexico), *Mixed Waste Landfill Groundwater Monitoring Report – Groundwater Monitoring Well MWL-MW4 – Calendar Year 2013*, May 20, 2014, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-14-009, July 24, 2014.

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 September 2014a Sandia National Laboratories, New Mexico (SNL/NM), September 2014. *Installation of Three FLUTe™ Soil-Vapor Monitoring Wells (MWL-SV03, MWL-SV04, and MWL-SV05) at the Mixed Waste Landfill*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2014b Sandia National Laboratories, New Mexico (SNL/NM), September 2014. *Mixed Waste Landfill Groundwater Monitoring Mini-Sampling and Analysis Plan for Fiscal Year 2015, 1st Quarter Sampling*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2014a Sandia National Laboratories/New Mexico (SNL/NM), June 2014. *Mixed Waste Landfill Annual Long-Term Monitoring and Maintenance Report, January – March 2014*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2014b Sandia National Laboratories, New Mexico (SNL/NM), June 2014. *Annual Groundwater Monitoring Report, Calendar Year 2013*, SAND Report SAND2043-15438R, prepared by Sandia National Laboratories, Albuquerque, New Mexico for the U.S. Department of Energy under Contract DE-AC04-94AL85000.

SNL June 2014c Sandia National Laboratories, New Mexico (SNL/NM), June 2014. *Data Validation Procedure for Chemical and Radiochemical Data*, AOP 00-03, Revision 4, Sample Management Office, Sandia National Laboratories, Albuquerque, New Mexico, June 16, 2014.

SNL May 2014 Sandia National Laboratories/New Mexico (SNL/NM), March 2012. *Mixed Waste Landfill Groundwater Monitoring Report, Monitoring Well MWL-MW4 Metals Data, Calendar Year 2013*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 2014 Sandia National Laboratories, New Mexico (SNL/NM), March 2014. *Mixed Waste Landfill Groundwater Monitoring Mini-Sampling and Analysis Plan for Fiscal Year 2014, 3rd Quarter Sampling*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL January 2014 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*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

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 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 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 Summary of Detected Volatile Organic Compounds, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 4A-5

4A-2 Method Detection Limits for Volatile Organic Compounds (Method SW846-8260B), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 4A-6

4A-3 Summary of Cadmium, Chromium, Nickel, and Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 4A-7

4A-4 Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Tritium, and Radon Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 4A-9

4A-5 Summary of Field Water Quality Measurements, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 4A-12

4A-6 MWL-MW4 Unfiltered Metals Results Summary for September 2014, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 4A-13

Footnotes for Mixed Waste Landfill Groundwater Analytical Results Tables 4A-15

This page intentionally left blank.

Table 4A-1
Summary of Detected Volatile Organic Compounds,
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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]
MWL-MW8	Tetrachloroethene	0.450	0.300	1.00	5.00	J		095821-001	SW846-8260B
28-Apr-14	Trichloroethene	0.380	0.300	1.00	5.00	J		095821-001	SW846-8260B
MWL-MW8 (Resample) 30-Jun-14	Tetrachloroethene	0.370	0.300	1.00	5.00	J		096150-001	SW846-8260B
MWL-MW8 (Resample Duplicate) 30-Jun-14	Tetrachloroethene	0.390	0.300	1.00	5.00	J		096151-001	SW846-8260B

Refer to footnotes on page 4A-15.

Table 4A-2
Method Detection Limits for Volatile Organic Compounds (Method[g] SW846 8260B), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

Analyte	MDL[b] (µg/L)
1,1,1-Trichloroethane	0.300
1,1,2,2-Tetrachloroethane	0.300
1,1,2-Trichloroethane	0.300
1,1-Dichloroethane	0.300
1,1-Dichloroethene	0.300
1,2-Dichloroethane	0.300
1,2-Dichloropropane	0.300
2-Butanone	2.00
2-Hexanone	2.20
4-methyl-, 2-Pentanone	1.50
Acetone	2.50–3.00
Benzene	0.300
Bromodichloromethane	0.300
Bromoform	0.300
Bromomethane	0.300
Carbon disulfide	1.50
Carbon tetrachloride	0.300
Chlorobenzene	0.300
Chloroethane	0.300
Chloroform	0.300
Chloromethane	0.300
Dibromochloromethane	0.300
Dichlorodifluoromethane	0.300
Ethyl benzene	0.300
Methylene chloride	1.70–3.00
Styrene	0.300
Tetrachloroethene	0.300
Toluene	0.300
Trichloroethene	0.300
Vinyl acetate	1.50
Vinyl chloride	0.300
Xylene	0.300
cis-1,2-Dichloroethene	0.300
cis-1,3-Dichloropropene	0.300
trans-1,2-Dichloroethene	0.300
trans-1,3-Dichloropropene	0.300

Refer to footnotes on page 4A-15.

Table 4A-3
Summary of Cadmium, Chromium, Nickel, and Uranium Results,
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	Cadmium	ND	0.00011	0.001	0.005	U		095811-009	SW846-6020
21-Apr-14	Chromium	ND	0.002	0.010	0.100	U		095811-009	SW846-6020
	Nickel	0.00092	0.0005	0.002	NE	J	0.0028U	095811-009	SW846-6020
	Uranium	0.00696	0.000067	0.0002	0.030			095811-009	SW846-6020
MWL-BW2 (Duplicate)	Cadmium	ND	0.00011	0.001	0.005	U		095812-009	SW846-6020
21-Apr-14	Chromium	ND	0.002	0.010	0.100	U		095812-009	SW846-6020
	Nickel	0.000973	0.0005	0.002	NE	J	0.0028U	095812-009	SW846-6020
	Uranium	0.007	0.000067	0.0002	0.030			095812-009	SW846-6020
MWL-MW7	Cadmium	ND	0.00011	0.001	0.005	U		095815-009	SW846-6020
22-Apr-14	Chromium	ND	0.002	0.010	0.100	U		095815-009	SW846-6020
	Nickel	0.000942	0.0005	0.002	NE	J		095815-009	SW846-6020
	Uranium	0.00741	0.000067	0.0002	0.030			095815-009	SW846-6020
MWL-MW8	Cadmium	ND	0.00011	0.001	0.005	U		095821-009	SW846-6020
28-Apr-14	Chromium	ND	0.002	0.010	0.100	U		095821-009	SW846-6020
	Nickel	0.00173	0.0005	0.002	NE	J		095821-009	SW846-6020
	Uranium	0.00839	0.000067	0.0002	0.030			095821-009	SW846-6020
MWL-MW9	Cadmium	ND	0.00011	0.001	0.005	U		095818-009	SW846-6020
23-Apr-14	Chromium	ND	0.002	0.010	0.100	U		095818-009	SW846-6020
	Nickel	0.000815	0.0005	0.002	NE	J		095818-009	SW846-6020
	Uranium	0.00922	0.000067	0.0002	0.030			095818-009	SW846-6020
MWL-BW2	Cadmium	ND	0.00011	0.001	0.005	U		096697-010	SW846-6020
16-Oct-14	Chromium	ND	0.002	0.010	0.100	U		096697-010	SW846-6020
	Nickel	0.000914	0.0005	0.002	NE	J		096697-010	SW846-6020
	Uranium	0.00759	0.000067	0.0002	0.030			096697-010	SW846-6020
MWL-MW7	Cadmium	ND	0.00011	0.001	0.005	U		096703-010	SW846-6020
17-Oct-14	Chromium	ND	0.002	0.010	0.100	U		096703-010	SW846-6020
	Nickel	0.000878	0.0005	0.002	NE	J		096703-010	SW846-6020
	Uranium	0.00864	0.000067	0.0002	0.030			096703-010	SW846-6020
MWL-MW7 (Duplicate)	Cadmium	ND	0.00011	0.001	0.005	U		096704-010	SW846-6020
17-Oct-14	Chromium	ND	0.002	0.010	0.100	U		096704-010	SW846-6020
	Nickel	0.00084	0.0005	0.002	NE	J		096704-010	SW846-6020
	Uranium	0.00863	0.000067	0.0002	0.030			096704-010	SW846-6020

Refer to footnotes on page 4A-15.

Table 4A-3 *(Concluded)*
Summary of Cadmium, Chromium, Nickel, and Uranium Results,
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	Cadmium	ND	0.00011	0.001	0.005	U		096710-010	SW846-6020
21-Oct-14	Chromium	ND	0.002	0.010	0.100	U		096710-010	SW846-6020
	Nickel	0.000827	0.0005	0.002	NE	J		096710-010	SW846-6020
	Uranium	0.00798	0.000067	0.0002	0.030			096710-010	SW846-6020
MWL-MW9	Cadmium	ND	0.00011	0.001	0.005	U		096707-010	SW846-6020
20-Oct-14	Chromium	ND	0.002	0.010	0.100	U		096707-010	SW846-6020
	Nickel	0.000777	0.0005	0.002	NE	J		096707-010	SW846-6020
	Uranium	0.00973	0.000067	0.0002	0.030			096707-010	SW846-6020

Refer to footnotes on page 4A-15.

Table 4A-4
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Tritium, and Radon Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 21-Apr-14	Americium-241	4.12 ± 12.0	18.5	9.05	NE	U	BD	095811-033	EPA 901.1
	Cesium-137	0.835 ± 2.88	3.95	1.90	NE	U	BD	095811-033	EPA 901.1
	Cobalt-60	-0.22 ± 2.18	3.82	1.80	NE	U	BD	095811-033	EPA 901.1
	Gross Alpha	3.93	NA	NA	15 pCi/L	NA	None	095811-034	EPA 900.0
	Gross Beta	12.2 ± 2.50	1.96	0.955	4mrem/yr			095811-034	EPA 900.0
	Tritium	-11.4 ± 93.5	164	78.8	NE	U	BD	095811-036	EPA 906.0 M
	Radon-222	416 ± 98.6	42.4	20.3	NE			095811-040	SM7500 Rn B
MWL-BW2 (Duplicate) 21-Apr-14	Americium-241	-0.40 ± 17.8	30.6	15.0	NE	U	BD	095812-033	EPA 901.1
	Cesium-137	-0.148 ± 1.88	3.34	1.60	NE	U	BD	095812-033	EPA 901.1
	Cobalt-60	0.445 ± 1.77	3.27	1.53	NE	U	BD	095812-033	EPA 901.1
	Gross Alpha	3.22	NA	NA	15 pCi/L	NA	None	095812-034	EPA 900.0
	Gross Beta	6.83 ± 1.62	1.54	0.741	4mrem/yr			095812-034	EPA 900.0
	Tritium	-36.9 ± 94.3	167	80.5	NE	U	BD	095812-036	EPA 906.0 M
	Radon-222	394 ± 94.1	42.5	20.4	NE			095812-040	SM7500 Rn B
MWL-MW7 22-Apr-14	Americium-241	2.30 ± 14.0	24.7	12.0	NE	U	BD	095815-033	EPA 901.1
	Cesium-137	-0.186 ± 1.85	3.30	1.58	NE	U	BD	095815-033	EPA 901.1
	Cobalt-60	-1.37 ± 2.01	3.28	1.53	NE	U	BD	095815-033	EPA 901.1
	Gross Alpha	4.37	NA	NA	15 pCi/L	NA	None	095815-034	EPA 900.0
	Gross Beta	6.10 ± 1.49	1.53	0.740	4mrem/yr			095815-034	EPA 900.0
	Tritium	-57.2 ± 93.1	166	80.2	NE	U	BD	095815-036	EPA 906.0 M
	Radon-222	156 ± 50.2	53.6	25.8	NE		J	095815-040	SM7500 Rn B
MWL-MW8 28-Apr-14	Americium-241	2.56 ± 8.68	13.5	6.57	NE	U	BD	095821-033	EPA 901.1
	Cesium-137	-0.465 ± 2.65	4.62	2.20	NE	U	BD	095821-033	EPA 901.1
	Cobalt-60	-1.68 ± 2.84	4.64	2.14	NE	U	BD	095821-033	EPA 901.1
	Gross Alpha	4.98	NA	NA	15 pCi/L	NA	None	095821-034	EPA 900.0
	Gross Beta	4.46 ± 1.25	1.38	0.664	4mrem/yr			095821-034	EPA 900.0
	Tritium	-13.5 ± 99.5	174	83.9	NE	U	BD	095821-036	EPA 906.0 M
	Radon-222	167 ± 55.6	61.3	29.4	NE		J	095821-040	SM7500 Rn B

Refer to footnotes on page 4A-15.

Table 4A-4 *(Continued)*
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Tritium, and Radon Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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-MW9 23-Apr-14	Americium-241	1.53 ± 13.0	22.1	10.8	NE	U	BD	095818-033	EPA 901.1
	Cesium-137	1.64 ± 1.95	3.66	1.76	NE	U	BD	095818-033	EPA 901.1
	Cobalt-60	-0.466 ± 2.15	3.69	1.73	NE	U	BD	095818-033	EPA 901.1
	Gross Alpha	2.99	NA	NA	15 pCi/L	NA	None	095818-034	EPA 900.0
	Gross Beta	8.01 ± 1.99	2.15	1.05	4mrem/yr			095818-034	EPA 900.0
	Tritium	64.1 ± 98.7	166	80.0	NE	U	BD	095818-036	EPA 906.0 M
	Radon-222	375 ± 90.6	44.9	21.3	NE			095818-040	SM7500 Rn B
MWL-BW2 16-Oct-14	Americium-241	6.07 ± 6.76	9.51	4.65	NE	U	BD	096697-033	EPA 901.1
	Cesium-137	1.21 ± 1.63	2.81	1.35	NE	U	BD	096697-033	EPA 901.1
	Cobalt-60	0.499 ± 2.26	3.21	1.52	NE	U	BD	096697-033	EPA 901.1
	Gross Alpha	1.23	NA	NA	15 pCi/L	NA	None	096697-034	EPA 900.0
	Gross Beta	5.55 ± 1.32	1.23	0.593	4mrem/yr		J	096697-034	EPA 900.0
	Tritium	-21.6 ± 72.7	137	62.7	NE	U	BD	096697-036	EPA 906.0 M
	Radon-222	427 ± 119	94.2	44.8	NE			096697-037	SM7500 Rn B
MWL-MW7 17-Oct-14	Americium-241	4.45 ± 6.58	10.7	5.19	NE	U	BD	096703-033	EPA 901.1
	Cesium-137	1.31 ± 1.87	3.28	1.57	NE	U	BD	096703-033	EPA 901.1
	Cobalt-60	-1.29 ± 2.50	3.48	1.62	NE	U	BD	096703-033	EPA 901.1
	Gross Alpha	0.85	NA	NA	15 pCi/L	NA	None	096703-034	EPA 900.0
	Gross Beta	5.30 ± 1.23	1.06	0.507	4mrem/yr		J	096703-034	EPA 900.0
	Tritium	-9.94 ± 73.9	137	62.8	NE	U	BD	096703-036	EPA 906.0 M
	Radon-222	156 ± 62.6	78.6	37.4	NE		J	096703-037	SM7500 Rn B
MWL-MW7 (Resample) 29-Oct-14	Radon-222	135 ± 56.4	72.5	34.4	NE		J	096857-037	SM7500 Rn B

Refer to footnotes on page 4A-15.

Table 4A-4 *(Concluded)*
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Tritium, and Radon Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 (Duplicate) 17-Oct-14	Americium-241	2.40 ± 19.6	28.4	13.9	NE	U	BD	096704-033	EPA 901.1
	Cesium-137	1.13 ± 2.08	3.55	1.71	NE	U	BD	096704-033	EPA 901.1
	Cobalt-60	2.52 ± 2.62	3.37	1.59	NE	U	BD	096704-033	EPA 901.1
	Gross Alpha	-0.10	NA	NA	15 pCi/L	NA	None	096704-034	EPA 900.0
	Gross Beta	7.42 ± 1.56	1.15	0.551	4mrem/yr		J	096704-034	EPA 900.0
	Tritium	3.05 ± 75.8	138	63.4	NE	U	BD	096704-036	EPA 906.0 M
	Radon-222	110 ± 55.8	78.8	37.5	NE		J	096704-037	SM7500 Rn B
MWL-MW7 (Resample Duplicate) 29-Oct-14	Radon-222	192 ± 66.0	72.6	34.4	NE		J	096858-037	SM7500 Rn B
MWL-MW8 21-Oct-14	Americium-241	10.6 ± 7.92	10.7	4.82	NE	U	BD	096710-033	EPA 901.1
	Cesium-137	1.17 ± 1.82	2.79	1.34	NE	U	BD	096710-033	EPA 901.1
	Cobalt-60	-3.11 ± 2.63	2.70	1.26	NE	U	BD	096710-033	EPA 901.1
	Gross Alpha	2.97	NA	NA	15 pCi/L	NA	None	096710-034	EPA 900.0
	Gross Beta	6.15 ± 1.43	1.35	0.651	4mrem/yr		J	096710-034	EPA 900.0
	Tritium	-24.7 ± 71.3	134	61.8	NE	U	BD	096710-036	EPA 906.0 M
	Radon-222	122 ± 53.0	69.2	32.7	NE		J	096710-037	SM7500 Rn B
MWL-MW9 20-Oct-14	Americium-241	12.3 ± 13.6	17.4	8.54	NE	U	BD	096707-033	EPA 901.1
	Cesium-137	-3.01 ± 4.22	3.84	1.86	NE	U	BD	096707-033	EPA 901.1
	Cobalt-60	-0.908 ± 1.99	3.31	1.56	NE	U	BD	096707-033	EPA 901.1
	Gross Alpha	4.38	NA	NA	15 pCi/L	NA	None	096707-034	EPA 900.0
	Gross Beta	7.16 ± 1.55	1.27	0.611	4mrem/yr		J	096707-034	EPA 900.0
	Tritium	7.26 ± 76.3	138	63.4	NE	U	BD	096707-036	EPA 906.0 M
	Radon-222	290 ± 88.8	83.2	39.3	NE			096707-040	SM7500 Rn B

Refer to footnotes on page 4A-15.

Table 4A-5
Summary of Field Water Quality Measurements[h],
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	21-Apr-14	22.44	695.7	110.0	7.41	0.20	11.0	0.95
MWL-MW7	22-Apr-14	23.88	594.4	246.0	7.66	0.26	74.6	6.24
MWL-MW8	28-Apr-14	18.35	528.1	202.7	7.66	0.23	40.0	3.70
	30-Jun-14	26.35	644.1	276.4	7.54	0.25	40.4	3.25
MWL-MW9	23-Apr-14	23.97	589.9	120.0	7.55	0.41	20.0	1.72
MWL-BW2	16-Oct-14	20.93	707.3	192.1	7.12	0.22	11.1	0.98
MWL-MW7	17-Oct-14	20.94	585.8	327.2	7.37	0.26	69.7	6.19
	29-Oct-14	19.17	571.4	37.2	7.58	0.32	73.5	6.65
MWL-MW8	21-Oct-14	21.42	604.4	275.0	7.43	0.37	35.6	3.14
MWL-MW9	20-Oct-14	20.97	584.4	171.3	7.35	0.44	23.0	2.01

Refer to footnotes on page 4A-15.

Table 4A-6
MWL-MW4 Unfiltered Metals Results Summary for September 2014,
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

Metal	MCL[d] (mg/L)	February 2013 (mg/L)	September 9 (mg/L)	September 15 (mg/L)	September 16 (mg/L)	September 18 (mg/L)	September 22 (mg/L)	September 25 (mg/L)	September 29[i] (mg/L)
Chromium	0.100	0.112	0.0364	0.0101	0.0105	0.00969	0.0163	0.00621	0.00595 (0.00705)
Cobalt	NE	0.00229	0.00084	0.000243	0.000187	0.000275	0.000235	0.000179	0.000211 (0.000209)
Copper	NE	0.0335	< 0.0056	0.00149	0.00143	0.00141	0.00231	0.00134	< 0.0040 (< 0.0040)
Iron	NE	2.92	0.558	0.120	0.113	0.148	0.157	0.106	0.104 (0.0997)
Nickel	NE	0.417	0.215	0.0965	0.0553	0.0443	0.0701	0.0362	0.0574 (0.056)

Refer to footnotes on page 4A-15.

This page intentionally left blank.

Footnotes for Mixed Waste Landfill Groundwater Analytical Results Tables

%	= Percent.
BW	= Background well.
CFR	= Code of Federal Regulations.
EPA	= U.S. Environmental Protection Agency.
GWM	= Groundwater Monitoring.
ID	= Identification.
µg/L	= Micrograms per liter.
mg/L	= Milligrams per liter.
mrem/yr	= Millirem per year.
MW	= Monitoring well.
MWL	= Mixed Waste Landfill.
No.	= Number.
pCi/L	= Picocuries per liter.
PQL	= practical quantitation limit.

[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 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

The MDL applies to Tables 4A- 1 through 4A-3. MDA applies to Table 4A- 4.

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 4A- 1 through 4A-3. Critical Level applies to Table 4A- 4.

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.

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.

[d]MCL

MCL = Maximum contaminant level. Established by the EPA Office of Water, National Primary Drinking Water Standards, (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- 15 pCi/L = Gross alpha particle activity, excluding total uranium (40 CFR Parts 9, 141, and 142, Table 1-4).
- 4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (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.

J = Estimated value, the analyte concentration is below the PQL.

NA = Not applicable.

U = Analyte is absent or below the method detection limit.

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.
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.

[g]**Analytical Method**

1998, "Standard Methods for the Examination of Water and Wastewater," 7500-Rn B Method, 20th Edition, 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, 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).

[i]**September 29**

Duplicate results are shown in parentheses.

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

This page intentionally left blank.

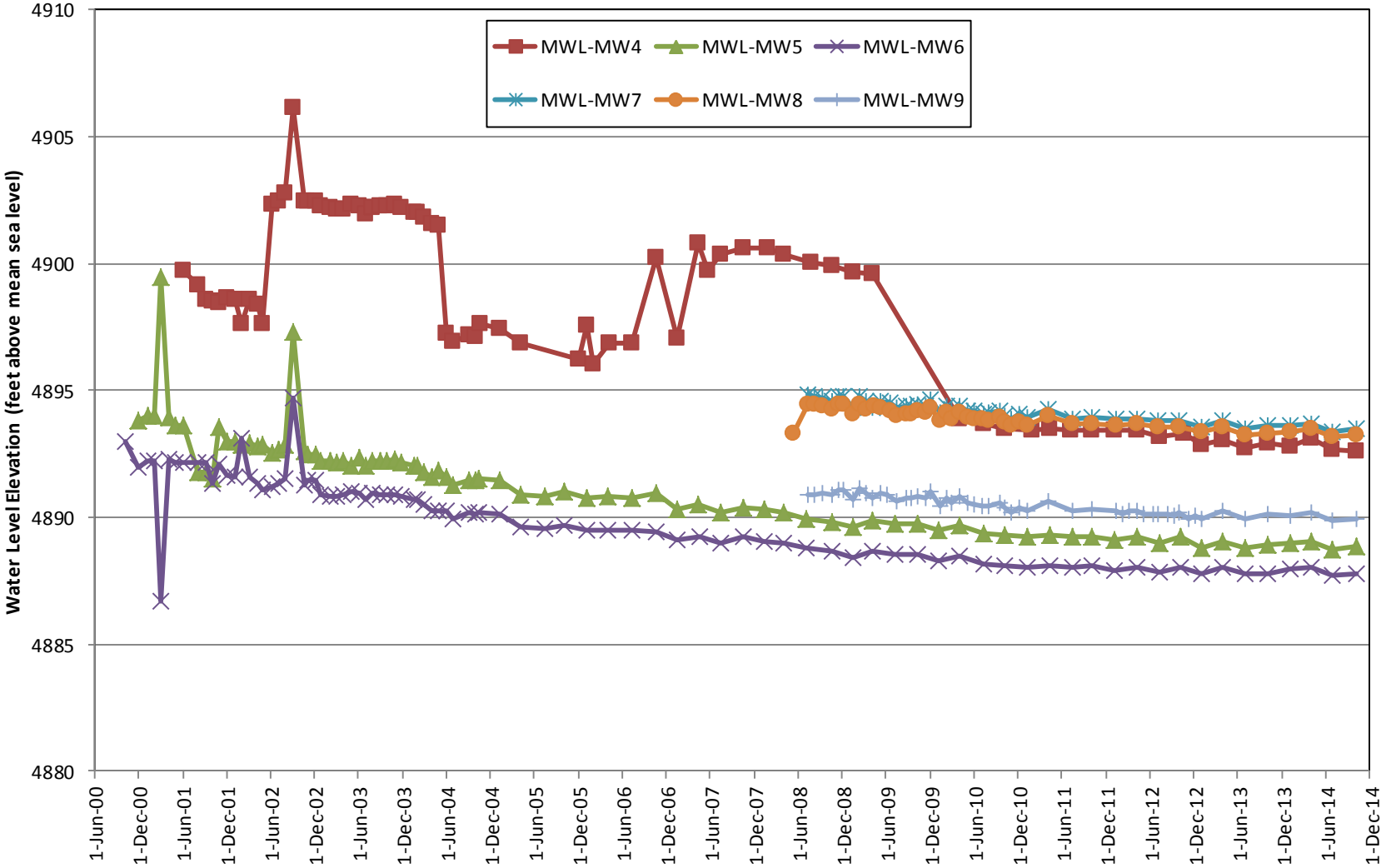


Figure 4B-1. MWL Study Area Wells (1 of 2)

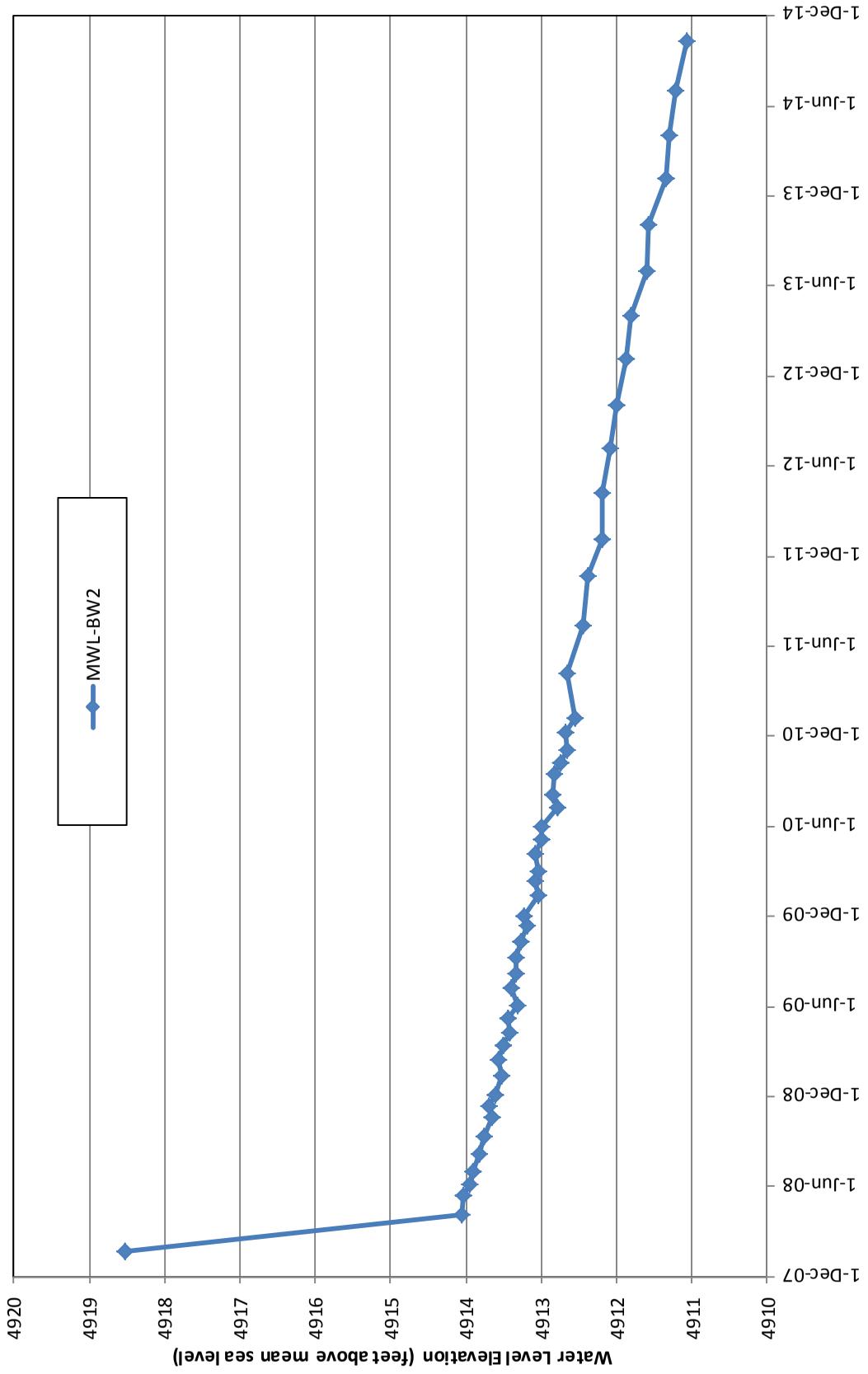


Figure 4B-2. MWL Study Area Wells (2 of 2)

5.0 Technical Area-V Groundwater Area of Concern

5.1 Introduction

Trichloroethene (TCE) and nitrate have been identified as constituents of concern (COCs) in groundwater at the Technical Area-V Groundwater (TAVG) Area of Concern (AOC) 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 groundwater at the TAVG AOC 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 TAVG AOC include low concentrations of TCE and nitrate in an alluvial aquifer that is approximately 500 feet (ft) below ground surface (bgs).

5.1.1 Location

Technical Area (TA)-V occupies approximately 35 acres in the northeast corner of TA-III (Figure 5-1) at Sandia National Laboratories, New Mexico (SNL/NM). TA-V is located in the west-central portion of Kirtland Air Force Base (KAFB), south of the City of Albuquerque (Figure 5-1).

TA-V is situated within the Albuquerque Basin, and the 500 ft thick vadose zone at TA-V 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 Albuquerque Bernalillo County Water Utility Authority (ABCWUA) supply wells located north of KAFB, and from KAFB water supply wells located in the northern portion of the base.

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 derived from TA-V facilities was disposed of to the Liquid Waste Disposal System (LWDS) drain field, two unlined LWDS surface impoundments, and TA-V seepage pits. SNL/NM Environmental Restoration (ER) Operations (formerly ER Project) personnel have conducted numerous groundwater investigations in the TAVG AOC 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 TAVG AOC 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 TAVG AOC have been conducted by SNL/NM over the past 22 years (Table 5-1). Groundwater monitoring at TA-V began in October 1992. TCE was first detected in monitoring well LWDS-MW1 in November 1993 and first detected above the MCL of 5 μg/L in the same well in September 1995. Since then, low concentrations of TCE have been consistently detected during quarterly sampling events. Nitrate was first detected above the MCL of 10 mg/L in monitoring well LWDS-MW1 in December 1995. The New Mexico Environment Department (NMED)-specified background concentration for nitrate in groundwater is 4 mg/L (Dinwiddie September 1997).

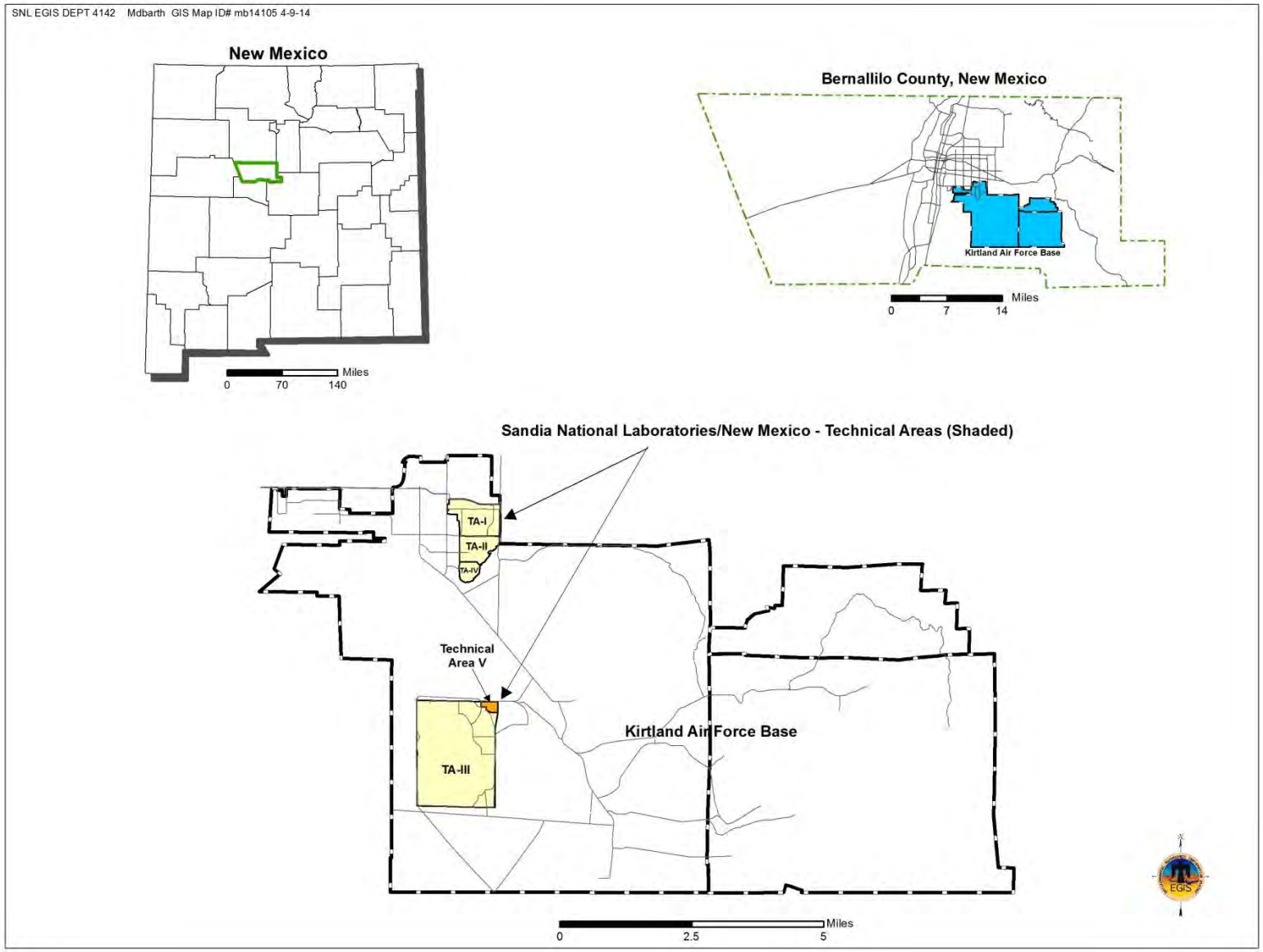


Figure 5-1. Location of SNL/NM and TA-V

Table 5-1. Historical Timeline of the TAVG AOC

Month	Year	Event	Reference
May	1959	KAFB water supply well KAFB-10 is installed in the northwest corner of TA-V. Water from the well was used occasionally for fire protection and maintenance.	NMOSE May 1959
April	1992	The LWDS RFI Work Plan (SWMUs 4, 5, and 52) is submitted.	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 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 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 due to the potential for the ungrouted annulus of 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

Refer to footnotes on page 5-7.

Table 5-1. Historical Timeline of the TAVG AOC *(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 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 Consent Order to the DOE/Sandia, which identified the TAVG as an AOC with groundwater contamination requiring a CME and a CCM.	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 Consent Order.	SNL April 2004a
May	2004	Submit the *Corrective Measures Evaluation Work Plan, Technical Area-V Groundwater*. This document was required by the Consent 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

Refer to footnotes on page 5-7.

Table 5-1. Historical Timeline of the TAVG AOC *(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 TAVG AOC.	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 at TA-V.	NMED April 2009
April	2009	Submit a response to the NOD on the July 2005 CME Report for TAVG AOC.	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 TAVG AOC.	NMED August 2009

Refer to footnotes on page 5-7.

Table 5-1. Historical Timeline of the TAVG AOC *(Continued)*

Month	Year	Event	Reference
November	2009	Submit a response to the second NOD on the July 2005 CME Report for TAVG AOC.	SNL November 2009
December	2009	NMED issues a third NOD on the July 2005 CME Report for TAVG AOC.	NMED December 2009
February	2010	Submit a response to the third NOD on the July 2005 CME Report for TAVG AOC.	SNL February 2010
May	2010	NMED issues a notice of conditional approval for the TA-V Groundwater Investigation Work Plan associated with the responses to the NODs.	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
September	2013	NMED approves the Summary Report for TA-V Groundwater and Soil-Vapor Monitoring Well Installation.	NMED September 2013
December	2013	DOE/NNSA and Sandia request the 2005 CME Report be withdrawn and replaced with an updated CCM and CME Report.	DOE December 2013
December	2013	NMED approves the extension request for an updated CCM and CME report due by November 21, 2014.	NMED December 2013
June	2014	Groundwater sampling analytical results for TA-V wells reported in the CY 2013 SNL/NM Annual Groundwater Monitoring Report.	SNL June 2014

Refer to footnotes on page 5-7.

Table 5-1. Historical Timeline of the TAVG AOC *(Concluded)*

Month	Year	Event	Reference
September	2014	DOE Office of Environmental Management IRR issues a memorandum to DOE/NNSA Sandia Field Office providing the review team's comments and recommendations on the proposed corrective measures for TAVG AOC based on a multi-agency meeting with NMED on July 17, 2014.	DOE September 2014
November	2014	DOE/NNSA and Sandia submit a two-year extension request for the CCM and CME Report.	DOE November 2014a
November	2014	DOE/IRR shares a memorandum that was submitted to the Deputy Assistant Secretary of the Office of Environmental Compliance regarding IRR team's recommendations for TAVG AOC.	DOE November 2014b

NOTES:
AOC = Area of Concern.
AVN = Area V (North).
CCM = Current Conceptual Model.
CME = Corrective Measures Evaluation.
CY = Calendar Year.
DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
FY = Fiscal Year.
IRR = Internal Remedy Reviews.
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.
TAV = Technical Area-V.
TAVG = Technical Area-V Groundwater.
TCE = Trichloroethene.
The Consent Order = Compliance Order on Consent.

In April 2004, the Compliance Order on Consent (the Consent Order) became effective between the NMED, U.S. Department of Energy (DOE), and Sandia Corporation (Sandia). The Consent Order specifies TA-V as an area of groundwater contamination (NMED April 2004). Since the initial discoveries of TCE and nitrate at the TAVG AOC, 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 Consent 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/National Nuclear Security Administration (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).

NMED subsequently issued three Notices of Disapproval (NODs) for the CME Report in July 2008, August 2009, and December 2009, respectively (NMED July 2008, August 2009, and December 2009). DOE/NNSA and Sandia submitted responses to the three NODs in April 2009, November 2009, and February 2010, respectively (SNL April 2009, SNL November 2009, and SNL February 2010). These NOD responses contained an attachment entitled "Technical Area-V Groundwater Investigation Work Plan," which included the installation of four additional groundwater monitoring wells and three soil-vapor monitoring wells to meet NMED's characterization requirements. In May 2010, NMED issued a notice of conditional approval for the TA-V Groundwater Investigation Work Plan (NMED May 2010). SNL/NM personnel installed four additional groundwater monitoring wells in November 2010 and three soil-vapor monitoring wells in March 2011.

The NMED-approved "Technical Area-V Groundwater Investigation Work Plan" specified that eight quarters of soil-vapor samples to be collected from the three soil-vapor monitoring wells and analyzed for volatile organic compounds (VOCs). Soil-vapor samples were collected for three quarters in 2011, four quarters in 2012, and one quarter in 2013; the monitoring activities and analytical results were presented in the Attachment 5D of Calendar Year (CY) 2011, CY 2012, and CY 2013 Annual Groundwater Monitoring Reports, respectively (SNL September 2012, June 2013, and June 2014). The soil-vapor sampling at TA-V was concluded in CY 2013 with the final quarterly sampling.

Groundwater monitoring results for TA-V wells have been summarized in the annual groundwater monitoring reports in accordance with requirements of the Consent Order.

5.1.4 Current Monitoring Network

In CY 2014, 16 wells in the TAVG AOC were being monitored for water quality and water levels (Figure 5-2; Table 5-2). Table XI-1 of the Consent Order (NMED April 2004) specifies that the sampling frequency for groundwater monitoring at TA-V is quarterly. The 16-well groundwater monitoring network has been in place since November 2010.

5.1.5 Summary of Calendar Year 2014 Activities

The following activities took place for the TAVG AOC during CY 2014:

- Obtained monthly or quarterly water level measurements for all TAVG AOC wells.
- Prepared sampling and analysis plans (SAPs) and conducted semiannual and quarterly groundwater sampling events at 16 wells (Table 5-2) in February/March, April/May, July/August/September, and October/November 2014 (SNL January 2014, April 2014, July 2014, and September 2014a).
- Prepared tables of analytical results (Attachment 5A), concentration versus time plots (Attachment 5B), and hydrographs (Attachment 5C) in support of this report.

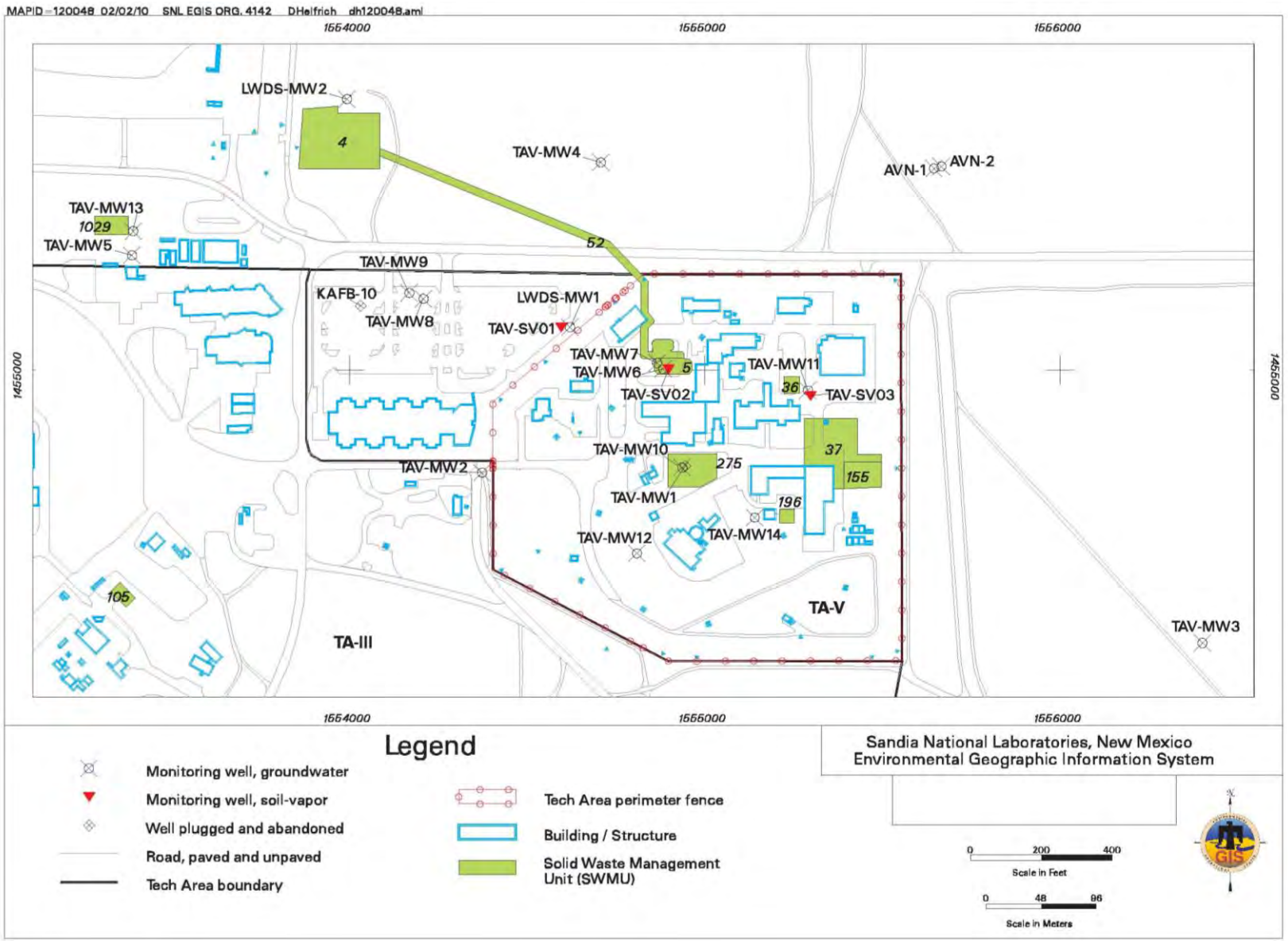


Figure 5-2. TAVG Monitoring Well Locations (16 Active Groundwater Monitoring Wells)

Table 5-2. Groundwater Monitoring Wells at the TAVG AOC

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	NA	NA	Regional aquifer; water table completion (currently dry)
TAV-MW1	1995	NA	NA	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 water quality sampling and water level measurements were obtained during this reporting period.

AOC = Area of Concern.
AVN = Area V (North).
bgs = Below ground surface.
ft = Foot (feet).
LWDS = Liquid Waste Disposal System.
MW = Monitoring well.
NA = Not applicable.
TAV = Technical Area-V (monitoring well designation).
TAVG = Technical Area-V Groundwater.
WL = Water level.
WQ = Water quality.

5.1.6 Summary of Future Activities

The following activities are anticipated for the TAVG AOC during CY 2015:

- Obtain periodic water level measurements for TAVG AOC wells.
- Conduct quarterly or semiannual (deep-completion wells only) groundwater sampling at 16 TAVG AOC wells.

5.1.7 Current Conceptual Model

This section presents an updated conceptual site model that characterizes contaminant source terms, the geological and hydrogeological framework, and the distribution and migration of contaminants in the subsurface at TA-V.

5.1.7.1 Regional Hydrogeologic Conditions

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 regional 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 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.

TA-V is largely underlain by a thick section of alluvial-fan deposits. The alluvial-fan lithofacies is 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 total thickness of the alluvial-fan deposits are typically thousands of feet thick. 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 Ancestral Rio Grande (ARG) deposits interfinger with the alluvial-fan deposits at depth west of TA-V. The ARG deposits consist predominantly of well-sorted sands and gravels that were deposited during the integration of the Rio Grande drainage system. The ARG deposits have a predominantly north to south depositional fabric. The nearest known occurrence of the ARG facies is at monitoring well PL-4, located approximately 8,800 ft northwest of TA-V. The ARG facies were not encountered during drilling of any TA-V wells.

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 supply wells 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.

5.1.7.2 Hydrologic Conditions at TA-V

Long-term average precipitation is 9.45 inches per year (30-year norm based on 1981-2010 data) at Albuquerque International Sunport (SNL September 2014b). 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 500-ft-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 to the 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 surface and shallow subsurface 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 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.

No evidence of groundwater perching has been observed at TA-V. Minimal moisture from wastewater discharge at TA-V remains in the vadose zone based on moisture content measurements in vadose-zone sediment samples.

Values of horizontal hydraulic conductivity for the alluvial-fan lithofacies were determined using aquifer pumping tests and slug tests. Aquifer pumping (and recovery) data were collected at two monitoring wells, TAV-MW2 and AVN-1, and the calculated hydraulic conductivities were 0.09 and 38.3 feet per day (ft/day), respectively. Slug tests were conducted at all 18 monitoring wells (Table 5-2). Estimates of horizontal hydraulic conductivity ranged from 0.04 to 30.82 ft/day. 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. Vertical hydraulic conductivity is typically estimated to be one-tenth to one-hundredth the horizontal hydraulic conductivity.

5.1.7.3 Local Direction of Flow

Water levels measured in the current 16 monitoring wells were used to construct a map of the local aquifer potentiometric surface at TA-V (Figure 5-3). The regional aquifer at TA-V is under unconfined conditions. The potentiometric surface indicates that the groundwater flow beneath TA-V is generally to the west, with localized flow paths to the south and southwest. The horizontal gradient ranges from approximately 0.002 to 0.008 feet per foot (ft/ft) based on the October 2014 potentiometric surface map (Figure 5-3). The horizontal groundwater flow velocity at TA-V can be calculated from the range of horizontal hydraulic conductivities (0.04 to 30.8 ft/day), the average horizontal hydraulic gradient of 0.005 ft/ft, and the effective porosity of 0.25. The estimates for linear groundwater flow velocity at TA-V range from 0.29 to 225 feet per year (ft/yr).

Water-table contours for previous years suggested that a subtle groundwater mound was present at monitoring wells TAV-MW8 and LWDS-MW1 with approximately 0.6 – 0.8 ft of additional head relative to nearby wells (SNL September 2012, June 2013, June 2014). The groundwater mound is most likely an artifact of laterally variable water level declines within a heterogeneous and anisotropic aquifer. In CY 2014, Figure 5-3 shows that a similar amount of additional hydraulic head still exists at wells TAV-MW8 and LWDS-MW1 relative to nearby wells, but a potentiometric mound cannot be confidently inferred using a 1-foot contour interval.

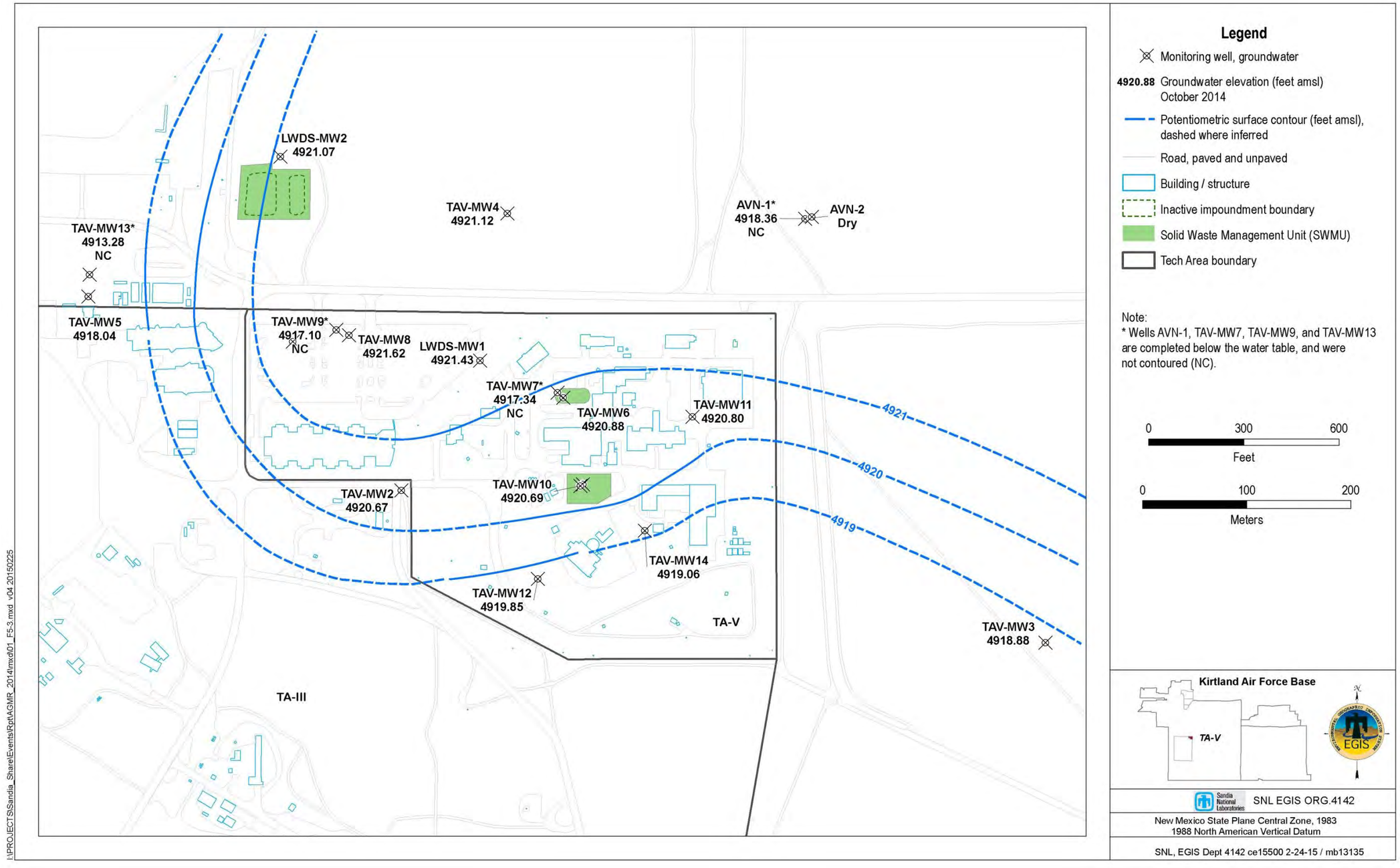


Figure 5-3. TAVG AOC Potentiometric Surface Map (October 2014)

Water level data indicate that groundwater flow to the west of TA-V turns sharply to the north, moving toward ABCWUA supply wells located north of KAFB and the 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 and transmissive than the fine-grained sediments of the alluvial-fan lithofacies at TA-V and allow for more rapid flow of groundwater.

Water level fluctuations are shown on the hydrographs present in Attachment 5C, Figures 5C-1 through 5C-3, for the current 16-well groundwater monitoring network at TA-V. Groundwater levels have steadily declined at all TA-V monitoring wells. The water level declines are due to the combined pumping of the regional aquifer by the KAFB and ABCWUA water supply wells. The rates of decline range from 0.55 to 0.88 ft/yr with an average decline rate of 0.77 ft/yr. In general, the rates of decline are higher to the east than to the west, with the groundwater level declining fastest in monitoring well TAV-MW3 and slowest in monitoring well TAV-MW5. The differential dewatering of the aquifer is expected to continue as long as pumping of water supply wells in the region continues.

Since late 2008, groundwater levels for regional aquifer wells in the northern part of KAFB show an increasing trend in groundwater elevations. Presumably, this is in response to the ABCWUA transitioning to surface water for potable water supplies and decreased dependence on water supply wells immediately north of KAFB (SNL June 2014). However, this effect has not been seen as far south as TA-V.

5.1.7.4 Contaminant Sources

Contaminant migration in the subsurface at TA-V is primarily controlled by infiltration of wastewater historically disposed of at TA-V and by the low permeability of the sedimentary units in the vadose zone and regional aquifer. Limited amounts of natural recharge are a minor factor. Possible sources of natural recharge include precipitation and ephemeral flows in nearby arroyos.

Prior to 1993, the majority of wastewater discharged at TA-V occurred at SWMUs 4, 5, and 275 (Figure 5-2). Table 5-3 identifies the dates of disposal and estimated disposal volumes. TCE and other organic chemicals were presumably present in wastewater that was discharged to the LWDS drain field from 1962 to 1967, to the LWDS surface impoundments from 1967 to 1972, and to the TA-V seepage pits from the 1960s until the early 1980s, when disposal practices were modified to protect the environment. Wastewater continued to be discharged to the seepage pits from the early 1980s until 1992, but it contained no organic solvents such as TCE. After 1992, wastewater was diverted to the ABCWUA sanitary sewer system.

Table 5-3. Wastewater Disposal History at TA-V

Disposal Site	Dates	Estimated Volume of Wastewater (gallons)
SWMU 5 – LWDS Drain Field	1962–1967	6.5 million
SWMU 4 – LWDS Surface Impoundments	1967–1972	12 million
SWMU 275 – TA-V Seepage Pits	1960s–1992	30 to 50 million

NOTES:
LWDS = Liquid Waste Disposal System.
SWMU = Solid Waste Management Unit.
TA-V = Technical Area-V.

Wastewater containing dissolved concentrations of TCE and other organic chemicals moved through the alluvial-fan lithofacies into the aquifer. Low concentrations of TCE present in the aquifer today are a result of these initial releases. Upon cessation of disposal, vertical pathways to the aquifer were drained by gravity. Continued wastewater flushing of the vadose zone beneath the seepage pits until 1992 likely removed significant sources of secondary contaminants.

Sampling and analysis have been conducted in the vadose zone to characterize the presence of VOCs. Locations of investigations are based on possible release sites (Table 5-3). Investigation results indicate that the overall presence of VOCs in the vadose zone is minimal. Within the LWDS drain field (SWMU 5), trace quantities of TCE, tetrachloroethene, and benzene were detected in shallow soil-vapor samples collected during 1994 (SNL March 1999a). The possibility of vadose zone contamination was further investigated with the installation of groundwater monitoring wells TAV-MW6, TAV-MW7, TAV-MW8, and TAV-MW9 in March and April 2001. The results for soil-core and soil-vapor samples show no significant residual VOCs in the vadose zone. Also, no results have shown evidence of excessive moisture in the vadose zone sediments; therefore, no significant residual wastewater is present in the vadose zone beneath the LWDS drain field (SNL October 2001).

In the vicinity of the TA-V seepage pits (SWMU 275), trace quantities of TCE, tetrachloroethene, benzene, toluene, and total xylene were detected in soil-vapor samples collected during passive, surficial characterization studies conducted during 1994 and 1995 (SNL March 1999a). Solvent disposals to the seepage pits were eliminated in the early 1980s, but wastewater disposal continued until 1992. This likely flushed into the aquifer any residual COCs that may have been present in the vadose zone.

Groundwater sample results from monitoring well LWDS-MW2, located to the immediate north of the LWDS surface impoundments (SWMU 4) (Figure 5-2), indicate that wastewater discharge to the surface impoundments did not impact groundwater. TCE has never been detected in groundwater samples from monitoring well LWDS-MW2, and nitrate concentrations have never exceeded its MCL in this well. The large surface area of the surface impoundments could have facilitated sufficient VOC and wastewater evaporation that minimized the depth of VOC and wastewater percolation.

Other shallow contamination sites (SWMUs 36, 37, 52, 155, and 196 as shown in Figure 5-2) have also been investigated at TA-V. Site characterization and corrective action activities included excavation of oil spills and confirmatory sampling, near surface soil-vapor and soil sampling, and vadose zone vapor and soil sampling. Sampling results have shown that these other sites have not contributed to groundwater contamination.

Nitrate in groundwater at TA-V may be derived from TA-V sanitary waste disposals to the subsurface. Sanitary waste discharges continued until 1992 when the disposals to these septic systems were routed to the ABCWUA sanitary system. Nitrate is considered to be a conservative constituent with regard to transport because it is highly soluble in water, is not typically sorbed by sediments, and is not biotransformed under aerobic conditions. Therefore, any locally derived nitrate most likely was transported through the vadose zone with the initial discharges of wastewater.

Nitrate concentrations in groundwater have exceeded the MCL in the two AVN wells (AVN-1 and AVN-2 [shallower well, now dry]) upgradient of TA-V, which are presumably derived from upgradient sources. Concentrations have also exceeded the MCL in samples from monitoring wells located within TA-V (LWDS-MW1 and TAV-MW10), suggesting an additional local source of nitrate. Nitrate in groundwater at TA-V could also be attributed to leaching of naturally occurring nitrate in the vadose zone by the infiltration of the wastewater.

5.1.7.5 Contaminant Distribution and Transport in Groundwater

Distribution and transport of COCs are discussed in this section. Because TCE is a volatile compound, vapor transport of TCE in the vadose zone is a possible mechanism. TCE is also hydrophobic with a water solubility of 1,100 mg/L at 20 degrees Celsius. Some TCE will be retained in the vadose zone due to sorption onto fine-grained materials, as well as dissolution into pore water.

VOC concentrations in soil vapor were measured at the three soil-vapor monitoring wells (TAV-SV01, TAV-SV02, and TAV-SV03 shown in Figure 5-2) for eight quarters from April 2011 to March 2013. At each well, soil-vapor samples were collected from 10, 1 foot long stainless steel screens set at 50 to 500 ft bgs and analyzed for VOCs. All eight quarters' analytical results have been reported in the Attachment 5D of the CY 2013 Annual Groundwater Monitoring Report (SNL June 2014). TCE is the most prevalent VOC in the vadose zone. The soil-vapor results show that the vapor concentrations have stabilized in the vadose zone at TA-V. Without an active driving force (such as wastewater disposal), it is unlikely for the TCE in the vadose zone to act as an ongoing contaminant source to groundwater.

TCE is present in low concentrations in the regional 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). Monitoring well TAV-MW6 is located at the LWDS drain field (SWMU 5) and monitoring well TAV-MW10 is located at the TA-V seepage pits (SWMU 275). 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 westward in the localized direction of groundwater flow. The variability in hydraulic conductivities in saturated sediments has most likely influenced the distribution of TCE in groundwater. The hydraulic conductivity values measured by slug tests at monitoring wells TAV-MW6 and TAV-MW10 were 1.14 and 4.12 ft/day, respectively. The lowest hydraulic conductivity value (0.04 ft/day) was measured in monitoring well LWDS-MW1, where some of the highest contaminant concentrations are present in groundwater. It is possible that the localized low conductivity zone near well LWDS-MW1 has acted as a barrier for contaminant transport in groundwater.

Using the average horizontal hydraulic gradient of 0.005 ft/ft and an assumed effective porosity of 0.25, the linear groundwater flow velocities are calculated as 0.29, 8.3, and 30 ft/yr at the locations of monitoring wells LWDS-MW1, TAV-MW6, and TAV-MW10, respectively.

The current 16-well groundwater monitoring network was completed in November 2010. From 2011 to 2014, TCE has been consistently detected above the MCL of 5 μg/L in the following five monitoring wells: LWDS-MW1, TAV-MW6, TAV-MW10, TAV-MW12, and TAV-MW14. TCE has also been detected below the MCL at monitoring wells TAV-MW2, TAV-MW4, TAV-MW8, and TAV-MW11. TCE has never been detected in the remaining seven monitoring wells.

Figure 5-4 shows the 5, 10, and 15 μg/L TCE isoconcentration contours in groundwater for the fourth quarter of CY 2014, except that the TCE concentration from the August sampling event is shown for TAV-MW6. The contours were relatively stable with the 15 μg/L concentration contour enclosing monitoring wells LWDS-MW1, TAV-MW6, and TAV-MW10 in CY 2011, 2012, and 2013 (SNL September 2012, June 2013, June 2014). In CY 2014, TCE concentrations in well LWDS-MW1 were consistently above 15 μg/L. TCE concentration in well TAV-MW6 was above 15 μg/L in the first quarter, below 15 μg/L in the second and third quarter, and was not detected in the fourth quarter. The fourth quarter result is considered an anomaly (see section 5.6). The TCE concentration in well TAV-MW10 was above 15 μg/L in the first quarter and below 15 μg/L for the remaining three quarters. TCE concentrations in wells TAV-MW12 and TAV-MW14 have been mostly between 5 and 10 μg/L.

This page intentionally left blank.

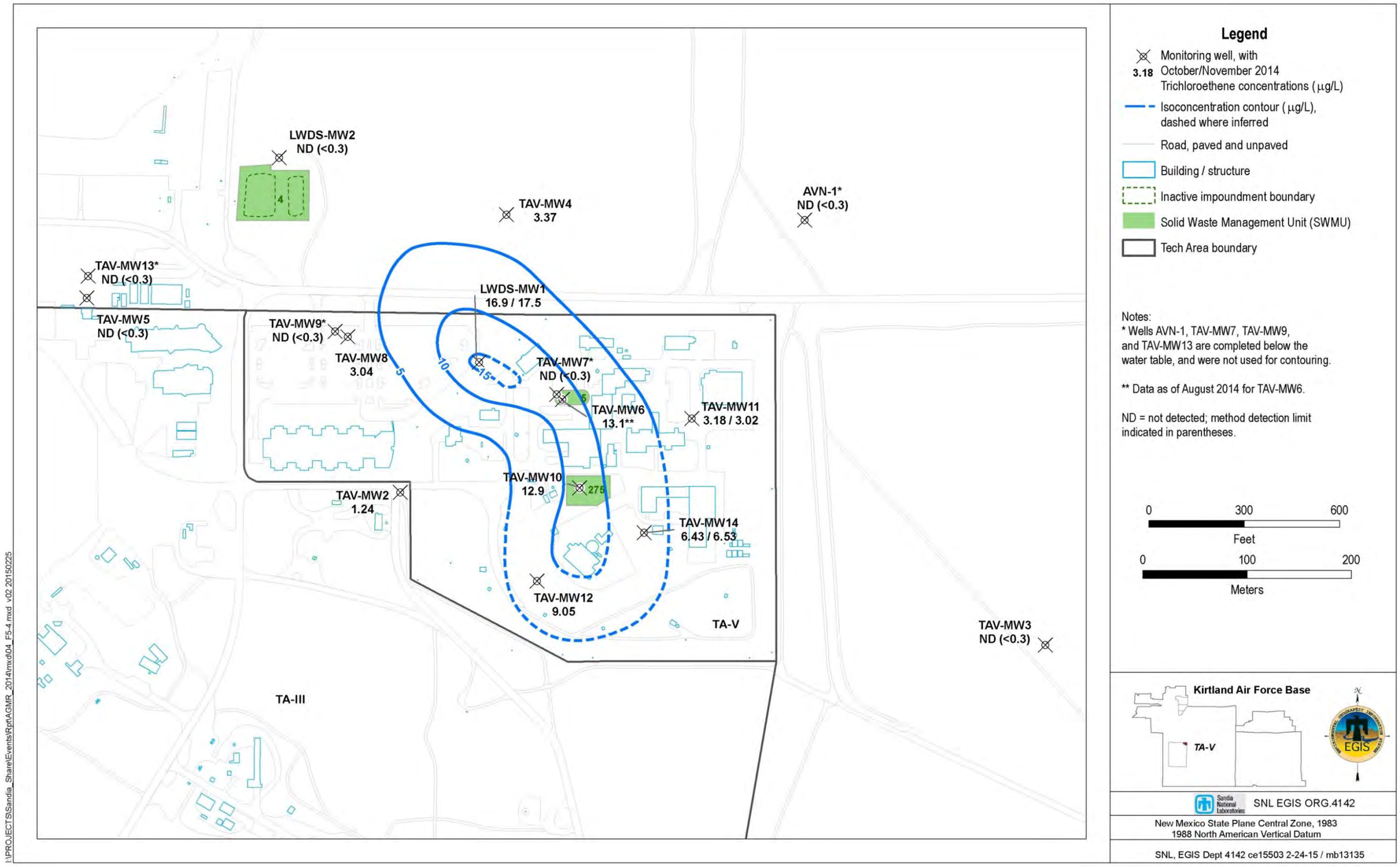


Figure 5-4. Distribution of TCE in Groundwater at TAVG AOC, October/November 2014

Figure 5-4 also shows that the concentrations of TCE decrease laterally from these wells. TCE has been detected only in the wells screened across the groundwater table and has not been detected in wells screened approximately 90 ft below the groundwater table, based on results of groundwater samples collected from deep monitoring wells TAV-MW7 and TAV-MW9.

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 (currently dry), LWDS-MW1, and TAV-MW10; nitrate was detected above MCL at TAV-MW5 in a split sample collected in November 1998, but has not been detected above the MCL ever since.

Figure 5-5 shows the 10 mg/L nitrate isoconcentration contour for the fourth quarter of CY 2014 with regards to the locations of the historical wastewater and sanitary discharges. The 10 mg/L nitrate contour is located within the 5 µg/L TCE contour. The general location of the 10 mg/L contour has not changed significantly over the past several years and encloses wells LWDS-MW1 and TAV-MW10, but not well TAV-MW6.

Nitrate has also been detected in groundwater monitoring wells outside the TA-V boundary. Concentrations of nitrate in upgradient monitoring well AVN-1 have occasionally exceeded the MCL of 10 mg/L. Concentrations of nitrate at LWDS-MW2 have been slightly below the MCL. In addition, upgradient wells AVN-1 and AVN-2 were completed at different depths, but showed similar nitrate concentrations. Monitoring well AVN-2 has been dry since 2005.

Contaminant transport mechanisms in groundwater include advection, dispersion, diffusion, sorption, and biodegradation. Groundwater monitoring results over the past two decades indicate that advection is not the main force driving contamination migration at TA-V, most likely because of the low groundwater velocities. Dispersion and diffusion are important mechanisms at TA-V because of limited advection with low groundwater velocities at the site. While nitrate does not tend to sorb to sediment surfaces, TCE is a hydrophobic organic compound and sorbs to the organic matter in the aquifer matrix. Sorption is a reversible process for TCE. As the dissolved contaminant concentration in groundwater decreases due to advection, dilution, or biodegradation, the sorbed TCE portion will tend to desorb and reenter groundwater through equilibration process. The comparatively stable TCE concentration contours can be attributed to the relatively slow processes of dispersion and diffusion, and the reversible sorption process.

Biodegradation of TCE was evaluated during preparation of the 2005 CME Report (SNL July 2005). The anaerobic biodegradation assessment indicated that anaerobic reductive dechlorination is not occurring in groundwater at TA-V, nor is biologically mediated transformation of nitrate. This is likely due to the relatively high concentration of dissolved oxygen and low concentration of dissolved organic carbon as carbon and energy sources. A study of denitrification parameters and isotopic signatures conducted in 2013 also indicated that natural denitrification was insignificant at TA-V (Madrid et al. June 2013).

5.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM ER Operations, as well as implements and enforces regulations mandated by the Resource Conservation and Recovery Act (RCRA). All ER SWMUs and AOCs 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).

This page intentionally left blank.

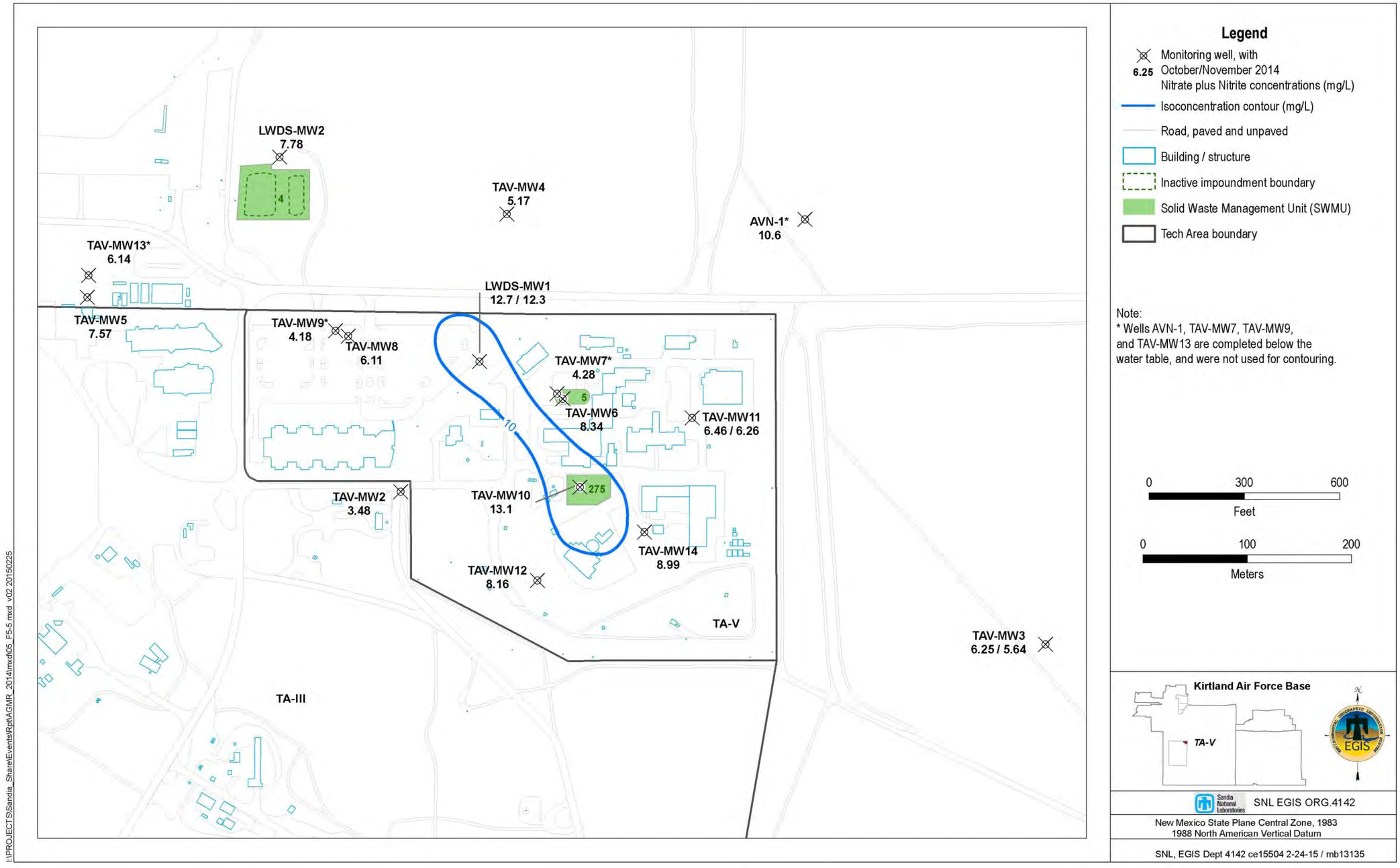


Figure 5-5. Distribution of Nitrate plus Nitrite in Groundwater at TAVG AOC, October/November 2014

Groundwater characterization at TA-V was initiated to satisfy the requirements of the SNL/NM RCRA Permit for characterization of SWMUs associated with TA-V activities (NMED 1993). The groundwater monitoring activities at TA-V 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 Consent 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 Consent Order. All corrective action requirements pertaining to the TAVG AOC are contained in the Consent Order (NMED April 2004). The TAVG AOC investigations must comply with requirements set forth in the Consent Order for site characterization and development of a CME (NMED April 2004).

DOE/NNSA and Sandia continue to present the TAVG monitoring 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 Consent Order.

In this report TAVG monitoring data are presented for both hazardous and radioactive constituents; however, the analytical data for radionuclides (gamma spectroscopy short-list, gross alpha, gross beta, 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 Consent Order. Additional information on radionuclides and the scope of the Consent Order is available in Section III.A of the Consent Order (NMED April 2004).

5.3 Scope of Activities

The activities for the TAVG monitoring for CY 2014, including plans and reports, are listed in Section 5.1.5. The field activities included groundwater level measurements and groundwater sampling. The CY 2014 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.

Quality control (QC) samples are collected in the field at the time of environmental sample collection. Field QC samples are used to monitor the sampling process and include duplicate environmental, equipment blank (EB), field blank (FB), and trip blank (TB). 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. Both duplicate environmental and EB samples are analyzed for the same parameters as environmental samples. 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 also collected for VOCs to determine whether contamination of the samples had resulted during preparation, transportation, or handling prior to receipt by the analytical laboratory.

Table 5-4. Groundwater Monitoring Well Network and Sampling Dates for the TAVG AOC, Calendar Year 2014

Date of Sampling Event	Wells Sampled	SAP
February/March 2014	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 2014* (SNL January 2014)
April/May 2014	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 2014* (SNL April 2014)
July/August/September 2014	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 2014* (SNL July 2014)
October/November 2014	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 2015* (SNL September 2014a)

NOTES:
AOC = Area of Concern.
AVN = Area V (North).
LWDS = Liquid Waste Disposal System.
MW = Monitoring well.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories.
TAV = Technical Area-V (monitoring well designation)
TAVG = Technical Area-V Groundwater.

Table 5-5. Parameters Sampled at TAVG Monitoring Wells for Each Sampling Event, Calendar Year 2014

Parameter	February/March 2014	Parameter	April/May 2014
Alkalinity	AVN-1	Alkalinity	AVN-1
Calcium, total	LWDS-MW1	Anions (Bromide, Chloride, Fluoride, Sulfate)	LWDS-MW1
Chloride	LWDS-MW2	NPN	LWDS-MW2
Iron, dissolved	TAV-MW2	Radionuclides (Gamma Spec*, Gross Alpha, Gross Beta, Tritium)	TAV-MW2
Magnesium, total	TAV-MW4	Sulfides	TAV-MW3
Manganese, dissolved	TAV-MW6	TAL Metals plus Total Uranium	TAV-MW4
NPN	TAV-MW8	Total Organic Carbon	TAV-MW4 (dup)
Potassium, total	TAV-MW8 (dup)	VOCs	TAV-MW5
Sodium, total	TAV-MW10		TAV-MW5 (dup)
Sulfate	TAV-MW10 (dup)		TAV-MW6
Sulfides	TAV-MW11		TAV-MW7
Total Organic Carbon	TAV-MW12		TAV-MW8
VOCs	TAV-MW13		TAV-MW9
	TAV-MW14		TAV-MW10
			TAV-MW11
			TAV-MW12
			TAV-MW13
			TAV-MW14
			TAV-MW14 (dup)
Parameter	**July/August/September 2014**	**Parameter**	**October/November 2014**
Alkalinity	AVN-1	Alkalinity	AVN-1
Calcium, total	AVN-1 (dup)	Calcium, total	LWDS-MW1
Chloride	LWDS-MW1	Chloride	LWDS-MW1 (dup)
Iron, dissolved	LWDS-MW2	Iron, dissolved	LWDS-MW2
Magnesium, total	LWDS-MW2 (dup)	Magnesium, total	TAV-MW2
Manganese, dissolved	TAV-MW2	Manganese, dissolved	TAV-MW3
NPN	TAV-MW4	NPN	TAV-MW3 (dup)
Potassium, total	TAV-MW6	Potassium, total	TAV-MW4
Sodium, total	TAV-MW8	Sodium, total	TAV-MW5
Sulfate	TAV-MW10	Sulfate	TAV-MW6
Sulfides	TAV-MW11	Sulfides	TAV-MW7
Total Organic Carbon	TAV-MW12	Total Organic Carbon	TAV-MW8
VOCs	TAV-MW13	VOCs	TAV-MW9
	TAV-MW14		TAV-MW10
			TAV-MW11
			TAV-MW11 (dup)
			TAV-MW12
			TAV-MW13
			TAV-MW14 (dup for VOCs only)

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)
TAVG = Technical Area-V Groundwater.
VOC = Volatile organic compound.

5.4 Field Methods and Measurements

The monitoring procedures conducted for TAVG monitoring are described in detail in Section 1.3. The water level information obtained in 2014 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 TAVG AOC that exceed regulatory standards. The analytical results and field measurements for all TAVG 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 MDLs in groundwater samples from TA-V monitoring wells include the following:

- Acetone
- Chloroform
- Chloromethane
- cis-1,2-Dichloroethene
- 1,2,3-Trichlorobenzene
- 1,2,4-Trichlorobenzene
- TCE

Seven VOCs were detected during CY 2014. Three of these VOCs have promulgated MCLs. Only TCE exceeds its MCL of 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 22.4 μg/L in the sample collected from monitoring well LWDS-MW1 in March 2014. Figures 5B-1 through 5B-5 (Attachment 5B) present TCE concentrations over the lifetime of the five wells. The highest concentrations of TCE have been consistently detected in monitoring well LWDS-MW1, followed by TAV-MW6 and TAV-MW10, then by TAV-MW12 and TAV-MW14.

Two anomalies for TCE occurred in CY 2014. TCE was not detected above the MDL (0.300 μg/L) in the environmental sample collected from monitoring well TAV-MW14 in August, and it was not detected in the environmental sample collected from monitoring well TAV-MW6 in November; both wells have historically had TCE concentrations above the MCL. An environmental duplicate was collected from monitoring well TAV-MW14 in November and analyzed for VOCs; TCE was detected at concentrations comparable to historical values in the November environmental sample (6.43 μg/L) and duplicate sample (6.53 μg/L). The historical range of TCE concentrations for well TAV-MW6 is shown in Figure 5B-2; the well is continually sampled quarterly.

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 14.6 mg/L in the sample collected from monitoring well TAV-MW10 in

August 2014. Figures 5B-6 through 5B-8 (Attachment 5B) present NPN concentrations over the lifetime of the three wells. The NPN concentrations in monitoring wells LWDS-MW1 and TAV-MW10 typically have exceeded the MCL, and those in monitoring well AVN-1 occasionally exceeded 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. SNL/NM personnel requested a reanalysis of alkalinity for the environmental sample from monitoring well TAV-MW8 collected in May 2014. Alkalinity was reported at 83.9 mg/L and significantly less than the historical average; the reanalysis reported alkalinity at 189 mg/L. The original result was qualified as unusable during data validation, and both original and reanalysis data are provided in Table 5A-4.

Total organic carbon (TOC) results are presented in Table 5A-5 (Attachment 5A); no MCL is established for TOC.

Unfiltered metal results are presented in Table 5A-6 and filtered metal results are presented in Table 5A-7; no metal results exceed established MCLs (Attachment 5A).

Gamma spectroscopy short-list, gross alpha, gross beta, and tritium results are presented in Table 5A-8; all radionuclide results are below established MCLs (Attachment 5A). Gross alpha activity is measured as a radiological screening tool and in accordance with 40 Code of Federal Regulations; Parts 9, 141, and 142; and Table I-4 should not include uranium. Naturally occurring uranium is measured independently (i.e., total uranium concentration determined by metals analysis described above) and the gross alpha activity measurements are corrected by subtracting the total uranium activity from the uncorrected gross alpha activity results. Radiological results are further reviewed by an SNL/NM Health Physicist to assure that the samples are nonradioactive. SNL/NM personnel requested a reanalysis by gamma spectroscopy for the environmental sample from monitoring well TAV-MW11 collected in May 2014. The original activities were reported as negative values and greater than twice the associated minimum detectable activity. The gamma spectroscopy reanalysis results were reported within acceptable limits, and both original and reanalysis data are provided in Table 5A-8.

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, turbidity, and dissolved oxygen. The parameter measurements 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 environmental 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 the following:

- Iron in the sample collected from monitoring well TAV-MW8 in February 2014 (Table 5A-7) had a calculated RPD of 87. However, the iron concentration is considered to be an estimated value due to poor replicate precision.

- Chromium in the sample collected from monitoring well TAV-MW5 in May 2014 (Table 5A-7) had a calculated RPD of 37. However, the chromium concentration is considered to be an estimated value because the reported values are less than the associated practical quantitation limit.

The results for the EB analyses are as follows:

- **February/March 2014 Sampling Event**—EB samples were collected prior to sampling monitoring wells TAV-MW8 and TAV-MW10 and submitted for all analyses. Bromodichloromethane, bromoform, chloride, chloroform, dibromochloromethane, magnesium, manganese, and TOC were detected in the EB samples. No corrective action was required for bromodichloromethane, bromoform, chloride, chloroform, dibromochloromethane, magnesium, or manganese, because these parameters were either not detected in environmental samples or the reported values in the environmental samples are greater than five times the EB concentration. TOC was detected in all EB samples at concentrations less than five times the associated environmental samples. TOC in TAV-MW8 and TAV-MW10 were qualified as not detected during data validation due to EB contamination.

- **April/May 2014 Sampling Event**—EB samples were collected prior to sampling monitoring wells TAV-MW4, TAV-MW5, and TAV-MW14 and submitted for all analyses. Bromodichloromethane, bromoform, cadmium, carbon disulfide, chloride, chloroform, copper, dibromochloromethane, 1,2-dichloroethene, manganese, sodium, TOC, and zinc were detected in EB samples. No corrective action was required because these parameters were either not detected in environmental samples or the reported values in environmental samples are greater than five times the EB concentration, except for copper, TOC, and manganese. Copper in all EB samples, TOC in the TAV-MW5 EB sample, and manganese in the TAV-MW14 EB sample were reported at concentrations within five times the associated environmental samples. As a result, these parameters were qualified as not detected during data validation in associated environmental samples for wells identified above.

- **July/August/September 2014 Sampling Event**—EB samples were collected prior to sampling monitoring wells AVN-1 and LWDS-MW2 and submitted for all analyses. Acetone, bromodichloromethane, calcium, chloroform, and TOC were detected in EB samples. No corrective action was required for acetone, bromodichloromethane, calcium, or chloroform, because these parameters were either not detected in environmental samples or the reported values in environmental samples are greater than five times the EB concentration. TOC was detected in the first analysis out of four analyses in both EB samples at concentrations less than five times the associated environmental samples. TOC in AVN-1 and LWDS-MW1 were qualified as not detected during data validation due to EB contamination.

- **October/November 2014 Sampling Event**—EB samples were collected prior to sampling monitoring wells LWDS-MW1, TAV-MW3, TAV-MW11, and TAV-MW14 and submitted for all analyses, except at TAV-MW14. Only VOCs were analyzed in the EB sample associated with TAV-MW14. Bromodichloromethane, chloroform, and dibromochloromethane were detected in TAV-MW3, TAV-MW11, and TAV-MW14 EB samples. Additional parameters detected in the LWDS-MW1 EB sample included acetone, bromoform, chloride, and sulfate. Sodium was also detected in the TAV-MW11 EB sample. No corrective action was required because all parameters were either not detected

in associated environmental samples, or the reported values in environmental samples are greater than five times the EB concentration.

The results for the FB analyses are as follows:

- **February/March 2014 Sampling Event**—FB samples were collected at monitoring wells LWDS-MW2, TAV-MW11, and TAV-MW12. The compounds detected in FB samples included bromodichloromethane, bromoform, chloroform, and dibromochloromethane. No corrective action was required because these compounds were not detected in associated environmental samples.

- **April/May 2014 Sampling Event**—FB samples were collected at monitoring wells TAV-MW3, TAV-MW7, and TAV-MW9. The compounds detected in FB samples included acetone, bromodichloromethane, chloroform, dibromochloromethane, methyl acetate, and 1,2-dichloroethene. No corrective action was required because these compounds were not detected in associated environmental samples.

- **July/August/September 2014 Sampling Event**—FB samples were collected at monitoring wells AVN-1, TAV-MW4, and TAV-MW6. The compounds detected in FB samples included acetone, bromodichloromethane, chloroform, and dibromochloromethane. No corrective action was required because these compounds were not detected in associated environmental samples.

- **October/November 2014 Sampling Event**—FB samples were collected at TAV-MW6, TAV-MW10, and TAV-MW12. The compounds detected in FB samples included bromodichloromethane, bromoform, chloroform, and dibromochloromethane. No corrective action was required because these compounds were not detected in associated environmental samples.

The results for the TB analyses are as follows:

- **February/March 2014 Sampling Event**—A total of 14 VOC TB samples were submitted with the February/March 2014 samples. No VOCs were detected above associated laboratory MDLs.

- **April/May 2014 Sampling Event**—A total of 19 VOC TB samples were submitted with the April/May 2014 samples. No VOCs were detected above associated laboratory MDLs, except carbon disulfide. Carbon disulfide was detected in TAV-MW5 and TAV-MW13 TB samples. No corrective action was required, because this compound was not detected in associated environmental samples.

- **July/August/September 2014 Sampling Event**—A total of 14 VOC TB samples were submitted with the July/August/September 2014 samples. No VOCs were detected above associated laboratory MDLs.

- **October/November 2014 Sampling Event**—A total of 20 VOC TB samples were submitted with October/November 2014 samples. No VOCs were detected above associated laboratory MDLs, except acetone. Acetone was detected in the TB sample associated with well TAV-MW5. Acetone was detected at a concentration less than five times the environmental sample; therefore, the environmental sample was qualified as not detected during data validation.

5.8 Variances and Nonconformances

No variances or nonconformances from requirements specified in the TAVG monitoring mini-SAPs (SNL January 2014, SNL April 2014, SNL July 2014, and SNL September 2014a) were identified during CY 2014 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 2014 Sampling Event**—Per compliance with the revised Work Planning and Control requirements, incorporating Engineered Safety principles at SNL/NM, authorization from TA-V Operations Management is required to perform work inside the technical area from this point on.

- **April/May 2014 Sampling Event**—The NMED DOE Oversight Bureau (OB) collected split samples at monitoring wells AVN-1, LWDS-MW1, LWDS-MW2, TAV-MW2, TAV-MW6, TAV-MW8, TAV-MW9, TAV-MW13, and TAV-MW14. The NMED DOE OB analytical results are not reported in this document, but are available through DOE/NNSA Sandia Field Office. The SNL/NM sampling team noted a strong odor (similar to mildew or rotten eggs) and a yellow coloration of groundwater collected from monitoring well TAV-MW9. At monitoring well AVN-1, rust particulates accumulated on the sample pump and tubing bundle during sampling. Several metal concentrations are increasing in AVN-1 groundwater samples. This increasing trend is probably associated with the degradation of the stainless steel screen at well AVN-1.

- **July/August/September 2014 Sampling Event**—A new tubing bundle and sample pump were used during this monitoring event. Monitoring well TAV-MW12 was purged an additional 9 gallons of groundwater prior to sampling due to unstable turbidity measurements. Sampling at monitoring well TAV-MW2 was delayed until September 9, 2014 due to road construction modifications near the monitoring well.

- **October/November 2014 Sampling Event**—Rust particulates accumulated on the sample pump and tubing bundle during sampling of monitoring wells AVN-1 and LWDS-MW2. Both monitoring wells have stainless steel screens.

5.9 Summary and Conclusions

The conceptual site model of contaminant transport at TA-V includes contaminant releases from the two primary sources, migration through the vadose zone, and movement into and along with groundwater. TCE was presumably present in wastewater that was discharged to the underground LWDS drain field during the period from 1962 to 1967, and to the buried 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 TCE and other organic chemicals moved downward through the alluvial-fan lithofacies and into the regional aquifer. Wastewater containing no TCE continued to flush the vadose zone beneath the seepage pits until 1992, which most likely removed significant portion of a secondary contaminant sources. Upon cessation of wastewater disposal, drainage diminished in vertical pathways through the vadose zone. Low concentrations of TCE present in the regional aquifer today represent the wastewater releases before 1992. The combined effect of low groundwater velocities,

dispersion, diffusion, and sorption 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 22.4 μg/L in the sample collected from monitoring well LWDS-MW1 in March 2014.

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 14.6 mg/L in the sample collected from monitoring well TAV-MW10 in August 2014.

The analytical results for this reporting period are consistent with historical values. The following conclusions are based on a comprehensive review of available information for current groundwater contamination conditions in the TAVG AOC:

- The primary COCs for the TAVG AOC are TCE and nitrate.
- The primary sources of TCE and possibly nitrate in the TAVG AOC consist of two wastewater disposal systems; the LWDS drain field (SWMU 5) and the TA-V seepage pits (SWMU 275). An upgradient source of nitrate may also be present.
- Based on the historical use and disposal of organic solvents at TA-V, the extent of TCE in groundwater is attributed to TA-V wastewater releases containing TCE and the subsequent transport of TCE through the vadose zone to the water table.
- The distribution of low concentrations of TCE in the regional aquifer at TA-V has remained relatively stable and is attributed to the combined effect of low groundwater velocities, dispersion, diffusion, and sorption.
- The distribution of nitrate concentrations above background level is laterally widespread in the area, both inside and outside the TA-V boundary. The extent of the 10 mg/L concentration contour in 2014, which accounts for the nitrate contamination within TA-V, has remained relatively stable. An unknown upgradient source probably contributes to the nitrate in the two AVN wells to the northeast of TA-V.

Ongoing environmental studies of the TAVG AOC include the following:

- Continue obtaining periodic measurements of groundwater elevations in all TAVG monitoring wells.
- Continue collecting groundwater samples at the 16 TAVG monitoring wells. At a minimum, the analytes for groundwater sampling will consist of VOCs and NPN.
- Continue reporting TAVG monitoring results in future SNL/NM Annual Groundwater Monitoring Reports.

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 September 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 November 2014a U.S. Department of Energy (DOE), November 2014. *Request for Extension for Submittal of the Technical Area-V Groundwater Corrective Measures Evaluation Report and the Current Conceptual Model, Sandia National Laboratories, EPA ID# NM5890110518*, U.S. Department of Energy, National Nuclear Security Administration, Sandia Field Office, Albuquerque, New Mexico, November 24, 2014.

DOE November 2014b U.S. Department of Energy (DOE), November 2014. *Internal Remedy Review Team Recommendations regarding the Burn Site and Technical Area-V Groundwater Areas of Concern, Sandia National Laboratories, Albuquerque, New Mexico*, memorandum from Steven Golian, Chair, Office of Environmental Management Internal Remedy Reviews, Office of Environmental Compliance, to Mark Gilbertson, Deputy Assistant Secretary, Office of Environmental Compliance, Washington DC, November 18, 2014.

DOE September 2014 U.S. Department of Energy (DOE), September 2014. *Internal Remedy Review of the Technical Area-V Groundwater Study Site, Sandia National Laboratories, Albuquerque, New Mexico*, memorandum from Steven Golian, Chair, Office of Environmental Management Internal Remedy Reviews, Office of Environmental Compliance, to Geoffrey Beausoleil, Manager, National Nuclear Security Administration, Sandia Field Office, Washington DC, September 11, 2014.

DOE December 2013 U.S. Department of Energy (DOE), December 2013. *Notification on the Status of the Technical Area-V Groundwater Corrective Measures Evaluation Report and the Current Conceptual Model, Sandia National Laboratories, EPA ID# NM5890110518*, U.S. Department of Energy, National Nuclear Security Administration, Sandia Field Office, Albuquerque, New Mexico, December 5, 2013.

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.

Madrid et al. June 2013 Madrid, V., Singleton, M.J., Visser, A., and Esser, B.K., June 2013. *Summary of Isotopic Data and Preliminary Interpretation of Denitrification and Age-dating for Groundwater Samples from Three Sites at Sandia National Laboratories, New Mexico*, a report to Sandia National Laboratories/New Mexico, Lawrence Livermore National Laboratory, LLNL-SR-636381.

NMED December 2013 New Mexico Environment Department (NMED), December 2013. *Technical Area-V Groundwater Corrective Measures Evaluation Report and Current Conceptual Model, Letter of December 5, 2013, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-05-027*, New Mexico Environment Department, Santa Fe, New Mexico, December 17, 2013.

NMED September 2013 New Mexico Environment Department (NMED), December 2013. *Notice of Approval: Summary Report for Technical Area-V Installation of Groundwater Monitoring Wells TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14 and Installation of Soil Vapor Monitoring Wells TAV-SV01, TAV-SV02, and TAV-SV03, June 2011*, New Mexico Environment Department, Santa Fe, New Mexico, September 3, 2013.

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 2014a Sandia National Laboratories, New Mexico (SNL/NM), September 2014. *TA-V Groundwater Monitoring Mini-SAP for First Quarter, Fiscal Year 2015*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico

SNL September 2014b Sandia National Laboratories, New Mexico (SNL/NM), September 2014. *2013 Annual Site Environmental Report for Sandia National Laboratories, New Mexico*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL July 2014 Sandia National Laboratories, New Mexico (SNL/NM), July 2014. *TA-V Groundwater Monitoring Mini-SAP for Fourth Quarter, Fiscal Year 2014*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2014 Sandia National Laboratories, New Mexico (SNL/NM), June 2014. *Annual Groundwater Monitoring Report, Calendar Year 2013, Long-Term Stewardship Consolidated Groundwater Monitoring Program,* Long-Term Stewardship and Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL April 2014 Sandia National Laboratories, New Mexico (SNL/NM), April 2014. *TA-V Groundwater Monitoring Mini-SAP for Third Quarter, Fiscal Year 2014*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL January 2014 Sandia National Laboratories, New Mexico (SNL/NM), January 2014. *TA-V Groundwater Monitoring Mini-SAP for Second Quarter, Fiscal Year 2014*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

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 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 2014 ..... 5A-5

5A-2 Method Detection Limits for Volatile Organic Compounds (EPA Method 8260), Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 5A-8

5A-3 Summary of Nitrate Plus Nitrite Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 5A-9

5A-4 Summary of Anions, Alkalinity, and Sulfide Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 5A-13

5A-5 Summary of Total Organic Carbon Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 5A-24

5A-6 Summary of Unfiltered Metals Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 5A-35

5A-7 Summary of Filtered Metals Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2012 ..... 5A-60

5A-8 Summary of Gross Alpha, Gross Beta, Gamma Spectroscopy, and Tritium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 5A-83

5A-9 Summary of Field Water Quality Measurements, Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 5A-87

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 2014

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]
LWDS-MW1	Trichloroethene	**22.4**	0.300	1.00	5.00			095341-001	SW846-8260B
03-Mar-14	cis-1,2-Dichloroethene	4.01	0.300	1.00	70.0			095341-001	SW846-8260B
TAV-MW2 21-Feb-14	Trichloroethene	0.890	0.300	1.00	5.00	J		095326-001	SW846-8260B
TAV-MW4	Chloroform	0.940	0.300	1.00	NE	J		095328-001	SW846-8260B
24-Feb-14	Trichloroethene	3.65	0.300	1.00	5.00			095328-001	SW846-8260B
TAV-MW6	Trichloroethene	**18.8**	0.300	1.00	5.00			095346-001	SW846-8260B
05-Mar-14	cis-1,2-Dichloroethene	2.98	0.300	1.00	70.0			095346-001	SW846-8260B
TAV-MW8 25-Feb-14	Trichloroethene	3.16	0.300	1.00	5.00			095333-001	SW846-8260B
TAV-MW8 (Duplicate) 25-Feb-14	Trichloroethene	3.10	0.300	1.00	5.00			095334-001	SW846-8260B
TAV-MW10	Trichloroethene	**16.8**	0.300	1.00	5.00			095351-001	SW846-8260B
06-Mar-14	cis-1,2-Dichloroethene	2.87	0.300	1.00	70.0			095351-001	SW846-8260B
TAV-MW10 (Duplicate)	Trichloroethene	**17.5**	0.300	1.00	5.00			095352-001	SW846-8260B
06-Mar-14	cis-1,2-Dichloroethene	2.89	0.300	1.00	70.0			095352-001	SW846-8260B
TAV-MW11	Trichloroethene	3.41	0.300	1.00	5.00			095337-001	SW846-8260B
26-Feb-14	cis-1,2-Dichloroethene	0.330	0.300	1.00	70.0	J		095337-001	SW846-8260B
TAV-MW12	Trichloroethene	**11.9**	0.300	1.00	5.00			095344-001	SW846-8260B
04-Mar-14	cis-1,2-Dichloroethene	0.620	0.300	1.00	70.0	J		095344-001	SW846-8260B
TAV-MW14	Trichloroethene	**8.43**	0.300	1.00	5.00			095339-001	SW846-8260B
27-Feb-14	cis-1,2-Dichloroethene	0.890	0.300	1.00	70.0	J		095339-001	SW846-8260B
AVN-1 07-May-14	Chloromethane	0.330	0.300	1.00	NE	B, J	1.0U	095854-001	SW846-8260B
LWDS-MW1	Trichloroethene	**17.7**	0.300	1.00	5.00			095869-001	SW846-8260B
19-May-14	cis-1,2-Dichloroethene	3.47	0.300	1.00	70.0			095869-001	SW846-8260B
LWDS-MW2 09-May-14	Chloromethane	0.310	0.300	1.00	NE	B, J	1.0U	095856-001	SW846-8260B
TAV-MW2 12-May-14	Trichloroethene	1.10	0.300	1.00	5.00			095858-001	SW846-8260B
TAV-MW3 02-May-14	Chloromethane	0.310	0.300	1.00	NE	B, J	1.0U	095846-001	SW846-8260B
TAV-MW4	Chloroform	0.810	0.300	1.00	NE	J	NJ	095864-001	SW846-8260B
14-May-14	Trichloroethene	3.16	0.300	1.00	5.00			095864-001	SW846-8260B
TAV-MW4 (Duplicate)	Chloroform	0.810	0.300	1.00	NE	J	NJ	095865-001	SW846-8260B
14-May-14	Trichloroethene	3.12	0.300	1.00	5.00			095865-001	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 2014

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	**14.3**	0.300	1.00	5.00			095879-001	SW846-8260B
22-May-14	cis-1,2-Dichloroethene	2.44	0.300	1.00	70.0			095879-001	SW846-8260B
TAV-MW8 13-May-14	Trichloroethene	2.71	0.300	1.00	5.00			095860-001	SW846-8260B
TAV-MW9 05-May-14	Chloromethane	0.340	0.300	1.00	NE	B, J	1.0U	095849-001	SW846-8260B
TAV-MW10	Trichloroethene	**14.1**	0.300	1.00	5.00			095881-001	SW846-8260B
27-May-14	cis-1,2-Dichloroethene	2.21	0.300	1.00	70.0			095881-001	SW846-8260B
TAV-MW11	Trichloroethene	3.08	0.300	1.00	5.00			095867-001	SW846-8260B
15-May-14	cis-1,2-Dichloroethene	0.350	0.300	1.00	70.0	J		095867-001	SW846-8260B
TAV-MW12	Trichloroethene	**9.40**	0.300	1.00	5.00			095877-001	SW846-8260B
21-May-14	cis-1,2-Dichloroethene	0.560	0.300	1.00	70.0	J		095877-001	SW846-8260B
TAV-MW14	Trichloroethene	**6.94**	0.300	1.00	5.00			095874-001	SW846-8260B
20-May-14	cis-1,2-Dichloroethene	0.740	0.300	1.00	70.0	J		095874-001	SW846-8260B
TAV-MW14 (Duplicate)	Trichloroethene	**7.11**	0.300	1.00	5.00			095875-001	SW846-8260B
20-May-14	cis-1,2-Dichloroethene	0.830	0.300	1.00	70.0	J		095875-001	SW846-8260B
LWDS-MW1	Trichloroethene	**16.0**	0.300	1.00	5.00			096316-001	SW846-8260B
11-Aug-14	cis-1,2-Dichloroethene	3.36	0.300	1.00	70.0			096316-001	SW846-8260B
TAV-MW2 09-Sep-14	Trichloroethene	1.05	0.300	1.00	5.00			096632-001	SW846-8260B
TAV-MW4	Chloroform	0.840	0.300	1.00	NE	J		096303-001	SW846-8260B
30-Jul-14	Trichloroethene	3.26	0.300	1.00	5.00		NJ	096303-001	SW846-8260B
TAV-MW6	Trichloroethene	**13.1**	0.300	1.00	5.00		J	096312-001	SW846-8260B
06-Aug-14	cis-1,2-Dichloroethene	2.44	0.300	1.00	70.0		J	096312-001	SW846-8260B
TAV-MW8 28-Jul-14	Trichloroethene	2.75	0.300	1.00	5.00			096294-001	SW846-8260B
TAV-MW10	Trichloroethene	**13.0**	0.300	1.00	5.00		J	096314-001	SW846-8260B
07-Aug-14	cis-1,2-Dichloroethene	2.45	0.300	1.00	70.0		J	096314-001	SW846-8260B
TAV-MW11	Trichloroethene	3.39	0.300	1.00	5.00			096305-001	SW846-8260B
31-Jul-14	cis-1,2-Dichloroethene	0.370	0.300	1.00	70.0	J		096305-001	SW846-8260B
TAV-MW12	Trichloroethene	**6.43**	0.300	1.00	5.00		J	096309-001	SW846-8260B
05-Aug-14	cis-1,2-Dichloroethene	0.390	0.300	1.00	70.0	J	J	096309-001	SW846-8260B
LWDS-MW1	Trichloroethene	**16.9**	0.300	1.00	5.00			096853-001	SW846-8260B
17-Nov-14	cis-1,2-Dichloroethene	3.45	0.300	1.00	70.0	N	J-	096853-001	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 2014

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]
LWDS-MW1 (Duplicate)	Trichloroethene	**17.5**	0.300	1.00	5.00			096854-001	SW846-8260B
17-Nov-14	cis-1,2-Dichloroethene	3.57	0.300	1.00	70.0	N	J-	096854-001	SW846-8260B
TAV-MW2 04-Nov-14	Trichloroethene	1.24	0.300	1.00	5.00			096827-001	SW846-8260B
TAV-MW3 (Duplicate) 28-Oct-14	Acetone	2.54	2.50	10.0	NE	J	J+	096817-001	SW846-8260B
TAV-MW4	Chloroform	0.830	0.300	1.00	NE	J		096829-001	SW846-8260B
05-Nov-14	Trichloroethene	3.37	0.300	1.00	5.00			096829-001	SW846-8260B
TAV-MW5 24-Oct-14	Acetone	2.60	2.50	10.0	NE	J	10UJ	096809-001	SW846-8260B
TAV-MW6	1,2,3-Trichlorobenzene	0.520	0.300	1.00	NE	J		096845-001	SW846-8260B
12-Nov-14	1,2,4-Trichlorobenzene	0.360	0.300	1.00	70.0	J		096845-001	SW846-8260B
TAV-MW8 31-Oct-14	Trichloroethene	3.04	0.300	1.00	5.00			096823-001	SW846-8260B
TAV-MW9 27-Oct-14	Acetone	2.95	2.50	10.0	NE	J	J+	096811-001	SW846-8260B
TAV-MW10	Trichloroethene	**12.9**	0.300	1.00	5.00			096848-001	SW846-8260B
13-Nov-14	cis-1,2-Dichloroethene	2.58	0.300	1.00	70.0	N	J-	096848-001	SW846-8260B
TAV-MW11 06-Nov-14	Trichloroethene	3.18	0.300	1.00	5.00			096833-001	SW846-8260B
TAV-MW11 (Duplicate) 06-Nov-14	Trichloroethene	3.02	0.300	1.00	5.00			096834-001	SW846-8260B
TAV-MW12	Trichloroethene	**9.05**	0.300	1.00	5.00			096842-001	SW846-8260B
11-Nov-14	cis-1,2-Dichloroethene	0.670	0.300	1.00	70.0	J, N	J-	096842-001	SW846-8260B
TAV-MW13 23-Oct-14	Acetone	2.75	2.50	10.0	NE	J	J+	096807-001	SW846-8260B
TAV-MW14	Trichloroethene	**6.43**	0.300	1.00	5.00			096838-001	SW846-8260B
10-Nov-14	cis-1,2-Dichloroethene	0.870	0.300	1.00	70.0	J, N	J-	096838-001	SW846-8260B
TAV-MW14 (Duplicate)	Trichloroethene	**6.53**	0.300	1.00	5.00			096839-001	SW846-8260B
10-Nov-14	cis-1,2-Dichloroethene	0.900	0.300	1.00	70.0	J, N	J-	096839-001	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 2014

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	0.500	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	0.300
1,2-Dichloropropane	0.300	Methylene chloride	1.70
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	2.50	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 2014

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 19-Feb-14	Nitrate plus nitrite	10.0	0.170	0.500	10.0			095321-018	EPA 353.2
LWDS-MW1 03-Mar-14	Nitrate plus nitrite	**12.3**	0.170	0.500	10.0			095341-018	EPA 353.2
LWDS-MW2 20-Feb-14	Nitrate plus nitrite	8.35	0.170	0.500	10.0			095324-018	EPA 353.2
TAV-MW2 21-Feb-14	Nitrate plus nitrite	3.73	0.170	0.500	10.0			095326-018	EPA 353.2
TAV-MW4 24-Feb-14	Nitrate plus nitrite	6.11	0.170	0.500	10.0			095328-018	EPA 353.2
TAV-MW6 05-Mar-14	Nitrate plus nitrite	8.29	0.170	0.500	10.0			095346-018	EPA 353.2
TAV-MW8 25-Feb-14	Nitrate plus nitrite	7.10	0.170	0.500	10.0			095333-018	EPA 353.2
TAV-MW8 (Duplicate) 25-Feb-14	Nitrate plus nitrite	6.55	0.170	0.500	10.0			095334-018	EPA 353.2
TAV-MW10 06-Mar-14	Nitrate plus nitrite	**12.0**	0.170	0.500	10.0			095351-018	EPA 353.2
TAV-MW10 (Duplicate) 06-Mar-14	Nitrate plus nitrite	**13.1**	0.170	0.500	10.0			095352-018	EPA 353.2
TAV-MW11 26-Feb-14	Nitrate plus nitrite	7.21	0.170	0.500	10.0			095337-018	EPA 353.2
TAV-MW12 04-Mar-14	Nitrate plus nitrite	7.04	0.170	0.500	10.0			095344-018	EPA 353.2
TAV-MW13 18-Feb-14	Nitrate plus nitrite	5.89	0.170	0.500	10.0			095319-018	EPA 353.2
TAV-MW14 27-Feb-14	Nitrate plus nitrite	9.50	0.170	0.500	10.0			095339-018	EPA 353.2
AVN-1 07-May-14	Nitrate plus nitrite	8.87	0.170	0.500	10.0			095854-018	EPA 353.2
LWDS-MW1 19-May-14	Nitrate plus nitrite	**11.9**	0.425	1.25	10.0			095869-018	EPA 353.2
LWDS-MW2 09-May-14	Nitrate plus nitrite	7.66	0.170	0.500	10.0			095856-018	EPA 353.2
TAV-MW2 12-May-14	Nitrate plus nitrite	3.38	0.170	0.500	10.0			095858-018	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 2014

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 02-May-14	Nitrate plus nitrite	5.60	0.170	0.500	10.0			095846-018	EPA 353.2
TAV-MW4 14-May-14	Nitrate plus nitrite	5.30	0.170	0.500	10.0			095864-018	EPA 353.2
TAV-MW4 (Duplicate) 14-May-14	Nitrate plus nitrite	5.32	0.170	0.500	10.0			095865-018	EPA 353.2
TAV-MW5 01-May-14	Nitrate plus nitrite	7.35	0.425	1.25	10.0			095842-018	EPA 353.2
TAV-MW5 (Duplicate) 01-May-14	Nitrate plus nitrite	7.75	0.425	1.25	10.0			095843-018	EPA 353.2
TAV-MW6 22-May-14	Nitrate plus nitrite	7.80	0.425	1.25	10.0			095879-018	EPA 353.2
TAV-MW7 06-May-14	Nitrate plus nitrite	4.17	0.170	0.500	10.0			095852-018	EPA 353.2
TAV-MW8 13-May-14	Nitrate plus nitrite	6.31	0.170	0.500	10.0			095860-018	EPA 353.2
TAV-MW9 05-May-14	Nitrate plus nitrite	3.90	0.170	0.500	10.0			095849-018	EPA 353.2
TAV-MW10 27-May-14	Nitrate plus nitrite	**12.0**	0.170	0.500	10.0			095881-018	EPA 353.2
TAV-MW11 15-May-14	Nitrate plus nitrite	6.83	0.425	1.25	10.0			095867-018	EPA 353.2
TAV-MW12 21-May-14	Nitrate plus nitrite	7.18	0.425	1.25	10.0			095877-018	EPA 353.2
TAV-MW13 30-Apr-14	Nitrate plus nitrite	5.77	0.170	0.500	10.0			095838-018	EPA 353.2
TAV-MW14 20-May-14	Nitrate plus nitrite	9.60	0.425	1.25	10.0			095874-018	EPA 353.2
TAV-MW14 (Duplicate) 20-May-14	Nitrate plus nitrite	9.18	0.425	1.25	10.0			095875-018	EPA 353.2
AVN-1 24-Jul-14	Nitrate plus nitrite	9.51	0.170	0.500	10.0			096291-018	EPA 353.2
AVN-1 (Duplicate) 24-Jul-14	Nitrate plus nitrite	9.52	0.170	0.500	10.0			096292-018	EPA 353.2
LWDS-MW1 11-Aug-14	Nitrate plus nitrite	**11.5**	0.170	0.500	10.0			096316-018	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 2014

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 29-Jul-14	Nitrate plus nitrite	7.61	0.170	0.500	10.0			096299-018	EPA 353.2
LWDS-MW2 (Duplicate) 29-Jul-14	Nitrate plus nitrite	8.18	0.170	0.500	10.0			096300-018	EPA 353.2
TAV-MW2 09-Sep-14	Nitrate plus nitrite	3.64	0.085	0.250	10.0			096632-018	EPA 353.2
TAV-MW4 30-Jul-14	Nitrate plus nitrite	5.34	0.170	0.500	10.0			096303-018	EPA 353.2
TAV-MW6 06-Aug-14	Nitrate plus nitrite	8.75	0.850	2.50	10.0			096312-018	EPA 353.2
TAV-MW8 28-Jul-14	Nitrate plus nitrite	5.84	0.170	0.500	10.0			096294-018	EPA 353.2
TAV-MW10 07-Aug-14	Nitrate plus nitrite	**14.6**	0.850	2.50	10.0			096314-018	EPA 353.2
TAV-MW11 31-Jul-14	Nitrate plus nitrite	6.49	0.170	0.500	10.0			096305-018	EPA 353.2
TAV-MW12 05-Aug-14	Nitrate plus nitrite	6.60	0.850	2.50	10.0			096309-018	EPA 353.2
TAV-MW13 23-Jul-14	Nitrate plus nitrite	5.67	0.170	0.500	10.0			096286-018	EPA 353.2
TAV-MW14 04-Aug-14	Nitrate plus nitrite	9.90	0.850	2.50	10.0			096307-018	EPA 353.2
AVN-1 30-Oct-14	Nitrate plus nitrite	**10.6**	0.425	1.25	10.0			096821-018	EPA 353.2
LWDS-MW1 17-Nov-14	Nitrate plus nitrite	**12.7**	0.170	0.500	10.0			096853-018	EPA 353.2
LWDS-MW1 (Duplicate) 17-Nov-14	Nitrate plus nitrite	**12.3**	0.170	0.500	10.0			096854-018	EPA 353.2
LWDS-MW2 03-Nov-14	Nitrate plus nitrite	7.78	0.170	0.500	10.0			096825-018	EPA 353.2
TAV-MW2 04-Nov-14	Nitrate plus nitrite	3.48	0.170	0.500	10.0			096827-018	EPA 353.2
TAV-MW3 28-Oct-14	Nitrate plus nitrite	6.25	0.085	0.250	10.0			096816-018	EPA 353.2
TAV-MW3 (Duplicate) 28-Oct-14	Nitrate plus nitrite	5.64	0.170	0.500	10.0			096817-018	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 2014

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 05-Nov-14	Nitrate plus nitrite	5.17	0.170	0.500	10.0			096829-018	EPA 353.2
TAV-MW5 24-Oct-14	Nitrate plus nitrite	7.57	0.170	0.500	10.0			096809-018	EPA 353.2
TAV-MW6 12-Nov-14	Nitrate plus nitrite	8.34	0.170	0.500	10.0			096845-018	EPA 353.2
TAV-MW7 29-Oct-14	Nitrate plus nitrite	4.28	0.085	0.250	10.0			096819-018	EPA 353.2
TAV-MW8 31-Oct-14	Nitrate plus nitrite	6.11	0.170	0.500	10.0			096823-018	EPA 353.2
TAV-MW9 27-Oct-14	Nitrate plus nitrite	4.18	0.085	0.250	10.0			096811-018	EPA 353.2
TAV-MW10 13-Nov-14	Nitrate plus nitrite	**13.1**	0.170	0.500	10.0			096848-018	EPA 353.2
TAV-MW11 06-Nov-14	Nitrate plus nitrite	6.46	0.170	0.500	10.0			096833-018	EPA 353.2
TAV-MW11 (Duplicate) 06-Nov-14	Nitrate plus nitrite	6.26	0.170	0.500	10.0			096834-018	EPA 353.2
TAV-MW12 11-Nov-14	Nitrate plus nitrite	8.16	0.170	0.500	10.0			096842-018	EPA 353.2
TAV-MW13 23-Oct-14	Nitrate plus nitrite	6.14	0.170	0.500	10.0			096807-018	EPA 353.2
TAV-MW14 10-Nov-14	Nitrate plus nitrite	8.99	0.170	0.500	10.0			096838-018	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 2014

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	9.54	0.134	0.400	NE			095321-016	SW846 9056
19-Feb-14	Sulfate	31.1	0.266	0.800	NE			095321-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095321-029	SW846 9034
	Bicarbonate Alkalinity	148	0.725	1.00	NE			095321-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095321-022	SM 2320B
LWDS-MW1	Chloride	76.5	1.34	4.00	NE			095341-016	SW846 9056
03-Mar-14	Sulfate	39.3	2.66	8.00	NE			095341-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095341-029	SW846 9034
	Bicarbonate Alkalinity	191	0.725	1.00	NE			095341-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095341-022	SM 2320B
LWDS-MW2	Chloride	12.4	0.335	1.00	NE			095324-016	SW846 9056
20-Feb-14	Sulfate	38.6	0.665	2.00	NE			095324-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095324-029	SW846 9034
	Bicarbonate Alkalinity	150	0.725	1.00	NE			095324-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095324-022	SM 2320B
TAV-MW2	Chloride	62.0	0.670	2.00	NE			095326-016	SW846 9056
21-Feb-14	Sulfate	56.7	1.33	4.00	NE			095326-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095326-029	SW846 9034
	Bicarbonate Alkalinity	237	0.725	1.00	NE			095326-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095326-022	SM 2320B
TAV-MW4	Chloride	37.5	0.670	2.00	NE			095328-016	SW846 9056
24-Feb-14	Sulfate	33.1	1.33	4.00	NE			095328-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095328-029	SW846 9034
	Bicarbonate Alkalinity	169	0.725	1.00	NE			095328-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095328-022	SM 2320B
TAV-MW6	Chloride	73.0	1.34	4.00	NE			095346-016	SW846 9056
05-Mar-14	Sulfate	44.0	2.66	8.00	NE			095346-016	SW846 9056
	Acid Soluble Sulfides	1.20	0.835	2.50	NE	J	J-	095346-029	SW846 9034
	Bicarbonate Alkalinity	192	0.725	1.00	NE			095346-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095346-022	SM 2320B
TAV-MW8	Chloride	40.8	0.670	2.00	NE			095333-016	SW846 9056
25-Feb-14	Sulfate	52.1	1.33	4.00	NE			095333-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095333-029	SW846 9034
	Bicarbonate Alkalinity	185	0.725	1.00	NE			095333-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095333-022	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 2014

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 (Duplicate)	Chloride	40.8	0.670	2.00	NE			095334-016	SW846 9056
25-Feb-14	Sulfate	52.5	1.33	4.00	NE			095334-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095334-029	SW846 9034
	Bicarbonate Alkalinity	191	0.725	1.00	NE			095334-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095334-022	SM 2320B
TAV-MW10	Chloride	47.7	0.670	2.00	NE			095351-016	SW846 9056
06-Mar-14	Sulfate	46.4	1.33	4.00	NE			095351-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U	UJ	095351-029	SW846 9034
	Bicarbonate Alkalinity	187	0.725	1.00	NE			095351-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095351-022	SM 2320B
TAV-MW10 (Duplicate)	Chloride	47.7	0.670	2.00	NE			095352-016	SW846 9056
06-Mar-14	Sulfate	46.0	1.33	4.00	NE			095352-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U	UJ	095352-029	SW846 9034
	Bicarbonate Alkalinity	188	0.725	1.00	NE			095352-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095352-022	SM 2320B
TAV-MW11	Chloride	44.2	0.670	2.00	NE			095337-016	SW846 9056
26-Feb-14	Sulfate	42.0	1.33	4.00	NE			095337-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095337-029	SW846 9034
	Bicarbonate Alkalinity	177	0.725	1.00	NE			095337-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095337-022	SM 2320B
TAV-**MW12**	Chloride	39.8	0.670	2.00	NE			095344-016	SW846 9056
04-Mar-14	Sulfate	46.6	1.33	4.00	NE			095344-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095344-029	SW846 9034
	Bicarbonate Alkalinity	215	0.725	1.00	NE			095344-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095344-022	SM 2320B
TAV-MW13	Chloride	19.1	0.335	1.00	NE			095319-016	SW846 9056
18-Feb-14	Sulfate	51.8	0.665	2.00	NE			095319-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095319-029	SW846 9034
	Bicarbonate Alkalinity	193	0.725	1.00	NE			095319-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095319-022	SM 2320B
TAV-MW14	Chloride	51.0	0.670	2.00	NE			095339-016	SW846 9056
27-Feb-14	Sulfate	51.6	1.33	4.00	NE			095339-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095339-029	SW846 9034
	Bicarbonate Alkalinity	197	0.725	1.00	NE			095339-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095339-022	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 2014

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	0.138	0.067	0.200	NE	J		095854-016	SW846 9056
07-May-14	Chloride	9.54	0.134	0.400	NE			095854-016	SW846 9056
	Fluoride	1.28	0.033	0.100	4.0			095854-016	SW846 9056
	Sulfate	31.2	0.266	0.800	NE			095854-016	SW846 9056
	Bicarbonate Alkalinity	149	0.725	1.00	NE			095854-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095854-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095854-029	SW846 9034
LWDS-MW1	Bromide	0.815	0.067	0.200	NE			095869-016	SW846 9056
19-May-14	Chloride	76.7	1.34	4.00	NE			095869-016	SW846 9056
	Fluoride	0.544	0.033	0.100	4.0			095869-016	SW846 9056
	Sulfate	39.1	2.66	8.00	NE			095869-016	SW846 9056
	Bicarbonate Alkalinity	193	0.725	1.00	NE			095869-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095869-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095869-029	SW846 9034
LWDS-MW2	Bromide	0.152	0.067	0.200	NE	J		095856-016	SW846 9056
09-May-14	Chloride	12.6	0.335	1.00	NE			095856-016	SW846 9056
	Fluoride	1.41	0.033	0.100	4.0			095856-016	SW846 9056
	Sulfate	40.2	0.665	2.00	NE			095856-016	SW846 9056
	Bicarbonate Alkalinity	172	0.725	1.00	NE			095856-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095856-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095856-029	SW846 9034
TAV-MW2	Bromide	0.359	0.067	0.200	NE			095858-016	SW846 9056
12-May-14	Chloride	62.7	0.670	2.00	NE			095858-016	SW846 9056
	Fluoride	1.05	0.033	0.100	4.0			095858-016	SW846 9056
	Sulfate	57.9	1.33	4.00	NE			095858-016	SW846 9056
	Bicarbonate Alkalinity	243	0.725	1.00	NE			095858-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095858-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095858-029	SW846 9034
TAV-MW3	Bromide	0.211	0.067	0.200	NE			095846-016	SW846 9056
02-May-14	Chloride	21.6	0.335	1.00	NE			095846-016	SW846 9056
	Fluoride	1.68	0.033	0.100	4.0			095846-016	SW846 9056
	Sulfate	67.6	0.665	2.00	NE			095846-016	SW846 9056
	Bicarbonate Alkalinity	191	0.725	1.00	NE			095846-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095846-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095846-029	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 2014

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 14-May-14	Bromide	0.418	0.067	0.200	NE			095864-016	SW846 9056
	Chloride	40.0	0.670	2.00	NE			095864-016	SW846 9056
	Fluoride	1.23	0.033	0.100	4.0			095864-016	SW846 9056
	Sulfate	34.6	1.33	4.00	NE			095864-016	SW846 9056
	Bicarbonate Alkalinity	169	0.725	1.00	NE			095864-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095864-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095864-029	SW846 9034
TAV-MW4 (Duplicate) 14-May-14	Bromide	0.441	0.067	0.200	NE			095865-016	SW846 9056
	Chloride	39.9	0.670	2.00	NE			095865-016	SW846 9056
	Fluoride	1.25	0.033	0.100	4.0			095865-016	SW846 9056
	Sulfate	34.5	1.33	4.00	NE			095865-016	SW846 9056
	Bicarbonate Alkalinity	169	0.725	1.00	NE			095865-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095865-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095865-029	SW846 9034
TAV-MW5 01-May-14	Bromide	0.193	0.067	0.200	NE	J		095842-016	SW846 9056
	Chloride	18.1	0.335	1.00	NE			095842-016	SW846 9056
	Fluoride	1.35	0.033	0.100	4.0			095842-016	SW846 9056
	Sulfate	43.0	0.665	2.00	NE			095842-016	SW846 9056
	Bicarbonate Alkalinity	183	0.725	1.00	NE			095842-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095842-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095842-029	SW846 9034
TAV-MW5 (Duplicate) 01-May-14	Bromide	0.185	0.067	0.200	NE	J		095843-016	SW846 9056
	Chloride	18.3	0.335	1.00	NE			095843-016	SW846 9056
	Fluoride	1.33	0.033	0.100	4.0			095843-016	SW846 9056
	Sulfate	43.3	0.665	2.00	NE			095843-016	SW846 9056
	Bicarbonate Alkalinity	185	0.725	1.00	NE			095843-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095843-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095843-029	SW846 9034
TAV-MW6 22-May-14	Bromide	0.839	0.067	0.200	NE			095879-016	SW846 9056
	Chloride	73.9	1.34	4.00	NE			095879-016	SW846 9056
	Fluoride	1.07	0.033	0.100	4.0			095879-016	SW846 9056
	Sulfate	42.3	2.66	8.00	NE			095879-016	SW846 9056
	Bicarbonate Alkalinity	190	0.725	1.00	NE			095879-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095879-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095879-029	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 2014

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	Bromide	0.248	0.067	0.200	NE			095852-016	SW846 9056
06-May-14	Chloride	27.8	0.335	1.00	NE			095852-016	SW846 9056
	Fluoride	1.21	0.033	0.100	4.0			095852-016	SW846 9056
	Sulfate	65.3	0.665	2.00	NE			095852-016	SW846 9056
	Bicarbonate Alkalinity	218	0.725	1.00	NE			095852-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095852-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095852-029	SW846 9034
TAV-MW8	Bromide	0.317	0.067	0.200	NE			095860-016	SW846 9056
13-May-14	Chloride	42.4	0.670	2.00	NE			095860-016	SW846 9056
	Fluoride	1.46	0.033	0.100	4.0			095860-016	SW846 9056
	Sulfate	54.0	1.33	4.00	NE			095860-016	SW846 9056
	Bicarbonate Alkalinity (reanalysis)	189	0.725	1.00	NE	H	J	095860-R22	SM 2320B
	Bicarbonate Alkalinity	83.9	0.725	1.00	NE		R	095860-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095860-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095860-029	SW846 9034
TAV-MW9	Bromide	0.268	0.067	0.200	NE			095849-016	SW846 9056
05-May-14	Chloride	34.2	0.670	2.00	NE			095849-016	SW846 9056
	Fluoride	1.03	0.033	0.100	4.0			095849-016	SW846 9056
	Sulfate	61.5	1.33	4.00	NE			095849-016	SW846 9056
	Bicarbonate Alkalinity	230	0.725	1.00	NE			095849-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095849-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095849-029	SW846 9034
TAV-MW10	Bromide	0.361	0.067	0.200	NE			095881-016	SW846 9056
27-May-14	Chloride	48.8	0.670	2.00	NE			095881-016	SW846 9056
	Fluoride	1.49	0.033	0.100	4.0			095881-016	SW846 9056
	Sulfate	44.5	1.33	4.00	NE			095881-016	SW846 9056
	Bicarbonate Alkalinity	183	0.725	1.00	NE			095881-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095881-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095881-029	SW846 9034
TAV-MW11	Bromide	0.460	0.067	0.200	NE			095867-016	SW846 9056
15-May-14	Chloride	45.8	0.670	2.00	NE			095867-016	SW846 9056
	Fluoride	1.32	0.033	0.100	4.0			095867-016	SW846 9056
	Sulfate	43.2	1.33	4.00	NE			095867-016	SW846 9056
	Bicarbonate Alkalinity	178	0.725	1.00	NE			095867-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095867-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095867-029	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 2014

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	0.255	0.067	0.200	NE			095877-016	SW846 9056
21-May-14	Chloride	40.2	0.670	2.00	NE			095877-016	SW846 9056
	Fluoride	1.19	0.033	0.100	4.0			095877-016	SW846 9056
	Sulfate	45.4	1.33	4.00	NE			095877-016	SW846 9056
	Bicarbonate Alkalinity	209	0.725	1.00	NE			095877-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095877-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U	UJ	095877-029	SW846 9034
TAV-MW13	Bromide	0.193	0.067	0.200	NE	J		095838-016	SW846 9056
30-Apr-14	Chloride	19.5	0.335	1.00	NE			095838-016	SW846 9056
	Fluoride	1.31	0.033	0.100	4.0			095838-016	SW846 9056
	Sulfate	52.8	0.665	2.00	NE			095838-016	SW846 9056
	Bicarbonate Alkalinity	193	0.725	1.00	NE			095838-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095838-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		095838-029	SW846 9034
TAV-MW14	Bromide	0.340	0.067	0.200	NE			095874-016	SW846 9056
20-May-14	Chloride	51.7	0.670	2.00	NE			095874-016	SW846 9056
	Fluoride	1.32	0.033	0.100	4.0			095874-016	SW846 9056
	Sulfate	52.8	1.33	4.00	NE			095874-016	SW846 9056
	Bicarbonate Alkalinity	198	0.725	1.00	NE			095874-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095874-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U	UJ	095874-029	SW846 9034
TAV-MW14 (Duplicate)	Bromide	0.328	0.067	0.200	NE			095875-016	SW846 9056
20-May-14	Chloride	51.7	0.670	2.00	NE			095875-016	SW846 9056
	Fluoride	1.30	0.033	0.100	4.0			095875-016	SW846 9056
	Sulfate	52.7	1.33	4.00	NE			095875-016	SW846 9056
	Bicarbonate Alkalinity	199	0.725	1.00	NE			095875-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095875-022	SM 2320B
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U	UJ	095875-029	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 2014

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	9.65	0.134	0.400	NE			096291-016	SW846 9056
24-Jul-14	Sulfate	32.2	0.266	0.800	NE			096291-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096291-029	SW846 9034
	Bicarbonate Alkalinity	138	0.725	1.00	NE			096291-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096291-022	SM 2320B
AVN-1 (Duplicate)	Chloride	9.70	0.134	0.400	NE			096292-016	SW846 9056
24-Jul-14	Sulfate	32.4	0.266	0.800	NE			096292-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096292-029	SW846 9034
	Bicarbonate Alkalinity	137	0.725	1.00	NE			096292-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096292-022	SM 2320B
LWDS-MW1	Chloride	81.6	1.34	4.00	NE			096316-016	SW846 9056
11-Aug-14	Sulfate	41.4	2.66	8.00	NE			096316-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096316-029	SW846 9034
	Bicarbonate Alkalinity	189	0.725	1.00	NE	H	J	096316-R22	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096316-022	SM 2320B
LWDS-MW2	Chloride	12.5	0.335	1.00	NE			096299-016	SW846 9056
29-Jul-14	Sulfate	40.3	0.665	2.00	NE			096299-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096299-029	SW846 9034
	Bicarbonate Alkalinity	170	0.725	1.00	NE	H	J	096299-R22	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096299-022	SM 2320B
LWDS-MW2 (Duplicate)	Chloride	12.5	0.335	1.00	NE			096300-016	SW846 9056
29-Jul-14	Sulfate	40.2	0.665	2.00	NE			096300-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096300-029	SW846 9034
	Bicarbonate Alkalinity	168	0.725	1.00	NE	H	J	096300-R22	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096300-022	SM 2320B
TAV-MW2	Chloride	62.7	0.670	2.00	NE			096632-016	SW846 9056
09-Sep-14	Sulfate	57.8	1.33	4.00	NE			096632-016	SW846 9056
	Acid Soluble Sulfides	1.40	0.835	2.50	NE	J		096632-029	SW846 9034
	Bicarbonate Alkalinity	136	0.725	1.00	NE			096632-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096632-022	SM 2320B
TAV-MW4	Chloride	37.3	0.670	2.00	NE	H	J	096303-R16	SW846 9056
30-Jul-14	Sulfate	32.8	1.33	4.00	NE	H	J	096303-R16	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096303-029	SW846 9034
	Bicarbonate Alkalinity	170	0.725	1.00	NE	H	J	096303-R22	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096303-022	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 2014

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	Chloride	80.5	1.34	4.00	NE			096312-016	SW846 9056
06-Aug-14	Sulfate	45.6	2.66	8.00	NE			096312-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096312-029	SW846 9034
	Bicarbonate Alkalinity	189	0.725	1.00	NE	H	J	096312-R22	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096312-022	SM 2320B
TAV-MW8	Chloride	42.4	0.670	2.00	NE			096294-016	SW846 9056
28-Jul-14	Sulfate	54.1	1.33	4.00	NE			096294-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096294-029	SW846 9034
	Bicarbonate Alkalinity	184	0.725	1.00	NE	H	J	096294-R22	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096294-R22	SM 2320B
TAV-MW10	Chloride	47.5	0.670	2.00	NE	H	J	096314-R16	SW846 9056
07-Aug-14	Sulfate	44.4	1.33	4.00	NE	H	J	096314-R16	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096314-029	SW846 9034
	Bicarbonate Alkalinity	179	0.725	1.00	NE	H	J	096314-R22	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096314-022	SM 2320B
TAV-MW11	Chloride	45.7	0.670	2.00	NE	H	J	096305-R16	SW846 9056
31-Jul-14	Sulfate	41.9	1.33	4.00	NE	H	J	096305-R16	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096305-029	SW846 9034
	Bicarbonate Alkalinity	183	0.725	1.00	NE	H	J	096305-R22	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096305-22	SM 2320B
TAV-MW12	Chloride	45.2	0.670	2.00	NE			096309-016	SW846 9056
05-Aug-14	Sulfate	51.3	1.33	4.00	NE			096309-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096309-029	SW846 9034
	Bicarbonate Alkalinity	214	0.725	1.00	NE	H	J	096309-R22	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096309-022	SM 2320B
TAV-MW13	Chloride	20.3	0.335	1.00	NE			096286-016	SW846 9056
23-Jul-14	Sulfate	55.8	0.665	2.00	NE			096286-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096286-029	SW846 9034
	Bicarbonate Alkalinity	191	0.725	1.00	NE	H	J	096286-R22	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096286-022	SM 2320B
TAV-MW14	Chloride	56.1	0.670	2.00	NE			096307-016	SW846 9056
04-Aug-14	Sulfate	57.3	1.33	4.00	NE			096307-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	H, U	UJ	096307-029	SW846 9034
	Bicarbonate Alkalinity	198	0.725	1.00	NE	H	J	096307-R22	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096307-022	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 2014

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	9.46	0.134	0.400	NE			096821-016	SW846 9056
30-Oct-14	Sulfate	31.3	0.266	0.800	NE			096821-016	SW846 9056
	Acid Soluble Sulfides	1.13	0.835	2.50	NE	J	J-	096821-029	SW846 9034
	Bicarbonate Alkalinity	156	0.725	1.00	NE			096821-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096821-022	SM 2320B
LWDS-MW1	Chloride	82.0	1.34	4.00	NE			096853-016	SW846 9056
17-Nov-14	Sulfate	41.5	2.66	8.00	NE			096853-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096853-029	SW846 9034
	Bicarbonate Alkalinity	199	0.725	1.00	NE			096853-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096853-022	SM 2320B
LWDS-MW1 (Duplicate)	Chloride	81.6	1.34	4.00	NE			096854-016	SW846 9056
17-Nov-14	Sulfate	41.1	2.66	8.00	NE			096854-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096854-029	SW846 9034
	Bicarbonate Alkalinity	198	0.725	1.00	NE			096854-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096854-022	SM 2320B
LWDS-MW2	Chloride	12.0	0.335	1.00	NE			096825-016	SW846 9056
03-Nov-14	Sulfate	39.0	0.665	2.00	NE			096825-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096825-029	SW846 9034
	Bicarbonate Alkalinity	178	0.725	1.00	NE			096825-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096825-022	SM 2320B
TAV-MW2	Chloride	60.2	0.670	2.00	NE			096827-016	SW846 9056
04-Nov-14	Sulfate	56.5	1.33	4.00	NE			096827-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096827-029	SW846 9034
	Bicarbonate Alkalinity	248	0.725	1.00	NE			096827-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096827-022	SM 2320B
TAV-MW3	Chloride	21.1	0.335	1.00	NE			096816-016	SW846 9056
28-Oct-14	Sulfate	65.6	0.665	2.00	NE			096816-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096816-029	SW846 9034
	Bicarbonate Alkalinity	199	0.725	1.00	NE			096816-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096816-022	SM 2320B
TAV-MW3 (Duplicate)	Chloride	21.1	0.335	1.00	NE			096817-016	SW846 9056
28-Oct-14	Sulfate	65.8	0.665	2.00	NE			096817-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096817-029	SW846 9034
	Bicarbonate Alkalinity	197	0.725	1.00	NE			096817-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096817-022	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 2014

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	37.8	0.670	2.00	NE			096829-016	SW846 9056
05-Nov-14	Sulfate	33.2	1.33	4.00	NE			096829-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096829-029	SW846 9034
	Bicarbonate Alkalinity	178	0.725	1.00	NE			096829-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096829-022	SM 2320B
TAV-MW5	Chloride	17.2	0.335	1.00	NE			096809-016	SW846 9056
24-Oct-14	Sulfate	41.1	0.665	2.00	NE			096809-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096809-029	SW846 9034
	Bicarbonate Alkalinity	183	0.725	1.00	NE			096809-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096809-022	SM 2320B
TAV-MW6	Chloride	79.2	1.34	4.00	NE			096845-016	SW846 9056
12-Nov-14	Sulfate	44.7	2.66	8.00	NE			096845-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096845-029	SW846 9034
	Bicarbonate Alkalinity	199	0.725	1.00	NE			096845-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096845-022	SM 2320B
TAV-MW7	Chloride	28.2	0.335	1.00	NE			096819-016	SW846 9056
29-Oct-14	Sulfate	65.5	0.665	2.00	NE			096819-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U	UJ	096819-029	SW846 9034
	Bicarbonate Alkalinity	231	0.725	1.00	NE			096819-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096819-022	SM 2320B
TAV-MW8	Chloride	40.7	0.670	2.00	NE			096823-016	SW846 9056
31-Oct-14	Sulfate	51.1	1.33	4.00	NE			096823-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096823-029	SW846 9034
	Bicarbonate Alkalinity	195	0.725	1.00	NE			096823-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096823-022	SM 2320B
TAV-MW9	Chloride	32.8	0.670	2.00	NE			096811-016	SW846 9056
27-Oct-14	Sulfate	58.9	1.33	4.00	NE			096811-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096811-029	SW846 9034
	Bicarbonate Alkalinity	238	0.725	1.00	NE			096811-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096811-022	SM 2320B
TAV-MW10	Chloride	53.4	1.34	4.00	NE			096848-016	SW846 9056
13-Nov-14	Sulfate	51.2	2.66	8.00	NE			096848-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096848-029	SW846 9034
	Bicarbonate Alkalinity	194	0.725	1.00	NE			096848-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096848-022	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 2014

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	Chloride	47.4	0.670	2.00	NE			096833-016	SW846 9056
06-Nov-14	Sulfate	42.0	1.33	4.00	NE			096833-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096833-029	SW846 9034
	Bicarbonate Alkalinity	186	0.725	1.00	NE			096833-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096833-022	SM 2320B
TAV-MW11 (Duplicate)	Chloride	47.2	0.670	2.00	NE			096834-016	SW846 9056
06-Nov-14	Sulfate	42.1	1.33	4.00	NE			096834-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096834-029	SW846 9034
	Bicarbonate Alkalinity	183	0.725	1.00	NE			096834-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096834-022	SM 2320B
TAV-MW12	Chloride	42.8	0.670	2.00	NE			096842-016	SW846 9056
11-Nov-14	Sulfate	47.6	1.33	4.00	NE			096842-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096842-029	SW846 9034
	Bicarbonate Alkalinity	224	0.725	1.00	NE			096842-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096842-022	SM 2320B
TAV-MW13	Chloride	19.2	0.335	1.00	NE			096807-016	SW846 9056
23-Oct-14	Sulfate	51.2	0.665	2.00	NE			096807-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096807-029	SW846 9034
	Bicarbonate Alkalinity	196	0.725	2.00	NE			096807-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		096807-022	SM 2320B
TAV-MW14	Chloride	55.0	0.670	2.00	NE			096838-016	SW846 9056
10-Nov-14	Sulfate	55.4	1.33	4.00	NE			096838-016	SW846 9056
	Acid Soluble Sulfides	ND	0.835	2.50	NE	U		096838-029	SW846 9034
	Bicarbonate Alkalinity	205	0.725	1.00	NE			096838-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096838-022	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 2014

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	0.585	0.330	1.00	NE	J		095321-004	SW846 9060
19-Feb-14	Total Organic Carbon #2	0.652	0.330	1.00	NE	J		095321-004	SW846 9060
	Total Organic Carbon #3	0.621	0.330	1.00	NE	J		095321-004	SW846 9060
	Total Organic Carbon #4	0.425	0.330	1.00	NE	J		095321-004	SW846 9060
	Total Organic Carbon Average	0.571	0.330	1.00	NE	J		095321-004	SW846 9060
LWDS-MW1	Total Organic Carbon #1	0.911	0.330	1.00	NE	J		095341-004	SW846 9060
03-Mar-14	Total Organic Carbon #2	1.03	0.330	1.00	NE			095341-004	SW846 9060
	Total Organic Carbon #3	0.938	0.330	1.00	NE	J		095341-004	SW846 9060
	Total Organic Carbon #4	1.09	0.330	1.00	NE			095341-004	SW846 9060
	Total Organic Carbon Average	0.993	0.330	1.00	NE	J		095341-004	SW846 9060
LWDS-MW2	Total Organic Carbon #1	0.597	0.330	1.00	NE	J		095324-004	SW846 9060
20-Feb-14	Total Organic Carbon #2	0.587	0.330	1.00	NE	J		095324-004	SW846 9060
	Total Organic Carbon #3	0.614	0.330	1.00	NE	J		095324-004	SW846 9060
	Total Organic Carbon #4	0.474	0.330	1.00	NE	J		095324-004	SW846 9060
	Total Organic Carbon Average	0.568	0.330	1.00	NE	J		095324-004	SW846 9060
TAV-MW2	Total Organic Carbon #1	0.754	0.330	1.00	NE	J		095326-004	SW846 9060
21-Feb-14	Total Organic Carbon #2	0.847	0.330	1.00	NE	J		095326-004	SW846 9060
	Total Organic Carbon #3	0.771	0.330	1.00	NE	J		095326-004	SW846 9060
	Total Organic Carbon #4	0.681	0.330	1.00	NE	J		095326-004	SW846 9060
	Total Organic Carbon Average	0.763	0.330	1.00	NE	J		095326-004	SW846 9060
TAV-MW4	Total Organic Carbon #1	0.793	0.330	1.00	NE	J		095328-004	SW846 9060
24-Feb-14	Total Organic Carbon #2	0.843	0.330	1.00	NE	J		095328-004	SW846 9060
	Total Organic Carbon #3	0.830	0.330	1.00	NE	J		095328-004	SW846 9060
	Total Organic Carbon #4	0.831	0.330	1.00	NE	J		095328-004	SW846 9060
	Total Organic Carbon Average	0.824	0.330	1.00	NE	J		095328-004	SW846 9060
TAV-MW6	Total Organic Carbon #1	0.970	0.330	1.00	NE	J		095346-004	SW846 9060
05-Mar-14	Total Organic Carbon #2	0.923	0.330	1.00	NE	J		095346-004	SW846 9060
	Total Organic Carbon #3	0.967	0.330	1.00	NE	J		095346-004	SW846 9060
	Total Organic Carbon #4	0.974	0.330	1.00	NE	J		095346-004	SW846 9060
	Total Organic Carbon Average	0.959	0.330	1.00	NE	J		095346-004	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 2014

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 25-Feb-14	Total Organic Carbon #1	0.935	0.330	1.00	NE	J	3.6U	095333-004	SW846 9060
	Total Organic Carbon #2	1.02	0.330	1.00	NE		3.3U	095333-004	SW846 9060
	Total Organic Carbon #3	1.03	0.330	1.00	NE		3.4U	095333-004	SW846 9060
	Total Organic Carbon #4	0.941	0.330	1.00	NE	J	3.5U	095333-004	SW846 9060
	Total Organic Carbon Average	0.981	0.330	1.00	NE	J	3.5U	095333-004	SW846 9060
TAV-MW8 (Duplicate) 25-Feb-14	Total Organic Carbon #1	0.833	0.330	1.00	NE	J	3.6U	095334-004	SW846 9060
	Total Organic Carbon #2	0.905	0.330	1.00	NE	J	3.3U	095334-004	SW846 9060
	Total Organic Carbon #3	0.821	0.330	1.00	NE	J	3.4U	095334-004	SW846 9060
	Total Organic Carbon #4	0.797	0.330	1.00	NE	J	3.5U	095334-004	SW846 9060
	Total Organic Carbon Average	0.839	0.330	1.00	NE	J	3.5U	095334-004	SW846 9060
TAV-MW10 06-Mar-14	Total Organic Carbon #1	0.968	0.330	1.00	NE	J	3.9U	095351-004	SW846 9060
	Total Organic Carbon #2	1.09	0.330	1.00	NE		3.8U	095351-004	SW846 9060
	Total Organic Carbon #3	0.997	0.330	1.00	NE	J	3.9U	095351-004	SW846 9060
	Total Organic Carbon #4	1.04	0.330	1.00	NE		4.1U	095351-004	SW846 9060
	Total Organic Carbon Average	1.02	0.330	1.00	NE		3.9U	095351-004	SW846 9060
TAV-MW10 (Duplicate) 06-Mar-14	Total Organic Carbon #1	0.920	0.330	1.00	NE	J	3.9U	095352-004	SW846 9060
	Total Organic Carbon #2	1.00	0.330	1.00	NE		3.8U	095352-004	SW846 9060
	Total Organic Carbon #3	0.996	0.330	1.00	NE	J	3.9U	095352-004	SW846 9060
	Total Organic Carbon #4	0.902	0.330	1.00	NE	J	4.1U	095352-004	SW846 9060
	Total Organic Carbon Average	0.955	0.330	1.00	NE	J	3.9U	095352-004	SW846 9060
TAV-MW11 26-Feb-14	Total Organic Carbon #1	0.956	0.330	1.00	NE	J		095337-004	SW846 9060
	Total Organic Carbon #2	0.998	0.330	1.00	NE	J		095337-004	SW846 9060
	Total Organic Carbon #3	0.988	0.330	1.00	NE	J		095337-004	SW846 9060
	Total Organic Carbon #4	0.955	0.330	1.00	NE	J		095337-004	SW846 9060
	Total Organic Carbon Average	0.974	0.330	1.00	NE	J		095337-004	SW846 9060
TAV-MW12 04-Mar-14	Total Organic Carbon #1	0.932	0.330	1.00	NE	J		095344-004	SW846 9060
	Total Organic Carbon #2	0.993	0.330	1.00	NE	J		095344-004	SW846 9060
	Total Organic Carbon #3	0.892	0.330	1.00	NE	J		095344-004	SW846 9060
	Total Organic Carbon #4	0.958	0.330	1.00	NE	J		095344-004	SW846 9060
	Total Organic Carbon Average	0.944	0.330	1.00	NE	J		095344-004	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 2014

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 18-Feb-14	Total Organic Carbon #1	0.560	0.330	1.00	NE	J		095319-004	SW846 9060
	Total Organic Carbon #2	0.675	0.330	1.00	NE	J		095319-004	SW846 9060
	Total Organic Carbon #3	0.595	0.330	1.00	NE	J		095319-004	SW846 9060
	Total Organic Carbon #4	0.509	0.330	1.00	NE	J		095319-004	SW846 9060
	Total Organic Carbon Average	0.585	0.330	1.00	NE	J		095319-004	SW846 9060
TAV-MW14 27-Feb-14	Total Organic Carbon #1	0.876	0.330	1.00	NE	J		095339-004	SW846 9060
	Total Organic Carbon #2	1.02	0.330	1.00	NE			095339-004	SW846 9060
	Total Organic Carbon #3	0.923	0.330	1.00	NE	J		095339-004	SW846 9060
	Total Organic Carbon #4	0.859	0.330	1.00	NE	J		095339-004	SW846 9060
	Total Organic Carbon Average	0.920	0.330	1.00	NE	J		095339-004	SW846 9060
AVN-1 07-May-14	Total Organic Carbon #1	0.543	0.330	1.00	NE	J	J-	095854-004	SW846 9060
	Total Organic Carbon #2	0.601	0.330	1.00	NE	J	J-	095854-004	SW846 9060
	Total Organic Carbon #3	0.505	0.330	1.00	NE	J	J-	095854-004	SW846 9060
	Total Organic Carbon #4	0.470	0.330	1.00	NE	J	J-	095854-004	SW846 9060
	Total Organic Carbon Average	0.530	0.330	1.00	NE	J	J-	095854-004	SW846 9060
LWDS-MW1 19-May-14	Total Organic Carbon #1	0.724	0.330	1.00	NE	J		095869-004	SW846 9060
	Total Organic Carbon #2	0.762	0.330	1.00	NE	J		095869-004	SW846 9060
	Total Organic Carbon #3	0.757	0.330	1.00	NE	J		095869-004	SW846 9060
	Total Organic Carbon #4	0.735	0.330	1.00	NE	J		095869-004	SW846 9060
	Total Organic Carbon Average	0.744	0.330	1.00	NE	J		095869-004	SW846 9060
LWDS-MW2 09-May-14	Total Organic Carbon #1	0.608	0.330	1.00	NE	J	J-	095856-004	SW846 9060
	Total Organic Carbon #2	0.637	0.330	1.00	NE	J	J-	095856-004	SW846 9060
	Total Organic Carbon #3	0.589	0.330	1.00	NE	J	J-	095856-004	SW846 9060
	Total Organic Carbon #4	0.633	0.330	1.00	NE	J	J-	095856-004	SW846 9060
	Total Organic Carbon Average	0.617	0.330	1.00	NE	J	J-	095856-004	SW846 9060
TAV-MW2 12-May-14	Total Organic Carbon #1	0.539	0.330	1.00	NE	J		095858-004	SW846 9060
	Total Organic Carbon #2	0.797	0.330	1.00	NE	J		095858-004	SW846 9060
	Total Organic Carbon #3	0.551	0.330	1.00	NE	J		095858-004	SW846 9060
	Total Organic Carbon #4	0.545	0.330	1.00	NE	J		095858-004	SW846 9060
	Total Organic Carbon Average	0.608	0.330	1.00	NE	J		095858-004	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 2014

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 02-May-14	Total Organic Carbon #1	0.688	0.330	1.00	NE	J	J-	095846-004	SW846 9060
	Total Organic Carbon #2	0.657	0.330	1.00	NE	J	J-	095846-004	SW846 9060
	Total Organic Carbon #3	0.580	0.330	1.00	NE	J	J-	095846-004	SW846 9060
	Total Organic Carbon #4	0.610	0.330	1.00	NE	J	J-	095846-004	SW846 9060
	Total Organic Carbon Average	0.634	0.330	1.00	NE	J	J-	095846-004	SW846 9060
TAV-MW4 14-May-14	Total Organic Carbon #1	0.540	0.330	1.00	NE	J		095864-004	SW846 9060
	Total Organic Carbon #2	0.509	0.330	1.00	NE	J		095864-004	SW846 9060
	Total Organic Carbon #3	0.463	0.330	1.00	NE	J		095864-004	SW846 9060
	Total Organic Carbon #4	0.466	0.330	1.00	NE	J		095864-004	SW846 9060
	Total Organic Carbon Average	0.494	0.330	1.00	NE	J		095864-004	SW846 9060
TAV-MW4 (Duplicate) 14-May-14	Total Organic Carbon #1	0.501	0.330	1.00	NE	J		095865-004	SW846 9060
	Total Organic Carbon #2	0.565	0.330	1.00	NE	J		095865-004	SW846 9060
	Total Organic Carbon #3	0.481	0.330	1.00	NE	J		095865-004	SW846 9060
	Total Organic Carbon #4	0.484	0.330	1.00	NE	J		095865-004	SW846 9060
	Total Organic Carbon Average	0.508	0.330	1.00	NE	J		095865-004	SW846 9060
TAV-MW5 01-May-14	Total Organic Carbon #1	0.748	0.330	1.00	NE	J	2.4UJ	095842-004	SW846 9060
	Total Organic Carbon #2	0.698	0.330	1.00	NE	J	2.1UJ	095842-004	SW846 9060
	Total Organic Carbon #3	0.669	0.330	1.00	NE	J	1.9UJ	095842-004	SW846 9060
	Total Organic Carbon #4	0.692	0.330	1.00	NE	J	J-	095842-004	SW846 9060
	Total Organic Carbon Average	0.702	0.330	1.00	NE	J	2.0UJ	095842-004	SW846 9060
TAV-MW5 (Duplicate) 01-May-14	Total Organic Carbon #1	0.632	0.330	1.00	NE	J	2.4UJ	095843-004	SW846 9060
	Total Organic Carbon #2	0.782	0.330	1.00	NE	J	2.1UJ	095843-004	SW846 9060
	Total Organic Carbon #3	0.623	0.330	1.00	NE	J	1.9UJ	095843-004	SW846 9060
	Total Organic Carbon #4	0.600	0.330	1.00	NE	J	J-	095843-004	SW846 9060
	Total Organic Carbon Average	0.659	0.330	1.00	NE	J	2.0UJ	095843-004	SW846 9060
TAV-MW6 22-May-14	Total Organic Carbon #1	0.622	0.330	1.00	NE	J		095879-004	SW846 9060
	Total Organic Carbon #2	0.793	0.330	1.00	NE	J		095879-004	SW846 9060
	Total Organic Carbon #3	0.680	0.330	1.00	NE	J		095879-004	SW846 9060
	Total Organic Carbon #4	0.646	0.330	1.00	NE	J		095879-004	SW846 9060
	Total Organic Carbon Average	0.685	0.330	1.00	NE	J		095879-004	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 2014

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 06-May-14	Total Organic Carbon #1	0.668	0.330	1.00	NE	J	J-	095852-004	SW846 9060
	Total Organic Carbon #2	0.697	0.330	1.00	NE	J	J-	095852-004	SW846 9060
	Total Organic Carbon #3	0.628	0.330	1.00	NE	J	J-	095852-004	SW846 9060
	Total Organic Carbon #4	0.638	0.330	1.00	NE	J	J-	095852-004	SW846 9060
	Total Organic Carbon Average	0.658	0.330	1.00	NE	J	J-	095852-004	SW846 9060
TAV-MW8 13-May-14	Total Organic Carbon #1	0.521	0.330	1.00	NE	J		095860-004	SW846 9060
	Total Organic Carbon #2	0.533	0.330	1.00	NE	J		095860-004	SW846 9060
	Total Organic Carbon #3	0.477	0.330	1.00	NE	J		095860-004	SW846 9060
	Total Organic Carbon #4	0.502	0.330	1.00	NE	J		095860-004	SW846 9060
	Total Organic Carbon Average	0.508	0.330	1.00	NE	J		095860-004	SW846 9060
TAV-MW9 05-May-14	Total Organic Carbon #1	2.54	0.330	1.00	NE			095849-004	SW846 9060
	Total Organic Carbon #2	2.58	0.330	1.00	NE			095849-004	SW846 9060
	Total Organic Carbon #3	2.55	0.330	1.00	NE			095849-004	SW846 9060
	Total Organic Carbon #4	2.57	0.330	1.00	NE			095849-004	SW846 9060
	Total Organic Carbon Average	2.56	0.330	1.00	NE			095849-004	SW846 9060
TAV-MW10 27-May-14	Total Organic Carbon #1	0.586	0.330	1.00	NE	J		095881-004	SW846 9060
	Total Organic Carbon #2	0.604	0.330	1.00	NE	J		095881-004	SW846 9060
	Total Organic Carbon #3	0.586	0.330	1.00	NE	J		095881-004	SW846 9060
	Total Organic Carbon #4	0.577	0.330	1.00	NE	J		095881-004	SW846 9060
	Total Organic Carbon Average	0.588	0.330	1.00	NE	J		095881-004	SW846 9060
TAV-MW11 15-May-14	Total Organic Carbon #1	0.458	0.330	1.00	NE	J		095867-004	SW846 9060
	Total Organic Carbon #2	0.531	0.330	1.00	NE	J		095867-004	SW846 9060
	Total Organic Carbon #3	0.490	0.330	1.00	NE	J		095867-004	SW846 9060
	Total Organic Carbon #4	0.484	0.330	1.00	NE	J		095867-004	SW846 9060
	Total Organic Carbon Average	0.490	0.330	1.00	NE	J		095867-004	SW846 9060
TAV-MW12 21-May-14	Total Organic Carbon #1	0.620	0.330	1.00	NE	J		095877-004	SW846 9060
	Total Organic Carbon #2	0.765	0.330	1.00	NE	J		095877-004	SW846 9060
	Total Organic Carbon #3	0.642	0.330	1.00	NE	J		095877-004	SW846 9060
	Total Organic Carbon #4	0.688	0.330	1.00	NE	J		095877-004	SW846 9060
	Total Organic Carbon Average	0.679	0.330	1.00	NE	J		095877-004	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 2014

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 30-Apr-14	Total Organic Carbon #1	0.701	0.330	1.00	NE	J	J-	095838-004	SW846 9060
	Total Organic Carbon #2	0.778	0.330	1.00	NE	J	J-	095838-004	SW846 9060
	Total Organic Carbon #3	0.735	0.330	1.00	NE	J	J-	095838-004	SW846 9060
	Total Organic Carbon #4	0.785	0.330	1.00	NE	J	J-	095838-004	SW846 9060
	Total Organic Carbon Average	0.750	0.330	1.00	NE	J	J-	095838-004	SW846 9060
TAV-MW14 20-May-14	Total Organic Carbon #1	0.636	0.330	1.00	NE	J	1.9U	095874-004	SW846 9060
	Total Organic Carbon #2	0.609	0.330	1.00	NE	J		095874-004	SW846 9060
	Total Organic Carbon #3	0.593	0.330	1.00	NE	J		095874-004	SW846 9060
	Total Organic Carbon #4	0.583	0.330	1.00	NE	J		095874-004	SW846 9060
	Total Organic Carbon Average	0.605	0.330	1.00	NE	J		095874-004	SW846 9060
TAV-MW14 (Duplicate) 20-May-14	Total Organic Carbon #1	0.612	0.330	1.00	NE	J	1.9U	095875-004	SW846 9060
	Total Organic Carbon #2	0.719	0.330	1.00	NE	J		095875-004	SW846 9060
	Total Organic Carbon #3	0.637	0.330	1.00	NE	J		095875-004	SW846 9060
	Total Organic Carbon #4	0.664	0.330	1.00	NE	J		095875-004	SW846 9060
	Total Organic Carbon Average	0.658	0.330	1.00	NE	J		095875-004	SW846 9060
AVN-1 24-Jul-14	Total Organic Carbon #1	0.480	0.330	1.00	NE	J	1.9U	096291-004	SW846 9060
	Total Organic Carbon #2	0.597	0.330	1.00	NE	J		096291-004	SW846 9060
	Total Organic Carbon #3	0.489	0.330	1.00	NE	J		096291-004	SW846 9060
	Total Organic Carbon #4	0.509	0.330	1.00	NE	J		096291-004	SW846 9060
	Total Organic Carbon Average	0.519	0.330	1.00	NE	J		096291-004	SW846 9060
AVN-1 (Duplicate) 24-Jul-14	Total Organic Carbon #1	0.502	0.330	1.00	NE	J	1.9U	096292-004	SW846 9060
	Total Organic Carbon #2	0.568	0.330	1.00	NE	J		096292-004	SW846 9060
	Total Organic Carbon #3	0.495	0.330	1.00	NE	J		096292-004	SW846 9060
	Total Organic Carbon #4	0.463	0.330	1.00	NE	J		096292-004	SW846 9060
	Total Organic Carbon Average	0.507	0.330	1.00	NE	J		096292-004	SW846 9060
LWDS-MW1 11-Aug-14	Total Organic Carbon #1	0.385	0.330	1.00	NE	J	2.73U	096316-004	SW846 9060
	Total Organic Carbon #2	0.403	0.330	1.00	NE	J	2.73U	096316-004	SW846 9060
	Total Organic Carbon #3	0.371	0.330	1.00	NE	J	2.73U	096316-004	SW846 9060
	Total Organic Carbon #4	0.351	0.330	1.00	NE	J	2.73U	096316-004	SW846 9060
	Total Organic Carbon Average	0.377	0.330	1.00	NE	B, J	2.73U	096316-004	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 2014

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 29-Jul-14	Total Organic Carbon #1	0.474	0.330	1.00	NE	J	1.9U	096299-004	SW846 9060
	Total Organic Carbon #2	0.578	0.330	1.00	NE	J		096299-004	SW846 9060
	Total Organic Carbon #3	0.505	0.330	1.00	NE	J		096299-004	SW846 9060
	Total Organic Carbon #4	0.455	0.330	1.00	NE	J		096299-004	SW846 9060
	Total Organic Carbon Average	0.503	0.330	1.00	NE	J		096299-004	SW846 9060
LWDS-MW2 (Duplicate) 29-Jul-14	Total Organic Carbon #1	0.509	0.330	1.00	NE	J	1.9U	096300-004	SW846 9060
	Total Organic Carbon #2	0.505	0.330	1.00	NE	J		096300-004	SW846 9060
	Total Organic Carbon #3	0.463	0.330	1.00	NE	J		096300-004	SW846 9060
	Total Organic Carbon #4	0.486	0.330	1.00	NE	J		096300-004	SW846 9060
	Total Organic Carbon Average	0.491	0.330	1.00	NE	J		096300-004	SW846 9060
TAV-MW2 09-Sep-14	Total Organic Carbon #1	0.929	0.330	1.00	NE	J		096632-004	SW846 9060
	Total Organic Carbon #2	1.15	0.330	1.00	NE			096632-004	SW846 9060
	Total Organic Carbon #3	1.03	0.330	1.00	NE			096632-004	SW846 9060
	Total Organic Carbon #4	1.02	0.330	1.00	NE			096632-004	SW846 9060
	Total Organic Carbon Average	1.03	0.330	1.00	NE			096632-004	SW846 9060
TAV-MW4 30-Jul-14	Total Organic Carbon #1	0.671	0.330	1.00	NE	J		096303-004	SW846 9060
	Total Organic Carbon #2	0.753	0.330	1.00	NE	J		096303-004	SW846 9060
	Total Organic Carbon #3	0.661	0.330	1.00	NE	J		096303-004	SW846 9060
	Total Organic Carbon #4	0.671	0.330	1.00	NE	J		096303-004	SW846 9060
	Total Organic Carbon Average	0.689	0.330	1.00	NE	J		096303-004	SW846 9060
TAV-MW6 06-Aug-14	Total Organic Carbon #1	0.492	0.330	1.00	NE	J	2.3U	096312-004	SW846 9060
	Total Organic Carbon #2	0.491	0.330	1.00	NE	J	2.3U	096312-004	SW846 9060
	Total Organic Carbon #3	0.443	0.330	1.00	NE	J	2.3U	096312-004	SW846 9060
	Total Organic Carbon #4	0.440	0.330	1.00	NE	J	2.3U	096312-004	SW846 9060
	Total Organic Carbon Average	0.466	0.330	1.00	NE	B, J	2.3U	096312-004	SW846 9060
TAV-MW8 28-Jul-14	Total Organic Carbon #1	0.574	0.330	1.00	NE	J		096294-004	SW846 9060
	Total Organic Carbon #2	0.722	0.330	1.00	NE	J		096294-004	SW846 9060
	Total Organic Carbon #3	0.641	0.330	1.00	NE	J		096294-004	SW846 9060
	Total Organic Carbon #4	0.603	0.330	1.00	NE	J		096294-004	SW846 9060
	Total Organic Carbon Average	0.635	0.330	1.00	NE	J		096294-004	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 2014

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 07-Aug-14	Total Organic Carbon #1	0.529	0.330	1.00	NE	J	2.3U	096314-004	SW846 9060
	Total Organic Carbon #2	0.525	0.330	1.00	NE	J	2.3U	096314-004	SW846 9060
	Total Organic Carbon #3	0.518	0.330	1.00	NE	J	2.3U	096314-004	SW846 9060
	Total Organic Carbon #4	0.523	0.330	1.00	NE	J	2.3U	096314-004	SW846 9060
	Total Organic Carbon Average	0.524	0.330	1.00	NE	B, J	2.3U	096314-004	SW846 9060
TAV-MW11 31-Jul-14	Total Organic Carbon #1	0.455	0.330	1.00	NE	J		096305-004	SW846 9060
	Total Organic Carbon #2	0.540	0.330	1.00	NE	J		096305-004	SW846 9060
	Total Organic Carbon #3	0.448	0.330	1.00	NE	J		096305-004	SW846 9060
	Total Organic Carbon #4	0.502	0.330	1.00	NE	J		096305-004	SW846 9060
	Total Organic Carbon Average	0.486	0.330	1.00	NE	J		096305-004	SW846 9060
TAV-MW12 05-Aug-14	Total Organic Carbon #1	0.579	0.330	1.00	NE	J	2.3U	096309-004	SW846 9060
	Total Organic Carbon #2	0.624	0.330	1.00	NE	J	2.3U	096309-004	SW846 9060
	Total Organic Carbon #3	0.513	0.330	1.00	NE	J	2.3U	096309-004	SW846 9060
	Total Organic Carbon #4	0.601	0.330	1.00	NE	J	2.3U	096309-004	SW846 9060
	Total Organic Carbon Average	0.579	0.330	1.00	NE	B, J	2.3U	096309-004	SW846 9060
TAV-MW13 23-Jul-14	Total Organic Carbon #1	0.392	0.330	1.00	NE	J		096286-004	SW846 9060
	Total Organic Carbon #2	0.420	0.330	1.00	NE	J		096286-004	SW846 9060
	Total Organic Carbon #3	0.362	0.330	1.00	NE	J		096286-004	SW846 9060
	Total Organic Carbon #4	0.374	0.330	1.00	NE	J		096286-004	SW846 9060
	Total Organic Carbon Average	0.387	0.330	1.00	NE	J		096286-004	SW846 9060
TAV-MW14 04-Aug-14	Total Organic Carbon #1	0.619	0.330	1.00	NE	J	2.3U	096307-004	SW846 9060
	Total Organic Carbon #2	0.556	0.330	1.00	NE	J	2.3U	096307-004	SW846 9060
	Total Organic Carbon #3	0.548	0.330	1.00	NE	J	2.3U	096307-004	SW846 9060
	Total Organic Carbon #4	0.534	0.330	1.00	NE	J	2.3U	096307-004	SW846 9060
	Total Organic Carbon Average	0.564	0.330	1.00	NE	B, J	2.3U	096307-004	SW846 9060
AVN-1 30-Oct-14	Total Organic Carbon #1	ND	0.330	1.00	NE	U		096821-004	SW846 9060
	Total Organic Carbon #2	ND	0.330	1.00	NE	U		096821-004	SW846 9060
	Total Organic Carbon #3	ND	0.330	1.00	NE	U		096821-004	SW846 9060
	Total Organic Carbon #4	ND	0.330	1.00	NE	U		096821-004	SW846 9060
	Total Organic Carbon Average	ND	0.330	1.00	NE	U		096821-004	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 2014

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 17-Nov-14	Total Organic Carbon #1	0.497	0.330	1.00	NE	J	2.41U	096853-004	SW846 9060
	Total Organic Carbon #2	0.553	0.330	1.00	NE	J	2.41U	096853-004	SW846 9060
	Total Organic Carbon #3	0.559	0.330	1.00	NE	J	2.41U	096853-004	SW846 9060
	Total Organic Carbon #4	0.485	0.330	1.00	NE	J	2.41U	096853-004	SW846 9060
	Total Organic Carbon Average	0.524	0.330	1.00	NE	J	2.41U	096853-004	SW846 9060
LWDS-MW1 (Duplicate) 17-Nov-14	Total Organic Carbon #1	0.536	0.330	1.00	NE	J	J-	096854-004	SW846 9060
	Total Organic Carbon #2	0.712	0.330	1.00	NE	J	J-	096854-004	SW846 9060
	Total Organic Carbon #3	0.610	0.330	1.00	NE	J	J-	096854-004	SW846 9060
	Total Organic Carbon #4	0.646	0.330	1.00	NE	J	J-	096854-004	SW846 9060
	Total Organic Carbon Average	0.626	0.330	1.00	NE	J	J-	096854-004	SW846 9060
LWDS-MW2 03-Nov-14	Total Organic Carbon #1	0.410	0.330	1.00	NE	J		096825-004	SW846 9060
	Total Organic Carbon #2	0.621	0.330	1.00	NE	J		096825-004	SW846 9060
	Total Organic Carbon #3	0.437	0.330	1.00	NE	J		096825-004	SW846 9060
	Total Organic Carbon #4	0.495	0.330	1.00	NE	J		096825-004	SW846 9060
	Total Organic Carbon Average	0.491	0.330	1.00	NE	J		096825-004	SW846 9060
TAV-MW2 04-Nov-14	Total Organic Carbon #1	0.443	0.330	1.00	NE	J		096827-004	SW846 9060
	Total Organic Carbon #2	0.487	0.330	1.00	NE	J		096827-004	SW846 9060
	Total Organic Carbon #3	0.547	0.330	1.00	NE	J		096827-004	SW846 9060
	Total Organic Carbon #4	0.479	0.330	1.00	NE	J		096827-004	SW846 9060
	Total Organic Carbon Average	0.489	0.330	1.00	NE	J		096827-004	SW846 9060
TAV-MW3 28-Oct-14	Total Organic Carbon #1	0.375	0.330	1.00	NE	J		096816-004	SW846 9060
	Total Organic Carbon #2	0.438	0.330	1.00	NE	J		096816-004	SW846 9060
	Total Organic Carbon #3	0.363	0.330	1.00	NE	J		096816-004	SW846 9060
	Total Organic Carbon #4	0.355	0.330	1.00	NE	J		096816-004	SW846 9060
	Total Organic Carbon Average	0.383	0.330	1.00	NE	J		096816-004	SW846 9060
TAV-MW3 (Duplicate) 28-Oct-14	Total Organic Carbon #1	0.399	0.330	1.00	NE	J		096817-004	SW846 9060
	Total Organic Carbon #2	0.489	0.330	1.00	NE	J		096817-004	SW846 9060
	Total Organic Carbon #3	0.404	0.330	1.00	NE	J		096817-004	SW846 9060
	Total Organic Carbon #4	0.389	0.330	1.00	NE	J		096817-004	SW846 9060
	Total Organic Carbon Average	0.420	0.330	1.00	NE	J		096817-004	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 2014

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 05-Nov-14	Total Organic Carbon #1	0.389	0.330	1.00	NE	J		096829-004	SW846 9060
	Total Organic Carbon #2	0.400	0.330	1.00	NE	J		096829-004	SW846 9060
	Total Organic Carbon #3	0.507	0.330	1.00	NE	J		096829-004	SW846 9060
	Total Organic Carbon #4	0.371	0.330	1.00	NE	J		096829-004	SW846 9060
	Total Organic Carbon Average	0.417	0.330	1.00	NE	J		096829-004	SW846 9060
TAV-MW5 24-Oct-14	Total Organic Carbon #1	0.366	0.330	1.00	NE	J		096809-004	SW846 9060
	Total Organic Carbon #2	0.390	0.330	1.00	NE	J		096809-004	SW846 9060
	Total Organic Carbon #3	0.395	0.330	1.00	NE	J		096809-004	SW846 9060
	Total Organic Carbon #4	0.405	0.330	1.00	NE	J		096809-004	SW846 9060
	Total Organic Carbon Average	0.389	0.330	1.00	NE	J		096809-004	SW846 9060
TAV-MW6 12-Nov-14	Total Organic Carbon #1	0.588	0.330	1.00	NE	J	2.41U	096845-004	SW846 9060
	Total Organic Carbon #2	0.473	0.330	1.00	NE	J	2.41U	096845-004	SW846 9060
	Total Organic Carbon #3	0.478	0.330	1.00	NE	J	2.41U	096845-004	SW846 9060
	Total Organic Carbon #4	0.391	0.330	1.00	NE	J	2.41U	096845-004	SW846 9060
	Total Organic Carbon Average	0.482	0.330	1.00	NE	B, J	2.41U	096845-004	SW846 9060
TAV-MW7 29-Oct-14	Total Organic Carbon #1	ND	0.330	1.00	NE	U		096819-004	SW846 9060
	Total Organic Carbon #2	0.387	0.330	1.00	NE	J		096819-004	SW846 9060
	Total Organic Carbon #3	0.338	0.330	1.00	NE	J		096819-004	SW846 9060
	Total Organic Carbon #4	0.371	0.330	1.00	NE	J		096819-004	SW846 9060
	Total Organic Carbon Average	0.352	0.330	1.00	NE	J		096819-004	SW846 9060
TAV-MW8 31-Oct-14	Total Organic Carbon #1	0.445	0.330	1.00	NE	J		096823-004	SW846 9060
	Total Organic Carbon #2	0.428	0.330	1.00	NE	J		096823-004	SW846 9060
	Total Organic Carbon #3	0.489	0.330	1.00	NE	J		096823-004	SW846 9060
	Total Organic Carbon #4	0.370	0.330	1.00	NE	J		096823-004	SW846 9060
	Total Organic Carbon Average	0.433	0.330	1.00	NE	J		096823-004	SW846 9060
TAV-MW9 27-Oct-14	Total Organic Carbon #1	2.62	0.330	1.00	NE			096811-004	SW846 9060
	Total Organic Carbon #2	2.66	0.330	1.00	NE			096811-004	SW846 9060
	Total Organic Carbon #3	2.78	0.330	1.00	NE			096811-004	SW846 9060
	Total Organic Carbon #4	2.69	0.330	1.00	NE			096811-004	SW846 9060
	Total Organic Carbon Average	2.69	0.330	1.00	NE			096811-004	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 2014

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 13-Nov-14	Total Organic Carbon #1	0.483	0.330	1.00	NE	J	2.41U	096848-004	SW846 9060
	Total Organic Carbon #2	0.479	0.330	1.00	NE	J	2.41U	096848-004	SW846 9060
	Total Organic Carbon #3	0.387	0.330	1.00	NE	J	2.41U	096848-004	SW846 9060
	Total Organic Carbon #4	0.398	0.330	1.00	NE	J	2.41U	096848-004	SW846 9060
	Total Organic Carbon Average	0.437	0.330	1.00	NE	B, J	2.41U	096848-004	SW846 9060
TAV-MW11 06-Nov-14	Total Organic Carbon #1	0.404	0.330	1.00	NE	J		096833-004	SW846 9060
	Total Organic Carbon #2	0.382	0.330	1.00	NE	J		096833-004	SW846 9060
	Total Organic Carbon #3	0.467	0.330	1.00	NE	J		096833-004	SW846 9060
	Total Organic Carbon #4	0.378	0.330	1.00	NE	J		096833-004	SW846 9060
	Total Organic Carbon Average	0.408	0.330	1.00	NE	J		096833-004	SW846 9060
TAV-MW11 (Duplicate) 06-Nov-14	Total Organic Carbon #1	0.431	0.330	1.00	NE	J		096834-004	SW846 9060
	Total Organic Carbon #2	0.498	0.330	1.00	NE	J		096834-004	SW846 9060
	Total Organic Carbon #3	0.441	0.330	1.00	NE	J		096834-004	SW846 9060
	Total Organic Carbon #4	0.490	0.330	1.00	NE	J		096834-004	SW846 9060
	Total Organic Carbon Average	0.465	0.330	1.00	NE	J		096834-004	SW846 9060
TAV-MW12 11-Nov-14	Total Organic Carbon #1	0.512	0.330	1.00	NE	J	2.41U	096842-004	SW846 9060
	Total Organic Carbon #2	0.443	0.330	1.00	NE	J	2.41U	096842-004	SW846 9060
	Total Organic Carbon #3	0.478	0.330	1.00	NE	J	2.41U	096842-004	SW846 9060
	Total Organic Carbon #4	0.460	0.330	1.00	NE	J	2.41U	096842-004	SW846 9060
	Total Organic Carbon Average	0.473	0.330	1.00	NE	B, J	2.41U	096842-004	SW846 9060
TAV-MW13 23-Oct-14	Total Organic Carbon #1	0.455	0.330	1.00	NE	J		096807-004	SW846 9060
	Total Organic Carbon #2	0.455	0.330	1.00	NE	J		096807-004	SW846 9060
	Total Organic Carbon #3	0.454	0.330	1.00	NE	J		096807-004	SW846 9060
	Total Organic Carbon #4	0.408	0.330	1.00	NE	J		096807-004	SW846 9060
	Total Organic Carbon Average	0.441	0.330	1.00	NE	J		096807-004	SW846 9060
TAV-MW14 10-Nov-14	Total Organic Carbon #1	0.394	0.330	1.00	NE	J	2.41U	096838-004	SW846 9060
	Total Organic Carbon #2	0.462	0.330	1.00	NE	J	2.41U	096838-004	SW846 9060
	Total Organic Carbon #3	0.483	0.330	1.00	NE	J	2.41U	096838-004	SW846 9060
	Total Organic Carbon #4	0.412	0.330	1.00	NE	J	2.41U	096838-004	SW846 9060
	Total Organic Carbon Average	0.438	0.330	1.00	NE	B, J	2.41U	096838-004	SW846 9060

Refer to footnotes on page 5A-89.

Table 5A-6
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	42.6	0.600	2.00	NE			095321-017	SW846 6020
19-Feb-14	Magnesium	9.99	0.010	0.030	NE			095321-017	SW846 6020
	Potassium	3.46	0.080	0.300	NE			095321-017	SW846 6020
	Sodium	39.4	0.800	2.50	NE			095321-017	SW846 6020
LWDS-MW1	Calcium	65.9	0.300	1.00	NE			095341-017	SW846 6020
03-Mar-14	Magnesium	19.8	0.010	0.030	NE		J	095341-017	SW846 6020
	Potassium	3.13	0.080	0.300	NE			095341-017	SW846 6020
	Sodium	74.0	0.400	1.25	NE			095341-017	SW846 6020
LWDS-MW2	Calcium	44.1	0.600	2.00	NE			095324-017	SW846 6020
20-Feb-14	Magnesium	14.2	0.010	0.030	NE			095324-017	SW846 6020
	Potassium	2.94	0.080	0.300	NE			095324-017	SW846 6020
	Sodium	43.2	0.800	2.50	NE			095324-017	SW846 6020
TAV-MW2	Calcium	72.6	0.600	2.00	NE			095326-017	SW846 6020
21-Feb-14	Magnesium	23.8	0.010	0.030	NE			095326-017	SW846 6020
	Potassium	4.02	0.080	0.300	NE		J	095326-017	SW846 6020
	Sodium	67.5	0.800	2.50	NE			095326-017	SW846 6020
TAV-MW4	Calcium	48.7	0.600	2.00	NE			095328-017	SW846 6020
24-Feb-14	Magnesium	15.0	0.010	0.030	NE		J	095328-017	SW846 6020
	Potassium	3.32	0.080	0.300	NE			095328-017	SW846 6020
	Sodium	45.9	0.080	0.250	NE			095328-017	SW846 6020
TAV-MW6	Calcium	65.6	0.300	1.00	NE			095346-017	SW846 6020
05-Mar-14	Magnesium	21.4	0.010	0.030	NE		J	095346-017	SW846 6020
	Potassium	3.57	0.080	0.300	NE			095346-017	SW846 6020
	Sodium	67.9	0.400	1.25	NE			095346-017	SW846 6020
TAV-MW8	Calcium	55.0	0.600	2.00	NE			095333-017	SW846 6020
25-Feb-14	Magnesium	18.0	0.010	0.030	NE		J	095333-017	SW846 6020
	Potassium	4.06	0.080	0.300	NE			095333-017	SW846 6020
	Sodium	55.8	0.800	2.50	NE			095333-017	SW846 6020
TAV-MW8 (Duplicate)	Calcium	53.5	0.600	2.00	NE			095334-017	SW846 6020
25-Feb-14	Magnesium	17.7	0.010	0.030	NE		J	095334-017	SW846 6020
	Potassium	3.91	0.080	0.300	NE			095334-017	SW846 6020
	Sodium	55.6	0.800	2.50	NE			095334-017	SW846 6020
TAV-MW10	Calcium	58.7	0.300	1.00	NE			095351-017	SW846 6020
06-Mar-14	Magnesium	17.3	0.010	0.030	NE		J	095351-017	SW846 6020
	Potassium	4.43	0.080	0.300	NE			095351-017	SW846 6020
	Sodium	53.9	0.400	1.25	NE			095351-017	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 (Duplicate)	Calcium	62.6	0.300	1.00	NE			095352-017	SW846 6020
06-Mar-14	Magnesium	18.1	0.010	0.030	NE		J	095352-017	SW846 6020
	Potassium	4.29	0.080	0.300	NE			095352-017	SW846 6020
	Sodium	61.0	0.400	1.25	NE			095352-017	SW846 6020
TAV-MW11	Calcium	54.0	0.600	2.00	NE			095337-017	SW846 6020
26-Feb-14	Magnesium	17.6	0.010	0.030	NE		J	095337-017	SW846 6020
	Potassium	4.28	0.080	0.300	NE			095337-017	SW846 6020
	Sodium	55.1	0.800	2.50	NE			095337-017	SW846 6020
TAV-MW12	Calcium	59.3	0.300	1.00	NE			095344-017	SW846 6020
04-Mar-14	Magnesium	20.1	0.010	0.030	NE		J	095344-017	SW846 6020
	Potassium	3.85	0.080	0.300	NE			095344-017	SW846 6020
	Sodium	54.5	0.400	1.25	NE			095344-017	SW846 6020
TAV-MW13	Calcium	53.2	0.600	2.00	NE			095319-017	SW846 6020
18-Feb-14	Magnesium	16.0	0.010	0.030	NE			095319-017	SW846 6020
	Potassium	3.63	0.080	0.300	NE			095319-017	SW846 6020
	Sodium	53.4	0.800	2.50	NE			095319-017	SW846 6020
TAV-MW14	Calcium	59.9	0.600	2.00	NE			095339-017	SW846 6020
27-Feb-14	Magnesium	20.7	0.010	0.030	NE		J	095339-017	SW846 6020
	Potassium	4.61	0.080	0.300	NE			095339-017	SW846 6020
	Sodium	61.7	0.800	2.50	NE			095339-017	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.0571	0.015	0.050	NE			095854-009	SW846 6020
07-May-14	Antimony	ND	0.001	0.003	0.006	U		095854-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095854-009	SW846 6020
	Barium	0.084	0.0006	0.002	2.00			095854-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095854-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095854-009	SW846 6020
	Calcium	44.9	0.060	0.200	NE	B		095854-009	SW846 6020
	Chromium	0.0172	0.002	0.010	0.100			095854-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		095854-009	SW846 6020
	Copper	0.000873	0.00035	0.001	NE	J		095854-009	SW846 6020
	Iron	0.273	0.033	0.100	NE			095854-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095854-009	SW846 6020
	Magnesium	10.0	0.010	0.030	NE			095854-009	SW846 6020
	Manganese	0.00207	0.001	0.005	NE	J		095854-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095854-009	SW846 7470
	Nickel	0.0227	0.0005	0.002	NE			095854-009	SW846 6020
	Potassium	3.45	0.080	0.300	NE			095854-009	SW846 6020
	Selenium	0.00247	0.0015	0.005	0.050	J		095854-009	SW846 6020
	Silver	0.000858	0.0002	0.001	NE	J		095854-009	SW846 6020
	Sodium	38.7	0.080	0.250	NE			095854-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095854-009	SW846 6020
	Uranium	0.00225	0.000067	0.0002	0.030			095854-009	SW846 6020
	Vanadium	0.00694	0.001	0.005	NE			095854-009	SW846 6010
	Zinc	0.0116	0.0035	0.010	NE			095854-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		095869-009	SW846 6020
19-May-14	Antimony	ND	0.001	0.003	0.006	U		095869-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095869-009	SW846 6020
	Barium	0.0806	0.0006	0.002	2.00			095869-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095869-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095869-009	SW846 6020
	Calcium	70.0	0.300	1.00	NE			095869-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095869-009	SW846 6020
	Cobalt	0.000122	0.0001	0.001	NE	J		095869-009	SW846 6020
	Copper	0.000649	0.00035	0.001	NE	J		095869-009	SW846 6020
	Iron	0.172	0.033	0.100	NE			095869-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095869-009	SW846 6020
	Magnesium	20.1	0.010	0.030	NE			095869-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095869-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095869-009	SW846 7470
	Nickel	0.00142	0.0005	0.002	NE	J		095869-009	SW846 6020
	Potassium	2.98	0.080	0.300	NE			095869-009	SW846 6020
	Selenium	0.00544	0.0015	0.005	0.050			095869-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095869-009	SW846 6020
	Sodium	69.6	0.400	1.25	NE			095869-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095869-009	SW846 6020
	Uranium	0.00334	0.000067	0.0002	0.030			095869-009	SW846 6020
	Vanadium	0.00454	0.001	0.005	NE	J		095869-009	SW846 6010
	Zinc	0.00456	0.0035	0.010	NE	J		095869-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		095856-009	SW846 6020
09-May-14	Antimony	ND	0.001	0.003	0.006	U		095856-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095856-009	SW846 6020
	Barium	0.0725	0.0006	0.002	2.00			095856-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095856-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095856-009	SW846 6020
	Calcium	47.6	0.060	0.200	NE	B		095856-009	SW846 6020
	Chromium	0.00393	0.002	0.010	0.100	J		095856-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		095856-009	SW846 6020
	Copper	0.000577	0.00035	0.001	NE	J		095856-009	SW846 6020
	Iron	0.0557	0.033	0.100	NE	J		095856-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095856-009	SW846 6020
	Magnesium	13.2	0.010	0.030	NE			095856-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095856-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095856-009	SW846 7470
	Nickel	0.000632	0.0005	0.002	NE	J		095856-009	SW846 6020
	Potassium	2.82	0.080	0.300	NE			095856-009	SW846 6020
	Selenium	0.00261	0.0015	0.005	0.050	J		095856-009	SW846 6020
	Silver	0.00157	0.0002	0.001	NE			095856-009	SW846 6020
	Sodium	42.6	0.080	0.250	NE			095856-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095856-009	SW846 6020
	Uranium	0.00313	0.000067	0.0002	0.030			095856-009	SW846 6020
	Vanadium	0.00673	0.001	0.005	NE			095856-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095856-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		095858-009	SW846 6020
12-May-14	Antimony	ND	0.001	0.003	0.006	U		095858-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095858-009	SW846 6020
	Barium	0.0602	0.0006	0.002	2.00			095858-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095858-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095858-009	SW846 6020
	Calcium	74.0	0.300	1.00	NE			095858-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095858-009	SW846 6020
	Cobalt	0.000197	0.0001	0.001	NE	J		095858-009	SW846 6020
	Copper	0.000562	0.00035	0.001	NE	J		095858-009	SW846 6020
	Iron	0.180	0.033	0.100	NE			095858-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095858-009	SW846 6020
	Magnesium	21.7	0.010	0.030	NE			095858-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095858-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095858-009	SW846 7470
	Nickel	0.00149	0.0005	0.002	NE	J		095858-009	SW846 6020
	Potassium	3.56	0.080	0.300	NE			095858-009	SW846 6020
	Selenium	0.00271	0.0015	0.005	0.050	J		095858-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095858-009	SW846 6020
	Sodium	67.7	0.400	1.25	NE			095858-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095858-009	SW846 6020
	Uranium	0.0065	0.000067	0.0002	0.030			095858-009	SW846 6020
	Vanadium	0.00574	0.001	0.005	NE			095858-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095858-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.0192	0.015	0.050	NE	J		095846-009	SW846 6020
02-May-14	Antimony	ND	0.001	0.003	0.006	U		095846-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095846-009	SW846 6020
	Barium	0.0474	0.0006	0.002	2.00			095846-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095846-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095846-009	SW846 6020
	Calcium	55.3	0.600	2.00	NE	B		095846-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095846-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		095846-009	SW846 6020
	Copper	0.000391	0.00035	0.001	NE	J		095846-009	SW846 6020
	Iron	0.0763	0.033	0.100	NE	J		095846-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095846-009	SW846 6020
	Magnesium	14.3	0.010	0.030	NE			095846-009	SW846 6020
	Manganese	0.0013	0.001	0.005	NE	J		095846-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095846-009	SW846 7470
	Nickel	0.000639	0.0005	0.002	NE	J		095846-009	SW846 6020
	Potassium	4.45	0.080	0.300	NE			095846-009	SW846 6020
	Selenium	0.00284	0.0015	0.005	0.050	J		095846-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095846-009	SW846 6020
	Sodium	51.1	0.800	2.50	NE			095846-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095846-009	SW846 6020
	Uranium	0.00344	0.000067	0.0002	0.030			095846-009	SW846 6020
	Vanadium	0.0056	0.001	0.005	NE			095846-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095846-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.0399	0.015	0.050	NE	J		095864-009	SW846 6020
14-May-14	Antimony	ND	0.001	0.003	0.006	U		095864-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095864-009	SW846 6020
	Barium	0.0816	0.0006	0.002	2.00			095864-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095864-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095864-009	SW846 6020
	Calcium	48.5	0.060	0.200	NE			095864-009	SW846 6020
	Chromium	0.0258	0.002	0.010	0.100			095864-009	SW846 6020
	Cobalt	0.000128	0.0001	0.001	NE	J		095864-009	SW846 6020
	Copper	0.000509	0.00035	0.001	NE	J	0.0044U	095864-009	SW846 6020
	Iron	0.177	0.033	0.100	NE			095864-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095864-009	SW846 6020
	Magnesium	14.0	0.010	0.030	NE			095864-009	SW846 6020
	Manganese	0.00162	0.001	0.005	NE	J		095864-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095864-009	SW846 7470
	Nickel	0.00128	0.0005	0.002	NE	J		095864-009	SW846 6020
	Potassium	3.07	0.080	0.300	NE			095864-009	SW846 6020
	Selenium	0.0035	0.0015	0.005	0.050	J		095864-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095864-009	SW846 6020
	Sodium	41.7	0.080	0.250	NE			095864-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095864-009	SW846 6020
	Uranium	0.00326	0.000067	0.0002	0.030			095864-009	SW846 6020
	Vanadium	0.00683	0.001	0.005	NE			095864-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095864-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 (Duplicate)	Aluminum	0.0458	0.015	0.050	NE	J		095865-009	SW846 6020
14-May-14	Antimony	ND	0.001	0.003	0.006	U		095865-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095865-009	SW846 6020
	Barium	0.0824	0.0006	0.002	2.00			095865-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095865-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095865-009	SW846 6020
	Calcium	52.9	0.300	1.00	NE			095865-009	SW846 6020
	Chromium	0.0268	0.002	0.010	0.100			095865-009	SW846 6020
	Cobalt	0.000136	0.0001	0.001	NE	J		095865-009	SW846 6020
	Copper	0.000541	0.00035	0.001	NE	J	0.0044U	095865-009	SW846 6020
	Iron	0.191	0.033	0.100	NE			095865-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095865-009	SW846 6020
	Magnesium	14.6	0.010	0.030	NE			095865-009	SW846 6020
	Manganese	0.00184	0.001	0.005	NE	J		095865-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095865-009	SW846 7470
	Nickel	0.00126	0.0005	0.002	NE	J		095865-009	SW846 6020
	Potassium	3.08	0.080	0.300	NE			095865-009	SW846 6020
	Selenium	0.00367	0.0015	0.005	0.050	J		095865-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095865-009	SW846 6020
	Sodium	43.7	0.080	0.250	NE			095865-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095865-009	SW846 6020
	Uranium	0.00335	0.000067	0.0002	0.030			095865-009	SW846 6020
	Vanadium	0.00726	0.001	0.005	NE			095865-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095865-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.0171	0.015	0.050	NE	J		095842-009	SW846 6020
01-May-14	Antimony	ND	0.001	0.003	0.006	U		095842-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095842-009	SW846 6020
	Barium	0.0608	0.0006	0.002	2.00		J	095842-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095842-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095842-009	SW846 6020
	Calcium	48.5	0.060	0.200	NE			095842-009	SW846 6020
	Chromium	0.00347	0.002	0.010	0.100	J		095842-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		095842-009	SW846 6020
	Copper	0.000461	0.00035	0.001	NE	J	0.0035U	095842-009	SW846 6020
	Iron	0.141	0.033	0.100	NE			095842-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095842-009	SW846 6020
	Magnesium	16.5	0.050	0.150	NE			095842-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095842-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095842-009	SW846 7470
	Nickel	0.00104	0.0005	0.002	NE	J		095842-009	SW846 6020
	Potassium	2.89	0.080	0.300	NE			095842-009	SW846 6020
	Selenium	0.00252	0.0015	0.005	0.050	J		095842-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095842-009	SW846 6020
	Sodium	52.0	0.400	1.25	NE			095842-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095842-009	SW846 6020
	Uranium	0.00376	0.000067	0.0002	0.030			095842-009	SW846 6020
	Vanadium	0.00646	0.001	0.005	NE			095842-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095842-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 (Duplicate)	Aluminum	0.016	0.015	0.050	NE	J		095843-009	SW846 6020
01-May-14	Antimony	ND	0.001	0.003	0.006	U		095843-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095843-009	SW846 6020
	Barium	0.0604	0.0006	0.002	2.00		J	095843-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095843-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095843-009	SW846 6020
	Calcium	47.7	0.060	0.200	NE			095843-009	SW846 6020
	Chromium	0.00364	0.002	0.010	0.100	J		095843-009	SW846 6020
	Cobalt	0.000101	0.0001	0.001	NE	J		095843-009	SW846 6020
	Copper	0.000487	0.00035	0.001	NE	J	0.0035U	095843-009	SW846 6020
	Iron	0.140	0.033	0.100	NE			095843-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095843-009	SW846 6020
	Magnesium	14.6	0.010	0.030	NE			095843-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095843-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095843-009	SW846 7470
	Nickel	0.00106	0.0005	0.002	NE	J		095843-009	SW846 6020
	Potassium	2.89	0.080	0.300	NE			095843-009	SW846 6020
	Selenium	0.00221	0.0015	0.005	0.050	J		095843-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095843-009	SW846 6020
	Sodium	48.6	0.080	0.250	NE			095843-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095843-009	SW846 6020
	Uranium	0.00372	0.000067	0.0002	0.030			095843-009	SW846 6020
	Vanadium	0.00649	0.001	0.005	NE			095843-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095843-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.134	0.015	0.050	NE			095879-009	SW846 6020
22-May-14	Antimony	ND	0.001	0.003	0.006	U		095879-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095879-009	SW846 6020
	Barium	0.0651	0.0006	0.002	2.00			095879-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095879-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095879-009	SW846 6020
	Calcium	66.5	0.300	1.00	NE			095879-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095879-009	SW846 6020
	Cobalt	0.000153	0.0001	0.001	NE	J		095879-009	SW846 6020
	Copper	0.000492	0.00035	0.001	NE	J		095879-009	SW846 6020
	Iron	0.257	0.033	0.100	NE			095879-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095879-009	SW846 6020
	Magnesium	20.1	0.010	0.030	NE			095879-009	SW846 6020
	Manganese	0.00186	0.001	0.005	NE	J		095879-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095879-009	SW846 7470
	Nickel	0.00135	0.0005	0.002	NE	J		095879-009	SW846 6020
	Potassium	3.72	0.080	0.300	NE			095879-009	SW846 6020
	Selenium	0.00362	0.0015	0.005	0.050	J		095879-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095879-009	SW846 6020
	Sodium	65.8	0.400	1.25	NE			095879-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095879-009	SW846 6020
	Uranium	0.00392	0.000067	0.0002	0.030			095879-009	SW846 6020
	Vanadium	0.00593	0.001	0.005	NE			095879-009	SW846 6010
	Zinc	0.00635	0.0035	0.010	NE	J		095879-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.0586	0.015	0.050	NE			095852-009	SW846 6020
06-May-14	Antimony	ND	0.001	0.003	0.006	U		095852-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095852-009	SW846 6020
	Barium	0.0584	0.0006	0.002	2.00			095852-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095852-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095852-009	SW846 6020
	Calcium	59.2	0.600	2.00	NE	B		095852-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095852-009	SW846 6020
	Cobalt	0.000165	0.0001	0.001	NE	J		095852-009	SW846 6020
	Copper	0.000605	0.00035	0.001	NE	J		095852-009	SW846 6020
	Iron	0.149	0.033	0.100	NE			095852-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095852-009	SW846 6020
	Magnesium	19.0	0.010	0.030	NE			095852-009	SW846 6020
	Manganese	0.00985	0.001	0.005	NE			095852-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095852-009	SW846 7470
	Nickel	0.000998	0.0005	0.002	NE	J		095852-009	SW846 6020
	Potassium	4.22	0.080	0.300	NE			095852-009	SW846 6020
	Selenium	0.00301	0.0015	0.005	0.050	J		095852-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095852-009	SW846 6020
	Sodium	56.2	0.800	2.50	NE			095852-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095852-009	SW846 6020
	Uranium	0.00486	0.000067	0.0002	0.030			095852-009	SW846 6020
	Vanadium	0.0067	0.001	0.005	NE			095852-009	SW846 6010
	Zinc	0.00566	0.0035	0.010	NE	J		095852-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.389	0.015	0.050	NE			095860-009	SW846 6020
13-May-14	Antimony	ND	0.001	0.003	0.006	U		095860-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095860-009	SW846 6020
	Barium	0.0514	0.0006	0.002	2.00			095860-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095860-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095860-009	SW846 6020
	Calcium	56.0	0.300	1.00	NE			095860-009	SW846 6020
	Chromium	0.00287	0.002	0.010	0.100	J		095860-009	SW846 6020
	Cobalt	0.000235	0.0001	0.001	NE	J		095860-009	SW846 6020
	Copper	0.000849	0.00035	0.001	NE	J		095860-009	SW846 6020
	Iron	0.403	0.033	0.100	NE			095860-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095860-009	SW846 6020
	Magnesium	16.5	0.010	0.030	NE			095860-009	SW846 6020
	Manganese	0.00541	0.001	0.005	NE			095860-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095860-009	SW846 7470
	Nickel	0.00148	0.0005	0.002	NE	J		095860-009	SW846 6020
	Potassium	3.56	0.080	0.300	NE			095860-009	SW846 6020
	Selenium	0.00273	0.0015	0.005	0.050	J		095860-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095860-009	SW846 6020
	Sodium	51.4	0.400	1.25	NE			095860-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095860-009	SW846 6020
	Uranium	0.00368	0.000067	0.0002	0.030			095860-009	SW846 6020
	Vanadium	0.00662	0.001	0.005	NE			095860-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095860-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.020	0.015	0.050	NE	J		095849-009	SW846 6020
05-May-14	Antimony	ND	0.001	0.003	0.006	U		095849-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095849-009	SW846 6020
	Barium	0.0656	0.0006	0.002	2.00			095849-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095849-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095849-009	SW846 6020
	Calcium	64.7	0.600	2.00	NE	B		095849-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095849-009	SW846 6020
	Cobalt	0.000105	0.0001	0.001	NE	J		095849-009	SW846 6020
	Copper	0.000709	0.00035	0.001	NE	J		095849-009	SW846 6020
	Iron	0.0961	0.033	0.100	NE	J		095849-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095849-009	SW846 6020
	Magnesium	19.2	0.010	0.030	NE			095849-009	SW846 6020
	Manganese	0.0058	0.001	0.005	NE			095849-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095849-009	SW846 7470
	Nickel	0.00118	0.0005	0.002	NE	J		095849-009	SW846 6020
	Potassium	4.10	0.080	0.300	NE			095849-009	SW846 6020
	Selenium	0.0028	0.0015	0.005	0.050	J		095849-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095849-009	SW846 6020
	Sodium	56.8	0.800	2.50	NE			095849-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095849-009	SW846 6020
	Uranium	0.00535	0.000067	0.0002	0.030			095849-009	SW846 6020
	Vanadium	0.00676	0.001	0.005	NE			095849-009	SW846 6010
	Zinc	0.00392	0.0035	0.010	NE	J		095849-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		095881-009	SW846 6020
27-May-14	Antimony	ND	0.001	0.003	0.006	U		095881-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095881-009	SW846 6020
	Barium	0.0559	0.0006	0.002	2.00			095881-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095881-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095881-009	SW846 6020
	Calcium	61.8	0.300	1.00	NE			095881-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095881-009	SW846 6020
	Cobalt	0.000107	0.0001	0.001	NE	J		095881-009	SW846 6020
	Copper	0.000444	0.00035	0.001	NE	J		095881-009	SW846 6020
	Iron	0.144	0.033	0.100	NE			095881-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095881-009	SW846 6020
	Magnesium	15.6	0.010	0.030	NE			095881-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095881-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095881-009	SW846 7470
	Nickel	0.00121	0.0005	0.002	NE	J		095881-009	SW846 6020
	Potassium	4.13	0.080	0.300	NE			095881-009	SW846 6020
	Selenium	0.00245	0.0015	0.005	0.050	J		095881-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095881-009	SW846 6020
	Sodium	61.6	0.400	1.25	NE			095881-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095881-009	SW846 6020
	Uranium	0.00349	0.000067	0.0002	0.030			095881-009	SW846 6020
	Vanadium	0.00544	0.001	0.005	NE			095881-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095881-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		095867-009	SW846 6020
15-May-14	Antimony	ND	0.001	0.003	0.006	U		095867-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095867-009	SW846 6020
	Barium	0.0623	0.0006	0.002	2.00			095867-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095867-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095867-009	SW846 6020
	Calcium	54.9	0.300	1.00	NE			095867-009	SW846 6020
	Chromium	0.00348	0.002	0.010	0.100	J		095867-009	SW846 6020
	Cobalt	0.000123	0.0001	0.001	NE	J		095867-009	SW846 6020
	Copper	0.000471	0.00035	0.001	NE	J		095867-009	SW846 6020
	Iron	0.143	0.033	0.100	NE			095867-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095867-009	SW846 6020
	Magnesium	14.9	0.010	0.030	NE			095867-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095867-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095867-009	SW846 7470
	Nickel	0.00117	0.0005	0.002	NE	J		095867-009	SW846 6020
	Potassium	3.59	0.080	0.300	NE			095867-009	SW846 6020
	Selenium	0.00381	0.0015	0.005	0.050	J		095867-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095867-009	SW846 6020
	Sodium	52.2	0.400	1.25	NE			095867-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095867-009	SW846 6020
	Uranium	0.00323	0.000067	0.0002	0.030			095867-009	SW846 6020
	Vanadium	0.00593	0.001	0.005	NE			095867-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095867-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.111	0.015	0.050	NE			095877-009	SW846 6020
21-May-14	Antimony	ND	0.001	0.003	0.006	U		095877-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095877-009	SW846 6020
	Barium	0.0693	0.0006	0.002	2.00			095877-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095877-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095877-009	SW846 6020
	Calcium	60.8	0.300	1.00	NE			095877-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095877-009	SW846 6020
	Cobalt	0.000156	0.0001	0.001	NE	J		095877-009	SW846 6020
	Copper	0.000536	0.00035	0.001	NE	J		095877-009	SW846 6020
	Iron	0.234	0.033	0.100	NE			095877-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095877-009	SW846 6020
	Magnesium	19.1	0.010	0.030	NE			095877-009	SW846 6020
	Manganese	0.00323	0.001	0.005	NE	J		095877-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095877-009	SW846 7470
	Nickel	0.00128	0.0005	0.002	NE	J		095877-009	SW846 6020
	Potassium	3.79	0.080	0.300	NE			095877-009	SW846 6020
	Selenium	0.00208	0.0015	0.005	0.050	J		095877-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095877-009	SW846 6020
	Sodium	60.1	0.400	1.25	NE			095877-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095877-009	SW846 6020
	Uranium	0.00477	0.000067	0.0002	0.030			095877-009	SW846 6020
	Vanadium	0.0043	0.001	0.005	NE	J		095877-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095877-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		095838-009	SW846 6020
30-Apr-14	Antimony	ND	0.001	0.003	0.006	U		095838-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095838-009	SW846 6020
	Barium	0.055	0.0006	0.002	2.00		J	095838-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095838-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095838-009	SW846 6020
	Calcium	57.4	0.300	1.00	NE			095838-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095838-009	SW846 6020
	Cobalt	0.000102	0.0001	0.001	NE	J		095838-009	SW846 6020
	Copper	0.000506	0.00035	0.001	NE	J		095838-009	SW846 6020
	Iron	0.139	0.033	0.100	NE			095838-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095838-009	SW846 6020
	Magnesium	17.3	0.050	0.150	NE			095838-009	SW846 6020
	Manganese	0.00254	0.001	0.005	NE	J		095838-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095838-009	SW846 7470
	Nickel	0.00114	0.0005	0.002	NE	J		095838-009	SW846 6020
	Potassium	3.45	0.080	0.300	NE			095838-009	SW846 6020
	Selenium	0.00215	0.0015	0.005	0.050	J		095838-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095838-009	SW846 6020
	Sodium	55.9	0.400	1.25	NE			095838-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095838-009	SW846 6020
	Uranium	0.00409	0.000067	0.0002	0.030			095838-009	SW846 6020
	Vanadium	0.00567	0.001	0.005	NE			095838-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095838-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.0474	0.015	0.050	NE	J		095874-009	SW846 6020
20-May-14	Antimony	ND	0.001	0.003	0.006	U		095874-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095874-009	SW846 6020
	Barium	0.0544	0.0006	0.002	2.00			095874-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095874-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095874-009	SW846 6020
	Calcium	64.4	0.300	1.00	NE			095874-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095874-009	SW846 6020
	Cobalt	0.000132	0.0001	0.001	NE	J		095874-009	SW846 6020
	Copper	0.000471	0.00035	0.001	NE	J	0.003U	095874-009	SW846 6020
	Iron	0.191	0.033	0.100	NE			095874-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095874-009	SW846 6020
	Magnesium	18.7	0.010	0.030	NE			095874-009	SW846 6020
	Manganese	0.00171	0.001	0.005	NE	J	0.015U	095874-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095874-009	SW846 7470
	Nickel	0.00125	0.0005	0.002	NE	J		095874-009	SW846 6020
	Potassium	4.21	0.080	0.300	NE			095874-009	SW846 6020
	Selenium	0.00265	0.0015	0.005	0.050	J		095874-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095874-009	SW846 6020
	Sodium	65.0	0.400	1.25	NE			095874-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095874-009	SW846 6020
	Uranium	0.00427	0.000067	0.0002	0.030			095874-009	SW846 6020
	Vanadium	0.00544	0.001	0.005	NE			095874-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095874-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 (Duplicate)	Aluminum	0.0476	0.015	0.050	NE	J		095875-009	SW846 6020
20-May-14	Antimony	ND	0.001	0.003	0.006	U		095875-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095875-009	SW846 6020
	Barium	0.0544	0.0006	0.002	2.00			095875-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095875-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095875-009	SW846 6020
	Calcium	65.1	0.300	1.00	NE			095875-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095875-009	SW846 6020
	Cobalt	0.000134	0.0001	0.001	NE	J		095875-009	SW846 6020
	Copper	0.000509	0.00035	0.001	NE	J	0.003U	095875-009	SW846 6020
	Iron	0.195	0.033	0.100	NE			095875-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095875-009	SW846 6020
	Magnesium	19.0	0.010	0.030	NE			095875-009	SW846 6020
	Manganese	0.00161	0.001	0.005	NE	J	0.015U	095875-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095875-009	SW846 7470
	Nickel	0.00125	0.0005	0.002	NE	J		095875-009	SW846 6020
	Potassium	4.13	0.080	0.300	NE			095875-009	SW846 6020
	Selenium	0.00252	0.0015	0.005	0.050	J		095875-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095875-009	SW846 6020
	Sodium	65.6	0.400	1.25	NE			095875-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095875-009	SW846 6020
	Uranium	0.00426	0.000067	0.0002	0.030			095875-009	SW846 6020
	Vanadium	0.00512	0.001	0.005	NE			095875-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095875-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	41.4	0.060	0.200	NE	B		096291-017	SW846 6020
24-Jul-14	Magnesium	9.14	0.010	0.030	NE			096291-017	SW846 6020
	Potassium	3.25	0.080	0.300	NE			096291-017	SW846 6020
	Sodium	36.3	0.080	0.250	NE			096291-017	SW846 6020
AVN-1 (Duplicate)	Calcium	42.1	0.060	0.200	NE	B		096292-017	SW846 6020
24-Jul-14	Magnesium	9.24	0.010	0.030	NE			096292-017	SW846 6020
	Potassium	3.26	0.080	0.300	NE			096292-017	SW846 6020
	Sodium	36.6	0.080	0.250	NE			096292-017	SW846 6020
LWDS-MW1	Calcium	69.0	0.600	2.00	NE			096316-017	SW846 6020
11-Aug-14	Magnesium	17.6	0.010	0.030	NE			096316-017	SW846 6020
	Potassium	2.93	0.080	0.300	NE			096316-017	SW846 6020
	Sodium	67.0	0.800	2.50	NE			096316-017	SW846 6020
LWDS-MW2	Calcium	41.5	0.060	0.200	NE			096299-017	SW846 6020
29-Jul-14	Magnesium	12.7	0.010	0.030	NE			096299-017	SW846 6020
	Potassium	2.72	0.080	0.300	NE			096299-017	SW846 6020
	Sodium	38.9	0.080	0.250	NE		J	096299-017	SW846 6020
LWDS-MW2 (Duplicate)	Calcium	44.0	0.060	0.200	NE			096300-017	SW846 6020
29-Jul-14	Magnesium	13.1	0.010	0.030	NE			096300-017	SW846 6020
	Potassium	2.80	0.080	0.300	NE			096300-017	SW846 6020
	Sodium	40.7	0.080	0.250	NE		J	096300-017	SW846 6020
TAV-MW2	Calcium	70.3	0.600	2.00	NE			096632-017	SW846 6020
09-Sep-14	Magnesium	22.7	0.100	0.300	NE			096632-017	SW846 6020
	Potassium	3.60	0.080	0.300	NE			096632-017	SW846 6020
	Sodium	66.5	0.800	2.50	NE			096632-017	SW846 6020
TAV-MW4	Calcium	48.3	0.060	0.200	NE			096303-017	SW846 6020
30-Jul-14	Magnesium	14.1	0.010	0.030	NE			096303-017	SW846 6020
	Potassium	3.23	0.080	0.300	NE			096303-017	SW846 6020
	Sodium	43.2	0.080	0.250	NE		J	096303-017	SW846 6020
TAV-MW6	Calcium	67.2	0.300	1.00	NE			096312-017	SW846 6020
06-Aug-14	Magnesium	18.6	0.010	0.030	NE			096312-017	SW846 6020
	Potassium	3.73	0.080	0.300	NE			096312-017	SW846 6020
	Sodium	65.9	0.400	1.25	NE			096312-017	SW846 6020
TAV-MW8	Calcium	55.2	0.300	1.00	NE			096294-017	SW846 6020
28-Jul-14	Magnesium	15.7	0.010	0.030	NE			096294-017	SW846 6020
	Potassium	3.81	0.080	0.300	NE			096294-017	SW846 6020
	Sodium	53.2	0.400	1.25	NE		J	096294-017	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	62.3	0.300	1.00	NE			096314-017	SW846 6020
07-Aug-14	Magnesium	16.9	0.010	0.030	NE			096314-017	SW846 6020
	Potassium	4.29	0.080	0.300	NE			096314-017	SW846 6020
	Sodium	59.0	0.400	1.25	NE			096314-017	SW846 6020
TAV-MW11	Calcium	54.2	0.300	1.00	NE			096305-017	SW846 6020
31-Jul-14	Magnesium	15.3	0.010	0.030	NE			096305-017	SW846 6020
	Potassium	3.74	0.080	0.300	NE			096305-017	SW846 6020
	Sodium	50.0	0.080	0.250	NE		J	096305-017	SW846 6020
TAV-MW12	Calcium	60.1	0.300	1.00	NE			096309-017	SW846 6020
05-Aug-14	Magnesium	19.6	0.010	0.030	NE			096309-017	SW846 6020
	Potassium	3.88	0.080	0.300	NE			096309-017	SW846 6020
	Sodium	55.9	0.400	1.25	NE			096309-017	SW846 6020
TAV-MW13	Calcium	48.4	0.060	0.200	NE	B		096286-017	SW846 6020
23-Jul-14	Magnesium	14.0	0.010	0.030	NE			096286-017	SW846 6020
	Potassium	3.31	0.080	0.300	NE			096286-017	SW846 6020
	Sodium	46.0	0.080	0.250	NE			096286-017	SW846 6020
TAV-MW14	Calcium	60.6	0.300	1.00	NE			096307-017	SW846 6020
04-Aug-14	Magnesium	20.3	0.010	0.030	NE			096307-017	SW846 6020
	Potassium	4.19	0.080	0.300	NE			096307-017	SW846 6020
	Sodium	58.2	0.400	1.25	NE			096307-017	SW846 6020
AVN-1	Calcium	43.4	0.060	0.200	NE			096821-010	SW846 6020
30-Oct-14	Magnesium	10.0	0.010	0.030	NE			096821-010	SW846 6020
	Potassium	3.41	0.080	0.300	NE			096821-010	SW846 6020
	Sodium	40.8	0.080	0.250	NE			096821-010	SW846 6020
LWDS-MW1	Calcium	66.4	0.300	1.00	NE			096853-010	SW846 6020
17-Nov-14	Magnesium	20.3	0.010	0.030	NE			096853-010	SW846 6020
	Potassium	3.04	0.080	0.300	NE			096853-010	SW846 6020
	Sodium	64.9	0.400	1.25	NE			096853-010	SW846 6020
LWDS-MW1 (Duplicate)	Calcium	65.2	0.300	1.00	NE			096854-010	SW846 6020
17-Nov-14	Magnesium	20.3	0.010	0.030	NE			096854-010	SW846 6020
	Potassium	3.01	0.080	0.300	NE			096854-010	SW846 6020
	Sodium	64.2	0.400	1.25	NE			096854-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Continued)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	Calcium	45.0	0.060	0.200	NE			096825-010	SW846 6020
03-Nov-14	Magnesium	13.0	0.010	0.030	NE			096825-010	SW846 6020
	Potassium	2.71	0.080	0.300	NE			096825-010	SW846 6020
	Sodium	42.5	0.080	0.250	NE			096825-010	SW846 6020
TAV-MW2	Calcium	70.9	0.300	1.00	NE			096827-010	SW846 6020
04-Nov-14	Magnesium	22.0	0.100	0.300	NE			096827-010	SW846 6020
	Potassium	3.71	0.080	0.300	NE			096827-010	SW846 6020
	Sodium	65.2	0.400	1.25	NE			096827-010	SW846 6020
TAV-MW3	Calcium	51.4	0.600	2.00	NE			096816-010	SW846 6020
28-Oct-14	Magnesium	14.6	0.010	0.030	NE			096816-010	SW846 6020
	Potassium	4.44	0.080	0.300	NE			096816-010	SW846 6020
	Sodium	48.7	0.800	2.50	NE			096816-010	SW846 6020
TAV-MW3 (Duplicate)	Calcium	52.2	0.600	2.00	NE			096817-010	SW846 6020
28-Oct-14	Magnesium	14.5	0.010	0.030	NE			096817-010	SW846 6020
	Potassium	4.46	0.080	0.300	NE			096817-010	SW846 6020
	Sodium	50.3	0.800	2.50	NE			096817-010	SW846 6020
TAV-MW4	Calcium	49.1	0.060	0.200	NE			096829-010	SW846 6020
05-Nov-14	Magnesium	14.2	0.010	0.030	NE			096829-010	SW846 6020
	Potassium	3.05	0.080	0.300	NE			096829-010	SW846 6020
	Sodium	43.2	0.080	0.250	NE			096829-010	SW846 6020
TAV-MW5	Calcium	48.3	0.060	0.200	NE			096809-010	SW846 6020
24-Oct-14	Magnesium	14.3	0.010	0.030	NE			096809-010	SW846 6020
	Potassium	2.94	0.080	0.300	NE			096809-010	SW846 6020
	Sodium	48.1	0.080	0.250	NE			096809-010	SW846 6020
TAV-MW6	Calcium	66.1	0.300	1.00	NE			096845-010	SW846 6020
12-Nov-14	Magnesium	19.4	0.010	0.030	NE			096845-010	SW846 6020
	Potassium	3.92	0.080	0.300	NE			096845-010	SW846 6020
	Sodium	63.6	0.400	1.25	NE			096845-010	SW846 6020
TAV-MW7	Calcium	55.9	0.600	2.00	NE			096819-010	SW846 6020
29-Oct-14	Magnesium	18.8	0.010	0.030	NE			096819-010	SW846 6020
	Potassium	4.06	0.080	0.300	NE			096819-010	SW846 6020
	Sodium	52.0	0.800	2.50	NE			096819-010	SW846 6020
TAV-MW8	Calcium	54.7	0.600	2.00	NE			096823-010	SW846 6020
31-Oct-14	Magnesium	16.6	0.010	0.030	NE			096823-010	SW846 6020
	Potassium	3.78	0.080	0.300	NE			096823-010	SW846 6020
	Sodium	53.6	0.800	2.50	NE			096823-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-6 *(Concluded)*
Summary of Unfiltered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	Calcium	58.8	0.600	2.00	NE			096811-010	SW846 6020
27-Oct-14	Magnesium	19.8	0.010	0.030	NE			096811-010	SW846 6020
	Potassium	4.20	0.080	0.300	NE			096811-010	SW846 6020
	Sodium	53.9	0.800	2.50	NE			096811-010	SW846 6020
TAV-MW10	Calcium	60.2	0.300	1.00	NE			096848-010	SW846 6020
13-Nov-14	Magnesium	17.4	0.010	0.030	NE			096848-010	SW846 6020
	Potassium	4.43	0.080	0.300	NE			096848-010	SW846 6020
	Sodium	60.4	0.400	1.25	NE			096848-010	SW846 6020
TAV-MW11	Calcium	55.8	0.300	1.00	NE			096833-010	SW846 6020
06-Nov-14	Magnesium	15.5	0.010	0.030	NE			096833-010	SW846 6020
	Potassium	3.78	0.080	0.300	NE			096833-010	SW846 6020
	Sodium	54.2	0.400	1.25	NE			096833-010	SW846 6020
TAV-MW11 (Duplicate)	Calcium	56.8	0.300	1.00	NE			096834-010	SW846 6020
06-Nov-14	Magnesium	15.0	0.010	0.030	NE			096834-010	SW846 6020
	Potassium	3.69	0.080	0.300	NE			096834-010	SW846 6020
	Sodium	54.7	0.400	1.25	NE			096834-010	SW846 6020
TAV-MW12	Calcium	57.1	0.300	1.00	NE			096842-010	SW846 6020
11-Nov-14	Magnesium	19.2	0.010	0.030	NE			096842-010	SW846 6020
	Potassium	3.91	0.080	0.300	NE			096842-010	SW846 6020
	Sodium	60.4	0.400	1.25	NE			096842-010	SW846 6020
TAV-MW13	Calcium	55.4	0.300	1.00	NE	B		096807-010	SW846 6020
23-Oct-14	Magnesium	16.1	0.010	0.030	NE			096807-010	SW846 6020
	Potassium	3.51	0.080	0.300	NE			096807-010	SW846 6020
	Sodium	48.8	0.080	0.250	NE			096807-010	SW846 6020
TAV-MW14	Calcium	62.0	0.300	1.00	NE			096838-010	SW846 6020
10-Nov-14	Magnesium	19.1	0.010	0.030	NE			096838-010	SW846 6020
	Potassium	4.43	0.080	0.300	NE			096838-010	SW846 6020
	Sodium	60.7	0.400	1.25	NE			096838-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.226	0.033	0.100	NE	*	J	095321-009	SW846 6020
19-Feb-14	Manganese	0.00258	0.001	0.005	NE	B, J	0.0066U	095321-009	SW846 6020
LWDS-MW1	Iron	0.156	0.033	0.100	NE	B	0.17U	095341-009	SW846 6020
03-Mar-14	Manganese	ND	0.001	0.005	NE	U		095341-009	SW846 6020
LWDS-MW2	Iron	0.104	0.033	0.100	NE	*	J	095324-009	SW846 6020
20-Feb-14	Manganese	ND	0.001	0.005	NE	U		095324-009	SW846 6020
TAV-MW2	Iron	0.279	0.033	0.100	NE	B	0.29U	095326-009	SW846 6020
21-Feb-14	Manganese	0.00163	0.001	0.005	NE	J		095326-009	SW846 6020
TAV-MW4	Iron	0.0946	0.033	0.100	NE	*, J	J	095328-009	SW846 6020
24-Feb-14	Manganese	ND	0.001	0.005	NE	U		095328-009	SW846 6020
TAV-MW6	Iron	0.171	0.033	0.100	NE	B		095346-009	SW846 6020
05-Mar-14	Manganese	ND	0.001	0.005	NE	U		095346-009	SW846 6020
TAV-MW8	Iron	0.336	0.033	0.100	NE	*	J	095333-009	SW846 6020
25-Feb-14	Manganese	ND	0.001	0.005	NE	U		095333-009	SW846 6020
TAV-MW8 (Duplicate)	Iron	0.132	0.033	0.100	NE	*	J	095334-009	SW846 6020
25-Feb-14	Manganese	0.00141	0.001	0.005	NE	B, J	0.014U	095334-009	SW846 6020
TAV-MW10	Iron	0.181	0.033	0.100	NE	B		095351-009	SW846 6020
06-Mar-14	Manganese	ND	0.001	0.005	NE	U		095351-009	SW846 6020
TAV-MW10 (Duplicate)	Iron	0.181	0.033	0.100	NE	B		095352-009	SW846 6020
06-Mar-14	Manganese	ND	0.001	0.005	NE	U		095352-009	SW846 6020
TAV-MW11	Iron	0.128	0.033	0.100	NE	*	J	095337-009	SW846 6020
26-Feb-14	Manganese	ND	0.001	0.005	NE	U		095337-009	SW846 6020
TAV-MW12	Iron	0.129	0.033	0.100	NE	B	0.17U	095344-009	SW846 6020
04-Mar-14	Manganese	0.0223	0.001	0.005	NE			095344-009	SW846 6020
TAV-MW13	Iron	0.325	0.033	0.100	NE	*	J	095319-009	SW846 6020
18-Feb-14	Manganese	0.004	0.001	0.005	NE	B, J	0.0066U	095319-009	SW846 6020
TAV-MW14	Iron	0.199	0.033	0.100	NE	*	J	095339-009	SW846 6020
27-Feb-14	Manganese	ND	0.001	0.005	NE	U		095339-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		095854-010	SW846 6020
07-May-14	Antimony	ND	0.001	0.003	0.006	U		095854-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095854-010	SW846 6020
	Barium	0.0795	0.0006	0.002	2.00			095854-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095854-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095854-010	SW846 6020
	Calcium	42.8	0.060	0.200	NE			095854-010	SW846 6020
	Chromium	0.00252	0.002	0.010	0.100	J		095854-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		095854-010	SW846 6020
	Copper	0.000521	0.00035	0.001	NE	J		095854-010	SW846 6020
	Iron	0.0949	0.033	0.100	NE	J		095854-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095854-010	SW846 6020
	Magnesium	9.40	0.010	0.030	NE			095854-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095854-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095854-010	SW846 7470
	Nickel	0.00151	0.0005	0.002	NE	J		095854-010	SW846 6020
	Potassium	3.12	0.080	0.300	NE	N	J	095854-010	SW846 6020
	Selenium	0.00189	0.0015	0.005	0.050	J		095854-010	SW846 6020
	Silver	0.000367	0.0002	0.001	NE	J		095854-010	SW846 6020
	Sodium	36.3	0.080	0.250	NE			095854-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095854-010	SW846 6020
	Vanadium	0.00716	0.001	0.005	NE			095854-010	SW846 6010
	Zinc	0.00375	0.0035	0.010	NE	J		095854-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		095869-010	SW846 6020
19-May-14	Antimony	ND	0.001	0.003	0.006	U		095869-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095869-010	SW846 6020
	Barium	0.0791	0.0006	0.002	2.00			095869-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095869-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095869-010	SW846 6020
	Calcium	67.9	0.300	1.00	NE			095869-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095869-010	SW846 6020
	Cobalt	0.000122	0.0001	0.001	NE	J		095869-010	SW846 6020
	Copper	0.000549	0.00035	0.001	NE	J		095869-010	SW846 6020
	Iron	0.165	0.033	0.100	NE			095869-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095869-010	SW846 6020
	Magnesium	20.4	0.010	0.030	NE			095869-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095869-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095869-010	SW846 7470
	Nickel	0.00135	0.0005	0.002	NE	J		095869-010	SW846 6020
	Potassium	2.86	0.080	0.300	NE			095869-010	SW846 6020
	Selenium	0.00518	0.0015	0.005	0.050			095869-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095869-010	SW846 6020
	Sodium	68.5	0.400	1.25	NE			095869-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095869-010	SW846 6020
	Vanadium	0.00485	0.001	0.005	NE	J		095869-010	SW846 6010
	Zinc	0.00425	0.0035	0.010	NE	J		095869-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		095856-010	SW846 6020
09-May-14	Antimony	ND	0.001	0.003	0.006	U		095856-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095856-010	SW846 6020
	Barium	0.0695	0.0006	0.002	2.00			095856-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095856-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095856-010	SW846 6020
	Calcium	45.5	0.060	0.200	NE			095856-010	SW846 6020
	Chromium	0.00311	0.002	0.010	0.100	J		095856-010	SW846 6020
	Cobalt	0.000114	0.0001	0.001	NE	J		095856-010	SW846 6020
	Copper	0.000576	0.00035	0.001	NE	J		095856-010	SW846 6020
	Iron	0.0968	0.033	0.100	NE	J		095856-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095856-010	SW846 6020
	Magnesium	13.4	0.010	0.030	NE			095856-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095856-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095856-010	SW846 7470
	Nickel	0.00105	0.0005	0.002	NE	J		095856-010	SW846 6020
	Potassium	2.65	0.080	0.300	NE	N	J	095856-010	SW846 6020
	Selenium	0.00198	0.0015	0.005	0.050	J		095856-010	SW846 6020
	Silver	0.000722	0.0002	0.001	NE	J		095856-010	SW846 6020
	Sodium	42.7	0.080	0.250	NE			095856-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095856-010	SW846 6020
	Vanadium	0.00728	0.001	0.005	NE			095856-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095856-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		095858-010	SW846 6020
12-May-14	Antimony	ND	0.001	0.003	0.006	U		095858-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095858-010	SW846 6020
	Barium	0.0574	0.0006	0.002	2.00			095858-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095858-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095858-010	SW846 6020
	Calcium	69.0	0.300	1.00	NE			095858-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095858-010	SW846 6020
	Cobalt	0.000155	0.0001	0.001	NE	J		095858-010	SW846 6020
	Copper	0.000558	0.00035	0.001	NE	J		095858-010	SW846 6020
	Iron	0.171	0.033	0.100	NE			095858-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095858-010	SW846 6020
	Magnesium	21.2	0.010	0.030	NE			095858-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095858-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095858-010	SW846 7470
	Nickel	0.00154	0.0005	0.002	NE	J		095858-010	SW846 6020
	Potassium	3.70	0.080	0.300	NE			095858-010	SW846 6020
	Selenium	0.00252	0.0015	0.005	0.050	J		095858-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095858-010	SW846 6020
	Sodium	62.1	0.400	1.25	NE			095858-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095858-010	SW846 6020
	Vanadium	0.00574	0.001	0.005	NE			095858-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095858-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		095846-010	SW846 6020
02-May-14	Antimony	ND	0.001	0.003	0.006	U		095846-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095846-010	SW846 6020
	Barium	0.047	0.0006	0.002	2.00			095846-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095846-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095846-010	SW846 6020
	Calcium	56.4	0.600	2.00	NE	B		095846-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095846-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		095846-010	SW846 6020
	Copper	0.000361	0.00035	0.001	NE	J		095846-010	SW846 6020
	Iron	0.066	0.033	0.100	NE	J		095846-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095846-010	SW846 6020
	Magnesium	14.0	0.010	0.030	NE			095846-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095846-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095846-010	SW846 7470
	Nickel	0.00057	0.0005	0.002	NE	J		095846-010	SW846 6020
	Potassium	4.35	0.080	0.300	NE			095846-010	SW846 6020
	Selenium	0.0027	0.0015	0.005	0.050	J		095846-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095846-010	SW846 6020
	Sodium	49.1	0.080	0.250	NE			095846-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095846-010	SW846 6020
	Vanadium	0.00655	0.001	0.005	NE			095846-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095846-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		095864-010	SW846 6020
14-May-14	Antimony	ND	0.001	0.003	0.006	U		095864-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095864-010	SW846 6020
	Barium	0.082	0.0006	0.002	2.00			095864-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095864-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095864-010	SW846 6020
	Calcium	49.1	0.060	0.200	NE			095864-010	SW846 6020
	Chromium	0.026	0.002	0.010	0.100			095864-010	SW846 6020
	Cobalt	0.000111	0.0001	0.001	NE	J		095864-010	SW846 6020
	Copper	0.000472	0.00035	0.001	NE	J		095864-010	SW846 6020
	Iron	0.130	0.033	0.100	NE			095864-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095864-010	SW846 6020
	Magnesium	13.7	0.010	0.030	NE			095864-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095864-010	SW846 6020
	Mercury	**0.00206**	0.000067	0.0002	0.002		R	095864-010	SW846 7470
	Nickel	0.00107	0.0005	0.002	NE	J		095864-010	SW846 6020
	Potassium	3.11	0.080	0.300	NE			095864-010	SW846 6020
	Selenium	0.00332	0.0015	0.005	0.050	J		095864-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095864-010	SW846 6020
	Sodium	43.9	0.080	0.250	NE			095864-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095864-010	SW846 6020
	Vanadium	0.00632	0.001	0.005	NE			095864-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095864-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		095865-010	SW846 6020
14-May-14	Antimony	ND	0.001	0.003	0.006	U		095865-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095865-010	SW846 6020
	Barium	0.0807	0.0006	0.002	2.00			095865-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095865-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095865-010	SW846 6020
	Calcium	47.8	0.060	0.200	NE			095865-010	SW846 6020
	Chromium	0.0255	0.002	0.010	0.100			095865-010	SW846 6020
	Cobalt	0.000108	0.0001	0.001	NE	J		095865-010	SW846 6020
	Copper	0.000475	0.00035	0.001	NE	J		095865-010	SW846 6020
	Iron	0.157	0.033	0.100	NE			095865-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095865-010	SW846 6020
	Magnesium	14.0	0.010	0.030	NE			095865-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095865-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095865-010	SW846 7470
	Nickel	0.00103	0.0005	0.002	NE	J		095865-010	SW846 6020
	Potassium	3.00	0.080	0.300	NE			095865-010	SW846 6020
	Selenium	0.0034	0.0015	0.005	0.050	J		095865-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095865-010	SW846 6020
	Sodium	42.3	0.080	0.250	NE			095865-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095865-010	SW846 6020
	Vanadium	0.00681	0.001	0.005	NE			095865-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095865-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		095842-010	SW846 6020
1-May-14	Antimony	ND	0.001	0.003	0.006	U		095842-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095842-010	SW846 6020
	Barium	0.0655	0.0006	0.002	2.00		J	095842-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095842-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095842-010	SW846 6020
	Calcium	49.5	0.060	0.200	NE			095842-010	SW846 6020
	Chromium	0.0033	0.002	0.010	0.100	J		095842-010	SW846 6020
	Cobalt	0.0001	0.0001	0.001	NE	J		095842-010	SW846 6020
	Copper	0.000471	0.00035	0.001	NE	J	0.0027U	095842-010	SW846 6020
	Iron	0.127	0.033	0.100	NE			095842-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095842-010	SW846 6020
	Magnesium	15.3	0.010	0.030	NE			095842-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095842-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095842-010	SW846 7470
	Nickel	0.00101	0.0005	0.002	NE	J		095842-010	SW846 6020
	Potassium	2.84	0.080	0.300	NE			095842-010	SW846 6020
	Selenium	0.00232	0.0015	0.005	0.050	J		095842-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095842-010	SW846 6020
	Sodium	49.4	0.080	0.250	NE			095842-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095842-010	SW846 6020
	Vanadium	0.00609	0.001	0.005	NE			095842-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095842-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		095843-010	SW846 6020
1-May-14	Antimony	ND	0.001	0.003	0.006	U		095843-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095843-010	SW846 6020
	Barium	0.0636	0.0006	0.002	2.00		J	095843-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095843-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095843-010	SW846 6020
	Calcium	46.8	0.060	0.200	NE			095843-010	SW846 6020
	Chromium	0.00226	0.002	0.010	0.100	J		095843-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		095843-010	SW846 6020
	Copper	ND	0.00035	0.001	NE	U		095843-010	SW846 6020
	Iron	0.120	0.033	0.100	NE			095843-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095843-010	SW846 6020
	Magnesium	15.2	0.010	0.030	NE			095843-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095843-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095843-010	SW846 7470
	Nickel	0.000733	0.0005	0.002	NE	J		095843-010	SW846 6020
	Potassium	2.90	0.080	0.300	NE			095843-010	SW846 6020
	Selenium	0.00244	0.0015	0.005	0.050	J		095843-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095843-010	SW846 6020
	Sodium	49.7	0.080	0.250	NE			095843-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095843-010	SW846 6020
	Vanadium	0.00555	0.001	0.005	NE			095843-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095843-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		095879-010	SW846 6020
22-May-14	Antimony	ND	0.001	0.003	0.006	U		095879-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095879-010	SW846 6020
	Barium	0.0645	0.0006	0.002	2.00			095879-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095879-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095879-010	SW846 6020
	Calcium	66.0	0.300	1.00	NE			095879-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095879-010	SW846 6020
	Cobalt	0.000146	0.0001	0.001	NE	J		095879-010	SW846 6020
	Copper	0.000529	0.00035	0.001	NE	J		095879-010	SW846 6020
	Iron	0.172	0.033	0.100	NE			095879-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095879-010	SW846 6020
	Magnesium	20.3	0.010	0.030	NE			095879-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095879-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095879-010	SW846 7470
	Nickel	0.00133	0.0005	0.002	NE	J		095879-010	SW846 6020
	Potassium	3.57	0.080	0.300	NE			095879-010	SW846 6020
	Selenium	0.0039	0.0015	0.005	0.050	J		095879-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095879-010	SW846 6020
	Sodium	66.7	0.400	1.25	NE			095879-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095879-010	SW846 6020
	Vanadium	0.00536	0.001	0.005	NE			095879-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095879-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		095852-010	SW846 6020
06-May-14	Antimony	ND	0.001	0.003	0.006	U		095852-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095852-010	SW846 6020
	Barium	0.0541	0.0006	0.002	2.00			095852-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095852-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095852-010	SW846 6020
	Calcium	61.0	0.300	1.00	NE			095852-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095852-010	SW846 6020
	Cobalt	0.000134	0.0001	0.001	NE	J		095852-010	SW846 6020
	Copper	0.000464	0.00035	0.001	NE	J		095852-010	SW846 6020
	Iron	0.121	0.033	0.100	NE			095852-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095852-010	SW846 6020
	Magnesium	18.1	0.010	0.030	NE			095852-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095852-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095852-010	SW846 7470
	Nickel	0.00117	0.0005	0.002	NE	J		095852-010	SW846 6020
	Potassium	3.82	0.080	0.300	NE	N	J	095852-010	SW846 6020
	Selenium	0.00189	0.0015	0.005	0.050	J		095852-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095852-010	SW846 6020
	Sodium	57.2	0.400	1.25	NE			095852-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095852-010	SW846 6020
	Vanadium	0.00682	0.001	0.005	NE			095852-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095852-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		095860-010	SW846 6020
13-May-14	Antimony	ND	0.001	0.003	0.006	U		095860-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095860-010	SW846 6020
	Barium	0.0507	0.0006	0.002	2.00			095860-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095860-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095860-010	SW846 6020
	Calcium	55.3	0.300	1.00	NE			095860-010	SW846 6020
	Chromium	0.00266	0.002	0.010	0.100	J		095860-010	SW846 6020
	Cobalt	0.000134	0.0001	0.001	NE	J		095860-010	SW846 6020
	Copper	0.000712	0.00035	0.001	NE	J		095860-010	SW846 6020
	Iron	0.155	0.033	0.100	NE			095860-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095860-010	SW846 6020
	Magnesium	15.7	0.010	0.030	NE			095860-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095860-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095860-010	SW846 7470
	Nickel	0.00121	0.0005	0.002	NE	J		095860-010	SW846 6020
	Potassium	3.61	0.080	0.300	NE			095860-010	SW846 6020
	Selenium	0.00262	0.0015	0.005	0.050	J		095860-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095860-010	SW846 6020
	Sodium	53.0	0.400	1.25	NE			095860-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095860-010	SW846 6020
	Vanadium	0.00605	0.001	0.005	NE			095860-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095860-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		095849-010	SW846 6020
05-May-14	Antimony	ND	0.001	0.003	0.006	U		095849-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095849-010	SW846 6020
	Barium	0.0629	0.0006	0.002	2.00			095849-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095849-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095849-010	SW846 6020
	Calcium	64.0	0.300	1.00	NE			095849-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095849-010	SW846 6020
	Cobalt	0.000154	0.0001	0.001	NE	J		095849-010	SW846 6020
	Copper	0.000556	0.00035	0.001	NE	J		095849-010	SW846 6020
	Iron	0.131	0.033	0.100	NE			095849-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095849-010	SW846 6020
	Magnesium	18.8	0.010	0.030	NE			095849-010	SW846 6020
	Manganese	0.00397	0.001	0.005	NE	J		095849-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095849-010	SW846 7470
	Nickel	0.00156	0.0005	0.002	NE	J		095849-010	SW846 6020
	Potassium	4.23	0.080	0.300	NE	N	J	095849-010	SW846 6020
	Selenium	0.00182	0.0015	0.005	0.050	J		095849-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095849-010	SW846 6020
	Sodium	59.6	0.400	1.25	NE			095849-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095849-010	SW846 6020
	Vanadium	0.00658	0.001	0.005	NE			095849-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095849-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		095881-010	SW846 6020
27-May-14	Antimony	ND	0.001	0.003	0.006	U		095881-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095881-010	SW846 6020
	Barium	0.0553	0.0006	0.002	2.00			095881-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095881-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095881-010	SW846 6020
	Calcium	60.3	0.300	1.00	NE			095881-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095881-010	SW846 6020
	Cobalt	0.000109	0.0001	0.001	NE	J		095881-010	SW846 6020
	Copper	0.000433	0.00035	0.001	NE	J		095881-010	SW846 6020
	Iron	0.146	0.033	0.100	NE			095881-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095881-010	SW846 6020
	Magnesium	15.7	0.010	0.030	NE			095881-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095881-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095881-010	SW846 7470
	Nickel	0.00119	0.0005	0.002	NE	J		095881-010	SW846 6020
	Potassium	4.09	0.080	0.300	NE			095881-010	SW846 6020
	Selenium	0.00266	0.0015	0.005	0.050	J		095881-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095881-010	SW846 6020
	Sodium	58.5	0.400	1.25	NE			095881-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095881-010	SW846 6020
	Vanadium	0.00543	0.001	0.005	NE			095881-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095881-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		095867-010	SW846 6020
15-May-14	Antimony	ND	0.001	0.003	0.006	U		095867-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095867-010	SW846 6020
	Barium	0.0658	0.0006	0.002	2.00			095867-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095867-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095867-010	SW846 6020
	Calcium	54.4	0.300	1.00	NE			095867-010	SW846 6020
	Chromium	0.00376	0.002	0.010	0.100	J		095867-010	SW846 6020
	Cobalt	0.000149	0.0001	0.001	NE	J		095867-010	SW846 6020
	Copper	0.000588	0.00035	0.001	NE	J		095867-010	SW846 6020
	Iron	0.143	0.033	0.100	NE			095867-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095867-010	SW846 6020
	Magnesium	15.2	0.010	0.030	NE			095867-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095867-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095867-010	SW846 7470
	Nickel	0.00118	0.0005	0.002	NE	J		095867-010	SW846 6020
	Potassium	3.53	0.080	0.300	NE			095867-010	SW846 6020
	Selenium	0.00367	0.0015	0.005	0.050	J		095867-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095867-010	SW846 6020
	Sodium	54.0	0.400	1.25	NE			095867-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095867-010	SW846 6020
	Vanadium	0.00601	0.001	0.005	NE			095867-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095867-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		095877-010	SW846 6020
21-May-14	Antimony	ND	0.001	0.003	0.006	U		095877-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095877-010	SW846 6020
	Barium	0.069	0.0006	0.002	2.00			095877-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095877-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095877-010	SW846 6020
	Calcium	59.8	0.300	1.00	NE			095877-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095877-010	SW846 6020
	Cobalt	0.000152	0.0001	0.001	NE	J		095877-010	SW846 6020
	Copper	0.00047	0.00035	0.001	NE	J		095877-010	SW846 6020
	Iron	0.145	0.033	0.100	NE			095877-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095877-010	SW846 6020
	Magnesium	19.2	0.010	0.030	NE			095877-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095877-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095877-010	SW846 7470
	Nickel	0.00114	0.0005	0.002	NE	J		095877-010	SW846 6020
	Potassium	3.49	0.080	0.300	NE			095877-010	SW846 6020
	Selenium	0.00205	0.0015	0.005	0.050	J		095877-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095877-010	SW846 6020
	Sodium	62.1	0.400	1.25	NE			095877-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095877-010	SW846 6020
	Vanadium	0.00435	0.001	0.005	NE	J		095877-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095877-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		095838-010	SW846 6020
30-Apr-14	Antimony	ND	0.001	0.003	0.006	U		095838-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095838-010	SW846 6020
	Barium	0.0553	0.0006	0.002	2.00		J	095838-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095838-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095838-010	SW846 6020
	Calcium	49.7	0.060	0.200	NE			095838-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095838-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		095838-010	SW846 6020
	Copper	0.000429	0.00035	0.001	NE	J		095838-010	SW846 6020
	Iron	0.124	0.033	0.100	NE			095838-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095838-010	SW846 6020
	Magnesium	16.1	0.050	0.150	NE			095838-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095838-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095838-010	SW846 7470
	Nickel	0.00111	0.0005	0.002	NE	J		095838-010	SW846 6020
	Potassium	3.25	0.080	0.300	NE			095838-010	SW846 6020
	Selenium	0.00202	0.0015	0.005	0.050	J		095838-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095838-010	SW846 6020
	Sodium	55.4	0.400	1.25	NE			095838-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095838-010	SW846 6020
	Vanadium	0.00584	0.001	0.005	NE			095838-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095838-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		095874-010	SW846 6020
20-May-14	Antimony	ND	0.001	0.003	0.006	U		095874-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095874-010	SW846 6020
	Barium	0.0551	0.0006	0.002	2.00			095874-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095874-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095874-010	SW846 6020
	Calcium	64.2	0.300	1.00	NE			095874-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095874-010	SW846 6020
	Cobalt	0.000111	0.0001	0.001	NE	J		095874-010	SW846 6020
	Copper	0.000459	0.00035	0.001	NE	J	0.002U	095874-010	SW846 6020
	Iron	0.151	0.033	0.100	NE			095874-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095874-010	SW846 6020
	Magnesium	19.1	0.010	0.030	NE			095874-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095874-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095874-010	SW846 7470
	Nickel	0.00122	0.0005	0.002	NE	J		095874-010	SW846 6020
	Potassium	4.22	0.080	0.300	NE			095874-010	SW846 6020
	Selenium	0.0025	0.0015	0.005	0.050	J		095874-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095874-010	SW846 6020
	Sodium	63.7	0.400	1.25	NE			095874-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095874-010	SW846 6020
	Vanadium	0.00497	0.001	0.005	NE	J		095874-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095874-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		095875-010	SW846 6020
20-May-14	Antimony	ND	0.001	0.003	0.006	U		095875-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095875-010	SW846 6020
	Barium	0.0543	0.0006	0.002	2.00			095875-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095875-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095875-010	SW846 6020
	Calcium	63.5	0.300	1.00	NE			095875-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095875-010	SW846 6020
	Cobalt	0.000107	0.0001	0.001	NE	J		095875-010	SW846 6020
	Copper	0.00044	0.00035	0.001	NE	J	0.002U	095875-010	SW846 6020
	Iron	0.155	0.033	0.100	NE			095875-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095875-010	SW846 6020
	Magnesium	19.4	0.010	0.030	NE			095875-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095875-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095875-010	SW846 7470
	Nickel	0.00116	0.0005	0.002	NE	J		095875-010	SW846 6020
	Potassium	4.10	0.080	0.300	NE			095875-010	SW846 6020
	Selenium	0.00268	0.0015	0.005	0.050	J		095875-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095875-010	SW846 6020
	Sodium	65.5	0.400	1.25	NE			095875-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095875-010	SW846 6020
	Vanadium	0.00495	0.001	0.005	NE	J		095875-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095875-010	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.0861	0.033	0.100	NE	J		096291-011	SW846 6020
24-Jul-14	Manganese	ND	0.001	0.005	NE	U		096291-011	SW846 6020
AVN-1 (Duplicate)	Iron	0.0857	0.033	0.100	NE	J		096292-011	SW846 6020
24-Jul-14	Manganese	ND	0.001	0.005	NE	U		096292-011	SW846 6020
LWDS-MW1	Iron	0.113	0.033	0.100	NE			096316-011	SW846 6020
11-Aug-14	Manganese	ND	0.001	0.005	NE	U		096316-011	SW846 6020
LWDS-MW2	Iron	0.0869	0.033	0.100	NE	J		096299-011	SW846 6020
29-Jul-14	Manganese	ND	0.001	0.005	NE	U		096299-011	SW846 6020
LWDS-MW2 (Duplicate)	Iron	0.0851	0.033	0.100	NE	J		096300-011	SW846 6020
29-Jul-14	Manganese	ND	0.001	0.005	NE	U		096300-011	SW846 6020
TAV-MW2	Iron	0.127	0.033	0.100	NE			096632-011	SW846 6020
09-Sep-14	Manganese	ND	0.001	0.005	NE	U		096632-011	SW846 6020
TAV-MW4	Iron	0.094	0.033	0.100	NE	J		096303-011	SW846 6020
30-Jul-14	Manganese	ND	0.001	0.005	NE	U		096303-011	SW846 6020
TAV-MW6	Iron	0.135	0.033	0.100	NE			096312-011	SW846 6020
06-Aug-14	Manganese	ND	0.001	0.005	NE	U		096312-011	SW846 6020
TAV-MW8	Iron	0.110	0.033	0.100	NE			096294-011	SW846 6020
28-Jul-14	Manganese	ND	0.001	0.005	NE	U		096294-011	SW846 6020
TAV-MW10	Iron	0.123	0.033	0.100	NE			096314-011	SW846 6020
07-Aug-14	Manganese	ND	0.001	0.005	NE	U		096314-011	SW846 6020
TAV-MW11	Iron	0.120	0.033	0.100	NE			096305-011	SW846 6020
31-Jul-14	Manganese	ND	0.001	0.005	NE	U		096305-011	SW846 6020
TAV-MW12	Iron	0.126	0.033	0.100	NE			096309-011	SW846 6020
05-Aug-14	Manganese	0.00548	0.001	0.005	NE			096309-011	SW846 6020
TAV-MW13	Iron	0.0893	0.033	0.100	NE	J		096286-011	SW846 6020
23-Jul-14	Manganese	ND	0.001	0.005	NE	U		096286-011	SW846 6020
TAV-MW14	Iron	0.122	0.033	0.100	NE			096307-011	SW846 6020
04-Aug-14	Manganese	ND	0.001	0.005	NE	U		096307-011	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Continued)*
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	ND	0.033	0.100	NE	U		096821-009	SW846 6020
30-Oct-14	Manganese	ND	0.001	0.005	NE	U		096821-009	SW846 6020
LWDS-MW1	Iron	ND	0.033	0.100	NE	U		096853-009	SW846 6020
17-Nov-14	Manganese	ND	0.001	0.005	NE	U		096853-009	SW846 6020
LWDS-MW1 (Duplicate)	Iron	ND	0.033	0.100	NE	U		096854-009	SW846 6020
17-Nov-14	Manganese	ND	0.001	0.005	NE	U		096854-009	SW846 6020
LWDS-MW2	Iron	ND	0.033	0.100	NE	U		096825-009	SW846 6020
03-Nov-14	Manganese	ND	0.001	0.005	NE	U		096825-009	SW846 6020
TAV-MW2	Iron	ND	0.033	0.100	NE	U		096827-009	SW846 6020
04-Nov-14	Manganese	ND	0.001	0.005	NE	U		096827-009	SW846 6020
TAV-MW3	Iron	ND	0.033	0.100	NE	U		096816-009	SW846 6020
28-Oct-14	Manganese	ND	0.001	0.005	NE	U		096816-009	SW846 6020
TAV-MW3 (Duplicate)	Iron	ND	0.033	0.100	NE	U		096817-009	SW846 6020
28-Oct-14	Manganese	ND	0.001	0.005	NE	U		096817-009	SW846 6020
TAV-MW4	Iron	ND	0.033	0.100	NE	U		096829-009	SW846 6020
05-Nov-14	Manganese	ND	0.001	0.005	NE	U		096829-009	SW846 6020
TAV-MW5	Iron	ND	0.033	0.100	NE	U		096809-009	SW846 6020
24-Oct-14	Manganese	ND	0.001	0.005	NE	U		096809-009	SW846 6020
TAV-MW6	Iron	ND	0.033	0.100	NE	U		096845-009	SW846 6020
12-Nov-14	Manganese	ND	0.001	0.005	NE	U		096845-009	SW846 6020
TAV-MW7	Iron	0.135	0.033	0.100	NE			096819-009	SW846 6020
29-Oct-14	Manganese	ND	0.001	0.005	NE	U		096819-009	SW846 6020
TAV-MW8	Iron	ND	0.033	0.100	NE	U		096823-009	SW846 6020
31-Oct-14	Manganese	ND	0.001	0.005	NE	U		096823-009	SW846 6020
TAV-MW9	Iron	ND	0.033	0.100	NE	U		096811-009	SW846 6020
27-Oct-14	Manganese	0.00444	0.001	0.005	NE	J		096811-009	SW846 6020
TAV-MW10	Iron	ND	0.033	0.100	NE	U		096848-009	SW846 6020
13-Nov-14	Manganese	ND	0.001	0.005	NE	U		096848-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-7 *(Concluded)*
Summary of Filtered Metals Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	Iron	ND	0.033	0.100	NE	U		096833-009	SW846 6020
06-Nov-14	Manganese	ND	0.001	0.005	NE	U		096833-009	SW846 6020
TAV-MW11 (Duplicate)	Iron	ND	0.033	0.100	NE	U		096834-009	SW846 6020
06-Nov-14	Manganese	ND	0.001	0.005	NE	U		096834-009	SW846 6020
TAV-MW12	Iron	ND	0.033	0.100	NE	U		096842-009	SW846 6020
11-Nov-14	Manganese	ND	0.001	0.005	NE	U		096842-009	SW846 6020
TAV-MW13	Iron	0.0477	0.033	0.100	NE	J		096807-009	SW846 6020
23-Oct-14	Manganese	ND	0.001	0.005	NE	U		096807-009	SW846 6020
TAV-MW14	Iron	ND	0.033	0.100	NE	U		096838-009	SW846 6020
10-Nov-14	Manganese	ND	0.001	0.005	NE	U		096838-009	SW846 6020

Refer to footnotes on page 5A-89.

Table 5A-8
Summary of Gross Alpha, Gross Beta, Gamma Spectroscopy, and Tritium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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]
AVN-1	Americium-241	0.709 ± 5.87	10.2	4.96	NE	U	BD	095854-033	EPA 901.1
07-May-14	Cesium-137	-0.311 ± 1.92	3.35	1.60	NE	U	BD	095854-033	EPA 901.1
	Cobalt-60	-4.23 ± 3.63	3.81	1.80	NE	U	BD	095854-033	EPA 901.1
	Potassium-40	-18.4 ± 36.2	48.3	23.1	NE	U	BD	095854-033	EPA 901.1
	Gross Alpha	2.74	NA	NA	15 pCi/L	NA	None	095854-034	EPA 900.0
	Gross Beta	4.98 ± 1.30	1.47	0.709	4mrem/yr		J	095854-034	EPA 900.0
	Tritium	-65.5 ± 89.6	180	81.4	NE	U	BD	095854-036	EPA 906.0 M
LWDS-MW1	Americium-241	0.0043 ± 4.20	6.04	2.97	NE	U	BD	095869-033	EPA 901.1
19-May-14	Cesium-137	0.836 ± 2.55	4.42	2.13	NE	U	BD	095869-033	EPA 901.1
	Cobalt-60	-0.168 ± 2.71	4.05	1.90	NE	U	BD	095869-033	EPA 901.1
	Potassium-40	32.8 ± 53.9	39.7	18.5	NE	U	BD	095869-033	EPA 901.1
	Gross Alpha	4.37	NA	NA	15 pCi/L	NA	None	095869-034	EPA 900.0
	Gross Beta	3.64 ± 1.81	2.77	1.35	4mrem/yr		J	095869-034	EPA 900.0
	Tritium	-42.8 ± 91.3	179	80.8	NE	U	BD	095869-036	EPA 906.0 M
LWDS-MW2	Americium-241	-0.964 ± 12.0	18.6	9.10	NE	U	BD	095856-033	EPA 901.1
09-May-14	Cesium-137	-0.367 ± 2.45	4.18	2.00	NE	U	BD	095856-033	EPA 901.1
	Cobalt-60	-0.174 ± 2.28	4.02	1.88	NE	U	BD	095856-033	EPA 901.1
	Potassium-40	13.6 ± 50.2	37.9	17.6	NE	U	BD	095856-033	EPA 901.1
	Gross Alpha	3.25	NA	NA	15 pCi/L	NA	None	095856-034	EPA 900.0
	Gross Beta	4.02 ± 1.29	1.71	0.829	4mrem/yr		J	095856-034	EPA 900.0
	Tritium	-8.66 ± 96.4	181	81.8	NE	U	BD	095856-036	EPA 906.0 M
TAV-MW2	Americium-241	13.5 ± 13.9	20.1	9.82	NE	U	BD	095858-033	EPA 901.1
12-May-14	Cesium-137	0.583 ± 2.57	4.46	2.14	NE	U	BD	095858-033	EPA 901.1
	Cobalt-60	0.859 ± 2.51	4.48	2.11	NE	U	BD	095858-033	EPA 901.1
	Potassium-40	-8.63 ± 42.5	49.0	23.2	NE	U	BD	095858-033	EPA 901.1
	Gross Alpha	3.76	NA	NA	15 pCi/L	NA	None	095858-034	EPA 900.0
	Gross Beta	5.94 ± 1.47	1.58	0.769	4mrem/yr			095858-034	EPA 900.0
	Tritium	-66.3 ± 89.3	180	81.5	NE	U	BD	095858-036	EPA 906.0 M
TAV-MW3	Americium-241	-1.77 ± 5.89	10.1	4.94	NE	U	BD	095846-033	EPA 901.1
02-May-14	Cesium-137	-0.616 ± 1.98	3.42	1.64	NE	U	BD	095846-033	EPA 901.1
	Cobalt-60	2.62 ± 2.64	3.67	1.73	NE	U	BD	095846-033	EPA 901.1
	Potassium-40	-38.2 ± 44.9	44.6	21.2	NE	U	BD	095846-033	EPA 901.1
	Gross Alpha	2.69	NA	NA	15 pCi/L	NA	None	095846-034	EPA 900.0
	Gross Beta	3.40 ± 1.27	1.81	0.885	4mrem/yr		J	095846-034	EPA 900.0
	Tritium	11.5 ± 60.5	110	49.6	NE	U	BD	095846-036	EPA 906.0 M

Refer to footnotes on page 5A-89.

Table 5A-8 *(Continued)*
Summary of Gross Alpha, Gross Beta, Gamma Spectroscopy, and Tritium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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]
TAV-MW4 14-May-14	Americium-241	-2.37 ± 6.16	10.4	5.06	NE	U	BD	095864-033	EPA 901.1
	Cesium-137	0.446 ± 2.00	3.55	1.70	NE	U	BD	095864-033	EPA 901.1
	Cobalt-60	-1.28 ± 3.22	4.37	2.08	NE	U	BD	095864-033	EPA 901.1
	Potassium-40	2.58 ± 46.0	32.5	15.2	NE	U	BD	095864-033	EPA 901.1
	Gross Alpha	5.84	NA	NA	15 pCi/L	NA	None	095864-034	EPA 900.0
	Gross Beta	5.27 ± 1.37	1.55	0.754	4mrem/yr			095864-034	EPA 900.0
	Tritium	-56.4 ± 90.5	180	81.5	NE	U	BD	095864-036	EPA 906.0 M
TAV-MW4 (Duplicate) 14-May-14	Americium-241	8.40 ± 18.6	28.5	13.9	NE	U	BD	095865-033	EPA 901.1
	Cesium-137	0.552 ± 1.98	3.60	1.71	NE	U	BD	095865-033	EPA 901.1
	Cobalt-60	-0.421 ± 1.99	3.44	1.59	NE	U	BD	095865-033	EPA 901.1
	Potassium-40	-15.3 ± 39.4	53.7	25.5	NE	U	BD	095865-033	EPA 901.1
	Gross Alpha	4.11	NA	NA	15 pCi/L	NA	None	095865-034	EPA 900.0
	Gross Beta	4.77 ± 1.27	1.46	0.709	4mrem/yr			095865-034	EPA 900.0
	Tritium	-52.6 ± 91.2	181	81.8	NE	U	BD	095865-036	EPA 906.0 M
TAV-MW5 01-May-14	Americium-241	-3.03 ± 9.72	16.2	7.98	NE	U	BD	095842-033	EPA 901.1
	Cesium-137	-1.44 ± 2.22	2.99	1.45	NE	U	BD	095842-033	EPA 901.1
	Cobalt-60	-2.58 ± 3.05	3.24	1.54	NE	U	BD	095842-033	EPA 901.1
	Potassium-40	2.36 ± 37.3	29.9	14.2	NE	U	BD	095842-033	EPA 901.1
	Gross Alpha	1.87	NA	NA	15 pCi/L	NA	None	095842-034	EPA 900.0
	Gross Beta	3.43 ± 0.997	1.02	0.486	4mrem/yr		J	095842-034	EPA 900.0
	Tritium	7.23 ± 61.5	112	50.9	NE	U	BD	095842-036	EPA 906.0 M
TAV-MW5 (Duplicate) 01-May-14	Americium-241	5.34 ± 7.97	13.5	6.64	NE	U	BD	095843-033	EPA 901.1
	Cesium-137	0.606 ± 3.42	2.94	1.41	NE	U	BD	095843-033	EPA 901.1
	Cobalt-60	2.09 ± 2.07	3.52	1.67	NE	U	BD	095843-033	EPA 901.1
	Potassium-40	1.40 ± 38.2	43.8	21.0	NE	U	BD	095843-033	EPA 901.1
	Gross Alpha	4.33	NA	NA	15 pCi/L	NA	None	095843-034	EPA 900.0
	Gross Beta	4.87 ± 1.52	2.01	0.983	4mrem/yr		J	095843-034	EPA 900.0
	Tritium	23.0 ± 63.2	112	50.8	NE	U	BD	095843-036	EPA 906.0 M
TAV-MW6 22-May-14	Americium-241	5.41 ± 7.95	12.3	6.00	NE	U	BD	095879-033	EPA 901.1
	Cesium-137	-2.81 ± 4.00	3.68	1.78	NE	U	BD	095879-033	EPA 901.1
	Cobalt-60	-0.569 ± 1.77	3.07	1.44	NE	U	BD	095879-033	EPA 901.1
	Potassium-40	44.2 ± 28.7	44.3	19.3	NE	U	BD	095879-033	EPA 901.1
	Gross Alpha	5.27	NA	NA	15 pCi/L	NA	None	095879-034	EPA 900.0
	Gross Beta	4.65 ± 1.36	1.53	0.727	4mrem/yr			095879-034	EPA 900.0
	Tritium	6.85 ± 97.9	181	81.5	NE	U	BD	095879-036	EPA 906.0 M

Refer to footnotes on page 5A-89.

Table 5A-8 *(Continued)*
Summary of Gross Alpha, Gross Beta, Gamma Spectroscopy, and Tritium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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]
TAV-MW7	Americium-241	13.7 ± 13.8	19.3	9.40	NE	U	BD	095852-033	EPA 901.1
06-May-14	Cesium-137	-0.436 ± 2.23	3.81	1.81	NE	U	BD	095852-033	EPA 901.1
	Cobalt-60	-2.64 ± 4.64	5.06	2.40	NE	U	BD	095852-033	EPA 901.1
	Potassium-40	-13.9 ± 38.0	52.9	25.1	NE	U	BD	095852-033	EPA 901.1
	Gross Alpha	3.94	NA	NA	15 pCi/L	NA	None	095852-034	EPA 900.0
	Gross Beta	7.06 ± 1.66	1.72	0.834	4mrem/yr		J	095852-034	EPA 900.0
	Tritium	-73.6 ± 88.6	180	81.5	NE	U	BD	095852-036	EPA 906.0 M
TAV-MW8	Americium-241	-6.42 ± 7.61	11.4	5.57	NE	U	BD	095860-033	EPA 901.1
13-May-14	Cesium-137	-1.5 ± 2.77	3.28	1.56	NE	U	BD	095860-033	EPA 901.1
	Cobalt-60	-1.42 ± 3.78	4.21	1.99	NE	U	BD	095860-033	EPA 901.1
	Potassium-40	9.39 ± 41.0	30.3	14.0	NE	U	BD	095860-033	EPA 901.1
	Gross Alpha	3.54	NA	NA	15 pCi/L	NA	None	095860-034	EPA 900.0
	Gross Beta	5.01 ± 1.39	1.69	0.820	4mrem/yr		J	095860-034	EPA 900.0
	Tritium	-0.232 ± 97.2	180	81.6	NE	U	BD	095860-036	EPA 906.0 M
TAV-MW9	Americium-241	-0.715 ± 18.1	27.8	13.5	NE	U	BD	095849-033	EPA 901.1
05-May-14	Cesium-137	0.443 ± 2.24	3.96	1.89	NE	U	BD	095849-033	EPA 901.1
	Cobalt-60	1.54 ± 2.41	4.39	2.06	NE	U	BD	095849-033	EPA 901.1
	Potassium-40	49.5 ± 46.7	37.3	17.3	NE	X	R	095849-033	EPA 901.1
	Gross Alpha	1.75	NA	NA	15 pCi/L	NA	None	095849-034	EPA 900.0
	Gross Beta	5.16 ± 1.76	1.84	0.822	4mrem/yr		J	095849-034	EPA 900.0
	Tritium	-82 ± 87.5	181	81.7	NE	U	BD	095849-036	EPA 906.0 M
TAV-MW10	Americium-241	12.0 ± 12.1	16.6	8.14	NE	U	BD	095881-033	EPA 901.1
27-May-14	Cesium-137	0.394 ± 1.98	3.43	1.65	NE	U	BD	095881-033	EPA 901.1
	Cobalt-60	0.286 ± 2.03	3.64	1.72	NE	U	BD	095881-033	EPA 901.1
	Potassium-40	-35.9 ± 46.9	43.8	20.9	NE	U	BD	095881-033	EPA 901.1
	Gross Alpha	3.87	NA	NA	15 pCi/L	NA	None	095881-034	EPA 900.0
	Gross Beta	3.18 ± 1.42	2.08	1.01	4mrem/yr		J	095881-034	EPA 900.0
	Tritium	34.7 ± 101	180	81.3	NE	U	BD	095881-036	EPA 906.0 M
TAV-MW11	Americium-241	-76.6 ± 36.2	7.36	3.61	NE	U	R	095867-033	EPA 901.1
15-May-14	Cesium-137	-1.91 ± 3.07	4.93	2.35	NE	U	R	095867-033	EPA 901.1
	Cobalt-60	-0.351 ± 2.92	5.15	2.39	NE	U	R	095867-033	EPA 901.1
	Potassium-40	25.5 ± 47.6	68.4	32.4	NE	U	R	095867-033	EPA 901.1
	Gross Alpha	2.72	NA	NA	15 pCi/L	NA	None	095867-034	EPA 900.0
	Gross Beta	4.30 ± 1.18	1.39	0.673	4mrem/yr			095867-034	EPA 900.0
	Tritium	-42.3 ± 92.4	181	81.7	NE	U	BD	095867-036	EPA 906.0 M

Refer to footnotes on page 5A-89.

Table 5A-8 *(Concluded)*
Summary of Gross Alpha, Gross Beta, Gamma Spectroscopy, and Tritium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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]
TAV-MW11 (Reanalysis)	Americium-241	-1.62 ± 10.7	16.5	8.10	NE	U	BD	095867-R33	EPA 901.1
15-May-14	Cesium-137	2.44 ± 2.42	3.86	1.87	NE	U	BD	095867-R33	EPA 901.1
	Cobalt-60	2.29 ± 4.17	4.17	1.99	NE	U	BD	095867-R33	EPA 901.1
	Potassium-40	-15.1 ± 36.7	43.8	20.9	NE	U	BD	095867-R33	EPA 901.1
TAV-MW12	Americium-241	-9.17 ± 8.59	9.69	4.74	NE	U	BD	095877-033	EPA 901.1
21-May-14	Cesium-137	2.67 ± 2.65	3.34	1.61	NE	U	BD	095877-033	EPA 901.1
	Cobalt-60	1.02 ± 1.99	3.59	1.70	NE	U	BD	095877-033	EPA 901.1
	Potassium-40	94.8 ± 41.2	32.3	15.2	NE		J	095877-033	EPA 901.1
	Gross Alpha	3.53	NA	NA	15 pCi/L	NA	None	095877-034	EPA 900.0
	Gross Beta	4.59 ± 1.28	1.53	0.740	4mrem/yr			095877-034	EPA 900.0
	Tritium	-35.8 ± 92.7	181	81.5	NE	U	BD	095877-036	EPA 906.0 M
TAV-MW13	Americium-241	-0.0886 ± 6.71	10.4	5.11	NE	U	BD	095838-033	EPA 901.1
30-Apr-14	Cesium-137	-4.37 ± 3.47	2.87	1.38	NE	U	BD	095838-033	EPA 901.1
	Cobalt-60	0.881 ± 1.87	3.32	1.58	NE	U	BD	095838-033	EPA 901.1
	Potassium-40	37.8 ± 40.3	30.9	14.6	NE	X	R	095838-033	EPA 901.1
	Gross Alpha	4.14	NA	NA	15 pCi/L	NA	None	095838-034	EPA 900.0
	Gross Beta	3.64 ± 1.11	1.28	0.619	4mrem/yr		J	095838-034	EPA 900.0
	Tritium	12.8 ± 58.9	106	48.2	NE	U	BD	095838-036	EPA 906.0 M
TAV-MW14	Americium-241	-6.63 ± 14.6	24.7	12.0	NE	U	BD	095874-033	EPA 901.1
20-May-14	Cesium-137	-1.74 ± 1.92	2.97	1.41	NE	U	BD	095874-033	EPA 901.1
	Cobalt-60	-3.06 ± 3.46	3.19	1.48	NE	U	BD	095874-033	EPA 901.1
	Potassium-40	8.17 ± 38.0	47.6	22.6	NE	U	BD	095874-033	EPA 901.1
	Gross Alpha	4.79	NA	NA	15 pCi/L	NA	None	095874-034	EPA 900.0
	Gross Beta	5.11 ± 1.32	1.48	0.713	4mrem/yr			095874-034	EPA 900.0
	Tritium	-32.6 ± 93.4	182	81.8	NE	U	BD	095874-036	EPA 906.0 M
TAV-MW14 (Duplicate)	Americium-241	-2.09 ± 11.8	18.1	8.84	NE	U	BD	095875-033	EPA 901.1
20-May-14	Cesium-137	3.22 ± 3.38	3.52	1.68	NE	U	BD	095875-033	EPA 901.1
	Cobalt-60	-1.24 ± 2.29	3.75	1.76	NE	U	BD	095875-033	EPA 901.1
	Potassium-40	-2.43 ± 43.3	49.0	23.3	NE	U	BD	095875-033	EPA 901.1
	Gross Alpha	3.19	NA	NA	15 pCi/L	NA	None	095875-034	EPA 900.0
	Gross Beta	4.99 ± 1.32	1.49	0.718	4mrem/yr			095875-034	EPA 900.0
	Tritium	-43.1 ± 91.7	181	81.4	NE	U	BD	095875-036	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 2014

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	19-Feb-14	20.01	358.1	260.6	7.78	1.58	45.1	4.10
LWDS-MW1	03-Mar-14	17.42	583.9	281.1	7.59	0.51	74.9	7.16
LWDS-MW2	20-Feb-14	18.46	385.9	292.8	7.69	0.33	47.1	4.45
TAV-MW2	21-Feb-14	18.75	600.8	284.9	7.40	9.07	52.8	4.90
TAV-MW4	24-Feb-14	19.67	441.6	278.6	7.69	0.98	72.6	6.62
TAV-MW6	05-Mar-14	19.61	590	310.7	7.57	3.90	75.9	6.93
TAV-MW8	25-Feb-14	20.26	513.1	298.6	7.61	11.4	70.0	6.29
TAV-MW10	06-Mar-14	19.56	543	305.3	7.60	0.18	77.0	7.05
TAV-MW11	26-Feb-14	19.42	488.5	286.5	7.64	0.29	74.7	6.87
TAV-MW12	04-Mar-14	18.97	519.3	298.4	7.58	9.01	56.9	5.26
TAV-MW13	18-Feb-14	20.71	464.1	244.6	7.59	0.37	31.7	2.84
TAV-MW14	27-Feb-14	18.68	551.6	289.1	7.56	2.60	75.0	6.98
AVN-1	07-May-14	20.39	395.8	241.8	7.65	0.75	43.9	3.96
LWDS-MW1	19-May-14	21.70	706.2	260.8	7.50	0.28	87.7	7.70
LWDS-MW2	09-May-14	19.74	436.6	236.7	7.54	0.28	50.1	4.56
TAV-MW2	12-May-14	19.68	672.9	239.7	7.36	0.50	55.2	5.03
TAV-MW3	02-May-14	20.66	524.0	243.6	7.66	0.74	68.8	6.16
TAV-MW4	14-May-14	20.06	488.9	294.5	7.65	1.56	76.6	6.94
TAV-MW5	01-May-14	20.83	477.0	232.9	7.69	0.51	54.6	4.88
TAV-MW6	22-May-14	20.86	661.5	313.2	7.46	3.04	80.3	7.16
TAV-MW7	06-May-14	20.76	580.0	128.8	7.52	3.85	3.2	0.28
TAV-MW8	13-May-14	15.34	500.3	252.5	7.58	6.80	67.8	6.69
TAV-MW9	05-May-14	20.79	574.9	62.6	7.40	1.08	13.9	1.24
TAV-MW10	27-May-14	21.89	621.8	300.6	7.54	0.17	83.7	7.32
TAV-MW11	15-May-14	20.34	547.1	295.7	7.59	0.17	80.0	7.20
TAV-MW12	21-May-14	21.91	602.4	299.9	7.44	3.51	70.4	6.15
TAV-MW13	30-Apr-14	19.81	496.4	173.6	7.64	0.44	25.7	2.33
TAV-MW14	20-May-14	20.73	628.4	282.1	7.45	1.52	79.7	7.12

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 2014

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmho/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
AVN-1	24-Jul-14	23.34	412.1	298.1	7.68	0.54	45.1	3.84
LWDS-MW1	11-Aug-14	22.64	702.5	283.4	7.46	0.35	87.8	7.56
LWDS-MW2	29-Jul-14	20.78	436.0	296.1	7.55	0.31	50.0	4.44
TAV-MW2	09-Sep-14	20.86	722.7	337.9	7.03	2.72	57.3	5.11
TAV-MW4	30-Jul-14	20.81	483.7	321.2	7.54	0.50	74.5	6.61
TAV-MW6	06-Aug-14	20.95	646.4	313.8	7.40	3.74	79.6	7.09
TAV-MW8	28-Jul-14	22.06	567.5	273.2	7.44	1.37	73.3	6.40
TAV-MW10	07-Aug-14	21.60	602.1	318.8	7.40	0.26	81.8	7.20
TAV-MW11	31-Jul-14	21.85	554.8	305.8	7.50	0.21	80.8	7.04
TAV-MW12	05-Aug-14	21.88	598.4	290.5	7.44	6.80	57.5	5.02
TAV-MW13	23-Jul-14	22.00	509.0	184.6	7.42	0.34	25.3	2.20
TAV-MW14	04-Aug-14	21.20	619.5	306.5	7.42	1.45	80.1	7.11
AVN-1	30-Oct-14	20.85	419.7	261.1	7.72	1.51	43.9	3.92
LWDS-MW1	17-Nov-14	16.30	651.3	284.6	7.77	0.48	76.8	7.43
LWDS-MW2	03-Nov-14	19.86	460.4	253.7	7.61	0.43	50.0	4.53
TAV-MW2	04-Nov-14	17.01	656.0	258.5	7.34	0.58	54.1	5.29
TAV-MW3	28-Oct-14	18.72	526.4	268.5	7.54	0.95	63.4	5.89
TAV-MW4	05-Nov-14	18.71	494.9	301.8	7.57	1.01	74.7	6.85
TAV-MW5	24-Oct-14	21.48	509.3	250.0	7.52	0.19	53.8	4.74
TAV-MW6	12-Nov-14	18.92	666.9	269.0	7.47	1.92	76.5	7.06
TAV-MW7	29-Oct-14	21.26	615.4	106.2	7.37	0.68	3.9	0.34
TAV-MW8	31-Oct-14	18.89	573.7	252.3	7.52	1.17	71.4	6.59
TAV-MW9	27-Oct-14	20.01	615.5	52.0	7.24	0.89	12.1	1.10
TAV-MW10	13-Nov-14	17.26	588.8	260.3	7.51	0.26	74.7	7.17
TAV-MW11	06-Nov-14	20.38	574.7	256.1	7.49	0.20	79.2	7.13
TAV-MW12	11-Nov-14	20.32	612.9	275.7	7.42	1.54	68.5	6.18
TAV-MW13	23-Oct-14	21.01	536.9	233.7	7.45	0.47	26.0	2.30
TAV-MW14	10-Nov-14	20.44	654.1	276.9	7.45	1.23	78.1	7.03

Refer to footnotes on page 5A-89.

Footnotes for Technical Area-V Analytical Results Tables

% = Percent.
AVN = Area V (North).
CFR = Code of Federal Regulations.
EPA = U.S. Environmental Protection Agency.
ID = Identification.
LWDS = Liquid Waste Disposal System.
µg/L = Micrograms per liter.
mg/L = Milligrams per liter.
mrem/yr = Millirem per year.
MW = Monitoring well.
No. = Number.
pCi/L = Picocuries per liter.
TAV = Technical Area-V (well).

[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 5A-1 through 5A-7. MDA applies to 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 Table 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. Established by the EPA Office of Water, National Primary Drinking Water Standards, (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- 15 pCi/L = Gross alpha particle activity, excluding total uranium (40 CFR Parts 9, 141, and 142, Table 5A-1-4).
- 4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (as dose rate).

NE = Not established.

Footnotes for Technical Area-V 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 or % relative percent difference (RPD) not within acceptance limits, and/or spike amount not compatible with the sample, or the duplicate RPD's are not applicable where the concentrations falls below the effective PQL.
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 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 numerical value is an estimated quantity with a suspected positive bias.
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.
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.

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.
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 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.

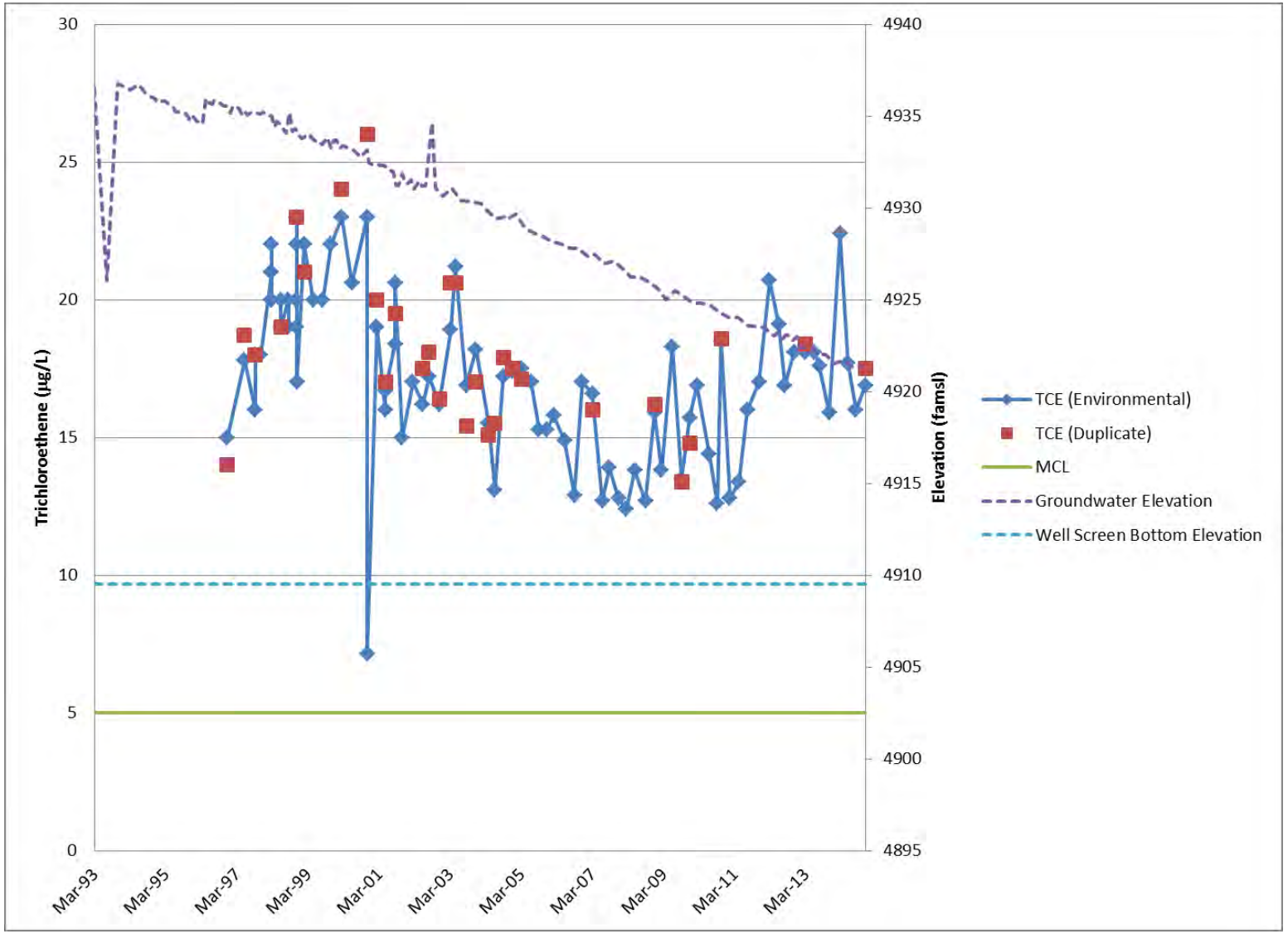
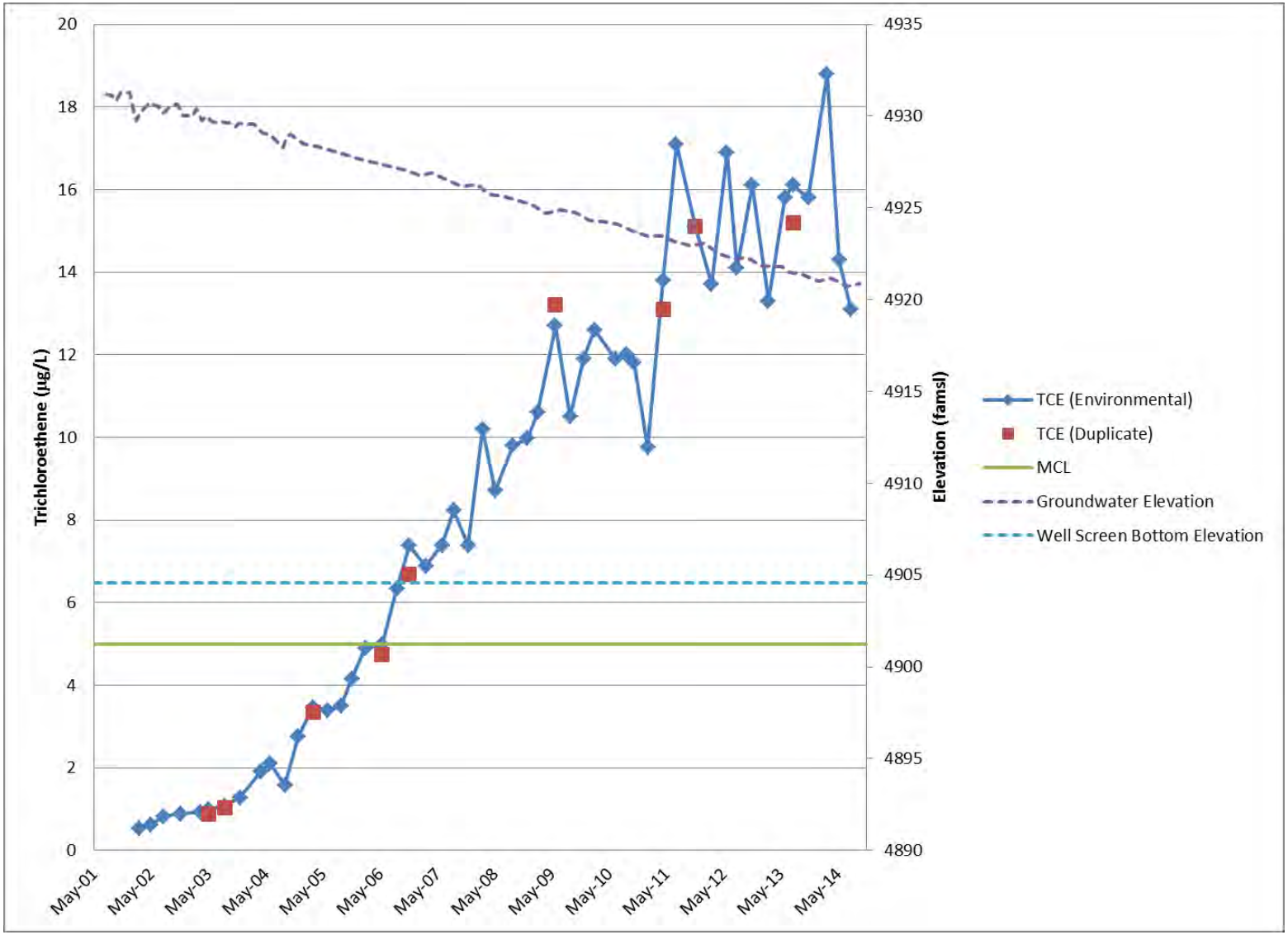


Figure 5B-1. Trichloroethene Concentrations, LWDS-MW1



Note: TCE was not detected in the sample collected in November 2014.

Figure 5B-2. Trichloroethene Concentrations, TAV-MW6

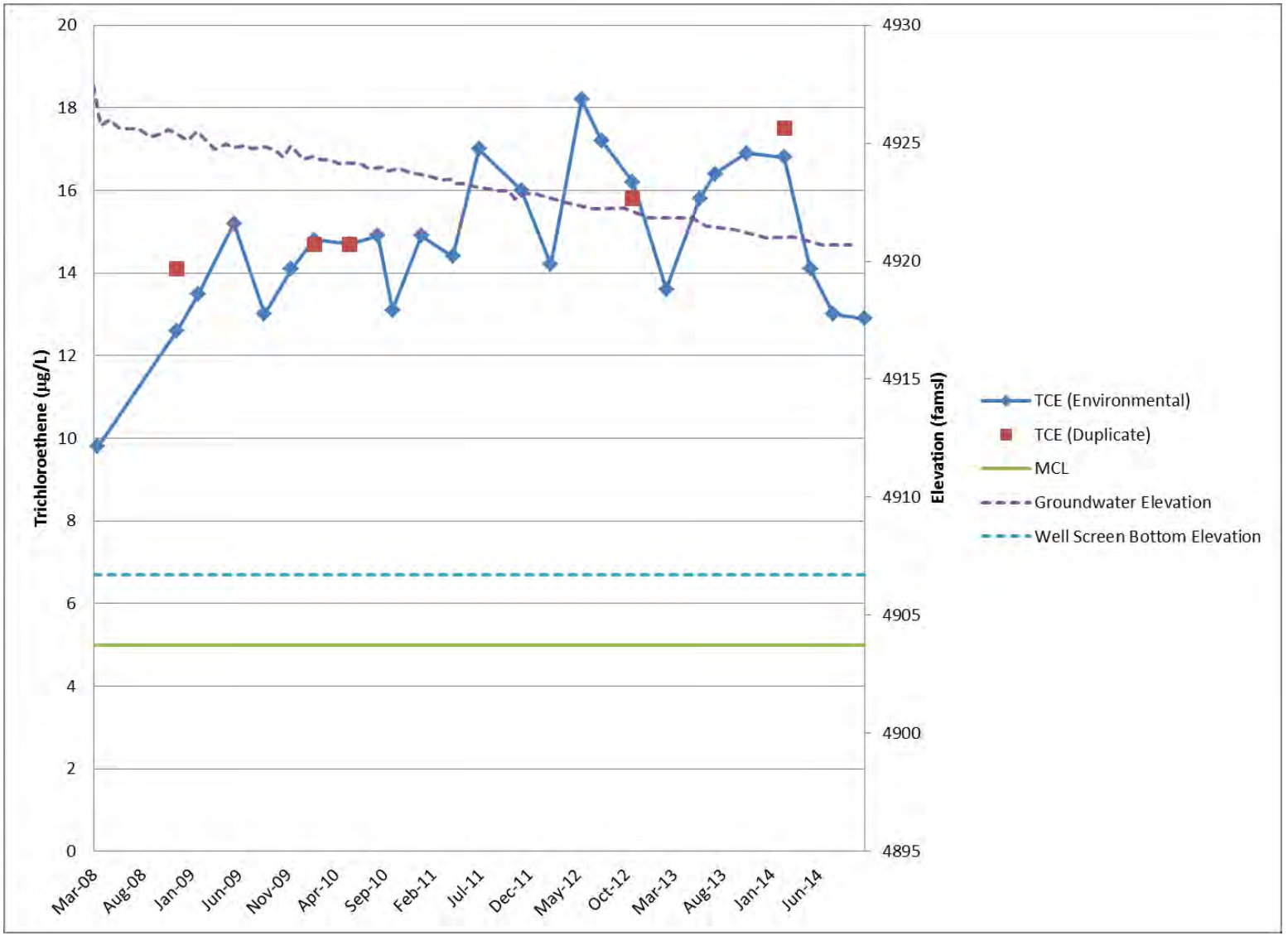


Figure 5B-3. Trichloroethene Concentrations, TAV-MW10

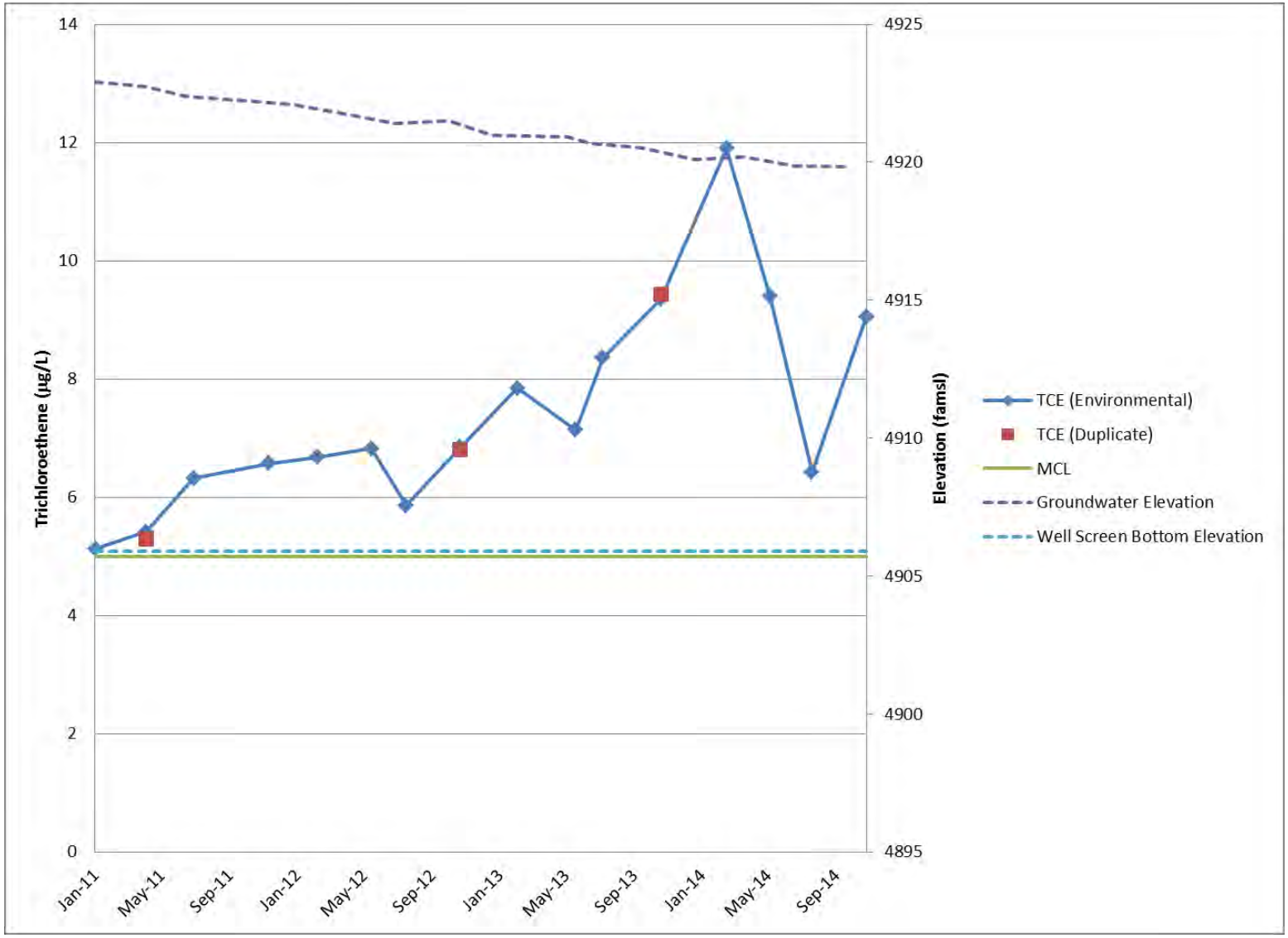
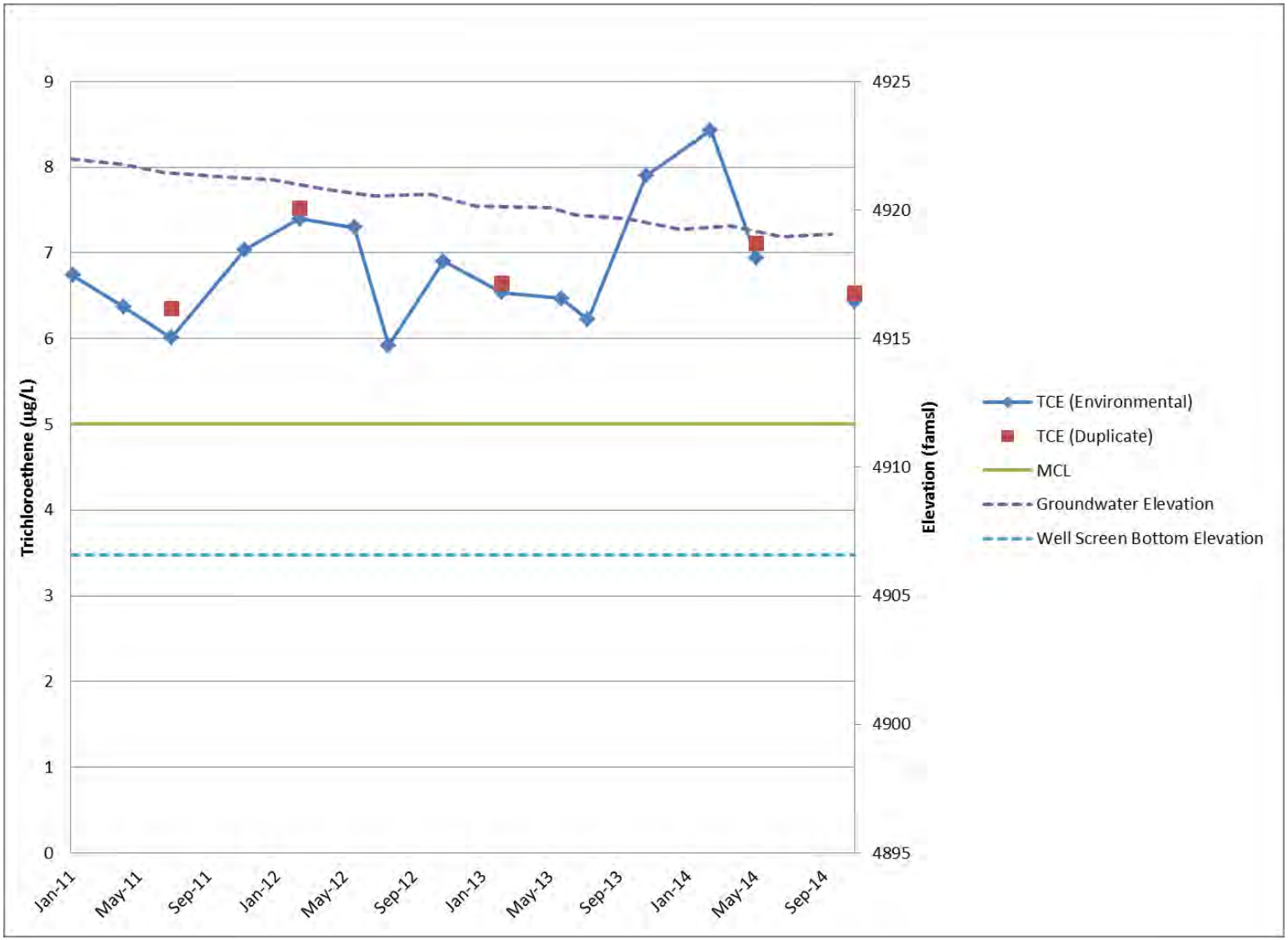


Figure 5B-4. Trichloroethene Concentrations, TAV-MW12



Note: TCE was not detected in the sample collected in August 2014.

Figure 5B-5. Trichloroethene Concentrations, TAV-MW14

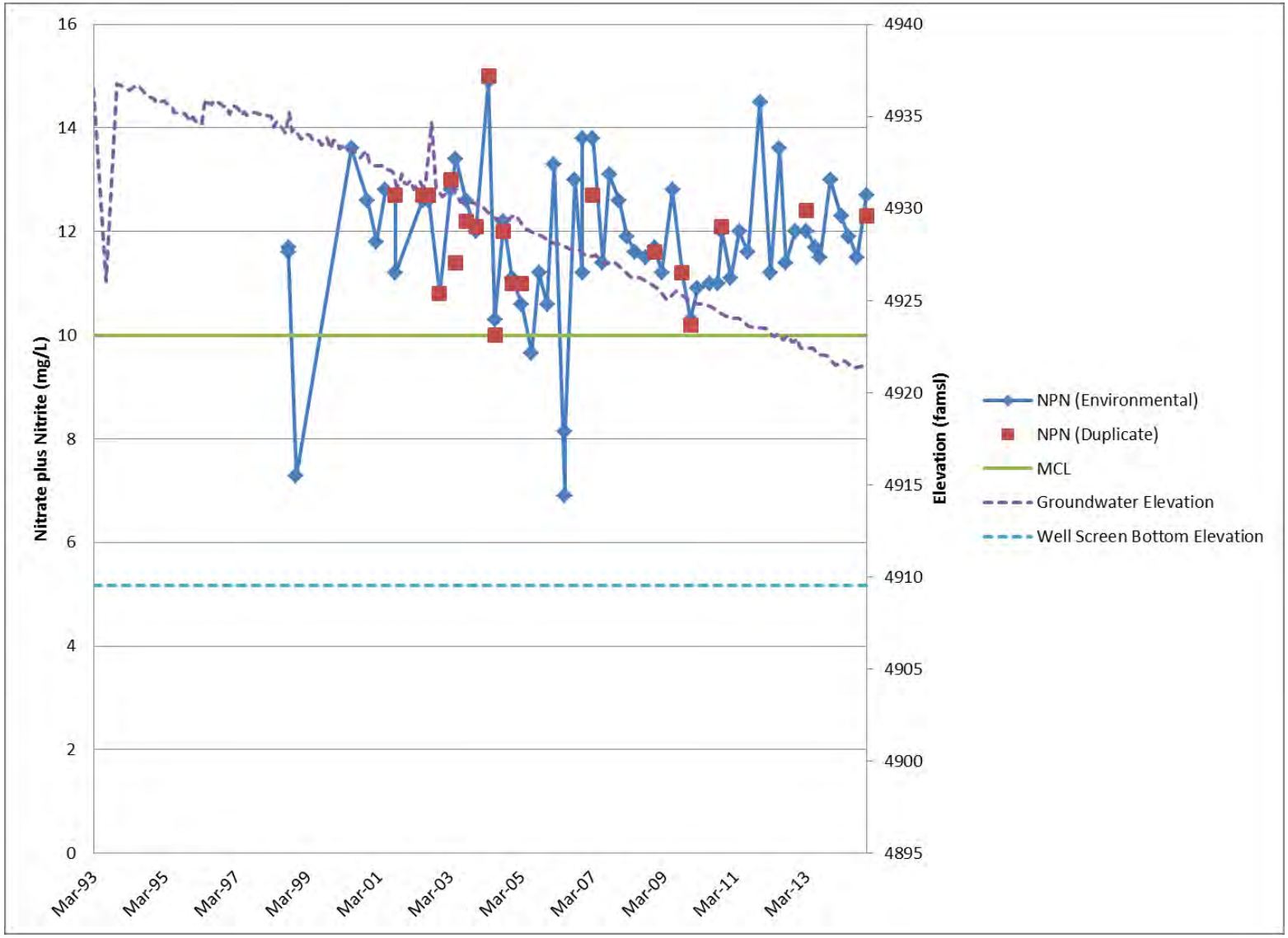


Figure 5B-6. Nitrate Plus Nitrite Concentrations, LWDS-MW1

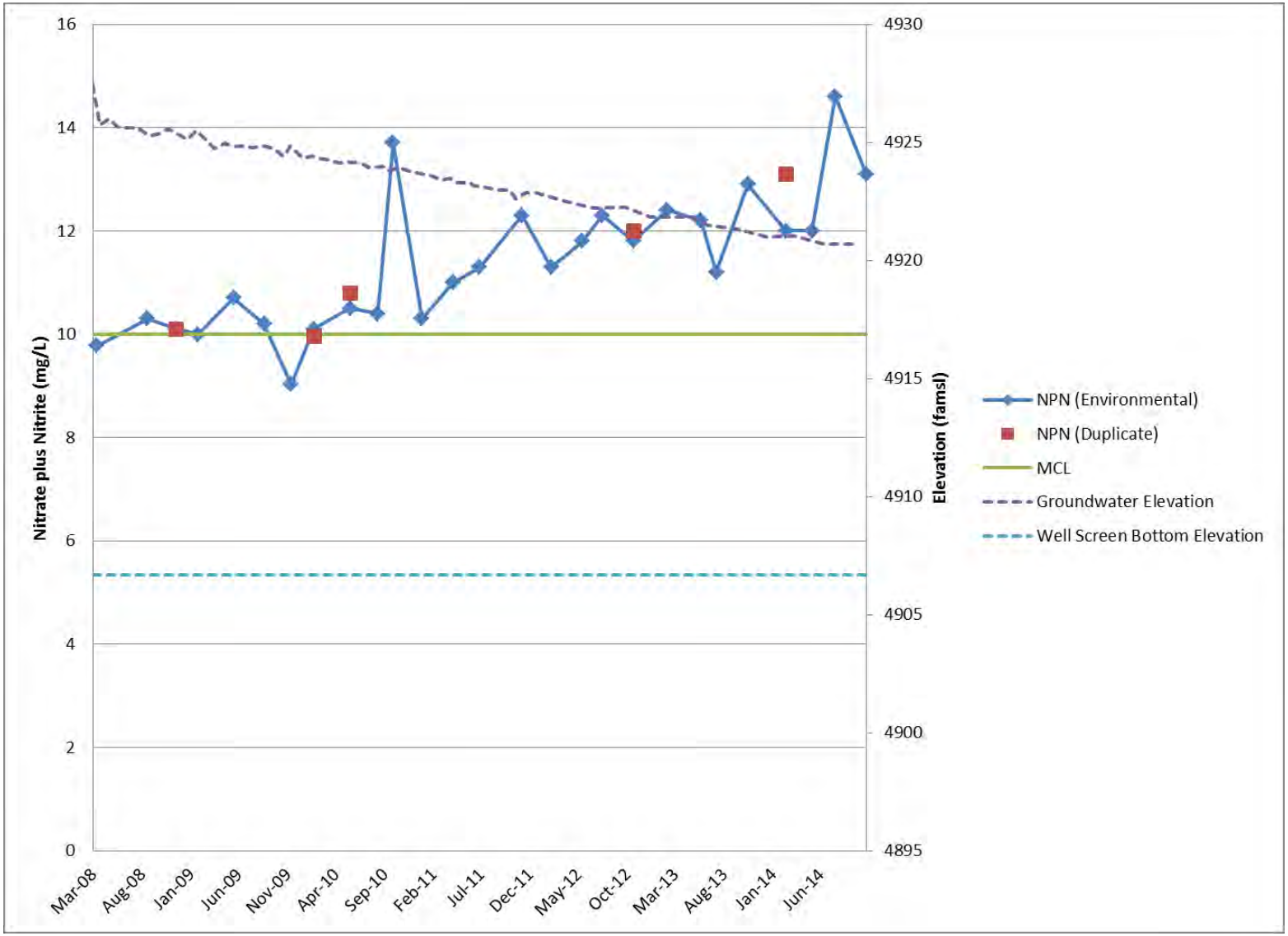


Figure 5B-7. Nitrate Plus Nitrite Concentrations, TAV-MW10

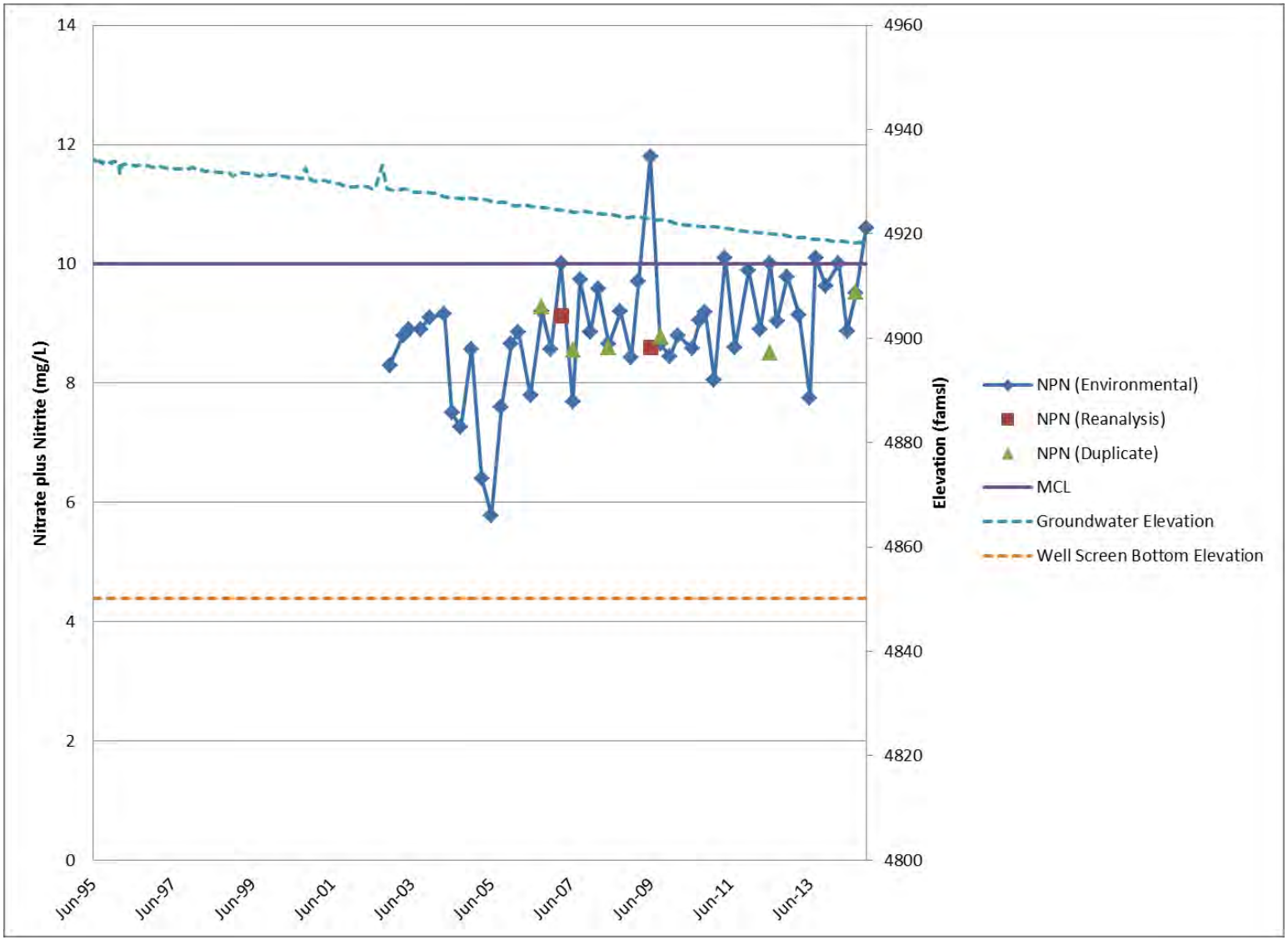


Figure 5B-8. Nitrate Plus Nitrite Concentrations, AVN-1

Attachment 5C
Technical Area-V
Hydrographs

This page intentionally left blank.

Attachment 5C Hydrographs

5C-1 TAVG AOC Wells (1 of 3)..... 5C-5

5C-2 TAVG AOC Wells (2 of 3)..... 5C-6

5C-3 TAVG AOC Wells (3 of 3)..... 5C-7

This page intentionally left blank.

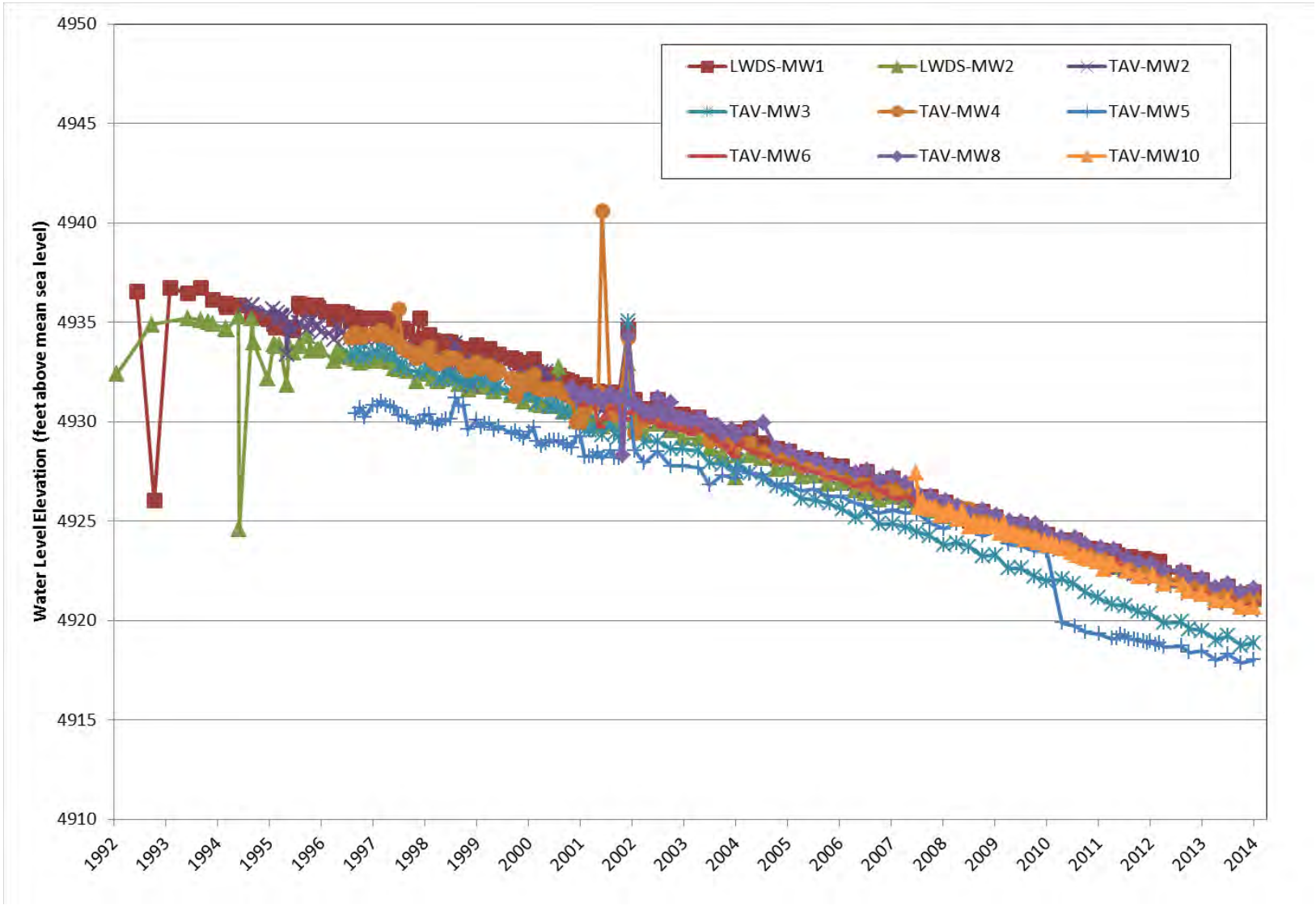


Figure 5C-1. TAVG AOC Wells (1 of 3)

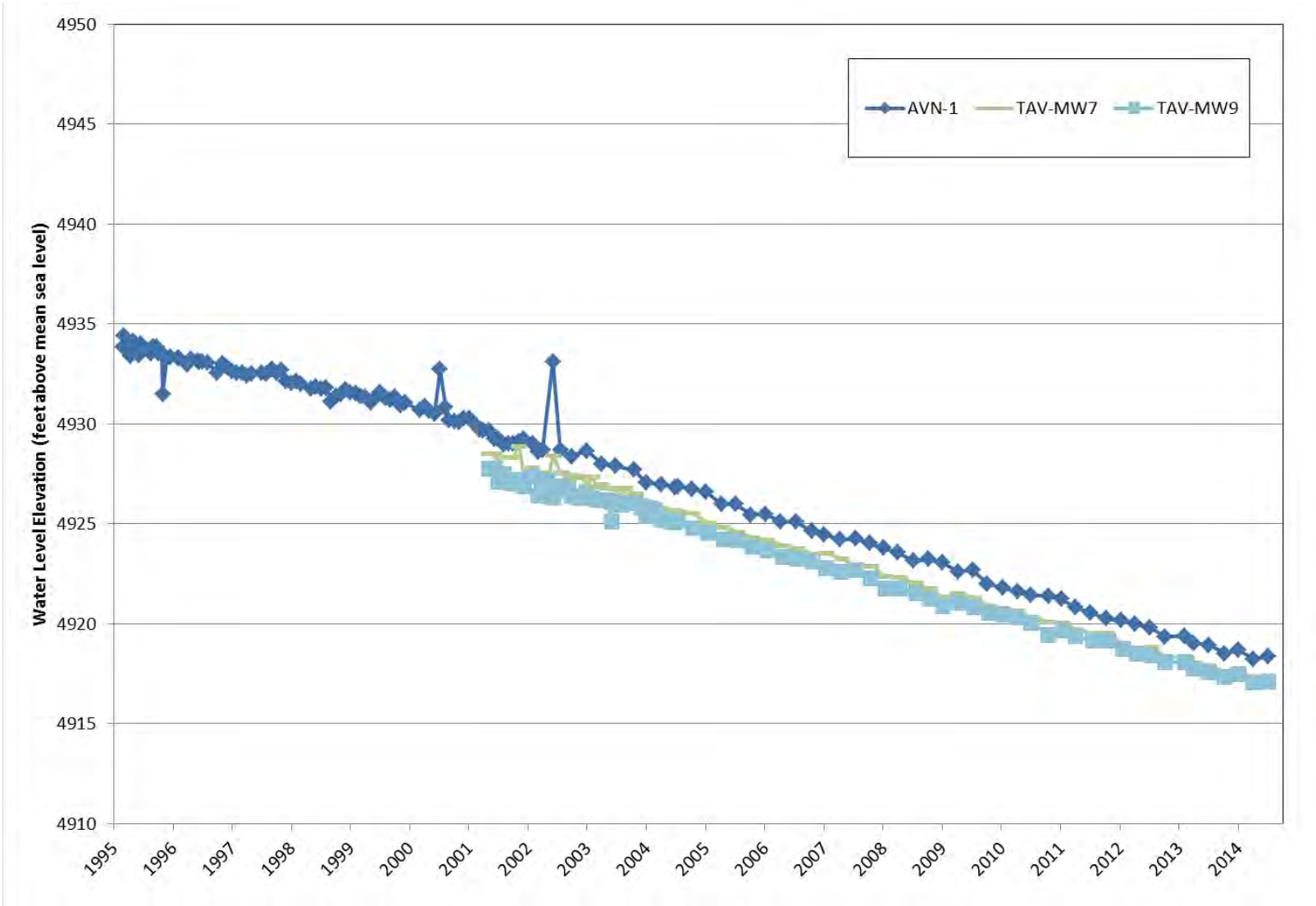


Figure 5C-2. TAVG AOC Wells (2 of 3)

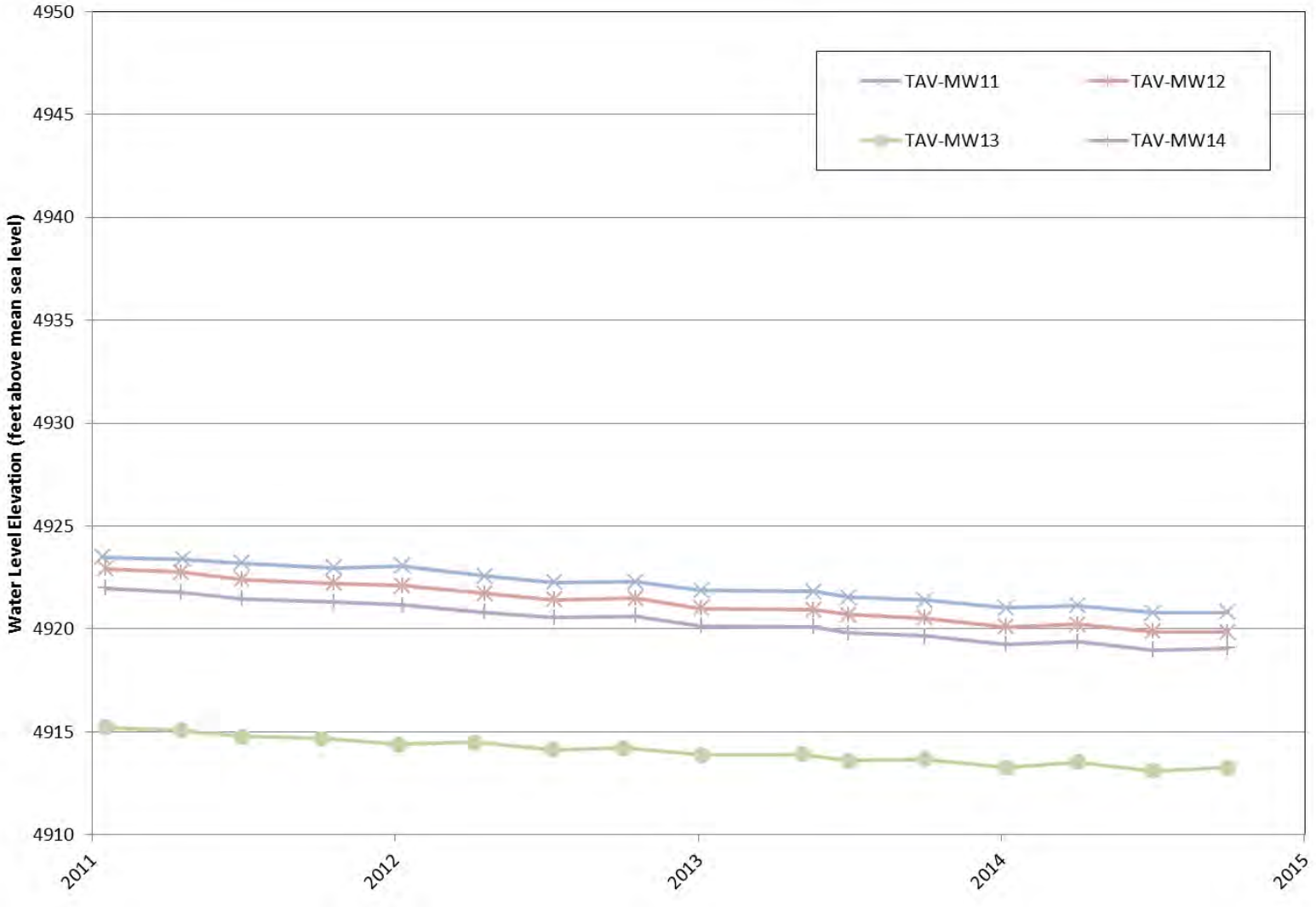


Figure 5C-3. TAVG AOC Wells (3 of 3)

This page intentionally left blank.

6.0 Tijeras Arroyo Groundwater Area of Concern

6.1 Introduction

Trichloroethene (TCE) and nitrate have been identified as constituents of concern (COCs) in groundwater at the Tijeras Arroyo Groundwater (TAG) Area of Concern (AOC) 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 AOC monitoring wells. Since August 1996, the historical maximum TCE concentration detected at the site has been 10.5 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 AOC 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 both the PGWS and the regional aquifer.

6.1.1 Location

The TAG AOC encompasses approximately 40 square miles (sq mi) in the north-central portion of Kirtland Air Force Base (KAFB) and adjoining Albuquerque (Figure 6-1). Three of the five Technical Areas (TAs) at Sandia National Laboratories, New Mexico (SNL/NM) are within the TAG AOC. Together, the three TAs (TA-I, TA-II, and TA-IV) encompass approximately 641 acres.

The parties identified as potentially responsible for groundwater contamination within the TAG AOC include the U.S. Department of Energy (DOE)/National Nuclear Security Administration (NNSA) and its contractor Sandia Corporation (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 the former 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 surplus 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 out-of-state manufacturing facilities and the early work at SNL/NM concentrated on prototype research and manufacturing of experimental devices.

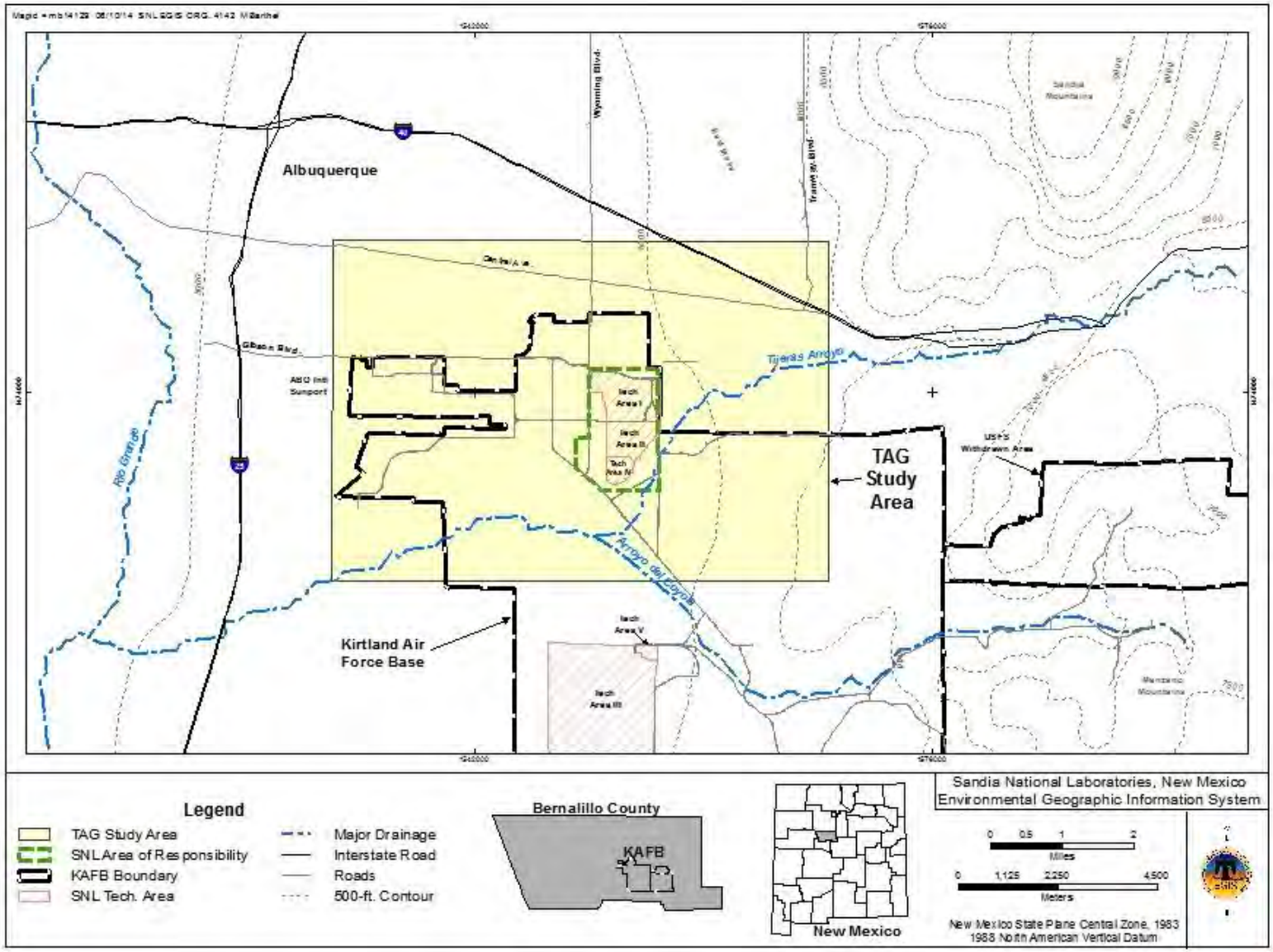


Figure 6-1. Location of the TAG AOC

Since 1949, SNL/NM has grown from 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 the ER Project) has conducted numerous groundwater investigations in the TAG AOC 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 AOC 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 AOC, the results of which are presented in the TAG Investigation Report (SNL November 2005).

6.1.3 Monitoring History

Investigations of groundwater quality in the TAG AOC 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. The regional aquifer is present at approximately 500 ft bgs beneath TA-II.

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 TAG 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 in groundwater at the TAG AOC, numerous characterization activities have been conducted (Table 6-1). Results of these characterization activities are summarized in the TAG 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 Consent Order) became effective between the DOE, Sandia, and the NMED, and the Consent Order specifies TAG as an area of groundwater contamination (NMED April 2004). In response to the Consent Order, DOE/Sandia submitted the TAG Corrective Measures Evaluation (CME) Work Plan to the NMED in July 2004 (SNL July 2004). After fulfilling the requirements of the CME Work Plan, DOE/Sandia submitted the CME Report to the NMED (SNL August 2005).

Table 6-1. Historical Timeline of the TAG AOC

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 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	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

Refer to footnotes on page 6-6.

Table 6-1. Historical Timeline of the TAG AOC *(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 Consent 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

Refer to footnotes on page 6-6.

Table 6-1. Historical Timeline of the TAG AOC *(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 AOC.	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
September	2014	Groundwater sampling analytical results for TAG wells reported in the CY 2013 SNL/NM Annual Groundwater Monitoring Report.	SNL September 2014
December	2014	Installed monitoring well TA2-W-28, Plugged and abandoned nearby monitoring well TA2-SW1-320.	Pending

NOTES:
µg/L = Microgram(s) per liter.
AOC = Area of Concern.
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.
The Consent Order = the Compliance Order on Consent.
USGS = U.S. Geological Survey.

Table XI-1 of the Consent 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, 22 wells in the TAG AOC are monitored for water quality, and 31 wells are monitored for water levels (Figure 6-2; Table 6-2). Two groundwater systems are present in the TAG AOC: the PGWS at approximately 269 to 340 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 2014 Activities

The following activities took place for the TAG investigation during Calendar Year (CY) 2014:

- Quarterly or annual water level measurements were obtained from TAG wells.
- Quarterly groundwater sampling events were conducted at eight locations (TA2-SW1-320 [and replacement well TA2-W-28], TA2-W-19, TA2-W-26, TJA-2, TJA-3, TJA-4, TJA-7, and WYO-4) in March, May/June, August/September, and November/December 2014 (SNL February 2014, May 2014, July 2014, and October 2014). The monitoring well TA2-SW1-320 was replaced with well TA2-W-28 in December 2014.
- Semiannual groundwater sampling was conducted at four wells (TA1-W-06, TA2-W-01, TA2-W-27, and TJA-6) in March 2014 and August/September 2014 (SNL February 2014 and July 2014).
- 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 2014 (SNL July 2014).
- 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 2015):

- Quarterly or annual water level measurements for TAG wells.
- Quarterly groundwater sampling at eight wells: TA2-W-19, TA2-W-26, TA2-W-28, 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.

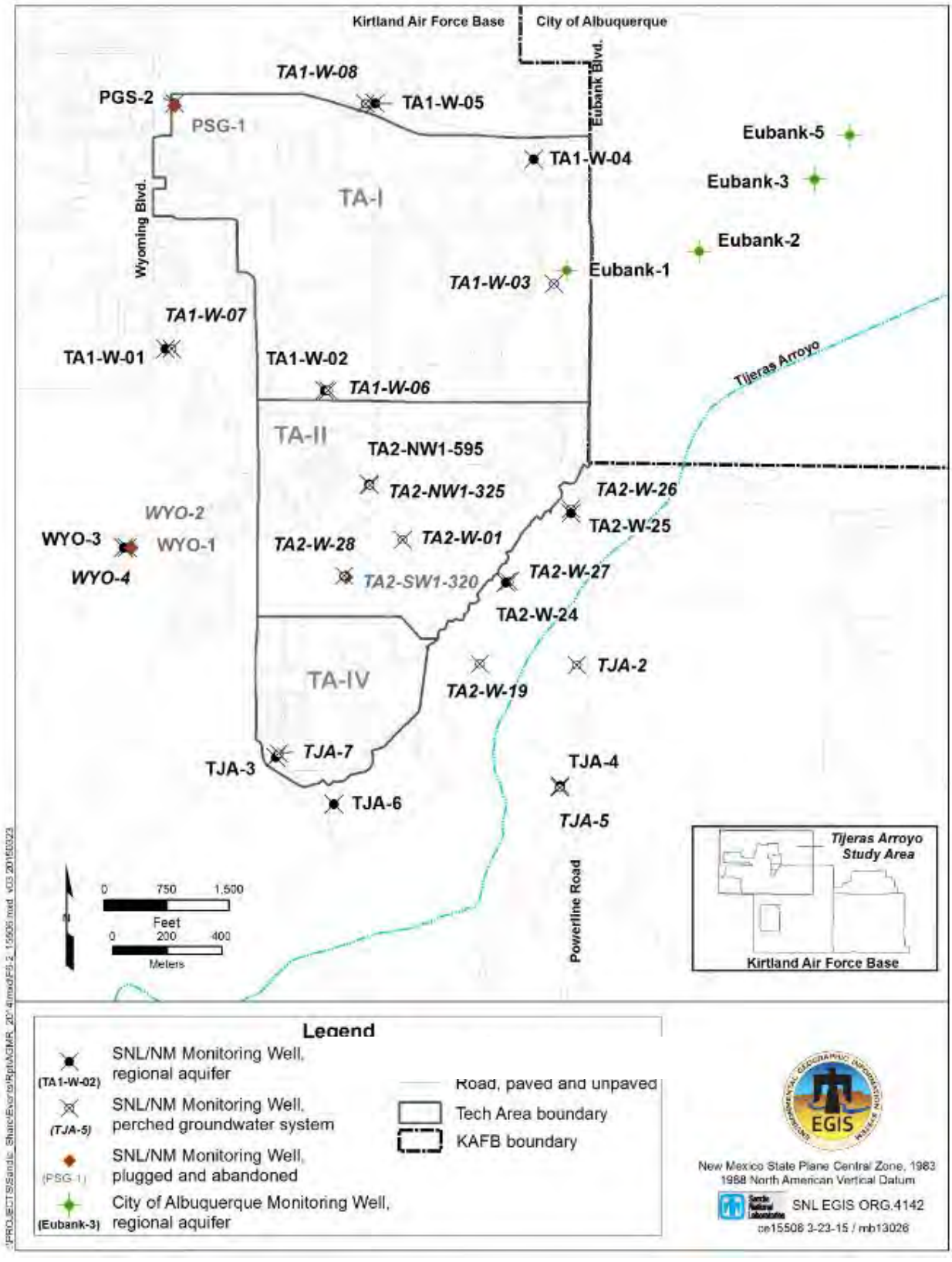


Figure 6-2. TAG Investigation Monitoring Well Locations

Table 6-2. Groundwater Monitoring Wells in the TAG AOC

Well ID	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
TA2-W-28	2014	✓	✓	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.

AOC = Area of Concern.
COA = City of Albuquerque.
ID = Identification.
PGWS = Perched Groundwater System.
TAG = Tijeras Arroyo Groundwater.
WL = Water level.
WQ = Water quality.

6.1.7 Conceptual Model

Two groundwater systems are present in the TAG AOC: the PGWS at approximately 269 to 340 ft bgs, and the regional aquifer at approximately 440 to 570 ft bgs. Both systems occur in the alluvial-fan lithofacies of the Santa Fe Group. 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. Data pertaining to the hydrogeologic setting have been synthesized into the TAG conceptual model. The hydrogeologic setting for the TAG AOC is well understood and based on a significant number of monitoring wells. Groundwater occurs in both the PGWS and the 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 AOC, the depth to groundwater for the PGWS ranges from 269 to 340 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 either too thin or too impermeable 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 AOC.

Multiple overlapping lenses and layers of low conductivity, mostly unsaturated sediments, serve as a perching horizon beneath the PGWS. Beneath the central TAG AOC, 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 AOC as well as the Albuquerque Basin. Across the TAG AOC, 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 AOC, 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. Deflection of the contours 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

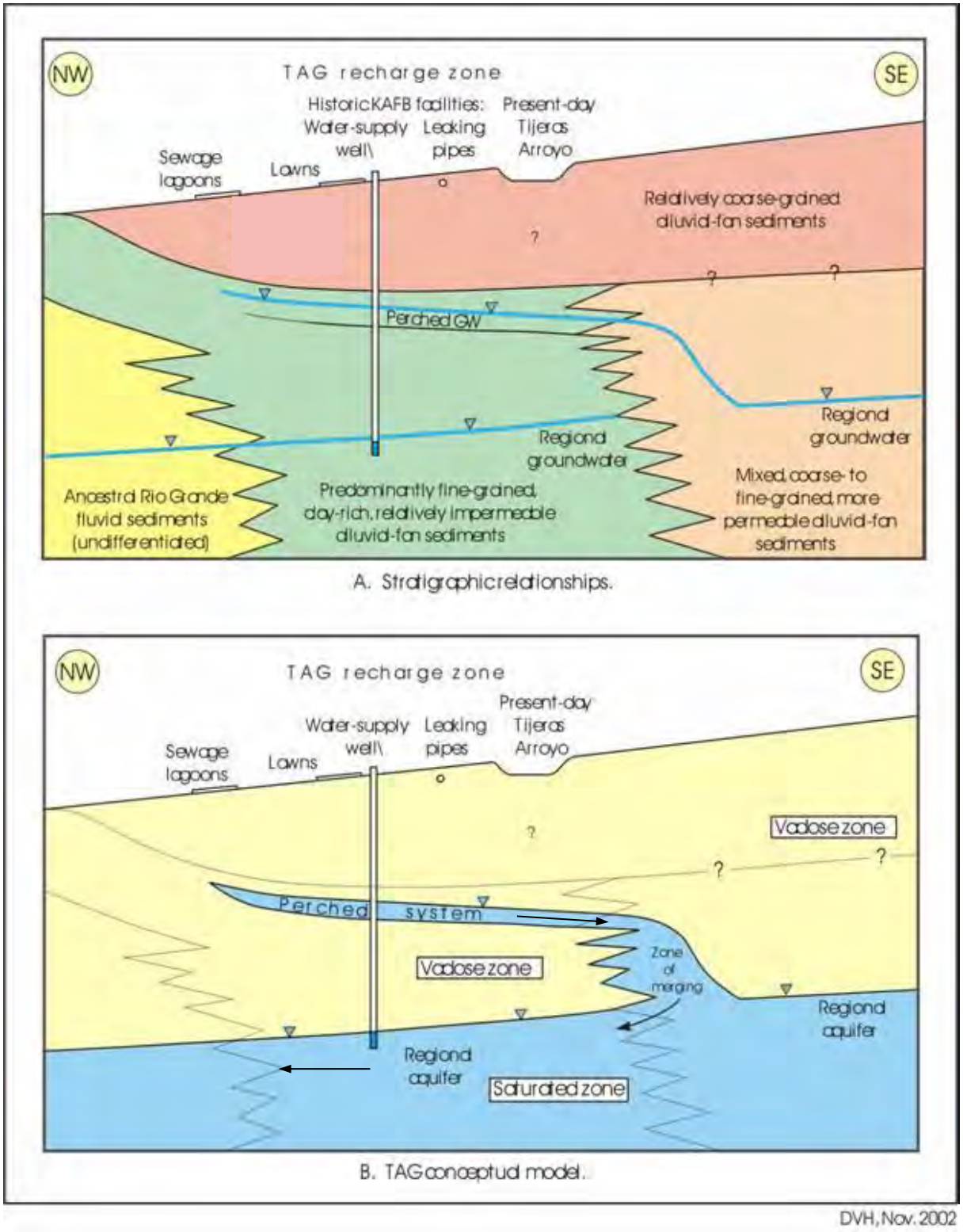


Figure 6-3. TAG Conceptual Model Illustration (Van Hart June 2003)

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 AOC 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 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 composed of well sorted, medium- to coarse-grained sands with higher hydraulic conductivities.

6.1.7.2 Hydrologic Conditions at the TAG AOC

The thickness of the vadose zone is reduced in the central portion of the TAG AOC 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 269 to 340 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 AOC 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 AOC (Figure 6-4). Beneath TA-I, TA-II, and TA-IV, 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.

Table 6-3. Comparison of the Perched Groundwater System and the Regional Aquifer in the Tijeras Arroyo Groundwater Area of Concern (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 AOC.	Increasing water levels in the north, declining water levels in the center, and increasing in the southeastern part of the TAG AOC.
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.
AOC = Area of Concern.
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.

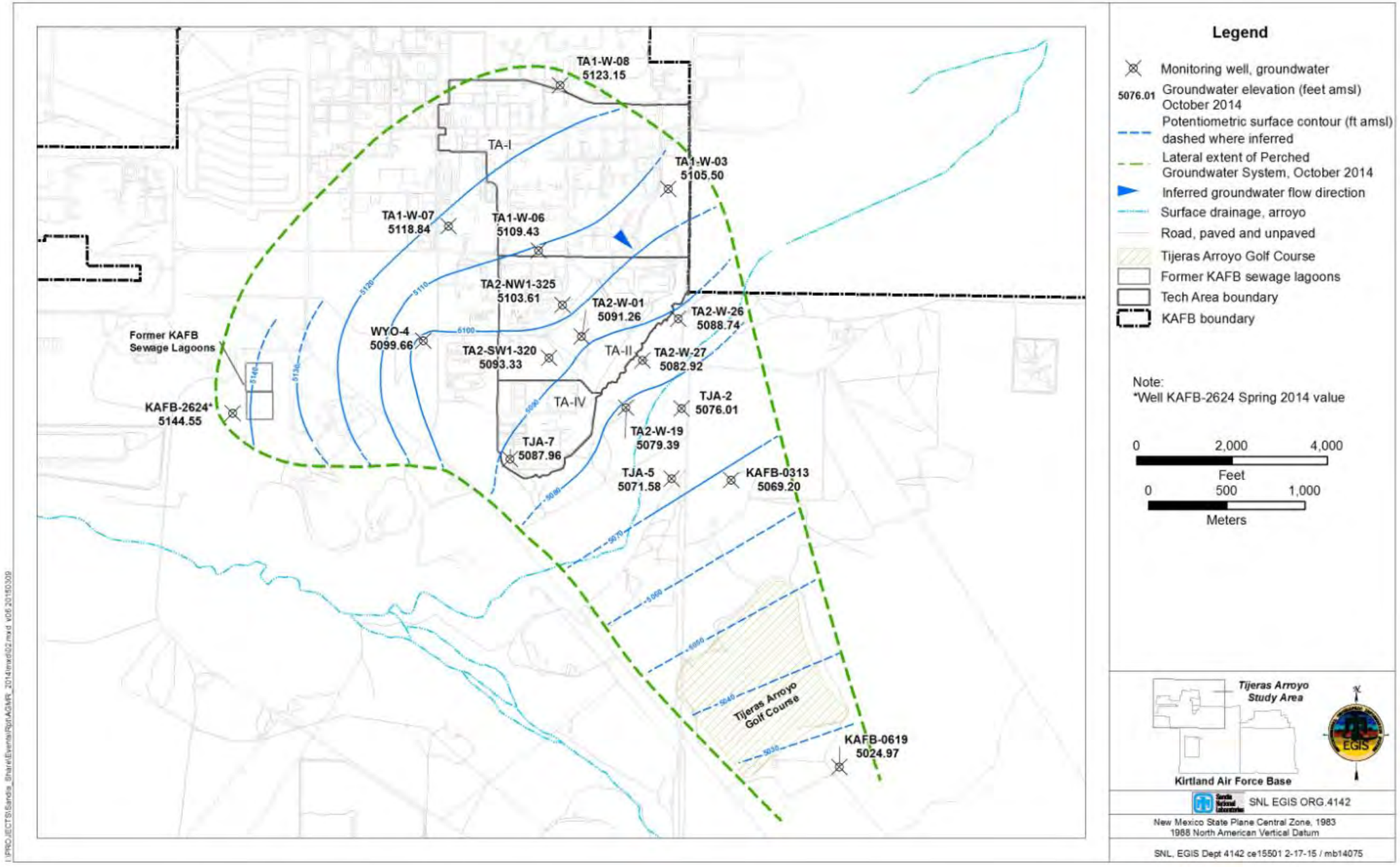


Figure 6-4. Tijeras Arroyo Groundwater Investigation Potentiometric Surface Map for the Perched Groundwater System (October 2014)

6.1.7.3 Local Direction of Flow

Figure 6-4 presents the October 2014 potentiometric surface for the PGWS. The direction of groundwater flow in the PGWS is generally toward the southeast. The horizontal gradient of the PGWS varies from approximately 0.004 to 0.012 ft/ft. Historically, water levels in the PGWS have fluctuated across the AOC (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-1 through 6C-7).

Figure 6-5 presents the October 2014 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 study area varies from approximately 0.005 to 0.05 ft/ft. Vertical flow gradients within the TAG AOC 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 AOC (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 AOC 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 SNL/NM 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 wastewater line and sanitary 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.

This page intentionally left blank.

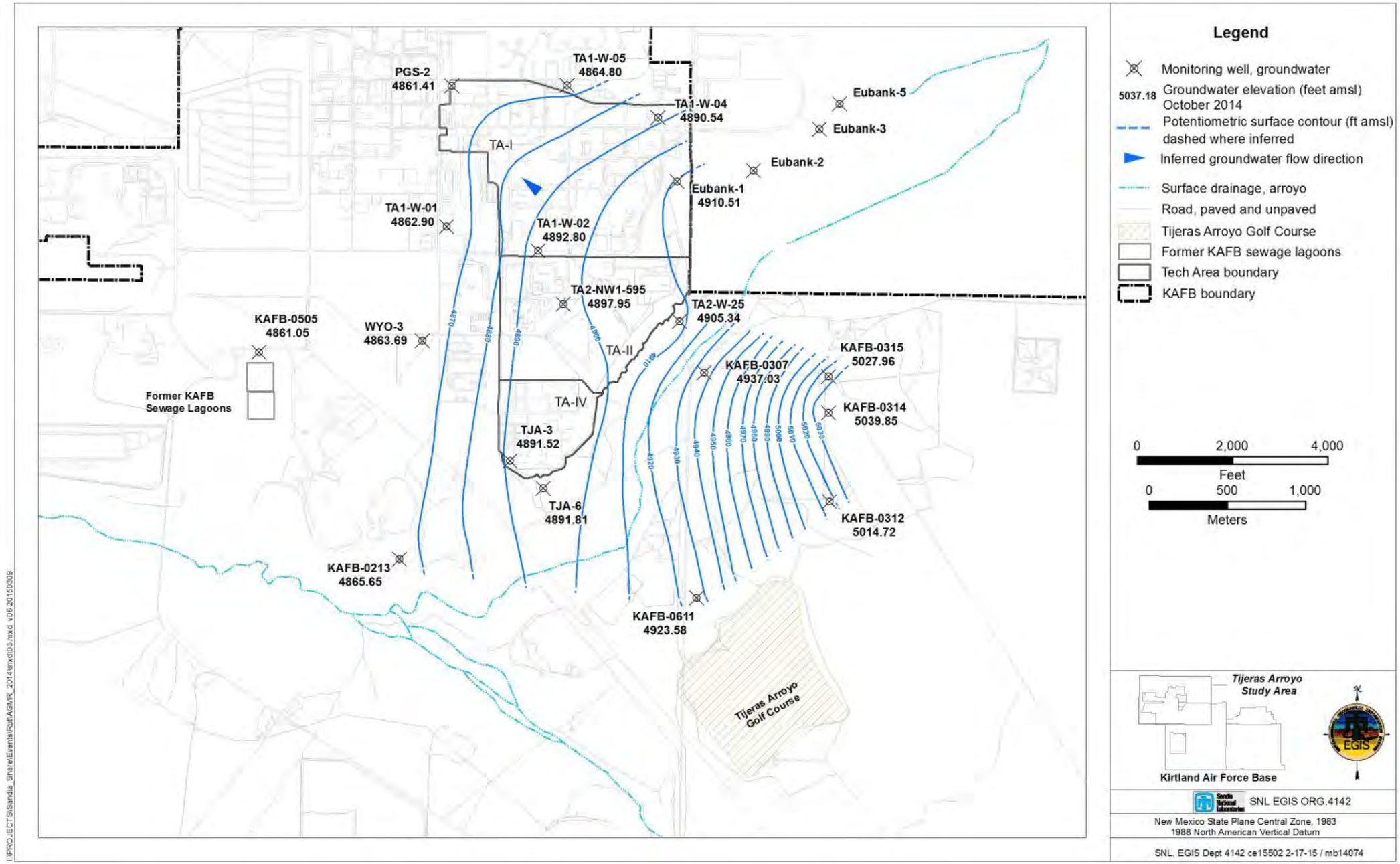


Figure 6-5. Tijeras Arroyo Groundwater Investigation Potentiometric Surface Map for the Regional Aquifer (October 2014)

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 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.

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., as vapor or as 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 contaminant 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 10.5 µg/L, which was collected from monitoring well WYO-4 in November 2014. The results for groundwater samples from only three TAG AOC 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 AOC 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 AOC. For purposes of discussion, KAFB has defined four plumes of elevated nitrate concentrations in groundwater. 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 AOC regional aquifer monitoring wells exceed the MCL of 5 µg/L for TCE.

For the regional aquifer, groundwater samples from nine SNL/NM TAG AOC 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 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 AOC are contained in the Consent 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 Consent 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 Consent Order (NMED April 2004). The TAG investigation must comply with requirements set forth in the Consent Order for site characterization and the development of a CME for the SNL Area of

Responsibility (Figure 6-1). The Consent 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 Consent Order.

Although the Consent Order requires that DOE/NNSA and Sandia evaluate the nature and extent of contamination in the TAG AOC, no specific reporting requirements are prescribed in the Consent 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 Consent 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 Consent Order (NMED April 2004). Additional information on radionuclides, and the scope of the Consent Order, is available in Section III.A of the Consent Order.

6.3 Scope of Activities

The CY 2014 activities for the TAG investigation, including plans and reports, are listed in Section 6.1.5. However, the recent field activities completed in the study area include groundwater monitoring, monitoring well decommissioning, and replacement well installation. 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), 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. 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 AOC 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.

Table 6-4. Groundwater Monitoring Well Network and Sampling Dates for the TAG AOC, Calendar Year 2014

Date of Sampling Event	Wells Sampled		SAP
March 2014	TA1-W-06 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 FY14, 2nd Quarter Sampling* (SNL February 2014)
May/June 2014	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, 3rd Quarter Sampling* (SNL May 2014)
August/September 2014	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 FY14, 4th Quarter Sampling* (SNL July 2014)
November/December 2014	 TA2-W-19 TA2-W-26 TA2-W-28 TJA-2	TJA-3 TJA-4 TJA-7 WYO-4	*Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY15, 1st Quarter Sampling* (SNL October 2014)

NOTES:
AOC = Area of Concern.
FY = Fiscal Year.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories.
TAG = Tijeras Arroyo Groundwater.

Table 6-5. Parameters Sampled at TAG AOC Wells for Each Sampling Event, Calendar Year 2014

Parameter	March 2014		
NPN VOCs	TA1-W-06 TA1-W-06 (dup) TA2-SW1-320 (low-flow) TA2-W-01 TA2-W-19	TA2-W-26 TA2-W-27 TJA-2 TJA-3 TJA-4	TJA-6 TJA-6 (dup) TJA-7 WYO-4
Parameter	**May/June 2014**		
NPN VOCs	TA2-SW1-320 (low-flow) TA2-W-19 TA2-W-19 (dup) TA2-W-26 TJA-2	TJA-3 TJA-4 TJA-7 WYO-4 WYO-4 (dup)	
Parameter	**August/September 2014**		
Alkalinity Anions Gamma Spec* Gross alpha/beta activity NPN TAL Metals, plus Total Uranium Tritium VOCs	PGS-2 (low-flow) PGS-2 (low-flow dup) TA1-W-01 TA1-W-02 TA1-W-03 TA1-W-03 (dup) TA1-W-04 TA1-W-05 TA1-W-05 (dup)	TA1-W-06 TA1-W-08 TA2-NW1-595 TA2-NW1-595 (dup) TA2-SW1-320 (low-flow) 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
Parameter	**November/December 2014**		
NPN VOCs	TA2-W-19 TA2-W-26 TA2-W-28 TJA-2 TJA-3	TJA-4 TJA-7 TJA-7 (dup) WYO-4	

NOTES:

AOC = Area of Concern.
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.

The VOCs detected at low concentrations in groundwater samples from TAG AOC monitoring wells include the following:

- 1,1-Dichloroethane
- 1,1-Dichloroethene
- Chloroform
- cis-1,2-Dichloroethene
- Tetrachloroethene
- TCE
- Toluene

Seven VOCs were detected during CY 2014. 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 10.5 µg/L in the sample collected during the November 2014 sampling event; this is also the all-time maximum concentration of TCE in this well. Figure 6B-1 (Attachment 6B) shows that the TCE concentrations in samples from monitoring well WYO-4 have exceeded the MCL, and the trend ranges from stable to 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-28, TA2-W-19, TJA-2, TJA-4, and TJA-7. The maximum concentration of NPN detected during this reporting period is 32.8 mg/L in the environmental sample from monitoring well TJA-4 collected during the September 2014 sampling event. Figures 6B-2 through 6B-6 (Attachment 6B) show that the NPN concentrations in monitoring wells TA2-SW1-320, TA2-W-28, TJA-4, and TJA-7 have generally exceeded the MCL for the duration of the wells, and NPN concentrations in monitoring wells TA2-W-19 and TJA-2 have regularly exceeded the MCL since May 2009.

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 radiological screening tool and in accordance with 40 Code of Federal Regulations; Parts 9, 141, and 142; and Table I-4 should not include uranium. Naturally occurring uranium is measured independently (i.e., the total uranium concentration determined by metals analysis described above) and the gross alpha activity measurements are corrected by subtracting the total uranium activity from the uncorrected gross alpha activity results. Radiological results are further reviewed by an SNL/NM 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 [RPD] values less than 20 for organic compounds and less than 35 for inorganic analyses), except for 1,1-dichloroethane. The RPD for 1,1-dichloroethane was calculated at 21 from the May/June 2014 samples collected at well TA2-W-19, and is an estimated value because reported concentrations are below the PQL.

The results for the EB analyses are as follows:

- **March 2014 Sampling Event**—The EB samples were collected prior to sampling monitoring wells TA1-W-06 and TJA-6 and submitted for analysis of VOCs and NPN. The organic compounds bromodichloromethane and chloroform were detected in the EB samples. No corrective action was required for bromodichloromethane because this compound was not detected in associated environmental samples. Chloroform was detected in the EB at a concentration greater than the associated TA1-W-06 environmental and environmental duplicate sample results, and chloroform was qualified as not detected during data validation in these groundwater samples.

- **May/June 2014 Sampling Event**—The EB samples were collected prior to sampling monitoring wells TA2-W-19 and WYO-4 and submitted for analysis of VOCs and NPN. Acetone, bromodichloromethane, chloroform, and dibromochloromethane were detected in the EB samples. No corrective action was required because these compounds were not detected in associated environmental samples.

- **August/September 2014 Sampling Event**—EB samples were collected prior to sampling monitoring wells PGS-2, TA1-W-03, TA1-W-05, and TA2-NW1-595 and submitted for VOC, NPN, anions, alkalinity, metals, gamma spectroscopy, gross alpha, gross beta, and tritium analyses. Bromide, bromodichloromethane, calcium, chloroform, chloride, copper, and NPN were detected above laboratory MDLs. No corrective action was necessary for bromodichloromethane, calcium, chloroform, chloride, or NPN because these analytes were not detected in environmental samples or were detected in environmental samples at concentrations greater than five times the blank result. Bromide was qualified as not detected during validation in TA1-W-05 environmental samples because bromide was reported at concentrations less than five times the EB result. Copper was detected in all associated environmental samples at concentrations less the associated EB result, and qualified as not detected during data validation.

- **November/December 2014 Sampling Event**—An EB sample was collected prior to sampling monitoring well TJA-7 and submitted for analysis of VOCs and NPN. Bromodichloromethane, chloroform, and dibromochloromethane were detected in the EB sample. No corrective action was required because these compounds were not detected in the associated environmental sample.

The results for the TB analyses are as follows:

- **March 2014 Sampling Event**—No VOCs were detected above laboratory MDLs in any TB sample.

- **May/June 2014 Sampling Event**—No VOCs were detected above laboratory MDLs in any TB sample except chloromethane and methylene chloride. No corrective action was required because these compounds were not detected in associated environmental samples.

- **August/September 2014 Sampling Event**—No VOCs were detected above laboratory MDLs in any TB sample.

- **November/December 2014 Sampling Event**—No VOCs were detected above laboratory MDLs in any TB sample.

The results for the FB analyses are as follows:

- **March 2014 Sampling Event**—FB samples were collected at monitoring wells TA2-W-26 and TJA-4. The compounds detected included bromodichloromethane, chloroform, and dibromochloromethane. No corrective action was required, because these compounds were not detected in the associated environmental samples.

- **May/June 2014 Sampling Event**—A FB sample was collected at monitoring well TJA-2. The compounds detected included bromodichloromethane, chloroform, and dibromochloromethane. No corrective action was required, because these compounds were not detected in the associated environmental sample.

- **August/September 2014 Sampling Event**—FB samples were collected at monitoring wells TA2-NW1-595, TA2-W-27, and TJA-2. The compounds detected in FB samples included bromodichloromethane chloroform, and dibromochloromethane. No corrective action was required, because these compounds were not detected in the associated environmental samples.

- **November/December 2014 Sampling Event**—A FB sample was collected at monitoring well TJA-3. The compounds detected included bromodichloromethane, chloroform, dibromochloromethane, and TCE. No corrective action was required for bromodichloromethane, chloroform, or dibromochloromethane, because these compounds were not detected in the TJA-3 environmental sample. TCE was reported in the FB sample at a concentration of 1.60 μg/L. Based upon historical results and the review in data validation indicate evidence of TCE in TJA-3; therefore, the environmental sample was qualified as an estimated value.

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 2014, May 2014, July 2014, and October 2014) 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 80 percent of the original water level, or upon sufficient volume to fill containers, and then samples were collected. (2) A QED Environmental Systems, Inc. (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 PGS-2 or TA2-SW1-320 due to well construction issues.

- **March 2014 Sampling Event**—The field team encountered difficulties operating the dedicated sampling system in monitoring well TA2-SW1-320. The sampling system initially did not produce purge water. The sampling system began operating properly after the field team made several adjustments to regulate pressure and cycle times to the microprocessor controller unit.

- **May/June 2014 Sampling Event**—The bladder pump controller for the dedicated sampling system failed to operate and pressurize the sampling system. A new controller was purchased and monitoring well TA2-SW1-320 was successfully sampled on June 20, 2014.

- **August/September 2014 Sampling Event**—Monitoring well WYO-3 did not purge dry prior to meeting groundwater stability criteria. Two groundwater sampling crews and trucks were used during August and September 2014 sampling activities.

- **November/December 2014 Sampling Event**—Monitoring well TA2-W-28 was recently installed as a replacement to monitoring well TA2-SW1-320. This is the initial monitoring event for well TA2-W-28.

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 2015 at the TAG AOC.

The TAG AOC encompasses an area of approximately 40 sq mi in the north-central portion of KAFB and adjoining Albuquerque. 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, May/June, August/September, and November/December 2014. 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. Analytical results were compared with EPA MCL guidelines for drinking water (EPA May 2009). 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 AOC wells. NPN concentrations exceed the MCL of 10 mg/L in samples from monitoring wells TA2-SW1-320, TA2-W-28, TA2-W-19, TJA-2, TJA-4, and TJA-7, with a maximum concentration of 32.8 mg/L in the environmental sample from monitoring well TJA-4 collected during the September 2014 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 10.5 µg/L in the sample collected during the November/December 2014 sampling event. This value establishes a new maximum concentration of TCE in the PGWS and monitoring well WYO-4. TCE concentrations in monitoring well WYO-4 have exceeded the MCL for the duration of the well, and the trend ranges from stable to increasing over time. A historical maximum concentration for TCE of 4.44 µg/L is reported at monitoring well TJA-2 during the November/December 2014 sampling event.

The following conclusions are based on a comprehensive review of available information for current groundwater contamination conditions in the TAG AOC:

- 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 most likely 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 AOC.
- The potential sources of TCE and/or nitrate in the TAG AOC 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 AOC 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, U.S. Geological Survey, 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 the 2015 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 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 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 2014 Sandia National Laboratories, New Mexico (SNL/NM), November 2014. *Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY15, 1st Quarter Sampling*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, October 30, 2014.

SNL September 2014 Sandia National Laboratories, New Mexico (SNL/NM), September 2014. *Annual Groundwater Monitoring Report Calendar Year 2013, Long-Term Stewardship Consolidated Groundwater Monitoring Program,* Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL July 2014 Sandia National Laboratories, New Mexico (SNL/NM), July 2014. *Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY14, 4th Quarter Sampling*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, July 17, 2014.

SNL May 2014 Sandia National Laboratories, New Mexico (SNL/NM), May 2014. *Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY14, 3rd Quarter Sampling,* Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, May 12, 2014.

SNL February 2014 Sandia National Laboratories, New Mexico (SNL/NM), February 2014. *Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY14, 2nd Quarter Sampling,* Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, February 24, 2014.

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 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 2014 ..... 6A-5

6A-2 Method Detection Limits for Volatile Organic Compounds (EPA Method SW846-8260B), Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 6A-8

6A-3 Summary of Nitrate plus Nitrite Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 6A-9

6A-4 Summary of Anions and Alkalinity Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 6A-13

6A-5 Summary of Target Analyte List Metals plus Uranium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 6A-18

6A-6 Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 6A-43

6A-7 Summary of Field Water Quality Measurements, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 6A-48

Footnotes for Tijeras Arroyo Groundwater Analytical Results Tables 6A-51

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 2014

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]
TA1-W-06 11-Mar-14	1,1-Dichloroethene	1.04	0.300	1.00	7.00	*, N	J	095526-001	SW846-8260B
	Chloroform	0.330	0.300	1.00	NE	*, J, N	1.0U	095526-001	SW846-8260B
	Trichloroethene	0.400	0.300	1.00	5.00	*, J, N	J	095526-001	SW846-8260B
TA1-W-06 (Duplicate) 11-Mar-14	1,1-Dichloroethene	1.05	0.300	1.00	7.00	*, N	J	095527-001	SW846-8260B
	Chloroform	0.310	0.300	1.00	NE	*, J, N	1.0U	095527-001	SW846-8260B
	Trichloroethene	0.410	0.300	1.00	5.00	*, J, N	J	095527-001	SW846-8260B
TA2-W-01 10-Mar-14	Tetrachloroethene	0.580	0.300	1.00	5.00	*, J, N	J	095521-001	SW846-8260B
	Trichloroethene	1.71	0.300	1.00	5.00	*, N	J	095521-001	SW846-8260B
TA2-W-19 19-Mar-14	1,1-Dichloroethane	0.480	0.300	1.00	NE	J		095542-001	SW846-8260B
	Trichloroethene	3.27	0.300	1.00	5.00			095542-001	SW846-8260B
	cis-1,2-Dichloroethene	0.440	0.300	1.00	70.0	J		095542-001	SW846-8260B
TA2-W-26 18-Mar-14	Tetrachloroethene	0.920	0.300	1.00	5.00	J		095540-001	SW846-8260B
	Trichloroethene	0.970	0.300	1.00	5.00	J		095540-001	SW846-8260B
	cis-1,2-Dichloroethene	0.310	0.300	1.00	70.0	J		095540-001	SW846-8260B
TA2-W-27 12-Mar-14	Tetrachloroethene	1.63	0.300	1.00	5.00	*, N	J	095529-001	SW846-8260B
	Trichloroethene	1.39	0.300	1.00	5.00	*, N	J	095529-001	SW846-8260B
TJA-2 20-Mar-14	1,1-Dichloroethane	0.380	0.300	1.00	NE	J		095544-001	SW846-8260B
	Trichloroethene	3.64	0.300	1.00	5.00			095544-001	SW846-8260B
	cis-1,2-Dichloroethene	0.490	0.300	1.00	70.0	J		095544-001	SW846-8260B
TJA-7 26-Mar-14	Trichloroethene	1.06	0.300	1.00	5.00			095551-001	SW846-8260B
WYO-4 24-Mar-14	1,1-Dichloroethane	0.940	0.300	1.00	NE	J		095546-001	SW846-8260B
	Tetrachloroethene	0.300	0.300	1.00	5.00	J		095546-001	SW846-8260B
	Trichloroethene	**9.85**	0.300	1.00	5.00			095546-001	SW846-8260B
	cis-1,2-Dichloroethene	1.86	0.300	1.00	70.0			095546-001	SW846-8260B
TA2-W-19 30-May-14	1,1-Dichloroethane	0.470	0.300	1.00	NE	J		096007-001	SW846-8260B
	Trichloroethene	3.12	0.300	1.00	5.00			096007-001	SW846-8260B
	cis-1,2-Dichloroethene	0.340	0.300	1.00	70.0	J		096007-001	SW846-8260B
TA2-W-19 (Duplicate) 30-May-14	1,1-Dichloroethane	0.380	0.300	1.00	NE	J		096008-001	SW846-8260B
	Trichloroethene	3.13	0.300	1.00	5.00			096008-001	SW846-8260B
	cis-1,2-Dichloroethene	0.330	0.300	1.00	70.0	J		096008-001	SW846-8260B

Refer to footnotes on page 6A-51.

Table 6A-1 *(Continued)*
Summary of Detected Volatile Organic Compounds,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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-26 26-May-14	Chloroform	0.320	0.300	1.00	NE	J		096000-001	SW846-8260B
	Tetrachloroethene	0.960	0.300	1.00	5.00	J		096000-001	SW846-8260B
	Trichloroethene	1.34	0.300	1.00	5.00			096000-001	SW846-8260B
	cis-1,2-Dichloroethene	0.320	0.300	1.00	70.0	J		096000-001	SW846-8260B
TJA-2 02-Jun-14	1,1-Dichloroethane	0.470	0.300	1.00	NE	J		096011-001	SW846-8260B
	Trichloroethene	4.04	0.300	1.00	5.00			096011-001	SW846-8260B
	cis-1,2-Dichloroethene	0.430	0.300	1.00	70.0	J		096011-001	SW846-8260B
TJA-3 29-May-14	Trichloroethene	2.49	0.300	1.00	5.00			096002-001	SW846-8260B
TJA-7 04-Jun-14	Trichloroethene	1.22	0.300	1.00	5.00			096015-001	SW846-8260B
WYO-4 10-Jun-14	1,1-Dichloroethane	0.960	0.300	1.00	NE	J		096021-001	SW846-8260B
	Trichloroethene	**6.75**	0.300	1.00	5.00			096021-001	SW846-8260B
	cis-1,2-Dichloroethene	2.02	0.300	1.00	70.0			096021-001	SW846-8260B
WYO-4 (Duplicate) 10-Jun-14	1,1-Dichloroethane	0.940	0.300	1.00	NE	J		096022-001	SW846-8260B
	Trichloroethene	**6.85**	0.300	1.00	5.00			096022-001	SW846-8260B
	cis-1,2-Dichloroethene	1.95	0.300	1.00	70.0			096022-001	SW846-8260B
TA1-W-03 14-Aug-14	Chloroform	0.410	0.300	1.00	NE	J	NJ	096360-001	SW846-8260B
TA1-W-03 (Duplicate) 14-Aug-14	Chloroform	0.390	0.300	1.00	NE	J	NJ	096361-001	SW846-8260B
TA1-W-06 13-Aug-14	1,1-Dichloroethene	0.600	0.300	1.00	7.00	J		096388-001	SW846-8260B
TA2-W-01 14-Aug-14	Tetrachloroethene	0.350	0.300	1.00	5.00	J, N		096390-001	SW846-8260B
	Trichloroethene	1.10	0.300	1.00	5.00			096390-001	SW846-8260B
TA2-W-19 28-Aug-14	1,1-Dichloroethane	0.420	0.300	1.00	NE	J		096403-001	SW846-8260B
	Trichloroethene	2.59	0.300	1.00	5.00			096403-001	SW846-8260B
	cis-1,2-Dichloroethene	0.400	0.300	1.00	70.0	J		096403-001	SW846-8260B
TA2-W-26 20-Aug-14	Tetrachloroethene	0.690	0.300	1.00	5.00	J		096401-001	SW846-8260B
	Trichloroethene	0.970	0.300	1.00	5.00	J		096401-001	SW846-8260B
TA2-W-27 15-Aug-14	Tetrachloroethene	1.17	0.300	1.00	5.00			096393-001	SW846-8260B
	Trichloroethene	1.08	0.300	1.00	5.00			096393-001	SW846-8260B
TJA-2 03-Sep-14	1,1-Dichloroethane	0.510	0.300	1.00	NE	J		096406-001	SW846-8260B
	Trichloroethene	4.08	0.300	1.00	5.00			096406-001	SW846-8260B
	cis-1,2-Dichloroethene	0.450	0.300	1.00	70.0	J		096406-001	SW846-8260B

Refer to footnotes on page 6A-51.

Table 6A-1 *(Concluded)*
Summary of Detected Volatile Organic Compounds,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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-3 21-Aug-14	Trichloroethene	0.430	0.300	1.00	5.00	J		096397-001	SW846-8260B
TJA-7 05-Sep-14	Trichloroethene	1.01	0.300	1.00	5.00			096412-001	SW846-8260B
WYO-4 25-Aug-14	1,1-Dichloroethane	0.990	0.300	1.00	NE	J		096410-001	SW846-8260B
	Chloroform	0.590	0.300	1.00	NE	J		096410-001	SW846-8260B
	Toluene	1.41	0.300	1.00	1000			096410-001	SW846-8260B
	Trichloroethene	4.19	0.300	1.00	5.00			096410-001	SW846-8260B
	cis-1,2-Dichloroethene	1.56	0.300	1.00	70.0			096410-001	SW846-8260B
TA2-W-19 19-Nov-14	1,1-Dichloroethane	0.510	0.300	1.00	NE	J		096900-001	SW846-8260B
	Trichloroethene	4.03	0.300	1.00	5.00			096900-001	SW846-8260B
	cis-1,2-Dichloroethene	0.480	0.300	1.00	70.0	J		096900-001	SW846-8260B
TA2-W-26 01-Dec-14	Tetrachloroethene	0.880	0.300	1.00	5.00	J		096908-001	SW846-8260B
	Trichloroethene	1.01	0.300	1.00	5.00			096908-001	SW846-8260B
	cis-1,2-Dichloroethene	0.340	0.300	1.00	70.0	J		096908-001	SW846-8260B
TA2-W-28 18-Dec-14	Toluene	0.820	0.300	1.00	1000	J		096981-001	SW846-8260B
TJA-2 20-Nov-14	1,1-Dichloroethane	0.460	0.300	1.00	NE	J		096902-001	SW846-8260B
	Trichloroethene	4.44	0.300	1.00	5.00			096902-001	SW846-8260B
	cis-1,2-Dichloroethene	0.510	0.300	1.00	70.0	J		096902-001	SW846-8260B
TJA-3 02-Dec-14	Trichloroethene	0.310	0.300	1.00	5.00	J	NJ	096911-001	SW846-8260B
TJA-7 03-Dec-14	Trichloroethene	1.15	0.300	1.00	5.00			096916-001	SW846-8260B
TJA-7 (Duplicate) 03-Dec-14	Trichloroethene	1.15	0.300	1.00	5.00			096917-001	SW846-8260B
WYO-4 24-Nov-14	1,1-Dichloroethane	1.18	0.300	1.00	NE			096904-001	SW846-8260B
	Trichloroethene	**10.5**	0.300	1.00	5.00			096904-001	SW846-8260B
	cis-1,2-Dichloroethene	2.11	0.300	1.00	70.0			096904-001	SW846-8260B

Refer to footnotes on page 6A-51.

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 2014

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	0.300–0.500	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	0.300–3.00
1,2-Dichloropropane	0.300	Methylene chloride	1.70–3.00
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	2.50–3.00	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-51.

Table 6A-3
Summary of Nitrate plus Nitrite Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 11-Mar-14	Nitrate plus nitrite	3.28	0.170	0.500	10.0			095526-018	EPA 353.2
TA1-W-06 (Duplicate) 11-Mar-14	Nitrate plus nitrite	3.28	0.085	0.250	10.0			095527-018	EPA 353.2
TA2-SW1-320 27-Mar-14	Nitrate plus nitrite	**21.7**	0.850	2.50	10.0			095553-018	EPA 353.2
TA2-W-01 10-Mar-14	Nitrate plus nitrite	4.60	0.170	0.500	10.0			095521-018	EPA 353.2
TA2-W-19 19-Mar-14	Nitrate plus nitrite	**10.8**	0.170	0.500	10.0			095542-018	EPA 353.2
TA2-W-26 18-Mar-14	Nitrate plus nitrite	6.18	0.170	0.500	10.0			095540-018	EPA 353.2
TA2-W-27 12-Mar-14	Nitrate plus nitrite	4.33	0.170	0.500	10.0			095529-018	EPA 353.2
TJA-2 20-Mar-14	Nitrate plus nitrite	**10.9**	0.170	0.500	10.0			095544-018	EPA 353.2
TJA-3 17-Mar-14	Nitrate plus nitrite	2.83	0.170	0.500	10.0			095537-018	EPA 353.2
TJA-4 25-Mar-14	Nitrate plus nitrite	**28.4**	0.850	2.50	10.0			095549-018	EPA 353.2
TJA-6 13-Mar-14	Nitrate plus nitrite	2.46	0.085	0.250	10.0			095534-018	EPA 353.2
TJA-6 (Duplicate) 13-Mar-14	Nitrate plus nitrite	2.48	0.085	0.250	10.0			095535-018	EPA 353.2
TJA-7 26-Mar-14	Nitrate plus nitrite	**24.8**	0.850	2.50	10.0			095551-018	EPA 353.2
WYO-4 24-Mar-14	Nitrate plus nitrite	2.98	0.170	0.500	10.0			095546-018	EPA 353.2
TA2-SW1-320 20-Jun-14	Nitrate plus nitrite	**22.3**	1.70	5.00	10.0	B		096017-018	EPA 353.2
TA2-W-19 30-May-14	Nitrate plus nitrite	10.0	0.425	1.25	10.0			096007-018	EPA 353.2
TA2-W-19 (Duplicate) 30-May-14	Nitrate plus nitrite	10.0	0.425	1.25	10.0			096008-018	EPA 353.2
TA2-W-26 28-May-14	Nitrate plus nitrite	5.41	0.170	0.500	10.0			096000-018	EPA 353.2

Refer to footnotes on page 6A-51.

Table 6A-3 *(Continued)*
Summary of Nitrate plus Nitrite Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 02-Jun-14	Nitrate plus nitrite	**11.2**	0.425	1.25	10.0			096011-018	EPA 353.2
TJA-3 29-May-14	Nitrate plus nitrite	2.50	0.085	0.250	10.0			096002-018	EPA 353.2
TJA-4 03-Jun-14	Nitrate plus nitrite	**31.2**	0.850	2.50	10.0			096013-018	EPA 353.2
TJA-7 04-Jun-14	Nitrate plus nitrite	**22.9**	0.850	2.50	10.0			096015-018	EPA 353.2
WYO-4 10-Jun-14	Nitrate plus nitrite	3.44	0.170	0.500	10.0			096021-018	EPA 353.2
WYO-4 (Duplicate) 10-Jun-14	Nitrate plus nitrite	3.29	0.170	0.500	10.0			096022-018	EPA 353.2
PGS-2 15-Aug-14	Nitrate plus nitrite	1.56	0.085	0.250	10.0			096368-018	EPA 353.2
PGS-2 (Duplicate) 15-Aug-14	Nitrate plus nitrite	1.53	0.085	0.250	10.0			096369-018	EPA 353.2
TA1-W-01 13-Aug-14	Nitrate plus nitrite	2.74	0.170	0.500	10.0			096356-018	EPA 353.2
TA1-W-02 18-Aug-14	Nitrate plus nitrite	1.11	0.085	0.250	10.0			096363-018	EPA 353.2
TA1-W-03 14-Aug-14	Nitrate plus nitrite	6.48	0.170	0.500	10.0			096360-018	EPA 353.2
TA1-W-03 (Duplicate) 14-Aug-14	Nitrate plus nitrite	6.84	0.170	0.500	10.0			096361-018	EPA 353.2
TA1-W-04 21-Aug-14	Nitrate plus nitrite	1.69	0.170	0.500	10.0			096378-018	EPA 353.2
TA1-W-05 20-Aug-14	Nitrate plus nitrite	1.35	0.085	0.250	10.0			096375-018	EPA 353.2
TA1-W-05 (Duplicate) 20-Aug-14	Nitrate plus nitrite	1.39	0.085	0.250	10.0			096376-018	EPA 353.2
TA1-W-06 13-Aug-14	Nitrate plus nitrite	3.23	0.170	0.500	10.0			096388-018	EPA 353.2
TA1-W-08 19-Aug-14	Nitrate plus nitrite	7.55	0.170	0.500	10.0			096371-018	EPA 353.2

Refer to footnotes on page 6A-51.

Table 6A-3 *(Continued)*
Summary of Nitrate plus Nitrite Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 26-Aug-14	Nitrate plus nitrite	3.87	0.170	0.500	10.0			096383-018	EPA 353.2
TA2-NW1-595 (Duplicate) 26-Aug-14	Nitrate plus nitrite	4.20	0.085	0.250	10.0			096384-018	EPA 353.2
TA2-SW1-320 27-Aug-14	Nitrate plus nitrite	**19.6**	0.340	1.00	10.0			096399-018	EPA 353.2
TA2-W-01 14-Aug-14	Nitrate plus nitrite	4.14	0.170	0.500	10.0			096390-018	EPA 353.2
TA2-W-19 28-Aug-14	Nitrate plus nitrite	**11.7**	0.170	0.500	10.0			096403-018	EPA 353.2
TA2-W-26 20-Aug-14	Nitrate plus nitrite	5.56	0.170	0.500	10.0			096401-018	EPA 353.2
TA2-W-27 15-Aug-14	Nitrate plus nitrite	3.98	0.170	0.500	10.0			096393-018	EPA 353.2
TJA-2 03-Sep-14	Nitrate plus nitrite	**10.9**	0.170	0.500	10.0			096406-018	EPA 353.2
TJA-3 21-Aug-14	Nitrate plus nitrite	2.50	0.170	0.500	10.0			096397-018	EPA 353.2
TJA-4 04-Sep-14	Nitrate plus nitrite	**32.8**	0.425	1.25	10.0			096408-018	EPA 353.2
TJA-6 19-Aug-14	Nitrate plus nitrite	2.45	0.170	0.500	10.0			096395-018	EPA 353.2
TJA-7 05-Sep-14	Nitrate plus nitrite	**20.8**	0.340	1.00	10.0			096412-018	EPA 353.2
WYO-3 22-Aug-14	Nitrate plus nitrite	1.97	0.170	0.500	10.0			096386-018	EPA 353.2
WYO-4 25-Aug-14	Nitrate plus nitrite	3.10	0.085	0.250	10.0			096410-018	EPA 353.2
TA2-W-19 19-Nov-14	Nitrate plus nitrite	**10.9**	0.850	2.50	10.0			096900-018	EPA 353.2
TA2-W-26 01-Dec-14	Nitrate plus nitrite	6.04	0.170	0.500	10.0			096908-018	EPA 353.2
TA2-W-28 18-Dec-14	Nitrate plus nitrite	**21.8**	0.425	1.25	10.0			096981-018	EPA 353.2

Refer to footnotes on page 6A-51.

Table 6A-3 *(Concluded)*
Summary of Nitrate plus Nitrite Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 20-Nov-14	Nitrate plus nitrite	**12.0**	0.850	2.50	10.0			096902-018	EPA 353.2
TJA-3 02-Dec-14	Nitrate plus nitrite	2.72	0.170	0.500	10.0			096911-018	EPA 353.2
TJA-4 25-Nov-14	Nitrate plus nitrite	**31.0**	0.425	1.25	10.0			096906-018	EPA 353.2
TJA-7 03-Dec-14	Nitrate plus nitrite	**22.4**	0.850	2.50	10.0			096916-018	EPA 353.2
TJA-7 (Duplicate) 03-Dec-14	Nitrate plus nitrite	**24.6**	0.850	2.50	10.0			096917-018	EPA 353.2
WYO-4 24-Nov-14	Nitrate plus nitrite	3.02	0.085	0.250	10.0			096904-018	EPA 353.2

Refer to footnotes on page 6A-51.

Table 6A-4
Summary of Anions and Alkalinity Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.235	0.067	0.200	NE			096368-016	SW846 9056
15-Aug-14	Chloride	14.9	0.670	2.00	NE			096368-016	SW846 9056
	Fluoride	ND	0.033	0.100	4.0	U		096368-016	SW846 9056
	Sulfate	67.5	1.33	4.00	NE			096368-016	SW846 9056
	Bicarbonate Alkalinity	199	0.725	1.00	NE			096368-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096368-022	SM 2320B
PGS-2 (Duplicate)	Bromide	0.220	0.067	0.200	NE			096369-016	SW846 9056
15-Aug-14	Chloride	14.6	0.670	2.00	NE			096369-016	SW846 9056
	Fluoride	ND	0.033	0.100	4.0	U		096369-016	SW846 9056
	Sulfate	66.4	1.33	4.00	NE			096369-016	SW846 9056
	Bicarbonate Alkalinity	200	0.725	1.00	NE			096369-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096369-022	SM 2320B
TA1-W-01	Bromide	0.188	0.067	0.200	NE	J		096356-016	SW846 9056
13-Aug-14	Chloride	13.8	0.670	2.00	NE			096356-016	SW846 9056
	Fluoride	0.420	0.033	0.100	4.0			096356-016	SW846 9056
	Sulfate	73.4	1.33	4.00	NE			096356-016	SW846 9056
	Bicarbonate Alkalinity	152	0.725	1.00	NE			096356-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096356-022	SM 2320B
TA1-W-02	Bromide	0.156	0.067	0.200	NE	J		096363-016	SW846 9056
18-Aug-14	Chloride	15.5	0.670	2.00	NE			096363-016	SW846 9056
	Fluoride	0.422	0.033	0.100	4.0			096363-016	SW846 9056
	Sulfate	83.6	1.33	4.00	NE			096363-016	SW846 9056
	Bicarbonate Alkalinity	152	0.725	1.00	NE			096363-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096363-022	SM 2320B
TA1-W-03	Bromide	3.04	0.134	0.400	NE			096360-016	SW846 9056
14-Aug-14	Chloride	232	3.35	10.0	NE			096360-016	SW846 9056
	Fluoride	0.204	0.033	0.100	4.0			096360-016	SW846 9056
	Sulfate	468	6.65	20.0	NE			096360-016	SW846 9056
	Bicarbonate Alkalinity	64.6	0.725	1.00	NE			096360-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096360-022	SM 2320B
TA1-W-03 (Duplicate)	Bromide	3.02	0.134	0.400	NE			096361-016	SW846 9056
14-Aug-14	Chloride	231	3.35	10.0	NE			096361-016	SW846 9056
	Fluoride	0.209	0.033	0.100	4.0			096361-016	SW846 9056
	Sulfate	462	6.65	20.0	NE			096361-016	SW846 9056
	Bicarbonate Alkalinity	65.1	0.725	1.00	NE			096361-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096361-022	SM 2320B

Refer to footnotes on page 6A-51.

Table 6A-4 *(Continued)*
Summary of Anions and Alkalinity Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	Bromide	0.171	0.067	0.200	NE	J		096378-016	SW846 9056
21-Aug-14	Chloride	15.7	0.670	2.00	NE			096378-016	SW846 9056
	Fluoride	0.412	0.033	0.100	4.0			096378-016	SW846 9056
	Sulfate	65.0	1.33	4.00	NE			096378-016	SW846 9056
	Bicarbonate Alkalinity	156	0.725	1.00	NE			096378-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096378-022	SM 2320B
TA1-W-05	Bromide	0.109	0.067	0.200	NE	J	0.467U	096375-016	SW846 9056
20-Aug-14	Chloride	11.2	0.670	2.00	NE			096375-016	SW846 9056
	Fluoride	0.242	0.033	0.100	4.0			096375-016	SW846 9056
	Sulfate	105	1.33	4.00	NE			096375-016	SW846 9056
	Bicarbonate Alkalinity	188	0.725	1.00	NE			096375-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096375-022	SM 2320B
TA1-W-05 (Duplicate)	Bromide	0.191	0.067	0.200	NE	J	0.467U	096376-016	SW846 9056
20-Aug-14	Chloride	12.2	0.670	2.00	NE			096376-016	SW846 9056
	Fluoride	0.292	0.033	0.100	4.0			096376-016	SW846 9056
	Sulfate	106	1.33	4.00	NE			096376-016	SW846 9056
	Bicarbonate Alkalinity	187	0.725	1.00	NE			096376-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096376-022	SM 2320B
TA1-W-06	Bromide	1.21	0.067	0.200	NE			096388-016	SW846 9056
13-Aug-14	Chloride	96.3	1.34	4.00	NE			096388-016	SW846 9056
	Fluoride	0.307	0.033	0.100	4.0			096388-016	SW846 9056
	Sulfate	195	2.66	8.00	NE			096388-016	SW846 9056
	Bicarbonate Alkalinity	79.2	0.725	1.00	NE			096388-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096388-022	SM 2320B
TA1-W-08	Bromide	2.66	0.067	0.200	NE			096371-016	SW846 9056
19-Aug-14	Chloride	234	6.70	20.0	NE			096371-016	SW846 9056
	Fluoride	0.241	0.033	0.100	4.0			096371-016	SW846 9056
	Sulfate	782	13.3	40.0	NE			096371-016	SW846 9056
	Bicarbonate Alkalinity	73.0	0.725	1.00	NE			096371-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096371-022	SM 2320B
TA2-NW1-595	Bromide	1.34	0.067	0.200	NE			096383-016	SW846 9056
26-Aug-14	Chloride	102	1.34	4.00	NE			096383-016	SW846 9056
	Fluoride	0.237	0.033	0.100	4.0			096383-016	SW846 9056
	Sulfate	107	2.66	8.00	NE			096383-016	SW846 9056
	Bicarbonate Alkalinity	118	0.725	1.00	NE			096383-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096383-022	SM 2320B

Refer to footnotes on page 6A-51.

Table 6A-4 *(Continued)*
Summary of Anions and Alkalinity Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 (Duplicate)	Bromide	1.36	0.067	0.200	NE			096384-016	SW846 9056
26-Aug-14	Chloride	102	1.34	4.00	NE			096384-016	SW846 9056
	Fluoride	0.233	0.033	0.100	4.0			096384-016	SW846 9056
	Sulfate	107	2.66	8.00	NE			096384-016	SW846 9056
	Bicarbonate Alkalinity	118	0.725	1.00	NE			096384-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096384-022	SM 2320B
TA2-SW1-320	Bromide	0.604	0.067	0.200	NE			096399-016	SW846 9056
27-Aug-14	Chloride	34.4	0.670	2.00	NE			096399-016	SW846 9056
	Fluoride	0.358	0.033	0.100	4.0			096399-016	SW846 9056
	Sulfate	14.9	0.133	0.400	NE			096399-016	SW846 9056
	Bicarbonate Alkalinity	99.6	0.725	1.00	NE			096399-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096399-022	SM 2320B
TA2-W-01	Bromide	1.35	0.067	0.200	NE			096390-016	SW846 9056
14-Aug-14	Chloride	93.4	1.34	4.00	NE			096390-016	SW846 9056
	Fluoride	0.323	0.033	0.100	4.0			096390-016	SW846 9056
	Sulfate	53.3	2.66	8.00	NE			096390-016	SW846 9056
	Bicarbonate Alkalinity	87.8	0.725	1.00	NE			096390-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096390-022	SM 2320B
TA2-W-19	Bromide	0.822	0.067	0.200	NE			096403-016	SW846 9056
28-Aug-14	Chloride	62.8	0.670	2.00	NE			096403-016	SW846 9056
	Fluoride	0.298	0.033	0.100	4.0			096403-016	SW846 9056
	Sulfate	55.8	1.33	4.00	NE			096403-016	SW846 9056
	Bicarbonate Alkalinity	98.3	0.725	1.00	NE			096403-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096403-022	SM 2320B
TA2-W-26	Bromide	2.65	0.067	0.200	NE			096401-016	SW846 9056
20-Aug-14	Chloride	208	6.70	20.0	NE			096401-016	SW846 9056
	Fluoride	0.241	0.033	0.100	4.0			096401-016	SW846 9056
	Sulfate	397	13.3	40.0	NE			096401-016	SW846 9056
	Bicarbonate Alkalinity	75.1	0.725	1.00	NE			096401-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096401-022	SM 2320B
TA2-W-27	Bromide	1.44	0.067	0.200	NE			096393-016	SW846 9056
15-Aug-14	Chloride	100	1.34	4.00	NE			096393-016	SW846 9056
	Fluoride	0.297	0.033	0.100	4.0			096393-016	SW846 9056
	Sulfate	131	2.66	8.00	NE			096393-016	SW846 9056
	Bicarbonate Alkalinity	87.4	0.725	1.00	NE			096393-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096393-022	SM 2320B

Refer to footnotes on page 6A-51.

Table 6A-4 *(Continued)*
Summary of Anions and Alkalinity Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	Bromide	0.923	0.067	0.200	NE			096406-016	SW846 9056
03-Sep-14	Chloride	66.7	0.670	2.00	NE			096406-016	SW846 9056
	Fluoride	0.273	0.033	0.100	4.0			096406-016	SW846 9056
	Sulfate	53.8	1.33	4.00	NE			096406-016	SW846 9056
	Bicarbonate Alkalinity	106	0.725	1.00	NE			096406-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096406-022	SM 2320B
TJA-3	Bromide	ND	0.067	0.200	NE	U		096397-016	SW846 9056
21-Aug-14	Chloride	14.5	0.670	2.00	NE			096397-016	SW846 9056
	Fluoride	0.320	0.033	0.100	4.0			096397-016	SW846 9056
	Sulfate	82.2	1.33	4.00	NE			096397-016	SW846 9056
	Bicarbonate Alkalinity	151	0.725	1.00	NE			096397-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096397-022	SM 2320B
TJA-4	Bromide	0.363	0.067	0.200	NE			096408-016	SW846 9056
04-Sep-14	Chloride	20.4	0.335	1.00	NE			096408-016	SW846 9056
	Fluoride	0.326	0.033	0.100	4.0			096408-016	SW846 9056
	Sulfate	18.0	0.133	0.400	NE			096408-016	SW846 9056
	Bicarbonate Alkalinity	131	0.725	1.00	NE			096408-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096408-022	SM 2320B
TJA-6	Bromide	0.207	0.067	0.200	NE			096395-016	SW846 9056
19-Aug-14	Chloride	15.2	0.670	2.00	NE			096395-016	SW846 9056
	Fluoride	0.425	0.033	0.100	4.0			096395-016	SW846 9056
	Sulfate	66.7	1.33	4.00	NE			096395-016	SW846 9056
	Bicarbonate Alkalinity	144	0.725	1.00	NE			096395-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096395-022	SM 2320B
TJA-7	Bromide	0.463	0.067	0.200	NE			096412-016	SW846 9056
05-Sep-14	Chloride	24.3	0.335	1.00	NE			096412-016	SW846 9056
	Fluoride	0.315	0.033	0.100	4.0			096412-016	SW846 9056
	Sulfate	21.5	0.665	2.00	NE			096412-016	SW846 9056
	Bicarbonate Alkalinity	124	0.725	1.00	NE			096412-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096412-022	SM 2320B

Refer to footnotes on page 6A-51.

Table 6A-4 *(Concluded)*
Summary of Anions and Alkalinity Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	Bromide	ND	0.067	0.200	NE	U		096386-016	SW846 9056
22-Aug-14	Chloride	15.4	0.670	2.00	NE			096386-016	SW846 9056
	Fluoride	0.463	0.330	0.100	4.0			096386-016	SW846 9056
	Sulfate	91.0	1.33	4.00	NE			096386-016	SW846 9056
	Bicarbonate Alkalinity	140	0.725	1.00	NE			096386-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096386-022	SM 2320B
WYO-4	Bromide	1.25	0.067	0.200	NE			096410-016	SW846 9056
25-Aug-14	Chloride	105	1.34	4.00	NE			096410-016	SW846 9056
	Fluoride	0.289	0.033	0.100	4.0			096410-016	SW846 9056
	Sulfate	50.5	2.66	8.00	NE			096410-016	SW846 9056
	Bicarbonate Alkalinity	90.1	0.725	1.00	NE			096410-022	SM 2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096410-022	SM 2320B

Refer to footnotes on page 6A-51.

Table 6A-5
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		096368-009	SW846 6020
15-Aug-14	Antimony	ND	0.001	0.003	0.006	U		096368-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096368-009	SW846 6020
	Barium	0.0685	0.0006	0.002	2.00			096368-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096368-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096368-009	SW846 6020
	Calcium	70.5	0.600	2.00	NE			096368-009	SW846 6020
	Chromium	0.0255	0.002	0.010	0.100			096368-009	SW846 6020
	Cobalt	0.000134	0.0001	0.001	NE	J		096368-009	SW846 6020
	Copper	0.00127	0.00035	0.001	NE		0.010U	096368-009	SW846 6020
	Iron	0.378	0.033	0.100	NE			096368-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096368-009	SW846 6020
	Magnesium	12.7	0.010	0.030	NE			096368-009	SW846 6020
	Manganese	0.00208	0.001	0.005	NE	J		096368-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096368-009	SW846 7470
	Nickel	0.0367	0.0005	0.002	NE			096368-009	SW846 6020
	Potassium	2.96	0.080	0.300	NE			096368-009	SW846 6020
	Selenium	0.00154	0.0015	0.005	0.050	J		096368-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096368-009	SW846 6020
	Sodium	41.3	0.080	0.250	NE			096368-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096368-009	SW846 6020
	Uranium	0.000515	0.000067	0.0002	0.030			096368-009	SW846 6020
	Vanadium	0.005	0.001	0.005	NE	J		096368-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096368-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		096369-009	SW846 6020
15-Aug-14	Antimony	ND	0.001	0.003	0.006	U		096369-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096369-009	SW846 6020
	Barium	0.0697	0.0006	0.002	2.00			096369-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096369-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096369-009	SW846 6020
	Calcium	68.6	0.600	2.00	NE			096369-009	SW846 6020
	Chromium	0.0257	0.002	0.010	0.100			096369-009	SW846 6020
	Cobalt	0.000142	0.0001	0.001	NE	J		096369-009	SW846 6020
	Copper	0.00121	0.00035	0.001	NE		0.010U	096369-009	SW846 6020
	Iron	0.385	0.033	0.100	NE			096369-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096369-009	SW846 6020
	Magnesium	12.1	0.010	0.030	NE			096369-009	SW846 6020
	Manganese	0.00233	0.001	0.005	NE	J		096369-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096369-009	SW846 7470
	Nickel	0.0362	0.0005	0.002	NE			096369-009	SW846 6020
	Potassium	2.93	0.080	0.300	NE			096369-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		096369-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096369-009	SW846 6020
	Sodium	41.0	0.080	0.250	NE			096369-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096369-009	SW846 6020
	Uranium	0.000513	0.000067	0.0002	0.030			096369-009	SW846 6020
	Vanadium	0.00501	0.001	0.005	NE			096369-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096369-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.0198	0.015	0.050	NE	J		096356-009	SW846 6020
13-Aug-14	Antimony	ND	0.001	0.003	0.006	U		096356-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096356-009	SW846 6020
	Barium	0.0447	0.0006	0.002	2.00			096356-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096356-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096356-009	SW846 6020
	Calcium	69.0	0.600	2.00	NE			096356-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096356-009	SW846 6020
	Cobalt	0.000175	0.0001	0.001	NE	J		096356-009	SW846 6020
	Copper	0.000558	0.00035	0.001	NE	J		096356-009	SW846 6020
	Iron	0.142	0.033	0.100	NE			096356-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096356-009	SW846 6020
	Magnesium	12.3	0.010	0.030	NE			096356-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096356-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096356-009	SW846 7470
	Nickel	0.00192	0.0005	0.002	NE	J		096356-009	SW846 6020
	Potassium	2.37	0.080	0.300	NE	N		096356-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		096356-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096356-009	SW846 6020
	Sodium	25.4	0.080	0.250	NE			096356-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096356-009	SW846 6020
	Uranium	0.0035	0.000067	0.0002	0.030			096356-009	SW846 6020
	Vanadium	0.00447	0.001	0.005	NE	J		096356-009	SW846 6010
	Zinc	0.00533	0.0035	0.010	NE	J		096356-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.124	0.015	0.050	NE			096363-009	SW846 6020
18-Aug-14	Antimony	ND	0.001	0.003	0.006	U		096363-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096363-009	SW846 6020
	Barium	0.0462	0.0006	0.002	2.00			096363-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096363-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096363-009	SW846 6020
	Calcium	67.7	0.600	2.00	NE			096363-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096363-009	SW846 6020
	Cobalt	0.000157	0.0001	0.001	NE	J		096363-009	SW846 6020
	Copper	0.000814	0.00035	0.001	NE	J		096363-009	SW846 6020
	Iron	0.270	0.033	0.100	NE			096363-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096363-009	SW846 6020
	Magnesium	13.0	0.010	0.030	NE			096363-009	SW846 6020
	Manganese	0.00542	0.001	0.005	NE			096363-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096363-009	SW846 7470
	Nickel	0.00217	0.0005	0.002	NE			096363-009	SW846 6020
	Potassium	2.22	0.080	0.300	NE			096363-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		096363-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096363-009	SW846 6020
	Sodium	22.0	0.080	0.250	NE			096363-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096363-009	SW846 6020
	Uranium	0.00375	0.000067	0.0002	0.030			096363-009	SW846 6020
	Vanadium	0.00446	0.001	0.005	NE	J		096363-009	SW846 6010
	Zinc	0.00597	0.0035	0.010	NE	J		096363-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.0427	0.015	0.050	NE	J		096360-009	SW846 6020
14-Aug-14	Antimony	ND	0.001	0.003	0.006	U		096360-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096360-009	SW846 6020
	Barium	0.0282	0.0006	0.002	2.00			096360-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096360-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096360-009	SW846 6020
	Calcium	284	0.600	2.00	NE			096360-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096360-009	SW846 6020
	Cobalt	0.000514	0.0001	0.001	NE	J		096360-009	SW846 6020
	Copper	0.0018	0.00035	0.001	NE		0.0066UJ	096360-009	SW846 6020
	Iron	0.598	0.033	0.100	NE			096360-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096360-009	SW846 6020
	Magnesium	31.5	0.010	0.030	NE			096360-009	SW846 6020
	Manganese	0.00119	0.001	0.005	NE	J		096360-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096360-009	SW846 7470
	Nickel	0.0042	0.0005	0.002	NE		J-	096360-009	SW846 6020
	Potassium	2.92	0.080	0.300	NE	N		096360-009	SW846 6020
	Selenium	0.0298	0.0015	0.005	0.050			096360-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096360-009	SW846 6020
	Sodium	49.9	0.080	0.250	NE			096360-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096360-009	SW846 6020
	Uranium	0.00121	0.000067	0.0002	0.030			096360-009	SW846 6020
	Vanadium	0.00274	0.001	0.005	NE	J		096360-009	SW846 6010
	Zinc	0.00374	0.0035	0.010	NE	J		096360-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 (Duplicate)	Aluminum	0.0437	0.015	0.050	NE	J		096361-009	SW846 6020
14-Aug-14	Antimony	ND	0.001	0.003	0.006	U		096361-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096361-009	SW846 6020
	Barium	0.0293	0.0006	0.002	2.00			096361-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096361-009	SW846 6020
	Cadmium	0.000113	0.00011	0.001	0.005	J		096361-009	SW846 6020
	Calcium	281	0.600	2.00	NE			096361-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096361-009	SW846 6020
	Cobalt	0.000514	0.0001	0.001	NE	J		096361-009	SW846 6020
	Copper	0.00174	0.00035	0.001	NE		0.0066UJ	096361-009	SW846 6020
	Iron	0.604	0.033	0.100	NE			096361-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096361-009	SW846 6020
	Magnesium	31.6	0.010	0.030	NE			096361-009	SW846 6020
	Manganese	0.00124	0.001	0.005	NE	J		096361-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096361-009	SW846 7470
	Nickel	0.00433	0.0005	0.002	NE		J-	096361-009	SW846 6020
	Potassium	2.71	0.080	0.300	NE	N		096361-009	SW846 6020
	Selenium	0.0301	0.0015	0.005	0.050			096361-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096361-009	SW846 6020
	Sodium	54.4	0.800	2.50	NE			096361-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096361-009	SW846 6020
	Uranium	0.00119	0.000067	0.0002	0.030			096361-009	SW846 6020
	Vanadium	0.00267	0.001	0.005	NE	J		096361-009	SW846 6010
	Zinc	0.00394	0.0035	0.010	NE	J		096361-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	ND	0.015	0.050	NE	U		096378-009	SW846 6020
21-Aug-14	Antimony	ND	0.001	0.003	0.006	U		096378-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096378-009	SW846 6020
	Barium	0.0513	0.0006	0.002	2.00			096378-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096378-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096378-009	SW846 6020
	Calcium	66.7	0.600	2.00	NE			096378-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096378-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		096378-009	SW846 6020
	Copper	0.000483	0.00035	0.001	NE	J		096378-009	SW846 6020
	Iron	0.148	0.033	0.100	NE			096378-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096378-009	SW846 6020
	Magnesium	11.0	0.010	0.030	NE			096378-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096378-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096378-009	SW846 7470
	Nickel	0.00119	0.0005	0.002	NE	J		096378-009	SW846 6020
	Potassium	2.03	0.080	0.300	NE			096378-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		096378-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096378-009	SW846 6020
	Sodium	22.4	0.080	0.250	NE			096378-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096378-009	SW846 6020
	Uranium	0.00325	0.000067	0.0002	0.030			096378-009	SW846 6020
	Vanadium	0.00428	0.001	0.005	NE	J		096378-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096378-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		096375-009	SW846 6020
20-Aug-14	Antimony	ND	0.001	0.003	0.006	U		096375-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096375-009	SW846 6020
	Barium	0.0333	0.0006	0.002	2.00			096375-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096375-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096375-009	SW846 6020
	Calcium	86.0	0.600	2.00	NE			096375-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096375-009	SW846 6020
	Cobalt	0.000104	0.0001	0.001	NE	J		096375-009	SW846 6020
	Copper	0.000616	0.00035	0.001	NE	J	0.0041U	096375-009	SW846 6020
	Iron	0.181	0.033	0.100	NE			096375-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096375-009	SW846 6020
	Magnesium	12.1	0.010	0.030	NE			096375-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096375-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096375-009	SW846 7470
	Nickel	0.00151	0.0005	0.002	NE	J		096375-009	SW846 6020
	Potassium	2.05	0.080	0.300	NE			096375-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		096375-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096375-009	SW846 6020
	Sodium	29.6	0.080	0.250	NE			096375-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096375-009	SW846 6020
	Uranium	0.00376	0.000067	0.0002	0.030			096375-009	SW846 6020
	Vanadium	0.0031	0.001	0.005	NE	J		096375-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096375-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		096376-009	SW846 6020
20-Aug-14	Antimony	ND	0.001	0.003	0.006	U		096376-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096376-009	SW846 6020
	Barium	0.0337	0.0006	0.002	2.00			096376-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096376-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096376-009	SW846 6020
	Calcium	88.9	0.600	2.00	NE			096376-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096376-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		096376-009	SW846 6020
	Copper	0.000586	0.00035	0.001	NE	J	0.0041U	096376-009	SW846 6020
	Iron	0.167	0.033	0.100	NE			096376-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096376-009	SW846 6020
	Magnesium	11.9	0.010	0.030	NE			096376-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096376-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096376-009	SW846 7470
	Nickel	0.00143	0.0005	0.002	NE	J		096376-009	SW846 6020
	Potassium	2.17	0.080	0.300	NE			096376-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		096376-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096376-009	SW846 6020
	Sodium	29.5	0.080	0.250	NE			096376-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096376-009	SW846 6020
	Uranium	0.00382	0.000067	0.0002	0.030			096376-009	SW846 6020
	Vanadium	0.0031	0.001	0.005	NE	J		096376-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096376-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.0212	0.015	0.050	NE	J		096388-009	SW846 6020
13-Aug-14	Antimony	ND	0.001	0.003	0.006	U		096388-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096388-009	SW846 6020
	Barium	0.0226	0.0006	0.002	2.00			096388-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096388-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096388-009	SW846 6020
	Calcium	131	0.600	2.00	NE			096388-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096388-009	SW846 6020
	Cobalt	0.000234	0.0001	0.001	NE	J		096388-009	SW846 6020
	Copper	0.000862	0.00035	0.001	NE	J	J-	096388-009	SW846 6020
	Iron	0.252	0.033	0.100	NE			096388-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096388-009	SW846 6020
	Magnesium	15.9	0.010	0.030	NE			096388-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096388-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096388-009	SW846 7470
	Nickel	0.00172	0.0005	0.002	NE	J	J-	096388-009	SW846 6020
	Potassium	2.21	0.080	0.300	NE	N		096388-009	SW846 6020
	Selenium	0.00805	0.0015	0.005	0.050			096388-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096388-009	SW846 6020
	Sodium	31.0	0.080	0.250	NE			096388-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096388-009	SW846 6020
	Uranium	0.00116	0.000067	0.0002	0.030			096388-009	SW846 6020
	Vanadium	0.00393	0.001	0.005	NE	J		096388-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096388-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		096371-009	SW846 6020
19-Aug-14	Antimony	ND	0.001	0.003	0.006	U		096371-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096371-009	SW846 6020
	Barium	0.0186	0.0006	0.002	2.00			096371-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096371-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096371-009	SW846 6020
	Calcium	339	0.600	2.00	NE			096371-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U	UJ	096371-009	SW846 6020
	Cobalt	0.000431	0.0001	0.001	NE	J		096371-009	SW846 6020
	Copper	0.0022	0.00035	0.001	NE		J-	096371-009	SW846 6020
	Iron	0.705	0.033	0.100	NE			096371-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096371-009	SW846 6020
	Magnesium	40.7	0.010	0.030	NE			096371-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096371-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096371-009	SW846 7470
	Nickel	0.00563	0.0005	0.002	NE		J-	096371-009	SW846 6020
	Potassium	2.86	0.080	0.300	NE			096371-009	SW846 6020
	Selenium	0.0304	0.0015	0.005	0.050			096371-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096371-009	SW846 6020
	Sodium	90.8	0.800	2.50	NE			096371-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096371-009	SW846 6020
	Uranium	0.00187	0.000067	0.0002	0.030			096371-009	SW846 6020
	Vanadium	0.00237	0.001	0.005	NE	J		096371-009	SW846 6010
	Zinc	0.00381	0.0035	0.010	NE	J		096371-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		096383-009	SW846 6020
26-Aug-14	Antimony	ND	0.001	0.003	0.006	U		096383-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096383-009	SW846 6020
	Barium	0.0444	0.0006	0.002	2.00			096383-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096383-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096383-009	SW846 6020
	Calcium	106	0.300	1.00	NE			096383-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096383-009	SW846 6020
	Cobalt	0.000143	0.0001	0.001	NE	J		096383-009	SW846 6020
	Copper	0.000579	0.00035	0.001	NE	J	0.0044UJ	096383-009	SW846 6020
	Iron	0.221	0.033	0.100	NE			096383-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096383-009	SW846 6020
	Magnesium	16.3	0.010	0.030	NE			096383-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096383-009	SW846 6020
	Mercury	ND	0.00067	0.0002	0.002	U		096383-009	SW846 7470
	Nickel	0.00182	0.0005	0.002	NE	J	J-	096383-009	SW846 6020
	Potassium	2.26	0.080	0.300	NE			096383-009	SW846 6020
	Selenium	0.00819	0.0015	0.005	0.050			096383-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096383-009	SW846 6020
	Sodium	28.8	0.080	0.250	NE			096383-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096383-009	SW846 6020
	Uranium	0.00221	0.000067	0.0002	0.030			096383-009	SW846 6020
	Vanadium	0.00374	0.001	0.005	NE	J		096383-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096383-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		096384-009	SW846 6020
26-Aug-14	Antimony	ND	0.001	0.003	0.006	U		096384-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096384-009	SW846 6020
	Barium	0.0432	0.0006	0.002	2.00			096384-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096384-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096384-009	SW846 6020
	Calcium	105	0.300	1.00	NE			096384-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096384-009	SW846 6020
	Cobalt	0.000129	0.0001	0.001	NE	J		096384-009	SW846 6020
	Copper	0.00056	0.00035	0.001	NE	J	0.0044UJ	096384-009	SW846 6020
	Iron	0.203	0.033	0.100	NE			096384-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096384-009	SW846 6020
	Magnesium	15.1	0.010	0.030	NE			096384-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096384-009	SW846 6020
	Mercury	ND	0.00067	0.0002	0.002	U		096384-009	SW846 7470
	Nickel	0.00173	0.0005	0.002	NE	J	J-	096384-009	SW846 6020
	Potassium	2.32	0.080	0.300	NE			096384-009	SW846 6020
	Selenium	0.00797	0.0015	0.005	0.050			096384-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096384-009	SW846 6020
	Sodium	27.5	0.080	0.250	NE			096384-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096384-009	SW846 6020
	Uranium	0.00218	0.000067	0.0002	0.030			096384-009	SW846 6020
	Vanadium	0.00351	0.001	0.005	NE	J		096384-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096384-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.105	0.015	0.050	NE			096399-009	SW846 6020
27-Aug-14	Antimony	ND	0.001	0.003	0.006	U		096399-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096399-009	SW846 6020
	Barium	0.206	0.0006	0.002	2.00			096399-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096399-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096399-009	SW846 6020
	Calcium	64.8	0.300	1.00	NE			096399-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096399-009	SW846 6020
	Cobalt	0.000126	0.0001	0.001	NE	J		096399-009	SW846 6020
	Copper	0.000446	0.00035	0.001	NE	J		096399-009	SW846 6020
	Iron	0.205	0.033	0.100	NE			096399-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096399-009	SW846 6020
	Magnesium	10.5	0.010	0.030	NE			096399-009	SW846 6020
	Manganese	0.00297	0.001	0.005	NE	J		096399-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096399-009	SW846 7470
	Nickel	0.00131	0.0005	0.002	NE	J		096399-009	SW846 6020
	Potassium	1.81	0.080	0.300	NE			096399-009	SW846 6020
	Selenium	0.00337	0.0015	0.005	0.050	J		096399-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096399-009	SW846 6020
	Sodium	17.5	0.080	0.250	NE			096399-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096399-009	SW846 6020
	Uranium	0.00139	0.000067	0.0002	0.030			096399-009	SW846 6020
	Vanadium	0.00559	0.001	0.005	NE			096399-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096399-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		096390-009	SW846 6020
14-Aug-14	Antimony	ND	0.001	0.003	0.006	U		096390-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096390-009	SW846 6020
	Barium	0.0784	0.0006	0.002	2.00			096390-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096390-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096390-009	SW846 6020
	Calcium	86.2	0.600	2.00	NE			096390-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096390-009	SW846 6020
	Cobalt	0.000153	0.0001	0.001	NE	J		096390-009	SW846 6020
	Copper	0.00062	0.00035	0.001	NE	J		096390-009	SW846 6020
	Iron	0.177	0.033	0.100	NE			096390-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096390-009	SW846 6020
	Magnesium	12.8	0.010	0.030	NE			096390-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096390-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096390-009	SW846 7470
	Nickel	0.00125	0.0005	0.002	NE	J		096390-009	SW846 6020
	Potassium	2.00	0.080	0.300	NE	N		096390-009	SW846 6020
	Selenium	0.0067	0.0015	0.005	0.050			096390-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096390-009	SW846 6020
	Sodium	22.5	0.080	0.250	NE			096390-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096390-009	SW846 6020
	Uranium	0.000989	0.000067	0.0002	0.030			096390-009	SW846 6020
	Vanadium	0.00403	0.001	0.005	NE	J		096390-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096390-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		096403-009	SW846 6020
28-Aug-14	Antimony	ND	0.001	0.003	0.006	U		096403-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096403-009	SW846 6020
	Barium	0.0467	0.0006	0.002	2.00			096403-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096403-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096403-009	SW846 6020
	Calcium	74.5	0.300	1.00	NE			096403-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096403-009	SW846 6020
	Cobalt	0.000104	0.0001	0.001	NE	J		096403-009	SW846 6020
	Copper	0.000429	0.00035	0.001	NE	J		096403-009	SW846 6020
	Iron	0.155	0.033	0.100	NE			096403-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096403-009	SW846 6020
	Magnesium	10.7	0.010	0.030	NE			096403-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096403-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096403-009	SW846 7470
	Nickel	0.00138	0.0005	0.002	NE	J		096403-009	SW846 6020
	Potassium	1.68	0.080	0.300	NE			096403-009	SW846 6020
	Selenium	0.00399	0.0015	0.005	0.050	J		096403-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096403-009	SW846 6020
	Sodium	19.6	0.080	0.250	NE			096403-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096403-009	SW846 6020
	Uranium	0.00124	0.000067	0.0002	0.030			096403-009	SW846 6020
	Vanadium	0.00519	0.001	0.005	NE			096403-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096403-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.025	0.015	0.050	NE	J		096401-009	SW846 6020
20-Aug-14	Antimony	ND	0.001	0.003	0.006	U		096401-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096401-009	SW846 6020
	Barium	0.0601	0.0006	0.002	2.00			096401-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096401-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096401-009	SW846 6020
	Calcium	232	0.600	2.00	NE			096401-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U	UJ	096401-009	SW846 6020
	Cobalt	0.0003	0.0001	0.001	NE	J		096401-009	SW846 6020
	Copper	0.00144	0.00035	0.001	NE		J-	096401-009	SW846 6020
	Iron	0.496	0.033	0.100	NE			096401-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096401-009	SW846 6020
	Magnesium	26.6	0.010	0.030	NE			096401-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096401-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096401-009	SW846 7470
	Nickel	0.0038	0.0005	0.002	NE		J-	096401-009	SW846 6020
	Potassium	2.50	0.080	0.300	NE			096401-009	SW846 6020
	Selenium	0.0206	0.0015	0.005	0.050			096401-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096401-009	SW846 6020
	Sodium	38.5	0.080	0.250	NE			096401-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096401-009	SW846 6020
	Uranium	0.00148	0.000067	0.0002	0.030			096401-009	SW846 6020
	Vanadium	0.00262	0.001	0.005	NE	J		096401-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096401-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.0175	0.015	0.050	NE	J		096393-009	SW846 6020
15-Aug-14	Antimony	ND	0.001	0.003	0.006	U		096393-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096393-009	SW846 6020
	Barium	0.0599	0.0006	0.002	2.00			096393-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096393-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096393-009	SW846 6020
	Calcium	123	0.600	2.00	NE			096393-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096393-009	SW846 6020
	Cobalt	0.000127	0.0001	0.001	NE	J		096393-009	SW846 6020
	Copper	0.000661	0.00035	0.001	NE	J	J-	096393-009	SW846 6020
	Iron	0.236	0.033	0.100	NE			096393-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096393-009	SW846 6020
	Magnesium	14.2	0.010	0.030	NE			096393-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096393-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096393-009	SW846 7470
	Nickel	0.00165	0.0005	0.002	NE	J	J-	096393-009	SW846 6020
	Potassium	2.03	0.080	0.300	NE			096393-009	SW846 6020
	Selenium	0.00863	0.0015	0.005	0.050			096393-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096393-009	SW846 6020
	Sodium	24.0	0.080	0.250	NE			096393-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096393-009	SW846 6020
	Uranium	0.00129	0.000067	0.0002	0.030			096393-009	SW846 6020
	Vanadium	0.00378	0.001	0.005	NE	J		096393-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096393-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		096406-009	SW846 6020
03-Sep-14	Antimony	ND	0.001	0.003	0.006	U		096406-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096406-009	SW846 6020
	Barium	0.0439	0.0006	0.002	2.00			096406-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	N, U		096406-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096406-009	SW846 6020
	Calcium	83.7	0.300	1.00	NE			096406-009	SW846 6020
	Chromium	0.00203	0.002	0.010	0.100	J		096406-009	SW846 6020
	Cobalt	0.000113	0.0001	0.001	NE	J		096406-009	SW846 6020
	Copper	0.000399	0.00035	0.001	NE	J		096406-009	SW846 6020
	Iron	0.108	0.033	0.100	NE			096406-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096406-009	SW846 6020
	Magnesium	12.4	0.010	0.030	NE			096406-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096406-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096406-009	SW846 7470
	Nickel	0.000876	0.0005	0.002	NE	J		096406-009	SW846 6020
	Potassium	1.88	0.080	0.300	NE			096406-009	SW846 6020
	Selenium	0.00475	0.0015	0.005	0.050	J		096406-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096406-009	SW846 6020
	Sodium	23.6	0.080	0.250	NE			096406-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096406-009	SW846 6020
	Uranium	0.00132	0.000067	0.0002	0.030			096406-009	SW846 6020
	Vanadium	0.00413	0.001	0.005	NE	J		096406-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096406-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		096397-009	SW846 6020
21-Aug-14	Antimony	ND	0.001	0.003	0.006	U		096397-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096397-009	SW846 6020
	Barium	0.0404	0.0006	0.002	2.00			096397-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096397-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096397-009	SW846 6020
	Calcium	72.5	0.600	2.00	NE			096397-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096397-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		096397-009	SW846 6020
	Copper	0.000581	0.00035	0.001	NE	J		096397-009	SW846 6020
	Iron	0.159	0.033	0.100	NE			096397-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096397-009	SW846 6020
	Magnesium	11.0	0.010	0.030	NE			096397-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096397-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096397-009	SW846 7470
	Nickel	0.00142	0.0005	0.002	NE	J		096397-009	SW846 6020
	Potassium	1.92	0.080	0.300	NE			096397-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		096397-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096397-009	SW846 6020
	Sodium	24.9	0.080	0.250	NE			096397-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096397-009	SW846 6020
	Uranium	0.00282	0.000067	0.0002	0.030			096397-009	SW846 6020
	Vanadium	0.00362	0.001	0.005	NE	J		096397-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096397-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		096408-009	SW846 6020
04-Sep-14	Antimony	ND	0.001	0.003	0.006	U		096408-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096408-009	SW846 6020
	Barium	0.178	0.0006	0.002	2.00			096408-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	N, U		096408-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096408-009	SW846 6020
	Calcium	77.7	0.300	1.00	NE			096408-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096408-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		096408-009	SW846 6020
	Copper	0.000398	0.00035	0.001	NE	J		096408-009	SW846 6020
	Iron	0.0906	0.033	0.100	NE	J		096408-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096408-009	SW846 6020
	Magnesium	14.3	0.010	0.030	NE			096408-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096408-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096408-009	SW846 7470
	Nickel	0.000692	0.0005	0.002	NE	J		096408-009	SW846 6020
	Potassium	3.23	0.080	0.300	NE			096408-009	SW846 6020
	Selenium	0.00263	0.0015	0.005	0.050	J		096408-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096408-009	SW846 6020
	Sodium	26.3	0.080	0.250	NE			096408-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096408-009	SW846 6020
	Uranium	0.00295	0.000067	0.0002	0.030			096408-009	SW846 6020
	Vanadium	0.00489	0.001	0.005	NE	J		096408-009	SW846 6010
	Zinc	0.00373	0.0035	0.010	NE	J		096408-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.145	0.015	0.050	NE			096395-009	SW846 6020
19-Aug-14	Antimony	ND	0.001	0.003	0.006	U		096395-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096395-009	SW846 6020
	Barium	0.0616	0.0006	0.002	2.00			096395-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096395-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096395-009	SW846 6020
	Calcium	64.8	0.600	2.00	NE			096395-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096395-009	SW846 6020
	Cobalt	0.000124	0.0001	0.001	NE	J		096395-009	SW846 6020
	Copper	0.00076	0.00035	0.001	NE	J		096395-009	SW846 6020
	Iron	0.241	0.033	0.100	NE			096395-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096395-009	SW846 6020
	Magnesium	11.7	0.010	0.030	NE			096395-009	SW846 6020
	Manganese	0.00457	0.001	0.005	NE	J		096395-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096395-009	SW846 7470
	Nickel	0.00128	0.0005	0.002	NE	J		096395-009	SW846 6020
	Potassium	2.09	0.080	0.300	NE			096395-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		096395-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096395-009	SW846 6020
	Sodium	21.9	0.080	0.250	NE			096395-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096395-009	SW846 6020
	Uranium	0.00355	0.000067	0.0002	0.030			096395-009	SW846 6020
	Vanadium	0.00494	0.001	0.005	NE	J		096395-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096395-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.0309	0.015	0.050	NE	J	0.14U	096412-009	SW846 6020
05-Sep-14	Antimony	ND	0.001	0.003	0.006	U		096412-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096412-009	SW846 6020
	Barium	0.196	0.0006	0.002	2.00			096412-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096412-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096412-009	SW846 6020
	Calcium	71.3	0.300	1.00	NE			096412-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096412-009	SW846 6020
	Cobalt	0.000873	0.0001	0.001	NE	J		096412-009	SW846 6020
	Copper	0.000357	0.00035	0.001	NE	J		096412-009	SW846 6020
	Iron	0.0511	0.033	0.100	NE	J		096412-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096412-009	SW846 6020
	Magnesium	13.2	0.010	0.030	NE		J	096412-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096412-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096412-009	SW846 7470
	Nickel	0.000592	0.0005	0.002	NE	J		096412-009	SW846 6020
	Potassium	2.04	0.080	0.300	NE			096412-009	SW846 6020
	Selenium	0.005	0.0015	0.005	0.050	J		096412-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096412-009	SW846 6020
	Sodium	20.6	0.080	0.250	NE			096412-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096412-009	SW846 6020
	Uranium	0.00182	0.000067	0.0002	0.030			096412-009	SW846 6020
	Vanadium	0.00493	0.001	0.005	NE	J		096412-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096412-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Continued)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	ND	0.015	0.050	NE	U		096386-009	SW846 6020
22-Aug-14	Antimony	ND	0.001	0.003	0.006	U		096386-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096386-009	SW846 6020
	Barium	0.042	0.0006	0.002	2.00			096386-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096386-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096386-009	SW846 6020
	Calcium	70.0	0.600	2.00	NE			096386-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096386-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		096386-009	SW846 6020
	Copper	0.000632	0.00035	0.001	NE	J		096386-009	SW846 6020
	Iron	0.158	0.033	0.100	NE			096386-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096386-009	SW846 6020
	Magnesium	13.3	0.010	0.030	NE			096386-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096386-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096386-009	SW846 7470
	Nickel	0.00129	0.0005	0.002	NE	J		096386-009	SW846 6020
	Potassium	2.28	0.080	0.300	NE			096386-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		096386-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096386-009	SW846 6020
	Sodium	26.2	0.080	0.250	NE			096386-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096386-009	SW846 6020
	Uranium	0.00366	0.000067	0.0002	0.030			096386-009	SW846 6020
	Vanadium	0.00528	0.001	0.005	NE			096386-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096386-009	SW846 6020

Refer to footnotes on page 6A-51.

Table 6A-5 *(Concluded)*
Summary of Target Analyte List Metals plus Uranium Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	ND	0.015	0.050	NE	U		096410-009	SW846 6020
25-Aug-14	Antimony	ND	0.001	0.003	0.006	U		096410-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096410-009	SW846 6020
	Barium	0.160	0.0006	0.002	2.00			096410-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096410-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096410-009	SW846 6020
	Calcium	84.6	0.300	1.00	NE			096410-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096410-009	SW846 6020
	Cobalt	0.000132	0.0001	0.001	NE	J		096410-009	SW846 6020
	Copper	0.000718	0.00035	0.001	NE	J		096410-009	SW846 6020
	Iron	0.171	0.033	0.100	NE			096410-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096410-009	SW846 6020
	Magnesium	13.3	0.010	0.030	NE			096410-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096410-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096410-009	SW846 7470
	Nickel	0.00171	0.0005	0.002	NE	J		096410-009	SW846 6020
	Potassium	1.89	0.080	0.300	NE			096410-009	SW846 6020
	Selenium	0.00527	0.0015	0.005	0.050			096410-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096410-009	SW846 6020
	Sodium	19.2	0.080	0.250	NE			096410-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096410-009	SW846 6020
	Uranium	0.00132	0.000067	0.0002	0.030			096410-009	SW846 6020
	Vanadium	0.00445	0.001	0.005	NE	J		096410-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096410-009	SW846 6020

Refer to footnotes on page 6A-51.

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 2014

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d] (pCi/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
PGS-2	Americium-241	8.29 ± 6.65	8.88	4.36	NE	U	BD	096368-033	EPA 901.1
15-Aug-14	Cesium-137	1.48 ± 1.80	3.01	1.45	NE	U	BD	096368-033	EPA 901.1
	Cobalt-60	-0.656 ± 1.69	2.88	1.36	NE	U	BD	096368-033	EPA 901.1
	Potassium-40	-15.2 ± 30.2	38.4	18.4	NE	U	BD	096368-033	EPA 901.1
	Gross Alpha	1.71	NA	NA	15 pCi/L	NA	None	096368-034	EPA 900.0
	Gross Beta	4.68 ± 1.34	1.65	0.802	4mrem/yr		J	096368-034	EPA 900.0
	Tritium	11.9 ± 86.1	160	70.9	NE	U	BD	096368-036	EPA 906.0 M
PGS-2 (Duplicate)	Americium-241	0.0846 ± 2.75	4.25	2.08	NE	U	BD	096369-033	EPA 901.1
15-Aug-14	Cesium-137	-1.97 ± 2.42	3.11	1.49	NE	U	BD	096369-033	EPA 901.1
	Cobalt-60	-1.64 ± 2.11	3.34	1.57	NE	U	BD	096369-033	EPA 901.1
	Potassium-40	11.4 ± 38.1	33.3	15.6	NE	U	BD	096369-033	EPA 901.1
	Gross Alpha	-0.17	NA	NA	15 pCi/L	NA	None	096369-034	EPA 900.0
	Gross Beta	3.91 ± 1.29	1.76	0.856	4mrem/yr		J	096369-034	EPA 900.0
	Tritium	125 ± 102	159	70.6	NE	U	BD	096369-036	EPA 906.0 M
TA1-W-01	Americium-241	1.89 ± 10.6	18.9	9.24	NE	U	BD	096356-033	EPA 901.1
13-Aug-14	Cesium-137	0.00121 ± 3.47	3.75	1.81	NE	U	BD	096356-033	EPA 901.1
	Cobalt-60	-3.04 ± 3.97	3.76	1.78	NE	U	BD	096356-033	EPA 901.1
	Potassium-40	25.3 ± 60.9	37.5	17.7	NE	U	BD	096356-033	EPA 901.1
	Gross Alpha	1.39	NA	NA	15 pCi/L	NA	None	096356-034	EPA 900.0
	Gross Beta	4.84 ± 1.34	1.62	0.784	4mrem/yr		J	096356-034	EPA 900.0
	Tritium	-5.2 ± 84.4	161	71.4	NE	U	BD	096356-036	EPA 906.0 M
TA1-W-02	Americium-241	-2.16 ± 14.9	25.6	12.4	NE	U	BD	096363-033	EPA 901.1
18-Aug-14	Cesium-137	0.636 ± 1.95	3.52	1.68	NE	U	BD	096363-033	EPA 901.1
	Cobalt-60	1.07 ± 2.14	3.97	1.85	NE	U	BD	096363-033	EPA 901.1
	Potassium-40	28.9 ± 60.5	33.6	15.4	NE	U	BD	096363-033	EPA 901.1
	Gross Alpha	0.22	NA	NA	15 pCi/L	NA	None	096363-034	EPA 900.0
	Gross Beta	2.66 ± 0.831	1.00	0.479	4mrem/yr		J	096363-034	EPA 900.0
	Tritium	31.2 ± 80.4	141	64.9	NE	U	BD	096363-036	EPA 906.0 M
TA1-W-03	Americium-241	-9.37 ± 8.33	12.2	5.94	NE	U	BD	096360-033	EPA 901.1
14-Aug-14	Cesium-137	1.23 ± 4.29	2.93	1.40	NE	U	BD	096360-033	EPA 901.1
	Cobalt-60	1.12 ± 1.97	3.53	1.67	NE	U	BD	096360-033	EPA 901.1
	Potassium-40	24.9 ± 37.1	31.4	14.8	NE	U	BD	096360-033	EPA 901.1
	Gross Alpha	-2.40	NA	NA	15 pCi/L	NA	None	096360-034	EPA 900.0
	Gross Beta	2.41 ± 2.49	4.11	1.98	4mrem/yr	U	BD	096360-034	EPA 900.0
	Tritium	5.90 ± 85.3	159	70.9	NE	U	BD	096360-036	EPA 906.0 M

Refer to footnotes on page 6A-51.

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 2014

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d] (pCi/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-03 (Duplicate)	Americium-241	-6.93 ± 14.6	18.7	9.18	NE	U	BD	096361-033	EPA 901.1
14-Aug-14	Cesium-137	-1.47 ± 2.28	3.43	1.65	NE	U	BD	096361-033	EPA 901.1
	Cobalt-60	0.456 ± 2.22	3.88	1.85	NE	U	BD	096361-033	EPA 901.1
	Potassium-40	60.9 ± 37.6	60.9	21.7	NE	U	BD	096361-033	EPA 901.1
	Gross Alpha	-5.75	NA	NA	15 pCi/L	NA	None	096361-034	EPA 900.0
	Gross Beta	5.89 ± 2.86	4.30	2.08	4mrem/yr		J	096361-034	EPA 900.0
	Tritium	98.4 ± 96.8	156	69.5	NE	U	BD	096361-036	EPA 906.0 M
TA1-W-04	Americium-241	9.74 ± 12.5	18.0	8.82	NE	U	BD	096378-033	EPA 901.1
21-Aug-14	Cesium-137	-0.398 ± 2.00	3.40	1.63	NE	U	BD	096378-033	EPA 901.1
	Cobalt-60	2.04 ± 2.29	4.01	1.89	NE	U	BD	096378-033	EPA 901.1
	Potassium-40	71.0 ± 78.8	36.6	17.1	NE	X	R	096378-033	EPA 901.1
	Gross Alpha	2.98	NA	NA	15 pCi/L	NA	None	096378-034	EPA 900.0
	Gross Beta	2.44 ± 0.751	0.911	0.436	4mrem/yr		J	096378-034	EPA 900.0
	Tritium	34.0 ± 81.0	142	65.2	NE	U	BD	096378-036	EPA 906.0 M
TA1-W-05	Americium-241	0.432 ± 6.62	10.2	4.98	NE	U	BD	096375-033	EPA 901.1
20-Aug-14	Cesium-137	0.666 ± 2.50	3.75	1.80	NE	U	BD	096375-033	EPA 901.1
	Cobalt-60	1.54 ± 2.22	3.99	1.88	NE	U	BD	096375-033	EPA 901.1
	Potassium-40	1.25 ± 44.2	36.6	17.2	NE	U	BD	096375-033	EPA 901.1
	Gross Alpha	0.15	NA	NA	15 pCi/L	NA	None	096375-R34	EPA 900.0
	Gross Beta	2.02 ± 0.756	0.992	0.472	4mrem/yr		J	096375-034	EPA 900.0
	Tritium	6.99 ± 80.1	145	66.6	NE	U	BD	096375-036	EPA 906.0 M
TA1-W-05 (Duplicate)	Americium-241	-28.9 ± 20.2	24.0	11.7	NE	U	BD	096376-033	EPA 901.1
20-Aug-14	Cesium-137	1.16 ± 2.60	3.95	1.89	NE	U	BD	096376-033	EPA 901.1
	Cobalt-60	-0.67 ± 2.49	4.25	1.99	NE	U	BD	096376-033	EPA 901.1
	Potassium-40	48.4 ± 33.7	51.3	24.3	NE	U	BD	096376-R33	EPA 901.1
	Gross Alpha	1.61	NA	NA	15 pCi/L	NA	None	096376-034	EPA 900.0
	Gross Beta	1.73 ± 0.937	1.43	0.692	4mrem/yr		J	096376-034	EPA 900.0
	Tritium	-2.91 ± 78.0	143	65.7	NE	U	BD	096376-036	EPA 906.0 M
TA1-W-06	Americium-241	-9.02 ± 18.0	25.5	12.5	NE	U	BD	096388-033	EPA 901.1
13-Aug-14	Cesium-137	2.98 ± 1.71	3.25	1.56	NE	U	BD	096388-033	EPA 901.1
	Cobalt-60	0.346 ± 1.89	3.44	1.62	NE	U	BD	096388-033	EPA 901.1
	Potassium-40	-28.4 ± 50.7	44.2	21.0	NE	U	BD	096388-033	EPA 901.1
	Gross Alpha	0.07	NA	NA	15 pCi/L	NA	None	096388-034	EPA 900.0
	Gross Beta	1.85 ± 1.38	2.23	1.08	4mrem/yr	U	BD	096388-034	EPA 900.0
	Tritium	18.3 ± 87.5	160	71.3	NE	U	BD	096388-036	EPA 906.0 M

Refer to footnotes on page 6A-51.

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 2014

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d] (pCi/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-08	Americium-241	5.35 ± 5.49	6.84	3.36	NE	U	BD	096371-033	EPA 901.1
19-Aug-14	Cesium-137	0.110 ± 2.86	4.95	2.38	NE	U	BD	096371-033	EPA 901.1
	Cobalt-60	1.97 ± 2.74	4.89	2.29	NE	U	BD	096371-033	EPA 901.1
	Potassium-40	29.7 ± 61.8	46.2	21.5	NE	U	BD	096371-033	EPA 901.1
	Gross Alpha	-0.56	NA	NA	15 pCi/L	NA	None	096371-R34	EPA 900.0
	Gross Beta	0.895 ± 2.17	3.72	1.77	4mrem/yr	U	BD	096371-034	EPA 900.0
	Tritium	-31.4 ± 75.0	142	65.4	NE	U	BD	096371-036	EPA 906.0 M
TA2-NW1-595	Americium-241	-7.9 ± 11.1	18.0	8.76	NE	U	BD	096383-033	EPA 901.1
26-Aug-14	Cesium-137	0.0692 ± 1.64	2.95	1.41	NE	U	BD	096383-033	EPA 901.1
	Cobalt-60	-1.17 ± 1.82	3.02	1.41	NE	U	BD	096383-033	EPA 901.1
	Potassium-40	-5.87 ± 31.3	42.4	20.2	NE	U	BD	096383-033	EPA 901.1
	Gross Alpha	-0.52	NA	NA	15 pCi/L	NA	None	096383-034	EPA 900.0
	Gross Beta	0.522 ± 2.06	3.48	1.70	4mrem/yr	U	BD	096383-034	EPA 900.0
	Tritium	3.85 ± 85.8	159	71.7	NE	U	BD	096383-036	EPA 906.0 M
TA2-NW1-595 (Duplicate)	Americium-241	16.7 ± 16.5	23.8	11.6	NE	U	BD	096384-033	EPA 901.1
26-Aug-14	Cesium-137	0.592 ± 1.93	3.19	1.52	NE	U	BD	096384-033	EPA 901.1
	Cobalt-60	-0.951 ± 2.00	3.42	1.59	NE	U	BD	096384-033	EPA 901.1
	Potassium-40	-29.1 ± 36.4	42.9	20.3	NE	U	BD	096384-033	EPA 901.1
	Gross Alpha	1.19	NA	NA	15 pCi/L	NA	None	096384-034	EPA 900.0
	Gross Beta	2.41 ± 1.47	2.29	1.10	4mrem/yr		J	096384-034	EPA 900.0
	Tritium	54.4 ± 89.6	154	69.6	NE	U	BD	096384-036	EPA 906.0 M
TA2-SW1-320	Americium-241	-1.55 ± 4.03	5.98	2.94	NE	U	BD	096399-033	EPA 901.1
27-Aug-14	Cesium-137	0.611 ± 2.65	4.59	2.21	NE	U	BD	096399-033	EPA 901.1
	Cobalt-60	2.85 ± 2.79	4.73	2.23	NE	U	BD	096399-033	EPA 901.1
	Potassium-40	-41.8 ± 55.0	47.5	22.4	NE	U	BD	096399-033	EPA 901.1
	Gross Alpha	0.48	NA	NA	15 pCi/L	NA	None	096399-034	EPA 900.0
	Gross Beta	2.08 ± 1.14	1.76	0.849	4mrem/yr		J	096399-034	EPA 900.0
	Tritium	7.95 ± 82.1	151	68.1	NE	U	BD	096399-036	EPA 906.0 M
TA2-W-01	Americium-241	4.64 ± 6.85	9.94	4.87	NE	U	BD	096390-033	EPA 901.1
14-Aug-14	Cesium-137	5.38 ± 3.41	2.50	1.20	NE	X	R	096390-033	EPA 901.1
	Cobalt-60	0.433 ± 1.71	3.10	1.46	NE	U	BD	096390-033	EPA 901.1
	Potassium-40	-34.7 ± 38.6	35.7	17.0	NE	U	BD	096390-033	EPA 901.1
	Gross Alpha	-1.21	NA	NA	15 pCi/L	NA	None	096390-034	EPA 900.0
	Gross Beta	2.10 ± 1.08	1.64	0.799	4mrem/yr		J	096390-034	EPA 900.0
	Tritium	-35.2 ± 79.7	159	70.9	NE	U	BD	096390-036	EPA 906.0 M

Refer to footnotes on page 6A-51.

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 2014

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d] (pCi/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-W-19	Americium-241	13.4 ± 16.4	25.3	12.3	NE	U	BD	096403-033	EPA 901.1
28-Aug-14	Cesium-137	0.241 ± 1.97	3.49	1.67	NE	U	BD	096403-033	EPA 901.1
	Cobalt-60	-0.824 ± 2.19	3.71	1.73	NE	U	BD	096403-033	EPA 901.1
	Potassium-40	-3.12 ± 42.4	55.1	26.3	NE	U	BD	096403-033	EPA 901.1
	Gross Alpha	0.35	NA	NA	15 pCi/L	NA	None	096403-034	EPA 900.0
	Gross Beta	1.80 ± 1.07	1.68	0.817	4mrem/yr		J	096403-034	EPA 900.0
	Tritium	7.46 ± 84.1	155	69.9	NE	U	BD	096403-036	EPA 906.0 M
TA2-W-26	Americium-241	4.72 ± 8.15	12.8	6.23	NE	U	BD	096401-033	EPA 901.1
20-Aug-14	Cesium-137	-3.12 ± 3.82	4.10	1.98	NE	U	BD	096401-033	EPA 901.1
	Cobalt-60	1.39 ± 1.82	3.31	1.55	NE	U	BD	096401-033	EPA 901.1
	Potassium-40	-25.1 ± 33.2	43.7	20.8	NE	U	BD	096401-033	EPA 901.1
	Gross Alpha	-1.13	NA	NA	15 pCi/L	NA	None	096401-034	EPA 900.0
	Gross Beta	1.48 ± 2.58	4.33	2.11	4mrem/yr	U	BD	096401-034	EPA 900.0
	Tritium	-11.6 ± 78.5	145	66.8	NE	U	BD	096401-036	EPA 906.0 M
TA2-W-27	Americium-241	4.46 ± 5.59	9.12	4.48	NE	U	BD	096393-033	EPA 901.1
15-Aug-14	Cesium-137	-0.738 ± 1.70	2.87	1.38	NE	U	BD	096393-033	EPA 901.1
	Cobalt-60	0.780 ± 1.70	3.03	1.44	NE	U	BD	096393-033	EPA 901.1
	Potassium-40	3.24 ± 43.0	28.0	13.2	NE	U	BD	096393-033	EPA 901.1
	Gross Alpha	-2.82	NA	NA	15 pCi/L	NA	None	096393-034	EPA 900.0
	Gross Beta	2.78 ± 1.31	1.97	0.951	4mrem/yr		J	096393-034	EPA 900.0
	Tritium	54.3 ± 92.8	161	71.5	NE	U	BD	096393-036	EPA 906.0 M
TJA-2	Americium-241	-10.4 ± 14.7	23.8	11.5	NE	U	BD	096406-033	EPA 901.1
03-Sep-14	Cesium-137	0.972 ± 1.78	3.20	1.53	NE	U	BD	096406-033	EPA 901.1
	Cobalt-60	-2.5 ± 2.19	3.03	1.40	NE	U	BD	096406-033	EPA 901.1
	Potassium-40	3.11 ± 38.6	34.4	16.0	NE	U	BD	096406-033	EPA 901.1
	Gross Alpha	-0.80	NA	NA	15 pCi/L	NA	None	096406-034	EPA 900.0
	Gross Beta	-0.115 ± 1.16	2.01	0.972	4mrem/yr	U	BD	096406-034	EPA 900.0
	Tritium	8.66 ± 82.7	152	68.6	NE	U	BD	096406-036	EPA 906.0 M
TJA-3	Americium-241	-1.63 ± 6.86	10.1	4.92	NE	U	BD	096397-033	EPA 901.1
21-Aug-14	Cesium-137	-0.0884 ± 1.95	2.99	1.43	NE	U	BD	096397-033	EPA 901.1
	Cobalt-60	0.529 ± 1.70	3.13	1.46	NE	U	BD	096397-033	EPA 901.1
	Potassium-40	-19.6 ± 30.2	39.2	18.6	NE	U	BD	096397-033	EPA 901.1
	Gross Alpha	1.57	NA	NA	15 pCi/L	NA	None	096397-034	EPA 900.0
	Gross Beta	3.17 ± 1.25	1.80	0.875	4mrem/yr		J	096397-034	EPA 900.0
	Tritium	31.6 ± 82.1	144	66.3	NE	U	BD	096397-036	EPA 906.0 M

Refer to footnotes on page 6A-51.

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 2014

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d] (pCi/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-4	Americium-241	18.7 ± 18.7	26.2	12.8	NE	U	BD	096408-033	EPA 901.1
04-Sep-14	Cesium-137	0.315 ± 1.96	3.41	1.64	NE	U	BD	096408-033	EPA 901.1
	Cobalt-60	2.29 ± 2.21	3.07	1.44	NE	U	BD	096408-033	EPA 901.1
	Potassium-40	-19.7 ± 39.1	43.1	20.5	NE	U	BD	096408-033	EPA 901.1
	Gross Alpha	-2.20	NA	NA	15 pCi/L	NA	None	096408-034	EPA 900.0
	Gross Beta	2.59 ± 1.95	3.16	1.55	4mrem/yr	U	BD	096408-034	EPA 900.0
	Tritium	-25.2 ± 80.1	154	69.7	NE	U	BD	096408-036	EPA 906.0 M
TJA-6	Americium-241	-4.78 ± 13.0	19.5	9.50	NE	U	BD	096395-033	EPA 901.1
19-Aug-14	Cesium-137	0.0596 ± 2.38	4.17	2.00	NE	U	BD	096395-033	EPA 901.1
	Cobalt-60	-1.33 ± 2.31	3.76	1.74	NE	U	BD	096395-033	EPA 901.1
	Potassium-40	4.83 ± 50.4	41.2	19.2	NE	U	BD	096395-033	EPA 901.1
	Gross Alpha	0.76	NA	NA	15 pCi/L	NA	None	096395-034	EPA 900.0
	Gross Beta	2.84 ± 1.41	2.12	1.03	4mrem/yr		J	096395-034	EPA 900.0
	Tritium	-2.38 ± 76.7	140	64.5	NE	U	BD	096395-036	EPA 906.0 M
TJA-7	Americium-241	-6.2 ± 15.2	19.6	9.60	NE	U	BD	096412-033	EPA 901.1
05-Sep-14	Cesium-137	2.39 ± 2.49	4.07	1.96	NE	U	BD	096412-033	EPA 901.1
	Cobalt-60	-0.639 ± 2.24	3.81	1.79	NE	U	BD	096412-033	EPA 901.1
	Potassium-40	23.8 ± 52.8	37.7	17.8	NE	U	BD	096412-033	EPA 901.1
	Gross Alpha	0.22	NA	NA	15 pCi/L	NA	None	096412-034	EPA 900.0
	Gross Beta	0.916 ± 1.10	1.83	0.884	4mrem/yr	U	BD	096412-034	EPA 900.0
	Tritium	-40.3 ± 77.6	153	69.1	NE	U	BD	096412-036	EPA 906.0 M
WYO-3	Americium-241	9.13 ± 12.4	19.1	9.37	NE	U	BD	096386-033	EPA 901.1
22-Aug-14	Cesium-137	2.46 ± 2.76	3.72	1.79	NE	U	BD	096386-033	EPA 901.1
	Cobalt-60	-0.474 ± 2.18	3.73	1.77	NE	U	BD	096386-033	EPA 901.1
	Potassium-40	-35.9 ± 50.0	55.7	26.9	NE	U	BD	096386-033	EPA 901.1
	Gross Alpha	3.10	NA	NA	15 pCi/L	NA	None	096386-034	EPA 900.0
	Gross Beta	2.60 ± 0.862	1.10	0.526	4mrem/yr		J	096386-034	EPA 900.0
	Tritium	-58.7 ± 71.8	141	64.9	NE	U	BD	096386-036	EPA 906.0 M
WYO-4	Americium-241	5.67 ± 6.83	9.78	4.77	NE	U	BD	096410-033	EPA 901.1
25-Aug-14	Cesium-137	1.41 ± 1.84	3.17	1.52	NE	U	BD	096410-033	EPA 901.1
	Cobalt-60	1.07 ± 1.79	3.27	1.53	NE	U	BD	096410-033	EPA 901.1
	Potassium-40	-43.8 ± 45.7	38.2	18.1	NE	U	BD	096410-033	EPA 901.1
	Gross Alpha	-0.71	NA	NA	15 pCi/L	NA	None	096410-034	EPA 900.0
	Gross Beta	2.26 ± 1.27	1.95	0.949	4mrem/yr		J	096410-034	EPA 900.0
	Tritium	1.93 ± 83.9	155	70.2	NE	U	BD	096410-036	EPA 906.0 M

Refer to footnotes on page 6A-51.

Table 6A-7
Summary of Field Water Quality Measurements[h],
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmho/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
TA1-W-06	11-Mar-14	17.48	674	154.9	7.79	3.81	45.6	4.36
TA2-SW1-320	27-Mar-14	15.04	367.7	254.7	7.96	4.92	75.4	7.51
TA2-W-01	10-Mar-14	18.05	502	98.4	7.87	0.29	62.9	5.94
TA2-W-19	19-Mar-14	16.42	448.1	211.7	7.80	1.19	74.2	7.20
TA2-W-26	18-Mar-14	16.02	999.0	204.1	7.63	3.98	66.8	6.56
TA2-W-27	12-Mar-14	14.98	595	143.7	7.76	0.41	50.1	4.96
TJA-2	20-Mar-14	16.47	445.8	195.9	7.78	0.89	72.1	7.00
TJA-3	17-Mar-14	19.21	407.9	184.7	7.65	1.25	66.8	6.12
TJA-4	25-Mar-14	17.81	443.5	191.6	7.73	0.28	59.4	5.62
TJA-6	13-Mar-14	18.08	370	177.6	7.69	2.27	55.1	5.17
TJA-7	26-Mar-14	16.72	395.5	241.7	7.76	2.08	81.5	7.89
WYO-4	24-Mar-14	15.21	470.1	215.5	7.88	1.13	76.7	7.91
TA2-SW1-320	20-Jun-14	12.67	503.7	293.3	7.92	12.3	89.4	7.42
TA2-W-19	30-May-14	18.74	516.8	295.3	7.65	0.78	94.0	8.75
TA2-W-26	28-May-14	20.22	1249.4	282.3	7.49	0.68	87.5	7.88
TJA-2	02-Jun-14	18.73	513.4	288.4	7.64	0.46	91.3	8.49
TJA-3	29-May-14	21.09	464.9	293.0	7.48	0.28	80.3	7.12
TJA-4	03-Jun-14	19.96	508.2	300.8	7.56	0.84	62.5	5.62
TJA-7	04-Jun-14	23.15	501.5	269.7	7.68	1.21	89.3	7.62
WYO-4	10-Jun-14	20.90	592.5	256.5	7.51	1.46	90.4	8.06
PGS-2	15-Aug-14	21.90	572.4	218.3	7.54	2.70	12.1	1.06
TA1-W-01	13-Aug-14	21.29	501.7	210.6	7.29	0.49	68.3	6.05
TA1-W-02	18-Aug-14	21.44	488.2	271.5	7.19	3.63	63.1	5.62
TA1-W-03	14-Aug-14	18.76	1551.8	228.9	7.06	1.28	82.7	7.67
TA1-W-04	21-Aug-14	19.59	447.0	290.4	7.18	0.25	63.7	5.83
TA1-W-05	20-Aug-14	20.59	561.8	298.1	7.01	0.51	82.2	7.39
TA1-W-06	13-Aug-14	20.27	810.9	80.6	7.47	0.68	74.9	6.76
TA1-W-08	19-Aug-14	22.35	1968.5	253.4	7.12	0.48	86.4	7.46
TA2-NW1-595	26-Aug-14	20.23	740.0	303.1	7.12	0.21	85.2	7.69
TA2-SW1-320	27-Aug-14	20.46	481.0	282.2	7.56	2.03	83.6	7.52
TA2-W-01	14-Aug-14	20.15	609.4	83.8	7.51	0.16	73.6	6.67
TA2-W-19	28-Aug-14	20.40	560.0	280.0	7.39	0.34	98.6	8.82

Refer to footnotes on page 6A-51.

Table 6A-7 *(Concluded)*
Summary of Field Water Quality Measurements[h],
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2014

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmho/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
TA2-W-26	20-Aug-14	20.81	1256.3	61.2	7.41	0.84	73.8	6.57
TA2-W-27	15-Aug-14	19.99	730.8	71.3	7.47	0.38	79.5	7.20
TJA-2	03-Sep-14	18.69	537.3	276.8	7.30	0.20	89.7	8.35
TJA-3	21-Aug-14	21.57	509.7	61.8	7.36	0.29	62.1	5.47
TJA-4	04-Sep-14	21.04	546.2	288.9	7.27	0.42	62.0	5.51
TJA-6	19-Aug-14	21.65	427.7	60.7	7.42	1.52	61.6	5.43
TJA-7	05-Sep-14	21.38	506.6	275.4	7.36	1.42	89.9	7.95
WYO-3	22-Aug-14	19.10	470.0	296.6	7.36	0.47	78.1	7.21
WYO-4	25-Aug-14	21.3	676.0	31.2	7.58	0.27	88.6	7.91
TA2-W-19	19-Nov-14	17.50	523.7	309.3	7.70	0.52	89.0	8.48
TA2-W-26	01-Dec-14	18.24	1266.1	247.9	7.39	1.09	82.0	7.69
TA2-W-28	18-Dec-14	17.36	453.9	242.8	7.68	1.64	52.1	4.99
TJA-2	20-Nov-14	15.27	496.8	302.3	7.66	0.29	84.1	8.40
TJA-3	02-Dec-14	18.82	461.4	261.9	7.46	0.31	74.6	6.94
TJA-4	25-Nov-14	17.45	501.5	349.8	7.60	0.31	59.4	5.70
TJA-7	03-Dec-14	18.42	471.5	266.5	7.54	1.18	84.7	7.91
WYO-4	24-Nov-14	12.43	506.9	274.6	7.88	0.44	76.7	8.16

Refer to footnotes on page 6A-51.

This page intentionally left blank.

Footnotes for Tijeras Arroyo Groundwater Analytical Results Tables

%	= Percent.
CFR	= Code of Federal Regulations.
EPA	= U.S. Environmental Protection Agency.
ID	= Identification.
µg/L	= Micrograms per liter.
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 1-4).

Bold = Value 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 Table 6A-1 through 6A-5. MDA applies to 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

The PQL applies to Table 6A-1 through 6A-5. MDA 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. Established by the EPA Office of Water, National Primary Drinking Water Standards (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- 15 pCi/L = Gross alpha particle activity, excluding total uranium (40 CFR Parts 9, 141, and 142, Table 1-4).
- 4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (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.

* = Recovery or % relative percent difference (RPD) not within acceptance limits and/or spike amount not compatible with the sample, or the duplicate RPD's are not applicable where the concentration falls below the effective PQL.

B = Analyte is detected in associated laboratory method blank.

J = Amount detected is below the practical quantitation limit (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.

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 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 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, 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 and TA2-W-28 ..... 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.

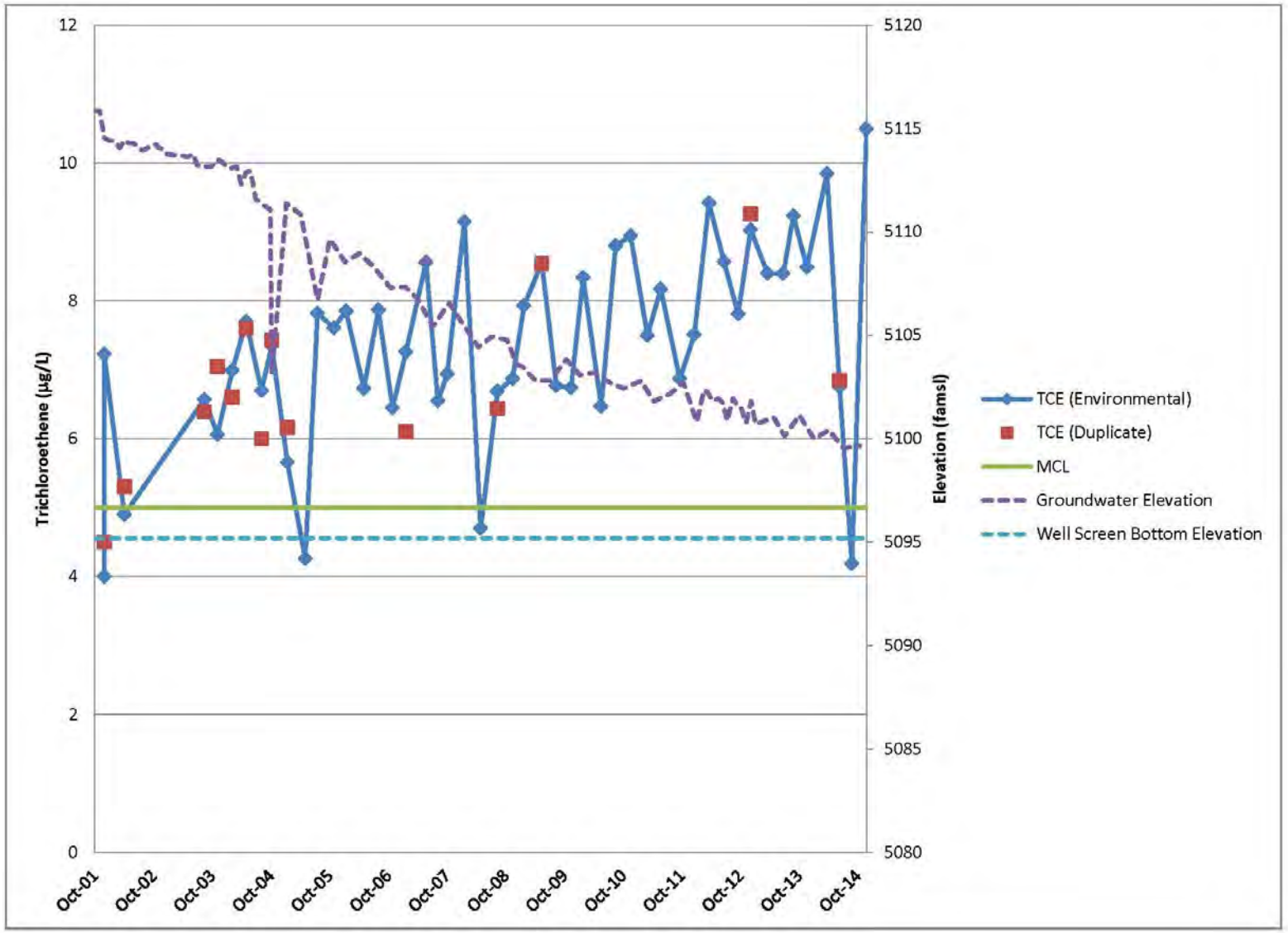


Figure 6B-1. Trichloroethene Concentrations, WYO-4

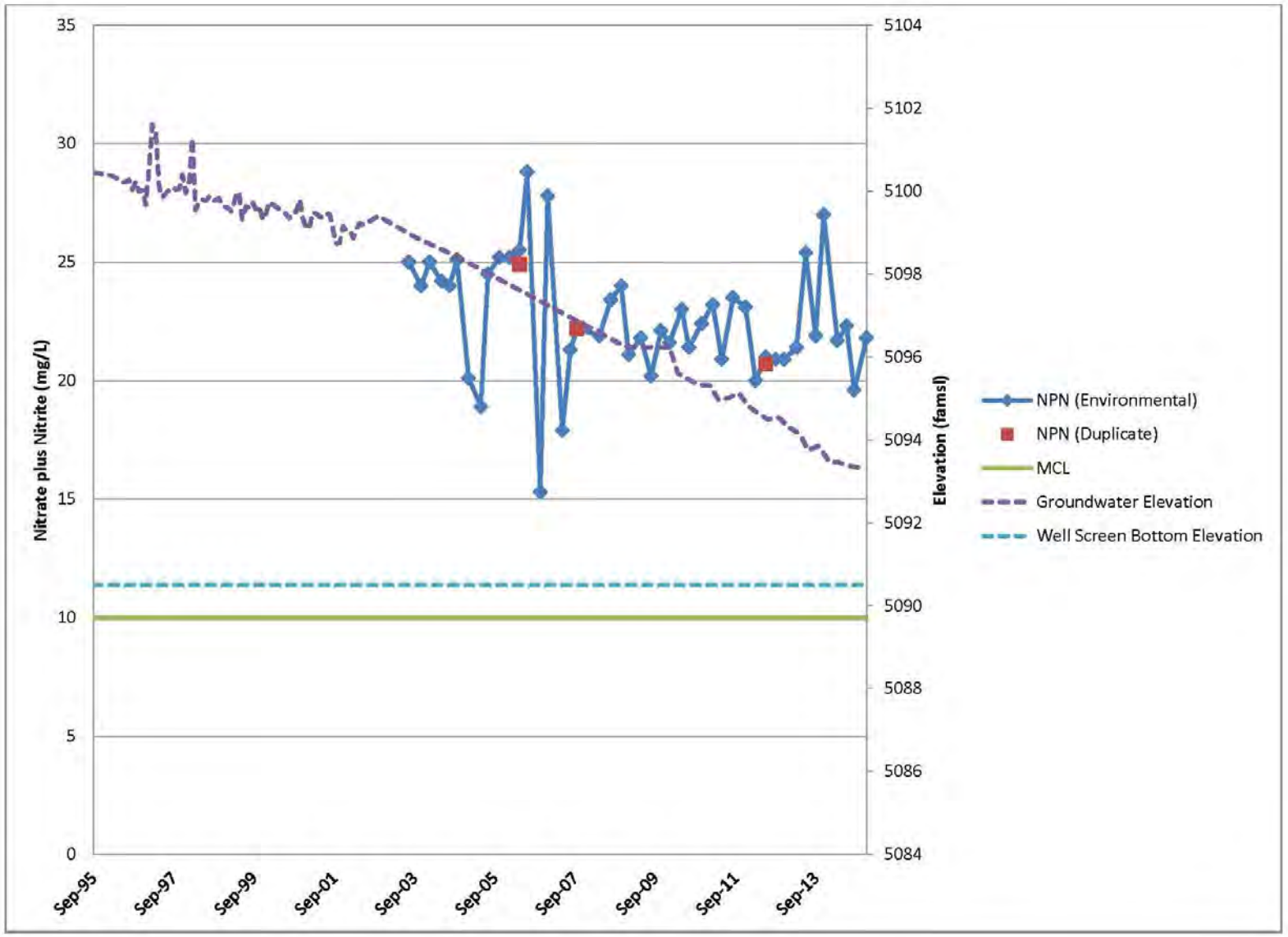


Figure 6B-2. Nitrate plus Nitrite Concentrations, TA2-SW1-320 and TA2-W-28

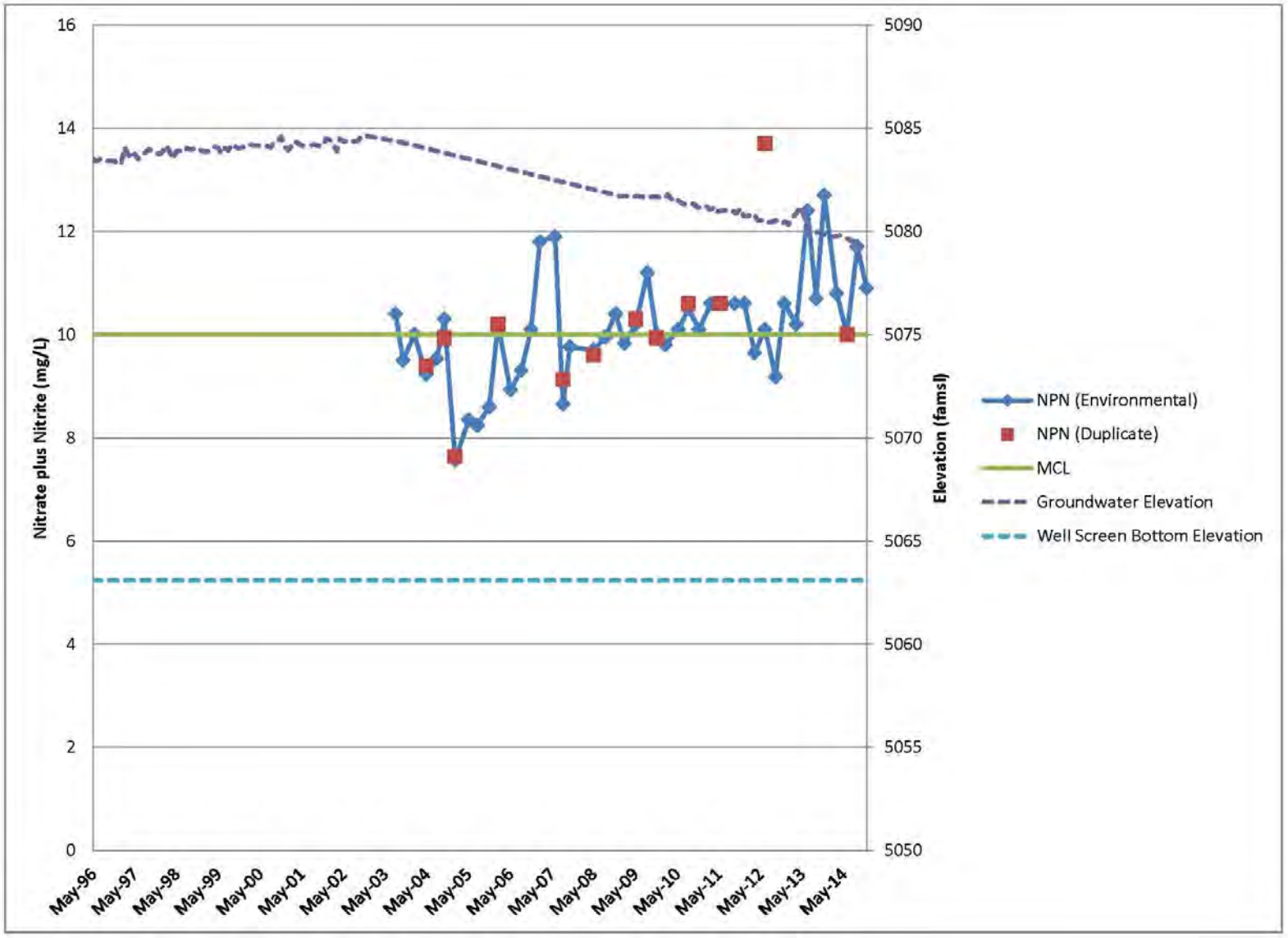


Figure 6B-3. Nitrate plus Nitrite Concentrations, TA2-W-19

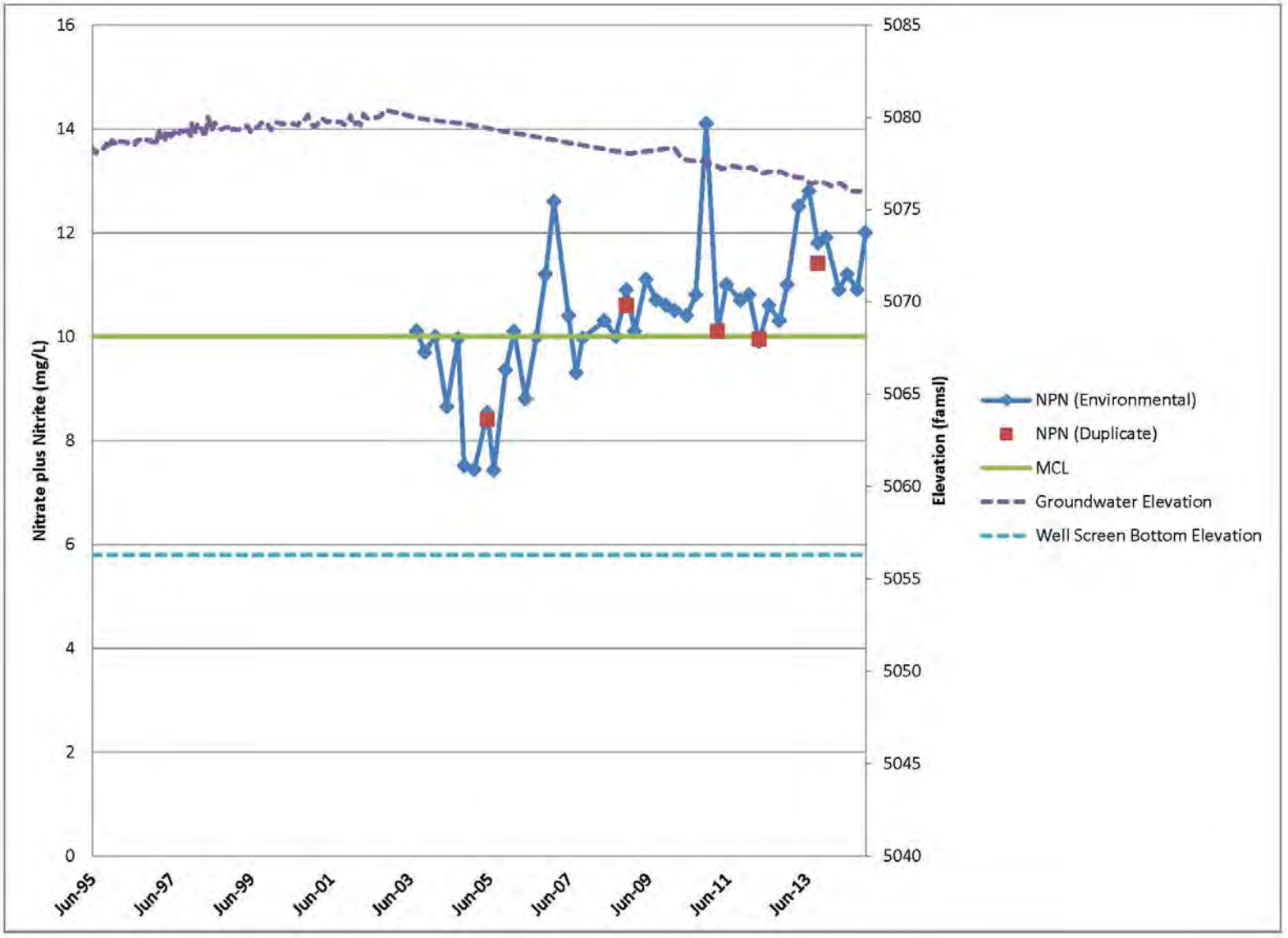


Figure 6B-4. Nitrate plus Nitrite Concentrations, TJA-2

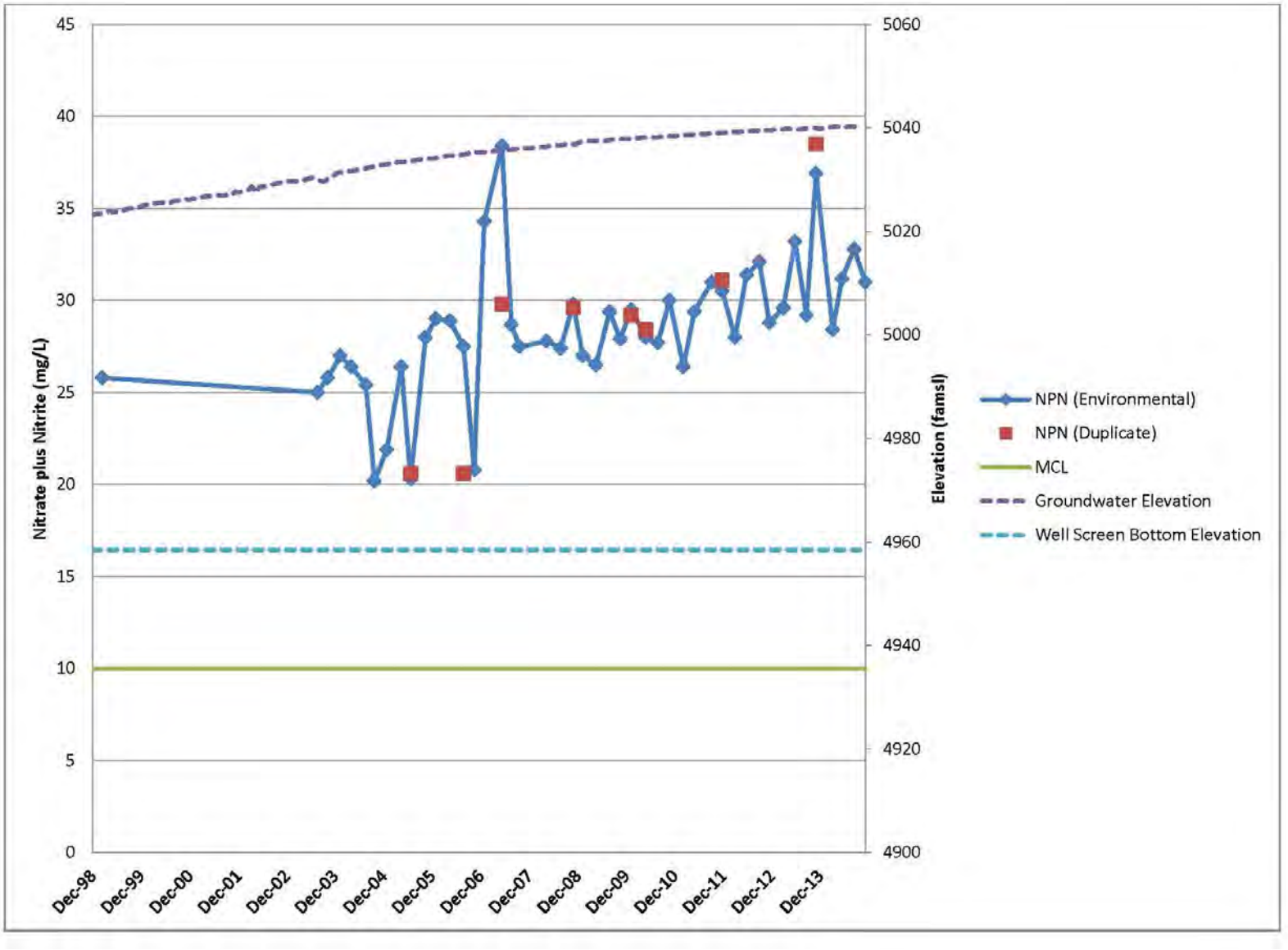


Figure 6B-5. Nitrate plus Nitrite Concentrations, TJA-4

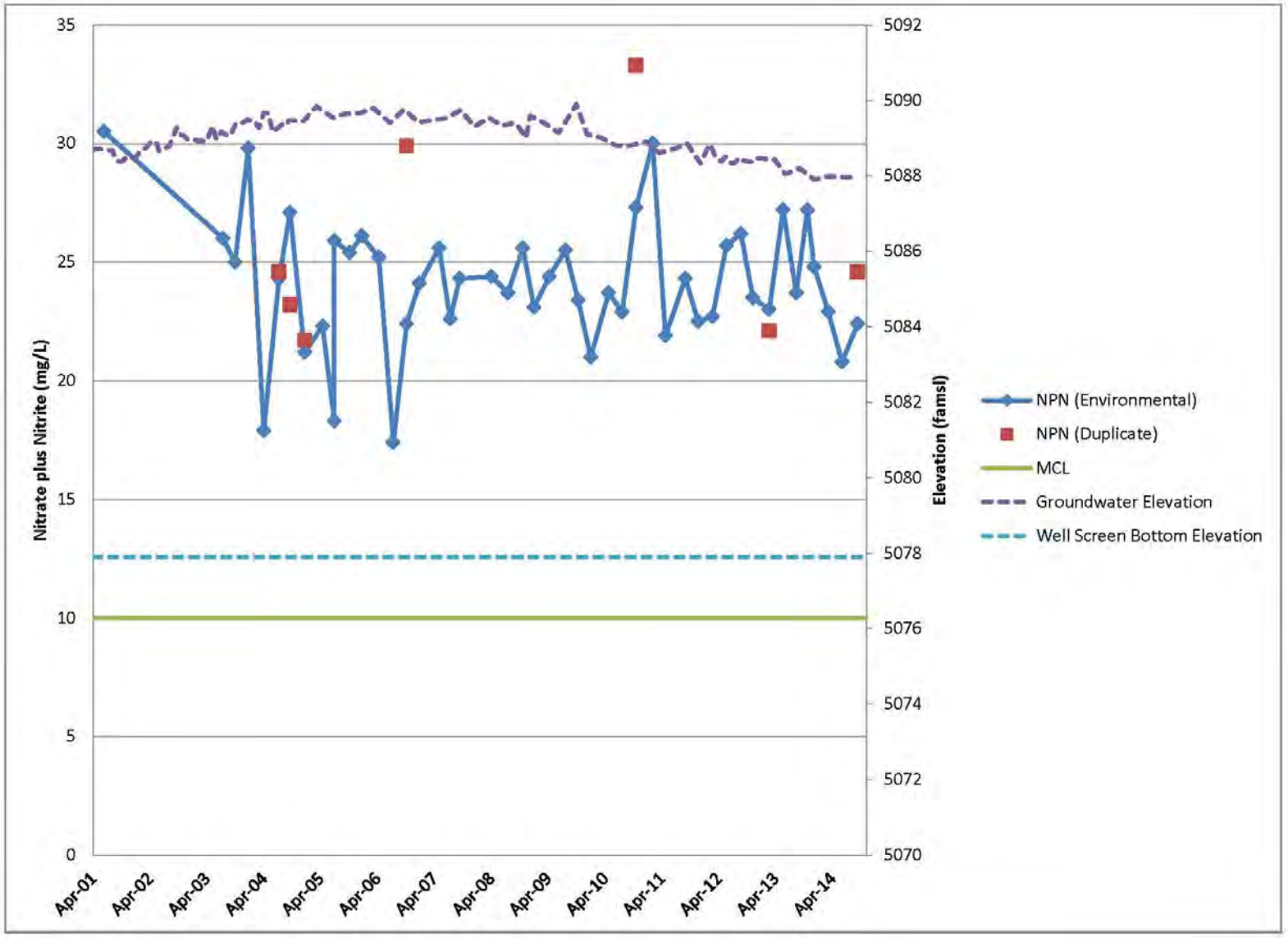


Figure 6B-6. Nitrate plus Nitrite Concentrations, TJA-7

Attachment 6C
Tijeras Arroyo Groundwater
Hydrographs

This page intentionally left blank.

Attachment 6C Hydrographs

6C-1 TAG Area of Concern Wells (1 of 7) 6C-5

6C-2 TAG Area of Concern Wells (2 of 7) 6C-6

6C-3 TAG Area of Concern Wells (3 of 7) 6C-7

6C-4 TAG Area of Concern Wells (4 of 7) 6C-8

6C-5 TAG Area of Concern Wells (5 of 7) 6C-9

6C-6 TAG Area of Concern Wells (6 of 7) 6C-10

6C-7 TAG Area of Concern Wells (7 of 7) 6C-11

This page intentionally left blank.

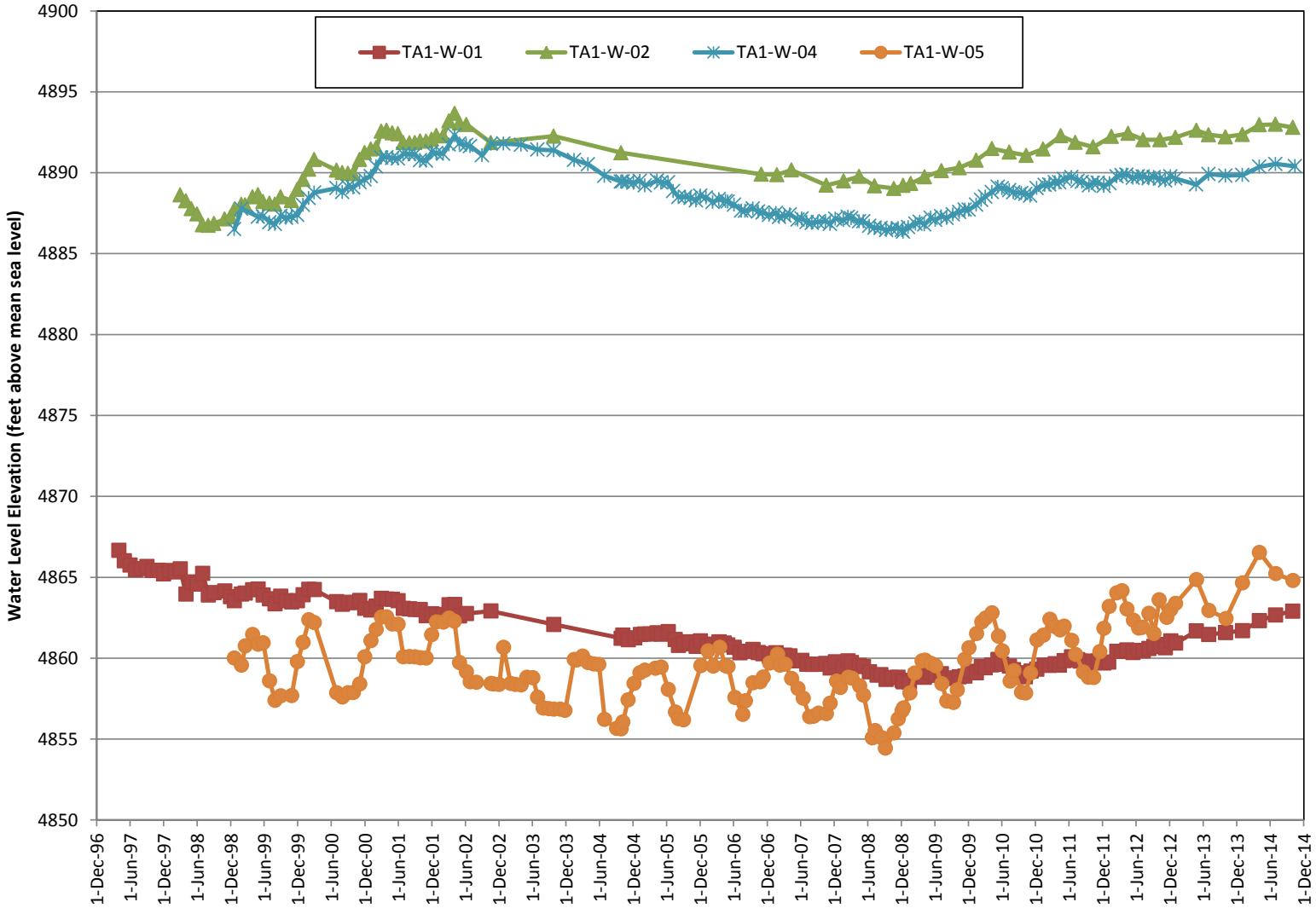


Figure 6C-1. TAG Area of Concern Wells (1 of 7)

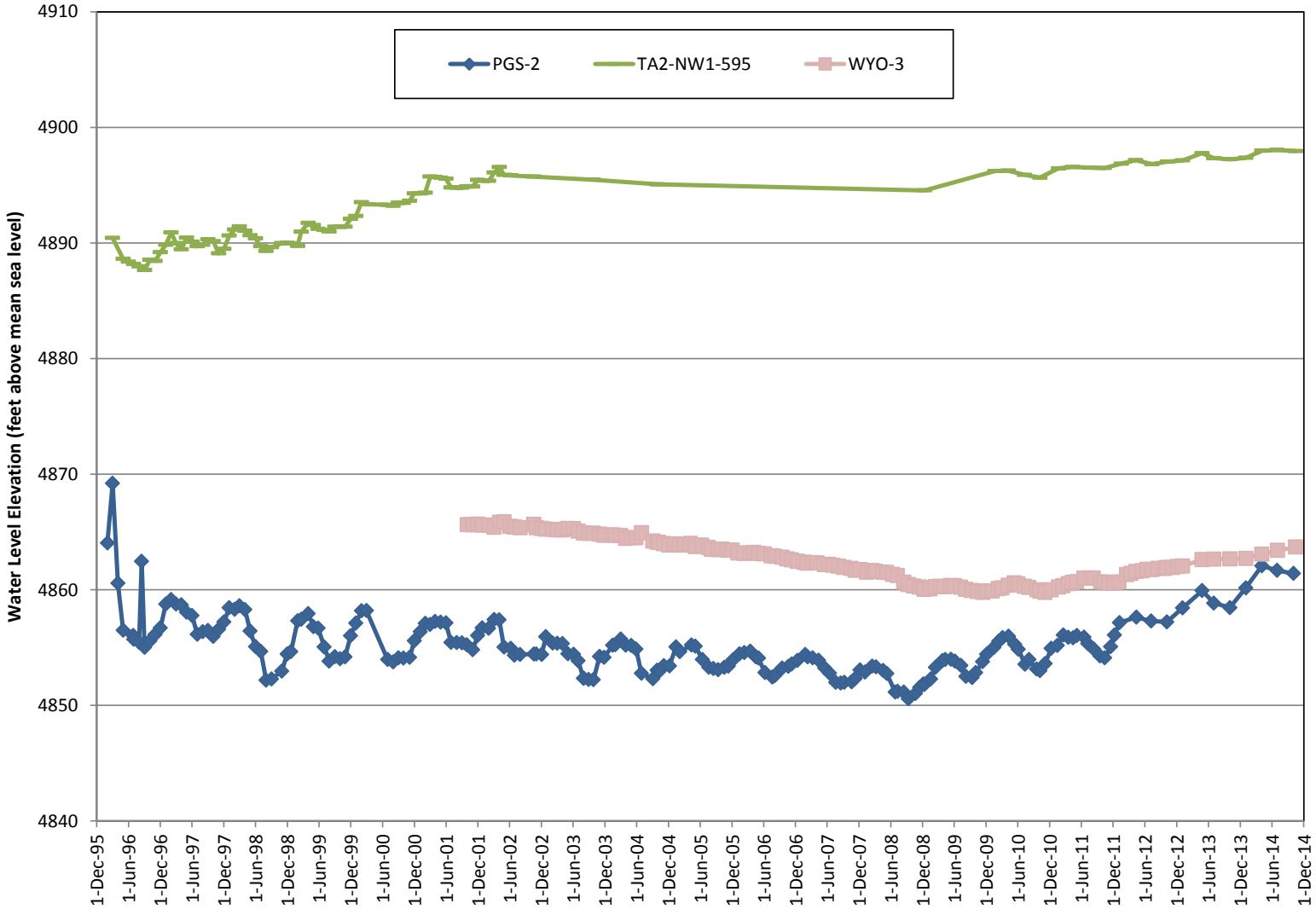


Figure 6C-2. TAG Area of Concern Wells (2 of 7)

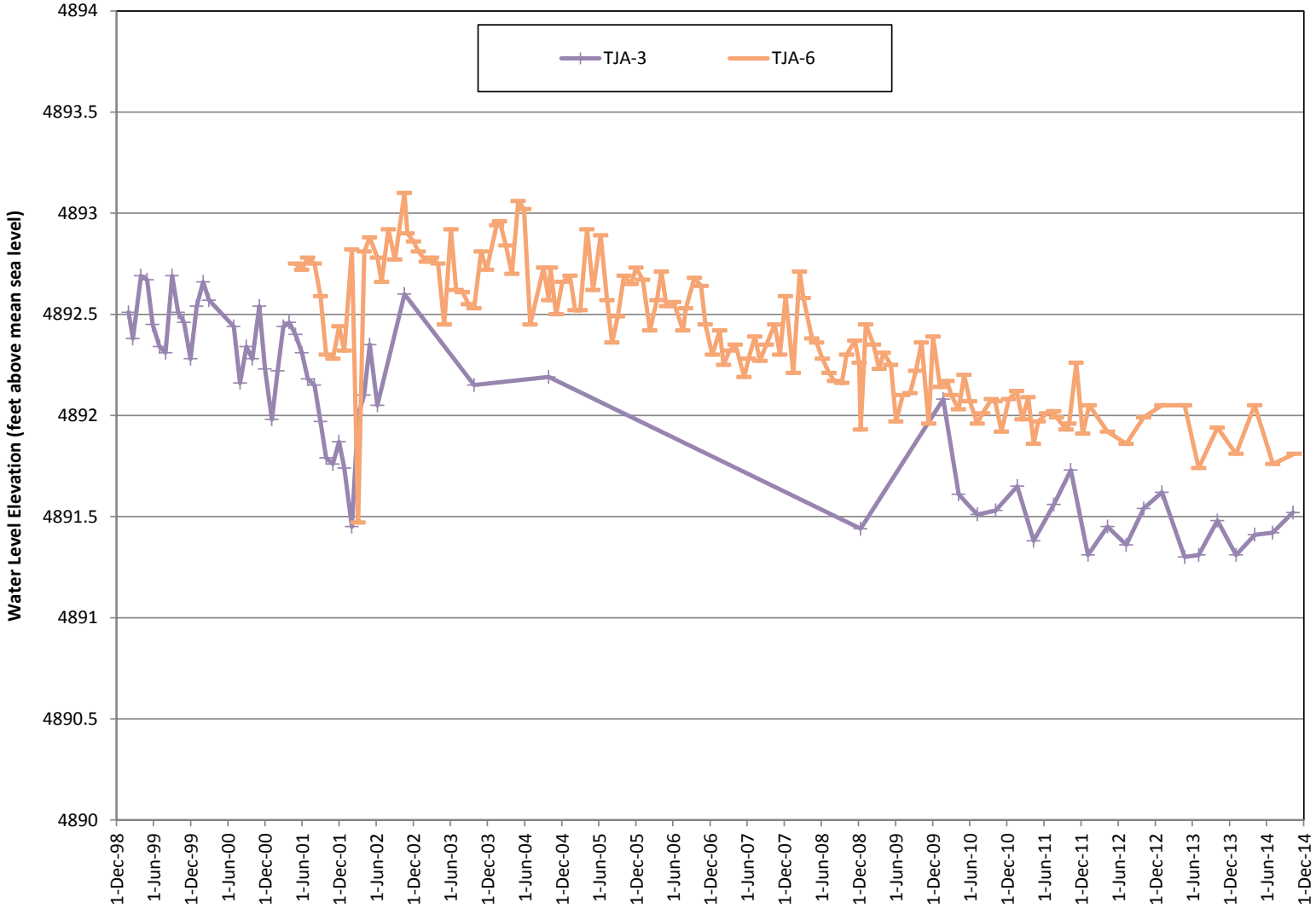


Figure 6C-3. TAG Area of Concern Wells (3 of 7)

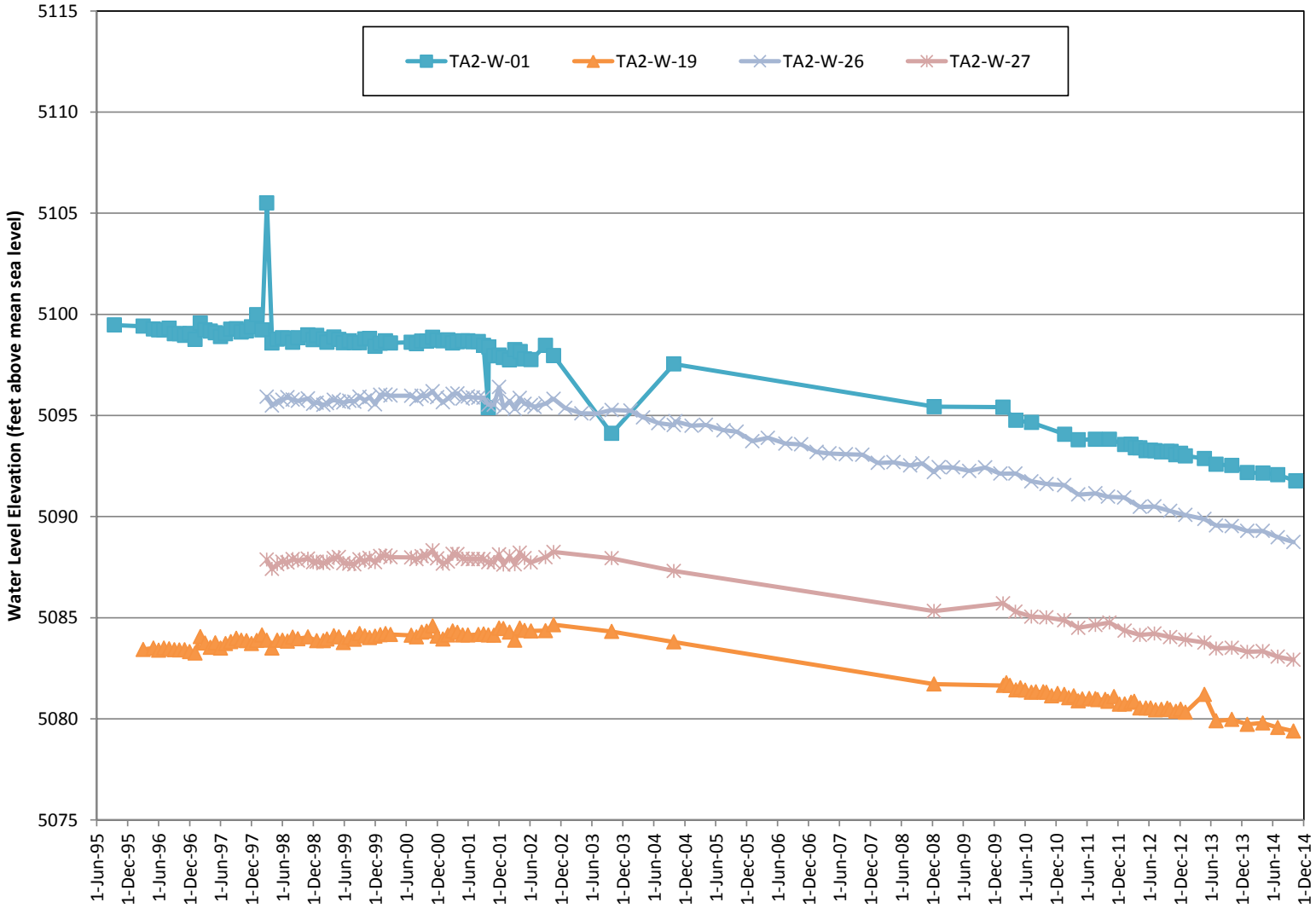


Figure 6C-4. TAG Area of Concern Wells (4 of 7)

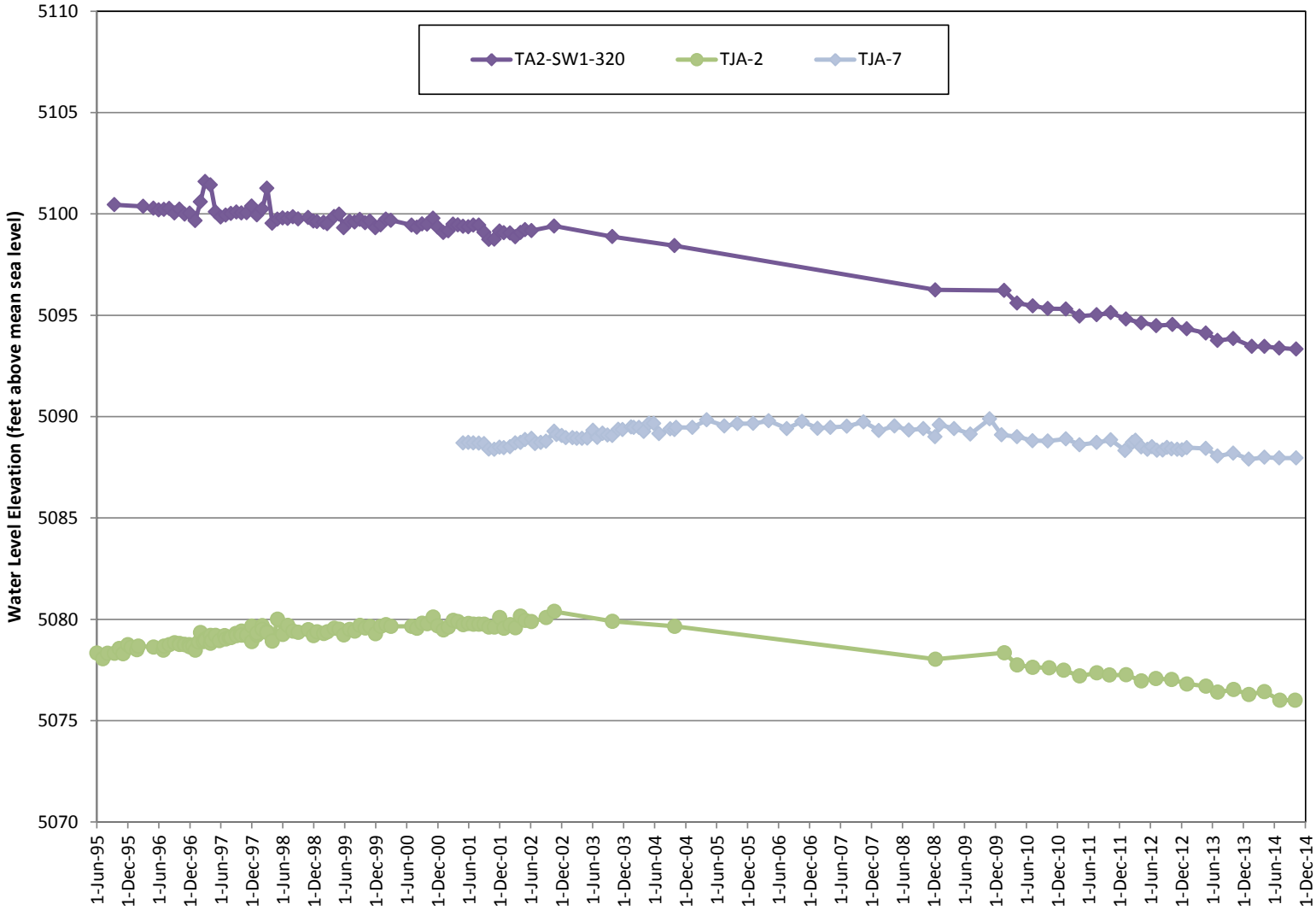


Figure 6C-5. TAG Area of Concern Wells (5 of 7)

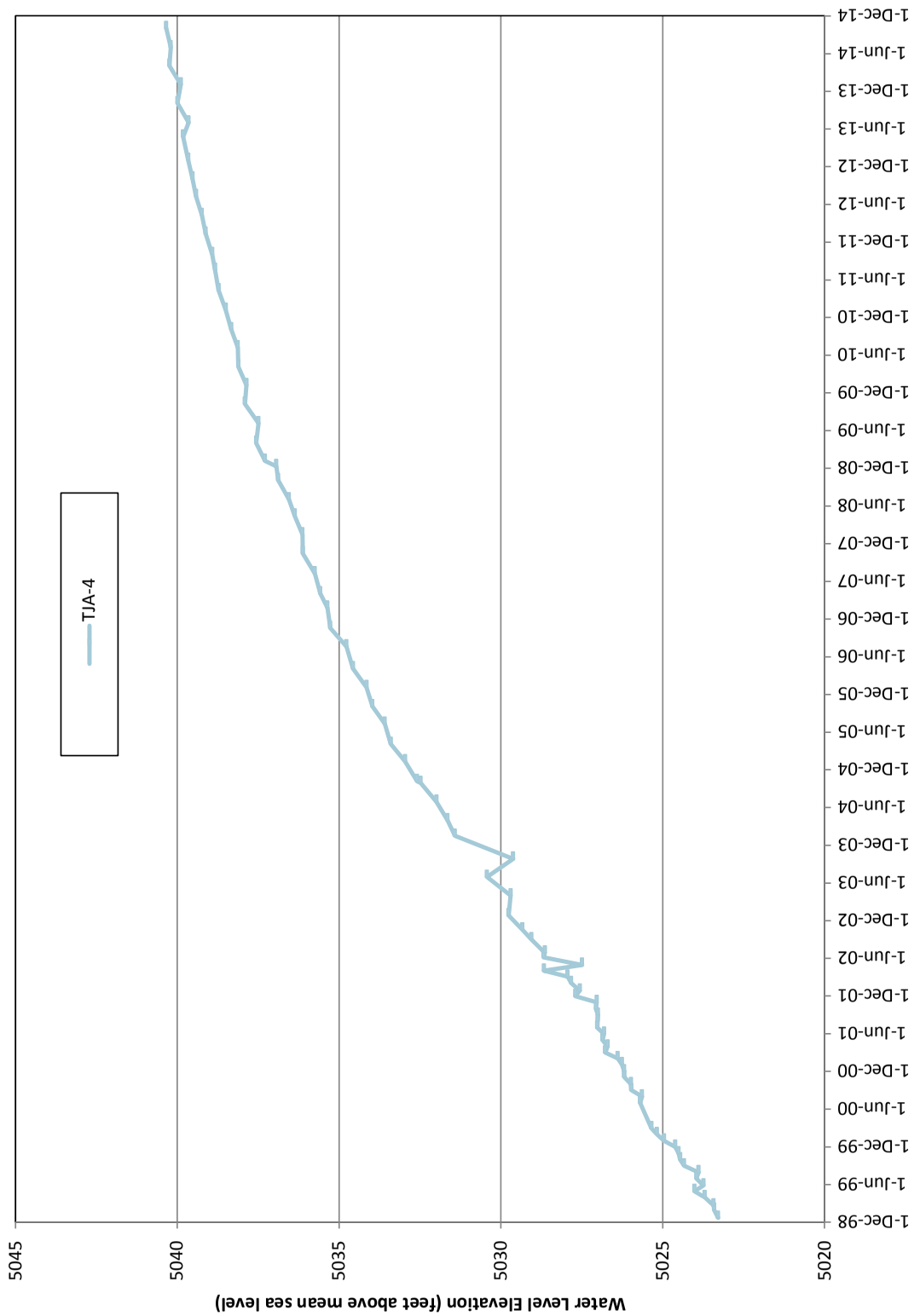


Figure 6C-6. TAG Area of Concern Wells (6 of 7)

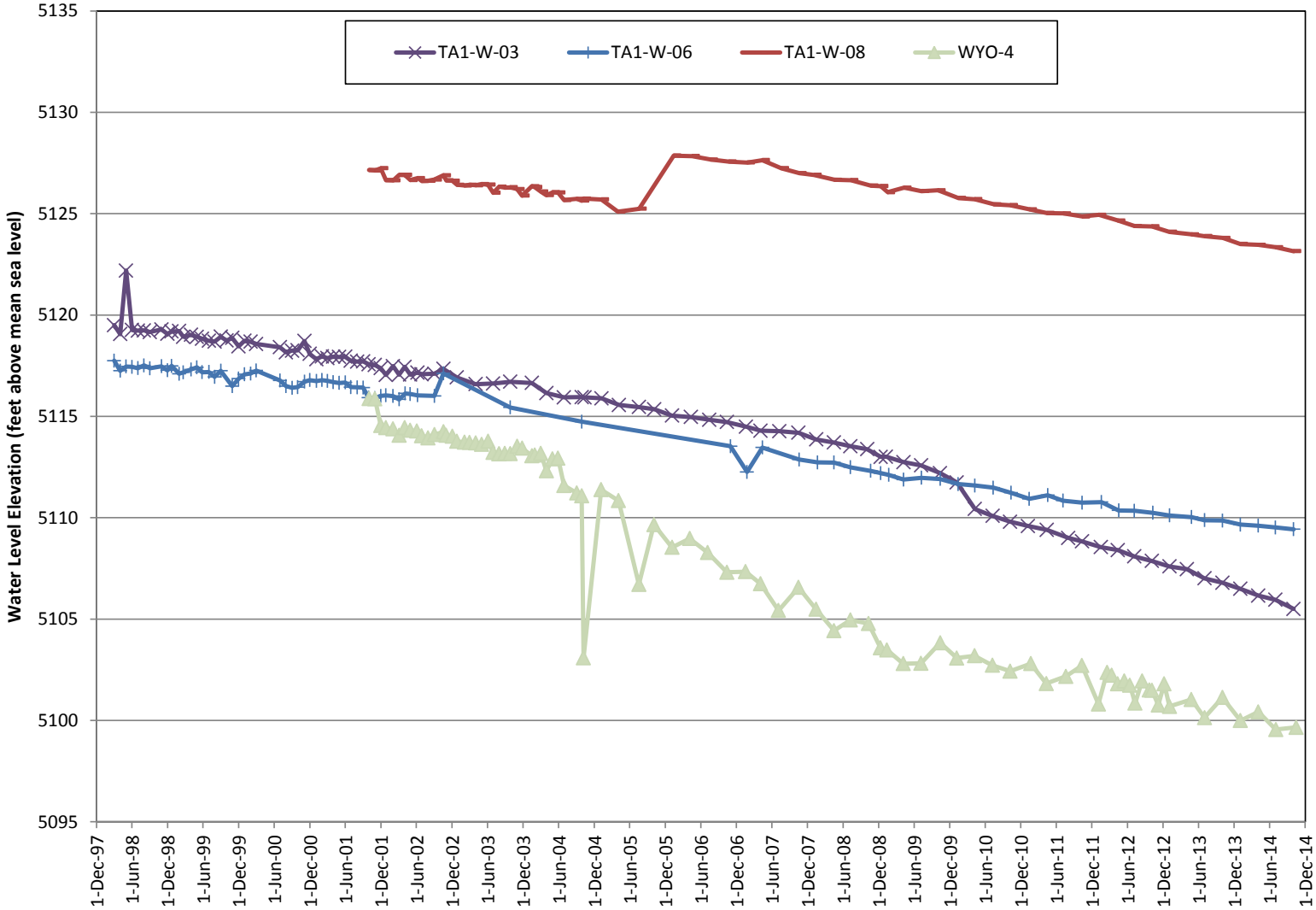


Figure 6C-7. TAG Area of Concern Wells (7 of 7)

This page intentionally left blank.

7.0 Burn Site Groundwater Area of Concern

7.1 Introduction

Unique features of the Burn Site Groundwater (BSG) Area of Concern (AOC) (previously Burn Site Groundwater Study Area), 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 AOC. 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 Consent 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 are to be sampled for perchlorate using a screening level/method detection limit (MDL) of 4 micrograms per liter (μg/L) (NMED April 2004). Furthermore, the Consent 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 in groundwater. Since March 2006, the maximum concentration of perchlorate in groundwater at the BSG AOC 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 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 AOC 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 (Table 7-1) also include open detonation of high explosive (HE) compounds 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.

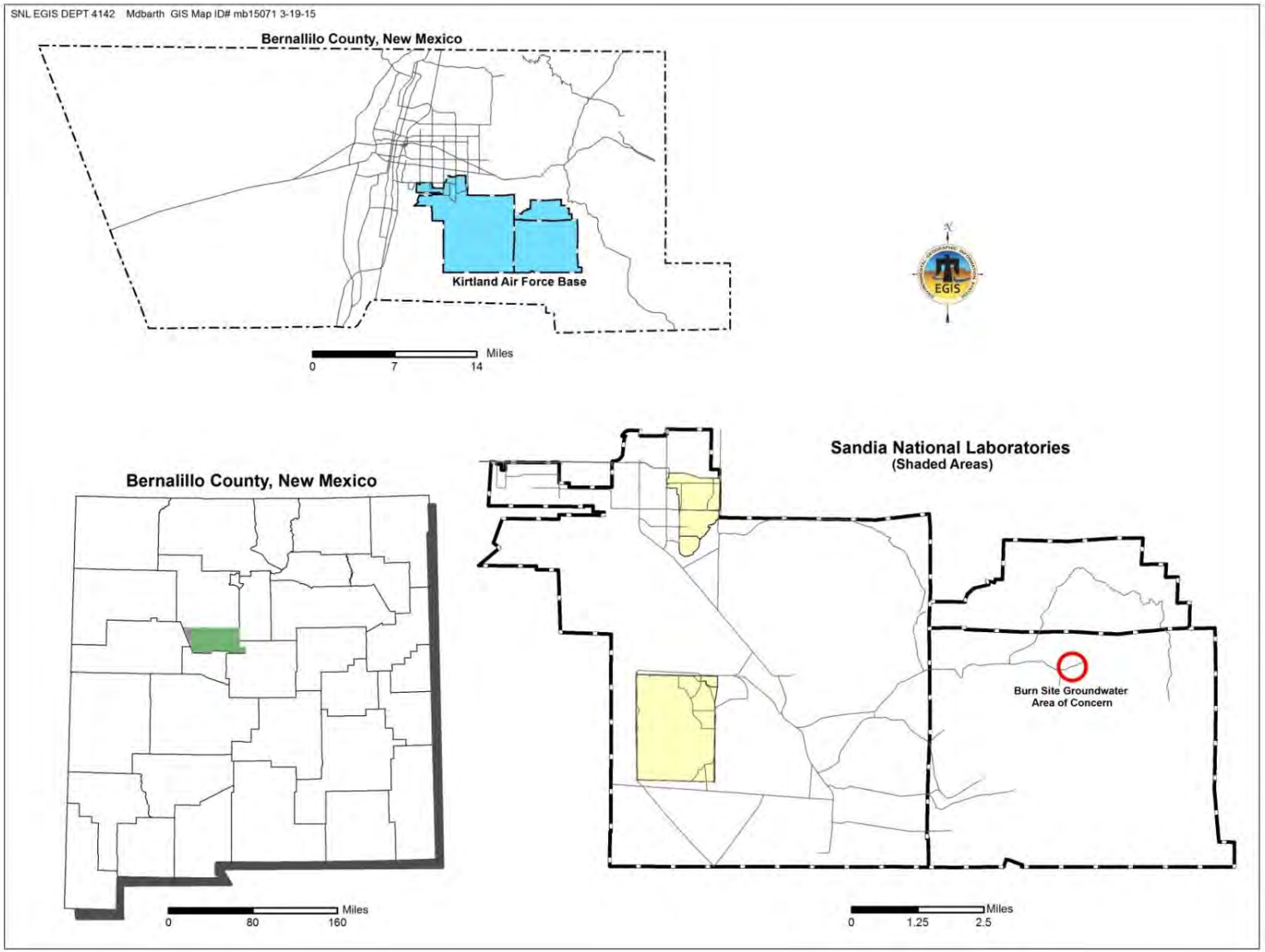


Figure 7-1. Location of the Burn Site Groundwater Area of Concern

Table 7-1. Historical Timeline of the Burn Site Groundwater Area of Concern

Month	Year	Event	Reference
	1967-early 1980s	HE testing conducted at the BSG AOC 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 12AUP01 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 AOC 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 AOC.	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 AOC 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 AOC that requires a CME.	NMED April 2004
June	2004	A CCM of the BSG AOC prepared.	SNL June 2004a
June	2004	A CME work plan for the BSG AOC prepared.	SNL June 2004b
January	2005	Nitrate source evaluation of deep soil in the BSG AOC performed.	SNL January 2005

Refer to footnotes on page 7-5.

Table 7-1. Historical Timeline of the Burn Site Groundwater Area of Concern *(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 AOC.	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 2009
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

Refer to footnotes on page 7-5.

Table 7-1. Historical Timeline of the Burn Site Groundwater Area of Concern *(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 12AUP01, 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 AOC 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
June	2014	Approval for installation of groundwater monitoring wells CYN-MW14A and CYN-MW15.	NMED June 2014
December	2014	Installed groundwater monitoring wells CYN-MW14A and CYN-MW15.	In progress

NOTES:
AOC = Area of Concern.
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 grade 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 grade 4 (JP-4). Several engineered structures, such as the Light Air Transport Accident Resistant Container Unit, were used at the Burn Site. The structures mostly used JP-4 and occasionally used diesel fuel and gasoline to create the high temperatures associated with transportation accidents. In the mid-1990s, jet propellant, fuel grade 8 (JP-8) replaced JP-4 as the petroleum fuel used for burn tests. Most test structures have been dismantled. The only remaining structure is the Smoke Emissions Reduction Facility. Portable burn pans are occasionally used.

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 Area of Concern

Well	Installation Year	WQ	WL	Comments
12AUP01	1996			Alluvial-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			Alluvial-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, replaced CYN-MW1D
CYN-MW14A	2014	√	√	Bedrock groundwater well
CYN-MW15	2014	√	√	Bedrock groundwater well, replacement for CYN-MW6

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 AOC 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 AOC, numerous characterization activities have been conducted (Table 7-1). The results of these characterization activities are summarized in the *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Burn Site* (SNL June 2004a) and subsequent update (April 2008a). The BSG conceptual site model provides a comprehensive list of groundwater monitoring data sources used to support the summary of investigations.

In April 2004, the Consent Order became effective between the DOE, Sandia, and the NMED, and the Consent Order specifies the Burn Site as an area of groundwater contamination (NMED April 2004). In response to the Consent Order, DOE/NNSA and Sandia submitted the Corrective Measures Evaluation (CME) Work Plan for the BSG AOC 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 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 AOC. 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. 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, 12AUP01, CYN-MW1D, and CYN-MW2S; and install a replacement groundwater monitoring well, CYN-MW13 (SNL February 2012). Monitoring wells 12AUP01 and CYN-MW2S had been 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. 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 (12AUP01, CYN-MW1D, and CYN-MW2S) were decommissioned in November 2012; and replacement monitoring well CYN-MW13 was installed in December 2012.

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 AOC to the DOE/NNSA Sandia Field Office (DOE October 2013). This review stated that more characterization activities were required at the BSG AOC before a Corrective Measures Evaluation could be implemented.

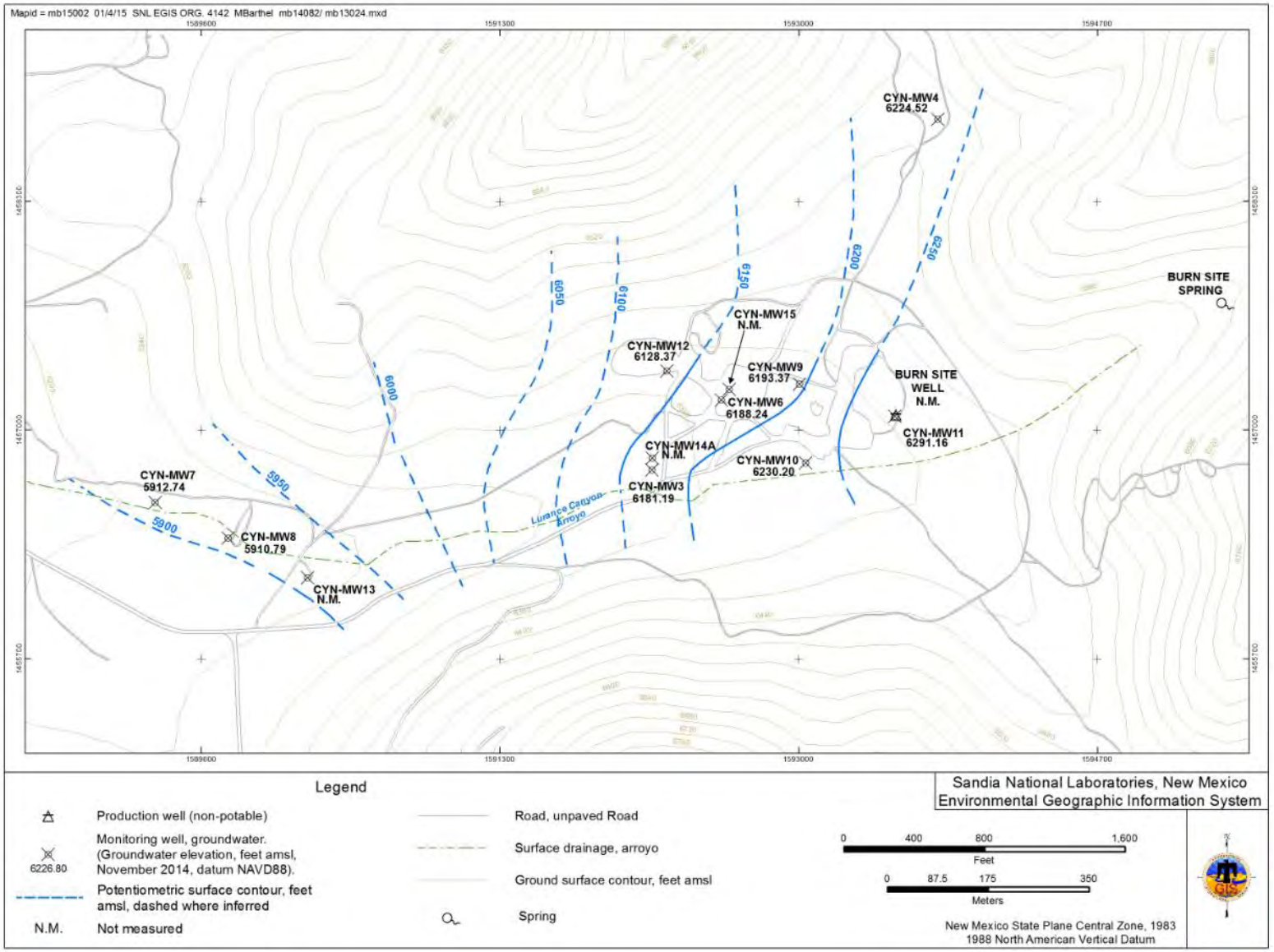


Figure 7-2. Burn Site Groundwater Area of Concern Potentiometric Surface Map (November 2014)

In September 2013, DOE/NNSA and Sandia submitted a work plan for the installation of two groundwater monitoring wells (SNL September 2013b) and in June 2014, the work plan was approved by NMED (NMED June 2014). The work plan discussed the need for installing two replacement wells (CYN-MW14 and CYN-MW15) because of declining groundwater levels at the Burn Site. Monitoring well CYN-MW14 was planned to replace CYN-MW3, whereas well CYN-MW15 was planned to replace CYN-MW6. In December 2014, monitoring wells CYN-MW14A (note the 'A' suffix) and CYN-MW15 were installed. The installation of a direct replacement for well CYN-MW3 was not possible because the shallow water-bearing fracture zone was not encountered by either of two nearby boreholes. A deeper-than-planned well, CYN-MW14A, was installed near CYN-MW3. The replacement well CYN-MW15 was installed, as planned, near well CYN-MW6. Details for the two well installations are being prepared and will be submitted to the NMED under separate cover.

7.1.4 Current Monitoring Network

Currently 12 monitoring wells in the BSG AOC are in place to monitor for water quality, including CYN-MW3, CYN-MW4, CYN-MW6, CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, CYN-MW13, CYN-MW14A, and CYN-MW15 (Figure 7-2). Monitoring well CYN-MW3 was dry and CYN-MW6 did not produce adequate water volume during both CY 2014 sampling events. The two-track access roads near wells at CYN-MW4 and CYN-MW13 were damaged during summer thunderstorms and could not be accessed during the December 2014 sampling event.

7.1.5 Summary of Calendar Year 2014 Activities

The following activities were performed for the BSG AOC during CY 2014:

- Semiannual groundwater sampling was conducted at monitoring wells CYN-MW4, CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, and CYN-MW13 in June, and at monitoring wells CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, CYN-MW14A, and CYN-MW15 in December 2014. Monitoring wells CYN-MW3 and CYN-MW6 did not have adequate water volumes to sample in June or December. Monitoring wells CYN-MW4 and CYN-MW13 were not sampled in December due to site access issues.

- Initial groundwater monitoring activities were performed at monitoring wells CYN-MW14A and CYN-MW15 during CY 2014. Monitoring well CYN-MW14A was installed near CYN-MW3. Monitoring well CYN-MW15 was installed to replace CYN-MW6.

- Tables of analytical results (Attachment 7A), concentration versus time graphs (Attachment 7B), and hydrographs (Attachment 7C) were prepared in support of this report.

- The Monitoring Well Plug and Abandonment Plan and Well Construction Plan (SNL September 2013b) for installation of groundwater monitoring wells CYN-MW14A and CYN-MW15 was approved by the NMED (NMED June 2014).

- Groundwater monitoring wells CYN-MW14A and CYN-MW15 were installed in December and a report describing well installation field activities is being prepared for submittal to the NMED.

7.1.6 Summary of Future Activities

The following activities are anticipated for the BSG AOC investigation during CY 2015:

- Semiannual groundwater sampling is planned at the following monitoring wells: CYN-MW3 (if water level recovers), CYN-MW4 (if accessible), CYN-MW6 (if water level recovers), CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, CYN-MW13 (if accessible), CYN-MW14A, and CYN-MW15 during the second and fourth quarters of CY 2015.

- Semiannual sampling for perchlorate analyses will be performed at monitoring wells CYN-MW6 (if the groundwater level recovers) and at CYN-MW15. Quarterly sampling for perchlorate analysis will be performed at monitoring well CYN-MW14A during CY 2015.

7.1.7 Conceptual Site Model

Groundwater flow in the BSG AOC 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 matrix permeability of the fractured bedrock units is low. Meager amounts of groundwater are produced from discontinuous water-bearing fracture zones. 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 after crossing the Tijeras Fault Zone.

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 some 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 AOC 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 AOC. The alluvial deposits pinch-out nearby.

7.1.7.2 Hydrogeologic Conditions at the BSG AOC

When the Burn Site Well was installed in 1986, the depth to the groundwater bearing fracture zone 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), the low permeability of the bedrock matrix, and the discontinuous nature of the bedrock fractures.

Regionally, groundwater in the western Manzanita Mountains flows generally toward the west from a groundwater flow divide located east of the BSG AOC (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 12AUP01) 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 12AUP01. The water level remained fairly constant for about one month. However, no water has been measured in monitoring well 12AUP01 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 November 2014 potentiometric surface for the BSG monitoring well network. The general direction of groundwater flow beneath the BSG AOC is to the west-southwest as inferred from the potentiometric surface. No water supply wells are located near the BSG AOC, except for the Burn Site Well that was used only rarely (last pumped in 2003) for nonpotable applications, such as for fire suppression in testing structures and for fuel pool tests. The submersible pump was removed from the

well in December 2014. Groundwater levels in the Paleozoic and Precambrian bedrock near the BSG AOC 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 apparent horizontal groundwater gradient based on BSG monitoring wells and springs varies from approximately 0.08 to 0.18 feet per foot (ft/ft) 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 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 AOC. Limited groundwater flow velocity information is based on COC first arrival estimates. Based on petroleum-fuel 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 (SNL April 2008a). No information is available about vertical flow velocity within the fractured rocks at the BSG AOC. 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 may 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. Until recently, no substantial seasonal variations in water levels were 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 AOC is poorly interconnected. Water level fluctuations may be a result of local heterogeneities in hydraulic properties related to the water-bearing fracture zones. The BSG monitoring wells in the upper portion of the canyon, most notably at monitoring wells CYN-MW9, CYN-MW10, and CYN-MW11, showed significant increases in groundwater levels in the past year, apparently in response to a pair of intense thunderstorms in the 2014 monsoon season. Water levels in these three wells rebounded by 10.85 to 25.82 ft between July and November 2014.

7.1.7.4 Contaminant Sources

Nitrate in the BSG AOC 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 the use of ammonium nitrate slurry, wastewater discharges, and the degradation of HE compounds. SNL/NM personnel have conducted several sampling events in the BSG AOC to identify the source of nitrate; however, no conclusive source has been identified. 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 AOC and contains open-air detonation areas where nitrate-based explosives were used. The detonations dispersed explosive compounds across the ground surface, and subsequent degradation (weathering) of these explosive compounds most likely released nitrate. SWMU 94 testing also involved burn tests involving ammonium-nitrate slurry, HE compounds, and rocket 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. In 2014, there were new maximum values of nitrate in monitoring wells CYN-MW10, CYN-MW11, CYN-MW12, and CYN-MW13 (Table 7-3). The first sampling event for monitoring wells CYN-MW14A and CYN-MW15 also revealed nitrate concentrations above the MCL. Nitrate concentrations in groundwater samples from monitoring wells CYN-MW4, CYN-MW7, and CYN-MW8 have not exceeded the MCL.

Table 7-3. Summary of Historical Nitrate Concentrations in Groundwater Monitoring Wells that Exceed the MCL[a] at the Burn Site Groundwater Area of Concern

Well	Historical Maximum NPN Concentration (mg/L)	Approximate 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	13.6[b]	600 ft west-southwest
CYN-MW11	17.9[b]	10 ft south
CYN-MW12	16.5[b]	1,300 ft west-northwest
CYN-MW13	39.5[b]	3,400 ft south-southwest
CYN-MW14A	14.8[c]	1,400 ft west
CYN-MW15	18.7[c]	1,000 ft west

NOTES:
[a] MCL for NPN is 10 mg/L.
[b] New maximum in 2014.
[c] Initial sampling in December 2014 exceeded MCL.
CYN = Canyons.
ft = Feet.
MCL = Maximum Contaminant Level.
mg/L = Milligrams per liter.
MW = Monitoring well.
NPN = Nitrate plus nitrite (as nitrogen).

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 in groundwater would decrease 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 predict 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).

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 regulations mandated by the Resource Conservation and Recovery Act (RCRA). All ER SWMUs and 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 the BSG AOC are contained in the Consent 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 Consent Order became effective in April 2004, groundwater investigations at the BSG AOC 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 Consent Order transferred regulatory authority for corrective action requirements from the HSWA module to the Consent Order (NMED April 2004). The BSG investigation must comply with requirements set forth in the Consent Order for site characterization and the development of a CME.

In response to the Consent 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 Consent 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 AOC. 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 AOC.
- 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 Consent 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 AOC and submit to the NMED a plan for such characterization. DOE/NNSA and Sandia met with the NMED in June and July 2009 and submitted a letter requesting an extension to November 30, 2009 (DOE July 2009). The results of the discussions 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 Consent Order (NMED April 2004). Additional information on radionuclides and the scope of the Consent Order is available in Section III.A of the Consent 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 2014 include groundwater monitoring (Table 7-4) and monitoring well installation. 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.

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 2014 BSG sampling events are presented in Tables 7A-1 through 7A-10 (Attachment 7A). Data qualifiers are explained in the footnotes following Table 7A-10.

No VOCs or HE compounds were detected, except for carbon disulfide (Table 7A-1). The VOC carbon disulfide was detected in monitoring well CYN-MW7 at a concentration of 1.74 µg/L. There is not an established MCL for this compound. This is the initial detection of a VOC in CYN-MW7; no other VOCs were detected. The MDLs for all analyzed VOCs are listed in Table 7A-2, and the MDLs for all analyzed HE compounds are listed in Table 7A-3.

Table 7-4. Groundwater Monitoring Well Network and Sampling Dates for the Burn Site Groundwater Area of Concern, Calendar Year 2014

Date of Sampling Event	Wells Sampled		SAP
June 2014	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 20143* (SNL May 2014)
December 2014	CYN-MW4 CYN-MW7 CYN-MW8 CYN-MW9	CYN-MW10 CYN-MW11 CYN-MW12 CYN-MW13 CYN-MW14A CYN-MW15	*Burn Site Groundwater Monitoring, Mini-SAP for First Quarter Fiscal Year 2015* (SNL November 2014)

NOTES:
CYN = Canyons.
MW = Monitoring well.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories.

Table 7-5. Parameters Sampled at Burn Site Groundwater Area of Concern Wells for Each Sampling Event, Calendar Year 2014

Parameter	June 2014	
Anions Gamma Spectroscopy[a] Gross Alpha Gross Beta Isotopic Uranium NPN TAL Metals, plus Total Uranium DRO GRO Tritium VOCs HE compounds	CYN-MW4 CYN-MW7 CYN-MW8 CYN-MW8 (dup) CYN-MW9 CYN-MW10	CYN-MW11 CYN-MW-12 CYN-MW12 (dup) CYN-MW13
Parameter	**December 2014**	
NPN DRO GRO Perchlorate[b]	CYN-MW7 CYN-MW8 CYN-MW9 CYN-MW9 (dup)	CYN-MW10 CYN-MW10 (dup) CYN-MW11 CYN-MW12 CYN-MW14A CYN-MW-15

NOTES:
[a] Gamma spectroscopy short list (Americium-241, Cesium-137, Cobalt-60, and Potassium-40).
[b] Perchlorate analysis performed on samples from monitoring wells CYN-MW14A and CYN-MW15 only.
CYN = Canyons.
DRO = Diesel range organics.
Dup = Duplicate sample.
GRO = Gasoline range organics.
HE = High explosive.
MW = Monitoring well.
NPN = Nitrate plus nitrate (reported as nitrogen).
TAL = Target Analyte List.
VOC = Volatile organic compound.

The analytical results for nitrate plus nitrite (NPN) (reported as nitrogen) are presented in Table 7A-4, and Figure 7-3 presents NPN concentration contours for the BSG AOC. NPN results exceed the MCL of 10 mg/L in samples from monitoring wells CYN-MW9, CYN-MW9 duplicate, CYN-MW10, CYN-MW10 duplicate, CYN-MW11, CYN-MW12, CYN-MW12 duplicate, CYN-MW13, CYN-MW14A, and CYN-MW15. NPN concentrations in samples from the other BSG wells are less than the MCL (Table 7A-4). For CY 2014, the NPN concentrations for wells exceeding the MCL are summarized as follows:

- Monitoring well CYN-MW6 has been replaced by CYN-MW15 (installed in December 2014). CYN-MW15 had a reported concentration of 18.7 mg/L for the initial sampling in December 2014. All NPN concentrations for monitoring well CYN-MW6 and the replacement monitoring well CYN-MW15 are displayed in Figure 7B-1.

- Monitoring well CYN-MW9 had reported concentrations of 41.7 mg/L (June 2014) and 39.9 mg/L (December 2014), and 40.6 mg/L (December 2014, duplicate). The historical range of NPN concentrations for monitoring well CYN-MW9 is approximately 29 to 42 mg/L with an upward trend in the past few years (Figure 7B-2).

- Monitoring well CYN-MW10 had reported concentrations of 14.0 mg/L (December 2014), 10.7 mg/L (December 2014, duplicate), and 13.6 mg/L (December 2014, reanalysis). The historical range of NPN concentrations for monitoring well CYN-MW10 is approximately 4 to 11 mg/L with a slightly decreasing trend, with the exception of the December 2014 results (Figure 7B-3).

- Monitoring well CYN-MW11 had reported concentrations 17.8 mg/L (December 2014), and 17.9 mg/L (December 2014, reanalysis). The historical range of NPN concentrations for monitoring well CYN-MW11 is approximately 9 to 12 mg/L with a consistent trend, with the exception of the December 2014 result (Figure 7B-4).

- Monitoring well CYN-MW12 had reported concentrations of 16.5 mg/L (June 2014), 15.2 mg/L (June 2014, duplicate) and 14.7 mg/L (December 2014). All NPN concentrations for monitoring well CYN-MW12 are displayed in Figure 7B-5.

- Monitoring well CYN-MW13 had a reported concentration of 39.5 mg/L (June 2014), and was not sampled in December 2014. All NPN concentrations for monitoring well CYN-MW13 are displayed in Figure 7B-6.

- Monitoring well CYN-MW14A (installed in December 2014) had a reported concentration of 14.8 mg/L for the initial sampling.

The results for DRO and GRO are listed in Table 7A-5. No MCLs have been established for DRO or GRO. No detections of GRO were reported for any of the samples collected during the CY 2014 sampling events. Several detections of DRO were reported in samples collected in December 2014 from monitoring wells CYN-MW7, CYN-MW9, and CYN-MW9 duplicate at concentrations ranging from 81.5 to 101 µg/L. However, these DRO results were qualified with "UJ" in the data validation process (Table 7A-5). DRO was detected in samples collected in December 2014 from monitoring wells CYN-MW14A at 69.6 µg/L and in CYN-MW15 at 74.7 µg/L.

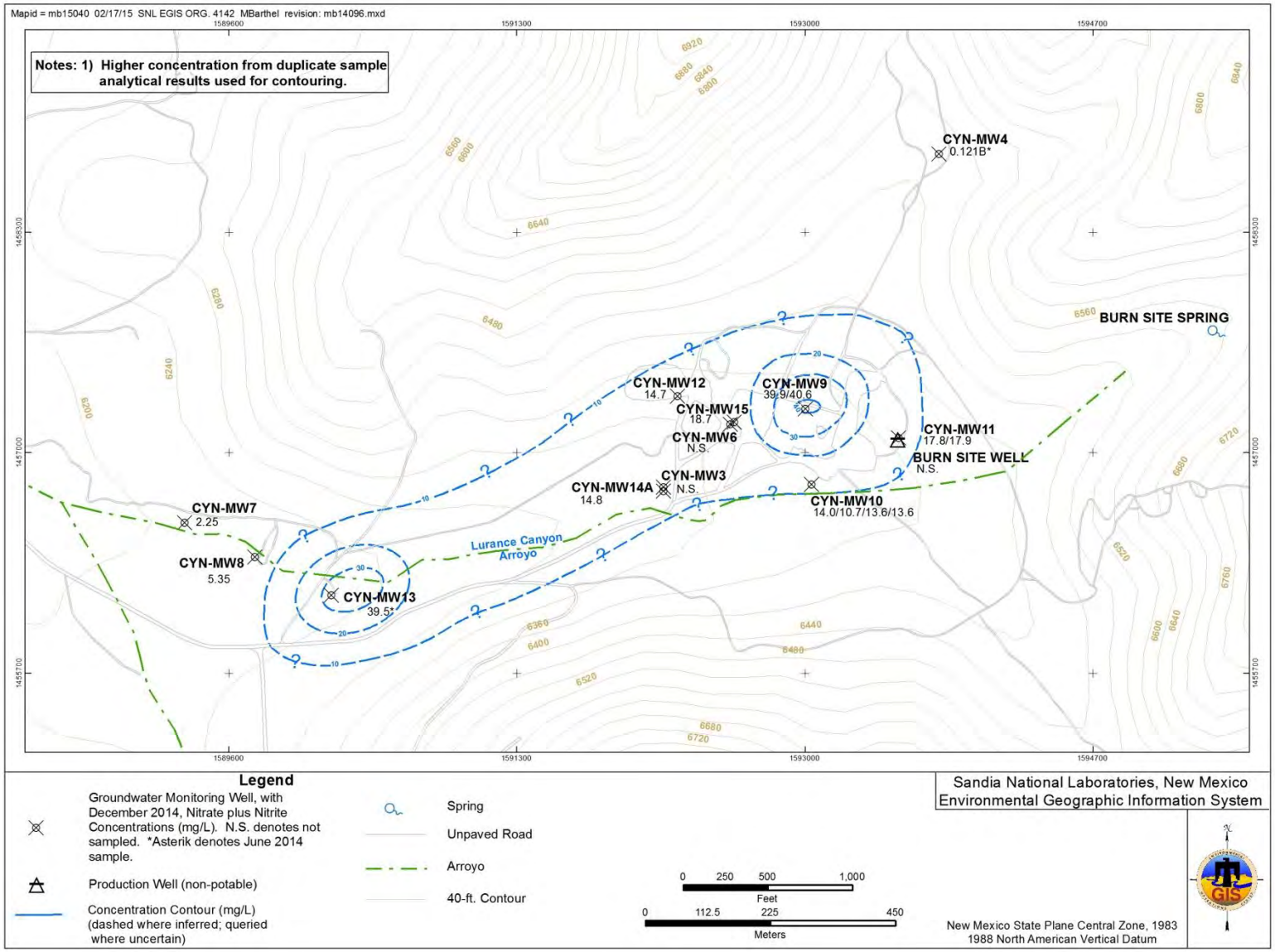


Figure 7-3. Nitrate plus Nitrite Concentration Contour Map for the Burn Site Groundwater Area of Concern

The results for perchlorate are listed in Table 7A-6. No detections of perchlorate were reported for samples collected in December 2014 from CYN-MW14A and CYN-MW15. No MCL has been established for perchlorate.

The analytical results for anions are presented in Table 7A-7. None of the analytes exceed MCLs, where established.

Total metal results are presented in Table 7A-8. 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-9. All radionuclide activity results are below established MCLs. Gross alpha activity is measured as a radiological screening tool and in accordance with 40 Code of Federal Regulations; Parts 9, 141, and 142; and Table I-4 should not include uranium. Naturally occurring uranium is measured independently (i.e., total uranium concentration determined by metals analysis described above) and the gross alpha activity measurements are corrected by subtracting the total uranium activity from the uncorrected gross alpha activity results. Americium-241 in CYN-MW11 was qualified as unusable during data validation because the result was negative with an absolute value greater than twice the associated MDA. Radiological results are further reviewed by an SNL/NM Health Physicist to assure that the samples are nonradioactive. Corrected gross alpha activity results are below the MCL of 15 picocuries per liter.

Field water quality parameters are measured during purging of each monitoring 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-10.

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 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 from both sampling events 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:

- **June 2014 Sampling Events at Monitoring Wells CYN-MW8 and CYN-MW12**—The EB samples were collected prior to sampling these wells and analyzed for all parameters. Arsenic, bromodichloromethane, bromoform, chloroform, chloride, copper, dibromochloromethane, nickel, and NPN were detected above the laboratory MDLs. No corrective action was necessary for bromodichloromethane, bromoform, chloroform, chloride, dibromochloromethane, or NPN, because these analytes were not detected in environmental samples, or were detected in environmental samples at concentrations greater than five times the EB result. Both arsenic and nickel reported in CYN-MW8 environmental samples were qualified as not detected during data validation because these metals were reported in the EB sample at concentrations less than five times the concentrations reported in the environmental samples. Copper in both CYN-MW8 and CYN-MW12 samples were qualified as not detected during data validation because copper was reported in the EB samples at concentrations greater than reported environmental samples.

- **December 2014 Sampling Events at Monitoring Wells CYN-MW9 and CYN-MW10**—The EB samples were collected prior to sampling these wells and analyzed for all parameters. No GRO or NPN was detected in EB samples. DRO was qualified as not detected during data validation in both EB samples because DRO was reported in the laboratory method blank sample at a concentration less than five times the associated EB result.

The results of the TB samples are as follows:

- **June 2014 Sampling Event**—A total of 10 VOC and 10 GRO TB samples were submitted during this sampling event. No VOCs or GRO were detected above laboratory MDLs in any TB sample.

- **December 2014 Sampling Event**—A total of 10 GRO TB samples were submitted during this sampling event. No GRO was detected above laboratory MDLs in any TB sample.

The results of the FB samples are as follows:

- **June 2014 Sampling Event at Monitoring Wells CYN-MW10 and CYN-MW13**—The VOCs bromodichloromethane, bromoform, chloroform, and dibromochloromethane were detected above associated laboratory MDLs in both VOC FB samples. No corrective action was required, because these compounds were not detected in associated environmental samples. GRO was not detected in any FB sample.

- **December 2014 Sampling Event at Monitoring Wells CYN-MW7 and CYN-MW11**—GRO was not detected in any FB sample.

7.8 Variances and Nonconformances

There was one variance from field or sampling requirements specified in the BSG Monitoring Mini-Sampling and Analysis Plans (SNL May 2014 and November 2014) that occurred during sampling activities. The following project-specific issues associated with the CY 2014 sampling events for BSG occurred:

- **June 2014 Sampling Event** (1) Monitoring well CYN-MW6 was not sampled due to insufficient groundwater volume. The water level declined below the well screen.

- **December 2014 Sampling Event** (1) No groundwater samples were collected from monitoring wells CYN-MW3 and CYN-MW6 due to a similar lack of water. (2) Monitoring wells CYN-MW4 and CYN-MW13 were not sampled due to site access issues. (3) Sandia requested NPN reanalysis from CYN-MW10 and CYN-MW11 samples because results are higher than historical values.

7.9 Summary and Conclusions

This section provides a brief summary of the following: field activities, COC concentrations, trends of concentrations versus time, the conceptual site model, and plans for studies to be completed during CY 2015 at the BSG AOC.

The BSG AOC 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. Monitoring wells were sampled during June and December

2014. The samples were analyzed for VOCs, HE compounds, DRO, GRO, NPN, Target Analyte List metals (plus uranium), anions, perchlorate, and gross alpha/beta activity, tritium, and radionuclides by gamma spectroscopy.

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 seven BSG AOC monitoring wells: CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, CYN-MW13, CYN-MW14A, and CYN-MW15. The maximum concentration reported is 41.7 mg/L in the sample collected from monitoring well CYN-MW9 during the December 2014 sampling event.

The analytical results for this reporting period are mostly consistent with historical concentrations. The notable exceptions are new maximum concentrations of nitrate in wells CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, and CYN-MW13. The newly installed monitoring wells CYN-MW14A and CYN-MW15 had initial nitrate concentrations that exceeded the MCL.

During CY 2015, semiannual groundwater sampling will continue at the BSG AOC wells during the second and fourth quarters. Water levels will be measured monthly.

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 2014 New Mexico Environment Department (NMED), June 2014. *RE: Approval, Monitoring Well Plug and Abandonment Plan and Well Construction Plan, Decommissioning of Groundwater Monitoring Well TA2-SW1-320, Installation of Groundwater Monitoring Wells TA2-W-28, CYN-MW14 and CYN-MW15, September 2013, Sandia National Laboratories, EPA ID #NM5890110518, SNL-13-010,* New Mexico Environment Department, Santa Fe, New Mexico, June 4, 2014.

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 2014 Sandia National Laboratories, New Mexico (SNL/NM), November 2014. *Burn Site Groundwater Monitoring, Mini-Sampling and Analysis Plan (SAP) for First Quarter, Fiscal Year 2015*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, November 19, 2014.

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 May 2014 Sandia National Laboratories, New Mexico (SNL/NM), May 2014. *Burn Site Groundwater Monitoring, Mini-Sampling and Analysis Plan (SAP) for Third Quarter, Fiscal Year 2014* Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, May 28, 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 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 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.

This page intentionally left blank.

Attachment 7A
Burn Site Groundwater
Analytical Results Tables

This page intentionally left blank.

Attachment 7A Tables

7A-1 Summary of Detected Volatile Organic and High Explosive Compounds (EPA Method SW846-8260B), Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 7A-5

7A-2 Method Detection Limits for Volatile Organic Compounds (EPA Method SW846-8260B), Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 7A-6

7A-3 Method Detection Limits for High Explosive Compounds (EPA Method SW846-8321A), Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 7A-7

7A-4 Summary of Nitrate plus Nitrite Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 7A-8

7A-5 Summary of Diesel Range Organics and Gasoline Range Organics Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 7A-10

7A-6 Summary of Perchlorate Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 7A-12

7A-7 Summary of Anion Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 7A-13

7A-8 Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 7A-15

7A-9 Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Tritium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 7A-25

7A-10 Summary of Field Water Quality Measurements, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 7A-29

Footnotes for Burn Site Groundwater Analytical Results Tables 7A-31

This page intentionally left blank.

Table 7A-1
Summary of Detected Volatile Organic and High Explosive Compounds (EPA Method[g] SW846-8260B), Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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.
CYN-MW7 17-Jun-14	Carbon Disulfide	1.74	1.50	5.00	NE	J		096099-001

Refer to footnotes on page 7A-31.

Table 7A-2
Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B), Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.500	Isopropylbenzene	0.300
1,2-Dichlorobenzene	0.300	Methyl acetate	1.50
1,2-Dichloroethane	0.300	Methylcyclohexane	0.300
1,2-Dichloropropane	0.300	Methylene chloride	1.70
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	2.50	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-31.

Table 7A-3
Method Detection Limits for High Explosive Compounds (EPA Method[g] SW846-8321A), Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

Analyte	MDL[b] (µg/L)
1,3,5-Trinitrobenzene	0.0825–0.0889
1,3-Dinitrobenzene	0.0825–0.0889
2,4,6-Trinitrotoluene	0.0825–0.0889
2,4-Dinitrotoluene	0.0825–0.0889
2,6-Dinitrotoluene	0.0825–0.0889
2-Amino-4,6-dinitrotoluene	0.0825–0.0889
2-Nitrotoluene	0.0845–0.0911
3-Nitrotoluene	0.0825–0.0889
4-Amino-2,6-dinitrotoluene	0.0825–0.0889
4-Nitrotoluene	0.155–0.167
HMX	0.0825–0.0889
Nitro-benzene	0.0825–0.0889
Pentaerythritol tetranitrate	0.103–0.111
RDX	0.0825–0.0889
Tetryl	0.0825–0.0889

Refer to footnotes on page 7A-31.

Table 7A-4
Summary of Nitrate plus Nitrite Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 16-Jun-14	Nitrate plus nitrite	0.121	0.017	0.050	10.0	B	0.14U	096097-018	EPA 353.2
CYN-MW7 17-Jun-14	Nitrate plus nitrite	1.83	0.170	0.500	10.0	B		096099-018	EPA 353.2
CYN-MW8 18-Jun-14	Nitrate plus nitrite	4.21	0.170	0.500	10.0	B		096103-018	EPA 353.2
CYN-MW8 (Duplicate) 18-Jun-14	Nitrate plus nitrite	4.20	0.170	0.500	10.0	B		096104-018	EPA 353.2
CYN-MW9 26-Jun-14	Nitrate plus nitrite	**41.7**	0.850	2.50	10.0			096120-018	EPA 353.2
CYN-MW10 20-Jun-14	Nitrate plus nitrite	4.19	0.170	0.500	10.0	B		096106-018	EPA 353.2
CYN-MW11 23-Jun-14	Nitrate plus nitrite	9.05	0.170	0.500	10.0	B		096109-018	EPA 353.2
CYN-MW12 24-Jun-14	Nitrate plus nitrite	**16.5**	0.425	1.25	10.0			096114-018	EPA 353.2
CYN-MW12 (Duplicate) 24-Jun-14	Nitrate plus nitrite	**15.2**	0.425	1.25	10.0			096115-018	EPA 353.2
CYN-MW13 25-Jun-14	Nitrate plus nitrite	**39.5**	0.850	2.50	10.0			096117-018	EPA 353.2
CYN-MW7 04-Dec-14	Nitrate plus nitrite	2.25	0.085	0.250	10.0			096958-018	EPA 353.2
CYN-MW8 15-Dec-14	Nitrate plus nitrite	5.35	0.425	1.25	10.0			096965-018	EPA 353.2
CYN-MW9 05-Dec-14	Nitrate plus nitrite	**39.9**	0.850	2.50	10.0			096962-018	EPA 353.2
CYN-MW9 (Duplicate) 05-Dec-14	Nitrate plus nitrite	**40.6**	0.850	2.50	10.0			096963-018	EPA 353.2
CYN-MW10 05-Dec-14	Nitrate plus nitrite	**14.0**	0.170	0.500	10.0			096970-018	EPA 353.2
CYN-MW10 (Duplicate) 05-Dec-14	Nitrate plus nitrite	**10.7**	0.850	2.50	10.0			096971-018	EPA 353.2
CYN-MW10 (Reanalysis) 05-Dec-14	Nitrate plus nitrite	**13.6**	0.170	0.500	10.0	H	J	096970-R18	EPA 353.2
CYN-MW10 (Reanalysis Duplicate) 05-Dec-14	Nitrate plus nitrite	**13.6**	0.170	0.500	10.0	H	J	096971-R18	EPA 353.2

Refer to footnotes on page 7A-31.

Table 7A-4 *(Concluded)*
Summary of Nitrate plus Nitrite Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 04-Dec-14	Nitrate plus nitrite	**17.8**	0.850	2.50	10.0			096955-018	EPA 353.2
CYN-MW11 (Reanalysis) 04-Dec-14	Nitrate plus nitrite	**17.9**	0.850	2.50	10.0	H	J	096955-R18	EPA 353.2
CYN-MW12 15-Dec-14	Nitrate plus nitrite	**14.7**	0.850	2.50	10.0			096973-018	EPA 353.2
CYN-MW14A 17-Dec-14	Nitrate plus nitrite	**14.8**	0.850	2.50	10.0			096977-018	EPA 353.2
CYN-MW15 17-Dec-14	Nitrate plus nitrite	**18.7**	0.850	2.50	10.0			096979-018	EPA 353.2

Refer to footnotes on page 7A-31.

Table 7A-5
Summary of Diesel Range Organics and Gasoline Range Organics Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	52.1	208	NE	U		096097-005	SW846 8015D
16-Jun-14	Gasoline Range Organics	ND	16.7	50.0	NE	U		096097-006	SW846 8015A/B
CYN-MW7	Diesel Range Organics	ND	51.5	206	NE	U		096099-005	SW846 8015D
17-Jun-14	Gasoline Range Organics	ND	16.7	50.0	NE	U		096099-006	SW846 8015A/B
CYN-MW8	Diesel Range Organics	ND	52.1	208	NE	U		096103-005	SW846 8015D
18-Jun-14	Gasoline Range Organics	ND	16.7	50.0	NE	U		096103-006	SW846 8015A/B
CYN-MW8 (Duplicate)	Diesel Range Organics	ND	52.1	208	NE	U		096104-005	SW846 8015D
18-Jun-14	Gasoline Range Organics	ND	16.7	50.0	NE	U		096104-006	SW846 8015A/B
CYN-MW9	Diesel Range Organics	ND	52.6	211	NE	U		096120-005	SW846 8015D
26-Jun-14	Gasoline Range Organics	ND	16.7	50.0	NE	U		096120-006	SW846 8015A/B
CYN-MW10	Diesel Range Organics	ND	56.2	225	NE	U		096106-005	SW846 8015D
20-Jun-14	Gasoline Range Organics	ND	16.7	50.0	NE	U		096106-006	SW846 8015A/B
CYN-MW11	Diesel Range Organics	ND	55.6	222	NE	U		096109-005	SW846 8015D
23-Jun-14	Gasoline Range Organics	ND	16.7	50.0	NE	U		096109-006	SW846 8015A/B
CYN-MW12	Diesel Range Organics	ND	52.6	211	NE	U		096114-005	SW846 8015D
24-Jun-14	Gasoline Range Organics	ND	16.7	50.0	NE	U		096114-006	SW846 8015A/B
CYN-MW12 (Duplicate)	Diesel Range Organics	ND	52.6	211	NE	U		096115-005	SW846 8015D
24-Jun-14	Gasoline Range Organics	ND	16.7	50.0	NE	U		096115-006	SW846 8015A/B
CYN-MW13	Diesel Range Organics	ND	52.6	211	NE	U		096117-005	SW846 8015D
25-Jun-14	Gasoline Range Organics	ND	16.7	50.0	NE	U		096117-006	SW846 8015A/B
CYN-MW7	Diesel Range Organics	81.5	52.6	211	NE	B, J	211UJ	096958-005	SW846 8015D
04-Dec-14	Gasoline Range Organics	ND	16.7	50.0	NE	U		096958-006	SW846 8015A/B
CYN-MW8	Diesel Range Organics	ND	50.5	202	NE	U		096965-005	SW846 8015D
15-Dec-14	Gasoline Range Organics	ND	16.7	50.0	NE	U		096965-006	SW846 8015A/B
CYN-MW9	Diesel Range Organics	87.2	53.2	213	NE	B, J	213UJ	096962-005	SW846 8015D
05-Dec-14	Gasoline Range Organics	ND	16.7	50.0	NE	U		096962-006	SW846 8015A/B
CYN-MW9 (Duplicate)	Diesel Range Organics	101	52.1	208	NE	B, J	208UJ	096963-005	SW846 8015D
05-Dec-14	Gasoline Range Organics	ND	16.7	50.0	NE	U		096963-006	SW846 8015A/B
CYN-MW10	Diesel Range Organics	ND	49.5	198	NE	U		096970-005	SW846 8015D
05-Dec-14	Gasoline Range Organics	ND	16.7	50.0	NE	U		096970-006	SW846 8015A/B
CYN-MW10 (Duplicate)	Diesel Range Organics	ND	50.0	200	NE	U		096971-005	SW846 8015D
05-Dec-14	Gasoline Range Organics	ND	16.7	50.0	NE	U		096971-006	SW846 8015A/B

Refer to footnotes on page 7A-31.

Table 7A-5 *(Concluded)*
Summary of Diesel Range Organics and Gasoline Range Organics Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	ND	50.0	200	NE	U		096955-005	SW846 8015D
04-Dec-14	Gasoline Range Organics	ND	16.7	50.0	NE	U		096955-006	SW846 8015A/B
CYN-MW12	Diesel Range Organics	ND	50.5	202	NE	U		096973-005	SW846 8015D
15-Dec-14	Gasoline Range Organics	ND	16.7	50.0	NE	U		096973-006	SW846 8015A/B
CYN-MW14A	Diesel Range Organics	69.6	50.0	200	NE	J		096977-005	SW846 8015D
17-Dec-14	Gasoline Range Organics	ND	16.7	50.0	NE	U		096977-006	SW846 8015A/B
CYN-MW15	Diesel Range Organics	74.7	51.0	204	NE	J		096979-005	SW846 8015D
17-Dec-14	Gasoline Range Organics	ND	16.7	50.0	NE	U		096979-006	SW846 8015A/B

Refer to footnotes on page 7A-31.

Table 7A-6
Summary of Perchlorate Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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-MW14A 17-Dec-14	ND	0.004	0.012	NE	U		096977-020	EPA 314.0
CYN-MW15 17-Dec-14	ND	0.004	0.012	NE	U		096979-020	EPA 314.0

Refer to footnotes on page 7A-31.

Table 7A-7
Summary of Anion Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.381	0.067	0.200	NE			096097-016	SW846 9056
16-Jun-14	Chloride	25.1	0.670	2.00	NE			096097-016	SW846 9056
	Fluoride	0.828	0.033	0.100	4.0			096097-016	SW846 9056
	Sulfate	142	1.33	4.00	NE			096097-016	SW846 9056
CYN-MW7	Bromide	0.591	0.067	0.200	NE			096099-016	SW846 9056
17-Jun-14	Chloride	44.5	0.670	2.00	NE			096099-016	SW846 9056
	Fluoride	1.42	0.033	0.100	4.0			096099-016	SW846 9056
	Sulfate	89.4	1.33	4.00	NE			096099-016	SW846 9056
CYN-MW8	Bromide	0.801	0.067	0.200	NE			096103-016	SW846 9056
18-Jun-14	Chloride	63.1	0.670	2.00	NE			096103-016	SW846 9056
	Fluoride	1.50	0.033	0.100	4.0			096103-016	SW846 9056
	Sulfate	130	1.33	4.00	NE			096103-016	SW846 9056
CYN-MW8 (Duplicate)	Bromide	0.793	0.067	0.200	NE			096104-016	SW846 9056
18-Jun-14	Chloride	67.0	0.670	2.00	NE			096104-016	SW846 9056
	Fluoride	1.51	0.033	0.100	4.0			096104-016	SW846 9056
	Sulfate	139	1.33	4.00	NE			096104-016	SW846 9056
CYN-MW9	Bromide	0.749	0.067	0.200	NE			096120-016	SW846 9056
26-Jun-14	Chloride	53.2	1.34	4.00	NE			096120-016	SW846 9056
	Fluoride	0.646	0.033	0.100	4.0			096120-016	SW846 9056
	Sulfate	145	2.66	8.00	NE			096120-016	SW846 9056
CYN-MW10	Bromide	0.680	0.067	0.200	NE			096106-016	SW846 9056
20-Jun-14	Chloride	45.9	1.34	4.00	NE			096106-016	SW846 9056
	Fluoride	0.645	0.033	0.100	4.0			096106-016	SW846 9056
	Sulfate	168	2.66	8.00	NE			096106-016	SW846 9056
CYN-MW11	Bromide	1.18	0.067	0.200	NE			096109-016	SW846 9056
23-Jun-14	Chloride	81.6	1.34	4.00	NE			096109-016	SW846 9056
	Fluoride	0.742	0.033	0.100	4.0			096109-016	SW846 9056
	Sulfate	180	2.66	8.00	NE			096109-016	SW846 9056
CYN-MW12	Bromide	0.967	0.067	0.200	NE			096114-016	SW846 9056
24-Jun-14	Chloride	86.4	1.34	4.00	NE			096114-016	SW846 9056
	Fluoride	1.14	0.033	0.100	4.0			096114-016	SW846 9056
	Sulfate	217	2.66	8.00	NE			096114-016	SW846 9056

Refer to footnotes on page 7A-31.

Table 7A-7 *(Concluded)*
Summary of Anion Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 (Duplicate)	Bromide	0.916	0.067	0.200	NE			096115-016	SW846 9056
24-Jun-14	Chloride	85.8	1.34	4.00	NE			096115-016	SW846 9056
	Fluoride	1.13	0.033	0.100	4.0			096115-016	SW846 9056
	Sulfate	217	2.66	8.00	NE			096115-016	SW846 9056
CYN-MW13	Bromide	0.415	0.067	0.200	NE			096117-016	SW846 9056
25-Jun-14	Chloride	18.7	0.670	2.00	NE			096117-016	SW846 9056
	Fluoride	1.75	0.033	0.100	4.0			096117-016	SW846 9056
	Sulfate	76.5	1.33	4.00	NE			096117-016	SW846 9056

Refer to footnotes on page 7A-31.

Table 7A-8
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		096097-009	SW846 6020
16-Jun-14	Antimony	ND	0.001	0.003	0.006	U		096097-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096097-009	SW846 6020
	Barium	0.0397	0.0006	0.002	2.00			096097-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096097-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096097-009	SW846 6020
	Calcium	65.0	1.20	4.00	NE			096097-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096097-009	SW846 6020
	Cobalt	0.000145	0.0001	0.001	NE	J		096097-009	SW846 6020
	Copper	0.000847	0.00035	0.001	NE	J		096097-009	SW846 6020
	Iron	0.0997	0.033	0.100	NE	J		096097-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096097-009	SW846 6020
	Magnesium	31.1	0.010	0.030	NE			096097-009	SW846 6020
	Manganese	0.00115	0.001	0.005	NE	J		096097-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096097-009	SW846 7470
	Nickel	0.000962	0.0005	0.002	NE	J		096097-009	SW846 6020
	Potassium	6.46	0.080	0.300	NE			096097-009	SW846 6020
	Selenium	0.0136	0.0015	0.005	0.050			096097-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096097-009	SW846 6020
	Sodium	40.2	0.080	0.250	NE			096097-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096097-009	SW846 6020
	Uranium	0.0131	0.000067	0.0002	0.030			096097-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		096097-009	SW846 6010
	Zinc	0.00548	0.0035	0.010	NE	J		096097-009	SW846 6020

Refer to footnotes on page 7A-31.

Table 7A-8 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.0199	0.015	0.050	NE	J		096099-009	SW846 6020
17-Jun-14	Antimony	ND	0.001	0.003	0.006	U		096099-009	SW846 6020
	Arsenic	0.00523	0.0017	0.005	0.010			096099-009	SW846 6020
	Barium	0.101	0.0006	0.002	2.00			096099-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096099-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096099-009	SW846 6020
	Calcium	97.8	1.20	4.00	NE			096099-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096099-009	SW846 6020
	Cobalt	0.000159	0.0001	0.001	NE	J		096099-009	SW846 6020
	Copper	0.00102	0.00035	0.001	NE			096099-009	SW846 6020
	Iron	0.158	0.033	0.100	NE			096099-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096099-009	SW846 6020
	Magnesium	19.8	0.010	0.030	NE			096099-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096099-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096099-009	SW846 7470
	Nickel	0.00159	0.0005	0.002	NE	J		096099-009	SW846 6020
	Potassium	2.44	0.080	0.300	NE			096099-009	SW846 6020
	Selenium	0.0041	0.0015	0.005	0.050	J		096099-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096099-009	SW846 6020
	Sodium	38.8	0.080	0.250	NE			096099-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096099-009	SW846 6020
	Uranium	0.00693	0.000067	0.0002	0.030			096099-009	SW846 6020
	Vanadium	0.00297	0.001	0.005	NE	J		096099-009	SW846 6010
	Zinc	0.0123	0.0035	0.010	NE			096099-009	SW846 6020

Refer to footnotes on page 7A-31.

Table 7A-8 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		096103-009	SW846 6020
18-Jun-14	Antimony	ND	0.001	0.003	0.006	U		096103-009	SW846 6020
	Arsenic	0.00413	0.0017	0.005	0.010	J	0.012U	096103-009	SW846 6020
	Barium	0.0541	0.0006	0.002	2.00			096103-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096103-009	SW846 6020
	Cadmium	0.000273	0.00011	0.001	0.005	J		096103-009	SW846 6020
	Calcium	111	1.20	4.00	NE			096103-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096103-009	SW846 6020
	Cobalt	0.000465	0.0001	0.001	NE	J		096103-009	SW846 6020
	Copper	0.001	0.00035	0.001	NE		0.028UJ	096103-009	SW846 6020
	Iron	0.155	0.033	0.100	NE			096103-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096103-009	SW846 6020
	Magnesium	22.9	0.010	0.030	NE			096103-009	SW846 6020
	Manganese	0.00336	0.001	0.005	NE	J	J+	096103-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096103-009	SW846 7470
	Nickel	0.0017	0.0005	0.002	NE	J	0.016UJ	096103-009	SW846 6020
	Potassium	2.31	0.080	0.300	NE			096103-009	SW846 6020
	Selenium	0.0066	0.0015	0.005	0.050			096103-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096103-009	SW846 6020
	Sodium	41.7	0.080	0.250	NE			096103-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096103-009	SW846 6020
	Uranium	0.0082	0.000067	0.0002	0.030			096103-009	SW846 6020
	Vanadium	0.00318	0.001	0.005	NE	J		096103-009	SW846 6010
	Zinc	0.00635	0.0035	0.010	NE	J		096103-009	SW846 6020

Refer to footnotes on page 7A-31.

Table 7A-8 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		096104-009	SW846 6020
18-Jun-14	Antimony	ND	0.001	0.003	0.006	U		096104-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096104-009	SW846 6020
	Barium	0.0544	0.0006	0.002	2.00			096104-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096104-009	SW846 6020
	Cadmium	0.000328	0.00011	0.001	0.005	J		096104-009	SW846 6020
	Calcium	106	1.20	4.00	NE			096104-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096104-009	SW846 6020
	Cobalt	0.000469	0.0001	0.001	NE	J		096104-009	SW846 6020
	Copper	0.00107	0.00035	0.001	NE		0.028UJ	096104-009	SW846 6020
	Iron	0.160	0.033	0.100	NE			096104-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096104-009	SW846 6020
	Magnesium	23.0	0.010	0.030	NE			096104-009	SW846 6020
	Manganese	0.00331	0.001	0.005	NE	J	J+	096104-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096104-009	SW846 7470
	Nickel	0.00184	0.0005	0.002	NE	J	0.016UJ	096104-009	SW846 6020
	Potassium	2.26	0.080	0.300	NE			096104-009	SW846 6020
	Selenium	0.00624	0.0015	0.005	0.050			096104-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096104-009	SW846 6020
	Sodium	42.1	0.080	0.250	NE			096104-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096104-009	SW846 6020
	Uranium	0.008	0.000067	0.0002	0.030			096104-009	SW846 6020
	Vanadium	0.00358	0.001	0.005	NE	J		096104-009	SW846 6010
	Zinc	0.00636	0.0035	0.010	NE	J		096104-009	SW846 6020

Refer to footnotes on page 7A-31.

Table 7A-8 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.018	0.015	0.050	NE	J		096120-009	SW846 6020
26-Jun-14	Antimony	ND	0.001	0.003	0.006	U		096120-009	SW846 6020
	Arsenic	0.00304	0.0017	0.005	0.010	B, J	0.015U	096120-009	SW846 6020
	Barium	0.0607	0.0006	0.002	2.00			096120-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096120-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096120-009	SW846 6020
	Calcium	148	1.20	4.00	NE	B		096120-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096120-009	SW846 6020
	Cobalt	0.000327	0.0001	0.001	NE	J		096120-009	SW846 6020
	Copper	0.00141	0.00035	0.001	NE		J-	096120-009	SW846 6020
	Iron	0.215	0.033	0.100	NE			096120-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096120-009	SW846 6020
	Magnesium	40.1	0.010	0.030	NE			096120-009	SW846 6020
	Manganese	0.00118	0.001	0.005	NE	J	J+	096120-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096120-009	SW846 7470
	Nickel	0.00223	0.0005	0.002	NE		J-	096120-009	SW846 6020
	Potassium	2.52	0.080	0.300	NE			096120-009	SW846 6020
	Selenium	0.00747	0.0015	0.005	0.050	B	0.009U	096120-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096120-009	SW846 6020
	Sodium	41.9	1.60	5.00	NE			096120-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096120-009	SW846 6020
	Uranium	0.00648	0.000067	0.0002	0.030			096120-009	SW846 6020
	Vanadium	0.00189	0.001	0.005	NE	J		096120-009	SW846 6010
	Zinc	0.00565	0.0035	0.010	NE	J		096120-009	SW846 6020

Refer to footnotes on page 7A-31.

Table 7A-8 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		096106-009	SW846 6020
20-Jun-14	Antimony	ND	0.001	0.003	0.006	U		096106-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096106-009	SW846 6020
	Barium	0.0484	0.0006	0.002	2.00			096106-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096106-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096106-009	SW846 6020
	Calcium	113	1.20	4.00	NE			096106-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U	UJ	096106-009	SW846 6020
	Cobalt	0.000253	0.0001	0.001	NE	J	J+	096106-009	SW846 6020
	Copper	0.00104	0.00035	0.001	NE		J-	096106-009	SW846 6020
	Iron	0.322	0.033	0.100	NE			096106-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096106-009	SW846 6020
	Magnesium	30.0	0.010	0.030	NE			096106-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096106-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096106-009	SW846 7470
	Nickel	0.00244	0.0005	0.002	NE			096106-009	SW846 6020
	Potassium	1.55	0.080	0.300	NE			096106-009	SW846 6020
	Selenium	0.00676	0.0015	0.005	0.050			096106-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096106-009	SW846 6020
	Sodium	35.8	0.080	0.250	NE			096106-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096106-009	SW846 6020
	Uranium	0.00561	0.000067	0.0002	0.030			096106-009	SW846 6020
	Vanadium	0.0029	0.001	0.005	NE	J		096106-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096106-009	SW846 6020

Refer to footnotes on page 7A-31.

Table 7A-8 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		096109-009	SW846 6020
23-Jun-14	Antimony	ND	0.001	0.003	0.006	U		096109-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096109-009	SW846 6020
	Barium	0.0652	0.0006	0.002	2.00			096109-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096109-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096109-009	SW846 6020
	Calcium	129	0.600	2.00	NE			096109-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096109-009	SW846 6020
	Cobalt	0.000432	0.0001	0.001	NE	J		096109-009	SW846 6020
	Copper	0.00112	0.00035	0.001	NE		J-	096109-009	SW846 6020
	Iron	0.387	0.033	0.100	NE			096109-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096109-009	SW846 6020
	Magnesium	35.7	0.010	0.030	NE			096109-009	SW846 6020
	Manganese	0.221	0.001	0.005	NE			096109-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096109-009	SW846 7470
	Nickel	0.00379	0.0005	0.002	NE			096109-009	SW846 6020
	Potassium	3.00	0.080	0.300	NE			096109-009	SW846 6020
	Selenium	0.00514	0.0015	0.005	0.050			096109-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096109-009	SW846 6020
	Sodium	35.6	0.080	0.250	NE			096109-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096109-009	SW846 6020
	Uranium	0.00512	0.000067	0.0002	0.030			096109-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		096109-009	SW846 6010
	Zinc	0.0239	0.0035	0.010	NE			096109-009	SW846 6020

Refer to footnotes on page 7A-31.

Table 7A-8 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.0178	0.015	0.050	NE	J		096114-009	SW846 6020
24-Jun-14	Antimony	ND	0.001	0.003	0.006	U		096114-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096114-009	SW846 6020
	Barium	0.0346	0.0006	0.002	2.00			096114-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096114-009	SW846 6020
	Cadmium	0.000244	0.00011	0.001	0.005	J		096114-009	SW846 6020
	Calcium	156	1.20	4.00	NE	B		096114-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096114-009	SW846 6020
	Cobalt	0.000478	0.0001	0.001	NE	J		096114-009	SW846 6020
	Copper	0.00146	0.00035	0.001	NE		0.013UJ	096114-009	SW846 6020
	Iron	0.174	0.033	0.100	NE			096114-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096114-009	SW846 6020
	Magnesium	38.7	0.010	0.030	NE			096114-009	SW846 6020
	Manganese	0.0359	0.001	0.005	NE		J+	096114-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096114-009	SW846 7470
	Nickel	0.00216	0.0005	0.002	NE		J-	096114-009	SW846 6020
	Potassium	2.85	0.080	0.300	NE			096114-009	SW846 6020
	Selenium	0.00819	0.0015	0.005	0.050	B	0.009U	096114-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096114-009	SW846 6020
	Sodium	40.1	1.60	5.00	NE			096114-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096114-009	SW846 6020
	Uranium	0.00814	0.000067	0.0002	0.030			096114-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		096114-009	SW846 6010
	Zinc	0.0146	0.0035	0.010	NE			096114-009	SW846 6020

Refer to footnotes on page 7A-31.

Table 7A-8 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		096115-009	SW846 6020
24-Jun-14	Antimony	ND	0.001	0.003	0.006	U		096115-009	SW846 6020
	Arsenic	0.00375	0.0017	0.005	0.010	B, J	0.015U	096115-009	SW846 6020
	Barium	0.0353	0.0006	0.002	2.00			096115-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096115-009	SW846 6020
	Cadmium	0.000236	0.00011	0.001	0.005	J		096115-009	SW846 6020
	Calcium	156	1.20	4.00	NE	B		096115-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096115-009	SW846 6020
	Cobalt	0.000538	0.0001	0.001	NE	J		096115-009	SW846 6020
	Copper	0.00151	0.00035	0.001	NE		0.013UJ	096115-009	SW846 6020
	Iron	0.220	0.033	0.100	NE			096115-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096115-009	SW846 6020
	Magnesium	39.7	0.010	0.030	NE			096115-009	SW846 6020
	Manganese	0.0399	0.001	0.005	NE		J+	096115-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096115-009	SW846 7470
	Nickel	0.00243	0.0005	0.002	NE		J-	096115-009	SW846 6020
	Potassium	2.98	0.080	0.300	NE			096115-009	SW846 6020
	Selenium	0.00807	0.0015	0.005	0.050	B	0.009U	096115-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096115-009	SW846 6020
	Sodium	40.6	1.60	5.00	NE			096115-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096115-009	SW846 6020
	Uranium	0.00843	0.000067	0.0002	0.030			096115-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		096115-009	SW846 6010
	Zinc	0.0156	0.0035	0.010	NE			096115-009	SW846 6020

Refer to footnotes on page 7A-31.

Table 7A-8 *(Concluded)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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		096117-009	SW846 6020
25-Jun-14	Antimony	ND	0.001	0.003	0.006	U		096117-009	SW846 6020
	Arsenic	0.00173	0.0017	0.005	0.010	B, J	0.015U	096117-009	SW846 6020
	Barium	0.107	0.0006	0.002	2.00			096117-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096117-009	SW846 6020
	Cadmium	0.000193	0.00011	0.001	0.005	J		096117-009	SW846 6020
	Calcium	116	1.20	4.00	NE	B		096117-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096117-009	SW846 6020
	Cobalt	0.000245	0.0001	0.001	NE	J		096117-009	SW846 6020
	Copper	0.000951	0.00035	0.001	NE	J	J-	096117-009	SW846 6020
	Iron	0.170	0.033	0.100	NE			096117-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096117-009	SW846 6020
	Magnesium	21.0	0.010	0.030	NE			096117-009	SW846 6020
	Manganese	0.0256	0.001	0.005	NE		J+	096117-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096117-009	SW846 7470
	Nickel	0.00179	0.0005	0.002	NE	J	J-	096117-009	SW846 6020
	Potassium	2.38	0.080	0.300	NE			096117-009	SW846 6020
	Selenium	0.0034	0.0015	0.005	0.050	B, J	0.009U	096117-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096117-009	SW846 6020
	Sodium	24.4	1.60	5.00	NE			096117-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096117-009	SW846 6020
	Uranium	0.00576	0.000067	0.0002	0.030			096117-009	SW846 6020
	Vanadium	0.00223	0.001	0.005	NE	J		096117-009	SW846 6010
	Zinc	0.0198	0.0035	0.010	NE			096117-009	SW846 6020

Refer to footnotes on page 7A-31.

Table 7A-9
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Tritium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	1.86 ± 2.92	4.41	2.15	NE	U	BD	096097-033	EPA 901.1
16-Jun-14	Cesium-137	-1.32 ± 2.12	3.38	1.62	NE	U	BD	096097-033	EPA 901.1
	Cobalt-60	-1.95 ± 2.80	3.61	1.70	NE	U	BD	096097-033	EPA 901.1
	Potassium-40	1.33 ± 34.9	48.4	23.1	NE	U	BD	096097-033	EPA 901.1
	Gross Alpha	8.25	NA	NA	15 pCi/L	NA	None	096097-R34	EPA 900.0
	Gross Beta	10.2 ± 2.86	2.12	1.02	4mrem/yr			096097-R34	EPA 900.0
	Uranium-233/234	34.1 ± 4.20	0.0941	0.0421	NE			096097-035	HASL-300
	Uranium-235/236	0.450 ± 0.105	0.0788	0.0333	NE			096097-035	HASL-300
	Uranium-238	4.30 ± 0.577	0.0528	0.0215	NE			096097-035	HASL-300
	Tritium	77.4 ± 74.4	120	53.5	NE	U	BD	096097-036	EPA 906.0 M
CYN-MW7	Americium-241	6.17 ± 11.3	16.6	8.16	NE	U	BD	096099-033	EPA 901.1
17-Jun-14	Cesium-137	-0.326 ± 1.98	3.37	1.62	NE	U	BD	096099-033	EPA 901.1
	Cobalt-60	0.513 ± 1.99	3.57	1.69	NE	U	BD	096099-033	EPA 901.1
	Potassium-40	48.6 ± 45.1	35.2	16.6	NE		J	096099-033	EPA 901.1
	Gross Alpha	3.89	NA	NA	15 pCi/L	NA	None	096099-034	EPA 900.0
	Gross Beta	11.4 ± 2.81	3.18	1.56	4mrem/yr			096099-034	EPA 900.0
	Uranium-233/234	17.0 ± 2.14	0.0722	0.0323	NE			096099-035	HASL-300
	Uranium-235/236	0.293 ± 0.0739	0.0605	0.0256	NE			096099-035	HASL-300
	Uranium-238	2.42 ± 0.339	0.0405	0.0165	NE			096099-035	HASL-300
	Tritium	4.15 ± 66.0	123	55.0	NE	U	BD	096099-036	EPA 906.0 M
CYN-MW8	Americium-241	26.7 ± 24.2	32.9	16.2	NE	U	BD	096103-033	EPA 901.1
18-Jun-14	Cesium-137	0.0932 ± 2.32	3.60	1.74	NE	U	BD	096103-033	EPA 901.1
	Cobalt-60	-2.2 ± 2.92	3.77	1.79	NE	U	BD	096103-033	EPA 901.1
	Potassium-40	1.21 ± 36.1	49.2	23.6	NE	U	BD	096103-033	EPA 901.1
	Gross Alpha	11.69	NA	NA	15 pCi/L	NA	None	096103-R34	EPA 900.0
	Gross Beta	5.68 ± 1.92	2.22	1.07	4mrem/yr		J	096103-R34	EPA 900.0
	Uranium-233/234	23.7 ± 2.94	0.0672	0.0301	NE			096103-035	HASL-300
	Uranium-235/236	0.408 ± 0.0876	0.0563	0.0238	NE			096103-035	HASL-300
	Uranium-238	2.70 ± 0.369	0.0377	0.0153	NE			096103-035	HASL-300
	Tritium	4.33 ± 65.8	122	54.7	NE	U	BD	096103-036	EPA 906.0 M

Refer to footnotes on page 7A-31.

Table 7A-9 *(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 2014

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-MW8 (Duplicate)	Americium-241	8.72 ± 15.5	24.1	11.8	NE	U	BD	096104-033	EPA 901.1
18-Jun-14	Cesium-137	2.29 ± 3.24	3.54	1.71	NE	U	BD	096104-033	EPA 901.1
	Cobalt-60	-0.109 ± 2.07	3.72	1.77	NE	U	BD	096104-033	EPA 901.1
	Potassium-40	-17.6 ± 41.1	50.0	24.0	NE	U	BD	096104-033	EPA 901.1
	Gross Alpha	9.65	NA	NA	15 pCi/L	NA	None	096104-034	EPA 900.0
	Gross Beta	7.70 ± 2.33	2.96	1.44	4mrem/yr		J	096104-034	EPA 900.0
	Uranium-233/234	24.5 ± 3.06	0.0722	0.0323	NE			096104-035	HASL-300
	Uranium-235/236	0.273 ± 0.0695	0.0606	0.0256	NE			096104-035	HASL-300
	Uranium-238	2.78 ± 0.383	0.0406	0.0165	NE			096104-035	HASL-300
	Tritium	60.7 ± 71.6	119	53.2	NE	U	BD	096104-036	EPA 906.0 M
CYN-MW9	Americium-241	-5.17 ± 8.08	12.0	5.83	NE	U	BD	096120-R33	EPA 901.1
26-Jun-14	Cesium-137	-0.134 ± 4.03	3.86	1.87	NE	U	BD	096120-R33	EPA 901.1
	Cobalt-60	-0.465 ± 1.72	3.01	1.41	NE	U	BD	096120-R33	EPA 901.1
	Potassium-40	-11.4 ± 33.9	40.3	19.2	NE	U	BD	096120-R33	EPA 901.1
	Gross Alpha	0.72	NA	NA	15 pCi/L	NA	None	096120-R34	EPA 900.0
	Gross Beta	6.03 ± 3.27	4.95	2.36	4mrem/yr		J	096120-R34	EPA 900.0
	Uranium-233/234	7.03 ± 0.946	0.0788	0.0344	NE			096120-035	HASL-300
	Uranium-235/236	0.131 ± 0.0521	0.0512	0.0195	NE		J	096120-035	HASL-300
	Uranium-238	1.87 ± 0.287	0.0781	0.0341	NE			096120-035	HASL-300
	Tritium	-3.8 ± 64.2	121	54.3	NE	U	BD	096120-036	EPA 906.0 M
CYN-MW10	Americium-241	3.79 ± 15.3	24.0	11.7	NE	U	BD	096106-033	EPA 901.1
20-Jun-14	Cesium-137	0.484 ± 1.90	3.26	1.56	NE	U	BD	096106-033	EPA 901.1
	Cobalt-60	1.32 ± 2.03	3.58	1.68	NE	U	BD	096106-033	EPA 901.1
	Potassium-40	-30 ± 44.9	44.3	21.0	NE	U	BD	096106-033	EPA 901.1
	Gross Alpha	3.35	NA	NA	15 pCi/L	NA	None	096106-034	EPA 900.0
	Gross Beta	1.64 ± 1.87	3.10	1.51	4mrem/yr	U	BD	096106-034	EPA 900.0
	Uranium-233/234	5.06 ± 0.669	0.075	0.0336	NE			096106-035	HASL-300
	Uranium-235/236	0.136 ± 0.0475	0.0629	0.0266	NE		J	096106-035	HASL-300
	Uranium-238	1.85 ± 0.270	0.0422	0.0171	NE			096106-035	HASL-300
	Tritium	-80.3 ± 101	179	87.0	NE	U	BD	096106-036	EPA 906.0 M

Refer to footnotes on page 7A-31.

Table 7A-9 *(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 2014

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	-56 ± 26.4	6.08	2.99	NE	U	R	096109-R33	EPA 901.1
23-Jun-14	Cesium-137	1.31 ± 2.57	4.42	2.13	NE	U	BD	096109-R33	EPA 901.1
	Cobalt-60	0.825 ± 2.66	4.73	2.23	NE	U	BD	096109-R33	EPA 901.1
	Potassium-40	5.60 ± 43.8	38.4	17.9	NE	U	BD	096109-R33	EPA 901.1
	Gross Alpha	1.55	NA	NA	15 pCi/L	NA	None	096109-034	EPA 900.0
	Gross Beta	6.12 ± 2.34	3.33	1.62	4mrem/yr		J	096109-034	EPA 900.0
	Uranium-233/234	5.32 ± 0.697	0.0712	0.0319	NE			096109-035	HASL-300
	Uranium-235/236	0.129 ± 0.0451	0.0597	0.0252	NE		J	096109-035	HASL-300
	Uranium-238	1.73 ± 0.252	0.040	0.0163	NE			096109-035	HASL-300
	Tritium	16.5 ± 66.8	121	54.3	NE	U	BD	096109-036	EPA 906.0 M
CYN-MW12	Americium-241	5.41 ± 15.6	23.5	11.5	NE	U	BD	096114-033	EPA 901.1
24-Jun-14	Cesium-137	-0.249 ± 2.21	3.70	1.78	NE	U	BD	096114-033	EPA 901.1
	Cobalt-60	0.623 ± 2.40	4.23	2.00	NE	U	BD	096114-033	EPA 901.1
	Potassium-40	-19.2 ± 42.7	49.3	23.5	NE	U	BD	096114-033	EPA 901.1
	Gross Alpha	5.90	NA	NA	15 pCi/L	NA	None	096114-034	EPA 900.0
	Gross Beta	-0.695 ± 3.37	5.81	2.84	4mrem/yr	U	BD	096114-034	EPA 900.0
	Uranium-233/234	12.2 ± 1.61	0.108	0.0473	NE			096114-035	HASL-300
	Uranium-235/236	0.124 ± 0.0591	0.0703	0.0267	NE		J	096114-035	HASL-300
	Uranium-238	2.88 ± 0.432	0.107	0.0468	NE			096114-035	HASL-300
	Tritium	-8.26 ± 63.0	120	53.7	NE	U	BD	096114-036	EPA 906.0 M
CYN-MW12 (Duplicate)	Americium-241	3.14 ± 7.62	13.3	6.51	NE	U	BD	096115-033	EPA 901.1
24-Jun-14	Cesium-137	-2.3 ± 3.35	3.90	1.89	NE	U	BD	096115-033	EPA 901.1
	Cobalt-60	-1.45 ± 1.92	3.06	1.44	NE	U	BD	096115-033	EPA 901.1
	Potassium-40	-0.191 ± 34.8	41.7	19.9	NE	U	BD	096115-033	EPA 901.1
	Gross Alpha	0.39	NA	NA	15 pCi/L	NA	None	096115-034	EPA 900.0
	Gross Beta	3.31 ± 2.58	4.16	2.03	4mrem/yr	U	BD	096115-034	EPA 900.0
	Uranium-233/234	12.2 ± 1.63	0.0861	0.0377	NE			096115-035	HASL-300
	Uranium-235/236	0.163 ± 0.061	0.056	0.0213	NE		J	096115-035	HASL-300
	Uranium-238	2.55 ± 0.383	0.0854	0.0373	NE			096115-035	HASL-300
	Tritium	38.9 ± 68.7	119	53.4	NE	U	BD	096115-036	EPA 906.0 M

Refer to footnotes on page 7A-31.

Table 7A-9 *(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 2014

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	Americium-241	14.6 ± 13.3	17.7	8.70	NE	U	BD	096117-033	EPA 901.1
25-Jun-14	Cesium-137	0.183 ± 2.00	3.45	1.66	NE	U	BD	096117-033	EPA 901.1
	Cobalt-60	2.70 ± 2.61	3.66	1.73	NE	U	BD	096117-033	EPA 901.1
	Potassium-40	-28.3 ± 37.6	48.4	23.2	NE	U	BD	096117-033	EPA 901.1
	Gross Alpha	2.17	NA	NA	15 pCi/L	NA	None	096117-034	EPA 900.0
	Gross Beta	2.06 ± 1.15	1.71	0.819	4mrem/yr		J	096117-034	EPA 900.0
	Uranium-233/234	8.72 ± 1.15	0.0708	0.0309	NE			096117-035	HASL-300
	Uranium-235/236	0.0366 ± 0.0559	0.046	0.0175	NE	U	BD	096117-035	HASL-300
	Uranium-238	1.71 ± 0.268	0.0702	0.0306	NE			096117-035	HASL-300
	Tritium	35.1 ± 69.2	121	54.2	NE	U	BD	096117-036	EPA 906.0 M

Refer to footnotes on page 7A-31.

Table 7A-10
Summary of Field Water Quality Measurements[h],
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmho/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
CYN-MW4	16-Jun-14	20.08	658.2	295.3	7.43	0.29	46.0	4.16
CYN-MW7	17-Jun-14	20.68	706.1	290.5	7.22	0.71	46.1	4.11
CYN-MW8	18-Jun-14	20.70	803.8	294.5	7.28	0.33	53.7	4.77
CYN-MW9	26-Jun-14	19.68	991.2	193.2	7.13	0.49	51.5	4.79
CYN-MW10	20-Jun-14	17.63	741.2	298.8	7.49	0.22	75.1	7.13
CYN-MW11	23-Jun-14	18.90	907.9	82.5	7.34	0.34	6.8	0.62
CYN-MW12	24-Jun-14	19.63	1001.0	247.4	7.10	0.42	12.8	1.17
CYN-MW13	25-Jun-14	19.01	680.4	270.2	7.29	0.48	27.3	2.51
CYN-MW7	04-Dec-14	17.46	682.7	245.8	7.09	1.56	46.0	4.39
CYN-MW8	15-Dec-14	15.19	743.7	13.9	7.44	0.39	55.1	5.52
CYN-MW9	05-Dec-14	16.01	936.9	254.1	7.03	0.28	62.5	6.14
CYN-MW10	05-Dec-14	14.66	809.3	8.1	7.51	0.22	73.5	7.43
CYN-MW11	04-Dec-14	15.64	961.2	-51.2	7.33	0.41	8.5	0.84
CYN-MW12	15-Dec-14	15.41	940.4	226.8	7.03	0.34	13.1	1.31
CYN-MW14A	17-Dec-14	14.59	904.2	-49.6	7.39	3.95	12.4	1.26
CYN-MW15	17-Dec-14	15.22	1036.5	190.6	7.01	2.86	10.9	1.09

Refer to footnotes on page 7A-31.

This page intentionally left blank.

Footnotes for Burn Site Groundwater Analytical Results Tables

% = Percent.
CFR = Code of Federal Regulations.
CYN = Canyons.
EPA = U.S. Environmental Protection Agency.
HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
ID = Identification.
µg/L = Micrograms per liter.
mg/L = Milligrams per liter.
mrem/yr = Millirem per year.
MW = Monitoring well.
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 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 Table 7A-1 through 8. MDA applies to Table 7A-9.

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 7A-1 through 8. Critical Level applies to Table 7A-9.

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 Drinking Water Standards, (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- 15 pCi/L = Gross alpha particle activity, excluding total uranium (40 CFR Parts 9, 141, and 142, Table 7A-1-4).
- 4 mrem/yr = Any combination of beta and/or gamma emitting radionuclides (as dose rate).

NE = Not established.

[e]Lab Qualifier

B = The analyte was detected in the blank above the effective method detection limit (MDL).
H = Analytical holding time was exceeded.
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.

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 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 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, 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 7B
Burn Site Groundwater
Plots

This page intentionally left blank.

Attachment 7B Plots

7B-1 Nitrate plus Nitrite Concentrations, CYN-MW6 and CYN-MW15 ..... 7B-5

7B-2 Nitrate plus Nitrite Concentrations, CYN-MW9 ..... 7B-6

7B-3 Nitrate plus Nitrite Concentrations, CYN-MW10 ..... 7B-7

7B-4 Nitrate plus Nitrite Concentrations, CYN-MW11 ..... 7B-8

7B-5 Nitrate plus Nitrite Concentrations, CYN-MW12 ..... 7B-9

7B-6 Nitrate plus Nitrite Concentrations, CYN-MW13 ..... 7B-10

This page intentionally left blank.

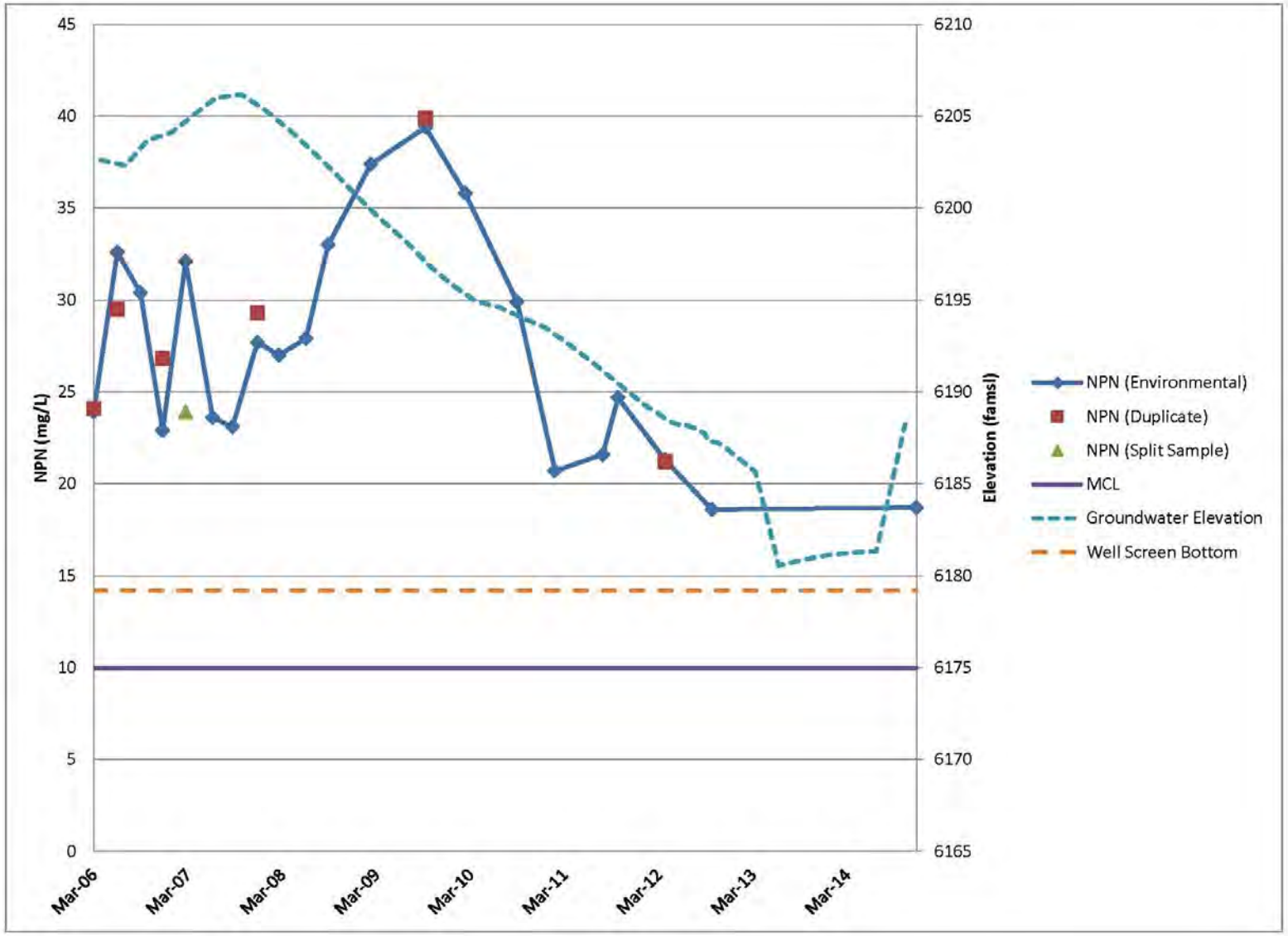


Figure 7B-1. Nitrate plus Nitrite Concentrations, CYN-MW6 and CYN-MW15

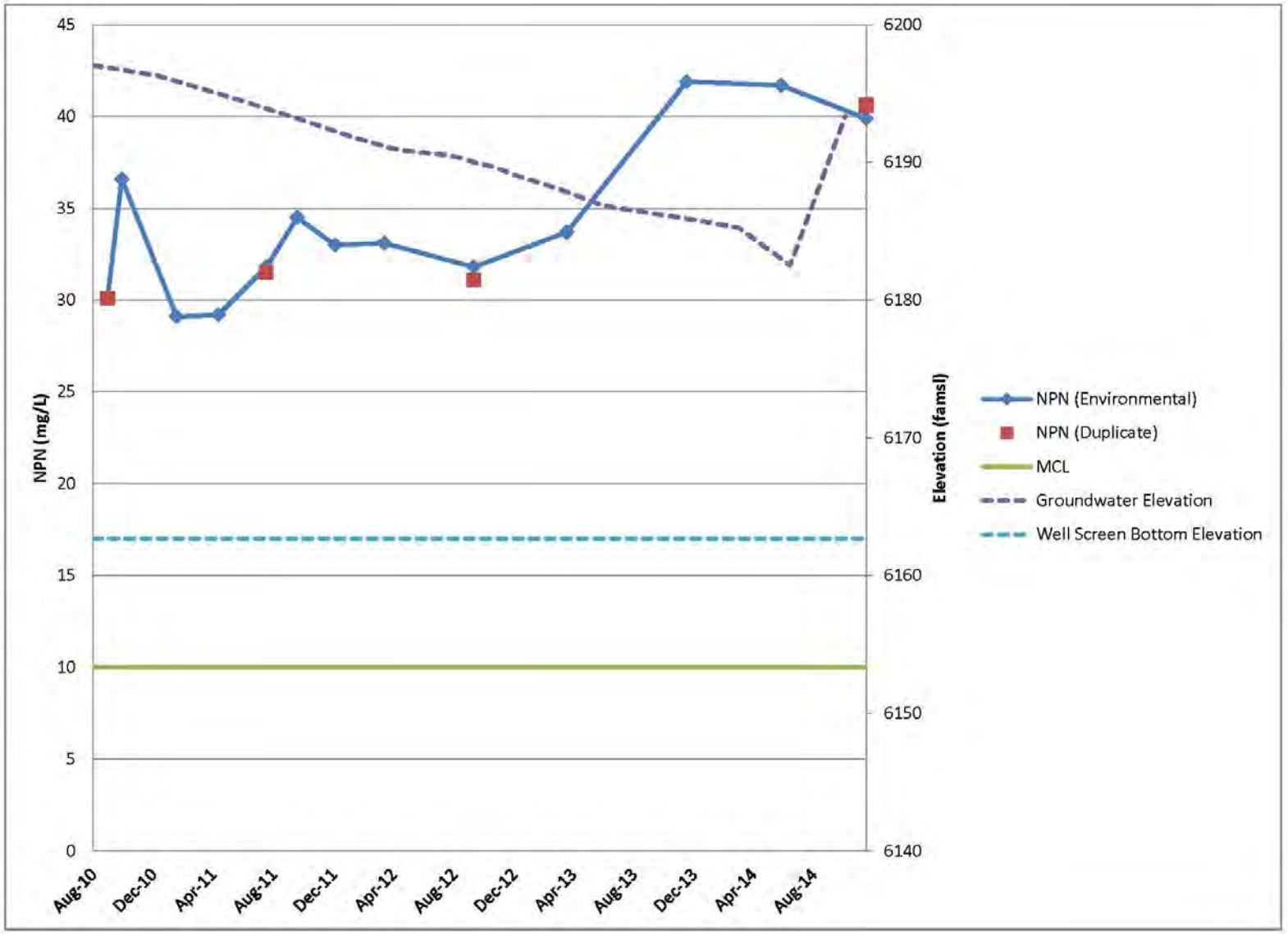


Figure 7B-2. Nitrate plus Nitrite Concentrations, CYN-MW9

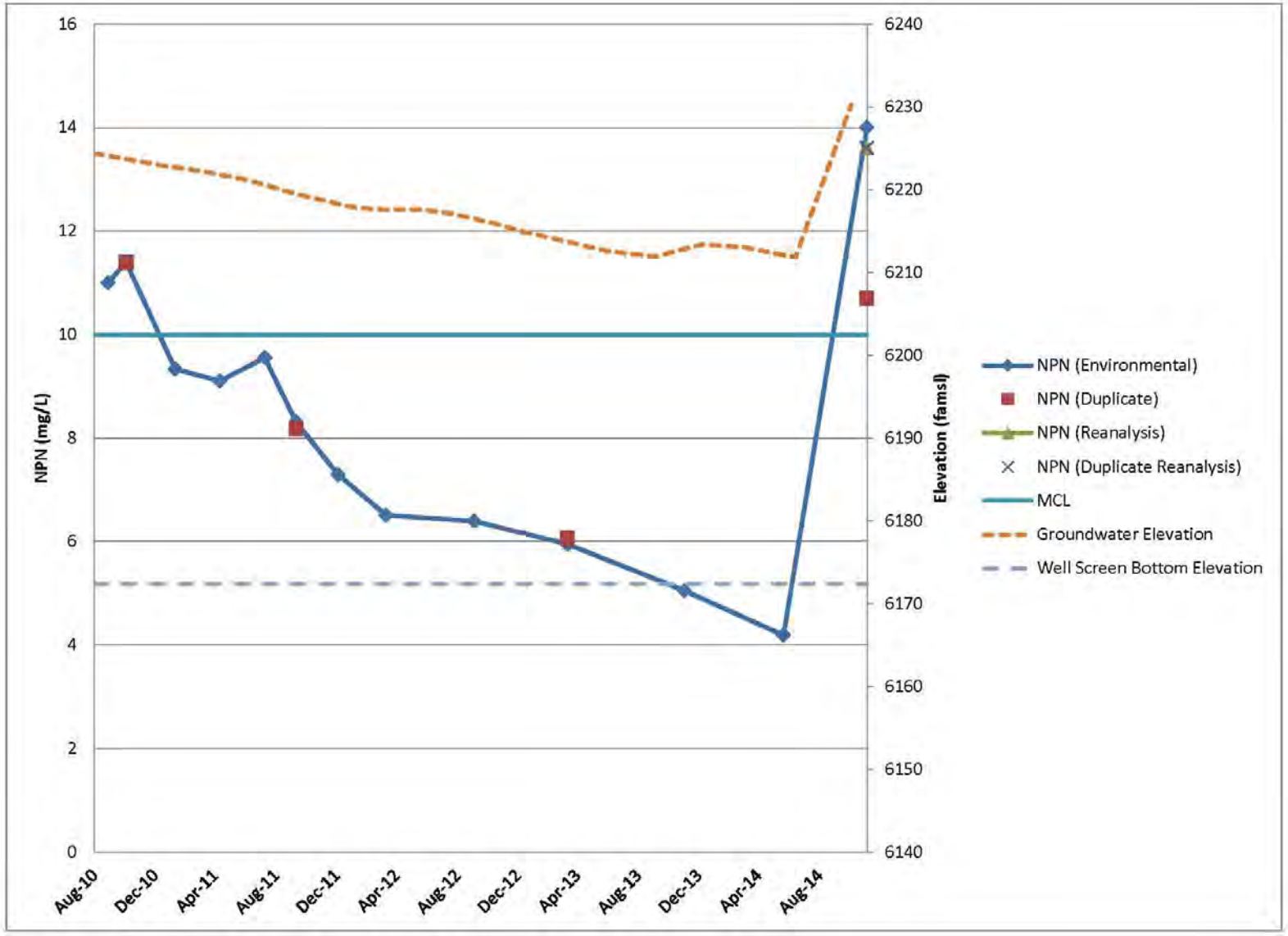


Figure 7B-3. Nitrate plus Nitrite Concentrations, CYN-MW10

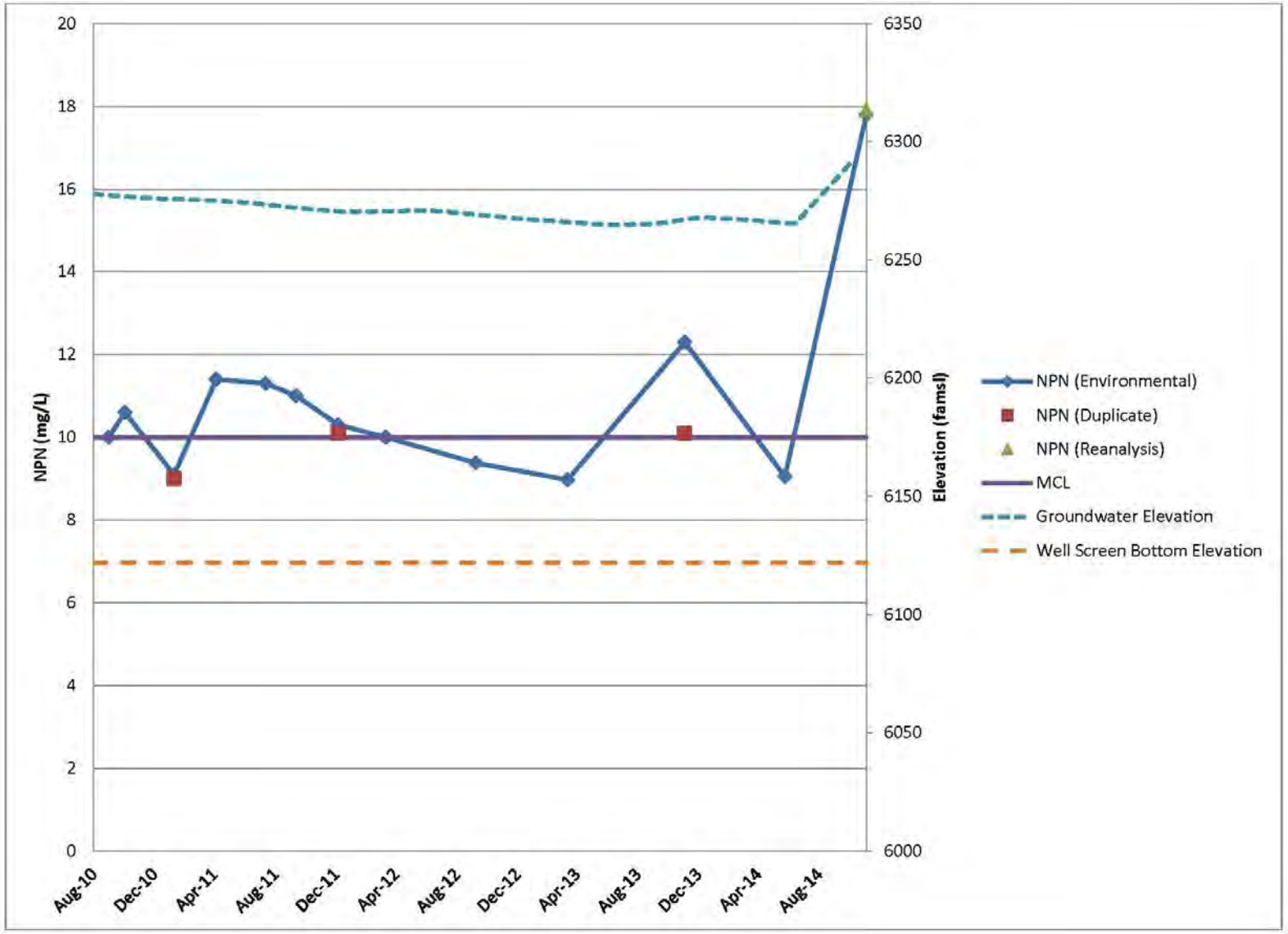


Figure 7B-4. Nitrate plus Nitrite Concentrations, CYN-MW11

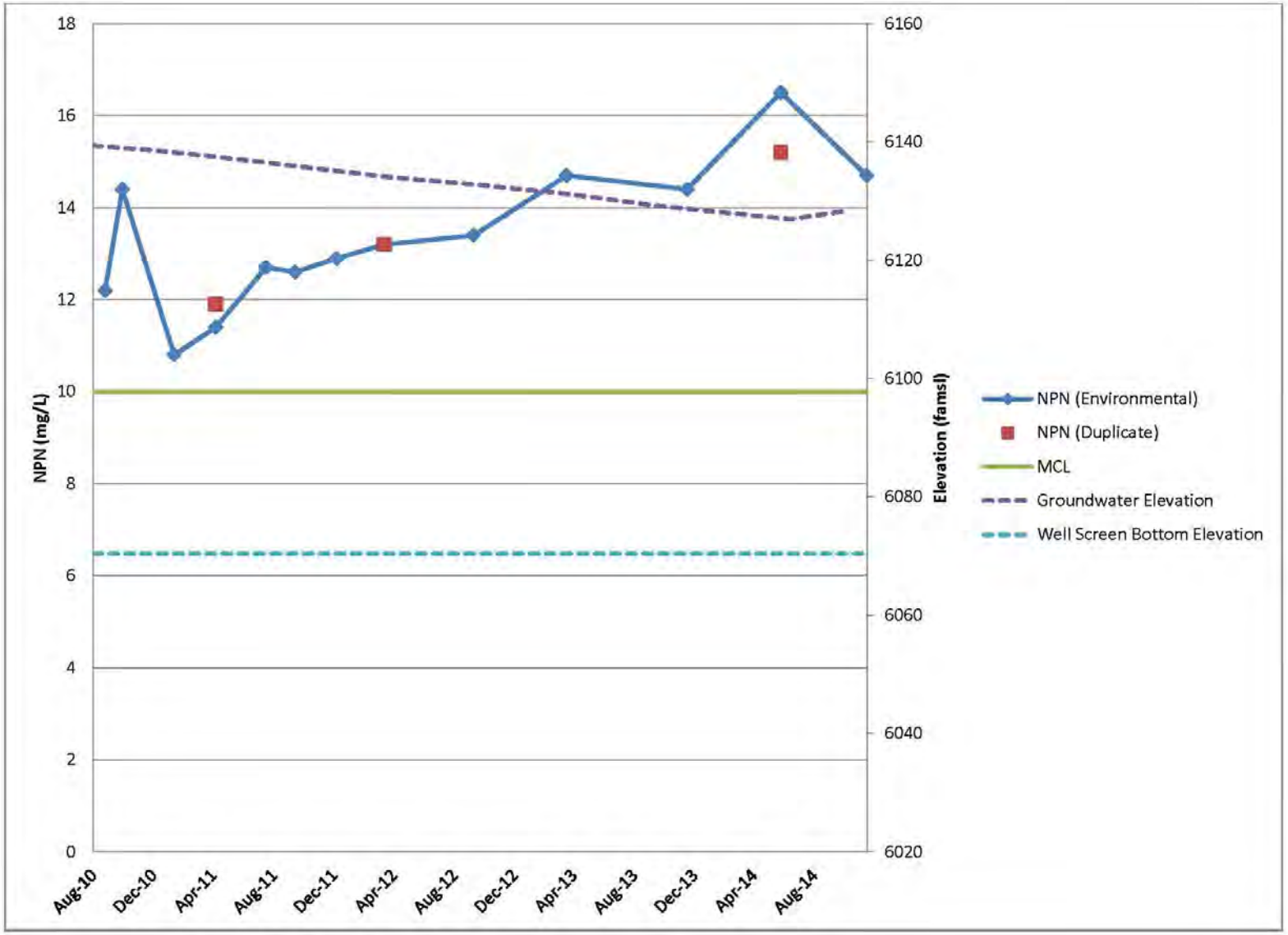


Figure 7B-5. Nitrate plus Nitrite Concentrations, CYN-MW12

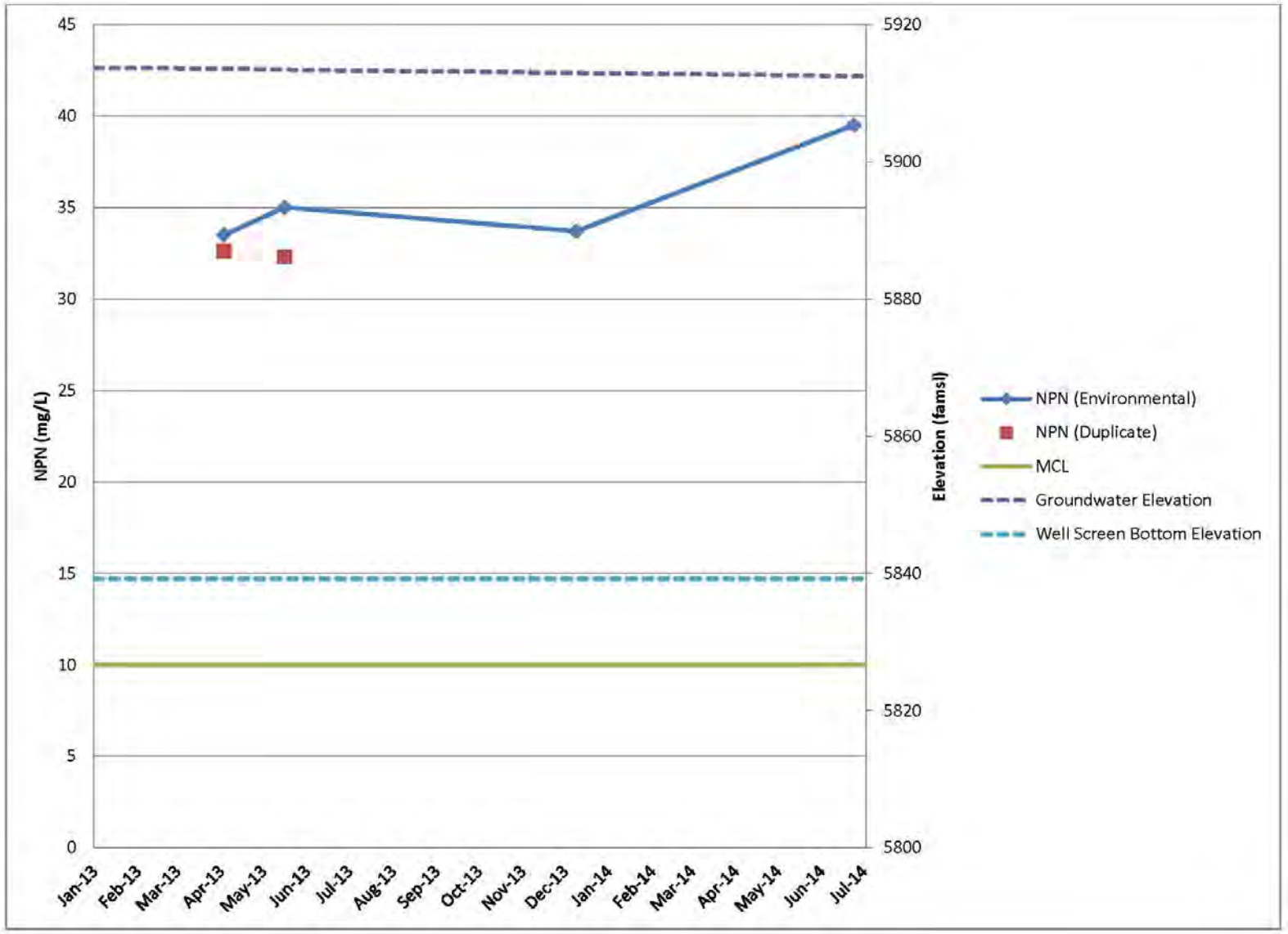


Figure 7B-6. Nitrate plus Nitrite Concentrations, CYN-MW13

Attachment 7C
Burn Site Groundwater
Hydrographs

This page intentionally left blank.

Attachment 7C Hydrographs

7C-1 BSG Area of Concern Wells (1 of 5)..... 7C-5

7C-2 BSG Area of Concern Wells (2 of 5)..... 7C-6

7C-3 BSG Area of Concern Wells (3 of 5)..... 7C-7

7C-4 BSG Area of Concern Wells (4 of 5)..... 7C-8

7C-5 BSG Area of Concern Wells (5 of 5)..... 7C-9

This page intentionally left blank.

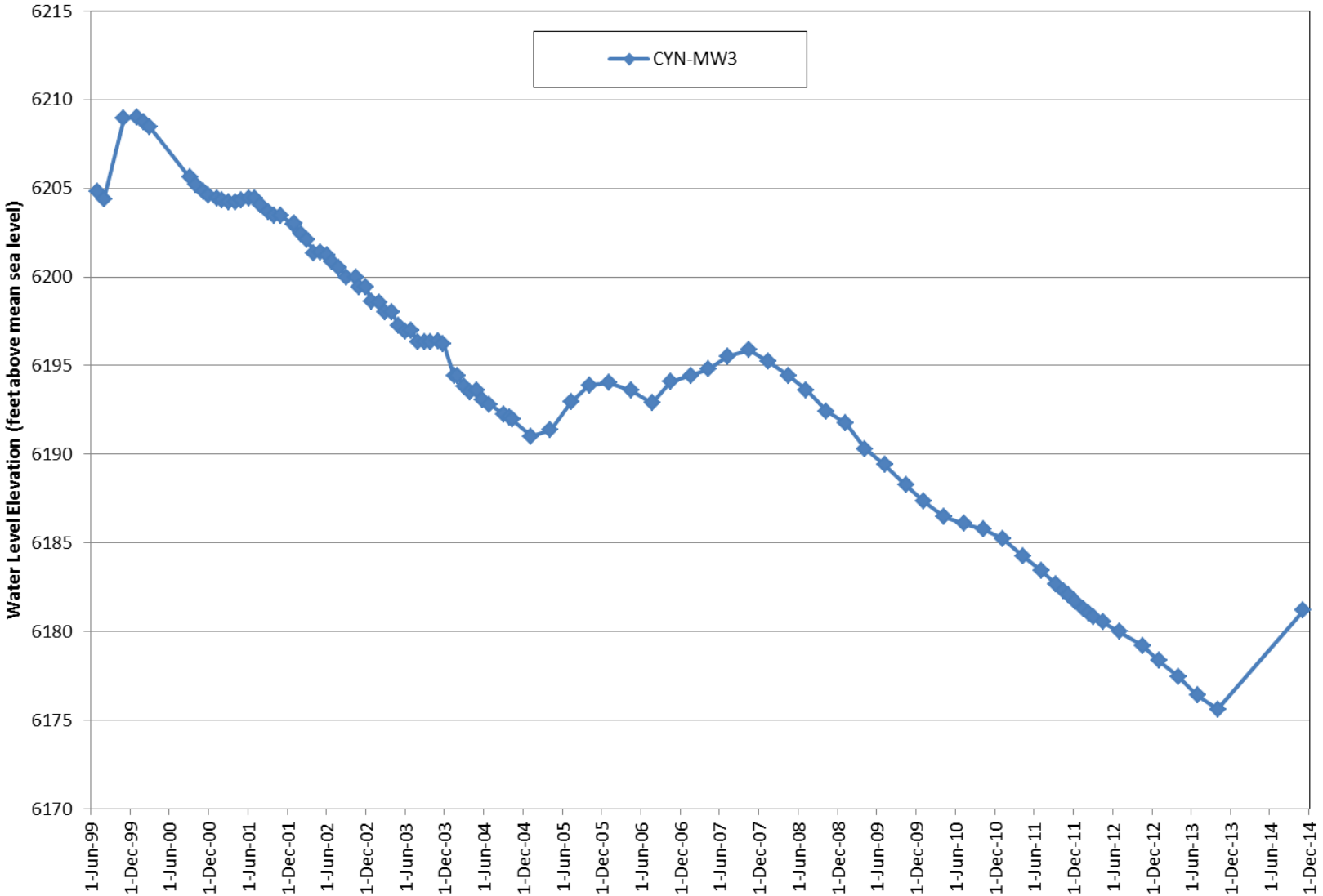


Figure 7C-1. BSG Area of Concern Wells (1 of 5)

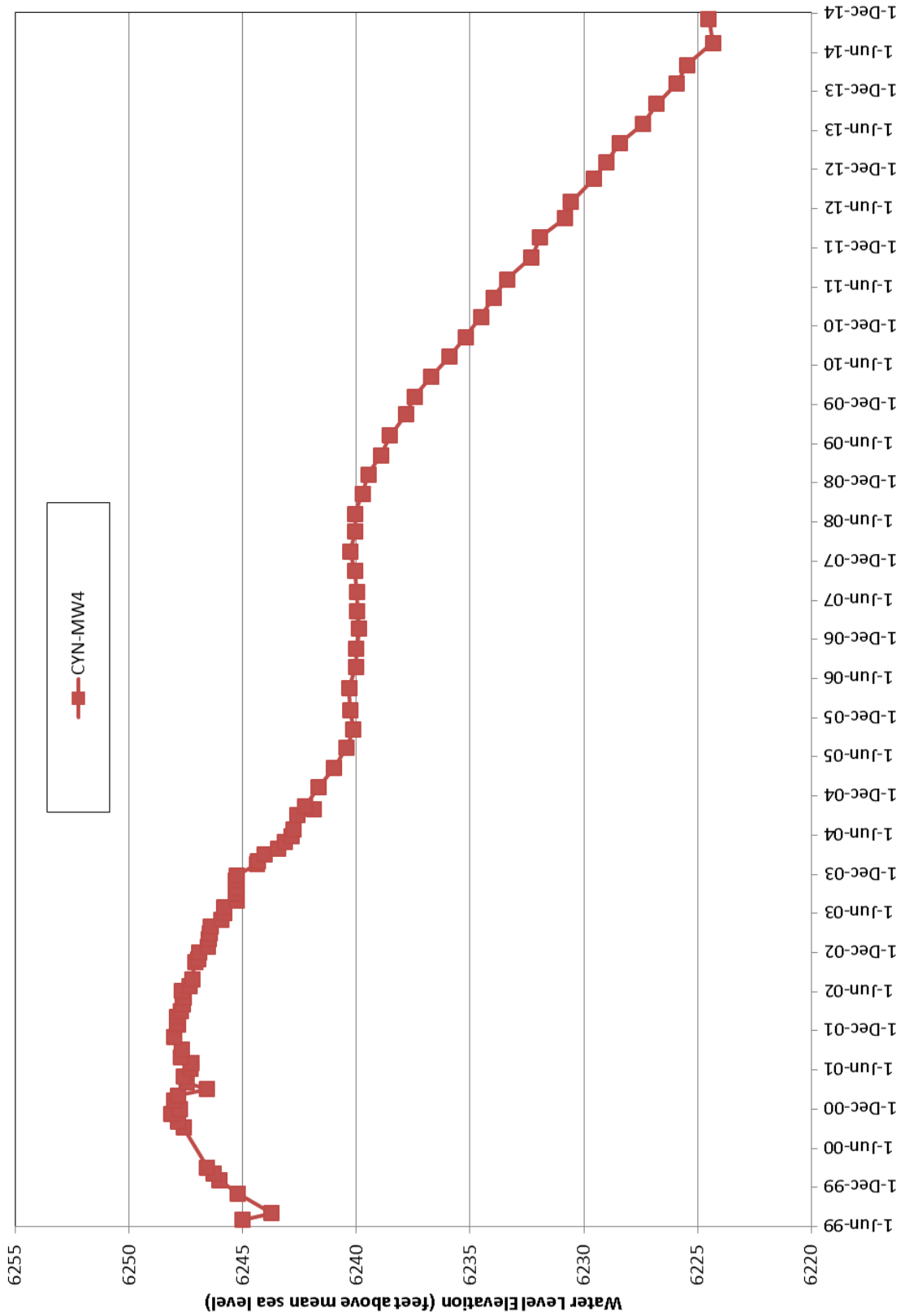


Figure 7C-2. BSG Area of Concern Wells (2 of 5)

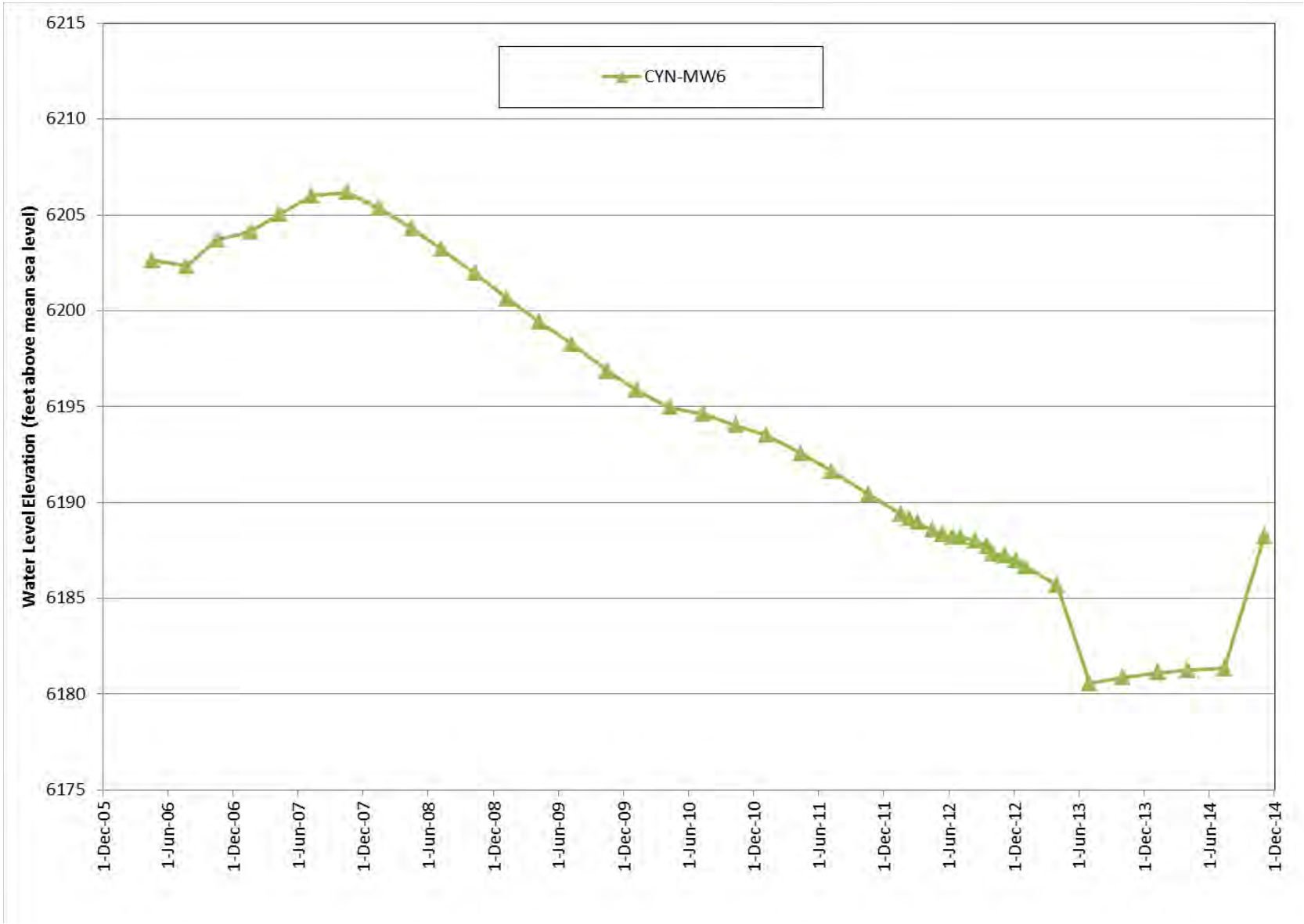


Figure 7C-3. BSG Area of Concern Wells (3 of 5)

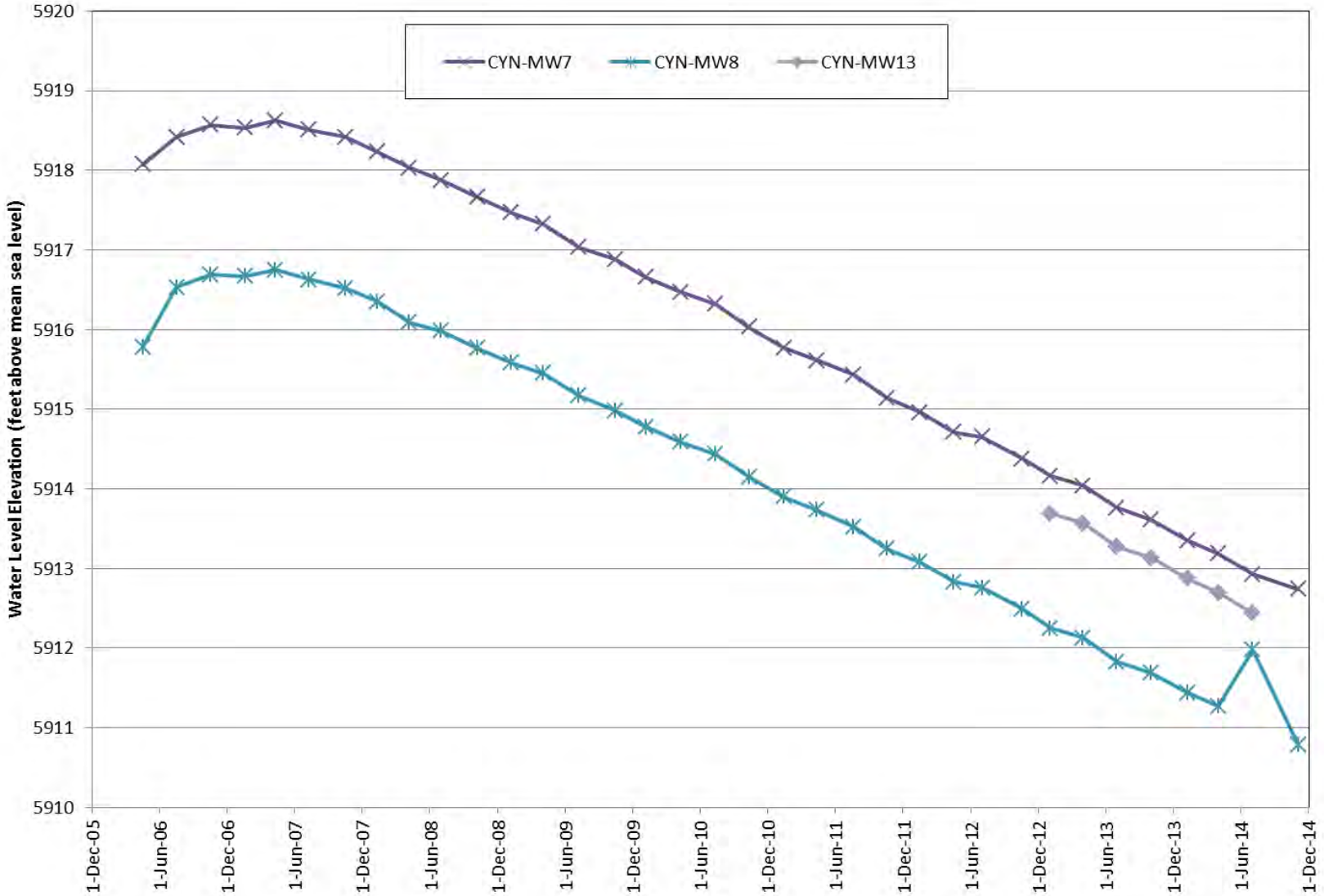


Figure 7C-4. BSG Area of Concern Wells (4 of 5)

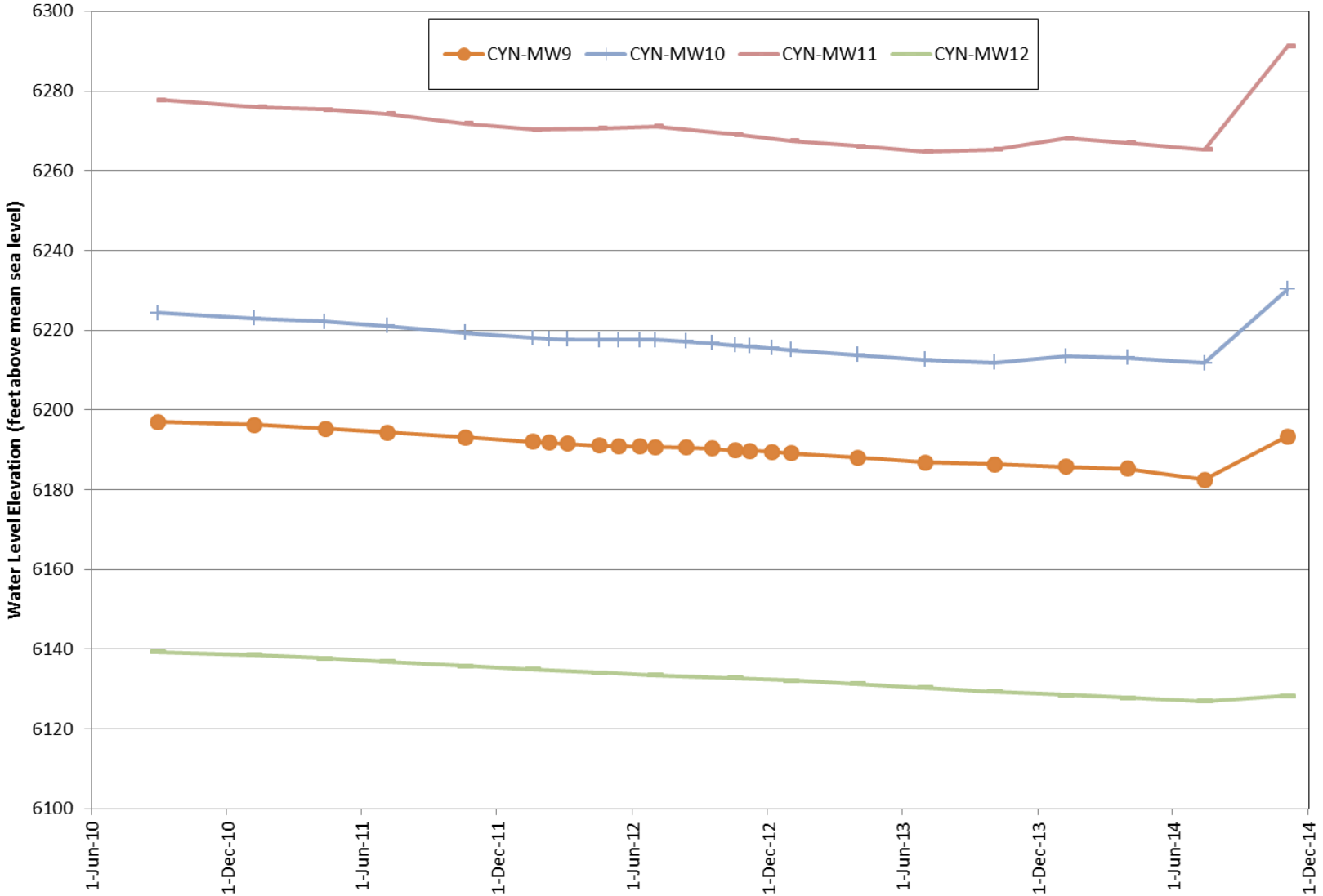


Figure 7C-5. BSG Area of Concern Wells (5 of 5)

This page intentionally left blank.

8.0 Solid Waste Management Units 8/58

8.1 Introduction

This chapter summarizes the Calendar Year (CY) 2014 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).

Monitoring wells CCBA-MW1 and CCBA-MW2 were installed at SWMUs 8/58 in August 2011. In April 2012, New Mexico Environment Department (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 Consent Order) between the NMED, U.S. Department of Energy (DOE), and Sandia Corporation (Sandia) (NMED April 2004) and the NMED letter dated April 8, 2010, from the NMED Hazardous Waste Bureau requiring additional corrective action, and specifically included additional groundwater monitoring at SWMUs 8/58 (NMED April 2010). In October 2014, DOE and Sandia notified NMED that groundwater monitoring at SWMUs 8/58 had been completed and would be discontinued (SNL October 2014).

Monitoring well CCBA-MW1 was sampled on January 27, 2014, April 7, 2014, July 22, 2014, and October 13, 2014. Monitoring well CCBA-MW2 was sampled on January 23, 2014, April 8, 2014, July 21, 2014, and October 14, 2014. 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 2013, March 2014, July 2014, and September 2014a). 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, and radionuclides by gamma spectroscopy.

Analytical results for the CY 2014 groundwater samples were compared with the U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) for drinking water (EPA May 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-5 (Attachment 8A). Fluoride concentrations in samples from monitoring well CCBA-MW1 ranged from 4.68 to 5.02 mg/L.

The eighth quarter of the required groundwater sampling (NMED April 2010) was conducted in July 2013 (SNL September 2014b). The thirteenth and final quarterly groundwater sampling event at SWMUs 8/58 was conducted in October 2014.

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/National Nuclear Security Administration (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.

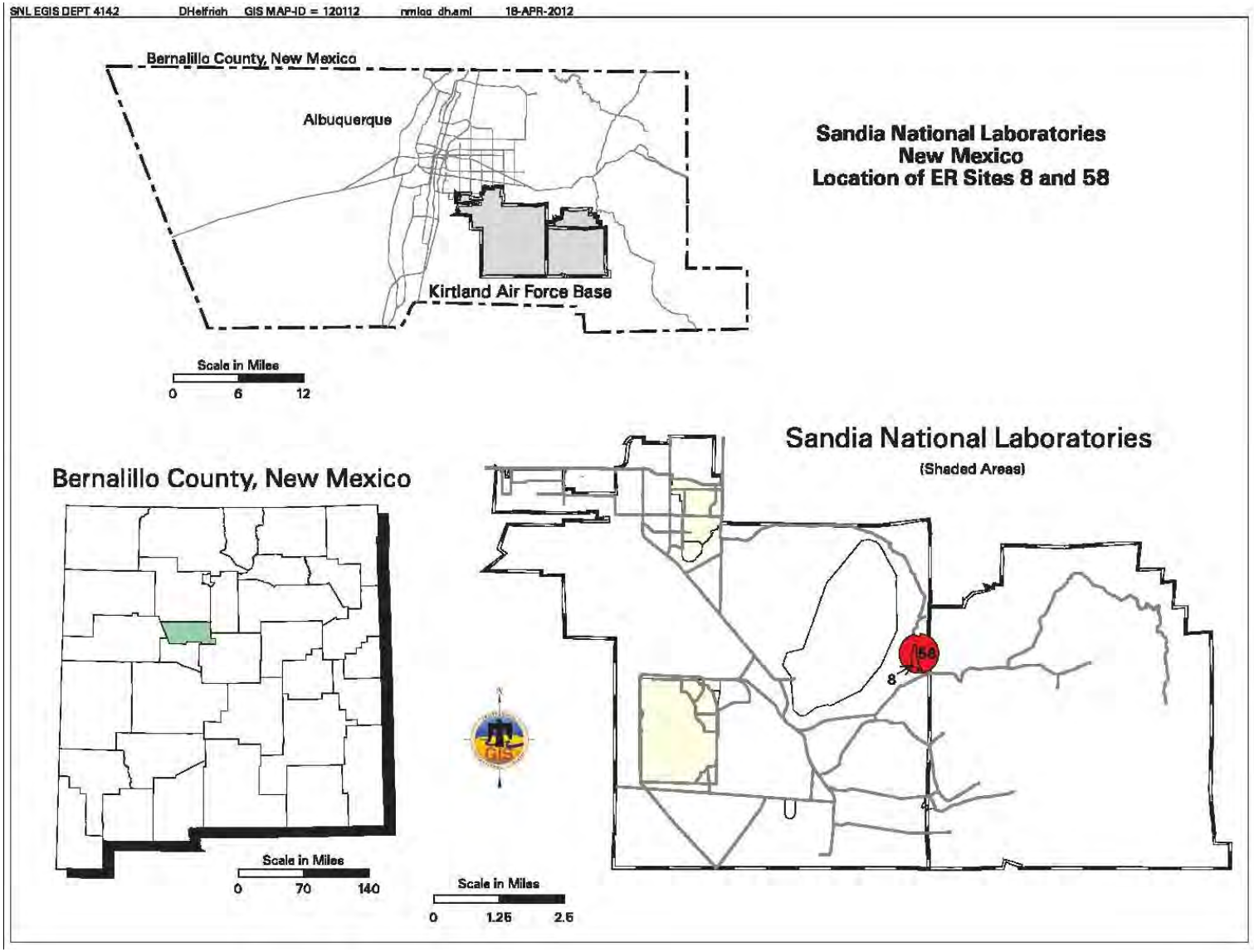


Figure 8-1. Location of SWMUs 8/58

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 above ground 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 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.

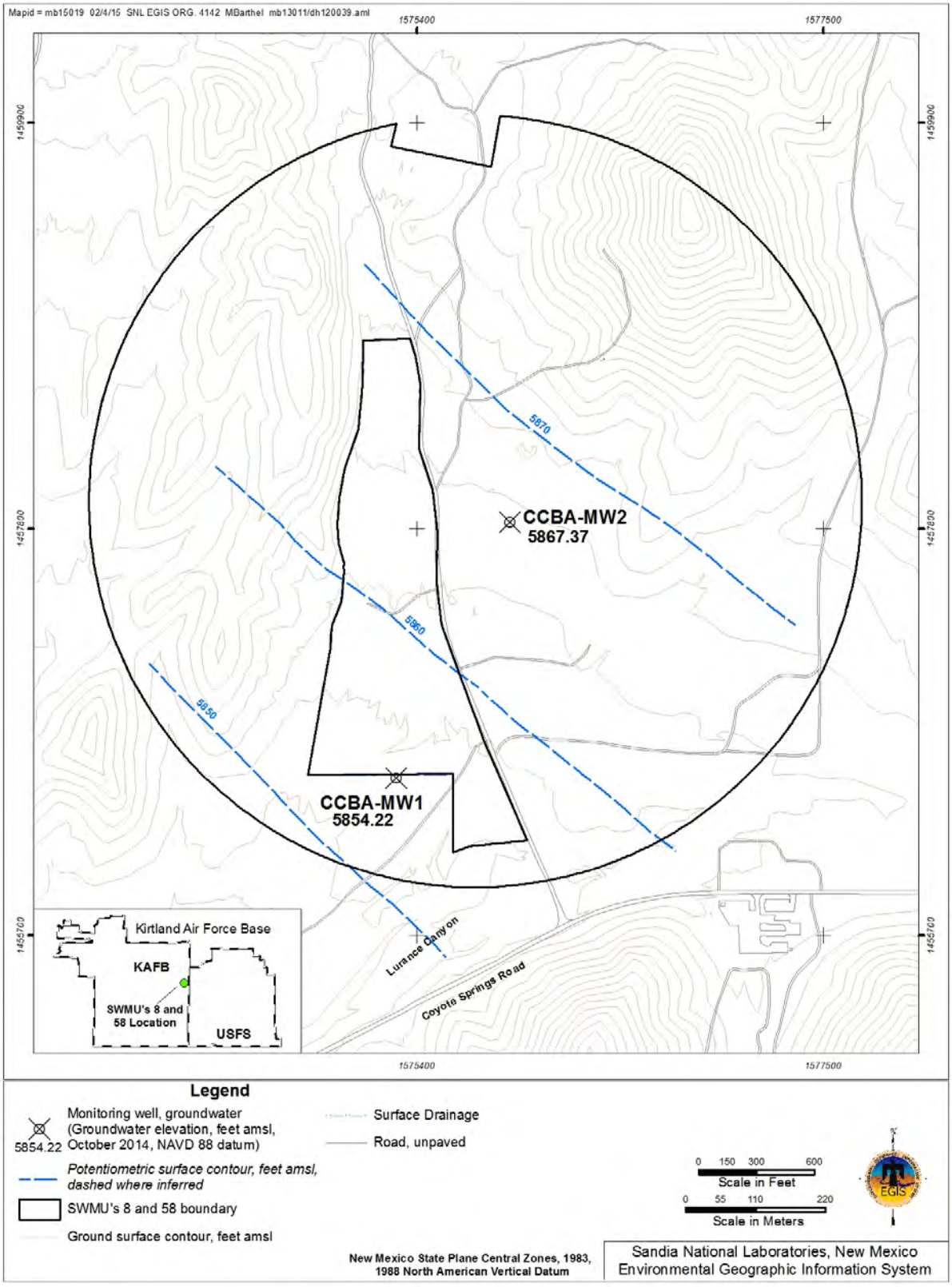


Figure 8-2. Groundwater Monitoring Wells CCBA-MW1 and CCBA-MW2 Installed at SWMUs 8/58 and Potentiometric Surface Map (October 2014)

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 2014 as described in Section 8.1.5.

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 were 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, and radionuclides by gamma spectroscopy. In CY 2014 isotopic uranium analysis was discontinued because the uncorrected gross alpha activities have consistently been reported below the MCL of 15 picocuries per liter (pCi/L).

8.1.5 Summary of Calendar Year 2014 Activities

The following activities occurred for SWMUs 8/58 during CY 2014:

- Quarterly groundwater sampling was conducted at monitoring wells CCBA-MW1 and CCBA-MW2 in January, April, July, and October 2014 (SNL December 2013, March 2014, July 2014, and September 2014a).
- Quarterly reporting of analytical results from monitoring wells CCBA-MW1 and CCBA-MW2.
- 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
	1950-1960s	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, 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 identified seven discrete cultural resource areas.	SNL February 1995a
	1994-2004	VCM and VCA conducted from 1994 until 2004 to remove surface and buried contaminated soil and wastes. Housekeeping activities were 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 removed surface debris in preparation for soil sampling during the RFI activities.	SNL May 1997
March	1997	Soil sampled at Burn Test Feature and contingency borehole sampling performed at Feature 58OO.	SNL April 2005
February	1998	Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report (SNL/NM December 1995) containing a description of SWMUs 8 and 58 hydrogeology was 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	Met 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	Prepared VCA plan for UCS at SWMU 58.	SNL October 2000
October	2000	Debris removed from UCS; radiological survey conducted.	SNL December 2000
January	2004	VCA plan submitted to NMED. Plan was 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 requested a determination of CAC without controls for SWMUs 8/58 as a whole.	SNL April 2005

Refer to footnotes on page 8-8.

Table 8-1. Historical Timeline of SWMUs 8/58 *(Continued)*

Month	Year	Event	Reference
June	2005	SWMU 8 was designated as "CAC without controls" from NMED. NMED also issued an RSI for seven features of SWMU 58. Additional sampling and analysis was 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 was included as an appendix to the response.	SNL June 2005
September	2005	NMED stated the additional sampling was adequate to complete the CAC proposal pending the outcome of the sampling results. Additional field sampling began.	NMED September 2005
March	2006	The first supplemental response and proposal for CAC for SWMUs 8/58 were submitted. The new sampling analysis revealed no COCs present at levels considered hazardous to human health. DOE/NNSA and Sandia requested CAC without controls for SWMUs 8/58.	SNL March 2006
June	2006	NMED RSI stated that the elevated levels of lead and nickel at Feature 58FF were not sufficiently defined horizontally or vertically; therefore, additional sampling was needed.	NMED June 2006
August	2006	A SAP was submitted to NMED outlining additional sampling to be completed at Feature 58FF. Planned boreholes will be sampled for lead and nickel only.	SNL August 2006
September	2006	Lead and nickel samples were collected from five boreholes at Feature 58FF.	SNL January 2007
October	2006	NMED officially approved the SAP for fall 2006 sampling (after the sampling was 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 revealed no COCs present at levels considered hazardous to human health. DOE/NNSA again requested CAC without controls for SWMUs 8/58.	SNL January 2007
June	2007	NMED approved the second RSI response and issued 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 provided comments that influenced 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 received that formally stated additional corrective action was 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 approved the SWMUs 8/58 Groundwater Characterization Work Plan.	NMED January 2011

Refer to footnotes on page 8-8.

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 was submitted to NMED.	SNL May 2011a
June	2011	NMED approved SWMUs 8/58 Proposed Groundwater Monitoring Well Location Adjustment.	NMED June 2011
June	2011	Requested 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 were installed.	SNL November 2011
August	2011	NMED approved 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 events were conducted for monitoring wells CCBA-MW1 and CCBA-MW2.	SNL September 2012
November	2011	SWMUs 8/58 Groundwater Monitoring Well Installation Report was submitted.	SNL November 2011
January	2012	Slug tests were 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 was 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 January 2014
October	2014	NMED was notified that groundwater monitoring at SWMUs 8/58 has been completed, and has been discontinued.	SNL October 2014

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 2015:

- No groundwater sampling will be conducted at monitoring wells CCBA-MW1 and CCBA-MW2 in CY 2015 unless NMED requires additional sampling.

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. The estimated average annual precipitation for SWMUs 8/58 is estimated to be approximately 11.5 in/yr. The estimate was extrapolated by using the precipitation model from the Canyon Area conceptual model of groundwater flow and contaminant transport (SNL May 2004) and the average elevation of approximately 6,000 ft amsl. 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 5-ft of borehole (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 8-2 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 13.15 ft higher than it was in monitoring well CCBA-MW1 in October 2014. The distance between the wells is 1,446 ft. The resulting gradient between the two wells was 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

Well ID	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 2014 (ft amsl)	Mid-Point Screen Elevation (ft amsl)	Approximate Pressure Head (ft[b])	Completion Zone
CCBA-MW1	5,899.89	70	75	5,825	60 - 80	5,854.22	5,829.90	24	Alluvium and quartzite
CCBA-MW2	5,936.95	30	100	5,837	98 - 118	5,867.37	5,829.00	38	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).
ID = Identification.
MW = Monitoring Well.
SWMU = Solid Waste Management Unit.

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 8-3. The groundwater composition for both wells is of the bicarbonate type dominated by calcium. The geochemical signatures from CY 2014 are consistent with CY 2013 and CY 2012 results (SNL September 2013; and September 2014b) 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 (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 the 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 apparent 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.

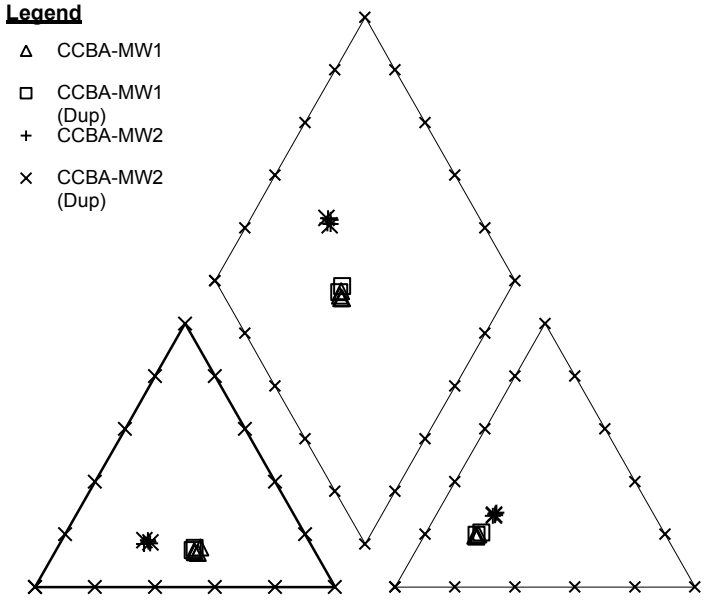


Figure 8-3. Piper Trilinear Diagram of Major Ion Chemistry for Monitoring Wells CCBA-MW1 and CCBA-MW2 at SWMUs 8/58, CY 2014

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 2014, fluoride was detected above the MCL of 4.0 mg/L in monitoring well CCBA-MW1 groundwater samples at concentrations that ranged from 4.68 to 5.02 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 1.46 to 1.63 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 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 Consent 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 Consent 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 sampling event required by NMED for monitoring wells CCBA-MW1 and CCBA-MW2 was completed in July 2013. In October 2014 DOE and Sandia notified NMED that after 13 quarters groundwater monitoring at SWMUs 8/58 had been completed, and would be discontinued (SNL October 2014).

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 Consent Order, as specified in Section III.A of the Consent Order (NMED April 2004).

8.3 Scope of Activities

Groundwater monitoring sampling and analysis during CY 2014 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 Consent 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 2014 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 2013; March 2014; July 2014; and September 2014a).

Groundwater samples were collected from monitoring wells CCBA-MW1 and CCBA-MW2 in January, April, July, and October 2014. 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, and radionuclides by gamma spectroscopy.

Table 8-3. Groundwater Monitoring Well Network and Sampling Dates for SWMUs 8/58, Calendar Year 2014

Date of Sampling Event	Wells Sampled	SAP
January 2014	CCBA-MW1 CCBA-MW2	*SWMU 8 and 58 Groundwater Monitoring Mini-SAP for Second Quarter Fiscal Year 2014* (SNL December 2013)
April 2014	CCBA-MW1 CCBA-MW2	*SWMU 8 and 58 Groundwater Monitoring Mini-SAP for Third Quarter Fiscal Year 2014* (SNL March 2014)
July 2014	CCBA-MW1 CCBA-MW2	*SWMU 8 and 58 Groundwater Monitoring Mini-SAP for Fourth Quarter Fiscal Year 2014* (SNL July 2014)
October 2014	CCBA-MW1 CCBA-MW2	*SWMU 8 and 58 Groundwater Monitoring Mini-SAP for First Quarter Fiscal Year 2015* (SNL September 2014a)

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 2014

Parameter	Sampling Period	
Anions	**January 2014**	**April 2014**
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 2014**	**October 2014**
NPN	CCBA-MW1	CCBA-MW1
Perchlorate	CCBA-MW1 (dup)	CCBA-MW2
SVOCs	CCBA-MW2	CCBA-MW2 (dup)
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 2014 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 2014, 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 8-2 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 2014 are presented in Table 8-4.

8.7 Summary of Analytical Results

This section discusses analytical results and field measurements for the CY 2014 sampling events at SWMUs 8/58. Data are presented in Tables 8A-1 through 8A-10 (Attachment 8A). Data qualifiers are explained in the footnotes following Table 8A-10. 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 Customer Funded Record 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 and Revision 4* (SNL May 2011b; June 2014). 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 above laboratory MDLs in any groundwater samples collected from SWMUs 8/58. Tables 8A-1 through 8A-3 list the MDLs for associated VOCs, SVOCs, and HE compounds, respectively (Attachment 8A).

Table 8A-4 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 1.59 to 3.89 mg/L.

Table 8A-5 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 4.68 to 5.02 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 1.46 to 1.63 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-6 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-7 (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-8 (Attachment 8A). These parameters have no established MCLs.

The results for gamma spectroscopy and gross alpha/beta activity are presented in Table 8A-9 (Attachment 8A). Gross alpha activity is measured as a radiological screening tool and in accordance with 40 Code of Federal Regulations; Parts 9, 141, and 142; and Table I-4 should not include uranium. Naturally occurring uranium is measured independently (i.e., total uranium concentration determined by metals analysis described above) and the gross alpha activity measurements are corrected by subtracting the total uranium activity from the uncorrected gross alpha activity results. Radiological results are further reviewed by an SNL/NM Health Physicist to assure that the samples are nonradioactive. All radionuclide activity results are below MCLs, where established.

Table 8A-10 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, field blanks (FBs), trip blanks (TBs), and equipment blanks (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. The duplicate samples collected in January, 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 were collected to verify the equipment decontamination process. The results for EB analyses are as follows:

- **January 2014 Sampling Event**—An EB or rinsate sample was collected prior to sampling monitoring well CCBA-MW1 and submitted for all analyses. Bromodichloromethane, bromoform, chloroform, dibromochloromethane, chloride, copper, and sodium were detected above the laboratory MDLs. With the exception of copper, no corrective action was necessary since analytes were not detected in environmental samples, or were detected in environmental

samples at concentrations greater than five times the EB result. Copper was qualified as not detected in both the CCBA-MW1 environmental and environmental duplicate samples during data validation, since copper was reported in the EB sample at a concentration greater than associated environmental samples.

- **April 2014 Sampling Event**—An EB or rinsate sample was collected prior to sampling monitoring well CCBA-MW2 and submitted for all analyses. Bromodichloromethane, chloroform, chloride, copper, and sodium were detected above the laboratory MDLs. With the exception of copper, no corrective action was necessary since analytes were not detected in environmental samples, or were detected at concentrations greater than five times the EB result. Copper was qualified as not detected in both the CCBA-MW2 environmental and environmental duplicate samples during data validation, since copper was reported in the EB sample at a concentration greater than associated environmental samples.

- **July 2014 Sampling Event**—An EB or rinsate sample was collected prior to sampling monitoring well CCBA-MW1 and submitted for all analyses. Acetone, bromodichloromethane, chloroform, chromium, copper, dibromochloromethane, and gross beta were detected above the laboratory MDLs or minimum detectable activities (MDAs). With the exception of copper, no corrective action was necessary since analytes were not detected in environmental samples, or were detected at concentrations greater than five times the EB result. Copper was qualified as not detected in both the CCBA-MW1 environmental and environmental duplicate samples during data validation, since copper was reported in the EB sample at a concentration greater than associated environmental samples.

- **October 2014 Sampling Event**—An EB or rinsate sample was collected prior to sampling monitoring well CCBA-MW2 and submitted for all analyses. Acetone, bromodichloromethane, chloroform, and copper were detected above the laboratory MDLs or MDAs. With the exception of copper, no corrective action was necessary since compounds were not detected in environmental samples. Copper was qualified as not detected in both the CCBA-MW2 environmental and environmental duplicate samples during data validation, since copper was reported in the EB sample at a concentration greater than associated environmental samples.

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 2014, 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: The results of the FB analysis are provided below:

- **January 2014 Sampling Event**—Analysis of the monitoring well CCBA-MW2 FB sample detected the VOC compounds bromodichloromethane, bromoform, chloroform, and dibromochloromethane above associated laboratory MDLs. No corrective action was required, since these compounds were not detected in the associated environmental sample.

- **April 2014 Sampling Event**—Analysis of the monitoring well CCBA-MW1 FB sample detected the VOC compounds bromodichloromethane and chloroform above associated

laboratory MDLs. No corrective action was required, since these compounds were not detected in the associated environmental sample.

- **July 2014 Sampling Event**—Analysis of the monitoring well CCBA-MW1 FB sample detected the VOC compounds acetone and chloroform above associated laboratory MDLs. No corrective action was required, since these compounds were not detected in the associated environmental sample.

- **October 2014 Sampling Event**—Analysis of the monitoring well CCBA-MW1 FB sample detected the VOCs compounds bromodichloromethane and chloroform above associated laboratory MDLs. No corrective action was required, since 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 2014**.**

8.9 Variances and Nonconformances

No variances or nonconformances from requirements specified in the Mini-SAPs for SWMUs 8/58 (SNL December 2013, March 2014, July 2014, and September 2014a) were noted during sampling activities. However, project-specific issues identified during CY 2014 sampling activities are noted as follows:

- **January 2014 Sampling Event**—Isotopic uranium analysis was discontinued because the uncorrected gross alpha activities have consistently been reported below the MCL of 15 pCi/L.

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 2014, 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. Fluoride was detected above the established MCL of 4.0 mg/L in monitoring well CCBA-MW1 samples that ranged from 4.68 to 5.02 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.

In October 2014, DOE and Sandia notified NMED that additional groundwater monitoring at SWMUs 8/58 had been completed and would be discontinued (SNL October 2014). No further groundwater sampling will be conducted at monitoring wells CCBA-MW1 and CCBA-MW2 unless NMED requires additional sampling.

The current conceptual model described in Section 8.1.7 does not require modification based on the analytical results for this reporting period.

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 May 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 Work Plans 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 October 2014 Sandia National Laboratories, New Mexico (SNL/NM), October 2014. *Completion of Monitoring at Solid Waste Management Units 68, 149, 154, and 8/58*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2014a Sandia National Laboratories, New Mexico (SNL/NM), September 2014. *SWMU 8 and 58 Groundwater Monitoring Mini-SAP for First Quarter Fiscal Year 2015*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2014b Sandia National Laboratories, New Mexico (SNL/NM), September 2014. *Annual Groundwater Monitoring Report, Calendar Year 2013 Groundwater Protection Program*, Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL July 2014 Sandia National Laboratories, New Mexico (SNL/NM), July 2014. *SWMU 8 and 58 Groundwater Monitoring Mini-SAP for Fourth Quarter Fiscal Year 2014*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2014 Sandia National Laboratories, New Mexico (SNL/NM), June 2014. *Data Validation Procedure for Chemical and Radiochemical Data*, AOP 00-03, Revision 4, Sample Management Office, Sandia National Laboratories, Albuquerque, New Mexico, June 16, 2014.

SNL March 2014 Sandia National Laboratories, New Mexico (SNL/NM), March 2014. *SWMU 8 and 58 Groundwater Monitoring Mini-SAP for Third Quarter Fiscal Year 2014,* 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 December 2013 Sandia National Laboratories, New Mexico (SNL/NM), December 2013. *SWMU 8 and 58 Groundwater Monitoring Mini-SAP for Second Quarter Fiscal Year 2014*, Environmental Restoration Operations, 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 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.

Attachment 8A
Solid Waste Management Units 8/58
Analytical Results Tables

This page intentionally left blank.

Attachment 8A Tables

8A-1 Method Detection Limits for Volatile Organic Compounds (EPA Method SW846-8260B), Solid Waste Management Units 8/58 Groundwater Investigation, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 8A-5

8A-2 Method Detection Limits for Semivolatile Organic Compounds (EPA Method SW846-8270C), Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 8A-6

8A-3 Method Detection Limits for High Explosive Compounds (EPA Method SW846-8321A), Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 8A-7

8A-4 Summary of Nitrate plus Nitrate Results, Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 8A-8

8A-5 Summary of Alkalinity, Anion, and Total Cyanide Results, Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 8A-9

8A-6 Summary of Perchlorate Results, Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 8A-12

8A-7 Summary of Target Analyte List Metals and Uranium Results, Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 8A-13

8A-8 Summary of Cation Results, Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 8A-25

8A-9 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 2014 ..... 8A-27

8A-10 Summary of Field Water Quality Measurements, Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 8A-31

Footnotes for Solid Waste Management Units 8/58 Analytical Results Tables 8A-33

This page intentionally left blank.

Table 8A-1
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 2014

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	0.300–0.500	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	0.300–3.00
1,2-Dichloropropane	0.300	Methylene chloride	1.70–3.00
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	2.50–3.00	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-2
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 2014

Analyte	MDL[b] (µg/L)	Analyte	MDL[b] (µg/L)
1'-Biphenyl 1	3.00–3.26	Butylbenzyl phthalate	3.00–3.26
1,2,4-Trichlorobenzene	3.00–3.26	Caprolactam	3.00–3.26
2,4,5-Trichlorophenol	3.00–3.26	Carbazole	0.300–0.326
1,4-Dioxane	3.00–3.26	Chrysene	0.300–0.326
2,4,6-Trichlorophenol	3.00–3.26	Di-n-butyl phthalate	3.00–3.26
2,4-Dichlorophenol	3.00–3.26	Di-n-octyl phthalate	3.00–3.26
2,4-Dimethylphenol	3.00–3.26	Dibenz[a,h]anthracene	0.300–0.326
2,4-Dinitrophenol	5.00–5.43	Dibenzofuran	3.00–3.26
2,4-Dinitrotoluene	3.00–3.26	Diethylphthalate	3.00–3.26
2,6-Dinitrotoluene	3.00–3.26	Dimethylphthalate	3.00–3.26
2-Chloronaphthalene	0.410–0.446	Dinitro-o-cresol	3.00–3.26
2-Chlorophenol	3.00–3.26	Diphenyl amine	3.00–3.26
2-Methylnaphthalene	0.300–0.326	Fluoranthene	0.300–0.326
2-Nitroaniline	3.00–3.26	Fluorene	0.300–0.326
2-Nitrophenol	3.00–3.26	Hexachlorobenzene	3.00–3.26
3,3'-Dichlorobenzidine	3.00–3.26	Hexachlorobutadiene	3.00–3.26
3-Nitroaniline	3.00–3.26	Hexachlorocyclopentadiene	3.00–3.26
4-Bromophenyl phenyl ether	3.00–3.26	Hexachloroethane	3.00–3.26
4-Chloro-3-methylphenol	3.00–3.26	Indeno(1,2,3-c,d)pyrene	0.300–0.326
4-Chlorobenzenamine	3.30–3.59	Isophorone	3.50–3.26
4-Chlorophenyl phenyl ether	3.00–3.26	Naphthalene	0.300–0.326
4-Nitroaniline	3.00–3.26	Nitro-benzene	3.00–3.26
4-Nitrophenol	3.00–3.26	Pentachlorophenol	3.00–3.26
Acenaphthene	0.300–0.326	Phenanthrene	0.300–0.326
Acenaphthylene	0.300–0.326	Phenol	3.00–3.26
Acetophenone	3.00–3.26	Pyrene	0.300–0.326
Anthracene	0.300–0.326	bis(2-Chloroethoxy)methane	3.00–3.26
Atrazine	3.00–3.26	bis(2-Chloroethyl)ether	3.00–3.26
Benzaldehyde	3.00–3.26	bis(2-Chloroisopropyl)ether	3.00–3.09
Benzo(a)anthracene	0.300–0.326	bis(2-Ethylhexyl)phthalate	3.00–3.26
Benzo(a)pyrene	0.300–0.326	m,p-Cresol	3.70–4.02
Benzo(b)fluoranthene	0.300–0.326	n-Nitrosodipropylamine	3.00–3.26
Benzo(ghi)perylene	0.300–0.326	o-Cresol	3.00–3.26
Benzo(k)fluoranthene	0.300–0.326		

Refer to footnotes on page 8A-33.

Table 8A-3
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 2014

Analyte	MDL[b] (µg/L)
1,3,5-Trinitrobenzene	0.0833–0.0874
1,3-Dinitrobenzene	0.0833–0.0874
2,4,6-Trinitrotoluene	0.0833–0.0874
2,4-Dinitrotoluene	0.0833–0.0874
2,6-Dinitrotoluene	0.0833–0.0874
2-Amino-4,6-dinitrotoluene	0.0833–0.0874
2-Nitrotoluene	0.0854–0.0896
3-Nitrotoluene	0.0833–0.0874
4-Amino-2,6-dinitrotoluene	0.0833–0.0874
4-Nitrotoluene	0.156–0.164
HMX	0.0833–0.0874
Nitro-benzene	0.0833–0.0874
Pentaerythritol tetranitrate	0.104–0.109
RDX	0.0833–0.0874
Tetryl	0.0833–0.0874

Refer to footnotes on page 8A-33.

Table 8A-4
Summary of Nitrate plus Nitrate Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 27-Jan-14	Nitrate plus nitrite	2.07	0.170	0.500	10.0			095213-018	EPA 353.2
CCBA-MW1 (Duplicate) 27-Jan-14	Nitrate plus nitrite	1.99	0.085	0.250	10.0			095214-018	EPA 353.2
CCBA-MW2 23-Jan-14	Nitrate plus nitrite	3.62	0.170	0.500	10.0			095208-018	EPA 353.2
CCBA-MW1 07-Apr-14	Nitrate plus nitrite	1.80	0.085	0.250	10.0			095725-018	EPA 353.2
CCBA-MW2 08-Apr-14	Nitrate plus nitrite	3.62	0.170	0.500	10.0			095730-018	EPA 353.2
CCBA-MW2 (Duplicate) 08-Apr-14	Nitrate plus nitrite	3.89	0.170	0.500	10.0			095731-018	EPA 353.2
CCBA-MW1 22-Jul-14	Nitrate plus nitrite	1.61	0.085	0.250	10.0			096269-018	EPA 353.2
CCBA-MW1 (Duplicate) 22-Jul-14	Nitrate plus nitrite	1.64	0.085	0.250	10.0			096270-018	EPA 353.2
CCBA-MW2 21-Jul-14	Nitrate plus nitrite	3.41	0.170	0.500	10.0			096263-018	EPA 353.2
CCBA-MW1 13-Oct-14	Nitrate plus nitrite	1.59	0.085	0.250	10.0			096685-018	EPA 353.2
CCBA-MW2 14-Oct-14	Nitrate plus nitrite	3.32	0.085	0.250	10.0			096691-018	EPA 353.2
CCBA-MW2 (Duplicate) 14-Oct-14	Nitrate plus nitrite	3.47	0.085	0.250	10.0			096692-018	EPA 353.2

Refer to footnotes on page 8A-33.

Table 8A-5
Summary of Alkalinity, Anion, and Total Cyanide Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	180	0.725	1.00	NE			095213-022	SM2320B
27-Jan-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095213-022	SM2320B
	Bromide	0.323	0.067	0.200	NE			095213-016	SW846 9056
	Chloride	28.3	0.335	1.00	NE			095213-016	SW846 9056
	Fluoride	**4.68**	0.165	0.500	4.0			095213-016	SW846 9056
	Sulfate	57.6	0.665	2.00	NE			095213-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	095213-027	SW846 9012
CCBA-MW1 (Duplicate)	Bicarbonate Alkalinity	177	0.725	1.00	NE			095214-022	SM2320B
27-Jan-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095214-022	SM2320B
	Bromide	0.325	0.067	0.200	NE			095214-016	SW846 9056
	Chloride	28.4	0.335	1.00	NE			095214-016	SW846 9056
	Fluoride	**4.74**	0.165	0.500	4.0			095214-016	SW846 9056
	Sulfate	57.9	0.665	2.00	NE			095214-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	095214-027	SW846 9012
CCBA-MW2	Bicarbonate Alkalinity	178	0.725	1.00	NE			095208-022	SM2320B
23-Jan-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095208-022	SM2320B
	Bromide	0.517	0.067	0.200	NE			095208-016	SW846 9056
	Chloride	36.8	0.670	2.00	NE			095208-016	SW846 9056
	Fluoride	1.46	0.033	0.100	4.0			095208-016	SW846 9056
	Sulfate	92.9	1.33	4.00	NE			095208-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	095208-027	SW846 9012
CCBA-MW1	Bicarbonate Alkalinity	181	0.725	1.00	NE			095725-022	SM2320B
07-Apr-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095725-022	SM2320B
	Bromide	0.334	0.067	0.200	NE			095725-016	SW846 9056
	Chloride	29.2	0.335	1.00	NE			095725-016	SW846 9056
	Fluoride	**4.97**	0.165	0.500	4.0			095725-016	SW846 9056
	Sulfate	58.0	0.665	2.00	NE			095725-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	095725-029	SW846 9012

Refer to footnotes on page 8A-33.

Table 8A-5 *(Continued)*
Summary of Alkalinity, Anion, and Total Cyanide Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	178	0.725	1.00	NE			095730-022	SM2320B
08-Apr-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095730-022	SM2320B
	Bromide	0.554	0.067	0.200	NE			095730-016	SW846 9056
	Chloride	38.6	0.670	2.00	NE			095730-016	SW846 9056
	Fluoride	1.59	0.033	0.100	4.0			095730-016	SW846 9056
	Sulfate	97.7	1.33	4.00	NE			095730-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	095730-029	SW846 9012
CCBA-MW2 (Duplicate)	Bicarbonate Alkalinity	178	0.725	1.00	NE			095731-022	SM2320B
08-Apr-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095731-022	SM2320B
	Bromide	0.569	0.067	0.200	NE			095731-016	SW846 9056
	Chloride	37.8	0.670	2.00	NE			095731-016	SW846 9056
	Fluoride	1.63	0.033	0.100	4.0			095731-016	SW846 9056
	Sulfate	95.8	1.33	4.00	NE			095731-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	095731-029	SW846 9012
CCBA-MW1	Bicarbonate Alkalinity	172	0.725	2.00	NE			096269-022	SM2320B
22-Jul-14	Carbonate Alkalinity	ND	0.725	2.00	NE	U		096269-022	SM2320B
	Bromide	0.320	0.067	0.200	NE			096269-016	SW846 9056
	Chloride	28.9	0.335	1.00	NE			096269-016	SW846 9056
	Fluoride	**4.99**	0.033	0.100	4.0			096269-016	SW846 9056
	Sulfate	57.5	0.665	2.00	NE			096269-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U		096269-027	SW846 9012
CCBA-MW1 (Duplicate)	Bicarbonate Alkalinity	166	0.725	2.00	NE			096270-022	SM2320B
22-Jul-14	Carbonate Alkalinity	ND	0.725	2.00	NE	U		096270-022	SM2320B
	Bromide	0.316	0.067	0.200	NE			096270-016	SW846 9056
	Chloride	29.5	0.335	1.00	NE			096270-016	SW846 9056
	Fluoride	**5.02**	0.033	0.100	4.0			096270-016	SW846 9056
	Sulfate	58.6	0.665	2.00	NE			096270-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U		096270-027	SW846 9012

Refer to footnotes on page 8A-33.

Table 8A-5 *(Concluded)*
Summary of Alkalinity, Anion, and Total Cyanide Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	170	0.725	1.00	NE			096263-022	SM2320B
21-Jul-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096263-022	SM2320B
	Bromide	0.568	0.067	0.200	NE			096263-016	SW846 9056
	Chloride	37.5	0.670	2.00	NE			096263-016	SW846 9056
	Fluoride	1.47	0.033	0.100	4.0			096263-016	SW846 9056
	Sulfate	95.7	1.33	4.00	NE			096263-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U		096263-027	SW846 9012
CCBA-MW1	Bicarbonate Alkalinity	178	0.725	1.00	NE			096685-022	SM2320B
13-Oct-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096685-022	SM2320B
	Bromide	0.320	0.067	0.200	NE			096685-016	SW846 9056
	Chloride	28.8	0.335	1.00	NE			096685-016	SW846 9056
	Fluoride	**4.81**	0.033	0.100	4.0			096685-016	SW846 9056
	Sulfate	55.9	0.665	2.00	NE			096685-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	096685-027	SW846 9012
CCBA-MW2	Bicarbonate Alkalinity	175	0.725	1.00	NE			096691-022	SM2320B
14-Oct-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096691-022	SM2320B
	Bromide	0.558	0.067	0.200	NE			096691-016	SW846 9056
	Chloride	38.2	0.670	2.00	NE			096691-016	SW846 9056
	Fluoride	1.50	0.033	0.100	4.0			096691-016	SW846 9056
	Sulfate	93.8	1.33	4.00	NE			096691-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	096691-027	SW846 9012
CCBA-MW2 (Duplicate)	Bicarbonate Alkalinity	179	0.725	1.00	NE			096692-022	SM2320B
14-Oct-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096692-022	SM2320B
	Bromide	0.553	0.067	0.200	NE			096692-016	SW846 9056
	Chloride	37.9	0.670	2.00	NE			096692-016	SW846 9056
	Fluoride	1.50	0.033	0.100	4.0			096692-016	SW846 9056
	Sulfate	94.1	1.33	4.00	NE			096692-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	096692-027	SW846 9012

Refer to footnotes on page 8A-33.

Table 8A-6
Summary of Perchlorate Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 27-Jan-14	ND	0.004	0.012	NE	U	UJ	095213-020	EPA 314.0
CCBA-MW1 (Duplicate) 27-Jan-14	ND	0.004	0.012	NE	U	UJ	095214-020	EPA 314.0
CCBA-MW2 23-Jan-14	ND	0.004	0.012	NE	U	UJ	095208-020	EPA 314.0
CCBA-MW1 07-Apr-14	ND	0.004	0.012	NE	U		095725-020	EPA 314.0
CCBA-MW2 08-Apr-14	ND	0.004	0.012	NE	U		095730-020	EPA 314.0
CCBA-MW2 (Duplicate) 08-Apr-14	ND	0.004	0.012	NE	U		095731-020	EPA 314.0
CCBA-MW1 22-Jul-14	ND	0.004	0.012	NE	U		096269-020	EPA 314.0
CCBA-MW1 (Duplicate) 22-Jul-14	ND	0.004	0.012	NE	U		096270-020	EPA 314.0
CCBA-MW2 21-Jul-14	ND	0.004	0.012	NE	U		096263-020	EPA 314.0
CCBA-MW1 13-Oct-14	ND	0.004	0.012	NE	U		096685-020	EPA 314.0
CCBA-MW2 14-Oct-14	ND	0.004	0.012	NE	U		096691-020	EPA 314.0
CCBA-MW2 (Duplicate) 14-Oct-14	ND	0.004	0.012	NE	U		096692-020	EPA 314.0

Refer to footnotes on page 8A-33.

Table 8A-7
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.0368	0.015	0.050	NE	J		095213-009	SW846 6020
27-Jan-14	Antimony	ND	0.001	0.003	0.006	U		095213-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095213-009	SW846 6020
	Barium	0.00226	0.0006	0.002	2.00	B	0.0059U	095213-009	SW846 6020
	Beryllium	0.000471	0.0002	0.0005	0.004	J		095213-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095213-009	SW846 6020
	Calcium	46.3	0.060	0.200	NE			095213-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095213-009	SW846 6020
	Cobalt	0.0001	0.0001	0.001	NE	J		095213-009	SW846 6020
	Copper	0.000545	0.00035	0.001	NE	J	0.0063U	095213-009	SW846 6020
	Iron	0.117	0.033	0.100	NE			095213-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095213-009	SW846 6020
	Magnesium	11.1	0.010	0.030	NE			095213-009	SW846 6020
	Manganese	0.00331	0.001	0.005	NE	J		095213-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095213-009	SW846 7470
	Nickel	0.000838	0.0005	0.002	NE	J		095213-009	SW846 6020
	Potassium	4.03	0.080	0.300	NE		J	095213-009	SW846 6020
	Selenium	0.00219	0.0015	0.005	0.050	J		095213-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095213-009	SW846 6020
	Sodium	65.4	0.400	1.25	NE			095213-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095213-009	SW846 6020
	Uranium	0.00222	0.000067	0.0002	0.03			095213-009	SW846 6020
	Vanadium	0.00129	0.001	0.005	NE	J	0.0053U	095213-009	SW846 6010
	Zinc	0.00681	0.0035	0.010	NE	J		095213-009	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-7 *(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 2014

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	0.0298	0.015	0.050	NE	J		095214-009	SW846 6020
27-Jan-14	Antimony	ND	0.001	0.003	0.006	U		095214-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095214-009	SW846 6020
	Barium	0.0022	0.0006	0.002	2.00	B	0.0059U	095214-009	SW846 6020
	Beryllium	0.000473	0.0002	0.0005	0.004	J		095214-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095214-009	SW846 6020
	Calcium	47.2	0.060	0.200	NE			095214-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095214-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		095214-009	SW846 6020
	Copper	0.000508	0.00035	0.001	NE	J	0.0063U	095214-009	SW846 6020
	Iron	0.113	0.033	0.100	NE			095214-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095214-009	SW846 6020
	Magnesium	10.7	0.010	0.030	NE			095214-009	SW846 6020
	Manganese	0.00327	0.001	0.005	NE	J		095214-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095214-009	SW846 7470
	Nickel	0.000876	0.0005	0.002	NE	J		095214-009	SW846 6020
	Potassium	4.19	0.080	0.300	NE		J	095214-009	SW846 6020
	Selenium	0.00225	0.0015	0.005	0.050	J		095214-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095214-009	SW846 6020
	Sodium	60.7	0.400	1.25	NE			095214-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095214-009	SW846 6020
	Uranium	0.00226	0.000067	0.0002	0.03			095214-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095214-009	SW846 6010
	Zinc	0.00437	0.0035	0.010	NE	J		095214-009	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-7 *(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 2014

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		095208-009	SW846 6020
23-Jan-14	Antimony	ND	0.001	0.003	0.006	U		095208-009	SW846 6020
	Arsenic	0.0018	0.0017	0.005	0.010	J		095208-009	SW846 6020
	Barium	0.0474	0.0006	0.002	2.00			095208-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095208-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095208-009	SW846 6020
	Calcium	77.9	0.600	2.00	NE			095208-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095208-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		095208-009	SW846 6020
	Copper	0.000645	0.00035	0.001	NE	J		095208-009	SW846 6020
	Iron	0.0936	0.033	0.100	NE	J		095208-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095208-009	SW846 6020
	Magnesium	15.5	0.010	0.030	NE			095208-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095208-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095208-009	SW846 7470
	Nickel	0.00119	0.0005	0.002	NE	J		095208-009	SW846 6020
	Potassium	1.42	0.080	0.300	NE			095208-009	SW846 6020
	Selenium	0.00363	0.0015	0.005	0.050	J		095208-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095208-009	SW846 6020
	Sodium	47.5	0.080	0.250	NE			095208-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095208-009	SW846 6020
	Uranium	0.00485	0.000067	0.0002	0.03			095208-009	SW846 6020
	Vanadium	0.0105	0.001	0.005	NE			095208-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095208-009	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-7 *(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 2014

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	0.0733	0.015	0.050	NE			095725-009	SW846 6020
07-Apr-14	Antimony	ND	0.001	0.003	0.006	U		095725-009	SW846 6020
	Arsenic	0.00179	0.0017	0.005	0.010	J		095725-009	SW846 6020
	Barium	0.00242	0.0006	0.002	2.00			095725-009	SW846 6020
	Beryllium	0.000414	0.0002	0.0005	0.004	J		095725-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095725-009	SW846 6020
	Calcium	48.5	0.060	0.200	NE			095725-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095725-009	SW846 6020
	Cobalt	0.000158	0.0001	0.001	NE	J		095725-009	SW846 6020
	Copper	0.000442	0.00035	0.001	NE	J		095725-009	SW846 6020
	Iron	0.147	0.033	0.100	NE			095725-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095725-009	SW846 6020
	Magnesium	9.57	0.010	0.030	NE		J	095725-009	SW846 6020
	Manganese	0.0044	0.001	0.005	NE	J		095725-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095725-009	SW846 7470
	Nickel	0.00165	0.0005	0.002	NE	J		095725-009	SW846 6020
	Potassium	4.35	0.080	0.300	NE		J	095725-009	SW846 6020
	Selenium	0.00227	0.0015	0.005	0.050	J		095725-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095725-009	SW846 6020
	Sodium	65.4	0.400	1.25	NE			095725-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095725-009	SW846 6020
	Uranium	0.00236	0.000067	0.0002	0.03			095725-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095725-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095725-009	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-7 *(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 2014

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		095730-009	SW846 6020
08-Apr-14	Antimony	ND	0.001	0.003	0.006	U		095730-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095730-009	SW846 6020
	Barium	0.0429	0.0006	0.002	2.00			095730-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095730-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095730-009	SW846 6020
	Calcium	80.1	0.300	1.00	NE			095730-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095730-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		095730-009	SW846 6020
	Copper	0.000586	0.00035	0.001	NE	J	0.0038U	095730-009	SW846 6020
	Iron	0.132	0.033	0.100	NE			095730-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095730-009	SW846 6020
	Magnesium	14.1	0.010	0.030	NE		J	095730-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095730-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095730-009	SW846 7470
	Nickel	0.00156	0.0005	0.002	NE	J		095730-009	SW846 6020
	Potassium	1.19	0.080	0.300	NE		J	095730-009	SW846 6020
	Selenium	0.00409	0.0015	0.005	0.050	J		095730-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095730-009	SW846 6020
	Sodium	46.1	0.080	0.250	NE			095730-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095730-009	SW846 6020
	Uranium	0.00534	0.000067	0.0002	0.03			095730-009	SW846 6020
	Vanadium	0.00997	0.001	0.005	NE			095730-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095730-009	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-7 *(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 2014

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		095731-009	SW846 6020
08-Apr-14	Antimony	ND	0.001	0.003	0.006	U		095731-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095731-009	SW846 6020
	Barium	0.0435	0.0006	0.002	2.00			095731-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095731-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095731-009	SW846 6020
	Calcium	75.5	0.300	1.00	NE			095731-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095731-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		095731-009	SW846 6020
	Copper	0.000483	0.00035	0.001	NE	J	0.0038U	095731-009	SW846 6020
	Iron	0.130	0.033	0.100	NE			095731-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095731-009	SW846 6020
	Magnesium	14.7	0.010	0.030	NE		J	095731-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095731-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095731-009	SW846 7470
	Nickel	0.00169	0.0005	0.002	NE	J		095731-009	SW846 6020
	Potassium	1.22	0.080	0.300	NE		J	095731-009	SW846 6020
	Selenium	0.00414	0.0015	0.005	0.050	J		095731-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095731-009	SW846 6020
	Sodium	43.1	0.080	0.250	NE			095731-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095731-009	SW846 6020
	Uranium	0.00535	0.000067	0.0002	0.03			095731-009	SW846 6020
	Vanadium	0.00977	0.001	0.005	NE			095731-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095731-009	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-7 *(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 2014

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	0.0221	0.015	0.050	NE	J		096269-009	SW846 6020
22-Jul-14	Antimony	ND	0.001	0.003	0.006	U		096269-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096269-R09	SW846 6020
	Barium	0.00231	0.0006	0.002	2.00			096269-009	SW846 6020
	Beryllium	0.000515	0.0002	0.0005	0.004	N	J+	096269-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096269-009	SW846 6020
	Calcium	48.9	0.060	0.200	NE	B		096269-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096269-009	SW846 6020
	Cobalt	0.000119	0.0001	0.001	NE	J		096269-009	SW846 6020
	Copper	0.000491	0.00035	0.001	NE	J	0.0031U	096269-009	SW846 6020
	Iron	0.0928	0.033	0.100	NE	J		096269-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096269-009	SW846 6020
	Magnesium	10.0	0.010	0.030	NE			096269-009	SW846 6020
	Manganese	0.00249	0.001	0.005	NE	J		096269-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096269-009	SW846 7470
	Nickel	0.000908	0.0005	0.002	NE	J		096269-009	SW846 6020
	Potassium	4.12	0.080	0.300	NE			096269-009	SW846 6020
	Selenium	0.00196	0.0015	0.005	0.050	J		096269-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096269-009	SW846 6020
	Sodium	62.4	0.400	1.25	NE			096269-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096269-009	SW846 6020
	Uranium	0.00249	0.000067	0.0002	0.03			096269-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U	UJ	096269-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096269-009	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-7 *(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 2014

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	0.025	0.015	0.050	NE	J		096270-009	SW846 6020
22-Jul-14	Antimony	ND	0.001	0.003	0.006	U		096270-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096270-R09	SW846 6020
	Barium	0.00233	0.0006	0.002	2.00			096270-009	SW846 6020
	Beryllium	0.000546	0.0002	0.0005	0.004	N	J+	096270-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096270-009	SW846 6020
	Calcium	49.2	0.300	1.00	NE	B		096270-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096270-009	SW846 6020
	Cobalt	0.000122	0.0001	0.001	NE	J		096270-009	SW846 6020
	Copper	0.000512	0.00035	0.001	NE	J	0.0031U	096270-009	SW846 6020
	Iron	0.0958	0.033	0.100	NE	J		096270-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096270-009	SW846 6020
	Magnesium	10.2	0.010	0.030	NE			096270-009	SW846 6020
	Manganese	0.00273	0.001	0.005	NE	J		096270-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096270-009	SW846 7470
	Nickel	0.00104	0.0005	0.002	NE	J		096270-009	SW846 6020
	Potassium	3.83	0.080	0.300	NE			096270-009	SW846 6020
	Selenium	0.00195	0.0015	0.005	0.050	J		096270-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096270-009	SW846 6020
	Sodium	61.6	0.400	1.25	NE			096270-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096270-009	SW846 6020
	Uranium	0.00267	0.000067	0.0002	0.03			096270-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U	UJ	096270-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096270-009	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-7 *(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 2014

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		096263-009	SW846 6020
21-Jul-14	Antimony	ND	0.001	0.003	0.006	U		096263-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096263-009	SW846 6020
	Barium	0.0471	0.0006	0.002	2.00			096263-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	N, U		096263-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096263-009	SW846 6020
	Calcium	75.7	0.300	1.00	NE	B		096263-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096263-009	SW846 6020
	Cobalt	0.000106	0.0001	0.001	NE	J		096263-009	SW846 6020
	Copper	0.000665	0.00035	0.001	NE	J		096263-009	SW846 6020
	Iron	0.119	0.033	0.100	NE			096263-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096263-009	SW846 6020
	Magnesium	14.6	0.010	0.030	NE			096263-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096263-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096263-009	SW846 7470
	Nickel	0.00103	0.0005	0.002	NE	J		096263-009	SW846 6020
	Potassium	1.18	0.080	0.300	NE			096263-009	SW846 6020
	Selenium	0.00395	0.0015	0.005	0.050	J		096263-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096263-009	SW846 6020
	Sodium	47.0	0.400	1.25	NE			096263-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096263-009	SW846 6020
	Uranium	0.00587	0.000067	0.0002	0.03			096263-009	SW846 6020
	Vanadium	0.00981	0.001	0.005	NE			096263-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096263-009	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-7 *(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 2014

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	0.0199	0.015	0.050	NE	J		096685-010	SW846 6020
13-Oct-14	Antimony	ND	0.001	0.003	0.006	U		096685-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096685-010	SW846 6020
	Barium	0.00193	0.0006	0.002	2.00	J		096685-010	SW846 6020
	Beryllium	0.000467	0.0002	0.0005	0.004	J		096685-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096685-010	SW846 6020
	Calcium	54.0	0.300	1.00	NE			096685-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096685-010	SW846 6020
	Cobalt	0.0001	0.0001	0.001	NE	J		096685-010	SW846 6020
	Copper	0.000509	0.00035	0.001	NE	J		096685-010	SW846 6020
	Iron	0.0617	0.033	0.100	NE	J		096685-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096685-010	SW846 6020
	Magnesium	10.6	0.010	0.030	NE			096685-010	SW846 6020
	Manganese	0.00221	0.001	0.005	NE	J		096685-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096685-010	SW846 7470
	Nickel	0.000673	0.0005	0.002	NE	J		096685-010	SW846 6020
	Potassium	4.36	0.080	0.300	NE			096685-010	SW846 6020
	Selenium	0.00207	0.0015	0.005	0.050	J		096685-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096685-010	SW846 6020
	Sodium	67.3	0.400	1.25	NE			096685-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096685-010	SW846 6020
	Uranium	0.00249	0.000067	0.0002	0.03			096685-010	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		096685-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096685-010	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-7 *(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 2014

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		096691-010	SW846 6020
14-Oct-14	Antimony	ND	0.001	0.003	0.006	U		096691-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096691-010	SW846 6020
	Barium	0.0464	0.0006	0.002	2.00			096691-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096691-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096691-010	SW846 6020
	Calcium	84.1	0.300	1.00	NE			096691-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096691-010	SW846 6020
	Cobalt	0.000106	0.0001	0.001	NE	J		096691-010	SW846 6020
	Copper	0.000561	0.00035	0.001	NE	J	0.0042U	096691-010	SW846 6020
	Iron	0.0812	0.033	0.100	NE	J		096691-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096691-010	SW846 6020
	Magnesium	15.6	0.010	0.030	NE			096691-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096691-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096691-010	SW846 7470
	Nickel	0.00086	0.0005	0.002	NE	J		096691-010	SW846 6020
	Potassium	1.33	0.080	0.300	NE			096691-010	SW846 6020
	Selenium	0.00418	0.0015	0.005	0.050	J		096691-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096691-010	SW846 6020
	Sodium	52.3	0.400	1.25	NE			096691-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096691-010	SW846 6020
	Uranium	0.00585	0.000067	0.0002	0.03			096691-010	SW846 6020
	Vanadium	0.00999	0.001	0.005	NE			096691-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096691-010	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-7 *(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 2014

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		096692-010	SW846 6020
14-Oct-14	Antimony	ND	0.001	0.003	0.006	U		096692-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096692-010	SW846 6020
	Barium	0.0458	0.0006	0.002	2.00			096692-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096692-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096692-010	SW846 6020
	Calcium	82.1	0.300	1.00	NE			096692-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096692-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		096692-010	SW846 6020
	Copper	0.000569	0.00035	0.001	NE	J	0.0042U	096692-010	SW846 6020
	Iron	0.0814	0.033	0.100	NE	J		096692-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096692-010	SW846 6020
	Magnesium	15.5	0.010	0.030	NE			096692-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096692-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096692-010	SW846 7470
	Nickel	0.00087	0.0005	0.002	NE	J		096692-010	SW846 6020
	Potassium	1.31	0.080	0.300	NE			096692-010	SW846 6020
	Selenium	0.00385	0.0015	0.005	0.050	J		096692-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096692-010	SW846 6020
	Sodium	50.7	0.400	1.25	NE			096692-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096692-010	SW846 6020
	Uranium	0.00611	0.000067	0.0002	0.03			096692-010	SW846 6020
	Vanadium	0.0107	0.001	0.005	NE			096692-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096692-010	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-8
Summary of Cation Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	46.8	0.060	0.200	NE			095213-017	SW846 6020
27-Jan-14	Magnesium	10.9	0.010	0.030	NE			095213-017	SW846 6020
	Potassium	4.12	0.080	0.300	NE		J	095213-017	SW846 6020
	Sodium	65.2	0.400	1.25	NE			095213-017	SW846 6020
CCBA-MW1 (Duplicate)	Calcium	46.9	0.060	0.200	NE			095214-017	SW846 6020
27-Jan-14	Magnesium	11.3	0.010	0.030	NE			095214-017	SW846 6020
	Potassium	4.26	0.080	0.300	NE		J	095214-017	SW846 6020
	Sodium	62.3	0.400	1.25	NE			095214-017	SW846 6020
CCBA-MW2	Calcium	79.8	0.600	2.00	NE			095208-017	SW846 6020
23-Jan-14	Magnesium	15.8	0.010	0.030	NE			095208-017	SW846 6020
	Potassium	1.48	0.080	0.300	NE			095208-017	SW846 6020
	Sodium	48.3	0.080	0.250	NE			095208-017	SW846 6020
CCBA-MW1	Calcium	48.2	0.060	0.200	NE			095725-017	SW846 6020
07-Apr-14	Magnesium	10.5	0.050	0.150	NE			095725-017	SW846 6020
	Potassium	4.34	0.080	0.300	NE	N		095725-017	SW846 6020
	Sodium	61.1	0.400	1.25	NE			095725-017	SW846 6020
CCBA-MW2	Calcium	75.5	0.300	1.00	NE			095730-017	SW846 6020
08-Apr-14	Magnesium	15.5	0.050	0.150	NE			095730-017	SW846 6020
	Potassium	1.22	0.080	0.300	NE	N		095730-017	SW846 6020
	Sodium	48.2	0.080	0.250	NE			095730-017	SW846 6020
CCBA-MW2 (Duplicate)	Calcium	78.4	0.300	1.00	NE			095731-017	SW846 6020
08-Apr-14	Magnesium	16.5	0.050	0.150	NE			095731-017	SW846 6020
	Potassium	1.29	0.080	0.300	NE	N		095731-017	SW846 6020
	Sodium	49.2	0.080	0.250	NE			095731-017	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-8 *(Concluded)*
Summary of Cation Results,
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	49.2	0.060	0.200	NE	B		096269-017	SW846 6020
22-Jul-14	Magnesium	9.98	0.010	0.030	NE			096269-017	SW846 6020
	Potassium	4.20	0.080	0.300	NE			096269-017	SW846 6020
	Sodium	62.7	0.400	1.25	NE			096269-017	SW846 6020
CCBA-MW1 (Duplicate)	Calcium	48.4	0.060	0.200	NE	B		096270-017	SW846 6020
22-Jul-14	Magnesium	9.94	0.010	0.030	NE			096270-017	SW846 6020
	Potassium	4.03	0.080	0.300	NE			096270-017	SW846 6020
	Sodium	63.3	0.400	1.25	NE			096270-017	SW846 6020
CCBA-MW2	Calcium	75.7	0.300	1.00	NE	B		096263-017	SW846 6020
21-Jul-14	Magnesium	14.7	0.010	0.030	NE			096263-017	SW846 6020
	Potassium	1.24	0.080	0.300	NE			096263-017	SW846 6020
	Sodium	45.0	0.080	0.250	NE			096263-017	SW846 6020
CCBA-MW1	Calcium	54.1	0.300	1.00	NE			096685-017	SW846 6020
13-Oct-14	Magnesium	10.7	0.010	0.030	NE			096685-017	SW846 6020
	Potassium	4.41	0.080	0.300	NE			096685-017	SW846 6020
	Sodium	69.9	0.400	1.25	NE			096685-017	SW846 6020
CCBA-MW2	Calcium	83.2	0.300	1.00	NE			096691-017	SW846 6020
14-Oct-14	Magnesium	15.5	0.010	0.030	NE			096691-017	SW846 6020
	Potassium	1.30	0.080	0.300	NE			096691-017	SW846 6020
	Sodium	53.2	0.400	1.25	NE			096691-017	SW846 6020
CCBA-MW2 (Duplicate)	Calcium	81.1	0.300	1.00	NE			096692-017	SW846 6020
14-Oct-14	Magnesium	15.5	0.010	0.030	NE			096692-017	SW846 6020
	Potassium	1.30	0.080	0.300	NE			096692-017	SW846 6020
	Sodium	52.0	0.400	1.25	NE			096692-017	SW846 6020

Refer to footnotes on page 8A-33.

Table 8A-9
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 2014

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 27-Jan-14	Americium-241	5.62 ± 9.02	12.9	6.36	NE	U	BD	095213-033	EPA 901.1
	Cesium-137	3.01 ± 2.47	3.75	1.82	NE	U	BD	095213-033	EPA 901.1
	Cobalt-60	0.932 ± 3.25	4.17	2.00	NE	U	BD	095213-033	EPA 901.1
	Potassium-40	-26.2 ± 36.4	46.5	22.5	NE	U	BD	095213-033	EPA 901.1
	Gross Alpha	2.26	NA	NA	15 pCi/L	NA	None	095213-034	EPA 900.0
	Gross Beta	3.71 ± 0.996	0.998	0.472	4mrem/yr		J	095213-034	EPA 900.0
CCBA-MW1 (Duplicate) 27-Jan-14	Americium-241	14.5 ± 16.6	23.5	11.6	NE	U	BD	095214-033	EPA 901.1
	Cesium-137	0.440 ± 3.99	3.53	1.71	NE	U	BD	095214-033	EPA 901.1
	Cobalt-60	-0.767 ± 2.12	3.58	1.71	NE	U	BD	095214-033	EPA 901.1
	Potassium-40	0.575 ± 39.0	46.4	22.3	NE	U	BD	095214-033	EPA 901.1
	Gross Alpha	0.74	NA	NA	15 pCi/L	NA	None	095214-034	EPA 900.0
	Gross Beta	2.65 ± 0.898	0.993	0.464	4mrem/yr		J	095214-034	EPA 900.0
CCBA-MW2 23-Jan-14	Americium-241	0.728 ± 11.4	17.6	8.66	NE	U	BD	095208-033	EPA 901.1
	Cesium-137	0.523 ± 3.10	4.00	1.94	NE	U	BD	095208-033	EPA 901.1
	Cobalt-60	0.374 ± 2.05	3.62	1.72	NE	U	BD	095208-033	EPA 901.1
	Potassium-40	17.5 ± 48.8	34.6	16.3	NE	U	BD	095208-033	EPA 901.1
	Gross Alpha	5.17	NA	NA	15 pCi/L	NA	None	095208-034	EPA 900.0
	Gross Beta	1.88 ± 0.793	0.994	0.469	4mrem/yr		J	095208-034	EPA 900.0

Refer to footnotes on page 8A-33.

Table 8A-9 *(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 2014

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	7.72 ± 15.7	24.5	12.0	NE	U	BD	095725-033	EPA 901.1
07-Apr-14	Cesium-137	2.57 ± 2.51	3.52	1.70	NE	U	BD	095725-033	EPA 901.1
	Cobalt-60	-1.22 ± 2.11	3.54	1.68	NE	U	BD	095725-033	EPA 901.1
	Potassium-40	-6.16 ± 36.7	51.3	24.7	NE	U	BD	095725-033	EPA 901.1
	Gross Alpha	3.48	NA	NA	15 pCi/L	NA	None	095725-034	EPA 900.0
	Gross Beta	5.06 ± 1.12	1.01	0.488	4mrem/yr		J	095725-034	EPA 900.0
CCBA-MW2	Americium-241	-57.8 ± 27.4	8.01	3.95	NE	U	R	095730-033	EPA 901.1
08-Apr-14	Cesium-137	-2.73 ± 3.65	4.80	2.32	NE	U	BD	095730-033	EPA 901.1
	Cobalt-60	0.494 ± 2.99	5.25	2.50	NE	U	BD	095730-033	EPA 901.1
	Potassium-40	-18.5 ± 52.6	59.1	28.3	NE	U	BD	095730-033	EPA 901.1
	Gross Alpha	4.55	NA	NA	15 pCi/L	NA	None	095730-034	EPA 900.0
	Gross Beta	3.17 ± 0.927	0.992	0.468	4mrem/yr			095730-034	EPA 900.0
CCBA-MW2 (Duplicate)	Americium-241	0.491 ± 18.4	29.4	14.4	NE	U	BD	095731-033	EPA 901.1
08-Apr-14	Cesium-137	-0.13 ± 2.43	3.69	1.77	NE	U	BD	095731-033	EPA 901.1
	Cobalt-60	0.956 ± 2.48	4.40	2.08	NE	U	BD	095731-033	EPA 901.1
	Potassium-40	-37.7 ± 46.9	49.5	23.5	NE	U	BD	095731-033	EPA 901.1
	Gross Alpha	8.82	NA	NA	15 pCi/L	NA	None	095731-034	EPA 900.0
	Gross Beta	2.60 ± 0.882	0.993	0.464	4mrem/yr		J	095731-034	EPA 900.0

Refer to footnotes on page 8A-33.

Table 8A-9 *(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 2014

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	-17.1 ± 23.0	21.3	10.4	NE	U	BD	096269-033	EPA 901.1
22-Jul-14	Cesium-137	1.71 ± 2.14	3.60	1.73	NE	U	BD	096269-033	EPA 901.1
	Cobalt-60	-2.88 ± 2.53	3.39	1.58	NE	U	BD	096269-033	EPA 901.1
	Potassium-40	17.6 ± 43.4	35.2	16.5	NE	U	BD	096269-033	EPA 901.1
	Gross Alpha	1.66	NA	NA	15 pCi/L	NA	None	096269-034	EPA 900.0
	Gross Beta	4.62 ± 1.18	1.27	0.610	4mrem/yr		7.5U	096269-034	EPA 900.0
CCBA-MW1 (Duplicate)	Americium-241	4.90 ± 5.91	8.67	4.25	NE	U	BD	096270-033	EPA 901.1
22-Jul-14	Cesium-137	-0.163 ± 1.64	2.86	1.38	NE	U	BD	096270-033	EPA 901.1
	Cobalt-60	-0.92 ± 2.13	3.05	1.45	NE	U	BD	096270-033	EPA 901.1
	Potassium-40	26.1 ± 51.0	28.0	13.2	NE	U	BD	096270-033	EPA 901.1
	Gross Alpha	0.79	NA	NA	15 pCi/L	NA	None	096270-034	EPA 900.0
	Gross Beta	4.91 ± 1.26	1.39	0.672	4mrem/yr		7.5U	096270-034	EPA 900.0
CCBA-MW2	Americium-241	-8.17 ± 6.90	9.26	4.53	NE	U	BD	096263-033	EPA 901.1
21-Jul-14	Cesium-137	1.84 ± 1.54	2.62	1.26	NE	U	BD	096263-033	EPA 901.1
	Cobalt-60	0.0694 ± 1.84	2.88	1.35	NE	U	BD	096263-033	EPA 901.1
	Potassium-40	-35.1 ± 35.9	37.7	18.0	NE	U	BD	096263-033	EPA 901.1
	Gross Alpha	4.65	NA	NA	15 pCi/L	NA	None	096263-034	EPA 900.0
	Gross Beta	3.93 ± 1.05	1.15	0.550	4mrem/yr			096263-034	EPA 900.0

Refer to footnotes on page 8A-33.

Table 8A-9 *(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 2014

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	7.63 ± 11.7	17.6	8.62	NE	U	BD	096685-033	EPA 901.1
13-Oct-14	Cesium-137	0.457 ± 2.06	3.54	1.70	NE	U	BD	096685-033	EPA 901.1
	Cobalt-60	1.33 ± 2.06	3.64	1.72	NE	U	BD	096685-033	EPA 901.1
	Potassium-40	-11.5 ± 36.2	46.2	22.1	NE	U	BD	096685-033	EPA 901.1
	Gross Alpha	1.62	NA	NA	15 pCi/L	NA	None	096685-034	EPA 900.0
	Gross Beta	4.88 ± 1.38	1.70	0.825	4mrem/yr		J	096685-034	EPA 900.0
CCBA-MW2	Americium-241	0.919 ± 25.1	29.1	14.2	NE	U	BD	096691-033	EPA 901.1
14-Oct-14	Cesium-137	0.105 ± 2.17	3.90	1.86	NE	U	BD	096691-033	EPA 901.1
	Cobalt-60	1.51 ± 2.28	4.20	1.96	NE	U	BD	096691-033	EPA 901.1
	Potassium-40	-3.67 ± 47.9	52.9	25.0	NE	U	BD	096691-033	EPA 901.1
	Gross Alpha	5.39	NA	NA	15 pCi/L	NA	None	096691-034	EPA 900.0
	Gross Beta	2.76 ± 1.04	1.44	0.694	4mrem/yr		J	096691-034	EPA 900.0
CCBA-MW2 (Duplicate)	Americium-241	4.06 ± 5.66	7.89	3.88	NE	U	BD	096692-033	EPA 901.1
14-Oct-14	Cesium-137	-2.89 ± 3.47	5.28	2.53	NE	U	BD	096692-033	EPA 901.1
	Cobalt-60	-3.78 ± 5.01	6.16	2.90	NE	U	BD	096692-033	EPA 901.1
	Potassium-40	-8.69 ± 55.1	68.6	32.5	NE	U	BD	096692-033	EPA 901.1
	Gross Alpha	6.61	NA	NA	15 pCi/L	NA	None	096692-034	EPA 900.0
	Gross Beta	1.22 ± 0.997	1.62	0.783	4mrem/yr	U	BD	096692-034	EPA 900.0

Refer to footnotes on page 8A-33.

Table 8A-10
Summary of Field Water Quality Measurements[h],
Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	27-Jan-14	13.53	395.0	324.6	6.76	0.49	32.3	3.45
CCBA-MW2	23-Jan-14	12.09	439.4	299.0	7.69	0.29	58.2	6.26
CCBA-MW1	07-Apr-14	15.68	452.5	194.3	6.70	1.19	32.4	3.21
CCBA-MW2	08-Apr-14	16.18	531.1	184.3	7.63	0.23	64.9	6.37
CCBA-MW1	22-Jul-14	20.12	490.2	299.6	6.57	0.41	34.1	3.07
CCBA-MW2	21-Jul-14	18.87	550.2	322.4	7.53	0.17	68.0	6.28
CCBA-MW1	13-Oct-14	16.10	481.5	305.4	6.42	0.32	33.3	3.28
CCBA-MW2	14-Oct-14	16.52	559.0	297.4	7.38	0.16	63.6	6.20

Refer to footnotes on page 8A-33.

This page intentionally left blank.

Footnotes for Solid Waste Management Units 8/58 Analytical Results Tables

% = Percent.
CCBA = Coyote Canyon Blast Area.
CFR = Code of Federal Regulations.
EPA = U.S. Environmental Protection Agency.
HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
ID = Identification.
µg/L = Micrograms per liter.
mg/L = Milligrams per liter.
mrem/yr = Millirem per year.
MW = Monitoring well.
No. = Number.
pCi/L = Picocuries per liter.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
SWMU = Solid Waste Management Unit.
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-8. MDA applies to Table 8A-9.
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-4 through 8A-8. Critical level applies to Table 8A-9.
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.

Footnotes for Solid Waste Management Units 8/58 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.
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.
None = No data validation for corrected gross alpha activity.
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, "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.

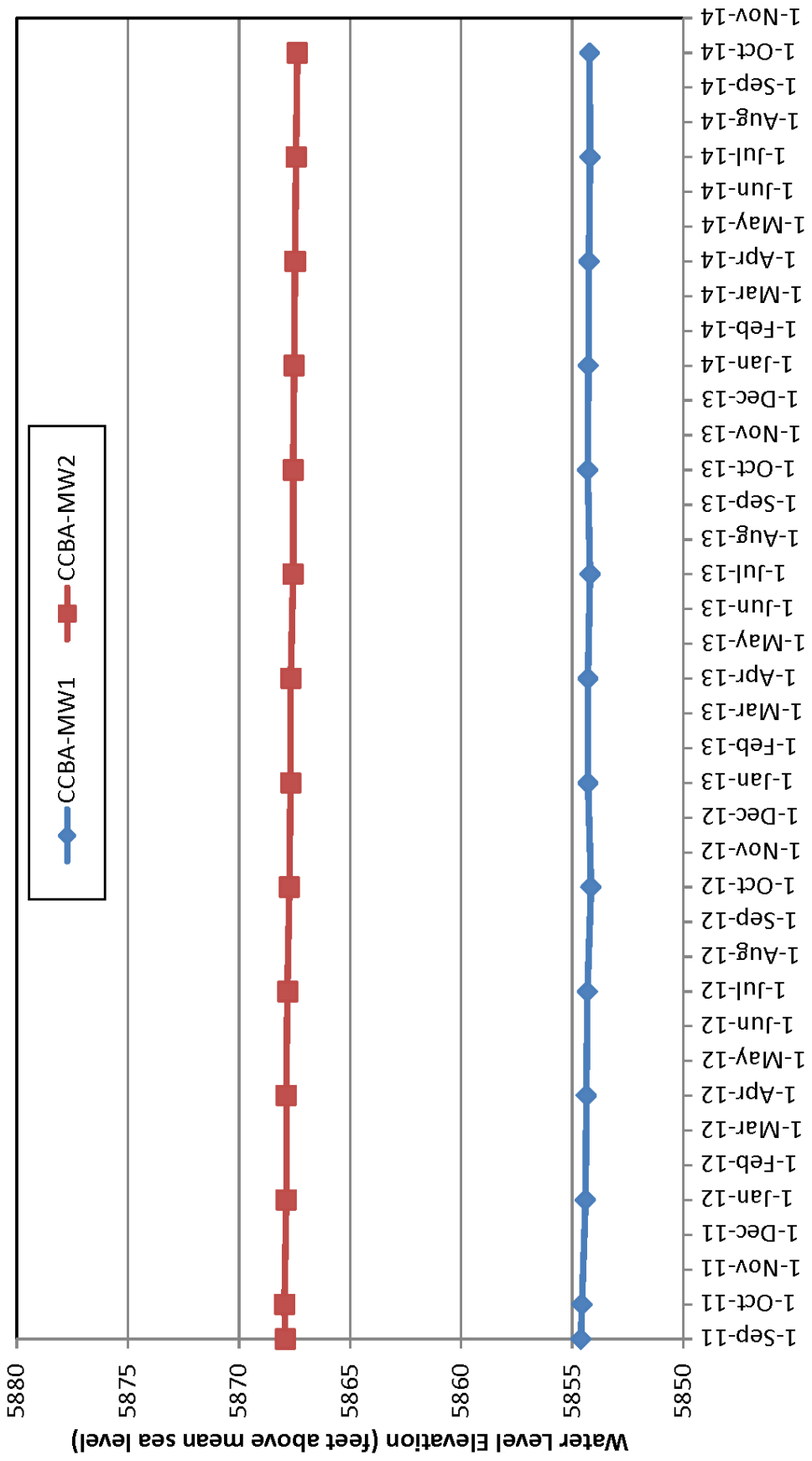


Figure 8C-1. SWMUs 8/58 Study Area Wells

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).

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 U.S. Department of Energy (DOE)/National Nuclear Security Administration (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 (shown as SWMU 49A in Figure 9-1) 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 (shown as SWMU 49B in Figure 9-1) 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.

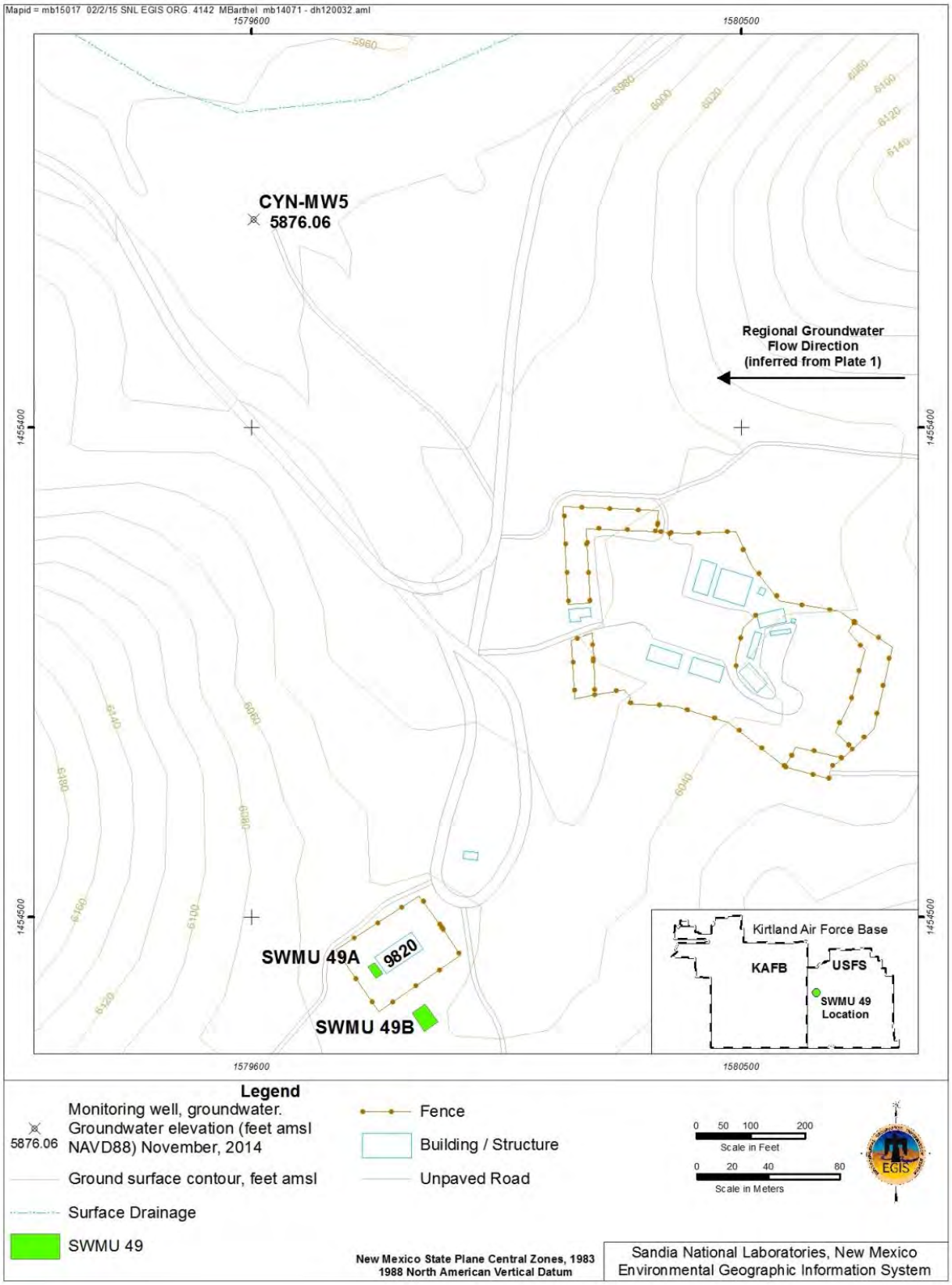


Figure 9-1. Location and Groundwater Elevation at SWMU 49

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
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
January	2014	Well CYN-MW5 sampled as part of LTS.	SNL January 2014

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 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 stormwater 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 May 2004) and the results were submitted to the New Mexico Environment Department (NMED) in the SNL/NM Environmental Restoration (ER) Project response to the third Request for Supplemental Information (SNL June 2005).

Following the May 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 2014 Activities

The following activities took place for the SWMU 49 investigation during Calendar Year (CY) 2014 (January through December 2014):

- Annual groundwater sampling was conducted at monitoring well CYN-MW5 in January 2014.
- 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

NMED approved completion of corrective action at SWMU 49 in conjunction with renewal of the Resource Conservation and Recovery Act (RCRA) Facility Operating Permit (Permit) (NMED December 2014). No long-term controls are needed and no future sampling activities are planned at SWMU 49.

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 1914 through 2013 was 8.65 inches per year (WRCC-DRI 2015). 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, resulting in minimal groundwater recharge. 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 Corporation (Sandia) personnel 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

Well ID	Ground Surface Elevation (ft amsl)	Depth of Screened Interval (ft bgs)	Elevation for Top of Screen (ft amsl)	Potentiometric Surface, November 2014 (ft amsl)	Mid-Point Screen Elevation (ft amsl)	Approximate Pressure Head (ft[a])
CYN-MW5	5,981.30	135 – 155	5,846.30	5,876.06	5,836.30	40

NOTES:
[a]From mid-point of screen.
amsl = Above mean sea level.
bgs = Below ground surface.
CYN = Canyons.
ft = Foot (feet).
ID = Identification.
MW = Monitoring Well.
SWMU = Solid Waste Management Unit.

The November 2014 groundwater elevation at monitoring well CYN-MW5 was 5,806 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.

9.1.7.3 Local Direction of Flow

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. In November 2014, the potentiometric surface at monitoring well CYN-MW5 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 of Attachment 9B) shows that significant water level increases only occurred twice in the last 10 years. During 2002 through 2014, 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.

9.1.7.4 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.

9.1.7.5 Contaminant Distribution and Transport in Groundwater

No COCs exceed the applicable U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) (EPA May 2009) in the CY 2014 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 regulations mandated by the 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* (EPA August 1993). All corrective action requirements pertaining to SWMUs and AOCs are contained in the Compliance Order on Consent (the Consent Order) (NMED April 2004) between the DOE, Sandia, and NMED.

The DOE/NNSA and Sandia received a letter from the NMED dated 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* (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 Consent 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 Consent Order, as specified in Section III.A of the Consent 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.

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 9-3. Groundwater Monitoring Well Network and Sampling Date for SWMU 49, Calendar Year 2014

Date of Sampling Event	Wells Sampled	SAP
January 2014	CYN-MW5	*SWMU 49 and 116 Groundwater Monitoring, Mini-SAP for Fiscal Year 2014 Annual Sampling* (SNL January 2014)

NOTES:
CYN = Canyons.
MW = Monitoring Well.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories.
SWMU = Solid Waste Management Unit.

Table 9-4. Parameters Sampled at SWMU 49

Parameter	January 2013
Alkalinity (total, bicarbonate, carbonate)	CYN-MW5
Anions	
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.
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 2014 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 2.20 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 radiological screening tool and in accordance with 40 Code of Federal Regulations; Parts 9, 141, and 142; and Table I-4 should not include uranium. Naturally occurring uranium is measured independently (i.e., total uranium concentration determined by metals analysis described above) and the gross alpha activity measurements are corrected by subtracting the total uranium activity from the uncorrected gross alpha activity results. Radiological results are further reviewed by an SNL/NM 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.

No VOCs were detected above laboratory MDLs in any TB sample.

The compounds detected in the FB sample included bromodichloromethane, bromoform, chloroform, and dibromochloromethane. No corrective action was required because these compounds were not detected in the environmental 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 January 2014) occurred during CY 2014 sampling activities.

Although some analytical results were qualified during the data validation process, no significant data quality problems were noted, and all data are determined as acceptable and reported QC measures appear adequate. 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, and the current conceptual site model.

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 2014. 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 May 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 monitoring at SWMU 49 will be discontinued. NMED approved completion of corrective action at SWMU 49 in conjunction with renewal of the Permit (NMED December 2014). No long-term controls are needed, and no future sampling activities are planned at SWMU 49.

9.10 References

EPA May 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 August 1993 U.S. Environmental Protection Agency (EPA) August 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,* Region 6, U.S. Environmental Protection Agency, Dallas, Texas.

NMED December 2014 New Mexico Environment Department (NMED), December 2014. *Final Order, State of New Mexico Before the Secretary of the Environment in the Matter of the Renewal of Hazardous Waste Permit EPA ID Number NM5890110518 and Granting of Corrective Action Complete Status for Certain Solid Waste Management Units and Areas of Concern at Sandia National Laboratories*. No. HWB 14-01(P). New Mexico Environment Department, 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.

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.

SNL January 2014 Sandia National Laboratories, New Mexico (SNL/NM), January 2014. *SWMU 49 and 116 Groundwater Monitoring, Mini-SAP for Fiscal Year 2014 Annual Sampling*. Environmental Restoration Operations, Sandia National Laboratories, New Mexico, January 14.

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 49 Operable Unit 1295 Building 9820 Drains (Lurance Canyon) ,* 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 2015 Western Regional Climate Center - Desert Research Institute, 2015. *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 2013*, http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?nmalbu. Accessed January 13, 2015.

This page intentionally left blank.

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 SW846-8260B), Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 9A-5

9A-2 Method Detection Limits for High Explosive Compounds (EPA Method SW846-8321A), Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 9A-6

9A-3 Summary of Nitrate plus Nitrite Results, Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 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 2014 ..... 9A-8

9A-5 Summary of Perchlorate Results, Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 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 2014 ..... 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 2014 ..... 9A-11

9A-8 Summary of Field Water Quality Measurements, Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 9A-12

Footnotes for Solid Waste Management Unit 49 Analytical Results Tables 9A-13

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 2014

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-13.

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 2014

Analyte	MDL[b] (µg/L)
1,3,5-Trinitrobenzene	0.0838
1,3-Dinitrobenzene	0.0838
2,4,6-Trinitrotoluene	0.0838
2,4-Dinitrotoluene	0.0838
2,6-Dinitrotoluene	0.0838
2-Amino-4,6-dinitrotoluene	0.0838
2-Nitrotoluene	0.0859
3-Nitrotoluene	0.0838
4-Amino-2,6-dinitrotoluene	0.0838
4-Nitrotoluene	0.157
HMX	0.0838
Nitro-benzene	0.0838
Pentaerythritol tetranitrate	0.105
RDX	0.0838
Tetryl	0.0838

Refer to footnotes on page 9A-13.

Table 9A-3
Summary of Nitrate plus Nitrite Results,
Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 28-Jan-14	Nitrate plus nitrite	2.20	0.085	0.250	10.0			095241-018	EPA 353.2

Refer to footnotes on page 9A-13.

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 2014

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	149	0.725	1.00	NE			095241-022	SM2320B
28-Jan-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095241-022	SM2320B
	Bromide	0.160	0.067	0.200	NE	J		095241-016	SW846 9056
	Chloride	15.7	0.134	0.400	NE			095241-016	SW846 9056
	Fluoride	0.334	0.033	0.100	4.0			095241-016	SW846 9056
	Sulfate	27.7	0.266	0.800	NE			095241-016	SW846 9056
	Calcium	56.3	0.600	2.00	NE	B		095241-017	SW846 6020
	Magnesium	10.4	0.010	0.030	NE			095241-017	SW846 6020
	Potassium	2.49	0.080	0.300	NE			095241-017	SW846 6020
	Sodium	14.4	0.080	0.250	NE		J	095241-017	SW846 6020
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	095241-027	SW846 9012B

Refer to footnotes on page 9A-13.

Table 9A-5
Summary of Perchlorate Results,
Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 28-Jan-14	ND	0.004	0.012	NE	U	UJ	095241-020	EPA 314.0

Refer to footnotes on page 9A-13.

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 2014

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	0.0633	0.015	0.050	NE			095241-009	SW846 6020
28-Jan-14	Antimony	ND	0.001	0.003	0.006	U		095241-009	SW846 6020
	Arsenic	0.00538	0.0017	0.005	0.010			095241-009	SW846 6020
	Barium	0.172	0.0006	0.002	2.00			095241-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095241-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095241-009	SW846 6020
	Calcium	58.1	0.600	2.00	NE	B		095241-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095241-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		095241-009	SW846 6020
	Copper	0.000646	0.00035	0.001	NE	J		095241-009	SW846 6020
	Iron	0.214	0.033	0.100	NE			095241-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095241-009	SW846 6020
	Magnesium	10.7	0.010	0.030	NE			095241-009	SW846 6020
	Manganese	0.00131	0.001	0.005	NE	J		095241-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095241-009	SW846 7470
	Nickel	0.00185	0.0005	0.002	NE	J		095241-009	SW846 6020
	Potassium	2.55	0.080	0.300	NE			095241-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		095241-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095241-009	SW846 6020
	Sodium	15.5	0.080	0.250	NE		J	095241-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095241-009	SW846 6020
	Uranium	0.000723	0.000067	0.0002	0.03			095241-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095241-009	SW846 6010
	Zinc	0.00534	0.0035	0.010	NE	B, J	0.018U	095241-009	SW846 6020

Refer to footnotes on page 9A-13.

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 2014

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	-0.975 ± 10.2	17.2	8.47	NE	U	BD	095241-033	EPA 901.1
28-Jan-14	Cesium-137	1.78 ± 2.03	3.28	1.59	NE	U	BD	095241-033	EPA 901.1
	Cobalt-60	-1.24 ± 1.97	3.15	1.50	NE	U	BD	095241-033	EPA 901.1
	Potassium-40	-19 ± 32.1	44.0	21.2	NE	U	BD	095241-033	EPA 901.1
	Gross Alpha	0.374	NA	NA	15 pCi/L	NA	None	095241-034	EPA 900.0
	Gross Beta	3.96 ± 1.04	0.987	0.464	NE		J	095241-034	EPA 900.0

Refer to footnotes on page 9A-13.

Table 9A-8
Summary of Field Water Quality Measurements[h],
Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	28-Jan-14	14.40	275.5	340.5	6.15	1.32	46.4	4.73

Refer to footnotes on page 9A-13.

Footnotes for Solid Waste Management Unit 49 Analytical Results Tables

% = Percent.
CFR = Code of Federal Regulations.
CYN = Canyons.
EPA = U.S .Environmental Protection Agency.
HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
ID = Identification.
μg/L = Micrograms per liter.
mg/L = Milligrams per liter.
MW = Monitoring well.
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

Values in **bold** exceed the established MCL.
Activities of zero or less are considered to be not detected.
Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 1-4)
ND = Not detected (at method detection limit).

[b]MDL or MDA

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

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:

- 15 pCi/L = Gross alpha particle activity, excluding total uranium (40 CFR Parts 9, 141, and 142, Table 1-4).
- 4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (as dose rate).

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.
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.
UJ = 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, 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 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.

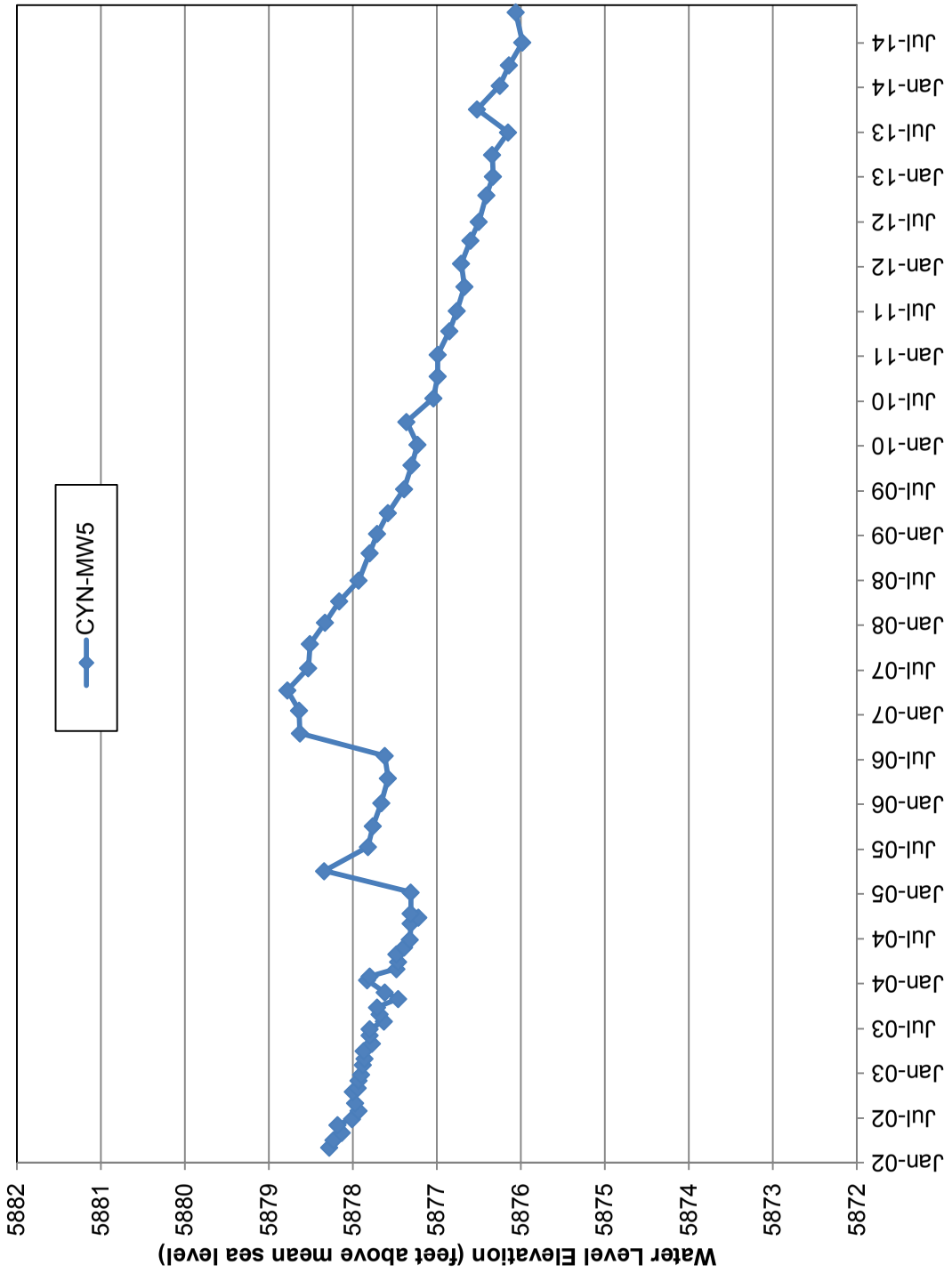


Figure 9B-1. SWMU 49 Study Area Well

This page intentionally left blank.

10.0 Solid Waste Management Unit 68

10.1 Introduction

This chapter summarizes the Calendar Year (CY) 2014 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).

Monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 were installed at SWMU 68 in August 2011. The installation report was approved by the New Mexico Environment Department (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 Consent Order) (NMED April 2004) between the NMED, U.S. Department of Energy (DOE), and Sandia Corporation (Sandia), and the NMED letter dated April 8, 2010, from the NMED Hazardous Waste Bureau requiring additional corrective action, and specifically additional groundwater monitoring at SWMU 68 (NMED April 2010). In October 2014, DOE and Sandia notified NMED that the additional groundwater monitoring at SWMU 68 had been completed, and would be discontinued (SNL October 2014).

Monitoring well OBS-MW1 was sampled on January 14, 2014; April 14, 2014; July 16, 2014; and October 6, 2014. Monitoring well OBS-MW2 was sampled on January 22, 2014; April 15, 2014; July 16, 2014; and October 7, 2014. Monitoring well OBS-MW3 was sampled on January 21, 2014; April 16, 2014; July 17, 2014; and October 8, 2014. 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 2013, March 2014, July 2014, and September 2014a). 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 2014 groundwater samples were compared with the U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) for drinking water (EPA May 2009). No parameters were detected above established MCLs.

The eighth quarter of groundwater monitoring required by NMED (NMED April 2010) was conducted in July 2013 (SNL September 2014b). The thirteenth and final quarterly groundwater sampling event at SWMU 68 was conducted in October 2014.

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).

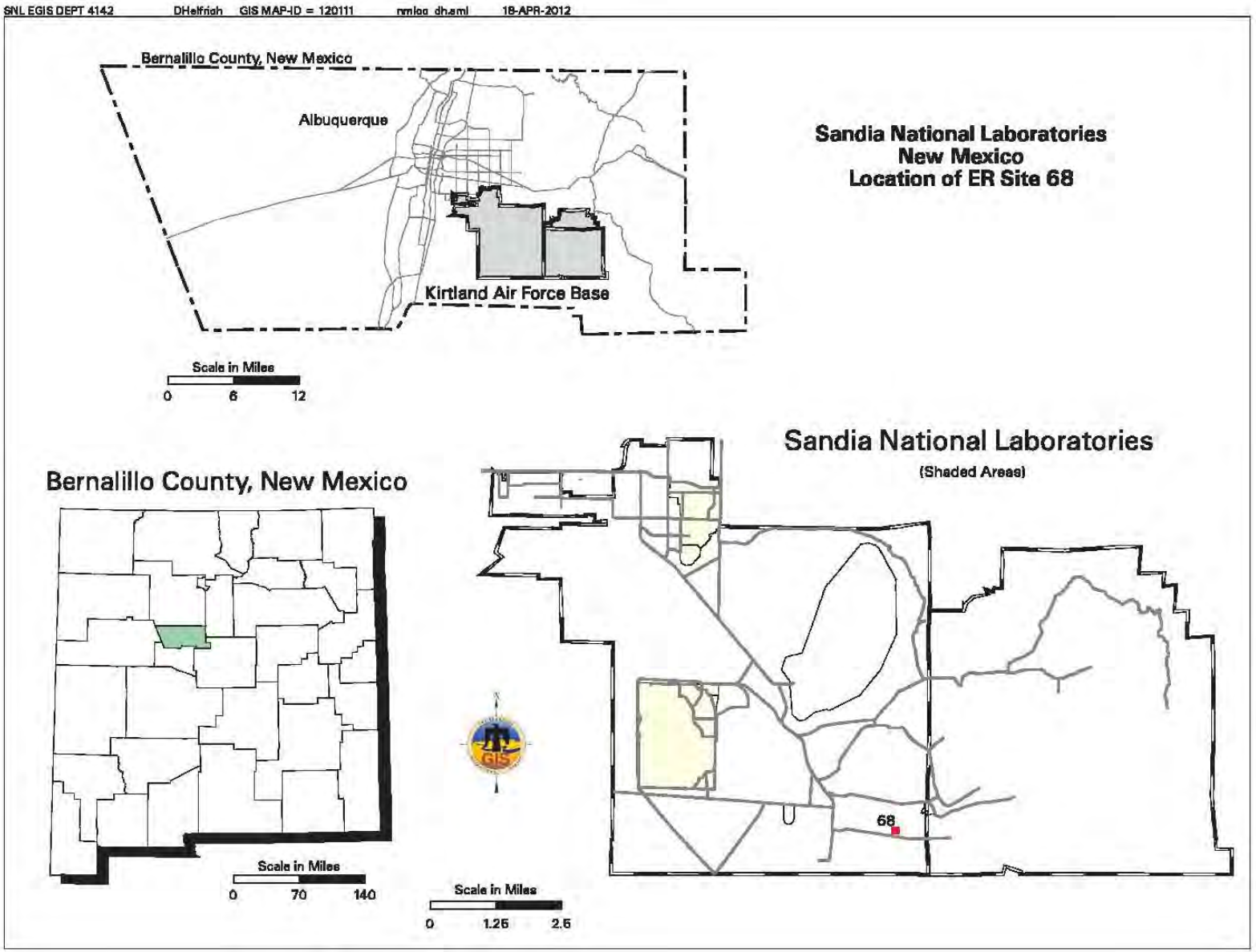


Figure 10-1. Location of SWMU 68

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 (i.e., 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 Consent Order (NMED April 2004) specifically identified SWMU 68 as requiring additional investigation. All corrective action requirements pertaining to SWMUs are contained in the Consent Order (NMED April 2004). Additional soil samples were collected in January 2005.

In September 2005, DOE/National Nuclear Security Administration (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 3 Permit Modification Request for SWMU 68 (SNL March 2006). In April 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. 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	Alpha radiation survey at SWMU 68 conducted by Los Alamos National Laboratory. 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 respond 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 screened 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 was discovered while trenching across the overflow basin. No elevated readings were measured on its surface. A large mound (68A Mound) was discovered.	Field logs

Refer to footnotes on page 10-6.

Table 10-1. Historical Timeline of SWMU 68 *(Continued)*

Month	Year	Event	Reference
August	1997	NMED issued an RSI on the Work Plan. Additional soil sampling for VOCs, SVOCs, total metals, gross alpha/beta, and gamma spectroscopy was 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 was submitted to NMED.	SNL February 1998
March	1998	NMED issued an 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 was discovered; the 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 was submitted to NMED. 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

Refer to footnotes on page 10-6.

Table 10-1. Historical Timeline of SWMU 68 *(Concluded)*

Month	Year	Event	Reference
October	2005	Letter received approving CAC without controls for SWMU 68.	NMED October 2005
March	2006	Request for Class III Permit Modification submitted.	SNL March 2006
June	2009	NMED removed SWMU 68 from the CAC process.	SNL June 2009
April	2010	Letter from NMED received that formally states 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 approved the SWMU 68 Groundwater Characterization 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 approved 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 completed.	SNL January 2014
October	2014	NMED was notified that quarterly groundwater monitoring at SWMU 68 has been completed, and has been discontinued.	SNL October 2014

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.
IT = International Technology.
KAFB = Kirtland Air Force Base.
MW = Monitoring well.
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.

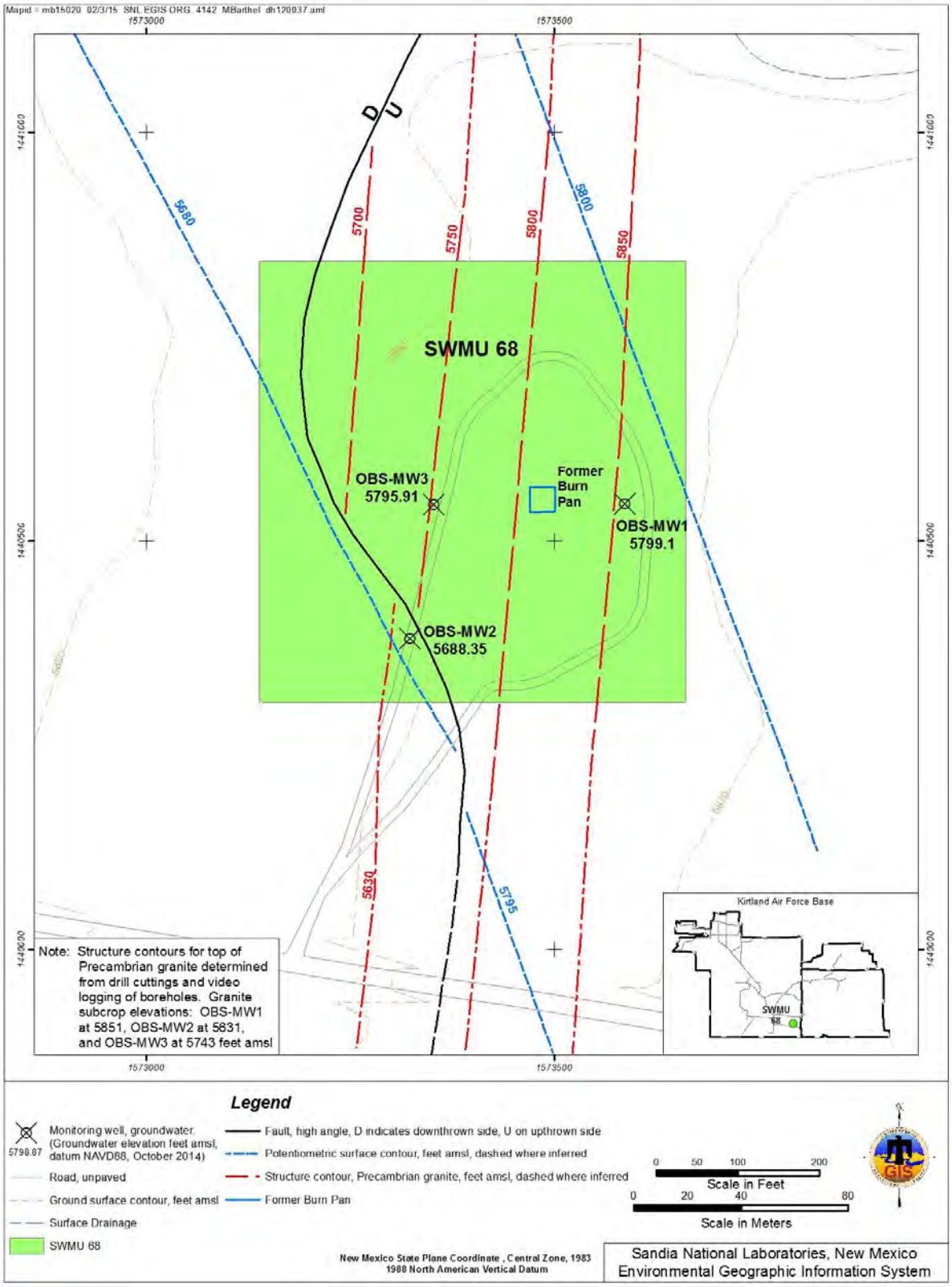


Figure 10-2. Groundwater Monitoring Wells OBS-MW1, OBS-MW2, and OBS-MW3 Installed at SWMU 68 and Potentiometric Surface Map (October 2014)

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, and were sampled for four quarters in CY 2014 as described in Section 10.1.5.

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 2014 Activities

The following activities occurred for SWMU 68 in CY 2014:

- Quarterly groundwater sampling was conducted at monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 in January, April, July and October 2014 (SNL December 2013; March 2014 July 2014; and September 2014a).
- Quarterly reporting of analytical results from monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 .
- Tables of analytical results (Attachment 10A) and a hydrograph (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 2015:

- No quarterly groundwater sampling at monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 will be conducted in CY 2015 unless additional guidance is received from NMED.

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.

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

Well ID	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 2014 (ft amsl)	Mid-Point Screen Elevation (ft amsl)	Pressure Head (ft[b])
OBS-MW1	5,869.08	18	5,851	135	5,734	135 - 155	5,799.10	5,724.10	75
OBS-MW2	5,860.75	230	5,631	240	5,621	234 - 254	5,688.35	5,616.80	72
OBS-MW3	5,863.31	120	5,743	190	5,673	190 - 210	5,795.91	5,663.30	133

NOTES:
[a]Observed during drilling.
[b]From mid-point of screen.
amsl = Above mean sea level.
bgs = Below ground surface.
ft = Foot (feet).
ID = Identification.
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 2014. 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 2014 Piper diagram and interpretation of a single water source is consistent with the data and interpretation provided in the Calendar Year 2011, 2012, and 2013 Annual Groundwater Reports (SNL September 2012; September 2013; September 2014b). Because the completion zones are known for monitoring wells OBS-MW1 and OBS-MW3 (i.e., screened in granite), 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 10-2 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 10-2. The water-level elevation in monitoring well OBS-MW1 was 3.19 ft higher than monitoring well OBS-MW3 in October 2014. 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

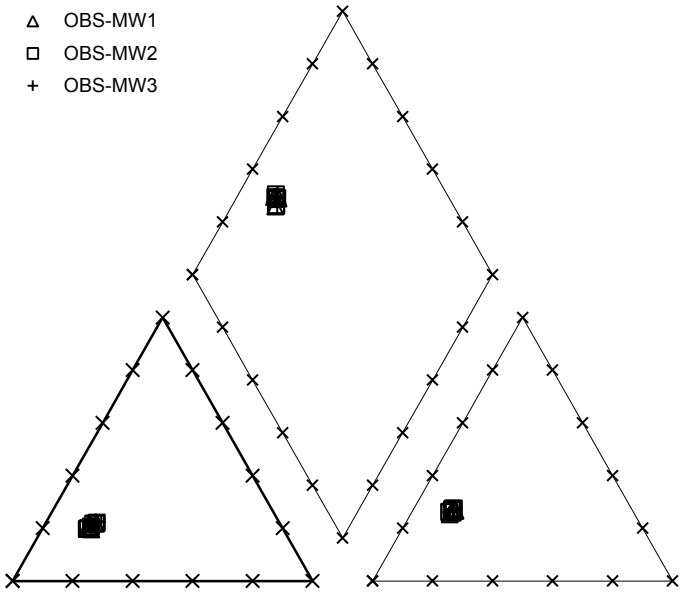


Figure 10-3. Piper Trilinear Diagram of Major Ion Chemistry for Monitoring Wells OBS-MW1, OBS-MW2, and OBS-MW3 at SWMU 68, CY 2014

minute (SNL June 2012). It should be noted that the slug test analyses were developed for use in 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 stormwater 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 2014, 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 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 Consent Order (NMED April 2004) specifically identified SWMU 68 as requiring investigation. All corrective action requirements pertaining to SWMU 68 are contained in the Consent 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 3 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 October 2014, DOE and Sandia notified NMED that after 13 quarters, groundwater monitoring at SWMU 68 had been completed, and that groundwater monitoring would be discontinued (SNL October 2014).

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 Consent Order, as specified in Section III.A of the Consent Order (NMED April 2004).

10.3 Scope of Activities

The field activity discussed in this section is groundwater monitoring sampling and analysis during CY 2014 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 2014

Date of Sampling Event	Monitoring Wells Sampled	SAP
January 2014	OBS-MW1 OBS-MW2 OBS-MW3	*SWMU 68 Groundwater Monitoring Mini-SAP for Second Quarter Fiscal Year 2014* (SNL December 2013)
April 2014	OBS-MW1 OBS-MW2 OBS-MW3	*SWMU 68 Groundwater Monitoring Mini-SAP for Third Quarter Fiscal Year 2014* (SNL March 2014)
July 2014	OBS-MW1 OBS-MW2 OBS-MW3	*SWMU 68 Groundwater Monitoring Mini-SAP for Fourth Quarter Fiscal Year 2014* (SNL July 2014)
October 2014	OBS-MW1 OBS-MW2 OBS-MW3	*SWMU 68 Groundwater Monitoring Mini-SAP for First Quarter Fiscal Year 2015* (SNL September 2014a)

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 2014

Parameter	Sampling Period	
Anions	**January 2014**	**April 2014**
Alkalinity	OBS-MW1	OBS-MW1
Filtered Cations	OBS-MW2	OBS-MW2
Gamma Spec*	OBS-MW2 (dup)	OBS-MW3
Gross Alpha	OBS-MW3	OBS-MW3 (dup)
Gross Beta		
HE compounds		
Hexavalent Chromium	**July 2014**	**October 2014**
Isotopic Uranium	OBS-MW1	OBS-MW1
NPN	OBS-MW1 (dup)	OBS-MW2
Perchlorate	OBS-MW2	OBS-MW2 (dup)
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.
MW = Monitoring well.
NPN = Nitrate plus nitrate (reported as nitrogen).
OBS = Old Burn Site.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.
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 Consent Order (NMED April 2004) and the NMED letter of April 8, 2010 (NMED April 2010), groundwater sampling was performed at SWMU 68. The CY 2014 sampling events were conducted in conformance with appropriate SNL/NM Field Operating Procedures for groundwater sampling activities, the SWMU 68 site-specific SAP (SNL September 2010), and the SWMU 68 site-specific Mini-SAPs (SNL December 2013, March 2014, July 2014, and September 2014a).

Groundwater samples were collected from monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 in January, April, July, and October 2014. 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 2014 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 2014 sampling, water level measurements were obtained to determine groundwater flow directions, hydraulic gradients, and changes in potentiometric surface elevations. The CY 2014 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 10-2 are derived from the base-wide potentiometric surface map. The hydrograph for SWMU 68 monitoring wells is shown in Figure 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 2014 are presented in Table 10-4.

10.7 Summary of Analytical Results

This section discusses analytical results and field measurements for the CY 2014 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, dates of analyses, results of quality control (QC) analyses, and data validation findings are filed in the SNL/NM Customer Funded Record Center.

The analytical data were reviewed and qualified in accordance with SNL/NM Administrative Operating Procedure 00-03 *Data Validation Procedure for Chemical and Radiochemical Data, Revision 3 and Revision 4* (SNL May 2011; June 2014). 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 2014, no VOCs, SVOCs, or HE compounds were detected above laboratory MDLs in any of the SWMU 68 groundwater samples. 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 milligrams per liter (mg/L). NPN was not detected above the MCL in any groundwater sample. NPN concentrations range from 1.54 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.

There were no detections of perchlorate. Currently, no MCL is established for perchlorate. Perchlorate was not detected above the NMED-specified 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 radiological screening tool and in accordance with 40 Code of Federal Regulations, Parts 9, 141, and 142; and Table I-4 should not include uranium. Naturally occurring uranium is measured independently (i.e., total uranium concentration determined by metals analysis described above) and the gross alpha activity measurements are corrected by subtracting the total uranium activity from the uncorrected gross alpha activity results. Radiological results are further reviewed by an SNL/NM 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 2014 (Table 10-4). Results show good agreement (RPD values less than 20 percent for organic compounds and less than 35 percent for inorganic analyses).

10.8.1.2 Equipment Blank Samples

EB or rinsate samples were collected to verify the equipment decontamination process. The results for EB analyses are as follows:

- **January 2014 Sampling Event**—An EB or rinsate sample was collected prior to sampling monitoring well OBS-MW1 and submitted for all analyses. Bromodichloromethane, bromoform, chloroform, dibromochloromethane, chloride, copper, and sodium were detected above the laboratory MDLs. With the exception of copper, no corrective action was necessary since analytes were not detected in environmental samples, or were detected in environmental samples at concentrations greater than five times the EB result. Copper was qualified as not detected in both the OBS-MW2 environmental and environmental duplicate samples during data validation, because copper was reported in the EB sample at a concentration greater than associated environmental samples.

- **April 2014 Sampling Event**—An EB or rinsate sample was collected prior to sampling monitoring well OBS-MW3 and submitted for all analyses. Alkalinity, bromodichloromethane, chloroform, chloride, copper, magnesium, and sodium were detected above the laboratory MDLs. With the exception of copper, no corrective action was necessary since analytes were not detected in environmental samples, or were detected in environmental samples at concentrations greater than five times the EB result. Copper was qualified as not detected in both the OBS-MW3 environmental and environmental duplicate samples during data validation, because copper was reported in the EB sample at a concentration greater than associated environmental samples.

- **July 2014 Sampling Event**—An EB or rinsate sample was collected prior to sampling monitoring well OBS-MW2 and submitted for all analyses. Acetone, bromodichloromethane, chloroform, chloride, copper, and sodium were detected above the laboratory MDLs. With the exception of copper, no corrective action was necessary since analytes were not detected in environmental samples, or were detected in environmental samples at concentrations greater than five times the EB result. Copper was qualified as not detected in both the OBS-MW1 environmental and environmental duplicate samples during data validation, because copper was reported in the EB sample at a concentration within five times the associated environmental sample results.

- **October 2014 Sampling Event**—An EB or rinsate sample was collected prior to sampling monitoring well OBS-MW1 and submitted for all analyses. Acetone, bromodichloromethane, chloroform, chloride, and copper were detected above the laboratory MDLs. No corrective action was necessary since these analytes were not detected in associated 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 2014 with 4 submitted for each sampling event in January, April, July, and October. No VOCs were detected above the associated laboratory MDLs in any TB sample, with the following exception:

- **April 2014 Sampling Event**—Toluene was detected above the MDL in the TB sample associated with monitoring well OBS-MW2. No corrective action was required, because this compound was not detected in the environmental 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. The results of the FB analysis are provided below:

- **January 2014 Sampling Event**—Analysis of the monitoring well OBS-MW3 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.

- **April 2014 Sampling Event**—Analysis of the monitoring well OBS-MW2 FB sample detected the VOC compounds bromodichloromethane, chloroform, and dibromochloromethane above associated laboratory MDLs. No corrective action was required, because these compounds were not detected in the associated environmental sample.

- **July 2014 Sampling Event**—Analysis of the monitoring well OBS-MW2 FB sample detected the VOC compounds acetone and chloroform above associated laboratory MDLs. No corrective action was required, because these compounds were not detected in the associated environmental sample.

- **October 2014 Sampling Event**—Analysis of the monitoring well OBS-MW3 FB sample detected the VOC compound acetone, bromodichloromethane, and chloroform above associated laboratory MDLs. No corrective action was required, because these compounds were not detected in the associated environmental sample.

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 2014.

10.9 Variances and Nonconformances

No variances or nonconformances from requirements specified in the SWMU 68 Groundwater Monitoring Mini-SAPs (SNL December 2013; March 2014; July 2014; and September 2014a) 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 2014, 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.

In October 2014, DOE and Sandia notified NMED that additional groundwater monitoring at SWMU 68 had been completed, and would be discontinued (SNL October 2014). No further groundwater sampling will be conducted at monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 unless additional guidance is received from 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 May 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 Work Plans 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 October 2014 Sandia National Laboratories, New Mexico (SNL/NM), October 2014. *Completion of Monitoring at Solid Waste Management Units 68, 149, 154, and 8/58*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2014a Sandia National Laboratories, New Mexico (SNL/NM), September 2014. *SWMU 68 Groundwater Monitoring Mini-SAP for First Quarter Fiscal Year 2015*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2014b Sandia National Laboratories, New Mexico (SNL/NM), September 2014. *Annual Groundwater Monitoring Report, Calendar Year 2013 Groundwater Protection Program*, Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL July 2014 Sandia National Laboratories, New Mexico (SNL/NM), July 2014. *SWMU 68 Groundwater Monitoring Mini-SAP for Fourth Quarter Fiscal Year 2014*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2014 Sandia National Laboratories, New Mexico (SNL/NM), June 2014. *Data Validation Procedure for Chemical and Radiochemical Data*, AOP 00-03, Revision 4, Sample Management Office, Sandia National Laboratories, Albuquerque, New Mexico, June 16, 2014.

SNL March 2014 Sandia National Laboratories, New Mexico (SNL/NM), March 2014. *SWMU 68 Groundwater Monitoring Mini-SAP for Third Quarter Fiscal Year 2014*, 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 December 2013 Sandia National Laboratories, New Mexico (SNL/NM), December 2013. *SWMU 68 Groundwater Monitoring Mini-SAP for Second Quarter Fiscal Year 2014*, Environmental Restoration Operations, 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 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 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 SW846-8260B), Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 10A-5

10A-2 Method Detection Limits for Semivolatile Organic Compounds (EPA Method SW846-8270C), Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 10A-6

10A-3 Method Detection Limits for High Explosive Compounds (EPA Method SW846-8321A), Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 10A-7

10A-4 Summary of Nitrate plus Nitrite Results, Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 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 2014 ..... 10A-9

10A-6 Summary of Perchlorate Results, Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 10A-13

10A-7 Summary of Hexavalent Chromium Results, Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 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 2014 ..... 10A-15

10A-9 Summary of Cation Results, Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 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 2014 ..... 10A-33

10A-11 Summary of Field Water Quality Measurements, Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 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 2014

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	0.300–0.500	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	0.300–3.00
1,2-Dichloropropane	0.300	Methylene chloride	1.70–3.00
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	2.50–3.00	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 2014

Analyte	MDL[b] (µg/L)	Analyte	MDL[b] (µg/L)
1'-Biphenyl 1	3.00–3.26	Butylbenzyl phthalate	3.00–3.26
1,2,4-Trichlorobenzene	3.00–3.26	Caprolactam	3.00–3.26
2,4,5-Trichlorophenol	3.00–3.26	Carbazole	0.300–0.326
1,4-Dioxane	3.00–3.26	Chrysene	0.300–0.326
2,4,6-Trichlorophenol	3.00–3.26	Di-n-butyl phthalate	3.00–3.26
2,4-Dichlorophenol	3.00–3.26	Di-n-octyl phthalate	3.00–3.26
2,4-Dimethylphenol	3.00–3.26	Dibenz[a,h]anthracene	0.300–0.326
2,4-Dinitrophenol	4.10–5.43	Dibenzofuran	3.00–3.26
2,4-Dinitrotoluene	3.00–3.26	Diethylphthalate	3.00–3.26
2,6-Dinitrotoluene	3.00–3.26	Dimethylphthalate	3.00–3.26
2-Chloronaphthalene	0.410–0.446	Dinitro-o-cresol	3.00–3.26
2-Chlorophenol	3.00–3.26	Diphenyl amine	3.00–3.26
2-Methylnaphthalene	0.300–0.326	Fluoranthene	0.300–0.326
2-Nitroaniline	3.00–3.26	Fluorene	0.300–0.326
2-Nitrophenol	3.00–3.26	Hexachlorobenzene	3.00–3.26
3,3'-Dichlorobenzidine	3.00–3.26	Hexachlorobutadiene	3.00–3.26
3-Nitroaniline	3.00–3.26	Hexachlorocyclopentadiene	3.00–3.26
4-Bromophenyl phenyl ether	3.00–3.26	Hexachloroethane	3.00–3.26
4-Chloro-3-methylphenol	3.00–3.26	Indeno(1,2,3-c,d)pyrene	0.300–0.326
4-Chlorobenzenamine	3.30–3.59	Isophorone	3.50–3.80
4-Chlorophenyl phenyl ether	3.00–3.26	Naphthalene	0.300–0.326
4-Nitroaniline	3.00–3.26	Nitro-benzene	3.00–3.26
4-Nitrophenol	3.00–3.26	Pentachlorophenol	3.00–3.26
Acenaphthene	0.300–0.326	Phenanthrene	0.300–0.326
Acenaphthylene	0.300–0.326	Phenol	3.00–3.26
Acetophenone	3.00–3.26	Pyrene	0.300–0.326
Anthracene	0.300–0.326	bis(1-Chloroisopropyl)ether	3.00–3.13
Atrazine	3.00–3.26	bis(2-Chloroethoxy)methane	3.00–3.26
Benzaldehyde	3.00–5.38	bis(2-Chloroethyl)ether	3.00–3.26
Benzo(a)anthracene	0.300–0.326	bis(2-Chloroisopropyl)ether	3.00–3.26
Benzo(a)pyrene	0.300–0.473	bis(2-Ethylhexyl)phthalate	3.00–3.26
Benzo(b)fluoranthene	0.300–0.326	m,p-Cresol	3.70–4.02
Benzo(ghi)perylene	0.300–0.326	n-Nitrosodipropylamine	3.00–3.26
Benzo(k)fluoranthene	0.300–0.326	o-Cresol	3.00–3.26

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 2014

Analyte	MDL[b] (µg/L)
1,3,5-Trinitrobenzene	0.0816–0.0914
1,3-Dinitrobenzene	0.0816–0.0914
2,4,6-Trinitrotoluene	0.0816–0.0914
2,4-Dinitrotoluene	0.0816–0.0914
2,6-Dinitrotoluene	0.0816–0.0914
2-Amino-4,6-dinitrotoluene	0.0816–0.0914
2-Nitrotoluene	0.0837–0.0937
3-Nitrotoluene	0.0816–0.0914
4-Amino-2,6-dinitrotoluene	0.0816–0.0914
4-Nitrotoluene	0.1523–0.171
HMX	0.0816–0.0914
Nitro-benzene	0.0816–0.0914
Pentaerythritol tetranitrate	0.102–0.114
RDX	0.0816–0.0914
Tetryl	0.0816–0.0914

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 2014

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 20-Jan-14	Nitrate plus nitrite	1.95	0.085	0.250	10.0			095196-018	EPA 353.2
OBS-MW2 22-Jan-14	Nitrate plus nitrite	1.58	0.085	0.250	10.0			095201-018	EPA 353.2
OBS-MW2 (Duplicate) 22-Jan-14	Nitrate plus nitrite	1.54	0.085	0.250	10.0			095202-018	EPA 353.2
OBS-MW3 21-Jan-14	Nitrate plus nitrite	1.85	0.085	0.250	10.0			095205-018	EPA 353.2
OBS-MW1 14-Apr-14	Nitrate plus nitrite	1.91	0.085	0.250	10.0			095733-018	EPA 353.2
OBS-MW2 15-Apr-14	Nitrate plus nitrite	1.68	0.085	0.250	10.0			095736-018	EPA 353.2
OBS-MW3 16-Apr-14	Nitrate plus nitrite	1.92	0.170	0.500	10.0			095741-018	EPA 353.2
OBS-MW3 (Duplicate) 16-Apr-14	Nitrate plus nitrite	1.89	0.170	0.500	10.0			095742-018	EPA 353.2
OBS-MW1 16-Jul-14	Nitrate plus nitrite	1.79	0.085	0.250	10.0			096255-018	EPA 353.2
OBS-MW1 (Duplicate) 16-Jul-14	Nitrate plus nitrite	1.83	0.085	0.250	10.0			096256-018	EPA 353.2
OBS-MW2 15-Jul-14	Nitrate plus nitrite	1.57	0.085	0.250	10.0			096251-018	EPA 353.2
OBS-MW3 17-Jul-14	Nitrate plus nitrite	1.81	0.085	0.250	10.0			096259-018	EPA 353.2
OBS-MW1 06-Oct-14	Nitrate plus nitrite	1.79	0.085	0.250	10.0			096653-018	EPA 353.2
OBS-MW2 07-Oct-14	Nitrate plus nitrite	1.55	0.085	0.250	10.0			096658-018	EPA 353.2
OBS-MW2 (Duplicate) 07-Oct-14	Nitrate plus nitrite	1.56	0.085	0.250	10.0			096659-018	EPA 353.2
OBS-MW3 08-Oct-14	Nitrate plus nitrite	1.89	0.085	0.250	10.0			096661-018	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 2014

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	177	0.725	1.00	NE			095196-022	SM2320B
20-Jan-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095196-022	SM2320B
	Bromide	0.317	0.067	0.200	NE			095196-016	SW846 9056
	Chloride	23.6	0.670	2.00	NE			095196-016	SW846 9056
	Fluoride	2.04	0.033	0.100	4.00			095196-016	SW846 9056
	Sulfate	79.1	1.33	4.00	NE			095196-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	095196-027	SW846 9012B
OBS-MW2	Bicarbonate Alkalinity	178	0.725	1.00	NE			095201-022	SM2320B
22-Jan-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095201-022	SM2320B
	Bromide	0.332	0.067	0.200	NE			095201-016	SW846 9056
	Chloride	22.7	0.670	2.00	NE			095201-016	SW846 9056
	Fluoride	2.16	0.033	0.100	4.00			095201-016	SW846 9056
	Sulfate	83.0	1.33	4.00	NE			095201-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	095201-027	SW846 9012B
OBS-MW2 (Duplicate)	Bicarbonate Alkalinity	176	0.725	1.00	NE			095202-022	SM2320B
22-Jan-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095202-022	SM2320B
	Bromide	0.361	0.067	0.200	NE			095202-016	SW846 9056
	Chloride	22.1	0.670	2.00	NE			095202-016	SW846 9056
	Fluoride	2.17	0.033	0.100	4.00			095202-016	SW846 9056
	Sulfate	82.7	1.33	4.00	NE			095202-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	095202-027	SW846 9012B
OBS-MW3	Bicarbonate Alkalinity	173	0.725	1.00	NE			095205-022	SM2320B
21-Jan-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095205-022	SM2320B
	Bromide	0.311	0.067	0.200	NE			095205-016	SW846 9056
	Chloride	22.5	0.670	2.00	NE			095205-016	SW846 9056
	Fluoride	2.20	0.033	0.100	4.00			095205-016	SW846 9056
	Sulfate	81.5	1.33	4.00	NE			095205-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	095205-027	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 2014

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	183	0.725	1.00	NE			095733-022	SM2320B
14-Apr-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095733-022	SM2320B
	Bromide	0.383	0.067	0.200	NE			095733-016	SW846 9056
	Chloride	24.3	0.670	2.00	NE			095733-016	SW846 9056
	Fluoride	2.24	0.033	0.100	4.00			095733-016	SW846 9056
	Sulfate	83.0	1.33	4.00	NE			095733-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U		095733-029	SW846 9012B
OBS-MW2	Bicarbonate Alkalinity	179	0.725	1.00	NE			095736-022	SM2320B
15-Apr-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095736-022	SM2320B
	Bromide	0.347	0.067	0.200	NE			095736-016	SW846 9056
	Chloride	23.0	0.670	2.00	NE			095736-016	SW846 9056
	Fluoride	2.36	0.033	0.100	4.00			095736-016	SW846 9056
	Sulfate	85.9	1.33	4.00	NE			095736-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U		095736-029	SW846 9012B
OBS-MW3	Bicarbonate Alkalinity	181	0.725	1.00	NE			095741-022	SM2320B
16-Apr-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095741-022	SM2320B
	Bromide	0.370	0.067	0.200	NE			095741-016	SW846 9056
	Chloride	23.6	0.670	2.00	NE			095741-016	SW846 9056
	Fluoride	2.39	0.033	0.100	4.00			095741-016	SW846 9056
	Sulfate	86.1	1.33	4.00	NE			095741-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U		095741-029	SW846 9012B
OBS-MW3 (Duplicate)	Bicarbonate Alkalinity	182	0.725	1.00	NE			095742-022	SM2320B
16-Apr-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095742-022	SM2320B
	Bromide	0.344	0.067	0.200	NE			095742-016	SW846 9056
	Chloride	23.9	0.670	2.00	NE			095742-016	SW846 9056
	Fluoride	2.39	0.033	0.100	4.00			095742-016	SW846 9056
	Sulfate	86.9	1.33	4.00	NE			095742-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U		095742-029	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 2014

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			096255-022	SM2320B
16-Jul-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096255-022	SM2320B
	Bromide	0.367	0.067	0.200	NE			096255-016	SW846 9056
	Chloride	25.6	0.670	2.00	NE			096255-016	SW846 9056
	Fluoride	2.24	0.033	0.100	4.00			096255-016	SW846 9056
	Sulfate	85.5	1.33	4.00	NE			096255-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	096255-027	SW846 9012B
OBS-MW1 (Duplicate)	Bicarbonate Alkalinity	182	0.725	1.00	NE			096256-022	SM2320B
16-Jul-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096256-022	SM2320B
	Bromide	0.377	0.067	0.200	NE			096256-016	SW846 9056
	Chloride	25.5	0.670	2.00	NE			096256-016	SW846 9056
	Fluoride	2.21	0.033	0.100	4.00			096256-016	SW846 9056
	Sulfate	85.2	1.33	4.00	NE			096256-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	096255-027	SW846 9056
OBS-MW2	Bicarbonate Alkalinity	181	0.725	2.00	NE			096251-022	SW846 9056
15-Jul-14	Carbonate Alkalinity	ND	0.725	2.00	NE	U		096251-022	SW846 9012B
	Bromide	0.371	0.067	0.200	NE			096251-016	SM2320B
	Chloride	23.9	0.670	2.00	NE			096251-016	SM2320B
	Fluoride	2.36	0.033	0.100	4.00			096251-016	SW846 9056
	Sulfate	87.2	1.33	4.00	NE			096251-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	096251-027	SW846 9056
OBS-MW3	Bicarbonate Alkalinity	180	0.725	1.00	NE			096259-022	SW846 9056
17-Jul-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096259-022	SW846 9012B
	Bromide	0.391	0.067	0.200	NE			096259-016	SM2320B
	Chloride	24.4	0.670	2.00	NE			096259-016	SM2320B
	Fluoride	2.37	0.033	0.100	4.00			096259-016	SW846 9056
	Sulfate	86.4	1.33	4.00	NE			096259-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	096259-027	SW846 9056

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 2014

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			096653-022	SM2320B
06-Oct-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096653-022	SM2320B
	Bromide	0.359	0.067	0.200	NE			096653-016	SW846 9056
	Chloride	23.0	0.670	2.00	NE			096653-016	SW846 9056
	Fluoride	2.01	0.033	0.100	4.00			096653-016	SW846 9056
	Sulfate	79.3	1.33	4.00	NE			096653-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	096653-027	SW846 9012B
OBS-MW2	Bicarbonate Alkalinity	183	0.725	1.00	NE			096658-022	SM2320B
07-Oct-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096658-022	SM2320B
	Bromide	0.343	0.067	0.200	NE			096658-016	SW846 9056
	Chloride	21.9	0.670	2.00	NE			096658-016	SW846 9056
	Fluoride	2.13	0.033	0.100	4.00			096658-016	SW846 9056
	Sulfate	81.5	1.33	4.00	NE			096658-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	096658-027	SW846 9012B
OBS-MW2 (Duplicate)	Bicarbonate Alkalinity	183	0.725	1.00	NE			096659-022	SM2320B
07-Oct-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096659-022	SM2320B
	Bromide	0.367	0.067	0.200	NE			096659-016	SW846 9056
	Chloride	21.9	0.670	2.00	NE			096659-016	SW846 9056
	Fluoride	2.15	0.033	0.100	4.00			096659-016	SW846 9056
	Sulfate	81.3	1.33	4.00	NE			096659-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	096659-027	SW846 9012B
OBS-MW3	Bicarbonate Alkalinity	181	0.725	1.00	NE			096661-022	SM2320B
08-Oct-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096661-022	SM2320B
	Bromide	0.375	0.067	0.200	NE			096661-016	SW846 9056
	Chloride	22.4	0.670	2.00	NE			096661-016	SW846 9056
	Fluoride	2.16	0.033	0.100	4.00			096661-016	SW846 9056
	Sulfate	80.8	1.33	4.00	NE			096661-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	096661-027	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 2014

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 20-Jan-14	ND	0.004	0.012	NE	U	UJ	095196-020	EPA 314.0
OBS-MW2 22-Jan-14	ND	0.004	0.012	NE	U	UJ	095201-020	EPA 314.0
OBS-MW2 (Duplicate) 22-Jan-14	ND	0.004	0.012	NE	U	UJ	095202-020	EPA 314.0
OBS-MW3 21-Jan-14	ND	0.004	0.012	NE	U	UJ	095205-020	EPA 314.0
OBS-MW1 14-Apr-14	ND	0.004	0.012	NE	U		095733-020	EPA 314.0
OBS-MW2 15-Apr-14	ND	0.004	0.012	NE	U		095736-020	EPA 314.0
OBS-MW3 16-Apr-14	ND	0.004	0.012	NE	U		095741-020	EPA 314.0
OBS-MW3 (Duplicate) 16-Apr-14	ND	0.004	0.012	NE	U		095742-020	EPA 314.0
OBS-MW1 16-Jul-14	ND	0.004	0.012	NE	U		096255-020	EPA 314.0
OBS-MW1 (Duplicate) 16-Jul-14	ND	0.004	0.012	NE	U		096256-020	EPA 314.0
OBS-MW2 15-Jul-14	ND	0.004	0.012	NE	U		096251-020	EPA 314.0
OBS-MW3 17-Jul-14	ND	0.004	0.012	NE	U		096259-020	EPA 314.0
OBS-MW1 06-Oct-14	ND	0.004	0.012	NE	U		096653-020	EPA 314.0
OBS-MW2 07-Oct-14	ND	0.004	0.012	NE	U		096658-020	EPA 314.0
OBS-MW2 (Duplicate) 07-Oct-14	ND	0.004	0.012	NE	U		096659-020	EPA 314.0
OBS-MW3 08-Oct-14	ND	0.004	0.012	NE	U		096661-020	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 2014

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 20-Jan-14	ND	0.0033	0.010	NE	U		095196-014	SW846 7196A
OBS-MW2 22-Jan-14	ND	0.0033	0.010	NE	U		095201-014	SW846 7196A
OBS-MW2 (Duplicate) 22-Jan-14	ND	0.0033	0.010	NE	U		095202-014	SW846 7196A
OBS-MW3 21-Jan-14	ND	0.0033	0.010	NE	U		095205-014	SW846 7196A
OBS-MW1 14-Apr-14	ND	0.003	0.010	NE	U		095733-014	SW846 7196A
OBS-MW2 15-Apr-14	ND	0.003	0.010	NE	U		095736-014	SW846 7196A
OBS-MW3 16-Apr-14	ND	0.003	0.010	NE	U		095741-014	SW846 7196A
OBS-MW3 (Duplicate) 16-Apr-14	ND	0.003	0.010	NE	U		095742-014	SW846 7196A
OBS-MW1 16-Jul-14	ND	0.003	0.010	NE	U	UJ	096255-014	SW846 7196A
OBS-MW1 (Duplicate) 16-Jul-14	0.00438	0.003	0.010	NE	J	0.017UJ	096256-014	SW846 7196A
OBS-MW2 15-Jul-14	ND	0.003	0.010	NE	U		096251-014	SW846 7196A
OBS-MW3 17-Jul-14	ND	0.003	0.010	NE	U		096259-014	SW846 7196A
OBS-MW1 06-Oct-14	ND	0.003	0.010	NE	U	UJ	096653-014	SW846 7196A
OBS-MW2 07-Oct-14	ND	0.003	0.010	NE	U		096658-014	SW846 7196A
OBS-MW2 (Duplicate) 07-Oct-14	ND	0.003	0.010	NE	U		096659-014	SW846 7196A
OBS-MW3 08-Oct-14	ND	0.003	0.010	NE	U		096661-014	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 2014

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	0.0189	0.015	0.050	NE	J		095196-009	SW846 6020
20-Jan-14	Antimony	ND	0.001	0.003	0.006	U		095196-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095196-009	SW846 6020
	Barium	0.0176	0.0006	0.002	2.00			095196-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095196-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095196-009	SW846 6020
	Calcium	83.8	0.600	2.00	NE			095196-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095196-009	SW846 6020
	Cobalt	0.000157	0.0001	0.001	NE	J		095196-009	SW846 6020
	Copper	0.000571	0.00035	0.001	NE	J		095196-009	SW846 6020
	Iron	0.154	0.033	0.100	NE			095196-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095196-009	SW846 6020
	Magnesium	16.0	0.010	0.030	NE			095196-009	SW846 6020
	Manganese	0.00242	0.001	0.005	NE	J		095196-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095196-009	SW846 7470
	Nickel	0.00173	0.0005	0.002	NE	J		095196-009	SW846 6020
	Potassium	1.79	0.080	0.300	NE			095196-009	SW846 6020
	Selenium	0.00302	0.0015	0.005	0.050	J		095196-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095196-009	SW846 6020
	Sodium	20.9	0.080	0.250	NE		J	095196-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095196-009	SW846 6020
	Uranium	0.0107	0.000067	0.0002	0.03			095196-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095196-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095196-009	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 2014

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		095201-009	SW846 6020
22-Jan-14	Antimony	ND	0.001	0.003	0.006	U		095201-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095201-009	SW846 6020
	Barium	0.0191	0.0006	0.002	2.00			095201-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095201-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095201-009	SW846 6020
	Calcium	82.9	0.600	2.00	NE			095201-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095201-009	SW846 6020
	Cobalt	0.000123	0.0001	0.001	NE	J		095201-009	SW846 6020
	Copper	0.000505	0.00035	0.001	NE	J	0.0044U	095201-009	SW846 6020
	Iron	0.150	0.033	0.100	NE			095201-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095201-009	SW846 6020
	Magnesium	15.4	0.010	0.030	NE			095201-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095201-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095201-009	SW846 7470
	Nickel	0.00169	0.0005	0.002	NE	J		095201-009	SW846 6020
	Potassium	1.83	0.080	0.300	NE			095201-009	SW846 6020
	Selenium	0.00348	0.0015	0.005	0.050	J		095201-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095201-009	SW846 6020
	Sodium	21.3	0.080	0.250	NE		J	095201-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095201-009	SW846 6020
	Uranium	0.0141	0.000067	0.0002	0.03			095201-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095201-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095201-009	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 2014

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		095202-009	SW846 6020
22-Jan-14	Antimony	ND	0.001	0.003	0.006	U		095202-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095202-009	SW846 6020
	Barium	0.0195	0.0006	0.002	2.00			095202-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095202-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095202-009	SW846 6020
	Calcium	83.6	0.600	2.00	NE			095202-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095202-009	SW846 6020
	Cobalt	0.000132	0.0001	0.001	NE	J		095202-009	SW846 6020
	Copper	0.00065	0.00035	0.001	NE	J	0.0044U	095202-009	SW846 6020
	Iron	0.154	0.033	0.100	NE			095202-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095202-009	SW846 6020
	Magnesium	16.3	0.010	0.030	NE			095202-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095202-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095202-009	SW846 7470
	Nickel	0.00204	0.0005	0.002	NE			095202-009	SW846 6020
	Potassium	1.75	0.080	0.300	NE			095202-009	SW846 6020
	Selenium	0.00342	0.0015	0.005	0.050	J		095202-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095202-009	SW846 6020
	Sodium	23.0	0.080	0.250	NE		J	095202-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095202-009	SW846 6020
	Uranium	0.0144	0.000067	0.0002	0.03			095202-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095202-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095202-009	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 2014

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		095205-009	SW846 6020
21-Jan-14	Antimony	ND	0.001	0.003	0.006	U		095205-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095205-009	SW846 6020
	Barium	0.0253	0.0006	0.002	2.00			095205-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095205-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095205-009	SW846 6020
	Calcium	77.4	0.600	2.00	NE			095205-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095205-009	SW846 6020
	Cobalt	0.000152	0.0001	0.001	NE	J		095205-009	SW846 6020
	Copper	0.000777	0.00035	0.001	NE	J		095205-009	SW846 6020
	Iron	0.148	0.033	0.100	NE			095205-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095205-009	SW846 6020
	Magnesium	16.4	0.010	0.030	NE			095205-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095205-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095205-009	SW846 7470
	Nickel	0.00173	0.0005	0.002	NE	J		095205-009	SW846 6020
	Potassium	1.84	0.080	0.300	NE			095205-009	SW846 6020
	Selenium	0.0031	0.0015	0.005	0.050	J		095205-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095205-009	SW846 6020
	Sodium	20.2	0.080	0.250	NE		J	095205-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095205-009	SW846 6020
	Uranium	0.0125	0.000067	0.0002	0.03			095205-009	SW846 6020
	Vanadium	0.00124	0.001	0.005	NE	J		095205-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095205-009	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 2014

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		095733-009	SW846 6020
14-Apr-14	Antimony	ND	0.001	0.003	0.006	U		095733-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095733-009	SW846 6020
	Barium	0.0178	0.0006	0.002	2.00			095733-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095733-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095733-009	SW846 6020
	Calcium	83.4	0.300	1.00	NE			095733-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095733-009	SW846 6020
	Cobalt	0.000108	0.0001	0.001	NE	J		095733-009	SW846 6020
	Copper	0.000853	0.00035	0.001	NE	J		095733-009	SW846 6020
	Iron	0.170	0.033	0.100	NE			095733-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095733-009	SW846 6020
	Magnesium	17.0	0.010	0.030	NE			095733-009	SW846 6020
	Manganese	0.00101	0.001	0.005	NE	J		095733-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095733-009	SW846 7470
	Nickel	0.00178	0.0005	0.002	NE	J		095733-009	SW846 6020
	Potassium	1.71	0.080	0.300	NE			095733-009	SW846 6020
	Selenium	0.00315	0.0015	0.005	0.050	J		095733-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095733-009	SW846 6020
	Sodium	21.6	0.080	0.250	NE			095733-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095733-009	SW846 6020
	Uranium	0.0107	0.000067	0.0002	0.03			095733-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095733-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095733-009	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 2014

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		095736-009	SW846 6020
15-Apr-14	Antimony	ND	0.001	0.003	0.006	U		095736-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095736-009	SW846 6020
	Barium	0.0191	0.0006	0.002	2.00			095736-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095736-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095736-009	SW846 6020
	Calcium	78.2	0.300	1.00	NE			095736-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095736-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		095736-009	SW846 6020
	Copper	0.000351	0.00035	0.001	NE	J		095736-009	SW846 6020
	Iron	0.161	0.033	0.100	NE			095736-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095736-009	SW846 6020
	Magnesium	16.4	0.010	0.030	NE			095736-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095736-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095736-009	SW846 7470
	Nickel	0.00162	0.0005	0.002	NE	J		095736-009	SW846 6020
	Potassium	1.65	0.080	0.300	NE			095736-009	SW846 6020
	Selenium	0.0031	0.0015	0.005	0.050	J		095736-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095736-009	SW846 6020
	Sodium	22.2	0.080	0.250	NE			095736-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095736-009	SW846 6020
	Uranium	0.0141	0.000067	0.0002	0.03			095736-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095736-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095736-009	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 2014

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		095741-009	SW846 6020
16-Apr-14	Antimony	ND	0.001	0.003	0.006	U		095741-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095741-009	SW846 6020
	Barium	0.0265	0.0006	0.002	2.00			095741-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095741-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095741-009	SW846 6020
	Calcium	76.9	0.300	1.00	NE			095741-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095741-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		095741-009	SW846 6020
	Copper	0.000375	0.00035	0.001	NE	J	0.0029U	095741-009	SW846 6020
	Iron	0.156	0.033	0.100	NE			095741-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095741-009	SW846 6020
	Magnesium	15.5	0.010	0.030	NE			095741-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095741-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095741-009	SW846 7470
	Nickel	0.00164	0.0005	0.002	NE	J		095741-009	SW846 6020
	Potassium	1.71	0.080	0.300	NE			095741-009	SW846 6020
	Selenium	0.00316	0.0015	0.005	0.050	J		095741-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095741-009	SW846 6020
	Sodium	21.5	0.080	0.250	NE			095741-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095741-009	SW846 6020
	Uranium	0.0129	0.000067	0.0002	0.03			095741-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095741-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095741-009	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 2014

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	ND	0.015	0.050	NE	U		095742-009	SW846 6020
16-Apr-14	Antimony	ND	0.001	0.003	0.006	U		095742-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095742-009	SW846 6020
	Barium	0.0264	0.0006	0.002	2.00			095742-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095742-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095742-009	SW846 6020
	Calcium	75.2	0.300	1.00	NE			095742-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095742-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		095742-009	SW846 6020
	Copper	0.000384	0.00035	0.001	NE	J	0.0029U	095742-009	SW846 6020
	Iron	0.157	0.033	0.100	NE			095742-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095742-009	SW846 6020
	Magnesium	16.8	0.010	0.030	NE			095742-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095742-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095742-009	SW846 7470
	Nickel	0.00157	0.0005	0.002	NE	J		095742-009	SW846 6020
	Potassium	1.67	0.080	0.300	NE			095742-009	SW846 6020
	Selenium	0.00334	0.0015	0.005	0.050	J		095742-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095742-009	SW846 6020
	Sodium	22.3	0.080	0.250	NE			095742-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095742-009	SW846 6020
	Uranium	0.0129	0.000067	0.0002	0.03			095742-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095742-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095742-009	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 2014

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	0.0271	0.015	0.050	NE	J		096255-009	SW846 6020
16-Jul-14	Antimony	ND	0.001	0.003	0.006	U		096255-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096255-009	SW846 6020
	Barium	0.018	0.0006	0.002	2.00			096255-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096255-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096255-009	SW846 6020
	Calcium	79.7	0.600	2.00	NE			096255-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096255-009	SW846 6020
	Cobalt	0.000135	0.0001	0.001	NE	J		096255-009	SW846 6020
	Copper	0.00116	0.00035	0.001	NE		0.0035U	096255-009	SW846 6020
	Iron	0.203	0.033	0.100	NE			096255-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096255-009	SW846 6020
	Magnesium	15.0	0.010	0.030	NE			096255-009	SW846 6020
	Manganese	0.00168	0.001	0.005	NE	J		096255-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096255-009	SW846 7470
	Nickel	0.00185	0.0005	0.002	NE	J		096255-009	SW846 6020
	Potassium	1.76	0.080	0.300	NE			096255-009	SW846 6020
	Selenium	0.00261	0.0015	0.005	0.050	J		096255-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096255-009	SW846 6020
	Sodium	21.2	0.080	0.250	NE			096255-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096255-009	SW846 6020
	Uranium	0.00973	0.000067	0.0002	0.03			096255-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		096255-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096255-009	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 2014

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	0.0252	0.015	0.050	NE	J		096256-009	SW846 6020
16-Jul-14	Antimony	ND	0.001	0.003	0.006	U		096256-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096256-009	SW846 6020
	Barium	0.0187	0.0006	0.002	2.00			096256-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096256-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096256-009	SW846 6020
	Calcium	78.5	0.600	2.00	NE			096256-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096256-009	SW846 6020
	Cobalt	0.000128	0.0001	0.001	NE	J		096256-009	SW846 6020
	Copper	0.000746	0.00035	0.001	NE	J	0.0035U	096256-009	SW846 6020
	Iron	0.186	0.033	0.100	NE			096256-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096256-009	SW846 6020
	Magnesium	14.4	0.010	0.030	NE			096256-009	SW846 6020
	Manganese	0.00228	0.001	0.005	NE	J		096256-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096256-009	SW846 7470
	Nickel	0.00149	0.0005	0.002	NE	J		096256-009	SW846 6020
	Potassium	1.69	0.080	0.300	NE			096256-009	SW846 6020
	Selenium	0.00273	0.0015	0.005	0.050	J		096256-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096256-009	SW846 6020
	Sodium	22.3	0.080	0.250	NE			096256-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096256-009	SW846 6020
	Uranium	0.00982	0.000067	0.0002	0.03			096256-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		096256-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096256-009	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 2014

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	0.0268	0.015	0.050	NE	J		096251-009	SW846 6020
15-Jul-14	Antimony	ND	0.001	0.003	0.006	U		096251-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096251-009	SW846 6020
	Barium	0.0194	0.0006	0.002	2.00			096251-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096251-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096251-009	SW846 6020
	Calcium	81.0	0.600	2.00	NE			096251-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096251-009	SW846 6020
	Cobalt	0.000124	0.0001	0.001	NE	J		096251-009	SW846 6020
	Copper	0.000678	0.00035	0.001	NE	J		096251-009	SW846 6020
	Iron	0.219	0.033	0.100	NE			096251-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096251-009	SW846 6020
	Magnesium	14.7	0.010	0.030	NE			096251-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096251-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096251-009	SW846 7470
	Nickel	0.00145	0.0005	0.002	NE	J		096251-009	SW846 6020
	Potassium	1.73	0.080	0.300	NE			096251-009	SW846 6020
	Selenium	0.0028	0.0015	0.005	0.050	J		096251-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096251-009	SW846 6020
	Sodium	20.2	0.080	0.250	NE			096251-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096251-009	SW846 6020
	Uranium	0.0133	0.000067	0.0002	0.03			096251-009	SW846 6020
	Vanadium	0.00125	0.001	0.005	NE	J		096251-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096251-009	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 2014

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		096259-009	SW846 6020
17-Jul-14	Antimony	ND	0.001	0.003	0.006	U		096259-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096259-009	SW846 6020
	Barium	0.0286	0.0006	0.002	2.00			096259-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096259-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096259-009	SW846 6020
	Calcium	76.5	0.600	2.00	NE			096259-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096259-009	SW846 6020
	Cobalt	0.000135	0.0001	0.001	NE	J		096259-009	SW846 6020
	Copper	0.000692	0.00035	0.001	NE	J		096259-009	SW846 6020
	Iron	0.191	0.033	0.100	NE			096259-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096259-009	SW846 6020
	Magnesium	14.7	0.010	0.030	NE			096259-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096259-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096259-009	SW846 7470
	Nickel	0.0015	0.0005	0.002	NE	J		096259-009	SW846 6020
	Potassium	1.61	0.080	0.300	NE			096259-009	SW846 6020
	Selenium	0.00254	0.0015	0.005	0.050	J		096259-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096259-009	SW846 6020
	Sodium	21.2	0.080	0.250	NE			096259-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096259-009	SW846 6020
	Uranium	0.0124	0.000067	0.0002	0.03			096259-009	SW846 6020
	Vanadium	0.00105	0.001	0.005	NE	J		096259-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096259-009	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 2014

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		096653-009	SW846 6020
06-Oct-14	Antimony	ND	0.001	0.003	0.006	U		096653-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096653-009	SW846 6020
	Barium	0.0175	0.0006	0.002	2.00			096653-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096653-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096653-009	SW846 6020
	Calcium	81.6	0.300	1.00	NE			096653-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096653-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		096653-009	SW846 6020
	Copper	ND	0.00035	0.001	NE	U		096653-009	SW846 6020
	Iron	ND	0.033	0.100	NE	U		096653-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096653-009	SW846 6020
	Magnesium	17.5	0.010	0.030	NE			096653-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096653-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096653-009	SW846 7470
	Nickel	ND	0.0005	0.002	NE	U		096653-009	SW846 6020
	Potassium	1.84	0.080	0.300	NE			096653-009	SW846 6020
	Selenium	0.00278	0.0015	0.005	0.050	J		096653-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096653-009	SW846 6020
	Sodium	25.0	0.080	0.250	NE			096653-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096653-009	SW846 6020
	Uranium	0.00945	0.000067	0.0002	0.03			096653-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		096653-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096653-009	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 2014

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		096658-009	SW846 6020
07-Oct-14	Antimony	ND	0.001	0.003	0.006	U		096658-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096658-009	SW846 6020
	Barium	0.0206	0.0006	0.002	2.00			096658-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096658-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096658-009	SW846 6020
	Calcium	81.6	0.300	1.00	NE			096658-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096658-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		096658-009	SW846 6020
	Copper	ND	0.00035	0.001	NE	U		096658-009	SW846 6020
	Iron	ND	0.033	0.100	NE	U		096658-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096658-009	SW846 6020
	Magnesium	17.8	0.010	0.030	NE			096658-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096658-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096658-009	SW846 7470
	Nickel	ND	0.0005	0.002	NE	U		096658-009	SW846 6020
	Potassium	1.84	0.080	0.300	NE			096658-009	SW846 6020
	Selenium	0.00327	0.0015	0.005	0.050	J		096658-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096658-009	SW846 6020
	Sodium	25.2	0.080	0.250	NE			096658-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096658-009	SW846 6020
	Uranium	0.0128	0.000067	0.0002	0.03			096658-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		096658-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096658-009	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 2014

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		096659-009	SW846 6020
07-Oct-14	Antimony	ND	0.001	0.003	0.006	U		096659-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096659-009	SW846 6020
	Barium	0.0205	0.0006	0.002	2.00			096659-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096659-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096659-009	SW846 6020
	Calcium	81.0	0.300	1.00	NE			096659-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096659-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		096659-009	SW846 6020
	Copper	ND	0.00035	0.001	NE	U		096659-009	SW846 6020
	Iron	ND	0.033	0.100	NE	U		096659-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096659-009	SW846 6020
	Magnesium	17.3	0.010	0.030	NE			096659-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096659-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096659-009	SW846 7470
	Nickel	ND	0.0005	0.002	NE	U		096659-009	SW846 6020
	Potassium	1.72	0.080	0.300	NE			096659-009	SW846 6020
	Selenium	0.00289	0.0015	0.005	0.050	J		096659-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096659-009	SW846 6020
	Sodium	24.7	0.080	0.250	NE			096659-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096659-009	SW846 6020
	Uranium	0.0128	0.000067	0.0002	0.03			096659-009	SW846 6020
	Vanadium	0.00108	0.001	0.005	NE	J		096659-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096659-009	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 2014

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		096661-009	SW846 6020
08-Oct-14	Antimony	ND	0.001	0.003	0.006	U		096661-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096661-009	SW846 6020
	Barium	0.0268	0.0006	0.002	2.00			096661-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096661-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096661-009	SW846 6020
	Calcium	81.5	0.300	1.00	NE			096661-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096661-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		096661-009	SW846 6020
	Copper	ND	0.00035	0.001	NE	U		096661-009	SW846 6020
	Iron	ND	0.033	0.100	NE	U		096661-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096661-009	SW846 6020
	Magnesium	18.2	0.010	0.030	NE			096661-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096661-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096661-009	SW846 7470
	Nickel	ND	0.0005	0.002	NE	U		096661-009	SW846 6020
	Potassium	1.88	0.080	0.300	NE			096661-009	SW846 6020
	Selenium	0.00363	0.0015	0.005	0.050	J		096661-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096661-009	SW846 6020
	Sodium	25.9	0.080	0.250	NE			096661-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096661-009	SW846 6020
	Uranium	0.0122	0.000067	0.0002	0.03			096661-009	SW846 6020
	Vanadium	0.00124	0.001	0.005	NE	J		096661-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096661-009	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 2014

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	83.7	0.600	2.00	NE			095196-017	SW846 6020
20-Jan-14	Magnesium	16.6	0.010	0.030	NE			095196-017	SW846 6020
	Potassium	1.79	0.080	0.300	NE			095196-017	SW846 6020
	Sodium	22.9	0.080	0.250	NE		J	095196-017	SW846 6020
OBS-MW2	Calcium	81.2	0.600	2.00	NE			095201-017	SW846 6020
22-Jan-14	Magnesium	16.9	0.010	0.030	NE			095201-017	SW846 6020
	Potassium	1.76	0.080	0.300	NE			095201-017	SW846 6020
	Sodium	21.4	0.080	0.250	NE		J	095201-017	SW846 6020
OBS-MW2 (Duplicate)	Calcium	81.3	0.600	2.00	NE			095202-017	SW846 6020
22-Jan-14	Magnesium	15.0	0.010	0.030	NE			095202-017	SW846 6020
	Potassium	1.67	0.080	0.300	NE			095202-017	SW846 6020
	Sodium	21.9	0.080	0.250	NE		J	095202-017	SW846 6020
OBS-MW3	Calcium	82.1	0.600	2.00	NE			095205-017	SW846 6020
21-Jan-14	Magnesium	16.3	0.010	0.030	NE			095205-017	SW846 6020
	Potassium	1.75	0.080	0.300	NE			095205-017	SW846 6020
	Sodium	22.3	0.080	0.250	NE		J	095205-017	SW846 6020
OBS-MW1	Calcium	78.2	0.300	1.00	NE			095733-017	SW846 6020
14-Apr-14	Magnesium	16.3	0.010	0.030	NE			095733-017	SW846 6020
	Potassium	1.89	0.080	0.300	NE			095733-017	SW846 6020
	Sodium	21.5	0.080	0.250	NE			095733-017	SW846 6020
OBS-MW2	Calcium	77.5	0.300	1.00	NE			095736-017	SW846 6020
15-Apr-14	Magnesium	15.0	0.010	0.030	NE			095736-017	SW846 6020
	Potassium	1.82	0.080	0.300	NE			095736-017	SW846 6020
	Sodium	21.5	0.080	0.250	NE			095736-017	SW846 6020
OBS-MW3	Calcium	76.9	0.300	1.00	NE			095741-017	SW846 6020
16-Apr-14	Magnesium	16.2	0.010	0.030	NE			095741-017	SW846 6020
	Potassium	1.82	0.080	0.300	NE			095741-017	SW846 6020
	Sodium	21.3	0.080	0.250	NE			095741-017	SW846 6020
OBS-MW3 (Duplicate)	Calcium	80.7	0.300	1.00	NE			095742-017	SW846 6020
16-Apr-14	Magnesium	16.1	0.010	0.030	NE			095742-017	SW846 6020
	Potassium	1.91	0.080	0.300	NE			095742-017	SW846 6020
	Sodium	22.6	0.080	0.250	NE			095742-017	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 2014

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	82.2	0.300	1.00	NE			096255-017	SW846 6020
16-Jul-14	Magnesium	16.7	0.010	0.030	NE			096255-017	SW846 6020
	Potassium	1.78	0.080	0.300	NE			096255-017	SW846 6020
	Sodium	23.0	0.080	0.250	NE			096255-017	SW846 6020
OBS-MW1 (Duplicate)	Calcium	81.2	0.300	1.00	NE			096256-017	SW846 6020
16-Jul-14	Magnesium	16.4	0.010	0.030	NE			096256-017	SW846 6020
	Potassium	1.60	0.080	0.300	NE			096256-017	SW846 6020
	Sodium	23.6	0.080	0.250	NE			096256-017	SW846 6020
OBS-MW2	Calcium	79.9	0.300	1.00	NE			096251-017	SW846 6020
15-Jul-14	Magnesium	15.4	0.010	0.030	NE			096251-017	SW846 6020
	Potassium	1.64	0.080	0.300	NE			096251-017	SW846 6020
	Sodium	22.1	0.080	0.250	NE			096251-017	SW846 6020
OBS-MW3	Calcium	80.2	0.300	1.00	NE			096259-017	SW846 6020
17-Jul-14	Magnesium	15.5	0.010	0.030	NE			096259-017	SW846 6020
	Potassium	1.68	0.080	0.300	NE			096259-017	SW846 6020
	Sodium	22.1	0.080	0.250	NE			096259-017	SW846 6020
OBS-MW1	Calcium	80.3	0.300	1.00	NE			096653-017	SW846 6020
06-Oct-14	Magnesium	17.0	0.010	0.030	NE			096653-017	SW846 6020
	Potassium	1.74	0.080	0.300	NE			096653-017	SW846 6020
	Sodium	23.5	0.080	0.250	NE			096653-017	SW846 6020
OBS-MW2	Calcium	78.3	0.300	1.00	NE			096658-017	SW846 6020
07-Oct-14	Magnesium	16.9	0.010	0.030	NE			096658-017	SW846 6020
	Potassium	1.72	0.080	0.300	NE			096658-017	SW846 6020
	Sodium	23.7	0.080	0.250	NE			096658-017	SW846 6020
OBS-MW2 (Duplicate)	Calcium	81.6	0.300	1.00	NE			096659-017	SW846 6020
07-Oct-14	Magnesium	17.3	0.010	0.030	NE			096659-017	SW846 6020
	Potassium	1.76	0.080	0.300	NE			096659-017	SW846 6020
	Sodium	24.0	0.080	0.250	NE			096659-017	SW846 6020
OBS-MW3	Calcium	79.0	0.300	1.00	NE			096661-017	SW846 6020
08-Oct-14	Magnesium	17.0	0.010	0.030	NE			096661-017	SW846 6020
	Potassium	1.70	0.080	0.300	NE			096661-017	SW846 6020
	Sodium	24.4	0.080	0.250	NE			096661-017	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 2014

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	-2.94 ± 14.0	21.6	10.6	NE	U	BD	095196-033	EPA 901.1
20-Jan-14	Cesium-137	-1.08 ± 1.84	3.09	1.47	NE	U	BD	095196-033	EPA 901.1
	Cobalt-60	-0.623 ± 2.05	3.61	1.69	NE	U	BD	095196-033	EPA 901.1
	Potassium-40	0.586 ± 45.6	31.3	14.4	NE	U	BD	095196-033	EPA 901.1
	Gross Alpha	-1.95	NA	NA	15 pCi/L	NA	None	095196-034	EPA 900.0
	Gross Beta	4.14 ± 1.10	0.997	0.475	4 mrem/yr		J	095196-034	EPA 900.0
	Uranium-233/234	18.5 ± 2.39	0.0607	0.0237	NE			095196-035	HASL-300
	Uranium-235/236	0.169 ± 0.0683	0.0547	0.0192	NE			095196-035	HASL-300
	Uranium-238	3.38 ± 0.493	0.0381	0.0124	NE			095196-035	HASL-300
OBS-MW2	Americium-241	11.3 ± 12.1	18.3	8.93	NE	U	BD	095201-033	EPA 901.1
22-Jan-14	Cesium-137	0.346 ± 4.85	3.89	1.87	NE	U	BD	095201-033	EPA 901.1
	Cobalt-60	0.773 ± 2.29	4.10	1.93	NE	U	BD	095201-033	EPA 901.1
	Potassium-40	-0.611 ± 44.8	51.5	24.6	NE	U	BD	095201-033	EPA 901.1
	Gross Alpha	4.93	NA	NA	15 pCi/L	NA	None	095201-034	EPA 900.0
	Gross Beta	3.95 ± 1.16	1.06	0.507	4 mrem/yr		J	095201-034	EPA 900.0
	Uranium-233/234	23.2 ± 2.96	0.0585	0.0229	NE			095201-035	HASL-300
	Uranium-235/236	0.187 ± 0.0841	0.0527	0.0185	NE			095201-035	HASL-300
	Uranium-238	4.28 ± 0.605	0.0367	0.0119	NE			095201-035	HASL-300
OBS-MW2 (Duplicate)	Americium-241	-3.86 ± 8.21	9.44	4.62	NE	U	BD	095202-033	EPA 901.1
22-Jan-14	Cesium-137	2.67 ± 2.25	3.33	1.60	NE	U	BD	095202-033	EPA 901.1
	Cobalt-60	1.00 ± 2.02	3.66	1.73	NE	U	BD	095202-033	EPA 901.1
	Potassium-40	8.54 ± 37.5	46.3	22.2	NE	U	BD	095202-033	EPA 901.1
	Gross Alpha	3.77	NA	NA	15 pCi/L	NA	None	095202-034	EPA 900.0
	Gross Beta	2.89 ± 1.31	0.999	0.471	4 mrem/yr		J	095202-034	EPA 900.0
	Uranium-233/234	22.1 ± 2.82	0.0582	0.0227	NE			095202-035	HASL-300
	Uranium-235/236	0.388 ± 0.107	0.0524	0.0184	NE			095202-035	HASL-300
	Uranium-238	4.54 ± 0.634	0.0365	0.0119	NE			095202-035	HASL-300
OBS-MW3	Americium-241	-0.657 ± 13.8	24.2	11.7	NE	U	BD	095205-033	EPA 901.1
21-Jan-14	Cesium-137	-0.509 ± 1.77	3.11	1.48	NE	U	BD	095205-033	EPA 901.1
	Cobalt-60	3.22 ± 3.69	3.75	1.76	NE	U	BD	095205-033	EPA 901.1
	Potassium-40	10.3 ± 36.5	28.4	13.0	NE	U	BD	095205-033	EPA 901.1
	Gross Alpha	5.18	NA	NA	15 pCi/L	NA	None	095205-034	EPA 900.0
	Gross Beta	3.24 ± 1.32	0.993	0.463	4 mrem/yr		J	095205-034	EPA 900.0
	Uranium-233/234	20.5 ± 2.72	0.0745	0.0291	NE			095205-035	HASL-300
	Uranium-235/236	0.260 ± 0.0968	0.0671	0.0235	NE			095205-035	HASL-300
	Uranium-238	3.86 ± 0.580	0.0467	0.0152	NE			095205-035	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 2014

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	14.7 ± 11.2	14.8	4.77	NE	U	BD	095733-033	EPA 901.1
14-Apr-14	Cesium-137	-2.74 ± 4.03	5.38	2.61	NE	U	BD	095733-033	EPA 901.1
	Cobalt-60	0.336 ± 3.31	5.78	2.76	NE	U	BD	095733-033	EPA 901.1
	Potassium-40	23.8 ± 60.1	71.8	34.6	NE	U	BD	095733-033	EPA 901.1
	Gross Alpha	-2.77	NA	NA	15 pCi/L	NA	None	095733-034	EPA 900.0
	Gross Beta	1.52 ± 0.931	0.954	0.453	4 mrem/yr		J	095733-034	EPA 900.0
	Uranium-233/234	16.9 ± 2.19	0.0959	0.0415	NE			095733-035	HASL-300
	Uranium-235/236	0.366 ± 0.105	0.0686	0.0263	NE			095733-035	HASL-300
	Uranium-238	3.50 ± 0.507	0.0796	0.0333	NE			095733-035	HASL-300
OBS-MW2	Americium-241	1.54 ± 12.9	22.2	10.9	NE	U	BD	095736-033	EPA 901.1
15-Apr-14	Cesium-137	0.653 ± 3.89	5.93	2.86	NE	U	BD	095736-033	EPA 901.1
	Cobalt-60	-0.197 ± 4.24	6.39	3.02	NE	U	BD	095736-033	EPA 901.1
	Potassium-40	-42.4 ± 55.5	72.8	34.6	NE	U	BD	095736-033	EPA 901.1
	Gross Alpha	13.74	NA	NA	15 pCi/L	NA	None	095736-034	EPA 900.0
	Gross Beta	6.05 ± 1.41	1.14	0.546	4 mrem/yr		J	095736-034	EPA 900.0
	Uranium-233/234	21.3 ± 2.63	0.0487	0.0211	NE			095736-035	HASL-300
	Uranium-235/236	0.381 ± 0.0813	0.0349	0.0134	NE			095736-035	HASL-300
	Uranium-238	4.28 ± 0.558	0.0404	0.0169	NE			095736-035	HASL-300
OBS-MW3	Americium-241	-1.77 ± 19.5	29.2	14.3	NE	U	BD	095741-033	EPA 901.1
16-Apr-14	Cesium-137	1.22 ± 2.91	4.35	2.10	NE	U	BD	095741-033	EPA 901.1
	Cobalt-60	0.0547 ± 2.69	4.68	2.23	NE	U	BD	095741-033	EPA 901.1
	Potassium-40	13.2 ± 46.5	59.1	28.4	NE	U	BD	095741-033	EPA 901.1
	Gross Alpha	10.16	NA	NA	15 pCi/L	NA	None	095741-034	EPA 900.0
	Gross Beta	4.07 ± 1.33	0.986	0.469	4 mrem/yr		J	095741-034	EPA 900.0
	Uranium-233/234	20.5 ± 2.56	0.0549	0.0237	NE			095741-035	HASL-300
	Uranium-235/236	0.371 ± 0.0841	0.0393	0.0151	NE			095741-035	HASL-300
	Uranium-238	4.07 ± 0.541	0.0455	0.0191	NE			095741-035	HASL-300
OBS-MW3 (Duplicate)	Americium-241	6.06 ± 15.1	24.2	11.9	NE	U	BD	095742-033	EPA 901.1
16-Apr-14	Cesium-137	-0.369 ± 2.37	3.45	1.66	NE	U	BD	095742-033	EPA 901.1
	Cobalt-60	-0.252 ± 2.62	4.01	1.91	NE	U	BD	095742-033	EPA 901.1
	Potassium-40	-40 ± 39.4	45.4	21.7	NE	U	BD	095742-033	EPA 901.1
	Gross Alpha	7.03	NA	NA	15 pCi/L	NA	None	095742-034	EPA 900.0
	Gross Beta	5.16 ± 1.29	1.32	0.639	4 mrem/yr		J	095742-034	EPA 900.0
	Uranium-233/234	20.7 ± 2.62	0.0607	0.0263	NE			095742-035	HASL-300
	Uranium-235/236	0.355 ± 0.0858	0.0434	0.0167	NE			095742-035	HASL-300
	Uranium-238	4.02 ± 0.545	0.0504	0.0211	NE			095742-035	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 2014

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	10.4 ± 8.49	10.4	4.33	NE	U	BD	096255-033	EPA 901.1
16-Jul-14	Cesium-137	-0.0433 ± 3.68	5.39	2.61	NE	U	BD	096255-033	EPA 901.1
	Cobalt-60	-0.228 ± 3.09	5.36	2.55	NE	U	BD	096255-033	EPA 901.1
	Potassium-40	-28.3 ± 46.9	61.1	29.2	NE	U	BD	096255-033	EPA 901.1
	Gross Alpha	-2.89	NA	NA	15 pCi/L	NA	None	096255-034	EPA 900.0
	Gross Beta	7.11 ± 1.81	2.06	1.01	4 mrem/yr			096255-034	EPA 900.0
	Uranium-233/234	17.3 ± 2.17	0.0676	0.0301	NE			096255-035	HASL-300
	Uranium-235/236	0.175 ± 0.054	0.0407	0.0158	NE			096255-035	HASL-300
	Uranium-238	3.21 ± 0.436	0.0603	0.0265	NE			096255-035	HASL-300
OBS-MW1 (Duplicate)	Americium-241	15.9 ± 23.2	35.7	17.5	NE	U	BD	096256-033	EPA 901.1
16-Jul-14	Cesium-137	0.146 ± 2.88	4.37	2.11	NE	U	BD	096256-033	EPA 901.1
	Cobalt-60	1.33 ± 2.83	4.96	2.36	NE	U	BD	096256-033	EPA 901.1
	Potassium-40	-20 ± 46.0	60.5	29.0	NE	U	BD	096256-033	EPA 901.1
	Gross Alpha	-2.36	NA	NA	15 pCi/L	NA	None	096256-034	EPA 900.0
	Gross Beta	7.35 ± 1.82	1.91	0.930	4 mrem/yr			096256-034	EPA 900.0
	Uranium-233/234	17.9 ± 2.22	0.0608	0.0271	NE			096256-035	HASL-300
	Uranium-235/236	0.209 ± 0.0563	0.0366	0.0142	NE			096256-035	HASL-300
	Uranium-238	3.25 ± 0.433	0.0543	0.0238	NE			096256-035	HASL-300
OBS-MW2	Americium-241	21.9 ± 18.6	24.5	12.1	NE	U	BD	096251-033	EPA 901.1
15-Jul-14	Cesium-137	-3.42 ± 3.70	4.11	2.00	NE	U	BD	096251-033	EPA 901.1
	Cobalt-60	-0.897 ± 3.41	3.84	1.83	NE	U	BD	096251-033	EPA 901.1
	Potassium-40	53.1 ± 62.2	35.0	16.7	NE	X	R	096251-033	EPA 901.1
	Gross Alpha	6.34	NA	NA	15 pCi/L	NA	None	096251-R34	EPA 900.0
	Gross Beta	9.14 ± 1.92	1.64	0.798	4 mrem/yr		J	096251-R34	EPA 900.0
	Uranium-233/234	22.6 ± 3.07	0.392	0.171	NE			096251-R35	HASL-300
	Uranium-235/236	0.357 ± 0.227	0.288	0.114	NE		J	096251-R35	HASL-300
	Uranium-238	4.10 ± 0.744	0.227	0.0892	NE			096251-R35	HASL-300
OBS-MW3	Americium-241	-1.66 ± 10.8	18.4	9.06	NE	U	BD	096259-033	EPA 901.1
17-Jul-14	Cesium-137	0.233 ± 2.11	3.15	1.52	NE	U	BD	096259-033	EPA 901.1
	Cobalt-60	-4.19 ± 3.35	3.32	1.58	NE	U	BD	096259-033	EPA 901.1
	Potassium-40	13.4 ± 42.0	31.8	15.1	NE	U	BD	096259-033	EPA 901.1
	Gross Alpha	10.99	NA	NA	15 pCi/L	NA	None	096259-034	EPA 900.0
	Gross Beta	6.66 ± 1.49	1.20	0.580	4 mrem/yr			096259-034	EPA 900.0
	Uranium-233/234	20.9 ± 2.63	0.0707	0.0315	NE			096259-035	HASL-300
	Uranium-235/236	0.258 ± 0.0685	0.0425	0.0165	NE			096259-035	HASL-300
	Uranium-238	3.85 ± 0.518	0.0631	0.0277	NE			096259-035	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 2014

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	-2.95 ± 7.02	11.8	5.75	NE	U	BD	096653-033	EPA 901.1
06-Oct-14	Cesium-137	-0.302 ± 3.41	3.41	1.64	NE	U	BD	096653-033	EPA 901.1
	Cobalt-60	-0.133 ± 1.82	3.17	1.48	NE	U	BD	096653-033	EPA 901.1
	Potassium-40	41.4 ± 39.0	30.4	14.2	NE		J	096653-033	EPA 901.1
	Gross Alpha	7.13	NA	NA	15 pCi/L	NA	None	096653-034	EPA 900.0
	Gross Beta	5.79 ± 1.47	1.64	0.795	4 mrem/yr		J	096653-034	EPA 900.0
	Uranium-233/234	16.3 ± 2.12	0.104	0.0465	NE			096653-035	HASL-300
	Uranium-235/236	0.220 ± 0.0754	0.0729	0.0295	NE			096653-035	HASL-300
	Uranium-238	2.75 ± 0.406	0.0555	0.0221	NE			096653-035	HASL-300
OBS-MW2	Americium-241	-10.8 ± 17.6	29.4	14.3	NE	U	BD	096658-033	EPA 901.1
07-Oct-14	Cesium-137	-0.468 ± 2.27	3.93	1.87	NE	U	BD	096658-033	EPA 901.1
	Cobalt-60	2.21 ± 3.01	4.84	2.27	NE	U	BD	096658-033	EPA 901.1
	Potassium-40	9.73 ± 54.6	42.9	20.0	NE	U	BD	096658-033	EPA 901.1
	Gross Alpha	-0.81	NA	NA	15 pCi/L	NA	None	096658-034	EPA 900.0
	Gross Beta	6.76 ± 1.50	1.38	0.669	4 mrem/yr		J	096658-034	EPA 900.0
	Uranium-233/234	21.7 ± 2.77	0.0836	0.0373	NE			096658-035	HASL-300
	Uranium-235/236	0.345 ± 0.0863	0.0585	0.0237	NE			096658-035	HASL-300
	Uranium-238	4.27 ± 0.585	0.0445	0.0178	NE			096658-035	HASL-300
OBS-MW2 (Duplicate)	Americium-241	-0.956 ± 6.74	10.4	5.10	NE	U	BD	096659-033	EPA 901.1
07-Oct-14	Cesium-137	1.59 ± 2.14	3.63	1.75	NE	U	BD	096659-033	EPA 901.1
	Cobalt-60	-0.696 ± 2.88	3.62	1.71	NE	U	BD	096659-033	EPA 901.1
	Potassium-40	-35.6 ± 38.2	46.5	22.2	NE	U	BD	096659-033	EPA 901.1
	Gross Alpha	2.41	NA	NA	15 pCi/L	NA	None	096659-034	EPA 900.0
	Gross Beta	7.12 ± 1.70	1.81	0.880	4 mrem/yr		J	096659-034	EPA 900.0
	Uranium-233/234	22.4 ± 2.88	0.0877	0.0391	NE			096659-035	HASL-300
	Uranium-235/236	0.693 ± 0.139	0.0614	0.0249	NE			096659-035	HASL-300
	Uranium-238	4.60 ± 0.631	0.0467	0.0186	NE			096659-035	HASL-300
OBS-MW3	Americium-241	3.56 ± 5.80	9.83	4.81	NE	U	BD	096661-033	EPA 901.1
08-Oct-14	Cesium-137	-0.854 ± 1.92	3.24	1.56	NE	U	BD	096661-033	EPA 901.1
	Cobalt-60	-0.454 ± 1.90	3.32	1.56	NE	U	BD	096661-033	EPA 901.1
	Potassium-40	40.8 ± 44.8	33.6	15.8	NE	X	R	096661-033	EPA 901.1
	Gross Alpha	4.59	NA	NA	15 pCi/L	NA	None	096661-034	EPA 900.0
	Gross Beta	7.31 ± 1.61	1.44	0.698	4 mrem/yr		J	096661-034	EPA 900.0
	Uranium-233/234	21.6 ± 2.78	0.0863	0.0385	NE			096661-035	HASL-300
	Uranium-235/236	0.330 ± 0.0859	0.0604	0.0245	NE			096661-035	HASL-300
	Uranium-238	4.18 ± 0.577	0.046	0.0183	NE			096661-035	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 2014

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	20-Jan-14	15.81	427.6	270.1	7.51	0.52	36.2	3.58
OBS-MW2	22-Jan-14	15.61	420.1	301.2	7.51	0.12	34.6	3.44
OBS-MW3	21-Jan-14	16.30	427.6	290.8	7.51	0.46	44.8	4.47
OBS-MW1	14-Apr-14	14.56	462.2	-199.9	7.54	0.31	36.4	3.71
OBS-MW2	15-Apr-14	16.14	464.0	189.7	7.52	0.19	36.2	3.55
OBS-MW3	16-Apr-14	16.7	471.0	197.7	7.56	0.24	46.6	4.52
OBS-MW1	16-Jul-14	18.09	479.1	301.3	7.40	0.41	37.9	3.58
OBS-MW2	15-Jul-14	18.10	473.8	291.1	7.38	0.28	37.1	3.50
OBS-MW3	17-Jul-14	19.00	484.6	303.6	7.39	0.56	47.3	4.38
OBS-MW1	06-Oct-14	17.89	511.0	298.8	7.27	0.22	38.8	3.66
OBS-MW2	07-Oct-14	18.70	517.1	301.1	7.22	0.23	37.3	3.47
OBS-MW3	08-Oct-14	17.46	503.1	254.0	7.21	0.18	46.9	4.48

Refer to footnotes on page 10A-39.

This page intentionally left blank

Footnotes for Solid Waste Management Unit 68 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	= Identification.
µg/L	= Micrograms per liter.
mg/L	= Milligrams per liter.
mrem/yr	= Millirem per year.
MW	= Monitoring well.
OBS	= Old Burn Site.
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 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.

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.
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.
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.
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.

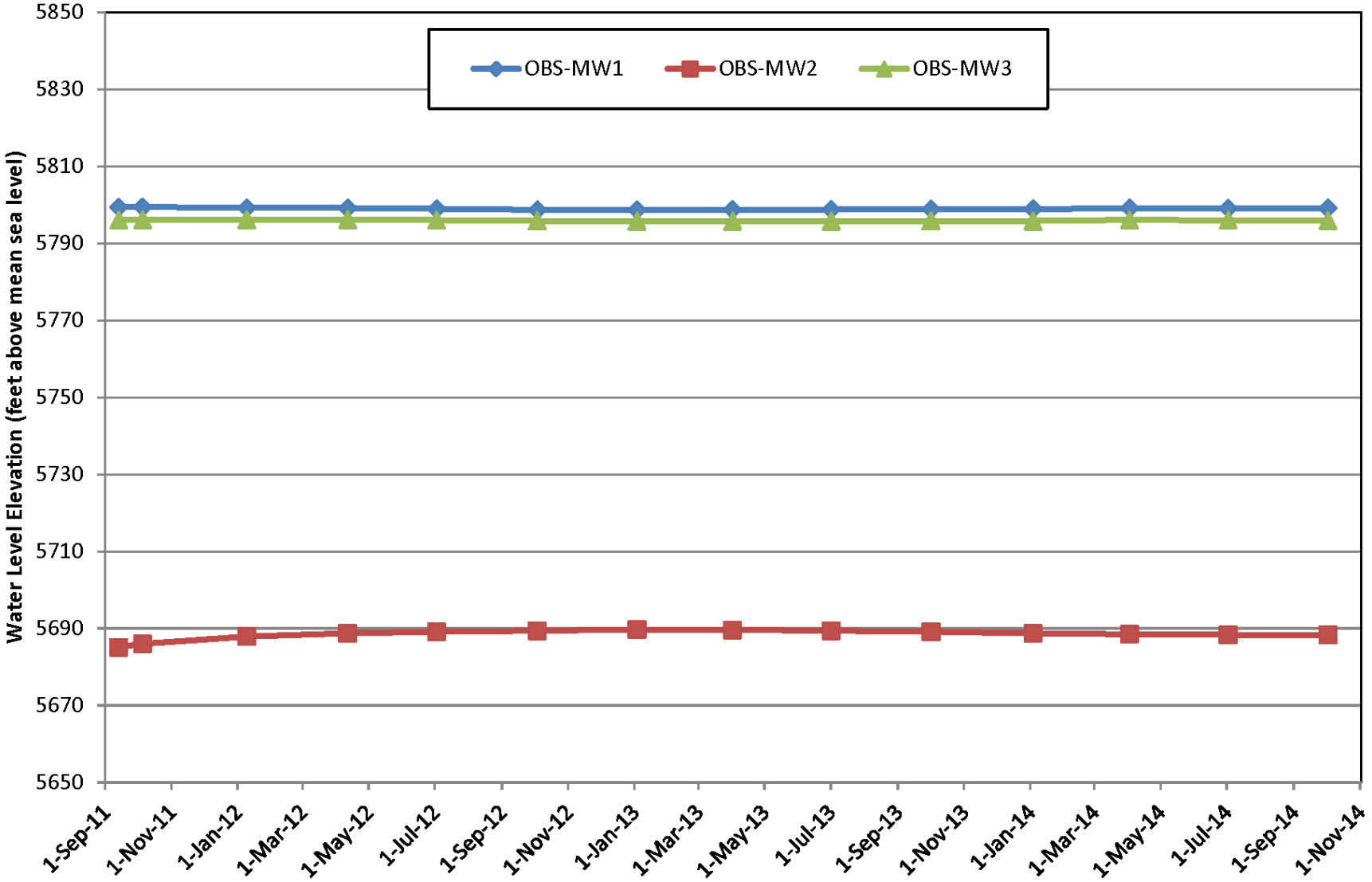


Figure 10B-1. SWMU 68 Study Area Wells

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).

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 (i.e., cholla, pincushion, strawberry, and prickly pear), and bunch grasses (i.e., 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 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).

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.

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 was 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 3 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 sampled as part of LTS.	SNL September 2012
February	2012	Monitoring well CTF-MW1 sampled as part of LTS.	SNL January 2012
January	2013	Monitoring well CTF-MW1 sampled as part of LTS.	SNL December 2012
January	2014	Monitoring well CTF-MW1 sampled as part of LTS.	SNL January 2014

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.
IT = International Technology Corporation.
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.
SNL/NM = Sandia National Laboratories, New Mexico.
SWMU = Solid Waste Management Unit.

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 stormwater 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 2014 Activities

The following activities were conducted for the SWMU 116 monitoring effort during Calendar Year (CY) 2014 (January through December 2014):

- Annual groundwater sampling was conducted at monitoring well CTF-MW1 in January 2014.
- 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

NMED approved completion of corrective action at SWMU 116 in conjunction with renewal of the Resource Conservation and Recovery Act (RCRA) Facility Operating Permit (Permit) (NMED December 2014). No long-term controls are needed, and no future sampling activities are planned at SWMU 116.

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.

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 (i.e., 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.

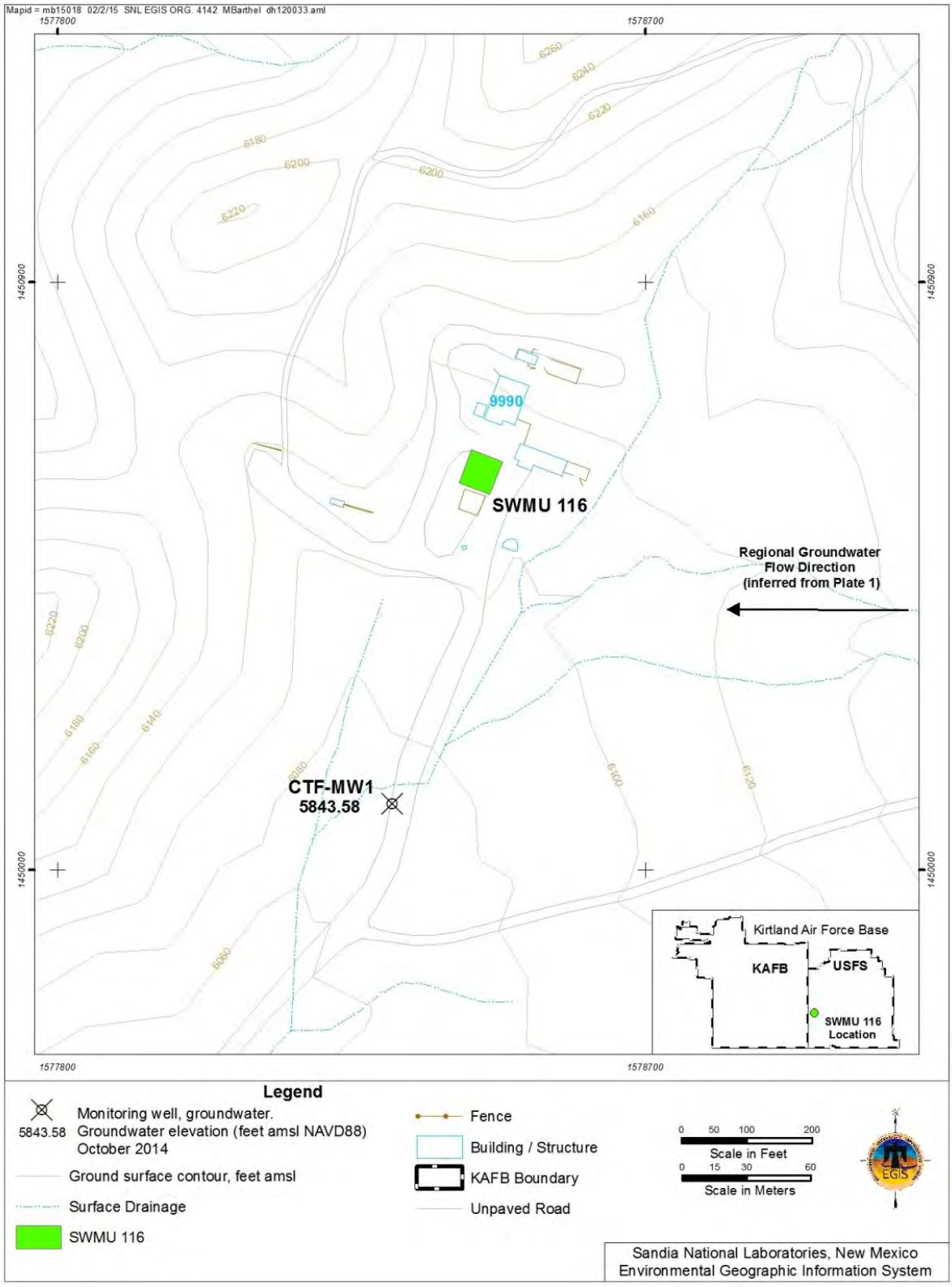


Figure 11-1. Location and Groundwater Elevation at SWMU 116

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 1914 through 2013, was 8.65 inches per year (WRCC-DRI 2015). The station is located 10 miles northwest of 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, resulting in minimal groundwater recharge. 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

Well ID	Ground Surface Elevation (ft amsl)	Depth of Screened Interval (ft bgs)	Elevation for Top of Screen (ft amsl)	Potentiometric Surface, October 2014 (ft amsl)	Mid-Point Screen Elevation (ft amsl)	Approximate Pressure Head (ft[a])
CTF-MW1	6,079.70	240 – 260	5,839.70	5,843.58	5,829.70	14

NOTES:
[a]From mid-point of screen.
amsl = Above mean sea level.
bgs = Below ground surface.
CTF = Coyote Test Field.
ft = Foot (feet).
ID = Identification.
MW = Monitoring Well.
SWMU = Solid Waste Management Unit.

The October 2014 groundwater elevation at monitoring well CTF-MW1 was 5,843.58 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 most likely 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 2014, the overall trend was downward. For the last five years, the water level in monitoring well CTF-MW1 has declined at approximately 0.5 foot per year. Groundwater most likely 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 May 2009) in the CY 2014 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 regulations mandated by 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* (EPA August 1993). All corrective action requirements pertaining to SWMUs and AOCs are contained in the Compliance Order on Consent (the

Consent Order) between the U.S. Department of Energy (DOE), Sandia Corporation (Sandia), and NMED (April 2004).

The DOE/National Nuclear Security Administration (NNSA) and Sandia received a letter from the NMED dated April 8, 2010, entitled *Class III 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 Consent 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 2014

Date of Sampling Event	Wells Sampled	SAP
January 2014	CTF-MW1	*SWMU 49 and 116 Groundwater Monitoring, Mini-SAP for Fiscal Year 2014 Annual Sampling* (SNL January 2014)

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, equipment blank (EB), and trip blank (TB) samples. A duplicate environmental and an EB sample was collected at monitoring well CTF-MW1 during the CY 2014 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).

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).

Table 11-4. Parameters Sampled at SWMU 116

Parameter	January 2014
Alkalinity (total, bicarbonate, carbonate) Anions Cations HE Compounds NPN Perchlorate TAL Metals, plus Total Uranium Total Cyanide VOCs	CTF-MW1 CTF-MW1 (duplicate)

NOTES:
CTF = Coyote Test Field.
HE = High explosive.
MW = Monitoring Well.
NPN = Nitrate plus nitrate.
SWMU = Solid Waste Management Unit.
TAL = Target Analyte List.
VOC = Volatile organic compound.

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 2014 SWMU 116 sampling event are presented in Tables 11A-1 through 11A-8 (Attachment 11A). Data qualifiers are explained in the footnotes following Table 11A-8.

One VOC (1,1,2-trichloro-1,2,2-trifluoroethane) was detected in the CTF-MW1 environmental and environmental duplicate samples at concentrations of 13.9 micrograms per liter (µg/L) and 13.6 µg/L, respectively. Results are 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 above MDLs. The MDLs for all analyzed HE compounds are listed in Table 11A-3 (Attachment 11A).

The analytical result for NPN is presented in Table 11A-4 (Attachment 11A). No NPN result exceeded the MCL of 10 milligrams per liter (mg/L). For CY 2014, NPN was reported at concentrations of 8.78 mg/L and 9.16 mg/L in the CTF-MW1 environmental and environmental duplicate samples.

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 µg/L (NMED April 2004).

Total metal results are presented in Table 11A-7 (Attachment 11A). No metals exceed 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-8 (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 Table 11A-1 and Tables 11A-4 through 11A-7 (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 for any QC did not exceed established MCLs.

A duplicate environmental sample was collected at CTF-MW1 and analyzed in order to estimate the overall reproducibility of the sampling and analytical process. 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 parameters. Relative percent difference (RPD) calculations, between duplicate samples, were performed for detected chemical analytes. The January 2014 duplicate sample data results show good agreement (low RPD values < 20 percent for organic compounds and < 35 percent for inorganic analyses) for all calculated parameters.

An EB sample was collected prior to sampling monitoring well CTF-MW1, and submitted for all analyses. Acetone, bromodichloromethane, bromoform, chloroform, dibromochloromethane, chloride, and copper were detected above the laboratory MDLs. With the exception of copper, no corrective action was necessary since analytes were not detected in environmental samples, or were detected in environmental samples at concentrations greater than five times the EB result. Copper was qualified as not detected in both the CTF-MW1 environmental and environmental duplicate samples during data validation, because copper was reported in the EB sample at a concentration greater than associated environmental samples.

No VOCs were detected above laboratory MDLs in any TB 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 January 2014), 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, and all data are determined as acceptable and reported QC measures appear adequate. Data validation qualifiers are provided with the analytical results in 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, and the current conceptual model.

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. One monitoring well at SWMU 116 (CTF-MW1) was sampled in January 2014, 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 May 2009). No parameters were detected above established MCLs in the groundwater samples.

The analytical results for CY 2014 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.

Annual groundwater monitoring at SWMU 116 will be discontinued. NMED approved completion of corrective action at SWMU 116 in conjunction with renewal of the Permit (NMED December 2014). No long-term controls are needed, and no future sampling activities are planned at SWMU 116.

11.10 References

EPA May 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 August 1993 U.S. Environmental Protection Agency (EPA), August 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,* Region 6, U.S. Environmental Protection Agency, Dallas, Texas.

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 December 2014 New Mexico Environment Department (NMED), December 2014. *Final Order, State of New Mexico Before the Secretary of the Environment in the Matter of the Renewal of Hazardous Waste Permit EPA ID Number NM5890110518 and Granting of Corrective Action Complete Status for Certain Solid Waste Management Units and Areas of Concern at Sandia National Laboratories.* No. HWB 14-01(P). New Mexico Environment Department, Santa Fe, New Mexico.

NMED April 2010 New Mexico Environment Department (NMED), April 2010. *Class III 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.

SNL January 2014 Sandia National Laboratories, New Mexico (SNL/NM), January 2014. *SWMU 49 and 116 Groundwater Monitoring, Mini-SAP for Fiscal Year 2014 Annual Sampling*. Environmental Restoration Operations, Sandia National Laboratories, New Mexico, January 14.

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 2015 Western Regional Climate Center - Desert Research Institute, 2015. *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 January 13, 2015.

This page intentionally left blank.

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 2014 ..... 11A-5

11A-2 Method Detection Limits for Volatile Organic Compounds (EPA Method SW846-8260B), Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 11A-6

11A-3 Method Detection Limits for High Explosive Compounds (EPA Method SW846-8321A), Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 11A-7

11A-4 Summary of Nitrate plus Nitrite Results, Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 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 2014 ..... 11A-9

11A-6 Summary of Perchlorate Results, Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 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 2014 ..... 11A-11

11A-8 Summary of Field Water Quality Measurements, Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 11A-13

Footnotes for Solid Waste Management Unit 116 Analytical Results 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 2014

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 29-Jan-14	1,1,2-Trichloro-1,2,2-trifluoroethane	13.9	1.50	5.00	NE			095246-001	SW846-8260B
CTF-MW1 (Duplicate) 29-Jan-14	1,1,2-Trichloro-1,2,2-trifluoroethane	13.6	1.50	5.00	NE			095247-001	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 2014

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 2014

Analyte	MDL[b] (µg/L)
1,3,5-Trinitrobenzene	0.0860–0.0870
1,3-Dinitrobenzene	0.0860–0.0870
2,4,6-Trinitrotoluene	0.0860–0.0870
2,4-Dinitrotoluene	0.0860–0.0870
2,6-Dinitrotoluene	0.0860–0.0870
2-Amino-4,6-dinitrotoluene	0.0860–0.0870
2-Nitrotoluene	0.0882–0.0891
3-Nitrotoluene	0.0860–0.0870
4-Amino-2,6-dinitrotoluene	0.0860–0.0870
4-Nitrotoluene	0.161–0.163
HMX	0.0860–0.0870
Nitro-benzene	0.0860–0.0870
Pentaerythritol tetranitrate	0.108–0.109
RDX	0.0860–0.0870
Tetryl	0.0860–0.0870

Refer to footnotes on page 11A-15.

Table 11A-4
Summary of Nitrate plus Nitrite Results,
Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 29-Jan-14	Nitrate plus nitrite	8.78	0.170	0.500	10.0			095246-018	EPA 353.2
CTF-MW1 (Duplicate) 29-Jan-14	Nitrate plus nitrite	9.16	0.170	0.500	10.0			095247-018	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 2014

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	203	0.725	1.00	NE			095246-022	SM2320B
29-Jan-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095246-022	SM2320B
	Bromide	0.620	0.067	0.200	NE			095246-016	SW846 9056
	Chloride	41.9	0.670	2.00	NE			095246-016	SW846 9056
	Fluoride	1.45	0.033	0.100	4.0			095246-016	SW846 9056
	Sulfate	87.3	1.33	4.00	NE			095246-016	SW846 9056
	Calcium	95.9	0.600	2.00	NE	B		095246-017	SW846 6020
	Magnesium	19.2	0.010	0.030	NE			095246-017	SW846 6020
	Potassium	1.81	0.080	0.300	NE			095246-017	SW846 6020
	Sodium	34.0	0.080	0.250	NE		J	095246-017	SW846 6020
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	095246-027	SW846 9012B
CTF-MW1 (Duplicate)	Bicarbonate Alkalinity	203	0.725	1.00	NE			095247-022	SM2320B
29-Jan-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095247-022	SM2320B
	Bromide	0.607	0.067	0.200	NE			095247-016	SW846 9056
	Chloride	41.8	0.670	2.00	NE			095247-016	SW846 9056
	Fluoride	1.45	0.033	0.100	4.0			095247-016	SW846 9056
	Sulfate	87.2	0.133	0.400	NE			095247-016	SW846 9056
	Calcium	98.3	0.600	2.00	NE	B		095247-017	SW846 6020
	Magnesium	18.6	0.010	0.030	NE			095247-017	SW846 6020
	Potassium	1.82	0.080	0.300	NE			095247-017	SW846 6020
	Sodium	32.6	0.080	0.250	NE		J	095247-017	SW846 6020
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	095247-027	SW846 9012B

Refer to footnotes on page 11A-15.

Table 11A-6
Summary of Perchlorate Results,
Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 29-Jan-14	ND	0.004	0.012	NE	U	UJ	095246-020	EPA 314.0
CTF-MW1 (Duplicate) 29-Jan-14	ND	0.004	0.012	NE	U	UJ	095247-020	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 2014

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		095246-009	SW846 6020
29-Jan-14	Antimony	ND	0.001	0.003	0.006	U		095246-009	SW846 6020
	Arsenic	0.00259	0.0017	0.005	0.010	J		095246-009	SW846 6020
	Barium	0.0434	0.0006	0.002	2.00			095246-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095246-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095246-009	SW846 6020
	Calcium	96.3	0.600	2.00	NE	B		095246-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095246-009	SW846 6020
	Cobalt	0.000296	0.0001	0.001	NE	J		095246-009	SW846 6020
	Copper	0.000702	0.00035	0.001	NE	J	0.0036U	095246-009	SW846 6020
	Iron	0.238	0.033	0.100	NE			095246-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095246-009	SW846 6020
	Magnesium	17.8	0.010	0.030	NE			095246-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095246-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095246-009	SW846 7470
	Nickel	0.00145	0.0005	0.002	NE	J		095246-009	SW846 6020
	Potassium	1.88	0.080	0.300	NE			095246-009	SW846 6020
	Selenium	0.00501	0.0015	0.005	0.050			095246-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095246-009	SW846 6020
	Sodium	32.6	0.080	0.250	NE		J	095246-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095246-009	SW846 6020
	Uranium	0.010	0.000067	0.0002	0.03			095246-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095246-009	SW846 6010
	Zinc	0.00409	0.0035	0.010	NE	B, J	0.018U	095246-009	SW846 6020

Refer to footnotes on page 11A-15.

Table 11A-7 *(Concluded)*
Summary of Target Analyte List Metals and Uranium Results,
Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		095247-009	SW846 6020
29-Jan-14	Antimony	ND	0.001	0.003	0.006	U		095247-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095247-009	SW846 6020
	Barium	0.0446	0.0006	0.002	2.00			095247-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095247-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095247-009	SW846 6020
	Calcium	95.2	0.600	2.00	NE	B		095247-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095247-009	SW846 6020
	Cobalt	0.000292	0.0001	0.001	NE	J		095247-009	SW846 6020
	Copper	0.000648	0.00035	0.001	NE	J	0.0036U	095247-009	SW846 6020
	Iron	0.237	0.033	0.100	NE			095247-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095247-009	SW846 6020
	Magnesium	19.3	0.010	0.030	NE			095247-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		095247-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095247-009	SW846 7470
	Nickel	0.00145	0.0005	0.002	NE	J		095247-009	SW846 6020
	Potassium	1.99	0.080	0.300	NE			095247-009	SW846 6020
	Selenium	0.00472	0.0015	0.005	0.050	J		095247-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095247-009	SW846 6020
	Sodium	31.8	0.080	0.250	NE		J	095247-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095247-009	SW846 6020
	Uranium	0.010	0.000067	0.0002	0.03			095247-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095247-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		095247-009	SW846 6020

Refer to footnotes on page 11A-15.

Table 11A-8
Summary of Field Water Quality Measurements[h],
Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	29-Jan-14	16.55	527.7	304.9	7.46	0.24	71.7	6.97

Refer to footnotes on page 11A-15.

This page intentionally left blank.

Footnotes for Solid Waste Management Unit 116 Analytical Results Tables

CTF = Coyote Test Field.
HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
ID = Identification..
MW = Monitoring well.
No. = Number.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
Tetryl = Methyl-2,4,6-trinitrophenylnitramine.

[a]Result
Values in bold exceed the established MCL.
ND = Not detected (at method detection limit).
µg/L = Micrograms per liter
mg/L = Milligrams per liter

[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. Established by the U.S. Environmental Protection Agency (EPA) 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 = Estimated value; the analyte concentration fell above the effective MDL and below the effective 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.
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.
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.

[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).

This page intentionally left blank.

Attachment 11B
Solid Waste Management Unit 116
Hydrographs

This page intentionally left blank.

Attachment 11B Hydrographs

11B-1 Solid Waste Management Unit 116 Study Area Well 11B-5

This page intentionally left blank.

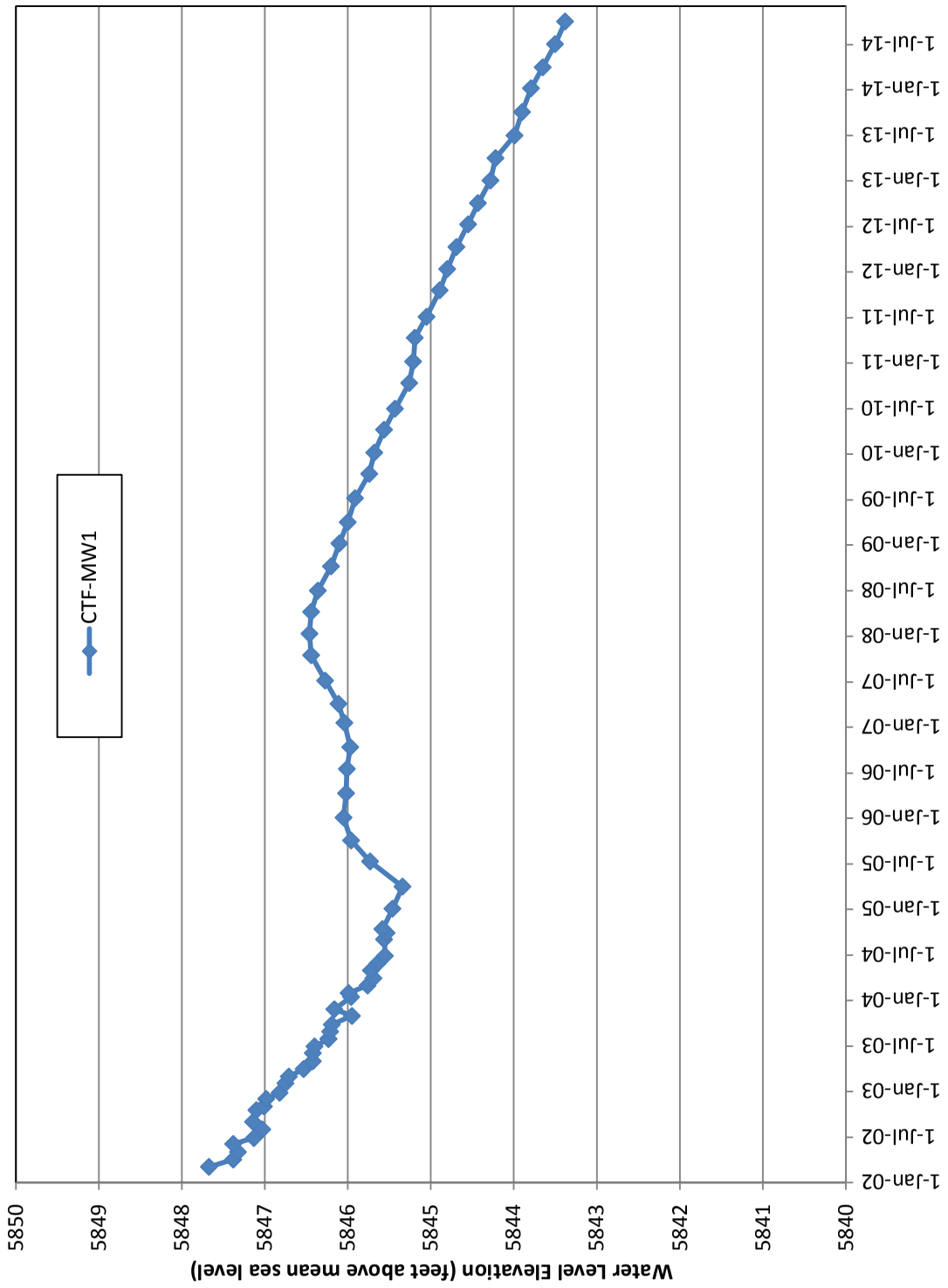


Figure 11B-1. Solid Waste Management Unit 116 Study Area Well

This page intentionally left blank.

12.0 Solid Waste Management Unit 149

12.1 Introduction

This chapter summarizes Calendar Year (CY) 2014 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).

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 Consent Order) (New Mexico Environment Department [NMED] April 2004) and the letter dated April 8, 2010, from the NMED Hazardous Waste Bureau (NMED April 2010).

Monitoring well CTF-MW3 was sampled on March 14, June 14, and September 14, 2014. In October 2014, the U.S. Department of Energy (DOE) and Sandia Corporation (Sandia) notified NMED that groundwater monitoring at SWMU 149 had been completed and would be discontinued (SNL October 2014). The CY 2014 groundwater samples were collected in accordance with the NMED-approved Sampling and Analysis Plan (SAP) (SNL June 2010) and Mini-SAPs (SNL February 2014, June 2014a, and August 2014). 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 2014 groundwater samples were compared with the U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) for drinking water (EPA May 2009). No analytical results for the monitoring well CTF-MW3 groundwater samples exceed the corresponding MCLs.

The eighth quarter of groundwater monitoring required by NMED (NMED April 2010) occurred on December 14, 2012 (SNL September 2013). The fourteenth and final quarterly groundwater sampling event at SWMU 149 occurred on September 12, 2014. All NMED requirements for groundwater monitoring at SWMU 149 have been met.

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/National Nuclear Security Administration (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).

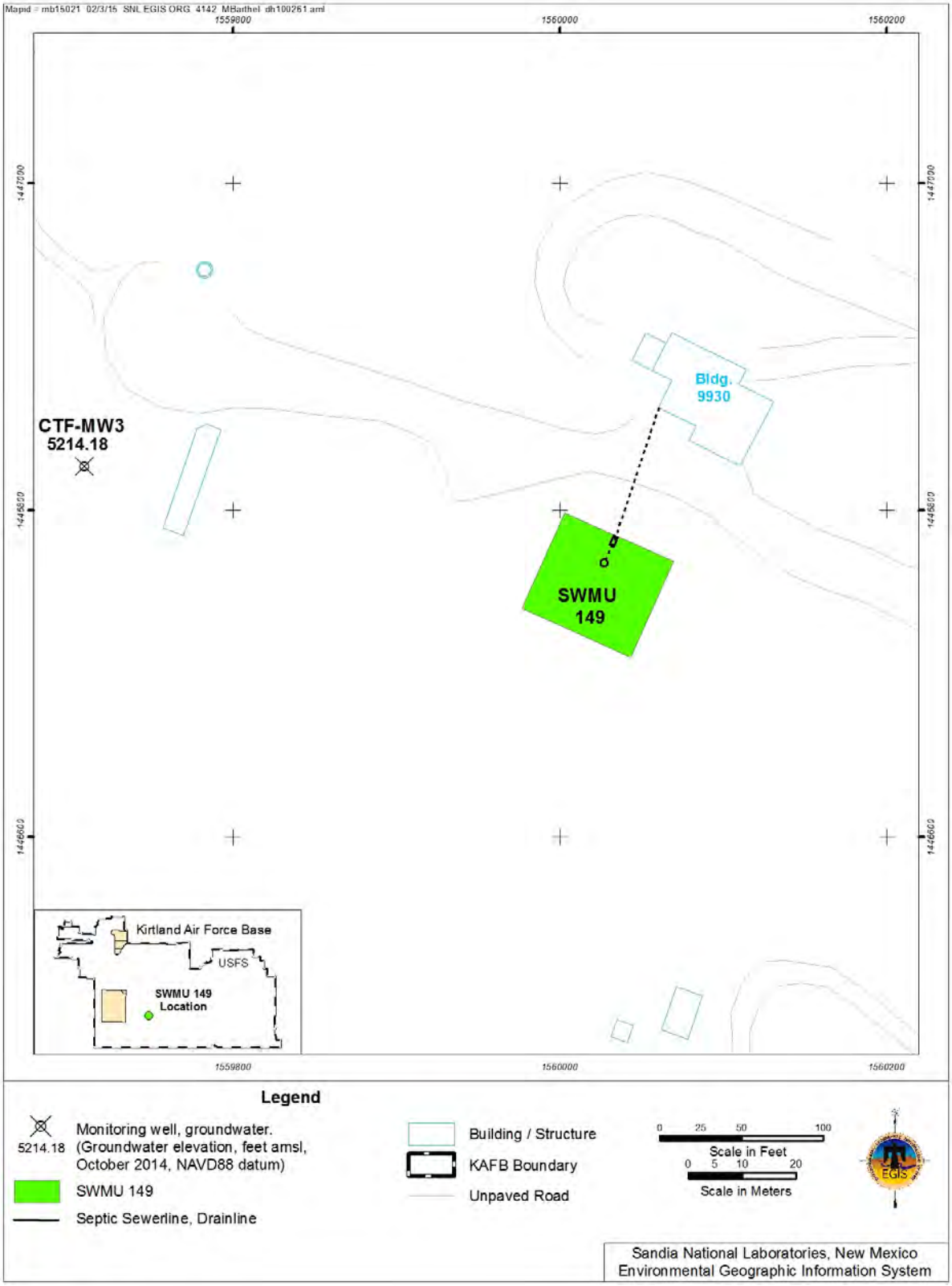


Figure 12-1. Location of Monitoring Well CTF-MW3 near SWMU 149

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. A downgradient groundwater monitoring well would be required if samples could not be collected as specified in the SAP (SNL October 1999). 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 3 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 the third quarter of CY 2014. The CY 2014 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™ 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	Revised Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report, Revised February 1998 contained a description of SWMU 149 hydrogeology that was 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

Refer to footnotes on page 12-5.

Table 12-1. Historical Timeline of SSWMU 149 *(Concluded)*

Month	Year	Event	Reference
June	2005	Third RSI response to RSI and CAC Proposal submitted to NMED.	SNL June 2005
September	2005	NMED issued Certificate of Completion for CAC without Controls for SWMU 149.	NMED September 2005
March	2006	Request for Class 3 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
October	2014	NMED was notified that groundwater monitoring at SWMU 149 has been completed, and was being discontinued.	SNL October 2014

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.
HI = High explosive.
IT = IT Corporation.
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. Fluoride detected is most likely naturally occurring and derived from Paleozoic and Precambrian bedrock (Skelly August 2013). 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 was monitored quarterly for VOCs, TAL metals, general chemistry parameters, perchlorate, and NPN.

12.1.5 Summary of Calendar Year 2014 Activities

The following activities for monitoring well CTF-MW3 near SWMU 149 occurred during CY 2014:

- Quarterly groundwater sampling was conducted at monitoring well CTF-MW3 in March, June, and September 2014 (SNL February 2014, June 2014a, and August 2014).

- Quarterly reporting of analytical results for monitoring well CTF-MW3 groundwater samples for the first three quarters of CY 2014.

- 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 2015:

- No groundwater sampling will be conducted at monitoring well CTF-MW3 in CY 2015 unless NMED requires additional sampling.

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 (i.e., 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 (i.e., 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) of the open borehole 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 2014 groundwater elevation was 5,214.18 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 was not excessive and the quantity of water produced was clearly adequate for typical groundwater sampling. Groundwater samples were collected using pneumatic (nitrogen gas) Bennett™ piston pumps.

Table 12-2. Lithologic and Hydrogeologic Elevation Data for Monitoring Well CTF-MW3 near SWMU 149

Well ID	Ground Surface Elevation (ft amsl)	Depth of Screened Interval (ft bgs)	Elevation for Top of Screen (ft amsl)	Potentiometric Surface, October 2014 (ft amsl)	Mid-Point Screen Elevation (ft amsl)	Pressure Head (ft[a])
CTF-MW3	5,519.80	340 – 360	5,179.80	5,214.18	5,169.80	45

NOTES:
[a]From mid-point of screen.
amsl = Above mean sea level.
bgs = Below ground surface.
CTF = Coyote Test Field.
ft = Foot (feet).
ID = Identification.
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, which has naturally calcium carbonate-filled fractures, likely 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. The groundwater level at well CTF-MW3 has steadily declined at approximately 0.7 ft per year. Groundwater underflow from the site most likely 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 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 2014, 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 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 Consent Order (NMED April 2004).

In March 2006, a Class 3 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 149 (NMED April 2010) in the form of an additional eight quarters of groundwater monitoring at monitoring well CTF-MW3. 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 resumed at monitoring well CTF-MW3 in CY 2011 (NMED April 2010). The eighth quarter of required groundwater monitoring was conducted in December 2012. In October 2014 DOE and Sandia notified NMED that after 14 quarters, groundwater monitoring at SWMU 149 had been completed and would be discontinued (SNL October 2014).

12.3 Scope of Activities

Groundwater monitoring sampling and analysis during CY 2014 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 2014

Date of Sampling Event	SAP
March 14, 2014	*SWMU 149 Groundwater Monitoring Mini-SAP for Second Quarter Fiscal Year 2014* (SNL February 2014)
June 27, 2014	*SWMU 149 Groundwater Monitoring Mini-SAP for Third Quarter Fiscal Year 2014* (SNL June 2014a)
September 12, 2014	*SWMU 149 Groundwater Monitoring Mini-SAP for Fourth Quarter Fiscal Year 2014* (SNL August 2014)

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 2014

Parameter	Sampling Period	
Anions	**March 2014**	**June 2014**
Alkalinity	CTF-MW3	CTF-MW3
NPN	CTF-MW3 (dup)	CTF-MW3 (dup)
Perchlorate		
TAL Metals	**September 2014**	
VOCs	CTF-MW3	

NOTES:
CTF = Coyote Test Field.
dup = Duplicate sample.
MW = Monitoring well.
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 Consent Order (NMED April 2004) addressing Section VII.D.6, and the NMED letter of April 8, 2010 (NMED April 2010), groundwater sampling was performed at SWMU 149. The CY 2014 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 February 2014, June 2014a, and August 2014).

Environmental groundwater samples were collected from monitoring well CTF-MW3 in March, June, and September 2014. 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.

The NMED DOE Oversight Bureau collected split samples with DOE/NNSA and Sandia during the June 2014 sampling event. The NMED DOE Oversight Bureau analytical results are not reported in this document, but are available through the DOE/NNSA Sandia Field Office.

12.5 Groundwater Elevation

Throughout CY 2014, 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 2014 are presented in Table 12-4.

12.7 Summary of Analytical Results

This section discusses analytical results and field measurements for the CY 2014 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 May 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 Customer Funded Record Center.

The analytical data were reviewed and qualified in accordance with SNL/NM Administrative Operating Procedure 00-03, *Data Validation Procedure for Chemical and Radiochemical Data, Revision 3 and Revision 4* (SNL May 2011, June 2014b). 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.

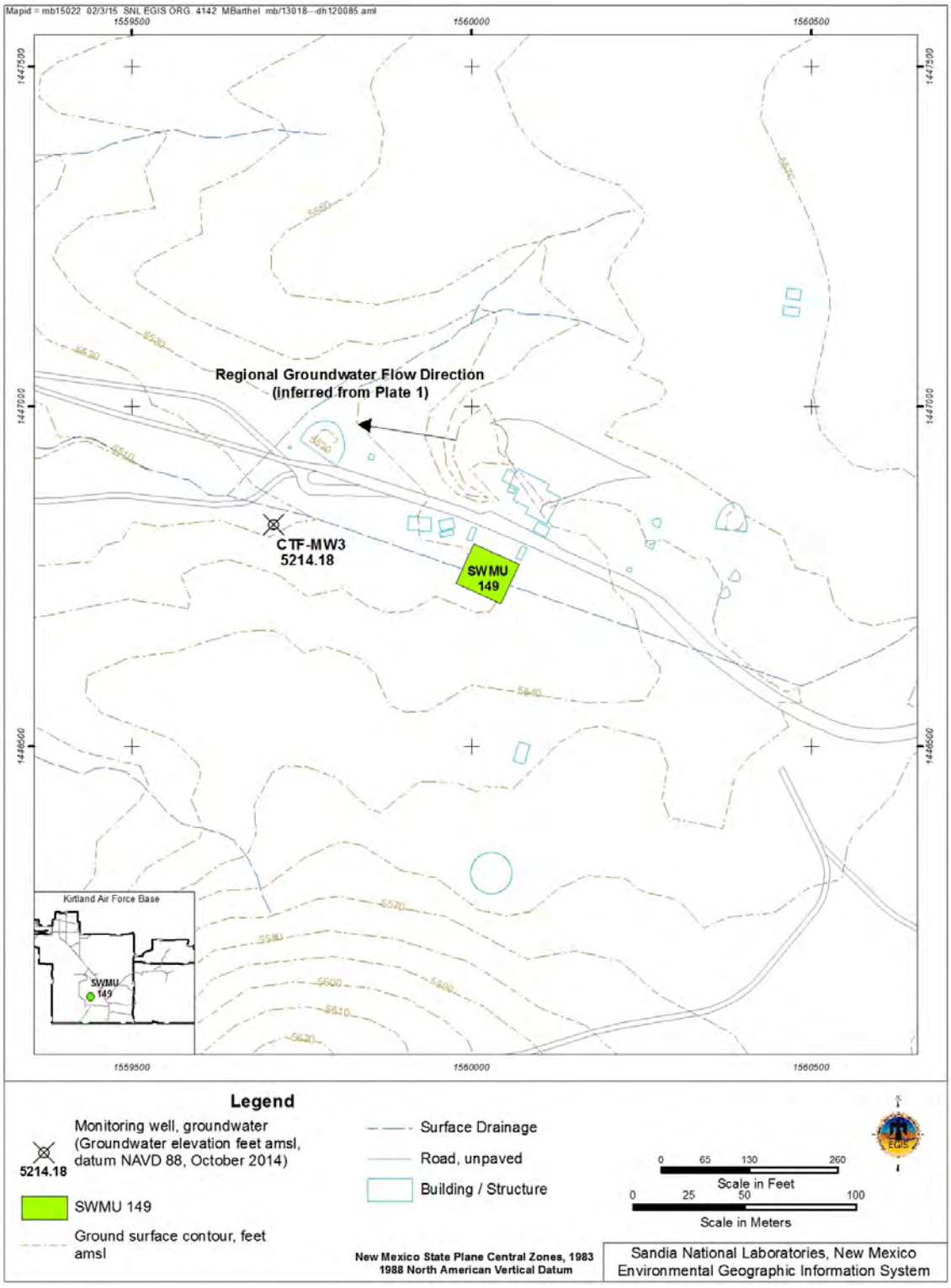


Figure 12-2. SWMU 149 Groundwater Flow Direction (October 2014)

No VOCs were detected at concentrations above established MCLs for any of the monitoring well CTF-MW3 groundwater samples. During CY 2014, the compounds bromodichloromethane, chloroform, and dibromochloromethane were detected at low concentrations above the laboratory MDL and are comparable to historical values. These compounds are all breakdown (degradation) products of chlorine and their detection in both the groundwater and equipment decontamination samples suggests the source is the deionized water used for decontaminating the sampling system.

In March 2014, acetone at a low concentration above the laboratory MDL in the groundwater duplicate was qualified as not detected during data validation because acetone was detected in the laboratory method blank sample at a concentration within 10 times the environmental result. 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.

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. Arsenic reanalysis was requested for the June groundwater sample and duplicate groundwater sample because there was variability between the initial results, and historically arsenic was not consistently detected. The analytical laboratory indicated that there may have been a small amount of arsenic carryover in equipment on the day of original analysis. Arsenic was not detected in the reanalysis, and the original results were qualified as unusable during data validation. 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 and June 2014 duplicate sample data results show

good agreement (low RPD values < 20 percent for organic compounds and < 35 percent for inorganic analyses) for all calculated parameters, except for the following. In March, the RPD for unfiltered aluminum, chromium, cobalt, iron, and zinc in the original analysis were calculated at 190, 52, 51, 51, and 62, respectively. The RPD for unfiltered aluminum, barium, cobalt, iron, and nickel in the reanalysis were calculated at 194, 44, 75, 154, and 77, respectively. The RPDs for aluminum, chromium, and cobalt are considered estimated values since sample results were detected below the PQL. The source (sampling, analytical preparation, or laboratory analysis) of the discrepancies was not determined, and additional corrective action was not performed.

12.8.1.2 Equipment Blank Samples

EB or rinsate samples were collected to verify the equipment decontamination process. The results for EB analyses are as follows.

- **March 2014 Sampling Event**—Bromodichloromethane, chloroform, copper, and chloride were detected above the laboratory MDLs. Bromodichloromethane and chloroform were detected above associated laboratory MDLs, but associated sample results were not qualified based upon assessment of historical data. No corrective action was necessary for chloride since the environmental and environmental duplicate samples are reported at concentrations greater than five times the EB result. Copper was qualified as not detected in both the CTF-MW3 environmental and environmental duplicate samples during data validation, since copper was reported in the EB sample at a concentration less than five times the associated environmental samples**.**

- **March 2014 Sampling Event**—Magnesium was detected above the laboratory MDL. No corrective action was necessary since the environmental and environmental duplicate samples report magnesium at concentrations greater than five times the EB result.

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 five TB samples were submitted during CY 2014. Two TBs were submitted for the March and June sampling events and one sample was submitted in September. No VOCs were detected above the associated laboratory MDLs in all TB samples.

12.8.1.4 Field Blank Samples

Two FB samples were collected for VOCs to assess whether contamination of the samples resulted from ambient field conditions in March and June 2014. In the March 2014 FB sample, the VOC compounds bromodichloromethane, chloroform, and dibromochloromethane were detected above associated laboratory MDLs. The associated sample results were not qualified based upon assessment of historical data. These compounds are common by-products of the deionization water purification process. No VOCs were detected above the associated laboratory MDLs in the June FB sample.

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 2014 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 February 2014, June 2014a, and August 2014) were identified

during any of the CY 2014 sampling events. However, project-specific issues identified during CY 2014 sampling activities are noted as follows:

- **June 2014 Sampling Event**—A new deionized (DI) water source was used for equipment decontamination and QC samples due to continuous detections of trihalomethanes at low level concentrations in the existing DI water supply. As a result, no VOCs were reported above MDLs in any subsequent EB or FB samples.

12.10 Summary and Conclusions

Quarterly sampling at monitoring well CTF-MW3 near SWMU 149 was conducted for three quarters (March, June, and September) in CY 2014. A December 2014 sampling event was not conducted because in October 2014, DOE and Sandia notified NMED that the supplemental groundwater monitoring at SWMU 149 had been completed, and would be discontinued (SNL October 2014). No further groundwater sampling will be conducted at monitoring well CTF-MW3 unless NMED requires additional sampling.

Analytical parameters included VOCs, NPN, major anions, alkalinity, TAL total metals, and perchlorate. Results were consistent with historical concentrations, and were compared with EPA MCL guidelines for drinking water (EPA May 2009). No parameters were detected above established MCLs.

The current conceptual model described in Section 12.1.7 does not require modification based on the analytical results for this reporting period.

12.11 References

EPA May 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 III 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), *Approval, 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), *Approval, 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.

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 October 2014 Sandia National Laboratories, New Mexico (SNL/NM), October 2014. *Completion of Monitoring at Solid Waste Management Units 68, 149, 154, and 8/58*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL August 2014 Sandia National Laboratories, New Mexico (SNL/NM), August 2014. *SWMU 149 Groundwater Monitoring Mini-SAP for Fourth Quarter Fiscal Year 2014,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2014a Sandia National Laboratories, New Mexico (SNL/NM), June 2014. *SWMU 149 Groundwater Monitoring Mini-SAP for Third Quarter Fiscal Year 2014,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2014b Sandia National Laboratories, New Mexico (SNL/NM), June 2014. Data Validation Procedure for Chemical and Radiochemical Data, AOP 00-03, Revision 4, Sample Management Office, Sandia National Laboratories, Albuquerque, New Mexico, June 16, 2014.

SNL February 2014 Sandia National Laboratories, New Mexico (SNL/NM), February 2014. *SWMU 149 Groundwater Monitoring Mini-SAP for Second 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 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 III 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.

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 2014 ..... 12A-5

12A-2 Method Detection Limits for Volatile Organic Compounds (EPA Method SW846-8260), Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 12A-6

12A-3 Summary of Nitrate plus Nitrite Results, Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 12A-7

12A-4 Summary of Anion and Alkalinity Results, Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 12A-8

12A-5 Summary of Perchlorate Results, Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 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 2014 ..... 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 2014 ..... 12A-17

12A-8 Summary of Field Water Quality Measurements, Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 12A-24

Footnotes for Solid Waste Management Unit 149 Analytical Results Tables 12A-25

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 2014

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 14-Mar-14	Bromodichloromethane	0.570	0.300	1.00	NE	J		095572-001	SW846 8260B
	Chloroform	0.760	0.300	1.00	NE	J		095572-001	SW846 8260B
	Dibromochloromethane	0.490	0.300	1.00	NE	J		095572-001	SW846 8260B
CTF-MW3 (Duplicate) 14-Mar-14	Acetone	5.14	3.00	10.0	NE	B, J	10UJ	095573-001	SW846 8260B
	Bromodichloromethane	0.590	0.300	1.00	NE	J		095573-001	SW846 8260B
	Chloroform	0.730	0.300	1.00	NE	J		095573-001	SW846 8260B
	Dibromochloromethane	0.480	0.300	1.00	NE	J	J+	095573-001	SW846 8260B
CTF-MW3 27-Jun-14	Bromodichloromethane	0.450	0.300	1.00	NE	J		096142-001	SW846 8260B
	Chloroform	0.720	0.300	1.00	NE	J		096142-001	SW846 8260B
CTF-MW3 (Duplicate) 27-Jun-14	Bromodichloromethane	0.440	0.300	1.00	NE	J		096143-001	SW846 8260B
	Chloroform	0.720	0.300	1.00	NE	J		096143-001	SW846 8260B
CTF-MW3 12-Sep-14	Bromodichloromethane	0.400	0.300	1.00	NE	J		096595-001	SW846 8260B
	Chloroform	0.650	0.300	1.00	NE	J		096595-001	SW846 8260B
	Dibromochloromethane	0.320	0.300	1.00	NE	J		096595-001	SW846 8260B
	Trichloroethene	0.660	0.300	1.00	5.00	B, J	1.0U	096595-001	SW846 8260B

Refer to footnotes on page 12A-25.

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 2014

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	0.300–0.005	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	0.300–3.00
1,2-Dichloropropane	0.300	Methylene chloride	1.70–3.00
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	2.50–3.00	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-25.

Table 12A-3
Summary of Nitrate plus Nitrite Results,
Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 14-Mar-14	Nitrate plus nitrite	6.35	0.170	0.500	10.0			095572-018	EPA 353.2
CTF-MW3 (Duplicate) 14-Mar-14	Nitrate plus nitrite	6.38	0.170	0.500	10.0			095573-018	EPA 353.2
CTF-MW3 27-Jun-14	Nitrate plus nitrite	5.97	0.170	0.500	10.0			096142-018	EPA 353.2
CTF-MW3 12-Sep-14	Nitrate plus nitrite	5.61	0.170	0.500	10.0			096595-018	EPA 353.2

Refer to footnotes on page 12A-25.

Table 12A-4
Summary of Anion and Alkalinity Results,
Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	319	0.725	1.00	NE			095572-022	SM2320B
14-Mar-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095572-022	SM2320B
	Bromide	1.18	0.067	0.200	NE			095572-016	SW846 9056
	Chloride	124	3.35	10.0	NE			095572-016	SW846 9056
	Fluoride	2.37	0.033	0.100	4.0			095572-016	SW846 9056
	Sulfate	515	6.65	20.0	NE			095572-016	SW846 9056
CTF-MW3 (Duplicate)	Bicarbonate Alkalinity	321	0.725	1.00	NE			095573-022	SM2320B
14-Mar-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095573-022	SM2320B
	Bromide	1.18	0.067	0.200	NE			095573-016	SW846 9056
	Chloride	120	3.35	10.0	NE			095573-016	SW846 9056
	Fluoride	2.35	0.033	0.100	4.0			095573-016	SW846 9056
	Sulfate	495	6.65	20.0	NE			095573-016	SW846 9056
CTF-MW3	Bicarbonate Alkalinity	328	0.725	1.00	NE			096142-022	SM2320B
27-Jun-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096142-022	SM2320B
	Bromide	1.17	0.067	0.200	NE			096142-016	SW846 9056
	Chloride	123	3.35	10.0	NE			096142-016	SW846 9056
	Fluoride	2.54	0.033	0.100	4.0			096142-016	SW846 9056
	Sulfate	507	6.65	20.0	NE			096142-016	SW846 9056
CTF-MW3	Bicarbonate Alkalinity	318	0.725	1.00	NE			096595-022	SM2320B
12-Sep-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096595-022	SM2320B
	Bromide	1.18	0.067	0.200	NE			096595-016	SW846 9056
	Chloride	121	3.35	10.0	NE			096595-016	SW846 9056
	Fluoride	2.64	0.033	0.100	4.0			096595-016	SW846 9056
	Sulfate	483	6.65	20.0	NE			096595-016	SW846 9056

Refer to footnotes on page 12A-25.

Table 12A-5
Summary of Perchlorate Results,
Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 14-Mar-14	ND	0.004	0.012	NE	U		095572-020	EPA 314.0
CTF-MW3 (Duplicate) 14-Mar-14	ND	0.004	0.012	NE	U		095573-020	EPA 314.0
CTF-MW3 27-Jun-14	ND	0.004	0.012	NE	U		096142-020	EPA 314.0
CTF-MW3 12-Sep-14	ND	0.004	0.012	NE	U		096595-020	EPA 314.0

Refer to footnotes on page 12A-25.

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 2014

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	1.38	0.015	0.050	NE			095572-009	SW846 6020
14-Mar-14	Antimony	ND	0.001	0.003	0.006	U		095572-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095572-009	SW846 6020
	Barium	0.0366	0.0006	0.002	2.00			095572-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095572-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095572-009	SW846 6020
	Calcium	212	0.600	2.00	NE			095572-009	SW846 6020
	Chromium	0.00419	0.002	0.010	0.100	J		095572-009	SW846 6020
	Cobalt	0.000757	0.0001	0.001	NE	J		095572-009	SW846 6020
	Copper	0.00515	0.00035	0.001	NE		J-	095572-009	SW846 6020
	Iron	1.28	0.033	0.100	NE	B		095572-009	SW846 6020
	Lead	0.00209	0.0005	0.002	NE			095572-009	SW846 6020
	Magnesium	43.7	0.010	0.030	NE		J	095572-009	SW846 6020
	Manganese	0.134	0.001	0.005	NE	B	J	095572-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095572-009	SW846 7470
	Nickel	0.00695	0.0005	0.002	NE			095572-009	SW846 6020
	Potassium	11.3	0.080	0.300	NE			095572-009	SW846 6020
	Selenium	0.0276	0.0015	0.005	0.050			095572-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095572-009	SW846 6020
	Sodium	157	0.800	2.50	NE			095572-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095572-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095572-009	SW846 6010
	Zinc	0.00958	0.0035	0.010	NE	J		095572-009	SW846 6020

Refer to footnotes on page 12A-25.

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 2014

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 (Reanalysis) 14-Mar-14	Aluminum	2.74	0.150	0.500	NE			095572-R09	SW846 6020
	Antimony	ND	0.010	0.030	0.006	U		095572-R09	SW846 6020
	Arsenic	ND	0.017	0.050	0.010	U		095572-R09	SW846 6020
	Barium	0.0483	0.006	0.020	2.00		J	095572-R09	SW846 6020
	Beryllium	ND	0.002	0.005	0.004	U		095572-R09	SW846 6020
	Cadmium	ND	0.0011	0.010	0.005	U		095572-R09	SW846 6020
	Calcium	182	3.00	10.0	NE	B		095572-R09	SW846 6020
	Chromium	ND	0.020	0.100	0.100	U		095572-R09	SW846 6020
	Cobalt	0.00114	0.001	0.010	NE	J		095572-R09	SW846 6020
	Copper	0.0085	0.0035	0.010	NE	J	J-	095572-R09	SW846 6020
	Iron	2.42	0.330	1.00	NE	B		095572-R09	SW846 6020
	Lead	ND	0.005	0.020	NE	U		095572-R09	SW846 6020
	Magnesium	45.2	0.100	0.300	NE			095572-R09	SW846 6020
	Manganese	0.196	0.010	0.050	NE	B		095572-R09	SW846 6020
	Nickel	0.00796	0.005	0.020	NE	J	J-	095572-R09	SW846 7470
	Potassium	11.3	0.800	3.00	NE			095572-R09	SW846 6020
	Selenium	0.0282	0.015	0.050	0.050	J		095572-R09	SW846 6020
	Silver	ND	0.002	0.010	NE	U		095572-R09	SW846 6020
	Sodium	150	4.00	12.5	NE			095572-R09	SW846 6020
	Thallium	ND	0.0045	0.020	0.002	U		095572-R09	SW846 6020
	Zinc	ND	0.035	0.100	NE	U		095572-R09	SW846 6020

Refer to footnotes on page 12A-25.

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 2014

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 (Duplicate)	Aluminum	0.0348	0.015	0.050	NE	J		095573-009	SW846 6020
14-Mar-14	Antimony	ND	0.001	0.003	0.006	U		095573-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095573-009	SW846 6020
	Barium	0.0303	0.0006	0.002	2.00			095573-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095573-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095573-009	SW846 6020
	Calcium	195	0.600	2.00	NE			095573-009	SW846 6020
	Chromium	0.00247	0.002	0.010	0.100	J		095573-009	SW846 6020
	Cobalt	0.000451	0.0001	0.001	NE	J		095573-009	SW846 6020
	Copper	0.00313	0.00035	0.001	NE		0.0045UJ	095573-009	SW846 6020
	Iron	0.759	0.033	0.100	NE	B		095573-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095573-009	SW846 6020
	Magnesium	45.2	0.050	0.150	NE		J	095573-009	SW846 6020
	Manganese	0.00631	0.001	0.005	NE	B	0.012UJ	095573-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095573-009	SW846 7470
	Nickel	0.00701	0.0005	0.002	NE			095573-009	SW846 6020
	Potassium	11.2	0.080	0.300	NE			095573-009	SW846 6020
	Selenium	0.0269	0.0015	0.005	0.050			095573-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095573-009	SW846 6020
	Sodium	156	0.800	2.50	NE			095573-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095573-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095573-009	SW846 6010
	Zinc	0.00502	0.0035	0.010	NE	J		095573-009	SW846 6020

Refer to footnotes on page 12A-25.

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 2014

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	0.042	0.015	0.050	NE	J		095573-R09	SW846 6020
(Duplicate Reanalysis)	Antimony	ND	0.001	0.003	0.006	U		095573-R09	SW846 6020
14-Mar-14	Arsenic	ND	0.0017	0.005	0.010	U		095573-R09	SW846 6020
	Barium	0.0309	0.0006	0.002	2.00		J	095573-R09	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095573-R09	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095573-R09	SW846 6020
	Calcium	210	0.600	2.00	NE	B		095573-R09	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095573-R09	SW846 6020
	Cobalt	0.00251	0.0001	0.001	NE	J		095573-R09	SW846 6020
	Copper	0.00199	0.00035	0.001	NE		0.0045UJ	095573-R09	SW846 6020
	Iron	0.316	0.033	0.100	NE	B		095573-R09	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095573-R09	SW846 6020
	Magnesium	55.8	0.100	0.300	NE			095573-R09	SW846 6020
	Manganese	0.00527	0.001	0.005	NE	B	0.0065U	095573-R09	SW846 6020
	Nickel	0.00353	0.0005	0.002	NE		J-	095573-R09	SW846 7470
	Potassium	13.0	0.800	3.00	NE			095573-R09	SW846 6020
	Selenium	0.0272	0.0015	0.005	0.050			095573-R09	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095573-R09	SW846 6020
	Sodium	186	0.800	2.50	NE			095573-R09	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095573-R09	SW846 6020
	Zinc	0.0055	0.0035	0.010	NE	J		095573-R09	SW846 6020

Refer to footnotes on page 12A-25.

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 2014

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	0.0226	0.015	0.050	NE	J		096142-009	SW846 6020
27-Jun-14	Antimony	ND	0.001	0.003	0.006	U		096142-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096142-009	SW846 6020
	Barium	0.0319	0.0006	0.002	2.00			096142-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096142-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096142-009	SW846 6020
	Calcium	197	3.00	10.0	NE	B		096142-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U	UJ	096142-009	SW846 6020
	Cobalt	0.000396	0.0001	0.001	NE	J		096142-009	SW846 6020
	Copper	0.00243	0.00035	0.001	NE		J-	096142-009	SW846 6020
	Iron	0.322	0.033	0.100	NE			096142-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096142-009	SW846 6020
	Magnesium	45.1	0.010	0.030	NE			096142-009	SW846 6020
	Manganese	0.00172	0.001	0.005	NE	J	J+	096142-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096142-009	SW846 7470
	Nickel	0.00338	0.0005	0.002	NE		J-	096142-009	SW846 6020
	Potassium	11.5	0.400	1.50	NE			096142-009	SW846 6020
	Selenium	0.0286	0.0015	0.005	0.050			096142-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096142-009	SW846 6020
	Sodium	163	4.00	12.5	NE			096142-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096142-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		096142-009	SW846 6010
	Zinc	0.00497	0.0035	0.010	NE	J		096142-009	SW846 6020

Refer to footnotes on page 12A-25.

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 2014

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 (Duplicate)	Aluminum	0.018	0.015	0.050	NE	J		096143-009	SW846 6020
27-Jun-14	Antimony	ND	0.001	0.003	0.006	U		096143-009	SW846 6020
	Arsenic	0.00292	0.0017	0.005	0.010	J		096143-009	SW846 6020
	Arsenic (reanalysis)	ND	0.0017	0.005	0.010	U		096143-R09	SW846 6020
	Barium	0.0317	0.0006	0.002	2.00			096143-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096143-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096143-009	SW846 6020
	Calcium	194	3.00	10.0	NE	B		096143-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U	UJ	096143-009	SW846 6020
	Cobalt	0.000404	0.0001	0.001	NE	J		096143-009	SW846 6020
	Copper	0.00257	0.00035	0.001	NE		J-	096143-009	SW846 6020
	Iron	0.319	0.033	0.100	NE			096143-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096143-009	SW846 6020
	Magnesium	43.9	0.010	0.030	NE			096143-009	SW846 6020
	Manganese	0.00168	0.001	0.005	NE	J	J+	096143-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096143-009	SW846 7470
	Nickel	0.00352	0.0005	0.002	NE		J-	096143-009	SW846 6020
	Potassium	11.3	0.400	1.50	NE			096143-009	SW846 6020
	Selenium	0.0272	0.0015	0.005	0.050			096143-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096143-009	SW846 6020
	Sodium	158	4.00	12.5	NE			096143-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096143-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		096143-009	SW846 6010
	Zinc	0.00458	0.0035	0.010	NE	J		096143-009	SW846 6020

Refer to footnotes on page 12A-25.

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 2014

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	0.0304	0.015	0.050	NE	J		096595-009	SW846 6020
12-Sep-14	Antimony	ND	0.001	0.003	0.006	U		096595-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096595-009	SW846 6020
	Barium	0.0325	0.0006	0.002	2.00			096595-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096595-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096595-009	SW846 6020
	Calcium	173	0.300	1.00	NE			096595-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096595-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		096595-009	SW846 6020
	Copper	0.000386	0.00035	0.001	NE	J		096595-009	SW846 6020
	Iron	0.0447	0.033	0.100	NE	J	0.18U	096595-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096595-009	SW846 6020
	Magnesium	44.6	0.050	0.150	NE			096595-009	SW846 6020
	Manganese	0.00175	0.001	0.005	NE	J		096595-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096595-009	SW846 7470
	Nickel	0.000598	0.0005	0.002	NE	J		096595-009	SW846 6020
	Potassium	12.1	0.400	1.50	NE			096595-009	SW846 6020
	Selenium	0.0296	0.0015	0.005	0.050			096595-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096595-009	SW846 6020
	Sodium	76.7	2.00	6.25	NE			096595-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096595-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		096595-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096595-009	SW846 6020

Refer to footnotes on page 12A-25.

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 2014

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		095572-010	SW846 6020
14-Mar-14	Antimony	ND	0.001	0.003	0.006	U		095572-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095572-010	SW846 6020
	Barium	0.0313	0.0006	0.002	2.00			095572-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095572-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095572-010	SW846 6020
	Calcium	200	0.600	2.00	NE			095572-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095572-010	SW846 6020
	Cobalt	0.000416	0.0001	0.001	NE	J		095572-010	SW846 6020
	Copper	0.00247	0.00035	0.001	NE		0.0035UJ	095572-010	SW846 6020
	Iron	0.599	0.033	0.100	NE	B		095572-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095572-010	SW846 6020
	Magnesium	48.8	0.050	0.150	NE		J	095572-010	SW846 6020
	Manganese	0.0016	0.001	0.005	NE	B, J	0.012UJ	095572-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095572-010	SW846 7470
	Nickel	0.00579	0.0005	0.002	NE			095572-010	SW846 6020
	Potassium	11.9	0.080	0.300	NE			095572-010	SW846 6020
	Selenium	0.0269	0.0015	0.005	0.050			095572-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095572-010	SW846 6020
	Sodium	171	0.800	2.50	NE			095572-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095572-010	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095572-010	SW846 6010
	Zinc	0.00466	0.0035	0.010	NE	J		095572-010	SW846 6020

Refer to footnotes on page 12A-25.

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 2014

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 (Reanalysis) 14-Mar-14	Aluminum	ND	0.015	0.050	NE	U		095572-R10	SW846 6020
	Antimony	ND	0.001	0.003	0.006	U		095572-R10	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095572-R10	SW846 6020
	Barium	0.0301	0.0006	0.002	2.00		J	095572-R10	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095572-R10	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095572-R10	SW846 6020
	Calcium	201	0.600	2.00	NE	B		095572-R10	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095572-R10	SW846 6020
	Cobalt	0.000236	0.0001	0.001	NE	J		095572-R10	SW846 6020
	Copper	0.00172	0.00035	0.001	NE		0.0035UJ	095572-R10	SW846 6020
	Iron	0.260	0.033	0.100	NE	B		095572-R10	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095572-R10	SW846 6020
	Magnesium	52.1	0.100	0.300	NE			095572-R10	SW846 6020
	Manganese	0.00169	0.001	0.005	NE	B, J	0.0065U	095572-R10	SW846 6020
	Nickel	0.00302	0.0005	0.002	NE		J-	095572-R10	SW846 7470
	Potassium	12.2	0.800	3.00	NE			095572-R10	SW846 6020
	Selenium	0.0273	0.0015	0.005	0.050			095572-R10	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095572-R10	SW846 6020
	Sodium	174	0.800	2.50	NE			095572-R10	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095572-R10	SW846 6020
	Zinc	0.00529	0.0035	0.010	NE	J		095572-R10	SW846 6020

Refer to footnotes on page 12A-25.

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 2014

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 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		095573-010	SW846 6020
14-Mar-14	Antimony	ND	0.001	0.003	0.006	U		095573-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095573-010	SW846 6020
	Barium	0.0305	0.0006	0.002	2.00			095573-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095573-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095573-010	SW846 6020
	Calcium	207	0.600	2.00	NE			095573-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095573-010	SW846 6020
	Cobalt	0.000462	0.0001	0.001	NE	J		095573-010	SW846 6020
	Copper	0.00313	0.00035	0.001	NE		0.0035UJ	095573-010	SW846 6020
	Iron	0.799	0.033	0.100	NE	B		095573-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095573-010	SW846 6020
	Magnesium	51.0	0.050	0.150	NE		J	095573-010	SW846 6020
	Manganese	0.00357	0.001	0.005	NE	B, J	0.012UJ	095573-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095573-010	SW846 7470
	Nickel	0.0069	0.0005	0.002	NE			095573-010	SW846 6020
	Potassium	11.6	0.080	0.300	NE			095573-010	SW846 6020
	Selenium	0.0285	0.0015	0.005	0.050			095573-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095573-010	SW846 6020
	Sodium	169	0.800	2.50	NE			095573-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095573-010	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095573-010	SW846 6010
	Zinc	0.00465	0.0035	0.010	NE	J		095573-010	SW846 6020

Refer to footnotes on page 12A-25.

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 2014

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 (Duplicate Reanalysis) 14-Mar-14	Aluminum	ND	0.015	0.050	NE	U		095573-R10	SW846 6020
	Antimony	ND	0.001	0.003	0.006	U	UJ	095573-R10	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		095573-R10	SW846 6020
	Barium	0.0304	0.0006	0.002	2.00		J	095573-R10	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		095573-R10	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095573-R10	SW846 6020
	Calcium	219	0.600	2.00	NE	B		095573-R10	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095573-R10	SW846 6020
	Cobalt	0.000230	0.0001	0.001	NE	J		095573-R10	SW846 6020
	Copper	0.00175	0.00035	0.001	NE		0.0035UJ	095573-R10	SW846 6020
	Iron	0.253	0.033	0.100	NE	B		095573-R10	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095573-R10	SW846 6020
	Magnesium	58.3	0.100	0.300	NE			095573-R10	SW846 6020
	Manganese	0.00138	0.001	0.005	NE	B, J	0.0065U	095573-R10	SW846 6020
	Nickel	0.003	0.0005	0.002	NE		J-	095573-R10	SW846 6020
	Potassium	13.5	0.800	3.00	NE			095573-R10	SW846 6020
	Selenium	0.0271	0.0015	0.005	0.050			095573-R10	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095573-R10	SW846 6020
	Sodium	194	0.800	2.50	NE			095573-R10	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		095573-R10	SW846 6010
	Zinc	0.00531	0.0035	0.010	NE	J		095573-R10	SW846 6020

Refer to footnotes on page 12A-25.

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 2014

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		096142-010	SW846 6020
27-Jun-14	Antimony	ND	0.001	0.003	0.006	U		096142-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096142-R10	SW846 6020
	Barium	0.031	0.0006	0.002	2.00			096142-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096142-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096142-010	SW846 6020
	Calcium	197	3.00	10.0	NE	B		096142-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U	UJ	096142-010	SW846 6020
	Cobalt	0.000378	0.0001	0.001	NE	J		096142-010	SW846 6020
	Copper	0.00233	0.00035	0.001	NE		J-	096142-010	SW846 6020
	Iron	0.293	0.033	0.100	NE			096142-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096142-010	SW846 6020
	Magnesium	44.8	0.010	0.030	NE			096142-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096142-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096142-010	SW846 7470
	Nickel	0.00347	0.0005	0.002	NE		J-	096142-010	SW846 6020
	Potassium	11.4	0.400	1.50	NE			096142-010	SW846 6020
	Selenium	0.0272	0.0015	0.005	0.050			096142-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096142-010	SW846 6020
	Sodium	159	4.00	12.5	NE			096142-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096142-010	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		096142-010	SW846 6010
	Zinc	0.00455	0.0035	0.010	NE	J		096142-010	SW846 6020

Refer to footnotes on page 12A-25.

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 2014

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 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		096143-010	SW846 6020
27-Jun-14	Antimony	ND	0.001	0.003	0.006	U		096143-010	SW846 6020
	Arsenic	0.00363	0.0017	0.005	0.010	J	R	096143-010	SW846 6020
	Arsenic (reanalysis)	ND	0.0017	0.005	0.010	U		096143-R10	SW846 6020
	Barium	0.0324	0.0006	0.002	2.00			096143-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096143-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096143-010	SW846 6020
	Calcium	218	3.00	10.0	NE	B		096143-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U	UJ	096143-010	SW846 6020
	Cobalt	0.000431	0.0001	0.001	NE	J		096143-010	SW846 6020
	Copper	0.00274	0.00035	0.001	NE		J-	096143-010	SW846 6020
	Iron	0.325	0.033	0.100	NE			096143-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096143-010	SW846 6020
	Magnesium	44.6	0.010	0.030	NE			096143-010	SW846 6020
	Manganese	0.00103	0.001	0.005	NE	J	J+	096143-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096143-010	SW846 7470
	Nickel	0.00355	0.0005	0.002	NE		J-	096143-010	SW846 6020
	Potassium	11.7	0.400	1.50	NE			096143-010	SW846 6020
	Selenium	0.0277	0.0015	0.005	0.050			096143-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096143-010	SW846 6020
	Sodium	177	4.00	12.5	NE			096143-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096143-010	SW846 6020
	Vanadium	0.00107	0.001	0.005	NE	J		096143-010	SW846 6010
	Zinc	0.00482	0.0035	0.010	NE	J		096143-010	SW846 6020

Refer to footnotes on page 12A-25.

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 2014

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		096595-010	SW846 6020
12-Sep-14	Antimony	ND	0.001	0.003	0.006	U		096595-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		096595-010	SW846 6020
	Barium	0.0336	0.0006	0.002	2.00			096595-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		096595-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096595-010	SW846 6020
	Calcium	184	0.300	1.00	NE			096595-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096595-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		096595-010	SW846 6020
	Copper	0.000471	0.00035	0.001	NE	J		096595-010	SW846 6020
	Iron	ND	0.033	0.100	NE	U		096595-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096595-010	SW846 6020
	Magnesium	47.7	0.050	0.150	NE			096595-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		096595-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096595-010	SW846 7470
	Nickel	0.000624	0.0005	0.002	NE	J		096595-010	SW846 6020
	Potassium	10.3	0.400	1.50	NE			096595-010	SW846 6020
	Selenium	0.0292	0.0015	0.005	0.050			096595-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096595-010	SW846 6020
	Sodium	75.9	2.00	6.25	NE			096595-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		096595-010	SW846 6020
	Vanadium	0.00166	0.001	0.005	NE	J		096595-010	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		096595-010	SW846 6020

Refer to footnotes on page 12A-25.

Table 12A-8
Summary of Field Water Quality Measurements[h],
Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	14-Mar-14	18.57	1398.5	193.2	7.08	0.71	53.6	5.01
CTF-MW3	27-Jun-14	22.11	1651.1	296.9	6.96	0.51	79.6	6.92
CTF-MW3	12-Sep-14	19.29	1625.6	284.2	6.62	1.36	81.4	7.48

Refer to footnotes on page 12A-25.

Footnotes for Solid Waste Management Unit 149 Analytical Results Tables

% = Percent.
CFR = Code of Federal Regulations.
CTF = Coyote Test Field.
EPA = U.S. Environmental Protection Agency.
ID = Identification..
µg/L = Micrograms per liter.
mg/L = Milligrams per liter.
MW = Monitoring well.
No. = Number.

[a]Result
Bold indicates the value exceed the established MCL.
ND = Not detected (at MDL).

[b]MDL
The MDL applies to Table 12A-1 through 12A-7.
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
The PQL applies to Table 12A-1 through 12A-7.
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]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.

DOE = U.S. Department of Energy.
HASL = Health and Safety Laboratory.
SM = Standard Method.

Footnotes for Solid Waste Management Unit 149 Analytical Results Tables (Concluded)

[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 12B
Solid Waste Management Unit 149
Hydrographs

This page intentionally left blank.

Attachment 12B Hydrographs

12B-1 Solid Waste Management Unit 149 Study Area Well 12B-5

This page intentionally left blank.

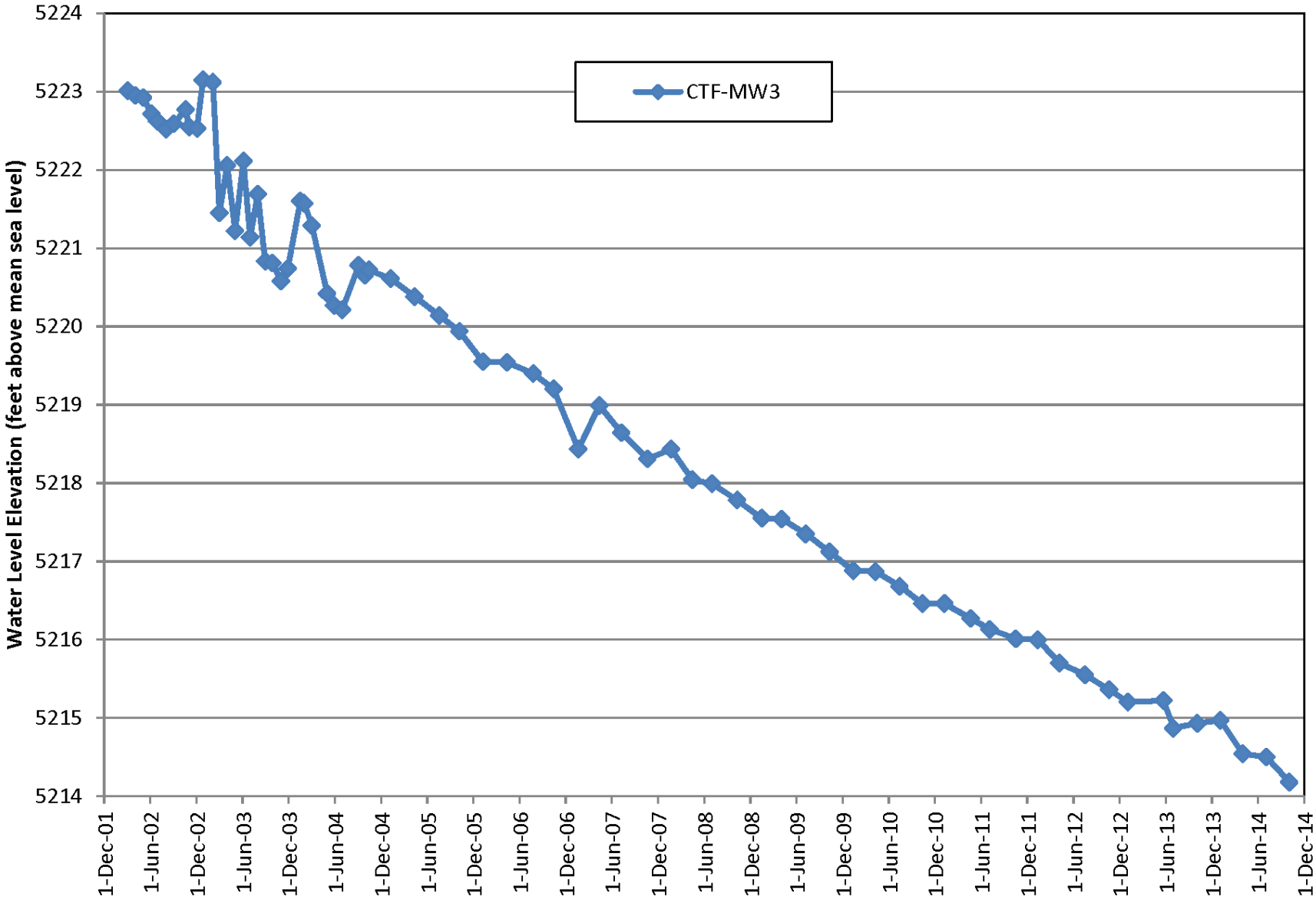


Figure 12B-1. Solid Waste Management Unit 149 Study Area Well

This page intentionally left blank.

13.0 Solid Waste Management Unit 154

13.1 Introduction

This chapter summarizes Calendar Year (CY) 2014 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).

Supplemental groundwater monitoring at SWMU 154 is designed to address the requirements of Section VII.D.6 of the Compliance Order on Consent (the Consent Order) (New Mexico Environment Department [NMED] April 2004) and the letter dated April 8, 2010, from the NMED Hazardous Waste Bureau (NMED April 2010).

During CY 2014, three quarterly groundwater samples were collected from monitoring well CTF-MW2 on March 18, June 6, and September 8, 2014. In October 2014, U.S. Department of Energy (DOE) and Sandia Corporation (Sandia) notified NMED that groundwater monitoring at SWMU 154 had been completed, and would be discontinued (SNL October 2014). The groundwater samples were collected in accordance with the NMED-approved Sampling and Analysis Plan (SAP) (SNL June 2010) and Mini-SAPs. 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 May 2009). During all three 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 quarter of groundwater monitoring required by NMED (NMED April 2010) was conducted on December 18, 2012 (SNL September 2013). The fifteenth and final quarterly groundwater sampling event at SWMU 154 occurred on September 8, 2014. All NMED requirements for groundwater monitoring at SWMU 154 have been met (NMED April 2010).

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/National Nuclear Security Administration (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 waste water 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).

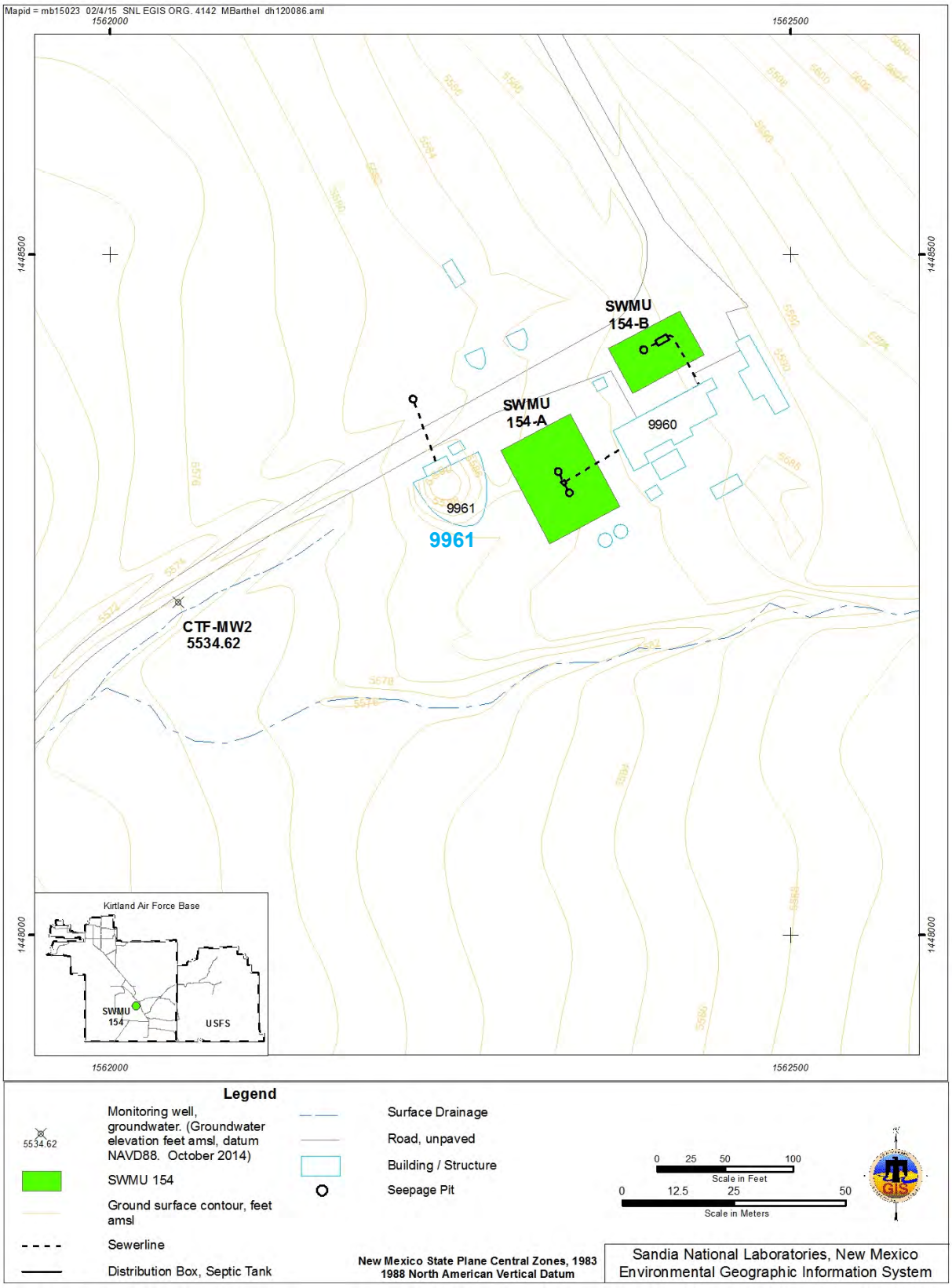


Figure 13-1. Location of Monitoring Well CTF-MW2 near SWMU 154

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^{IM} 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

Refer to footnotes on page 13-4.

Table 13-1. Historical Timeline of SWMU 154 *(Concluded)*

Month	Year	Event	Reference
November	2001	A follow-up FIP documenting specific investigation procedure to be completed submitted to the NMED.	SNL November 2001
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 3 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. April 2010 NMED requirements met.	SNL September 2013
October	2014	NMED was notified that groundwater monitoring at SWMU 154 has been completed, and was being discontinued.	SNL October 2014

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.

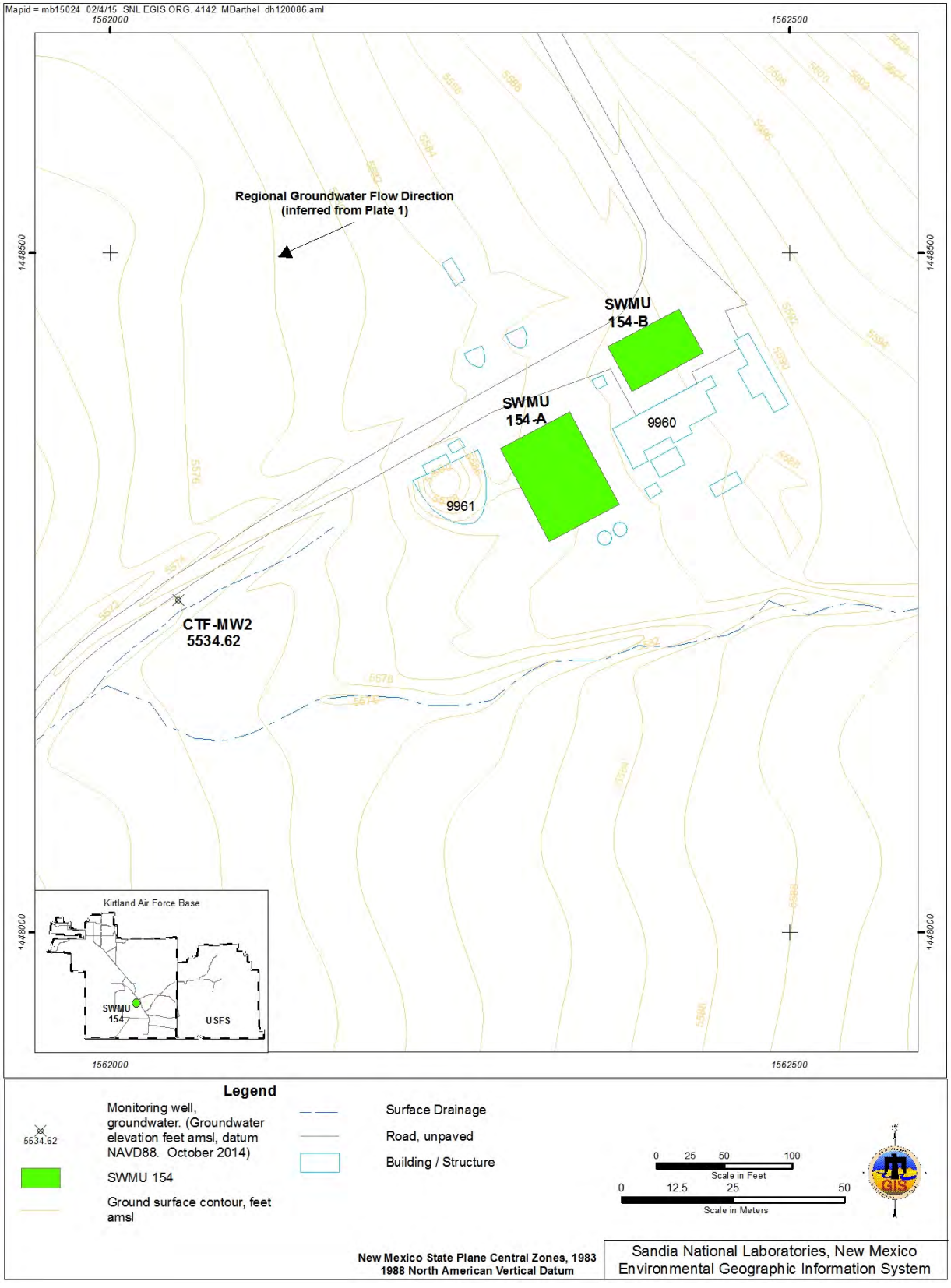


Figure 13-2. SWMU 154 Groundwater Flow Direction (October 2014)

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 requirements. 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 3 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 2014. The analytical results for CY 2014 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 was 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.

13.1.5 Summary of Calendar Year 2014 Activities

The following activities took place for monitoring well CTF-MW2 near SWMU 154 during CY 2014:

- Quarterly groundwater sampling was conducted at monitoring well CTF-MW2 in March, June, and September 2014 (SNL February 2014, May 2014, and August 2014).

- Quarterly reporting of analytical results for monitoring well CTF-MW2 groundwater samples for the first three quarters of CY 2014.

- Tables of analytical results (Attachment 13A), arsenic concentration versus time plots (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 2015:

- No groundwater sampling will be conducted at monitoring well CTF-MW2 in CY 2015 unless additional guidance is received from NMED.

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 (i.e., 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

Well ID	Ground Surface Elevation (ft amsl)	Depth of Screened Interval (ft bgs)	Elevation for Top of Screen (ft amsl)	Potentiometric Surface, October 2014 (ft amsl)	Mid-Point Screen Elevation (ft amsl)	Pressure Head (ft[a])
CTF-MW2	5,575.60	110–130	5,465.60	5,534.62	5,455.60	79

NOTES:
[a]From mid-point of screen.
amsl = Above mean sea level.
bgs = Below ground surface.
CTF = Coyote Test Field.
ft = Foot (feet).
ID = Identification.
MW = Monitoring Well.
SWMU = Solid Waste Management Unit.

The October 2014 groundwater elevation was 5,534.62 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 was not excessive and the quantity of water produced was 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 first phase groundwater samples and was attributed to natural sources, and not to research activities conducted at Building 9960.

The second phase of quarterly groundwater sampling began in March 2011. During CY 2014, three 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 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 Consent 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 3 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 resumed at monitoring well CTF-MW2 in CY 2011 (NMED April 2010). The eighth quarter of groundwater monitoring required by NMED was completed in December 2012. In October 2014, DOE and Sandia notified NMED that after 15 quarters, groundwater monitoring at SWMU 154 had been completed, and would be discontinued (SNL October 2014).

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 Consent Order, as specified in Section III.A of the Consent Order (NMED April 2004).

13.3 Scope of Activities

Groundwater monitoring sampling and analysis during CY 2014 is summarized in Table 13-3. The analytical parameters for monitoring well CTF-MW2 for each sampling event are listed in Table 13-4.

Table 13-3. Sampling Dates and SAPs for Monitoring Well CTF-MW2 near SWMU 154, Calendar Year 2014

Date of Sampling Event	SAP
March 18, 2014	*SWMU 154 Groundwater Monitoring Mini-SAP for Second Quarter Fiscal Year 2014* (SNL February 2014)
June 6, 2014	*SWMU 154 Groundwater Monitoring Mini-SAP for Third Quarter Fiscal Year 2014* (SNL May 2014)
September 8, 2014	*SWMU 154 Groundwater Monitoring Mini-SAP for Fourth Quarter Fiscal Year 2014* (SNL August 2014)

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 2014

Parameter	Sampling Period	
Anions	**March 18, 2014**	**June 6, 2014**
Alkalinity	CTF-MW2	CTF-MW2
Gamma Spec*	CTF-MW2 (dup)	
Gross Alpha		
Gross Beta	**September 8, 2014**	
HE Compounds	CTF-MW2	
Isotopic Uranium		
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.

13.4 Field Methods and Measurements

According to the requirements of the Consent Order (NMED April 2004) addressing Section VII.D.6, and the NMED letter of April 8, 2010 (NMED April 2010), groundwater sampling was performed at SWMU 154. The CY 2014 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-SAPs (SNL February 2014, May 2014, and August 2014).

Environmental groundwater samples were collected from monitoring well CTF-MW2 in March, June, and September 2014. 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.

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 2014, 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 2014 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 2014 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 May 2009). A concentration trend plot for arsenic, which exceeded the MCL, is presented in Attachment 13B, Figure 13B-1. 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, dates of analyses, results of quality control (QC) analyses, and data validation findings are filed in the SNL/NM Customer Funded Record Center.

The analytical data were reviewed and qualified in accordance with SNL/NM Administrative Operating Procedure (AOP) 00-03 (SNL May 2011 and June 2014). 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 2014 sampling events are summarized as follows:

- **March 2014 Sampling Event**—The HE compound hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) was detected in monitoring well CTF-MW2 environmental and duplicate environmental samples at concentrations of 0.267 and 0.340 micrograms per liter (µg/L), respectively.

- **June 2014 Sampling Event**—The HE compound RDX was detected at a concentration of 0.208 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 2014.

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 2014.

Table 13A-7 presents the perchlorate results (Attachment 13A). Currently, no MCL is established for perchlorate. Perchlorate was not detected above the NMED-specified screening level/MDL of 4 µg/L in CY 2014 monitoring well CTF-MW2 samples.

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 2014 groundwater samples is arsenic, discussed as follows:

- **March 2014 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 0.0365 and 0.0355 mg/L, and filtered arsenic at 0.0365 and 0.0329 mg/L.

- **June 2014 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 0.0341 mg/L, and filtered arsenic at 0.0261 mg/L.

- **September 2014 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 0.0458 mg/L, and filtered arsenic at 0.0398 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 radiological screening tool and in accordance with 40 Code of Federal Regulations; Parts 9, 141, and 142; and Table I-4 should not include uranium. Naturally occurring uranium is measured independently (i.e., total uranium concentration determined by metal analysis described above) and the gross alpha activity measurements are corrected by subtracting the total uranium activity from the uncorrected gross alpha activity results. Radiological results are further reviewed by an SNL/NM Health Physicist to assure that the samples are nonradioactive. All radionuclide activity results are below the MCLs, where established.

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, field blanks (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 2014 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.

13.8.1.2 Equipment Blank Samples

EB (rinsate) samples were collected to verify the equipment decontamination process. The March 2014 EB, or rinsate, sample was collected prior to sampling monitoring well CTF-MW3 and submitted for all analyses. Bromodichloromethane, chloroform, copper, iron, lead, manganese, nickel, and sodium were

detected above the laboratory MDLs. All metals listed were detected in the unfiltered metals sample. No metals were reported above the MDL in the filtered metals sample. With the exception of copper, no corrective action was necessary since analytes were not detected in environmental samples, or were detected in environmental samples at concentrations greater than five times the EB result. Copper was qualified as not detected in both the CTF-MW2 environmental and environmental duplicate samples during data validation, since copper was reported in the EB sample at a concentration less than five times the associated 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 four TB samples were submitted during CY 2014. Two TBs were submitted for the March 2014 sampling event and one sample each was submitted in June and September 2014. 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 2014 FB sample from the monitoring well CTF-MW3 detected the VOCs bromodichloromethane and chloroform. 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 2014 sampling event, no significant data quality problems were noted during the data validation process. In June and September 2014 some analytical results were qualified as unusable 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 2014 sampling activities.

13.10 Summary and Conclusions

During CY 2014, three quarterly groundwater samples were collected from monitoring well CTF-MW2 (March, May, and September). The December 2014 sampling event was not conducted because in October 2014, DOE and Sandia notified NMED that the additional groundwater monitoring at SWMU 154 had been completed and would be discontinued (SNL October 2014). No further groundwater sampling will be conducted at monitoring well CTF-MW2 unless NMED requires additional sampling.

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 consistent with historical concentrations, were compared with MCL guidelines for drinking water (EPA May 2009), and are summarized as follows:

- **March 2014 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 0.0365 to

0.0355 mg/L in unfiltered samples and ranging from 0.0365 to 0.0329 mg/L in filtered samples, respectively.

- **May 2014 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 0.0341 mg/L, and 0.0261 mg/L, respectively.

- **September 2014 Sampling Event**—No parameters were detected above established MCLs, except for arsenic. 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 0.0458 mg/L, and filtered arsenic at 0.0398 mg/L.

The elevated arsenic, trace gases, and helium isotope data all indicate that the groundwater source is deeply derived upwelling fluids. The current conceptual model described in Section 13.1.7 does not require modification based on the analytical results for this reporting period.

13.11 References

EPA May 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 III 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 October 2014 Sandia National Laboratories, New Mexico (SNL/NM), October 2014. *Completion of Monitoring at Solid Waste Management Units 68, 149, 154, and 8/58*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL August 2014 Sandia National Laboratories, New Mexico (SNL/NM), August 2014. *SWMU 154 Groundwater Monitoring Mini-SAP for Fourth Quarter Fiscal Year 2014,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2014 Sandia National Laboratories, New Mexico (SNL/NM), June 2014. *Data Validation Procedure for Chemical and Radiochemical Data*, AOP 00-03, Revision 4, Sample Management Office, Sandia National Laboratories, Albuquerque, New Mexico, June 16, 2014.

SNL May 2014 Sandia National Laboratories, New Mexico (SNL/NM), May 2014. *SWMU 154 Groundwater Monitoring Mini-SAP for Third Quarter Fiscal Year 2014,* Sandia National Laboratories, Albuquerque, New Mexico.

SNL February 2014 Sandia National Laboratories, New Mexico (SNL/NM), February 2014. *SWMU 154 Groundwater Monitoring Mini-SAP for Second 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 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 III 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) *Notification 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.

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 2014 ..... 13A-5

13A-2 Method Detection Limits for Volatile Organic Compounds (EPA Method SW846-8260B), Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 13A-6

13A-3 Method Detection Limits for Semivolatile Organic Compounds (EPA Method SW846-8270D), Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 13A-7

13A-4 Method Detection Limits for High Explosive Compounds (EPA Method SW846-8321A), Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 13A-8

13A-5 Summary of Nitrate plus Nitrate Results, Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 13A-9

13A-6 Summary of Anion and Alkalinity Results, Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 13A-10

13A-7 Summary of Perchlorate Results, Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 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 2014 ..... 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 2014 ..... 13A-16

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 2014 ..... 13A-20

13A-11 Summary of Field Water Quality Measurements, Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2014 ..... 13A-22

Footnotes for Solid Waste Management Unit 154 Analytical Results Tables 13A-23

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 2014

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 18-Mar-14	RDX	0.267	0.087	0.272	NE	J	J+	095579-024	SW846 8321A
CTF-MW2 (Duplicate) 18-Mar-14	RDX	0.340	0.086	0.269	NE		J+	095580-024	SW846 8321A
CTF-MW2 06-Jun-14	RDX	0.208	0.0865	0.270	NE	J		096045-024	SW846 8321A

Refer to footnotes on page 13A-23.

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 2014

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	0.300–0.500	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	0.300–3.00
1,2-Dichloropropane	0.300	Methylene chloride	1.70–3.00
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	2.50–3.00	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-23.

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 2014

Analyte	MDL[b] (µg/L)	Analyte	MDL[b] (µg/L)
1'-Biphenyl 1	3.00–3.09	Butylbenzyl phthalate	3.00–3.09
1,4-Dioxane	3.00–3.09	Caprolactam	3.00–3.09
1,2,4-Trichlorobenzene	3.00–3.09	Carbazole	0.300–0.309
2,4,5-Trichlorophenol	3.00–3.09	Chrysene	0.300–0.309
2,4,6-Trichlorophenol	3.00–3.09	Di-n-butyl phthalate	3.00–3.09
2,4-Dichlorophenol	3.00–3.09	Di-n-octyl phthalate	3.00–3.09
2,4-Dimethylphenol	3.00–3.09	Dibenz[a,h]anthracene	0.300–0.309
2,4-Dinitrophenol	5.00–5.15	Dibenzofuran	3.00–3.09
2,4-Dinitrotoluene	3.00–3.09	Diethylphthalate	3.00–3.09
2,6-Dinitrotoluene	3.00–3.09	Dimethylphthalate	3.00–3.09
2-Chloronaphthalene	0.410–0.423	Dinitro-o-cresol	3.00–3.09
2-Chlorophenol	3.00–3.09	Diphenyl amine	3.00–3.09
2-Methylnaphthalene	0.300–0.309	Fluoranthene	0.300–0.309
2-Nitroaniline	3.00–3.09	Fluorene	0.300–0.309
2-Nitrophenol	3.00–3.09	Hexachlorobenzene	3.00–3.09
3,3'-Dichlorobenzidine	3.00–3.09	Hexachlorobutadiene	3.00–3.09
3-Nitroaniline	3.00–3.09	Hexachlorocyclopentadiene	3.00–3.09
4-Bromophenyl phenyl ether	3.00–3.09	Hexachloroethane	3.00–3.09
4-Chloro-3-methylphenol	3.00–3.09	Indeno(1,2,3-c,d)pyrene	0.300–0.309
4-Chlorobenzenamine	3.30–3.40	Isophorone	3.50–3.61
4-Chlorophenyl phenyl ether	3.00–3.09	Naphthalene	0.300–0.309
4-Nitroaniline	3.00–3.09	Nitro-benzene	3.00–3.09
4-Nitrophenol	3.00–3.09	Pentachlorophenol	3.00–3.09
Acenaphthene	0.300–0.309	Phenanthrene	0.300–0.309
Acenaphthylene	0.300–0.309	Phenol	3.00–3.09
Acetophenone	3.00–3.09	Pyrene	0.300–0.309
Anthracene	0.300–0.309	bis(2-Chloroethoxy)methane	3.00–3.09
Atrazine	3.00–3.09	bis(2-Chloroethyl)ether	3.00–3.09
Benzaldehyde	3.00–3.09	bis(2-Chloroisopropyl)ether	3.00–3.09
Benzo(a)anthracene	0.300–0.309	bis(2-Ethylhexyl)phthalate	3.00–3.09
Benzo(a)pyrene	0.300–0.309	m,p-Cresol	3.70–3.81
Benzo(b)fluoranthene	0.300–0.309	n-Nitrosodipropylamine	3.00–3.09
Benzo(ghi)perylene	0.300–0.309	o-Cresol	3.00–3.09
Benzo(k)fluoranthene	0.300–0.309		

Refer to footnotes on page 13A-23.

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 2014

Analyte	MDL[b] (µg/L)
1,3,5-Trinitrobenzene	0.0860–0.0870
1,3-Dinitrobenzene	0.0860–0.0870
2,4,6-Trinitrotoluene	0.0860–0.0870
2,4-Dinitrotoluene	0.0860–0.0870
2,6-Dinitrotoluene	0.0860–0.0870
2-Amino-4,6-dinitrotoluene	0.0860–0.0870
2-Nitrotoluene	0.0882–0.0891
3-Nitrotoluene	0.0860–0.0870
4-Amino-2,6-dinitrotoluene	0.0860–0.0870
4-Nitrotoluene	0.161– 0.163
HMX	0.0860–0.0870
Nitro-benzene	0.0860–0.0870
Pentaerythritol tetranitrate	0.108–0.109
RDX	0.0860–0.0870
Tetryl	0.0860–0.0870

Refer to footnotes on page 13A-23.

Table 13A-5
Summary of Nitrate plus Nitrite Results,
Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 18-Mar-14	Nitrate plus nitrite	ND	0.017	0.050	10.0	U		095579-018	EPA 353.2
CTF-MW2 (Duplicate) 18-Mar-14	Nitrate plus nitrite	ND	0.017	0.050	10.0	U		095580-018	EPA 353.2
CTF-MW2 06-Jun-14	Nitrate plus nitrite	ND	0.085	0.250	10.0	U		096045-018	EPA 353.2
CTF-MW2 08-Sep-14	Nitrate plus nitrite	ND	0.017	0.050	10.0	U		096593-018	EPA 353.2

Refer to footnotes on page 13A-23.

Table 13A-6
Summary of Anion and Alkalinity Results,
Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	1440	0.725	1.00	NE			095579-022	SM2320B
18-Mar-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095579-022	SM2320B
	Bromide	1.76	0.335	1.00	NE			095579-016	SW846 9056
	Chloride	468	3.35	10.0	NE			095579-016	SW846 9056
	Fluoride	2.42	0.033	0.100	4.0			095579-016	SW846 9056
	Sulfate	149	6.65	20.0	NE			095579-016	SW846 9056
CTF-MW2 (Duplicate)	Bicarbonate Alkalinity	1410	0.725	1.00	NE			095580-022	SM2320B
18-Mar-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		095580-022	SM2320B
	Bromide	1.69	0.335	1.00	NE			095580-016	SW846 9056
	Chloride	460	3.35	10.0	NE			095582-016	SW846 9056
	Fluoride	2.37	0.033	0.100	4.0			095580-016	SW846 9056
	Sulfate	148	6.65	20.0	NE			095580-016	SW846 9056
CTF-MW2	Bicarbonate Alkalinity	1530	0.725	1.00	NE			096045-022	SM2320B
06-Jun-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U		096045-022	SM2320B
	Bromide	ND	0.067	0.200	NE	N, U		096045-016	SW846 9056
	Chloride	460	6.70	20.0	NE			096045-016	SW846 9056
	Fluoride	2.37	0.033	0.100	4.0			096045-016	SW846 9056
	Sulfate	158	13.3	40.0	NE			096045-016	SW846 9056
CTF-MW2	Bicarbonate Alkalinity	1540	0.725	1.00	NE		J	096593-022	SM2320B
08-Sep-14	Carbonate Alkalinity	ND	0.725	1.00	NE	U	UJ	096593-022	SM2320B
	Bromide	ND	0.067	0.200	NE	U		096593-016	SW846 9056
	Chloride	447	6.70	20.0	NE			096593-016	SW846 9056
	Fluoride	2.67	0.033	0.100	4.0			096593-016	SW846 9056
	Sulfate	153	13.3	40.0	NE			096593-016	SW846 9056

Refer to footnotes on page 13A-23.

Table 13A-7
Summary of Perchlorate Results,
Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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 18-Mar-14	ND	0.004	0.012	NE	U		095579-020	EPA 314.0
CTF-MW2 (Duplicate) 18-Mar-14	ND	0.004	0.012	NE	U		095580-020	EPA 314.0
CTF-MW2 06-Jun-14	ND	0.004	0.012	NE	U		096045-020	EPA 314.0
CTF-MW2 08-Sep-14	ND	0.004	0.012	NE	U		096593-020	EPA 314.0

Refer to footnotes on page 13A-23.

Table 13A-8
Summary of Target Analyte List Metal Results,
Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	0.108	0.015	0.050	NE			095579-009	SW846 6020
18-Mar-14	Antimony	ND	0.001	0.003	0.006	U		095579-009	SW846 6020
	Arsenic	**0.0365**	0.0017	0.005	0.010			095579-009	SW846 6020
	Barium	0.0768	0.0006	0.002	2.00	B		095579-009	SW846 6020
	Beryllium	0.00212	0.0002	0.0005	0.004			095579-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095579-009	SW846 6020
	Calcium	335	0.600	2.00	NE			095579-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095579-009	SW846 6020
	Cobalt	0.00871	0.0001	0.001	NE			095579-009	SW846 6020
	Copper	0.00121	0.00035	0.001	NE		0.0040UJ	095579-009	SW846 6020
	Iron	2.68	0.033	0.100	NE			095579-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095579-009	SW846 6020
	Magnesium	77.4	0.100	0.300	NE			095579-009	SW846 6020
	Manganese	2.85	0.050	0.250	NE		J	095579-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095579-009	SW846 7470
	Nickel	0.0179	0.0005	0.002	NE			095579-009	SW846 6020
	Potassium	43.6	0.080	0.300	NE			095579-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		095579-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095579-009	SW846 6020
	Sodium	465	4.00	12.5	NE			095579-009	SW846 6020
	Thallium	0.00154	0.00045	0.002	0.002	J		095579-009	SW846 6020
	Uranium	0.0257	0.000067	0.0002	0.03			095579-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095579-009	SW846 6010
	Zinc	0.230	0.0175	0.050	NE			095579-009	SW846 6020

Refer to footnotes on page 13A-23.

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 2014

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	0.114	0.015	0.050	NE			095580-009	SW846 6020
18-Mar-14	Antimony	ND	0.001	0.003	0.006	U		095580-009	SW846 6020
	Arsenic	**0.0355**	0.0017	0.005	0.010			095580-009	SW846 6020
	Barium	0.0825	0.0006	0.002	2.00	B		095580-009	SW846 6020
	Beryllium	0.00217	0.0002	0.0005	0.004			095580-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095580-009	SW846 6020
	Calcium	354	0.600	2.00	NE			095580-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095580-009	SW846 6020
	Cobalt	0.00872	0.0001	0.001	NE			095580-009	SW846 6020
	Copper	0.00139	0.00035	0.001	NE		0.0040UJ	095580-009	SW846 6020
	Iron	2.67	0.033	0.100	NE			095580-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095580-009	SW846 6020
	Magnesium	83.6	0.100	0.300	NE			095580-009	SW846 6020
	Manganese	2.84	0.050	0.250	NE		J	095580-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095580-009	SW846 7470
	Nickel	0.0171	0.0005	0.002	NE			095580-009	SW846 6020
	Potassium	42.4	0.080	0.300	NE			095580-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		095580-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095580-009	SW846 6020
	Sodium	475	4.00	12.5	NE			095580-009	SW846 6020
	Thallium	0.00131	0.00045	0.002	0.002	J		095580-009	SW846 6020
	Uranium	0.0254	0.000067	0.0002	0.03			095580-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095580-009	SW846 6010
	Zinc	0.227	0.0175	0.050	NE			095580-009	SW846 6020

Refer to footnotes on page 13A-23.

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 2014

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	0.116	0.015	0.050	NE			096045-009	SW846 6020
06-Jun-14	Antimony	ND	0.001	0.003	0.006	U		096045-009	SW846 6020
	Arsenic	**0.0341**	0.0017	0.005	0.010			096045-009	SW846 6020
	Barium	0.0797	0.0006	0.002	2.00			096045-009	SW846 6020
	Beryllium	0.00274	0.0002	0.0005	0.004			096045-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096045-009	SW846 6020
	Calcium	347	6.00	20.0	NE			096045-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096045-009	SW846 6020
	Cobalt	0.0091	0.0001	0.001	NE			096045-009	SW846 6020
	Copper	0.000987	0.00035	0.001	NE	J	J-	096045-009	SW846 6020
	Iron	2.14	0.033	0.100	NE			096045-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096045-009	SW846 6020
	Magnesium	73.7	1.00	3.00	NE			096045-009	SW846 6020
	Manganese	2.84	0.100	0.500	NE		J	096045-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096045-009	SW846 7470
	Nickel	0.0157	0.0005	0.002	NE		J-	096045-009	SW846 6020
	Potassium	47.9	0.080	0.300	NE		J	096045-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		096045-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096045-009	SW846 6020
	Sodium	444	8.00	25.0	NE			096045-009	SW846 6020
	Thallium	0.0013	0.00045	0.002	0.002	J	2.5U	096045-009	SW846 6020
	Uranium	0.0258	0.000067	0.0002	0.03			096045-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		096045-009	SW846 6010
	Zinc	0.104	0.0035	0.010	NE			096045-009	SW846 6020

Refer to footnotes on page 13A-23.

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 2014

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	0.189	0.015	0.050	NE			096593-009	SW846 6020
08-Sep-14	Antimony	ND	0.001	0.003	0.006	U		096593-009	SW846 6020
	Arsenic	**0.0458**	0.0017	0.005	0.010			096593-009	SW846 6020
	Barium	0.0786	0.0006	0.002	2.00			096593-009	SW846 6020
	Beryllium	0.00263	0.0002	0.0005	0.004			096593-009	SW846 6020
	Cadmium	0.000143	0.00011	0.001	0.005	J		096593-009	SW846 6020
	Calcium	381	0.600	2.00	NE			096593-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096593-009	SW846 6020
	Cobalt	0.0105	0.0001	0.001	NE			096593-009	SW846 6020
	Copper	0.00082	0.00035	0.001	NE	J	J-	096593-009	SW846 6020
	Iron	2.65	0.033	0.100	NE			096593-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096593-009	SW846 6020
	Magnesium	83.3	0.100	0.300	NE			096593-009	SW846 6020
	Manganese	2.98	0.010	0.050	NE		J	096593-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	096593-009	SW846 7470
	Nickel	0.0167	0.0005	0.002	NE		J-	096593-009	SW846 6020
	Potassium	49.5	0.080	0.300	NE			096593-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		096593-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096593-009	SW846 6020
	Sodium	485	0.800	2.50	NE			096593-009	SW846 6020
	Thallium	0.00117	0.00045	0.002	0.002	J		096593-009	SW846 6020
	Uranium	0.0261	0.000067	0.0002	0.03			096593-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		096593-009	SW846 6010
	Zinc	0.0366	0.0035	0.010	NE			096593-009	SW846 6020

Refer to footnotes on page 13A-23.

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 2014

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	0.103	0.015	0.050	NE			095579-010	SW846 6020
18-Mar-14	Antimony	ND	0.001	0.003	0.006	U		095579-010	SW846 6020
	Arsenic	**0.0365**	0.0017	0.005	0.010			095579-010	SW846 6020
	Barium	0.0813	0.0006	0.002	2.00	B		095579-010	SW846 6020
	Beryllium	0.00215	0.0002	0.0005	0.004			095579-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095579-010	SW846 6020
	Calcium	357	0.600	2.00	NE			095579-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095579-010	SW846 6020
	Cobalt	0.00892	0.0001	0.001	NE			095579-010	SW846 6020
	Copper	0.00108	0.00035	0.001	NE		J-	095579-010	SW846 6020
	Iron	2.71	0.033	0.100	NE			095579-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095579-010	SW846 6020
	Magnesium	84.4	0.100	0.300	NE			095579-010	SW846 6020
	Manganese	2.91	0.050	0.250	NE		J	095579-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095579-010	SW846 7470
	Nickel	0.018	0.0005	0.002	NE			095579-010	SW846 6020
	Potassium	43.3	0.080	0.300	NE			095579-010	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		095579-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095579-010	SW846 6020
	Sodium	518	4.00	12.5	NE			095579-010	SW846 6020
	Thallium	0.0014	0.00045	0.002	0.002	J		095579-010	SW846 6020
	Uranium	0.0264	0.000067	0.0002	0.03			095579-010	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095579-010	SW846 6010
	Zinc	0.221	0.0175	0.050	NE			095579-010	SW846 6020

Refer to footnotes on page 13A-23.

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 2014

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	0.104	0.015	0.050	NE			095580-010	SW846 6020
18-Mar-14	Antimony	ND	0.001	0.003	0.006	U		095580-010	SW846 6020
	Arsenic	**0.0329**	0.0017	0.005	0.010			095580-010	SW846 6020
	Barium	0.0814	0.0006	0.002	2.00	B		095580-010	SW846 6020
	Beryllium	0.00201	0.0002	0.0005	0.004			095580-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		095580-010	SW846 6020
	Calcium	349	0.600	2.00	NE			095580-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		095580-010	SW846 6020
	Cobalt	0.00828	0.0001	0.001	NE			095580-010	SW846 6020
	Copper	0.00132	0.00035	0.001	NE		J-	095580-010	SW846 6020
	Iron	2.64	0.033	0.100	NE			095580-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		095580-010	SW846 6020
	Magnesium	84.6	0.100	0.300	NE			095580-010	SW846 6020
	Manganese	2.84	0.050	0.250	NE		J	095580-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		095580-010	SW846 7470
	Nickel	0.0171	0.0005	0.002	NE			095580-010	SW846 6020
	Potassium	43.9	0.080	0.300	NE			095580-010	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		095580-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		095580-010	SW846 6020
	Sodium	498	4.00	12.5	NE			095580-010	SW846 6020
	Thallium	0.00128	0.00045	0.002	0.002	J		095580-010	SW846 6020
	Uranium	0.0248	0.000067	0.0002	0.03			095580-010	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		095580-010	SW846 6010
	Zinc	0.215	0.0175	0.050	NE			095580-010	SW846 6020

Refer to footnotes on page 13A-23.

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 2014

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	0.100	0.015	0.050	NE			096045-010	SW846 6020
06-Jun-14	Antimony	ND	0.001	0.003	0.006	U		096045-010	SW846 6020
	Arsenic	**0.0261**	0.0017	0.005	0.010			096045-010	SW846 6020
	Barium	0.0782	0.0006	0.002	2.00			096045-010	SW846 6020
	Beryllium	0.00246	0.0002	0.0005	0.004			096045-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		096045-010	SW846 6020
	Calcium	343	6.00	20.0	NE			096045-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096045-010	SW846 6020
	Cobalt	0.00867	0.0001	0.001	NE			096045-010	SW846 6020
	Copper	0.0551	0.00035	0.001	NE		J-	096045-010	SW846 6020
	Iron	1.97	0.033	0.100	NE			096045-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096045-010	SW846 6020
	Magnesium	72.8	1.00	3.00	NE			096045-010	SW846 6020
	Manganese	2.71	0.100	0.500	NE		J	096045-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		096045-010	SW846 7470
	Nickel	0.017	0.0005	0.002	NE		J-	096045-010	SW846 6020
	Potassium	49.6	0.080	0.300	NE		J	096045-010	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		096045-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096045-010	SW846 6020
	Sodium	433	8.00	25.0	NE			096045-010	SW846 6020
	Thallium	0.00131	0.00045	0.002	0.002	J		096045-010	SW846 6020
	Uranium	0.0123	0.000067	0.0002	0.03			096045-010	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		096045-010	SW846 6010
	Zinc	0.832	0.0035	0.010	NE			096045-010	SW846 6020

Refer to footnotes on page 13A-23.

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 2014

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	0.161	0.015	0.050	NE			096593-010	SW846 6020
08-Sep-14	Antimony	ND	0.001	0.003	0.006	U		096593-010	SW846 6020
	Arsenic	**0.0398**	0.0017	0.005	0.010			096593-010	SW846 6020
	Barium	0.075	0.0006	0.002	2.00			096593-010	SW846 6020
	Beryllium	0.00275	0.0002	0.0005	0.004			096593-010	SW846 6020
	Cadmium	0.000216	0.00011	0.001	0.005	J		096593-010	SW846 6020
	Calcium	367	0.600	2.00	NE			096593-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		096593-010	SW846 6020
	Cobalt	0.00958	0.0001	0.001	NE			096593-010	SW846 6020
	Copper	0.000999	0.00035	0.001	NE	J	J-	096593-010	SW846 6020
	Iron	2.39	0.033	0.100	NE			096593-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		096593-010	SW846 6020
	Magnesium	81.2	0.100	0.300	NE			096593-010	SW846 6020
	Manganese	2.84	0.010	0.050	NE		J	096593-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	096593-010	SW846 7470
	Nickel	0.0157	0.0005	0.002	NE		J-	096593-010	SW846 6020
	Potassium	47.7	0.080	0.300	NE			096593-010	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		096593-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		096593-010	SW846 6020
	Sodium	479	0.800	2.50	NE			096593-010	SW846 6020
	Thallium	0.00139	0.00045	0.002	0.002	J		096593-010	SW846 6020
	Uranium	0.0278	0.000067	0.0002	0.03			096593-010	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		096593-010	SW846 6010
	Zinc	0.055	0.0035	0.010	NE			096593-010	SW846 6020

Refer to footnotes on page 13A-23.

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 2014

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 18-Mar-14	Americium-241	2.46 ± 10.3	16.1	7.87	NE	U	BD	095579-033	EPA 901.1
	Cesium-137	-1.43 ± 4.28	3.89	1.88	NE	U	BD	095579-033	EPA 901.1
	Cobalt-60	-1.53 ± 2.00	3.09	1.45	NE	U	BD	095579-033	EPA 901.1
	Potassium-40	39.4 ± 43.6	32.6	15.4	NE	X	R	095579-033	EPA 901.1
	Gross Alpha	6.99	NA	NA	15 pCi/L	NA	None	095579-034	EPA 900.0
	Gross Beta	65.2 ± 13.2	9.39	4.53	4mrem/yr			095579-034	EPA 900.0
	Uranium-233/234	57.2 ± 7.12	0.0701	0.0293	NE			095579-035	HASL 300
	Uranium-235/236	0.633 ± 0.139	0.0669	0.0264	NE			095579-035	HASL 300
	Uranium-238	8.38 ± 1.10	0.0655	0.027	NE			095579-035	HASL 300
CTF-MW2 (Duplicate) 18-Mar-14	Americium-241	4.19 ± 6.53	9.54	4.67	NE	U	BD	095580-033	EPA 901.1
	Cesium-137	-2.25 ± 2.77	2.87	1.38	NE	U	BD	095580-033	EPA 901.1
	Cobalt-60	1.09 ± 1.70	3.05	1.44	NE	U	BD	095580-033	EPA 901.1
	Potassium-40	39.2 ± 41.7	27.1	12.7	NE	X	R	095580-033	EPA 901.1
	Gross Alpha	7.63	NA	NA	15 pCi/L	NA	None	095580-034	EPA 900.0
	Gross Beta	63.2 ± 12.9	9.32	4.49	4mrem/yr			095580-034	EPA 900.0
	Uranium-233/234	60.5 ± 8.55	0.105	0.0437	NE			095580-035	HASL 300
	Uranium-235/236	0.585 ± 0.159	0.0998	0.0393	NE			095580-035	HASL 300
	Uranium-238	8.69 ± 1.30	0.0977	0.0403	NE			095580-035	HASL 300
CTF-MW2 06-Jun-14	Americium-241	-0.726 ± 11.8	20.5	10.0	NE	U	BD	096045-033	EPA 901.1
	Cesium-137	-0.0079 ± 1.77	3.19	1.52	NE	U	BD	096045-033	EPA 901.1
	Cobalt-60	-1.16 ± 3.22	3.55	1.66	NE	U	BD	096045-033	EPA 901.1
	Potassium-40	32.1 ± 44.4	32.0	14.8	NE	X	R	096045-033	EPA 901.1
	Gross Alpha	-6.64	NA	NA	15 pCi/L	NA	None	096045-034	EPA 900.0
	Gross Beta	56.6 ± 24.5	31.3	14.2	4mrem/yr		J	096045-034	EPA 900.0
	Uranium-233/234	56.9 ± 7.24	0.132	0.0589	NE			096045-035	HASL 300
	Uranium-235/236	0.566 ± 0.138	0.110	0.0466	NE			096045-035	HASL 300
	Uranium-238	8.77 ± 1.18	0.0739	0.030	NE			096045-035	HASL 300

Refer to footnotes on page 13A-23.

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 2014

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	6.64 ± 8.69	14.3	7.01	NE	U	BD	096593-033	EPA 901.1
08-Sep-14	Cesium-137	-0.151 ± 1.61	2.72	1.31	NE	U	BD	096593-033	EPA 901.1
	Cobalt-60	0.987 ± 1.84	3.23	1.54	NE	U	BD	096593-033	EPA 901.1
	Potassium-40	90.6 ± 40.7	24.8	11.6	NE			096593-033	EPA 901.1
	Gross Alpha	-7.72	NA	NA	15 pCi/L	NA	None	096593-034	EPA 900.0
	Gross Beta	53.2 ± 17.5	23.7	11.6	4mrem/yr		J	096593-034	EPA 900.0
	Uranium-233/234	62.1 ± 7.94	0.115	0.0504	NE			096593-035	EPA 900.0
	Uranium-235/236	0.761 ± 0.171	0.0846	0.0334	NE			096593-035	EPA 900.0
	Uranium-238	8.86 ± 1.20	0.0668	0.0262	NE			096593-035	HASL 300

Refer to footnotes on page 13A-23.

Table 13A-11
Summary of Field Water Quality Measurements[h],
Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2014

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	18-Mar-14	13.65	3299	-40.6	5.64	0.39	3.5	0.36
CTF-MW2	06-Jun-14	19.17	3195.0	35.2	5.86	0.86	0.9	0.09
CTF-MW2	08-Sep-14	17.83	3316.1	31.9	5.58	0.54	1.3	0.12

Refer to footnotes on page 13A-23.

Footnotes for Solid Waste Management Unit 154 Analytical Results Tables

% = Percent.
CFR = Code of Federal Regulations.
CTF = Coyote Test Field.
EPA = U.S. Environmental Protection Agency,
HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
ID = Identification.
µg/L = Micrograms per liter.
mg/L = Milligrams per liter.
mrem/yr = Millirem per year.
MW = Monitoring well.
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 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. MDA 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).

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.

B = The analyte was found 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.
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.
R = The data are unusable. Resampling and reanalysis are necessary for verification.
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.
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

This page intentionally left blank.

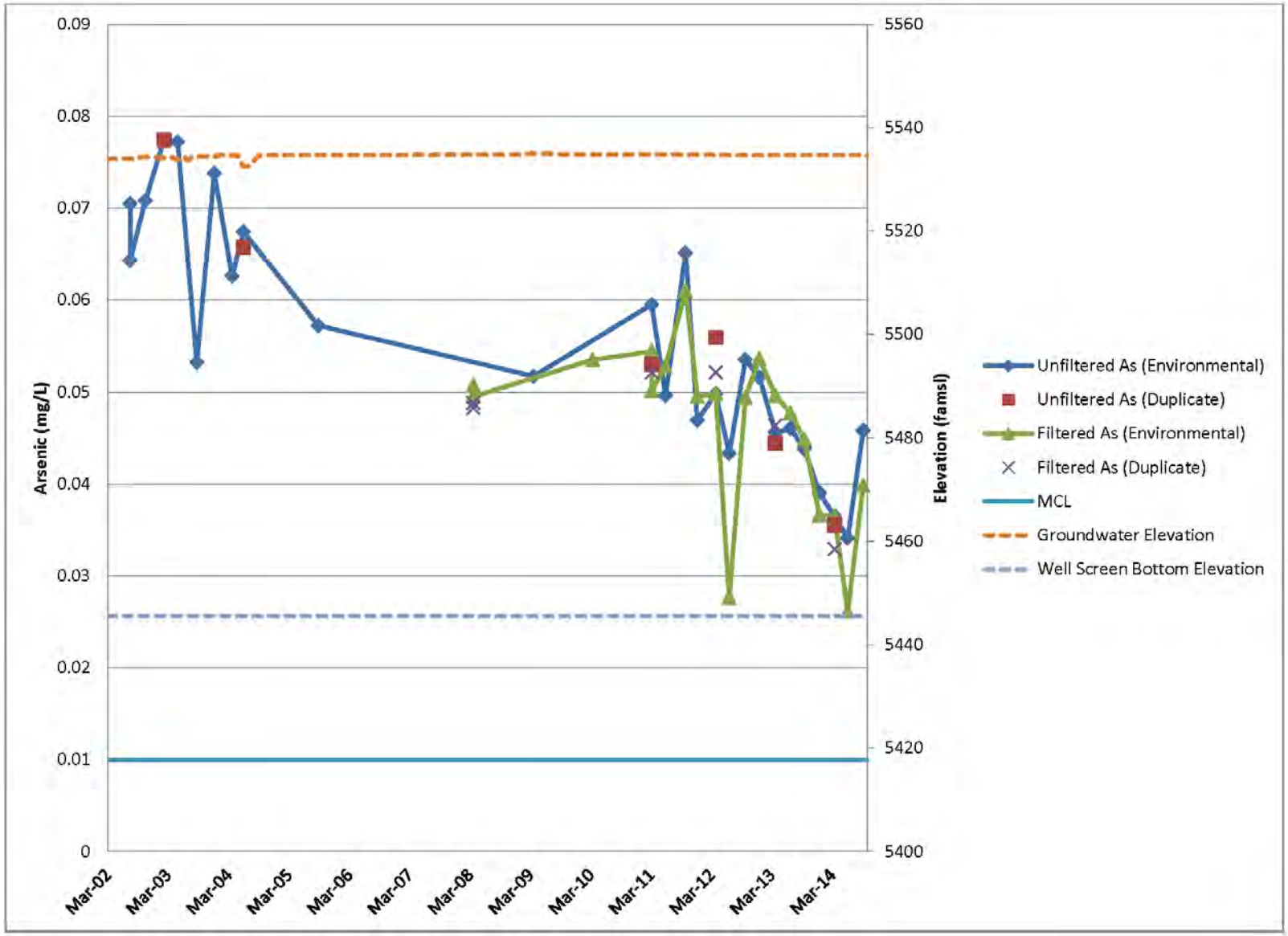


Figure 13B-1. Arsenic Concentrations, CTF-MW2

This page intentionally left blank.

Attachment 13C
Solid Waste Management Unit 154
Hydrographs

This page intentionally left blank.

Attachment 13C Hydrographs

13C-1 Solid Waste Management Unit 154 Study Area Well 13C-5

This page intentionally left blank.

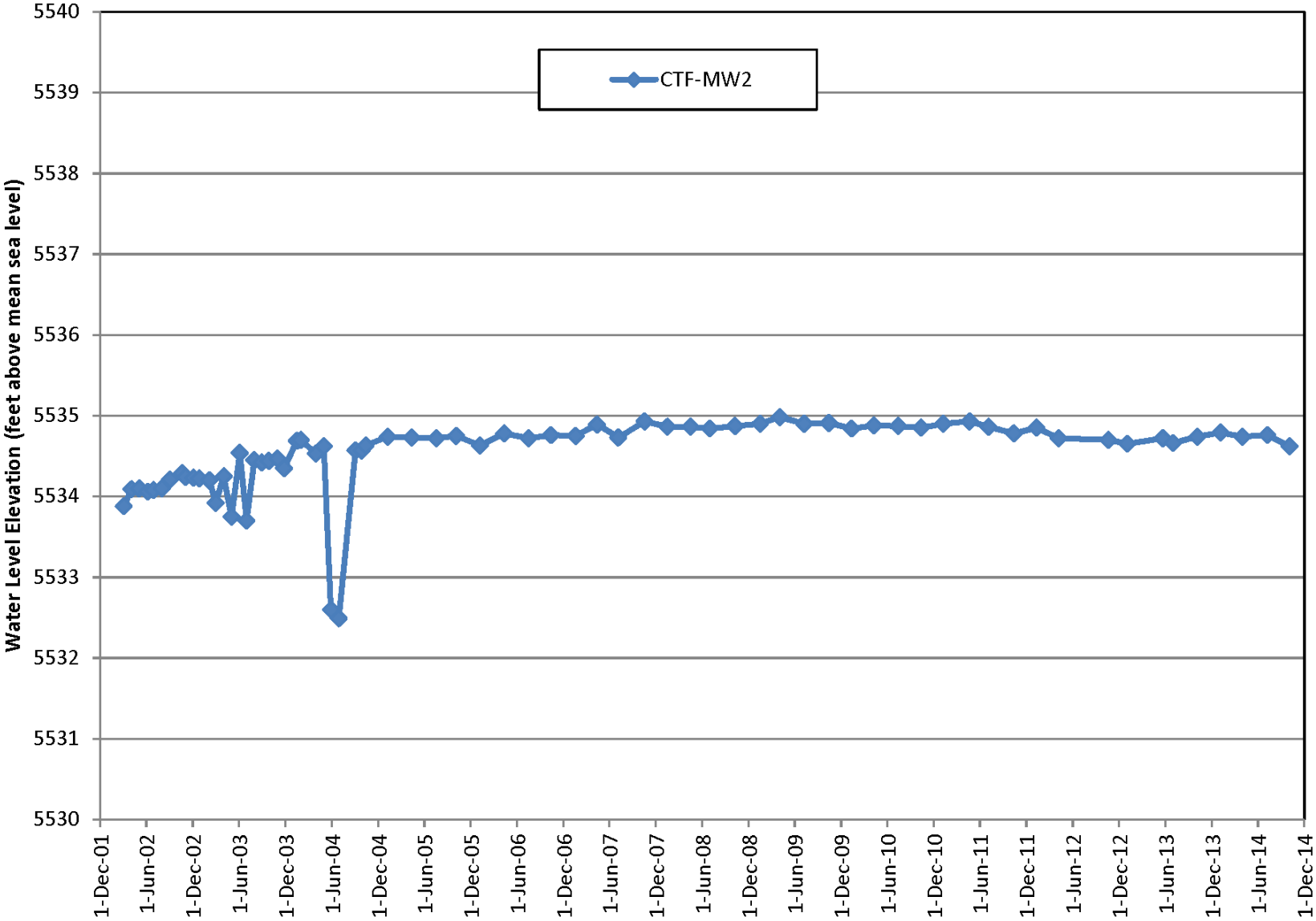


Figure 13C-1. Solid Waste Management Unit 154 Study Area Well

This page intentionally left blank.

Table 1. Inventory of Groundwater Monitoring and Production Wells Located at SNL/NM and Surrounding Areas

Well	Type	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	5939.28	5937.0	98.0	118.0	5839.0	5819.0	123.0	4.7	PVC	Bedrock (granite)	31-Aug-11	
CYN-MW1D	MW	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	MW	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	MW	6313.26	6311.9	120.0	130.0	6191.9	6181.9	135.0	5.0	PVC	Bedrock (metamorphics)	18-Jun-99	
CYN-MW4	MW	6455.48	6454.7	260.0	280.0	6194.7	6174.7	290.0	5.0	PVC	Bedrock (quartzite)	18-Jun-99	
CYN-MW5	MW	5984.23	5981.3	135.0	155.0	5846.3	5826.3	160.0	5.0	PVC	Bedrock (quartzite)	15-Aug-01	
CYN-MW6	MW	6343.37	6340.5	141.5	161.3	6199.0	6179.2	161.7	5.0	PVC	Bedrock (metamorphics)	9-Dec-05	
CYN-MW7	MW	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	MW	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	MW	6360.67	6358.5	175.8	195.8	6182.7	6162.7	200.8	4.8	PVC	Bedrock (metamorphics)	27-Jul-10	
CYN-MW10	MW	6345.45	6342.8	150.4	170.4	6192.4	6172.4	175.4	4.8	PVC	Bedrock (metamorphics)	28-Jul-10	
CYN-MW11	MW	6374.41	6371.9	229.8	249.8	6142.1	6122.1	254.8	4.8	PVC	Bedrock (metamorphics)	29-Jul-10	
CYN-MW12	MW	6345.16	6342.9	252.5	272.5	6090.4	6070.4	277.5	4.8	PVC	Bedrock (metamorphics)	29-Jul-10	

Table 1. Inventory of Groundwater Monitoring and Production Wells Located at SNL/NM and Surrounding Areas *(Continued)*

Well	Type	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
Lurance Canyon and Vicinity (Continued)													
CYN-MW13	MW	6237.79	6236.03	376.8	396.8	5859.2	5839.2	402.2	4.8	PVC	Bedrock (granitic gneiss)	5-Dec-2012	
CYN-MW14A	MW	6315.85	6313.46	263.6	293.6	6047.4	6017.4	298.6	4.8	PVC	Bedrock (metamorphics)	9-Dec-14	
CYN-MW15	MW	6344.44	6342.33	162.2	192.2	6178.8	6148.8	195.0	4.8	PVC	Bedrock (metamorphics)	8-Dec-14	
Burn Site Well	P	6374.52	6373.7**	231.0	341.0	6142.7	6032.7	341.0	4.0	PVC	Bedrock (schist and granite)	20-Feb-86	
Greystone-MW2	MW	5814.20	5811.4	60.0	80.0	5751.4	5731.4	85.0	4.8	PVC	Alluvium	25-Apr-02	
HERTF	P		6229.7	449.0*	500.0*	5780.7*	5729.7*	449.0?*	5.0	OH?	Bedrock (granite)	13-Jul-1990	Yes
TSA-1	P	6063.68	6060.2	190.0	210.0	5870.2	5850.2	300.0	6.0	CS	Bedrock (metamorphics)	10-Nov-87	Aug-01
Mixed Waste Landfill and Vicinity													
MWL-BW1	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	5871.42	5869.1	135.0	155.0	5734.1	5714.1	160.0	4.7	PVC	Bedrock (granite)	31-Aug-11	
OBS-MW2	MW	5863.16	5860.8	234.0	254.0	5626.8	5606.8	259.0	4.7	PVC	Bedrock (granite)	30-Aug-11	
OBS-MW3	MW	5865.50	5863.3	190.0	210.0	5673.3	5653.3	215.0	4.7	PVC	Bedrock (granite)	30-Aug-11	
CTF-MW1	MW	6082.63	6079.7	240.0	260.0	5839.7	5819.7	265.0	5.0	PVC	Bedrock (granite)	16-Aug-01	
CTF-MW2	MW	5578.60	5575.6	110.0	130.0	5465.6	5445.6	135.0	5.0	PVC	Bedrock (granite)	18-Aug-01	
CTF-MW3	MW	5522.82	5519.8	340.0	360.0	5179.8	5159.8	365.0	5.0	PVC	Bedrock (granite)	21-Aug-01	
LMF-1	MW	5628.60	5626.5	310.0	350.0	5316.5	5276.5	360.0	4.1	PVC	Bedrock (limestone)	11-Aug-95	15-Jan-98
School House Well	MW	5796.33	5799.0	103.0*	107.0*	5696.0*	5692.0*	103.0*	6.0	CS	Bedrock (Sandia Formation)		
SFR-1D	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	5498.66	5496.9	713.0	733.0	4783.9	4763.9	753.0	5.4	SS	Bedrock (sandstone)	23-Sep-93	
SFR-4P	MW	5573.33	5571.3	344.0	354.0	5227.3	5217.3	364.0	1.9	PVC	Bedrock (sandstone)	29-Jul-93	
SFR-4T	MW	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	MW	5535.53	5533.3	149.8	169.8	5383.5	5363.5	179.8	4.3	PVC	Santa Fe Group sediments	18-Jun-95	23-Sep-97
TRE-1	MW	5497.25	5495.2	255.0	295.0	5240.2	5200.2	305.0	4.3	PVC	Santa Fe Group sediments	31-Jul-95	

Table 1. Inventory of Groundwater Monitoring and Production Wells Located at SNL/NM and Surrounding Areas *(Continued)*

Well	Type	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
Coyote Test Field and Vicinity (Continued)													
TRE-2	MW	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	MW	5735.62	5733.6	320.0	340.0	5413.6	5393.6	350.0	3.8	PVC	Bedrock (sandstone)	12-Oct-94	
TRS-1	MW	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	MW	5779.80	5777.5	266.4	306.4	5511.1	5471.1	316.4	1.9	PVC	Bedrock (limestone)	6-Sep-95	
TRS-1S	MW	5780.07	5777.5	164.0	204.0	5613.5	5573.5	214.8	1.9	PVC	Bedrock (limestone)	6-Sep-95	
TRS-2	MW	5780.76	5778.3	165.0	205.0	5613.3	5573.3	210.0	4.5	CS	Bedrock (limestone)	9-Sep-95	
Tijeras Arroyo Groundwater													
TA1-W-01	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	5411.85	5410.1	299.6	319.6	5110.5	5090.5	324.6	3.8	PVC	Santa Fe Group sediments	30-Nov-92	12-Dec-14
TA2-W-01	MW	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	MW	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	MW	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	MW	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	MW	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	MW	5362.85	5360.8	275.0	295.0	5085.8	5065.8	300.6	5.0	PVC	Santa Fe Group sediments	9-Feb-98	
TA2-W-28	MW	5412.41	5409.99	310.5	330.5	5099.5	5079.5	335.45	4.8	PVC	Santa Fe Group sediments	5-Dec-14	
TJA-2	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	5392.57	5390.2	275.0	295.0	5115.2	5095.2	300.0	4.5	PVC	Santa Fe Group sediments	22-Jul-01	
EUBANK-1	MW	5460.02	5458.1	550.0	610.0	4908.1	4848.1	615.0	4.0	SS	Santa Fe Group sediments	16-Jul-88	
PGS-1	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	5408.71	5406.6	487.0	507.0	4919.6	4899.6	512.7	4.8	PVC	Santa Fe Group sediments	26-Apr-97	

Table 1. Inventory of Groundwater Monitoring and Production Wells Located at SNL/NM and Surrounding Areas *(Continued)*

Well	Type	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
Technical Area V (Continued)													
TAV-MW6	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	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	MW	5412.41	5411.5	506.0	526.0	4905.5	4885.5	531.0	3.9	PVC	Santa Fe Group sediments	30-Oct-92	
Albuquerque Bernalillo County Water Utility Authority													
MESA DEL SOL - S	MW	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	MW	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	MW	5271.06		382.0	422.0			427.0	4.0	PVC	Santa Fe Group sediments	19-May-97	
EUBANK-2	MW	5474.39		552.0	592.0			597.0	4.0	PVC	Santa Fe Group sediments	15-Nov-96	
EUBANK-3	MW	5498.73		590.0	650.0			655.0	4.0	PVC	Santa Fe Group sediments	15-Nov-96	
EUBANK-5	MW	5507.40		605.0	665.0			670.0	4.0	PVC	Santa Fe Group sediments	15-Nov-96	
Kirtland Air Force Base													
EOD Well	MW	5829.70	5828.7	206.0*	247.0*	5622.7*	5581.7*	206.0*	6.0	OH	Bedrock (granite)	1970?	
KAFB-0118	MW	5320.69	5321.2	458.0	488.0	4863.2	4833.2	499.6	5.0	PVC	Santa Fe Group sediments		
KAFB-0119	MW	5315.76	5315.6	452.3	482.3	4863.3	4833.3	482.0	4.0	PVC	Santa Fe Group sediments		
KAFB-0120	MW	5292.29	5288.7	429.0	459.0	4859.7	4829.7	461.5	4.0	PVC	Santa Fe Group sediments	12-Jun-06	
KAFB-0121	MW	5307.60	5305.0	445.8	475.8	4859.2	4829.2	480.8	4.0	PVC	Santa Fe Group sediments	24-Nov-06	
KAFB-0213	MW	5282.00	5297.3	378.0	428.0	4919.3	4869.3	438.0		PVC	Santa Fe Group sediments	10-Jan-84	
KAFB-0219	MW	5263.69	5262.7	396.0	426.0	4866.7	4836.7	428.5	4.0	PVC	Santa Fe Group sediments	8-Jun-06	
KAFB-0220	MW	5265.10	5262.5	424.0	454.0	4838.5	4808.5	456.0	4.0	PVC/SS	Santa Fe Group sediments	15-Jul-06	
KAFB-0307	MW	5364.53	5362.7	405.0	450.0	4957.7	4912.7	460.0	3.8	PVC	Santa Fe Group sediments	4-Aug-91	
KAFB-0308	MW	5381.65	5380.7	463.0	488.0	4917.7	4892.7	498.0	3.8	PVC	Santa Fe Group sediments	31-Jul-91	
KAFB-0310	MW	5416.48	5413.2	400.0	445.0	5013.2	4968.2	455.0	3.8	PVC	Santa Fe Group sediments	27-Aug-91	
KAFB-0311	MW	5353.29	5351.7	433.0	458.0	4918.7	4893.7	468.0	3.8	PVC	Santa Fe Group sediments	24-Jul-92	
KAFB-0312	MW	5432.17	5430.2	503.0	528.0	4927.2	4902.2	533.0	4.5	PVC	Santa Fe Group sediments	26-Aug-98	
KAFB-0313	MW	5418.98	5416.9	348.0	368.0	5068.9	5048.9	373.0	4.5	PVC	Santa Fe Group sediments	13-Aug-98	
KAFB-0314	MW	5455.75	5453.9	428.0	448.0	5025.9	5005.9	453.0	4.5	PVC	Santa Fe Group sediments	30-Sep-98	
KAFB-0315	MW	5466.11	5464.1	447.0	472.0	5017.1	4992.1	477.0	4.5	PVC	Santa Fe Group sediments	8-Sep-00	
KAFB-0417	MW	5313.07	5310.0	430.0	455.0	4880.0	4855.0	465.0	3.8	PVC	Santa Fe Group sediments	6-Jun-92	
KAFB-0505	MW	5362.81	5360.8	495.4	520.5	4865.4	4840.3	521.3	4.5	PVC	Santa Fe Group sediments	22-Jul-99	
KAFB-0506	MW	5363.47	5361.0	200.0	220.0	5161.0	5141.0	220.0	4.5	PVC	Santa Fe Group sediments	31-Aug-98	
KAFB-0507	MW	5358.82	5355.7	482.3	507.3	4873.4	4848.4	512.3	3.5	PVC	Santa Fe Group sediments	21-Feb-01	
KAFB-0508	MW	5351.88	5349.7	481.0	506.0	4868.7	4843.7	507.0	3.5	PVC	Santa Fe Group sediments	2-May-01	
KAFB-0510	MW	5367.10	5364.7	511.0	536.0	4853.7	4828.7	537.0	3.5	PVC	Santa Fe Group sediments	17-May-01	
KAFB-0512	MW	5304.07	5301.1	424.0	449.0	4877.1	4852.1	450.0	3.5	PVC	Santa Fe Group sediments	25-Apr-01	
KAFB-0514	MW	5206.41	5204.5	340.0	365.0	4864.5	4839.5	366.0	3.5	PVC	Santa Fe Group sediments	18-May-01	
KAFB-0517	MW	5197.10	5194.6	325.0	350.0	4869.6	4844.6	352.0	4.0	PVC	Santa Fe Group sediments	8-Nov-02	

Table 1. Inventory of Groundwater Monitoring and Production Wells Located at SNL/NM and Surrounding Areas *(Continued)*

Well	Type	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-0518	MW	5177.76	5175.5	305.0	335.0	4870.5	4840.5	337.0	4.0	PVC	Santa Fe Group sediments	22-Dec-02	
KAFB-0520	MW	5247.90	5246.2	379.5	404.5	4866.7	4841.7	410.0	4.0	PVC	Santa Fe Group sediments	15-Jun-04	
KAFB-0522	MW	5267.48	5265.7	405.0	430.0	4860.7	4835.7	432.5	4.0	PVC	Santa Fe Group sediments	23-Jun-04	
KAFB-0523	MW	5352.62	5350.5	600.0	625.0	4750.5	4725.5	627.0	4.0	PVC	Santa Fe Group sediments		
KAFB-0524	MW	5345.61	5343.4	484.0	509.0	4859.4	4834.4	511.0	4.0	PVC	Santa Fe Group sediments	31-Oct-06	
KAFB-0525	MW	5229.75	5227.9	371.0	396.0	4856.9	4831.9	398.0	4.0	PVC	Santa Fe Group sediments	19-Nov-06	
KAFB-0608	MW	5361.17	5359.9	307.0	327.0	5052.9	5032.9	338.0	4.0	PVC	Santa Fe Group sediments	28-Mar-90	
KAFB-0611	MW	5386.09	5383.5	498.0	508.0	4885.5	4875.5	513.0	4.0	PVC	Santa Fe Group sediments	13-Nov-02	
KAFB-0612	MW	5385.45	5383.5	290.0	315.0	5093.5	5068.5	317.0	4.0	PVC	Santa Fe Group sediments	21-Nov-02	
KAFB-0613	MW	5390.78	5391.3	420.0	450.0	4971.3	4941.3	452.0	4.0	PVC	Santa Fe Group sediments	8-Dec-02	
KAFB-0614	MW	5390.89	5391.4	360.0	370.0	5031.4	5021.4	372.0	4.0	PVC	Santa Fe Group sediments	12-Dec-02	
KAFB-0615	MW	5638.43	5636.3	300.0	325.0	5336.3	5311.3	327.0	4.0	PVC	Bedrock (granite)	27-Nov-02	
KAFB-0616	MW	5481.07	5478.7	472.0	497.0	5006.7	4981.7	499.0	4.0	PVC	Santa Fe Group sediments	24-Nov-02	
KAFB-0617	MW	5505.78	5503.3	565.0	590.0	4938.3	4913.3	592.0	4.0	PVC	Santa Fe Group sediments	18-May-04	
KAFB-0618	MW	5410.05	5408.2	535.0	560.0	4873.2	4848.2	562.0	4.0	PVC	Santa Fe Group sediments	15-Jun-04	
KAFB-0619	MW	5410.78	5409.0	389.0	404.0	5020.0	5005.0	406.0	4.0	PVC	Santa Fe Group sediments	4-Jun-04	
KAFB-0620	MW	5334.64	5332.0	447.0	472.0	4885.0	4860.0	474.5	4.0	PVC	Santa Fe Group sediments	18-Jun-04	
KAFB-0621	MW	5569.89	5568.0	624.0	649.0	4944.0	4919.0	650.0	4.0	PVC	Santa Fe Group sediments	17-Jun-04	
KAFB-0622	MW	5488.64	5486.2	529.0	554.0	4957.2	4932.2	555.0	4.0	PVC	Santa Fe Group sediments	25-Jun-04	
KAFB-0623	MW	5328.94	5327.0	265.0	290.0	5062.0	5037.0	292.5	4.0	PVC	Santa Fe Group sediments	29-Jun-04	
KAFB-0625	MW	5392.90	5387.5								Santa Fe Group sediments		
KAFB-0901	MW	5390.07	5389.8	465.0	527.0	4924.8	4862.8	537.0	4.0	PVC	Santa Fe Group sediments	15-Mar-90	
KAFB-0904	MW	5291.90		343.0	368.0			368.0	4.0	PVC	Santa Fe Group sediments	2002	
KAFB-1006	MW	5257.01	5257.0	363.0	383.0	4894.0	4874.0	383.0	4.0	SS	Santa Fe Group sediments	10-Aug-96	
KAFB-1007	MW	5260.11	5260.1	362.0	382.0	4898.1	4878.1	382.0	4.0	SS	Santa Fe Group sediments	27-Aug-96	
KAFB-1008	MW	5258.16	5258.8	367.6	397.6	4891.2	4861.2	400.0	4.0	PVC	Santa Fe Group sediments		
KAFB-1901	MW	5751.58	5748.7	79.0	104.0	5669.7	5644.7	114.0	3.8	PVC	Santa Fe Group sediments	1-Jul-92	
KAFB-2005	MW	5624.27	5624.6	126.0	156.0	5498.6	5468.6	158.5	4.0	PVC	Santa Fe Group sediments	10-May-06	
KAFB-2007	MW	5567.18	5564.8	273.0	303.0	5291.8	5261.8	305.5	4.0	PVC	Santa Fe Group sediments	13-May-06	
KAFB-2009	MW	5655.63									Santa Fe Group sediments		
KAFB-2622	MW	5358.41	5356.5	195.0	215.0	5161.5	5141.5	217.0	4.0	PVC	Santa Fe Group sediments	2-Dec-04	
KAFB-2623	MW	5635.27	5365.3	199.8	219.8	5165.5	5145.5	221.8	4.0	PVC	Santa Fe Group sediments	30-Dec-04	
KAFB-2624	MW	5356.59	5354.8	195.0	215.0	5159.8	5139.8	217.0	4.0	PVC	Santa Fe Group sediments		
KAFB-2625	MW	5359.26	5355.8								Santa Fe Group sediments		
KAFB-3391	MW	5396.60	5393.6	262.3	282.3	5131.3	5111.3	284.3	4.0	PVC	Santa Fe Group sediments	1-Aug-98	
KAFB-3392	MW	5394.51	5393.4	536.0	561.0	4857.4	4832.4	562.0	4.0	PVC	Santa Fe Group sediments	8-Oct-99	
KAFB-3411	MW	5342.81	5340.5	477.0	502.0	4863.5	4838.5	503.0		PVC	Santa Fe Group sediments	10-Nov-99	
KAFB-6243	MW	5426.22	5421.0								Santa Fe Group sediments		
KAFB-6301	MW	5459.64	5457.3	535.0	560.0	4922.3	4897.3	561.0	3.5	PVC	Santa Fe Group sediments	8-Sep-99	
KAFB-8351	MW	5325.51	5323.3	474.0	499.0	4849.3	4824.3	505.0	4.0	PVC	Santa Fe Group sediments	23-Nov-99	
ST105-MW107	MW	5621.97								PVC	Santa Fe Group sediments	2013?	
ST105-MW108	MW	5221.68								PVC	Santa Fe Group sediments	2013?	
ASL PD	PW			337.0	401.6			401.6	4.0	PVC	Bedrock (granite)	11-Jan-1990	

Table 1. Inventory of Groundwater Monitoring and Production Wells Located at SNL/NM and Surrounding Areas *(Concluded)*

Well	Type	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)													
Greystone Well	PW	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
KAFB-3	PW		5356.9	452.0	900.0	4904.9	4456.9	920.0	14.0	CS	Santa Fe Group sediments	1-Oct-1949	
KAFB-4	PW		5360.2	494.0	858.0	4866.2	4502.2	1000.0	14.0	CS	Santa Fe Group sediments	1-Dec-1949	
KAFB-14	PW	5324.67	5324.2	380.0	1000.0	4944.2	4324.2	1000.0	16.0	CS	Santa Fe Group sediments	1-Jan -1969	
KAFB-15	PW		5347.0	697.0	993.0	4650.0	4354.0	1600.0		CS	Santa Fe Group sediments	2000?	
KAFB-16	PW		5370.0	697.0	993.0	4673.0	4377.0	1600.0		CS	Santa Fe Group sediments	2000?	
KAFB-20	PW			710.0	1180.0			1250.0	20.0	CS	Santa Fe Group sediments	2010?	
RG-1598-S-4	PW	5369.90	5368.4	290.0	440.0	5078.4	4928.4	455.0	12.0	SS	Santa Fe Group sediments	14-Oct-98	
KAFB-0602	PW	5365.47	5364.2	437.0	457.0	4927.2	4907.2	467.0	4.0	PVC/SS	Santa Fe Group sediments	20-Mar-1990	
KAFB-0609	PW	5365.87	5364.7	316.0	336.0	5048.7	5028.7	345.0	4.0	PVC/SS	Santa Fe Group sediments	31-Mar-1990	22-Jun-14
KAFB-0610	PW	5359.47	5357.3	333.0	353.0	5024.3	5004.3	363.0	4.0	PVC/SS	Santa Fe Group sediments	4-Apr-1990	
Optical Range Well	PW		5965.7	160.0	320.0	5805.7	5645.7	320.0	5.0	PVC	Bedrock (metarhyolite)	19-Aug-1987	
VA-2	PW			590.0	990.0			1010.0	13.4	SS	Santa Fe Group sediments	18-Apr-1997	
Yates Well	PW	6104.67	6102.7							CS	Bedrock (granite)	1-Jan-1930	

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.

Well RG-1598-S-4 is also known as the Golf Course Main Pond well. Some KAFB documents also use the name RG-1589-S-4.

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.
amsl = Above mean sea level.
ASL PD = Albuquerque Seismological Laboratory Production.
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.
CYN = Lurance Canyon.
EOD = Explosive Ordnance Disposal.
HERTF = High Energy Research Test Facility.
KAFB = Kirtland Air Force Base.
L = Lower.
LMF = Large Melt Facility.
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.
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.
PW = Production well.
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.

Table 2. CY 2014 Base-Wide AGMR Groundwater Levels, updated 13 April 2015

Well ID	2014 Date Measured	Measurement Point (ft amsl)	2014 Depth to Water (ft btoc)	2014 Water Level Elevation (ft amsl)	Owner	Data Source	Screened Unit
AVN-1	1-Oct-14	5443.00	524.64	4918.36	SNL/NM	SNL/NM	SFG - regional aquifer
CCBA-MW1	2-Oct-14	5902.34	48.12	5854.22	SNL/NM	SNL/NM	Alluvium and bedrock (granite)
CCBA-MW2	2-Oct-14	5939.28	71.91	5867.37	SNL/NM	SNL/NM	Bedrock (granite)
CTF-MW1	2-Oct-14	6082.63	239.25	5843.38	SNL/NM	SNL/NM	Bedrock (granite)
CTF-MW2	3-Oct-14	5578.60	43.98	5534.62	SNL/NM	SNL/NM	Bedrock (granite)
CTF-MW3	3-Oct-14	5522.82	308.64	5214.18	SNL/NM	SNL/NM	Bedrock (granite)
CWL-BW5	10-Oct-14	5434.79	511.61	4923.18	SNL/NM	SNL/NM	SFG - regional aquifer
CWL-MW9	10-Oct-14	5426.12	503.62	4922.50	SNL/NM	SNL/NM	SFG - regional aquifer
CWL-MW10	10-Oct-14	5424.58	500.65	4923.93	SNL/NM	SNL/NM	SFG - regional aquifer
CWL-MW11	10-Oct-14	5423.24	499.06	4924.18	SNL/NM	SNL/NM	SFG - regional aquifer
CYN-MW3	3-Nov-14	6313.26	132.07	6181.19	SNL/NM	SNL/NM	Bedrock (metamorphics)
CYN-MW4	3-Nov-14	6455.48	230.96	6224.52	SNL/NM	SNL/NM	Bedrock (quartzite)
CYN-MW5	3-Nov-14	5984.23	108.17	5876.06	SNL/NM	SNL/NM	Bedrock (quartzite)
CYN-MW6	3-Nov-14	6343.37	155.13	6188.24	SNL/NM	SNL/NM	Bedrock (metamorphics)
CYN-MW7	3-Nov-14	6216.35	303.61	5912.74	SNL/NM	SNL/NM	SFG - PGWS
CYN-MW8	3-Nov-14	6230.11	319.32	5910.79	SNL/NM	SNL/NM	Bedrock (granitic gneiss)
CYN-MW9	3-Nov-14	6360.67	167.30	6193.37	SNL/NM	SNL/NM	Bedrock (metamorphics)
CYN-MW10	3-Nov-14	6345.45	115.25	6230.20	SNL/NM	SNL/NM	Bedrock (metamorphics)
CYN-MW11	3-Nov-14	6374.41	83.25	6291.16	SNL/NM	SNL/NM	Bedrock (metamorphics)
CYN-MW12	3-Nov-14	6345.16	216.79	6128.37	SNL/NM	SNL/NM	Bedrock (metamorphics)
CYN-MW13	n.m.	6237.79	n.m.	n.m.	SNL/NM	SNL/NM	Bedrock (granitic gneiss)
CYN-MW14A	n.m.	6315.85	n.m.	n.m.	SNL/NM	SNL/NM	Bedrock (metamorphics)
CYN-MW15	n.m.	6344.44	n.m.	n.m.	SNL/NM	SNL/NM	Bedrock (metamorphics)
GREYSTONE-MW2	2-Oct-14	5814.20	53.82	5760.38	SNL/NM	SNL/NM	Alluvium
LWDS-MW1	1-Oct-14	5423.83	502.4	4921.43	SNL/NM	SNL/NM	SFG - regional aquifer
LWDS-MW2	1-Oct-14	5412.41	491.34	4921.07	SNL/NM	SNL/NM	SFG - regional aquifer
MRN-2	13-Oct-14	5308.18	435.74	4872.44	SNL/NM	SNL/NM	SFG - regional aquifer
MRN-3D	13-Oct-14	5309.34	436.17	4873.17	SNL/NM	SNL/NM	SFG - regional aquifer
MWL-BW2	9-Oct-14	5391.02	479.96	4911.06	SNL/NM	SNL/NM	SFG - regional aquifer
MWL-MW4	9-Oct-14	5391.70	501.81	4889.89	SNL/NM	SNL/NM	SFG - regional aquifer
MWL-MW5	9-Oct-14	5382.56	493.71	4888.85	SNL/NM	SNL/NM	SFG - regional aquifer
MWL-MW6	10-Oct-14	5375.31	487.56	4887.75	SNL/NM	SNL/NM	SFG - regional aquifer
MWL-MW7	9-Oct-14	5383.30	489.83	4893.47	SNL/NM	SNL/NM	SFG - regional aquifer
MWL-MW8	9-Oct-14	5384.67	491.4	4893.27	SNL/NM	SNL/NM	SFG - regional aquifer
MWL-MW9	9-Oct-14	5381.91	491.95	4889.96	SNL/NM	SNL/NM	SFG - regional aquifer
NWTA3-MW2	24-Oct-14	5337.49	468.01	4869.48	SNL/NM	SNL/NM	SFG - regional aquifer

Table 2. CY 2014 Base-Wide AGMR Groundwater Levels, updated 13 April 2015 *(Continued)*

Well ID	2014 Date Measured	Measurement Point (ft amsl)	2014 Depth to Water (ft btoc)	2014 Water Level Elevation (ft amsl)	Owner	Data Source	Screened Unit
NWTA3-MW3D	24-Oct-14	5340.80	467.04	4873.76	SNL/NM	SNL/NM	SFG - regional aquifer
OBS-MW1	2-Oct-14	5871.42	72.32	5799.10	SNL/NM	SNL/NM	Bedrock (granite)
OBS-MW2	2-Oct-14	5863.16	174.81	5688.35	SNL/NM	SNL/NM	Bedrock (granite)
OBS-MW3	2-Oct-14	5865.50	69.59	5795.91	SNL/NM	SNL/NM	Bedrock (granite)
PGS-2	3-Oct-14	5408.29	546.88	4861.41	SNL/NM	SNL/NM	SFG - regional aquifer
PL-2	13-Oct-14	5336.01	468.06	4867.95	SNL/NM	SNL/NM	SFG - regional aquifer
PL-4	13-Oct-14	5334.98	467.24	4867.74	SNL/NM	SNL/NM	SFG - regional aquifer
SFR-1D	3-Oct-14	5399.13	139.81	5259.32	SNL/NM	SNL/NM	SFG - regional aquifer
SFR-1S	3-Oct-14	5399.16	89.93	5309.23	SNL/NM	SNL/NM	SFG - regional aquifer
SFR-2S	3-Oct-14	5432.77	100.66	5332.11	SNL/NM	SNL/NM	SFG - regional aquifer
SFR-3D	3-Oct-14	5497.94	161.84	5336.10	SNL/NM	SNL/NM	SFG - regional aquifer
SFR-3P	3-Oct-14	5499.63	162.01	5337.62	SNL/NM	SNL/NM	SFG - regional aquifer
SFR-3S	3-Oct-14	5498.24	160.98	5337.26	SNL/NM	SNL/NM	Bedrock (sandstone)
SFR-3T	3-Oct-14	5498.66	69.61	5429.05	SNL/NM	SNL/NM	Bedrock (sandstone)
SFR-4P	3-Oct-14	5573.33	149.04	5424.29	SNL/NM	SNL/NM	Bedrock (sandstone)
SFR-4T	3-Oct-14	5573.95	145.06	5428.89	SNL/NM	SNL/NM	Bedrock (sandstone)
SWTA3-MW2	24-Oct-14	5325.60	451.28	4874.32	SNL/NM	SNL/NM	SFG - regional aquifer
SWTA3-MW3	24-Oct-14	5323.94	448.55	4875.39	SNL/NM	SNL/NM	SFG - regional aquifer
SWTA3-MW4	24-Oct-14	5324.81	449.21	4875.60	SNL/NM	SNL/NM	SFG - regional aquifer
TA1-W-01	2-Oct-14	5403.82	540.92	4862.90	SNL/NM	SNL/NM	SFG - regional aquifer
TA1-W-02	3-Oct-14	5416.62	523.82	4892.80	SNL/NM	SNL/NM	SFG - regional aquifer
TA1-W-03	2-Oct-14	5457.03	351.53	5105.50	SNL/NM	SNL/NM	SFG - PGWS
TA1-W-04	15-Oct-14	5460.98	570.58	4890.40	SNL/NM	SNL/NM	SFG - regional aquifer
TA1-W-05	3-Oct-14	5433.84	569.04	4864.80	SNL/NM	SNL/NM	SFG - regional aquifer
TA1-W-06	2-Oct-14	5417.10	307.67	5109.43	SNL/NM	SNL/NM	SFG - PGWS
TA1-W-07	2-Oct-14	5404.92	286.08	5118.84	SNL/NM	SNL/NM	SFG - PGWS
TA1-W-08	3-Oct-14	5434.19	311.04	5123.15	SNL/NM	SNL/NM	SFG - PGWS
TA2-NW1-325	15-Oct-14	5421.94	318.33	5103.61	SNL/NM	SNL/NM	SFG - PGWS
TA2-NW1-595	15-Oct-14	5421.26	523.31	4897.95	SNL/NM	SNL/NM	SFG - regional aquifer
TA2-SW1-320	9-Oct-14	5411.85	318.52	5093.33	SNL/NM	SNL/NM	SFG - PGWS
TA2-W-01	15-Oct-14	5419.99	328.23	5091.76	SNL/NM	SNL/NM	SFG - PGWS
TA2-W-19	2-Oct-14	5351.21	271.82	5079.39	SNL/NM	SNL/NM	SFG - PGWS
TA2-W-24	2-Oct-14	5363.66	442.68	4920.98	SNL/NM	SNL/NM	SFG - intermediate
TA2-W-25	2-Oct-14	5374.86	469.52	4905.34	SNL/NM	SNL/NM	SFG - regional aquifer
TA2-W-26	2-Oct-14	5375.77	287.03	5088.74	SNL/NM	SNL/NM	SFG - PGWS
TA2-W-27	2-Oct-14	5362.85	279.93	5082.92	SNL/NM	SNL/NM	SFG - PGWS

Table 2. CY 2014 Base-Wide AGMR Groundwater Levels, updated 13 April 2015 *(Continued)*

Well ID	2014 Date Measured	Measurement Point (ft amsl)	2014 Depth to Water (ft btoc)	2014 Water Level Elevation (ft amsl)	Owner	Data Source	Screened Unit
TA2-W-28	n.m.	5412.41	n.m.	n.m.	SNL/NM	SNL/NM	SFG - PGWS
TAV-MW2	1-Oct-14	5427.33	506.66	4920.67	SNL/NM	SNL/NM	SFG - regional aquifer
TAV-MW3	1-Oct-14	5464.26	545.38	4918.88	SNL/NM	SNL/NM	SFG - regional aquifer
TAV-MW4	1-Oct-14	5427.89	506.77	4921.12	SNL/NM	SNL/NM	SFG - regional aquifer
TAV-MW5	1-Oct-14	5408.71	490.67	4918.04	SNL/NM	SNL/NM	SFG - regional aquifer
TAV-MW6	1-Oct-14	5431.17	510.29	4920.88	SNL/NM	SNL/NM	SFG - regional aquifer
TAV-MW7	1-Oct-14	5430.40	513.06	4917.34	SNL/NM	SNL/NM	SFG - regional aquifer
TAV-MW8	1-Oct-14	5417.00	495.38	4921.62	SNL/NM	SNL/NM	SFG - regional aquifer
TAV-MW9	1-Oct-14	5416.27	499.17	4917.10	SNL/NM	SNL/NM	SFG - regional aquifer
TAV-MW10	1-Oct-14	5437.03	516.34	4920.69	SNL/NM	SNL/NM	SFG - regional aquifer
TAV-MW11	1-Oct-14	5440.12	519.32	4920.80	SNL/NM	SNL/NM	SFG - regional aquifer
TAV-MW12	1-Oct-14	5435.72	515.87	4919.85	SNL/NM	SNL/NM	SFG - regional aquifer
TAV-MW13	1-Oct-14	5409.02	495.74	4913.28	SNL/NM	SNL/NM	SFG - regional aquifer
TAV-MW14	1-Oct-14	5441.52	522.46	4919.06	SNL/NM	SNL/NM	SFG - regional aquifer
TJA-2	1-Oct-14	5353.20	277.19	5076.01	SNL/NM	SNL/NM	SFG - PGWS
TJA-3	1-Oct-14	5390.56	499.04	4891.52	SNL/NM	SNL/NM	SFG - regional aquifer
TJA-4	1-Oct-14	5341.16	300.82	5040.34	SNL/NM	SNL/NM	SFG - intermediate
TJA-5	1-Oct-14	5341.33	269.75	5071.58	SNL/NM	SNL/NM	SFG - PGWS
TJA-6	1-Oct-14	5343.16	451.35	4891.81	SNL/NM	SNL/NM	SFG - regional aquifer
TJA-7	9-Oct-14	5391.27	303.31	5087.96	SNL/NM	SNL/NM	SFG - PGWS
TRE-1	13-Oct-14	5497.25	177.27	5319.98	SNL/NM	SNL/NM	SFG - regional aquifer
TRN-1	2-Oct-14	5735.62	91.42	5644.20	SNL/NM	SNL/NM	Bedrock (sandstone)
TRS-1D	2-Oct-14	5779.80	127.38	5652.42	SNL/NM	SNL/NM	Bedrock (limestone)
TRS-1S	2-Oct-14	5780.07	134.03	5646.04	SNL/NM	SNL/NM	Bedrock (limestone)
TRS-2	2-Oct-14	5780.76	134.62	5646.14	SNL/NM	SNL/NM	Bedrock (limestone)
WYO-3	15-Oct-14	5392.09	528.40	4863.69	SNL/NM	SNL/NM	SFG - regional aquifer
WYO-4	15-Oct-14	5392.57	292.91	5099.66	SNL/NM	SNL/NM	SFG - PGWS
Non Sandia Wells							
EOD	19-Dec-14	5829.70	143.05	5686.65	KAFB	SNL/NM	Bedrock (limestone and granite)
Eubank-1	2-Oct-14	5460.02	549.51	4910.51	ABCWUA	SNL/NM	SFG - regional aquifer
Eubank-2	14-Oct-14	5471.72	577.97	4893.75	ABCWUA	ABCWUA	SFG - regional aquifer
Eubank-3	14-Oct-14	5496.06	606.40	4889.66	ABCWUA	ABCWUA	SFG - regional aquifer
Eubank-5	14-Oct-14	5504.73	615.34	4889.39	ABCWUA	ABCWUA	SFG - regional aquifer
KAFB-0118	1-Jun-14	5320.69	457.39	4863.30	KAFB	KAFB	SFG - regional aquifer
KAFB-0119	1-Jun-14	5315.76	452.87	4862.89	KAFB	KAFB	SFG - regional aquifer
KAFB-0120	1-Jun-14	5289.56	425.41	4864.15	KAFB	KAFB	SFG - regional aquifer

Table 2. CY 2014 Base-Wide AGMR Groundwater Levels, updated 13 April 2015 *(Continued)*

Well ID	2014 Date Measured	Measurement Point (ft amsl)	2014 Depth to Water (ft btoc)	2014 Water Level Elevation (ft amsl)	Owner	Data Source	Screened Unit
KAFB-0121	1-Jun-14	5307.60	444.34	4863.26	KAFB	KAFB	SFG - regional aquifer
KAFB-0213	23-Dec-14	5282.00	416.35	4865.65	KAFB	KAFB	SFG - regional aquifer
KAFB-0219	1-Jun-14	5263.69	399.19	4864.50	KAFB	KAFB	SFG - regional aquifer
KAFB-0220	1-Jun-14	5265.10	401.28	4863.82	KAFB	KAFB	SFG - regional aquifer
KAFB-0307	18-Dec-14	5364.53	427.50	4937.03	KAFB	KAFB	SFG - regional aquifer
KAFB-0308	1-Jun-14	5381.65	447.27	4934.38	KAFB	KAFB	SFG - regional aquifer
KAFB-0310	1-Jun-14	5416.48	353.24	5063.24	KAFB	KAFB	SFG - PGWS
KAFB-0311	1-Jun-14	5353.29	420.72	4932.57	KAFB	KAFB	SFG - regional aquifer
KAFB-0312	18-Dec-14	5432.17	417.45	5014.72	KAFB	KAFB	SFG - regional aquifer
KAFB-0313	18-Dec-14	5418.98	349.78	5069.20	KAFB	KAFB	SFG - PGWS
KAFB-0314	18-Dec-14	5455.75	415.90	5039.85	KAFB	KAFB	SFG - regional aquifer
KAFB-0315	18-Dec-14	5466.11	438.15	5027.96	KAFB	KAFB	SFG - regional aquifer
KAFB-0505	1-Jun-14	5362.81	501.76	4861.05	KAFB	KAFB	SFG - regional aquifer
KAFB-0506	1-Jun-14	5363.47	208.63	5154.84	KAFB	KAFB	SFG - PGWS
KAFB-0507	1-Jun-14	5358.82	496.28	4862.54	KAFB	KAFB	SFG - regional aquifer
KAFB-0508	23-Dec-14	5351.88	489.20	4862.68	KAFB	KAFB	SFG - regional aquifer
KAFB-0510	19-Dec-14	5367.10	505.59	4861.51	KAFB	KAFB	SFG - regional aquifer
KAFB-0512	1-Jun-14	5303.15	440.33	4862.82	KAFB	KAFB	SFG - regional aquifer
KAFB-0514	1-Jun-14	5206.41	344.57	4861.84	KAFB	KAFB	SFG - regional aquifer
KAFB-0517	1-Jun-14	5197.10	331.60	4865.50	KAFB	KAFB	SFG - regional aquifer
KAFB-0518	1-Jun-14	5177.76	311.66	4866.10	KAFB	KAFB	SFG - regional aquifer
KAFB-0520	1-Jun-14	5247.90	386.60	4861.30	KAFB	KAFB	SFG - regional aquifer
KAFB-0522	23-Dec-14	5267.48	404.87	4862.61	KAFB	KAFB	SFG - regional aquifer
KAFB-0523	1-Jun-14	5352.62	487.95	4864.67	KAFB	KAFB	SFG - regional aquifer
KAFB-0524	1-Jun-14	5345.61	482.90	4862.71	KAFB	KAFB	SFG - regional aquifer
KAFB-0525	1-Jun-14	5229.75	365.86	4863.89	KAFB	KAFB	SFG - regional aquifer
KAFB-0608	1-Jun-14	5359.90	294.28	5065.62	KAFB	KAFB	SFG - regional aquifer
KAFB-0611	18-Dec-14	5386.09	462.51	4923.58	KAFB	KAFB	SFG - regional aquifer
KAFB-0612	1-Jun-14	5385.45	296.51	5088.94	KAFB	KAFB	SFG - PGWS
KAFB-0613	1-Jun-14	5390.78	354.16	5036.62	KAFB	KAFB	SFG - PGWS
KAFB-0614	1-Jun-14	5390.89	331.90	5058.99	KAFB	KAFB	SFG - PGWS
KAFB-0615	18-Dec-14	5638.43	203.14	5435.29	KAFB	KAFB	Bedrock (granite)
KAFB-0616	1-Jun-14	5481.07	442.87	5038.20	KAFB	KAFB	SFG - regional aquifer
KAFB-0617	19-Dec-14	5505.78	558.50	4947.28	KAFB	KAFB	SFG - regional aquifer
KAFB-0618	1-Jun-14	5410.05	485.26	4924.79	KAFB	KAFB	SFG - regional aquifer
KAFB-0619	18-Dec-14	5410.78	385.81	5024.97	KAFB	KAFB	SFG - PGWS

Table 2. CY 2014 Base-Wide AGMR Groundwater Levels, updated 13 April 2015 *(Continued)*

Well ID	2014 Date Measured	Measurement Point (ft amsl)	2014 Depth to Water (ft btoc)	2014 Water Level Elevation (ft amsl)	Owner	Data Source	Screened Unit
KAFB-0620	19-Dec-14	5334.64	442.63	4892.01	KAFB	KAFB	SFG - regional aquifer
KAFB-0621	19-Dec-14	5569.89	627.52	4942.37	KAFB	KAFB	SFG - regional aquifer
KAFB-0622	19-Dec-14	5488.64	550.41	4938.23	KAFB	KAFB	SFG - regional aquifer
KAFB-0623	1-Jun-14	5328.94	258.97	5069.97	KAFB	KAFB	SFG - PGWS
KAFB-0625	1-Jun-14	5392.90	471.48	4921.42	KAFB	KAFB	SFG - regional aquifer
KAFB-0901	1-Jun-14	5390.07	471.01	4919.06	KAFB	KAFB	SFG - regional aquifer
KAFB-0904	1-Jun-14	5291.90	351.78	4940.12	KAFB	KAFB	SFG - regional aquifer?
KAFB-1006	1-Jun-14	5257.01	380.17	4876.84	KAFB	KAFB	SFG - regional aquifer
KAFB-1007	1-Jun-14	5260.11	384.39	4875.72	KAFB	KAFB	SFG - regional aquifer
KAFB-1008	1-Jun-14	5258.16	379.73	4878.43	KAFB	KAFB	SFG - regional aquifer
KAFB-1901	19-Dec-14	5751.58	85.58	5666.00	KAFB	KAFB	SFG - regional aquifer
KAFB-2005	1-Jun-14	5624.27	123.06	5501.21	KAFB	KAFB	SFG - regional aquifer
KAFB-2007	19-Dec-14	5567.18	263.75	5303.43	KAFB	KAFB	SFG - regional aquifer
KAFB-2009	1-Jun-14	5655.63	70.80	5584.83	KAFB	KAFB	SFG - regional aquifer
KAFB-2622	1-Jun-14	5358.41	202.78	5155.63	KAFB	KAFB	SFG - PGWS
KAFB-2623	1-Jun-14	5635.27	221.59	5413.68	KAFB	KAFB	SFG - PGWS
KAFB-2624	1-Jun-14	5356.59	217.72	5138.87	KAFB	KAFB	SFG - PGWS
KAFB-2625	1-Jun-14	5359.26	197.53	5161.73	KAFB	KAFB	SFG - PGWS
KAFB-3391	1-Jun-14	5396.60	275.82	5120.78	KAFB	KAFB	SFG - PGWS
KAFB-3392	1-Jun-14	5394.51	535.58	4858.93	KAFB	KAFB	SFG - regional aquifer
KAFB-3411	1-Jun-14	5466.50	536.93	4929.57	KAFB	KAFB	SFG - regional aquifer
KAFB-6243	1-Jun-14	5426.22	497.87	4928.35	KAFB	KAFB	SFG - regional aquifer
KAFB-6301	1-Jun-14	5459.64	539.23	4920.41	KAFB	KAFB	SFG - regional aquifer
KAFB-8351	1-Jun-14	5325.51	460.22	4865.29	KAFB	KAFB	SFG - regional aquifer
Mesa del Sol-S	7-Oct-14	5302.67	422.67	4880.00	NMOSE	USGS	SFG - regional aquifer
Montessa Park - S	7-Oct-14	5102.67	220.25	4882.42	ABCWUA	USGS	SFG - regional aquifer
Optical Range Well	31-Oct-14	5965.70	146.00	5819.70	KAFB	KAFB	Bedrock (metarhyolite)
Yale-MW9	14-Oct-14	5271.06	381.07	4889.99	ABCWUA	ABCWUA	SFG - regional aquifer

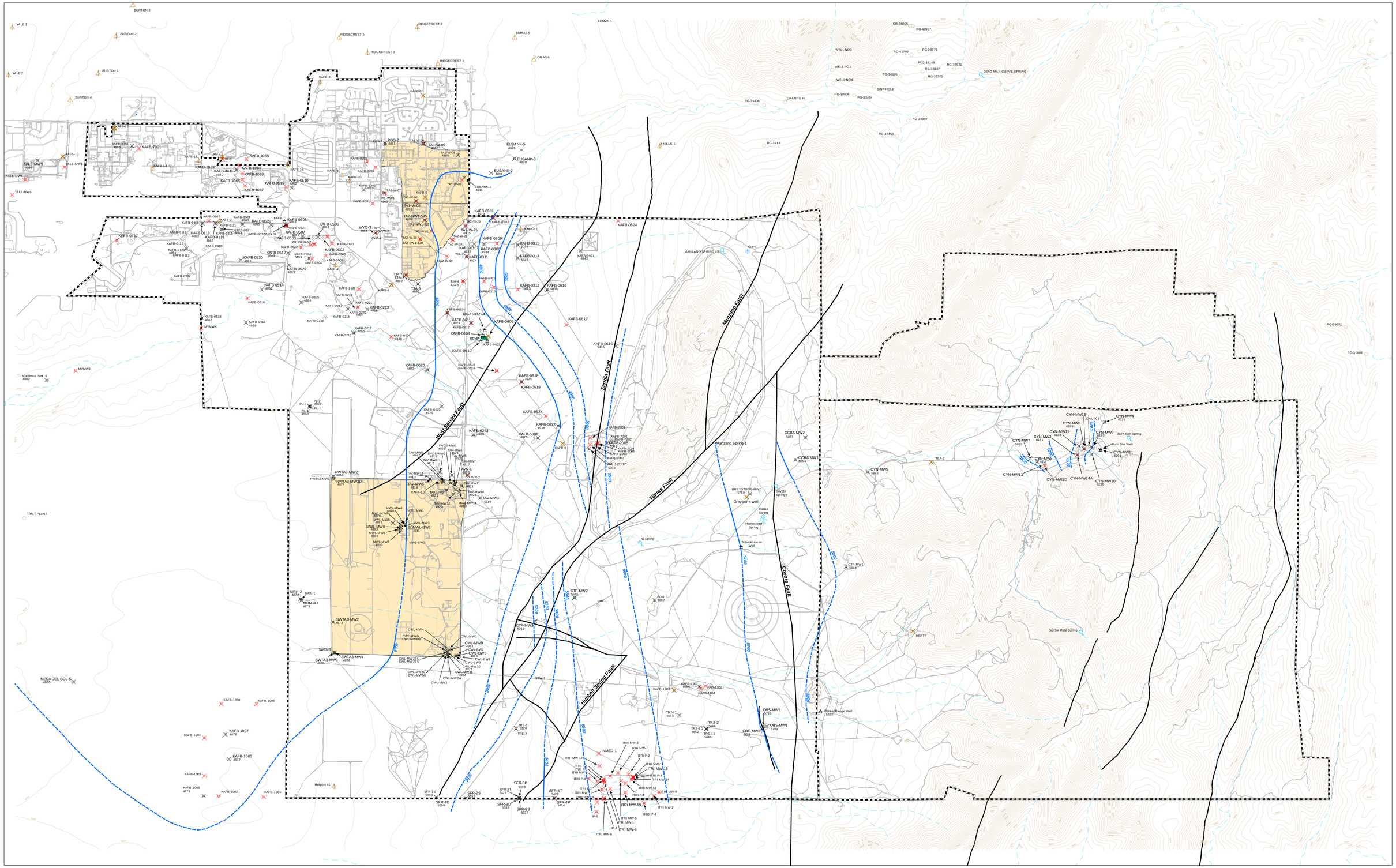
NOTES:

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.

Table 2. CY 2014 Base-Wide AGMR Groundwater Levels, updated 13 April 2015 *(Concluded)*

NOTES (continued):

CTF = Coyote Test Field.
CWL = Chemical Waste Landfill.
CY = Calendar year.
CYN = Lurance Canyon.
EOD = Explosive Ordnance Disposal.
ft = Foot (feet).
ID = Identification.
KAFB = Kirtland Air Force Base.
LWDS = Liquid Waste Disposal System.
MRN = Magazine Road North.
MW = Monitoring well.
MWL = Mixed Waste Landfill.
n.m. = Not measured.
NMOSE = New Mexico Office of the State Engineer.
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.
USGS = U.S. Geological Survey.
WYO = Wyoming.


Manzano Fault
Sandia Fault
West Sandia Fault
Tijeras Fault
Coyote Fault
Hubbell Spring Fault
5000
5100
5200
5300
5400
5500
5600
5700
5800
5900
6000
6100
6200
6300
6400
6500
6600
6700
6800
6900
7000
7100
7200
7300
7400
7500
7600
7700
7800
7900
8000
8100
8200
8300
8400
8500
8600
8700
8800
8900



Appendix B
FY 2015 Site Sustainability Plan

Appendix B presents the Site Sustainability Plan for fiscal year 2015.

Exceptional service in the national interest

Sandia National Laboratories



FY 2015 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. SAND NO. 2014-20139 O

Approvers of record for this revision are as follows:

Prepared	Jeffrey Jarry, Manager Waste Management and Pollution Prevention (4144)	12-1-14 Date
Prepared	Stephanie Salinas, Manager Environmental Programs (4143)	12/2/14 Date
Prepared	Mark S. Crawford, Manager Fleet Services (10265)	12/1/14 Date
Prepared	Jack H. Mizner, Manager Planning and Partnerships, HMS (4853)	12/1/2014 Date
Prepared	David Anthony Perea, Manager Infrastructure Computing Systems (9324)	12/3/2014 Date
Prepared	Cedric Hawkins, Manager Enterprise Desktop and IT Service Management (9344)	12/2/2014 Date
Reviewed	Stephen G. Fattor, Manager Partnership and Planning (4850)	1 DEC 2014 Date
Reviewed	David A. Darling, Director Facilities Management and Operations Center (4800)	3 Dec. 2014 Date
Approved	Michael W. Hazen, Vice President Infrastructure Operations (4000)	3 Dec 2014 Date

Table of Contents

Page

1.0 Executive Summary....1
1.1 Introduction....1
1.2 Vision and Sustainability Definition....3
1.3 Planning Assumptions, Principles, Practices, Strategies, and Energy Issues....3
1.4 FY 2014 Success and Path Forward....6
1.5 DOE SSPP and NNSA Goals and Sandia Objectives....10

2.0 Goal Performance Review and Plans....17
2.1 Goal 1: Greenhouse Gas Reduction....17
2.2 Goal 2: Sustainable Buildings....24
2.3 Goal 3: Fleet Management....39
2.4 Goal 4: Water Use Efficiency and Management....42
2.5 Goal 5: P2 and Waste Reduction....46
2.6 Goal 6: Sustainable Acquisition....49
2.7 Goal 7: Electronic Stewardship and Data Centers....51
2.8 Goal 8: Renewable Energy....58
2.9 Goal 9: Climate Change Resilience....60
2.10 Goal 10: Energy Performance Contracts....66

3.0 Budget and Funding....67
3.1 FY 2014 Performance Status....67
3.2 Planned and Projected Performance....67

4.0 Training and Awareness....68
4.1 FY 2014 Performance Status and Projected Performance....68

List of Figures

Page

Figure 2.1. SNL Total Scopes 1, 2, 3 GHG Emissions in Metric Tons CO2e....17
Figure 2.2. SNL FY 2014 Total GHG Emissions....18
Figure 2.3. Scopes 1 and 2 GHG Emissions in MT CO2e....20
Figure 2.4. SNL Scope 3 GHG Emissions in Metric Tons CO2e....22
Figure 2.5. SNL Total Energy Intensity in Btu/GSF/Yr....25

Figure 2.6. Total Site MBTU/Total Mission Cost 26
Figure 2.7. Total Site MBTU per Capita 26
Figure 2.8. SNL Regular Building Energy Intensity Reduction Progress 28
Figure 2.9. SNL 10-Year Load Forecast 31
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 2014 Water Use 44
Figure 2.15. SNL/CA September 2014 Water Use 44
Figure 2.16. SNL Waste and Diversion 49
Figure 2.17. SNL Renewable Electric Generation 59

List of Tables

Page

Table 1.1. Sandia FY 2014 Energy Projects 7
Table 1.2. Sandia FY 2015 Energy Projects 9
Table 1.3. Sandia Objectives, Performance Status, and Projected Performance 11
Table 2.1. SNL Emissions Categories by GHG Protocol Scopes 18
Table 2.2. SNL Actual and Projected Electricity Consumption (x 10^6 kWh) 30
Table 2.3. Sandia Requirements to Meet Guiding Principles 34
Table 2.4. Sandia's Plan to Meet Guiding Principles 35
Table 2.5. Performance Status and Plans and Projected Performance 37
Table 2.6. SNL Retired Fleet Replacement with AFVs 41
Table 2.7. SNL Data Centers 52
Table 2.8. SNL Virtualized Services 54
Table 2.9. SNL Renewable Energy Generation 60
Table 2.10. Current FY 2014 Performance Status and Planned and Projected Performance 61
Table 2.11. High-Level Description and Estimate of Climate Risk by Hazard and Location 65
Table 4.1. Current Performance Status and Planned and Projected Performance 68

Appendix A: Consolidated Energy Data Report (CEDR)
Appendix B: Baseline and Current Information
Appendix C: NNSA Excluded Buildings and Self-Certification Form
Appendix D: Sandia National Laboratories FY 2015 Site Sustainability Commitments
Appendix E: Data Center White Paper – Final Draft

Acknowledgements

SNL New Mexico

Penny Avery, 4143
Erika Barraza, 4821
Amy Blumberg, 11100
Matthew Brito, 4821
Harold Brown, 1342
Mary Bultmann, 4853
Kathye Chávez, 9324
Ralph Cipriani, 4853
Jeff Fleming, 4824
Jerry Gallegos, 4853
Jamie Gomez, 4143
Colin Hallahan, 10507
Ann Koepp, 4856
Tom Lowry, 6926
Miriam Maldonado, 9344
David J. Martínez, 9324
Gabe Martinez, 4821
Leonard E. Martinez, 1353
Samuel McCord, 4144
Randall McKee, 1657
Carol Meincke, 4853
Kathleen Moore, 1673
Sharon Moyer, 9544
Mike Nagy, 4143
Chris Nesbit, 4855
Enrico Quintana, 1522
Ray Thomas, 1342
Todd Tillman, 4821
Chad Twitchell, 10598
Douglas Vetter, 4143
Ralph Wrons, 4144
Jeff T. Young, 10265
John Zavadil, 4856

SNL California

Steve Carpenter, 8945
Deanna Dicker, 8516
Lee Gardizi, 8516
Gabriel Gutierrez, 8515-1
Janet Harris, 8516
Robert Holland, 8516
Barbara Larsen, 8516
Howard Royer, 8512
Wayne Schock, 8512
Matt Schrager, 8945
Kristina Sullivan, 8512
Craig Taylor, 8515
Laura Tidwell, 8516
Doug Vrieling, 8512

NNSA/SFO

Joe Estrada, Engineering Group
Carolyn Holloway, Engineering Group
Frank Gonzales, Contract Administration and Business Management Group (IT)

Acronyms

Acronym	Definition
AFV	Alternative Fuel Vehicle
AQC	Air Quality Compliance
ARC	Analytical Reporting Capability
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
CD	Critical Decision
CEDR	Consolidated Energy Data Report
CEM	Certified Energy Manager
CEP	Chemical Exchange Program
CIS	Chemical Inventory System
CNG	Compressed Natural Gas
CO2e	Carbon Dioxide Equivalent
CRAC	Computer Room Air Conditioning
CSRI	Computer Science Research Institute
CUB	Central Utility Building
CW	Chilled Water
CY	Calendar Year
D&D	Decontamination and Demolition
DCC	Data Center Consolidation
DCIM	Data Center Infrastructure Management
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
EC	Energy and Climate
EISA	Energy Independence and Security Act
EMES	Electromagnetic Environment Simulator
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
FCS	Facilities Control System
FDCCI	Federal Data Center Consolidation Initiative

Acronym	Definition
FEMO	Facilities Engineering, Maintenance, and Operations
FEMP	Federal Energy Management Program
FIMS	Facilities Information Management System
FMOC	Facilities Management and Operations Center
FY	Fiscal Year
GGE	Gasoline Gallon Equivalent
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
K	Thousand
KAFB	Kirtland Air Force Base
kBtu	Kilo-British Thermal Unit
KPI	Key Performance Indicator
KTF	Kauai Test Facility
kV	Kilowatt
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
MESA	Microsystems and Engineering Sciences Application Complex
MMBtu	Millions of British Thermal Units
MO	Mobile Office
MR	Major Renovation
MRCOG	Mid Region Council of Governments
MT	Metric Tons
MWh	Mega-Watt Hours
NC	New Construction
NEPA	National Environmental Policy Act
NG	Natural Gas

Acronym	Definition
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
NSTTF	National Solar Thermal Test Facility
P2	Pollution Prevention
PC	Personal Computer
POD	Performance Optimized Data
PPA	Purchased Power Agreement
PPTRS	Pollution Prevention Tracking and Reporting System
PREP	Preliminary Real Estate Plan
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
SF	Square feet or footage
SF6	Sulfur Hexafluoride
SFO	Sandia Field Office
SIF	Sustainability Innovation Foundry
SLS	Sandia Lightning Simulator
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
SSTP	Sandia Science and Technology Park
SWEIS	Site-Wide Environmental Impact Statement
T	Transportable
T&D	Transmission and Distribution
TA	Technical Area
TLCC	Tri-Laboratory Linux Capacity Cluster
TTR	Tonopah Test Range
U.S.	United States
UPS	Uninterruptible Power Supply
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 efficient, 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 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 DOE's SSPP, as well as the DOE requirement to comply with EOs 13423 and 13514. This SSP fulfills the contractual requirement for Sandia Corporation (Sandia) to deliver an annual sustainability plan to the NNSA and SFO.

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 Sandia 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 20 environmental programs, 6 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 1.3. 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 6.58 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 3 miles east of downtown Livermore and 40 miles east of San Francisco, California. The location has approximately 895,094 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 121,937 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 Kauai Test Facility (KTF) is an SNL rocket-launch range consisting mainly of rocket- and payload-assembly facilities and a launch operations facility. The location has approximately 50,317 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 (IX) toward 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 its 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 has identified high-level sustainability strategies that will influence future decision making:

- Preserve it.
  - Protect the 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) 2015 SNL SSP and summarizes 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 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 (note that the perceived GSF increase in FY 2014 occurred because the Facilities Information Management System [FIMS] changed the definition of "building" to include more structures, not because new buildings were constructed).

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 test beds 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 and encourage 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 timeframes. 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 timeframe. RE projects will be pursued based on favorable economics. The 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 2014, Sandia has identified the following specific energy issues and concerns:

- Sulfur hexafluoride (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, is increasing and needs focused attention.
- New data center efficiency goals are aggressive but poorly defined. Sandia continues, in coordination with other NNSA laboratories, to work on an achievable 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 2014 Success and Path Forward

This section describes the successes of FY 2014 and the path forward.

1.4.1 FY 2014 Success

Building Operations and Maintenance

In FY 2014, Sandia pursued the following operation and maintenance activities:

- Retro-commissioning projects
- Programming and monitoring the building automation system (BAS)

Facilities Organization/Line Organization Interaction

In FY 2014, Sandia Energy Management, ES&H, and Building Operations personnel accomplished the following:

- Continued collaboration and partnership with Energy and Climate (EC) and Science and Technology communities, including the Sustainability Innovation Foundry and IX projects.

- Reducing individual laboratory energy use (Building 701 was the pilot for FY 2014)
- Continued collaboration with Center 9300 for efficient data center operations and consolidation.
- Matching Class 100,000 cleanroom laminar flows to clean class requirements (Building 986)
- Set back Class 100 cleanroom temperatures during unoccupied hours (Building 986)

Facilities Organization/NNSA Interaction

In FY 2014, Sandia worked with the NNSA and SFO to accomplish the following:

- Hosted the NNSA Sustainability Summit.
- Participated as the first site to undergo a GP compliance review.
- Reviewed Sandia's data center energy reduction/consolidation initiatives.
- Demonstrated the IX tool to NNSA sites.

Training and Tools

In FY 2014, the Sandia Energy Management Program offered training and provided tools to achieve positive energy savings:

- Training
  - Continued providing NNSA- and Federal Energy Management Program (FEMP)-funded training and technical assistance to other DOE and federal sites on high-performance sustainable buildings (HPSB).
- Tools
  - IX and eQuest

FY 2014 Energy Projects

In FY 2014, Sandia completed the projects summarized in Table 1.1, which resulted in significant energy savings. See Section 2.2.1.1 and the *Consolidated Energy Data Report* (CEDR) worksheet, "Conservation and RE Measures," for more detailed information. These savings will not be fully realized until FY 2015.

Table 1.1. Sandia FY 2014 Energy Projects

2014 Projects	Annual Budget (K)	Estimated Savings (BBtus/Year)
Install lighting/HVAC occupancy sensors	$200	1.3
Design and convert buildings to full digital control	$3,700	10.0
Combine Bldg. 858N/858J chilled water (CW) loops (finish in FY 2015)	$537	9.6
Energy audits/retro-commissioning building tune-ups, Energy Management Team support	$150	2.0
IX-EC collaboration (energy efficiency via simulation)	$535	0
TOTAL	**$5,122**	**22.9**

BBtus = Billions of British Thermal Units

1.4.2 Path Forward – FY 2015 and Beyond

Sandia recognizes that implementing energy conservation projects are key, but these 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 buildings for specific missions, 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 2015, Sandia will pursue the following operation and maintenance activities:

- Implement retro-commissioning projects.
- Program (including lighting/HVAC occupancy sensors) and monitor BAS.
- Establish temperature set points in office space.
- Improve compressed air operations.
  - Delamp and increase efficiency of light fixtures by installing reflector retrofit kits.
- Develop and implement energy analytics to provide monitoring and diagnostics of HVAC systems and plant systems.
- Develop key performance indicators (KPIs) for buildings and HVAC systems.
  - Monitor KPIs using energy analytics to determine when buildings and systems are not operating efficiently.

Facilities Organization/Line Organization Interaction

In FY 2015, Sandia Energy Management, ES&H, and Building Operations personnel will do the following:

- Engage line organizations in energy audits of high-process buildings and look for opportunities to reduce energy for 24/7 operations. Buildings include 858EF, 899A, 810A, 983, 897, 880/880A, 962, and 827.
- Make use of IX/eQuest to evaluate energy conservation measures and use energy models during energy audits to evaluate operational conservation measures (funded collaboration with Division 6000).
- Reduce laboratory energy use in Buildings 701, 858EL, 518, and 897.
  - Control fume hood air flow per American National Standards Institute (ANSI) and American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) standards.
  - Establish temperature set points in laboratories during occupied periods.
  - Set back temperature set points in laboratories during unoccupied periods.
- Investigate cleanroom energy saving opportunities (applicable to 858N, 986, and others).
  - Determine the correct operating air flows and air handling configuration, benchmarking against industry standards.
- Begin community-based social marketing initiative.
  - Employ a method to identify, evaluate, and implement long-term behavior change.
- Continue collaboration and partnership with EC and Science and Technology communities, including the Sustainability Innovation Foundry and IX projects.

- Continue collaboration with Center 9300 for efficient data center operations and data center consolidation.
- Perform energy audits and retro-commissioning for the buildings listed below. This effort will restore and commission the buildings back to their original or modified design basis. The effort will also identify both energy conservation and operational conservation measures. Buildings include 858EF, 899A, 810A, 983, 897, 880/880A, 850, 962, 770, 857, 827, and 981.

Facilities Organization/NNSA Interaction

- Conduct an overview of the Sandia Sustainability Program for SFO to increase employee awareness about energy, water, sustainable acquisition, and pollution prevention.

Training and Tools

In FY 2015, Sandia Energy management will offer training and provide tools to achieve positive energy savings as follows:

- Training
  - BAS (for Facilities system engineers and building operators)
  - Energy audits
  - eQuest and IX modeling and analytic tools
  - Continuance of NNSA- and FEMP-funded training and technical assistance to other DOE and federal sites on HPSBs.
- Tools
  - IX and eQuest
  - Energy analytics and diagnostics

FY 2015 Energy Projects

In FY 2015, Sandia will complete the projects summarized in Table 1.2, which will result in significant energy savings. See Section 2.2.1.2 and the CEDR worksheet, "Conservation and RE Measures," for more details on each project. The savings from these projects will not be fully realized until FY 2016.

Table 1.2. Sandia FY 2015 Energy Projects

2015 Projects	Annual Budget (K)	Savings (BBtus/Year)
Bldg. 897 Pneumatics to Direct Digital Controls (DDC) Units	$100	1.9
Bldg. 836 Pneumatics to DDC Units	$503	1.3
DCC Support to Remove Computer Room Air Conditioning (CRAC) Units	$100	0
eQuest Modeling Support	$100	0
DOE Guiding Principles for HPSB Occupancy Sensor Installations	$200	1.3
DOE Guiding Principles for HPSB Low-Flow Water Fixture Installations	$75	0
DOE Guiding Principles for HPSB ASHRAE Audits	$100	0
Carbon Dioxide (CO2) Sensor Installations to Comply with ASHRAE 62 and DOE	$50	0
DOE BTU Metering and Apportioning	$100	0
Electric Meter (Bldg. 986)	$15	0
Energy Program Team Support (24/7 Operations and Lab Operations)	$150	3.1

2015 Projects	Annual Budget (K)	Savings (BBtus/Year)
858N Chase Ductwork Repairs	$130	8.1
Delamping Project	$120	4.0
Bldg. 870 Upgrade Facility Control System (FCS) Programming to Demand-Based	$30	2.7
850 Heat Exchanger/Water-Side Economizer	$350	9.5
858N Clean Room Air Change Rate Reduction Project	$60	3.1
858N and 858J Chilled Water Tie-In	$306	9.6
C942 Controls Project	$1,080	6.6
C910 DDC Conversion Design	$120	0 (5.6 when constructed)
C906 DDC Conversion Design	$110	0 (5.2 when constructed)
Energy Analytics Project/Improve Building Operations	$200	3.0
Variable Frequency Drive (VFD) Pump Project	$60	0.9
Behavior Change Energy Study	$100	0 (Future Savings TBD)
Energy Audits/Retro-Commissioning	$150	2.3
IX Maintenance Support	$100	0
Replace Top 10 Inefficient Refrigerators with ENERGY STAR Refrigerators	$13	0.06
858 Heat Pump Chiller Design	$50	0 (24.2 when constructed)
858EF Energy Study	$125	0
Compressed Air Assessments/Audits	$200	2.5
California High-Efficiency Lighting Project	$200	1.3
823 Solar Hot Water (HW) Design	$50	0 (Future Savings TBD)
California Heat Exchanger/Water Side Economizer Conceptual Designs	$100	0 (Future Savings TBD)
Energy Awareness, Recognition, and Communication	$50	0
TOTAL	**$5,197**	**61.23**

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 2015 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 2014	Planned Actions and Contribution	Risk of Non-Attainment
GOAL 1: Greenhouse Gas Reduction					
1.1	2.1.1	28% Scope 1 and 2 GHG reduction by FY 2020 from an FY 2008 baseline (2014 target: 19%)	56% reduction in FY 2014 relative to FY 2008 baseline. Sandia considers this medium risk primarily due to the nature of sulfur hexafluoride (SF6) applications.	In FY 2015, Sandia will continue Scopes 1 and 2 GHG reductions. *Included in SNL EMS as a target.*	Medium
1.2	2.1.2	13% Scope 3 GHG reduction by FY 2020 from an FY 2008 baseline (2014 target: 5%)	3% increase in FY 2014 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: Sustainable Buildings					
2.1	2.2.1	30% energy intensity (Btu/SF) reduction by FY 2015 from an FY 2003 baseline (2014 target: 27%)	1.84% reduction in FY 2014 relative to FY 2012 and 29.64% relative to FY 2003 baseline for regular (nonexcluded) buildings. Sandia considers this low risk despite potential mission changes and funding availability.	Continuing in FY 2015, 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 policy • Behavior change *Included in SNL EMS as a target.*	Low

SSPP Goal #	SSP Section	DOE SSPP and NNSA Goal/ Sandia Objective	Performance Status through FY 2014	Planned Actions and Contribution	Risk of Non-Attainment
2.2	2.2.2	EISA Section 432 energy and water evaluations	Completed 42% (cumulative FY 2013 and 2014) of its covered facilities audits in FY 2014 due to emphasis on Guiding Principles audit/commissioning efforts.	See the 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 75% (cumulative, FY 2013 – 2015) of its covered facilities in FY 2015 to reach 100% by FY 2016.	Low
2.3	2.2.3	Individual buildings metering for 90% of electricity by October 1, 2012; for 90% steam, NG, and CW by October 1, 2015 (2014 target: 90% and 75% respectively)	SNL FY 2014 Energy and Water Metering Plan was completed in December 2014. • All electric meters required by EPAct 2005 have been installed. • FY 2014 electricity individually building metered: 88.2% • Sandia does not use steam as an energy stream. • FY 2014 NG individually building metered: 55.5% • Sandia considers this medium risk because the final NG percentage cannot be calculated until all the HW meters are programmed into the BAS. • 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.	• Several new electric meters will be installed at the individual building level to meet the goal. • Objective may not be met for NG, HW Btu, and CW Btu meters. • New meters will be installed and existing meters programmed into the 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.	High
2.4	2.2.4	Cool roofs, unless uneconomical, for roof replacements unless project already has Critical Decision (CD)-2 approval. New roofs must have thermal resistance of at least R-30.	Sandia meets this objective: SNL has 132 total cool roofs at SNL/NM and 27 cool roofs at SNL/CA.	See the CEDR worksheet, "Conservation and RE Measures," for proposed, new cool-roof projects. Sandia will replace roofs on 6 buildings with cool roofs in FY 2015.	Low
2.5	2.2.5	15% of existing buildings greater than 5,000 GSF are compliant with the Guiding Principles for HPSBs by FY 2015 (2014 target: 13%).	11.9% of SNL existing buildings over 5,000 GSF (by number of buildings) were compliant in CY 2014. 14.4% of existing buildings over 5,000 GSF (by	Sandia has a plan to meet the objective.	Low

SSPP Goal #	SSP Section	DOE SSPP and NNSA Goal/ Sandia Objective	Performance Status through FY 2014	Planned Actions and Contribution	Risk of Non-Attainment
			GSF) were compliant in calendar year (CY) 2014.		
2.6	2.2.6	All new construction, major renovations (MRs), and alterations of buildings greater than 5,000 GSF must comply with the Guiding Principles.	Sandia constructed one new building in FY 2014. LEED Gold certification is expected in early FY 2015. Sandia considers this low risk even though the green building certification program Leadership in Energy and Environmental Design (LEED) for New Construction or Guiding Principles for New Construction 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. One new institutional general plant project (IGPP) is proposed in the next year, which will comply with the Guiding Principles and be LEED Gold for New Construction. Alterations may not meet LEED for New Construction or Guiding Principles for New Construction. NNSA is considering an exception process, which may address the issue.	Low
2.7	2.2.7	Efforts to increase regional and local planning coordination and involvement	Sandia meets this objective.	Sandia will continue to meet this objective.	Low
GOAL 3: Fleet Management					
3.1	2.3.1	10% annual increase in fleet alternative fuel consumption by FY 2015 relative to an FY 2005 baseline (2014 target: 136% cumulative since 2005)	• 19.3% increase since FY 2005 • 52.1% decrease from FY 2013 to FY 2014 Limited access to E-85 fuel in FY 2014 resulted in decreased alternative fuel consumption and increased petroleum fuel consumption.	Sandia will work to resolve the issues associated with access to E-85 fuel. *Included in SNL EMS as a target*.	Medium
3.2	2.3.1	2% annual reduction in fleet petroleum consumption by FY 2015 relative to an FY 2005 baseline (2014 target: 18% cumulative since 2005)	• 18.3% reduction since FY 2005 • 34.5% increase from FY 2013 to FY 2014. Limited access to E-85 fuel in FY 2014 resulted in decreased alternative fuel consumption and increased petroleum fuel consumption.	Sandia will work to resolve the issues associated with access to E-85 fuel. *Included in SNL EMS as a target.*	Medium
3.3	2.3.1	100% of light-duty vehicle purchases must consist of alternative fuel vehicles (AFVs) by FY 2015 and thereafter (75% FY 2005 – 2015)	Objective has been met. Sandia continues to exceed this objective, purchasing 98% alternative fuel, light-duty vehicles in FY 2014.	Sandia will continue to exceed this objective.	Low
GOAL 4: Water Use Efficiency and Management					
4.1	2.4.1	26% water intensity reduction by	Sandia exceeds the objective with a 29.53%	Sandia will continue to exceed this	Low

SSPP Goal #	SSP Section	DOE SSPP and NNSA Goal/ Sandia Objective	Performance Status through FY 2014	Planned Actions and Contribution	Risk of Non-Attainment
		FY 2020 from an FY 2007 baseline (2014 target: 14%).	decrease relative to FY 2007 baseline.	objective. *Included in SNL EMS as a target.*	
4.2	2.4.1	20% water-consumption reduction of ILA water by FY 2020 from an FY 2010 baseline (2014 target: 8%).	Included in previous objective.	Included in previous objective.	Low
GOAL 5: Pollution Prevention and Waste Reduction					
5.1	2.5.1	Divert at least 50% of nonhazardous solid waste, excluding construction and demolition (C&D) debris by FY 2015.	Ending FY 2014: • SNL/NM – 67.3% • SNL/CA – 81.5% 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	2.5.1	Divert at least 50% of C&D materials and debris by FY 2015.	Ending FY 2014: • SNL/NM – 80.5% • SNL/CA – 97.0% SNL/CA is required State regulations to divert 80% of C&D 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 in 95% of applicable contracts.	SNL purchasing agreements and procurement documents meet the objective.	The *FMOC Design Standards Manual* and remaining Standard Specifications will be updated in FY 2015. • Update 1000S Design-Build specification for applicable Sustainable Acquisition (SA) requirements. • Add or update SA requirements to Section I for new contracts and, when possible, existing contracts. • Develop quarterly means of tracking and recording number of applicable contract actions placed.	Low
GOAL 7: Electronic Stewardship and Data Centers					
7.1	2.7.1.1	All core data centers are metered to measure a monthly Power Utilization Effectiveness (PUE) (100% by FY 2015). (2014 target: 90%)	The two SNL/NM core data centers are metered. The SNL/CA core data center is not metered.	Sandia will meter the SNL/CA data center in FY 2015.	Medium

SSPP Goal #	SSP Section	DOE SSPP and NNSA Goal/ Sandia Objective	Performance Status through FY 2014	Planned Actions and Contribution	Risk of Non-Attainment
7.2	2.7.1	Core data centers maximum annual weighted average PUE of 1.4 by FY 2015 (2014 target: 1.5)	The SNL/CA core data center is not metered and will not achieve the 1.4 PUE by FY 2015. The SNL/NM core data centers have not achieved the target PUE.	There is no plan to renovate C912 in FY 2015 so Sandia will not meet this goal. SNL/NM is installing an energy management system in the core data centers, which will allow accurate PUE measurements to be taken. It is unlikely those measurements will meet the goal.	High
7.3	2.7.2	Power Management - 100% of eligible personal computers (PCs), laptops, and monitors with power management actively implemented and in use by FY 2012 and continuously thereafter.	Continued NightWatchman installation on new Windows 7 and 8 computers at SNL/NM and SNL/CA SNL locations. Saw a decrease in actual NightWatchman use in FY 2014.	Sandia will develop and implement a plan to: • Improve power management use on eligible computers. • Expand the number of eligible computers. • Investigate and implement improvements to increase power savings at desktop workstations.	High
7.4	2.7.3	Electronic stewardship – 95% of eligible electronics acquisitions meet Electronic Product Environmental Assessment Tool (EPEAT) standards.	Electronic Stewardship – 95% of eligible electronics acquisitions meet EPEAT Standards.	Sandia plans to: • Improve ENERGY STAR compliance for eligible enterprise server purchases. • Standardize on available models of printers for purchase to be minimum EPEAT Silver level, and to reduce printer consumables costs and waste. • Expand utilization of networked Fleet Copiers to meet workforce Print/Copy/Scan/Fax needs	Low
GOAL 8: Renewable Energy					
8.1	2.8	20% of annual electricity consumption from renewable sources by FY 2020 (2014 target: 7.5%)	Sandia met this objective using Renewable Energy Credits (RECs) and implementing small RE projects. See the CEDR worksheets, "Operating Onsite Renewables" and "Purchased Renewables." Sandia purchased 7.5% (24,000 Mega Watt Hours [MWh]) RECs in FY 2014 to meet this objective.	In FY 2015, Sandia will continue to pursue RECs. See the 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

SSPP Goal #	SSP Section	DOE SSPP and NNSA Goal/ Sandia Objective	Performance Status through FY 2014	Planned Actions and Contribution	Risk of Non-Attainment
GOAL 9: Climate Change Resilience					
9.1	2.9	Address DOE Climate Change Adaptation Plan goals	This goal and associated objectives was completely changed in the FY 2015 SSP Guidance. See detailed response in Section 2.9 by objective.	See detailed response in Section 2.9 by objective.	Medium
GOAL 10: Energy Performance Contracts					
10.1	2.10	Utilization of Energy Performance Contracts	Sandia did not utilize Energy Performance Contracts in FY 2014	Sandia does not plan to utilize Energy Performance Contracts in FY 2015.	N/A

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

This section summarizes the current state of SNL GHG emissions given various elements of GHG emissions described in the following 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 timeframes.

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 2.1 for Scopes 1, 2, and 3 GHG emissions in metric tons (MTs) of carbon dioxide equivalent (CO_2e).

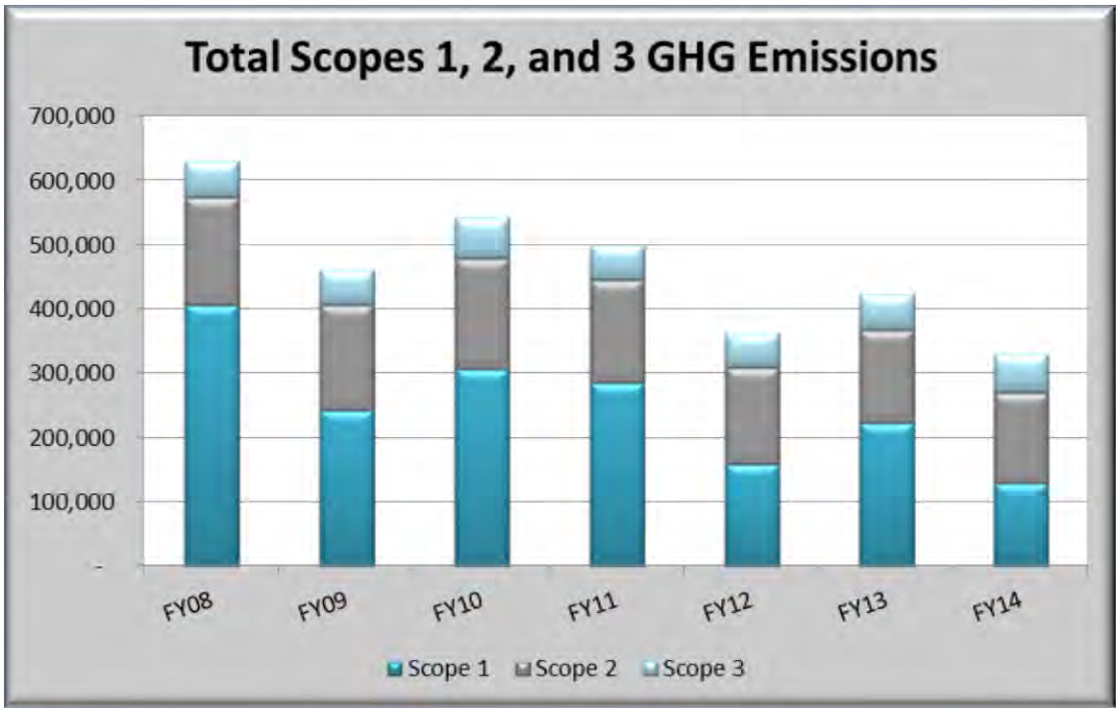


Figure 2.1. SNL Total Scopes 1, 2, 3 GHG Emissions in Metric Tons CO_2e

The second largest source of GHG emissions at SNL was SF6 emissions. With SF6's global warming potential of 22,800, SF6 reductions provide opportunities for significant GHG reduction (see Figure 2.2).

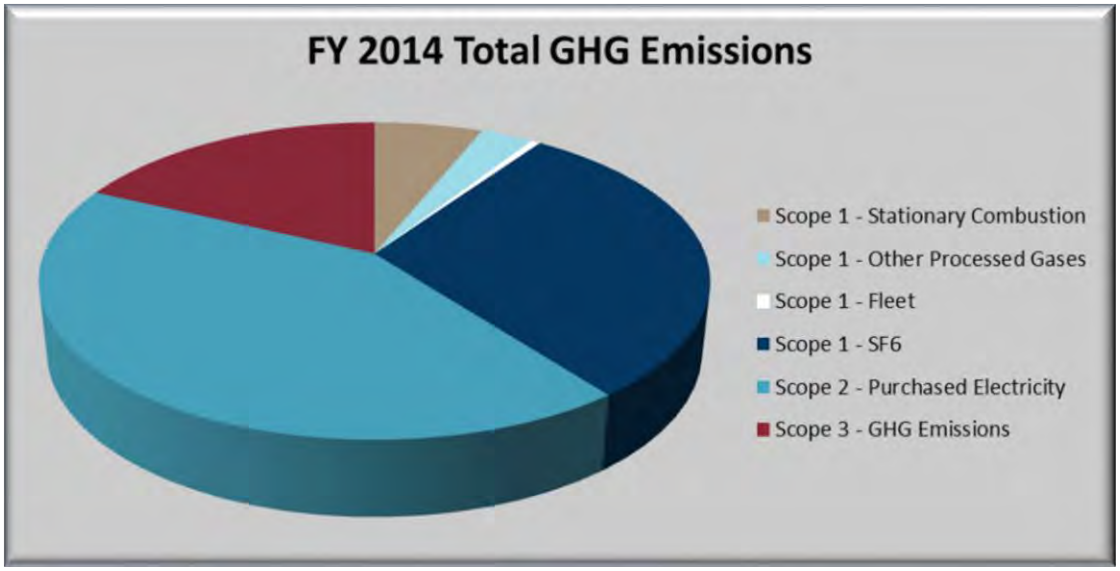


Figure 2.2. SNL FY 2014 Total GHG Emissions

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 percent by FY 2020 from an 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
• NG 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 includes diesel and gasoline used in generators and jet fuel used for experimentation. • Fleet is onsite transportation.		

2.1.1.1 FY 2014 Performance Status

Sandia has reduced GHG Scopes 1 and 2 emissions by 56 percent in FY 2014 from an FY 2008 baseline. The major source of SNL's Scope 1 GHG emissions is fugitive emissions, which are 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 SF6.

SF6 used in pulsed power and high-voltage R&D 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 percent, in comparison to the pulsed power applications.

The FY 2010 SSPP committed DOE to acquire SF6 capture and storage equipment, develop training, and deploy an 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.

Since FY 2012, Sandia personnel have been 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 (SLS), and the Electromagnetic Environment Simulator). This method of tracking provides better information about SF6 emissions at the equipment level than tracking purchases only. Sandia has identified and taken measures to reduce emissions during storage at some of these facilities. Emissions from all other SNL operations continue to be estimated based on purchases. See SNL's SF6 purchases and estimated use as reported in the CEDR worksheets.

The department that maintains and operates the Saturn and HERMES III accelerators also made several improvements in FY 2013 to minimize SF6 emissions. This team continued their efforts in FY 2014 by doing the following:

- Installing pressure-relief valves that vent to storage rather than to the atmosphere
- Installing additional valves to isolate leaks
- Implementing the use of substitute gases for leak checks

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 addition, the department that maintains and operates the SLS and Electromagnetic Environment Simulator (EMES) has made several improvements in FY 2014 to minimize SF6 emissions, including the following:

- Updating the SLS SF6 gas supply and return manifolds with new fittings, gas regulators, and piping to eliminate leaks
- Procuring new load cells for the existing SLS SF6 reclaimer, which will provide more accurate SF6 loss measurements; the new load cells are scheduled for installation in FY 2015
- Acquiring a new SF6 reclaimer for EMES to support high-voltage operations in FY 2015–2020

In FY 2014, Sandia's Pulsed Power Engineering Department purchased a forward-looking infrared (FLIR) optical gas detection camera to enhance the leak detection program at SNL's pulsed power facilities. This infrared optical gas imaging camera identifies and corrects numerous small leaks at the Z-Machine.

In FY 2011, SNL/CA initiated a multiyear electrical switchgear refurbishment project, with the intent of reducing SF6 emissions from the site's 18 gas-insulated switchgear. The project began with sending three inactive switches (i.e., in storage) back to the manufacturer for refurbishment. Upon their return to SNL/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 2014, seven switches had been refurbished and reactivated. An additional five switches had been removed from service and were awaiting shipment to the manufacturer for refurbishment.

This process will continue until all 18 switchgears have been replaced with new or 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 percent for 2011. The leak rate limit declines by 1 percent each year until 2020, when it reaches a final allowable leak rate of 1 percent.

Figure 2.3 illustrates Scopes 1 and 2 GHG emissions in MT of CO2e. Combined Scopes 1 and 2 emissions decreased by 29 percent between FY 2008 and FY 2009 but increased by 18 percent between FY 2009 and FY 2010 due to an increase in SF6 purchases. Between the baseline year of FY 2008 and FY 2014, Scopes 1 and 2 emissions decreased 54 percent.

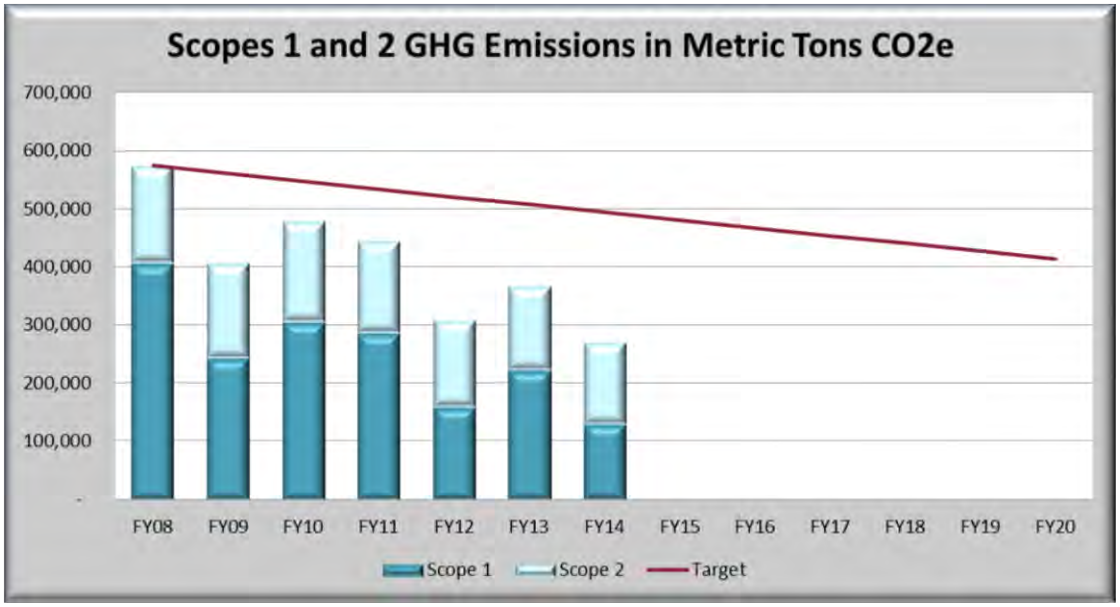


Figure 2.3. Scopes 1 and 2 GHG Emissions in MT CO2e

In FY 2014, 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 CEDR worksheets, "Conservation and RE Measures" and "Building Inventory Changes," for a list of specific projects executed in FY 2014 and prior years as well as Section 2.1.1 for the performance status as of FY 2014 to reduce energy and, as a result, Scopes 1 and 2 GHG emissions.

2.1.1.2 Plans and Projected Performance

A new SF6 storage system for the Z-Machine has been designed, and installation is underway. The new system will prevent releases of SF6 from the storage torpedoes. Installation of new sensors to detect

leaks and stop flow in the Z-Machine SF6 delivery system is planned for FY 2015 to reduce emissions and the amount of SF6 used.

The Saturn/HERMES team worked closely with the SF6 reclaimer manufacturer in FY 2014 and determined that custom reclamation units are warranted. The custom reclaimers are expected to be manufactured and installed in FY 2015. These units will have much higher efficiency than those being replaced and provide more appropriate filtration for the accelerator systems than the commercial off-the-shelf reclaimers. This team also has an FY 2015 goal to install quick disconnect fittings to isolate Marx generators that require routine maintenance.

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 the total work scope.

The Radiography group in Sandia's Structural Dynamics X-Ray Department initiated a substitution analysis to determine the feasibility of using compressed air rather than SF6 in their flash x-ray systems. In FY 2015, the Radiography group will have the equipment vendor retrofit all of their 450 kilovolt (kV) flash x-ray generators to eliminate the majority of their SF6 usage. The Radiography group also uses 1 megavolt (MeV) flash x-ray equipment, but the vendor determined that a substitute gas cannot be used. The 1 MeV flash x-ray systems are not used as frequently as the 450 kV systems, and equipment modifications are expected to eliminate most of this department's SF6 use, which would be a reduction of approximately 460 pounds (4,757 MT CO2e) annually. The Radiography group is currently exploring the use of an SF6 reclamation system to further decrease its SF6 gas usage.

See the CEDR worksheets and Section 2.1.1.2, Plans and Projected Performance, 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 percent by FY 2020 from an FY 2008 baseline. Sandia is committed to meeting this target; however, emissions are increasing, not decreasing.

2.1.2.1 FY 2014 Performance Status

Annual Scope 3 GHG emissions are shown in Figure 2.4. SNL's Scope 3 emissions show a 3 percent increase from the FY 2008 baseline to FY 2014.

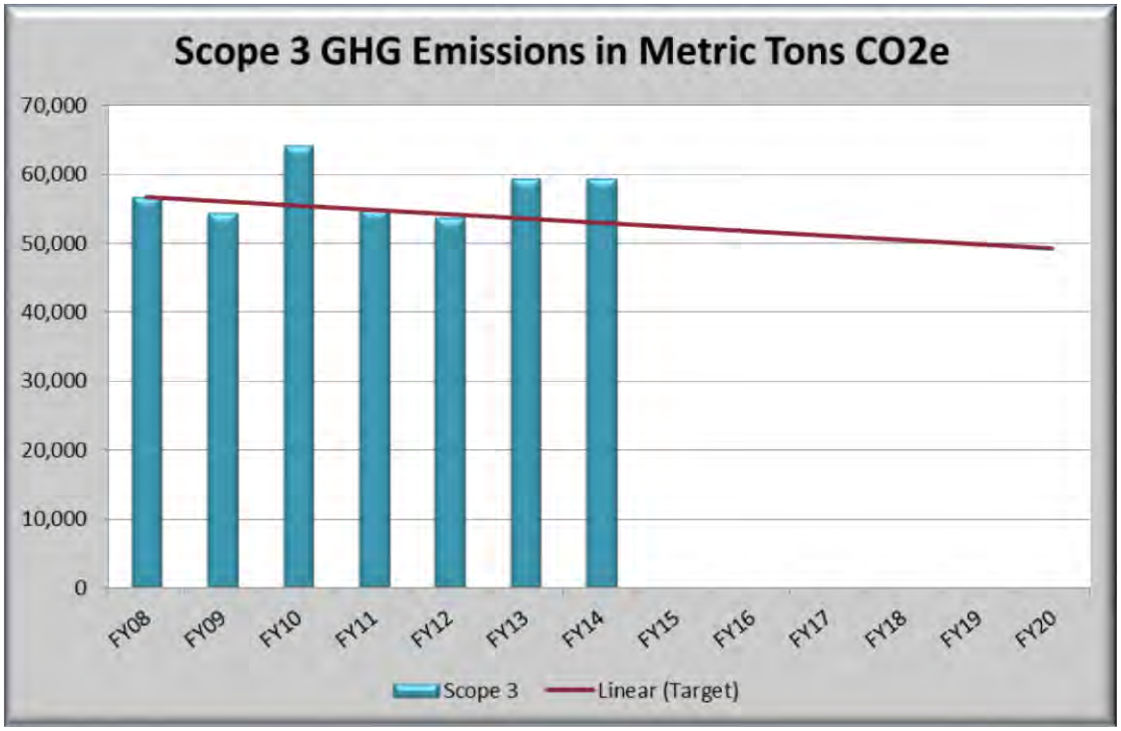


Figure 2.4. SNL Scope 3 GHG Emissions in Metric Tons CO2e

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: This is 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: This is an SNL internal website that provides Sandia personnel with information about gear, routes, shower and locker facilities, safety, traffic, and the "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 Program.
- Express bus routes: At SNL/NM, there are 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.

- Vanpooling: SNL/CA has partnered with VRide, a local vanpool company to support vanpooling at the California site.
- Bike commuter support: SNL/CA provides fully enclosed bicycle lockers across the site.
- Electric vehicles: Sandia is pursuing how to utilize electric cart and Fleet vehicle charging stations for personal electric vehicles.

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 a 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 its 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 solid waste disposal, which is referred to as “commercial solid waste” disposal in program documents. At SNL/NM, Sandia uses the city of Albuquerque Cerro Colorado landfill and the Waste Management-owned Rio Rancho landfill for offsite solid waste disposal.

At SNL/CA, the Facilities Management organization owns and manages the solid waste disposal contracts and works in conjunction with the SNL/CA P2 program to ensure reporting and recycling requirements are met. To meet the new recycling ordinance implemented by Alameda County in July 2014, SNL/CA significantly changed its solid waste management activities to increase recyclables and implement composting. Facilities Management self-hauls trash and mixed recycle waste directly from the site to the Vasco Road Landfill owned by Republic Services. Organic wastes are collected under contract by Livermore Sanitation, which transfers the composting process to Recology Grover Environmental. Livermore Sanitation is contracted to pick up trash, asphalt, concrete, carpeting, C&D, tires, and wood that are transported to Vasco Road Landfill for disposal or recycling. Cardboard is transferred to Alameda County Industries.

The number of new contract actions reported in FY 2014 is significantly less than the number reported in FY 2012 and FY 2013. Discussions with Facilities Engineering personnel indicate that past years’ reports

counted all new projects and activities, including those that did not require contract modifications. A thorough review of actions that involved new or modified contracts verified that the number reported for FY 2014 is accurate.

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 Scopes 1 and 2 GHG emission reductions in the near term, Sandia plans future Scope 3 GHG emissions reduction 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, video conferencing, 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 by proposing development of requirements for fuel-efficient rental car use.
- Support Sandia personnel use of public transportation by facilitating its use through negotiating schedules with the provider and by providing incentives for use of mass transit.
- Actively pursue how electric vehicle charging stations can be utilized on site for personal vehicle use within federal restrictions.

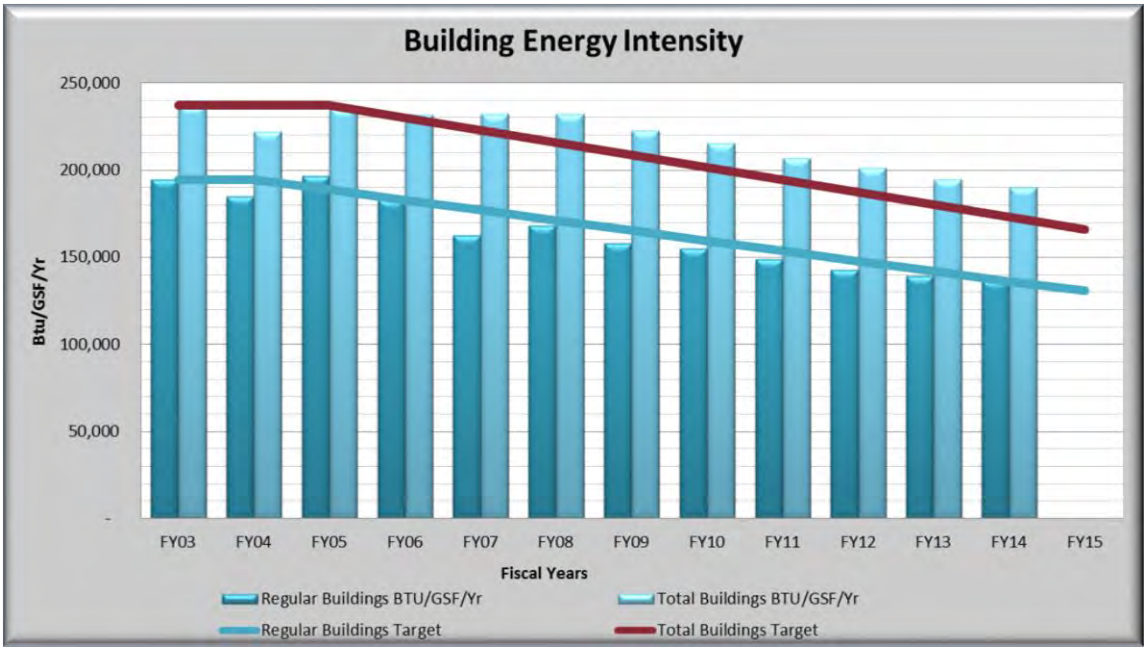
2.2 Goal 2: Sustainable Buildings

2.2.1 Energy Intensity

EISA 2007 requires DOE to reduce its energy intensity by 30 percent by FY 2015 from an 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 2014 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 29.64 percent from FY 2003 to FY 2014 (see Figure 2.6). For all buildings, Sandia reduced energy intensity per SF by 19.66 percent from FY 2003 to FY 2014. These results reflect energy-conservation initiatives completed in FY 2013. See the CEDR worksheets, "Conservation and RE Measures" and "Building Inventory Changes," for a list of specific projects executed in FY 2014 and prior years as well as the CEDR worksheet, "Energy and Water," for energy intensity information. Appendix C contains a copy of the final FIMS list of NNSA buildings (as of November 10, 2014) that 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 2009–2014 data include offsite leases in which energy cost was not included in the lease cost.

Figure 2.5. SNL Total Energy Intensity in Btu/GSF/Yr

In FY 2013, Sandia began tracking two additional voluntary metrics: Total British Thermal Unit (Btu)/ Total Mission Dollar and Total Btu/Capita. Total Million British Thermal Unit (MBtu) (1,328,250) is based on the total site energy usage (NM, CA, and NV). For FY 2014:

Total MBtu/Total Mission Dollar (M) = 1,328,250/4,813 = 275.97 MBtu/Total Mission Dollar (M)

Total Mission Dollar is the total Sandia cost for all programs (including Work for Others 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. See also Table B-11 in Appendix B for more information.

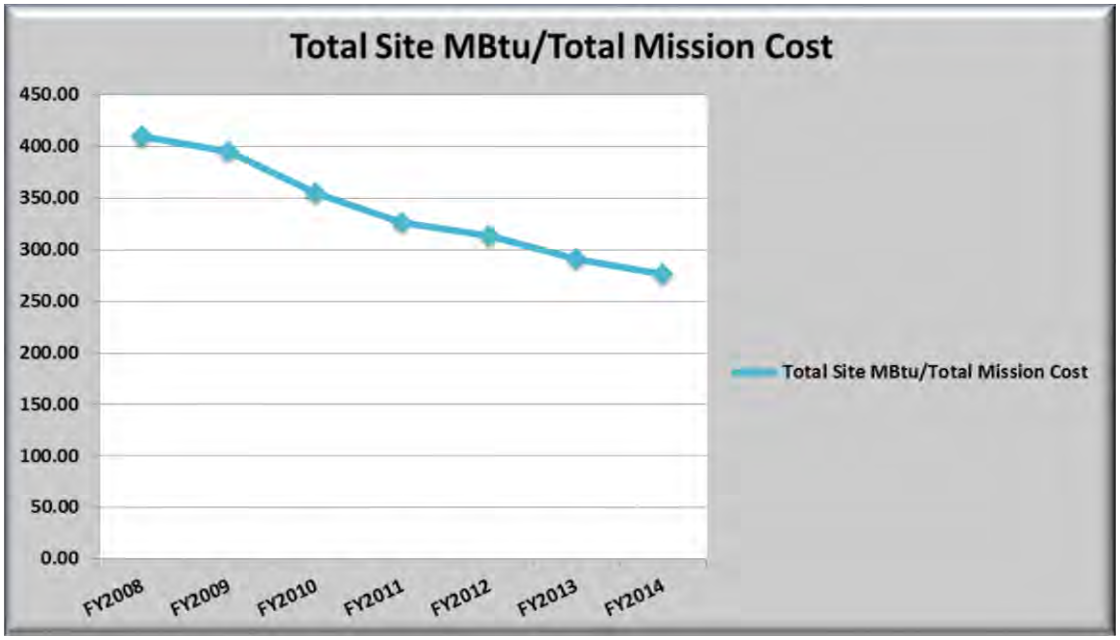


Figure 2.6. Total Site MBTU/Total Mission Cost

Total MBtu/Capita = 1,328,250/11,849 = 112.10 MBtu/Capita

Capita is the total Sandia workforce number, including staff, onsite staff augmentation contractors, and visitors. The above calculation does not include SNL/HI. See Table B-10 for more information.

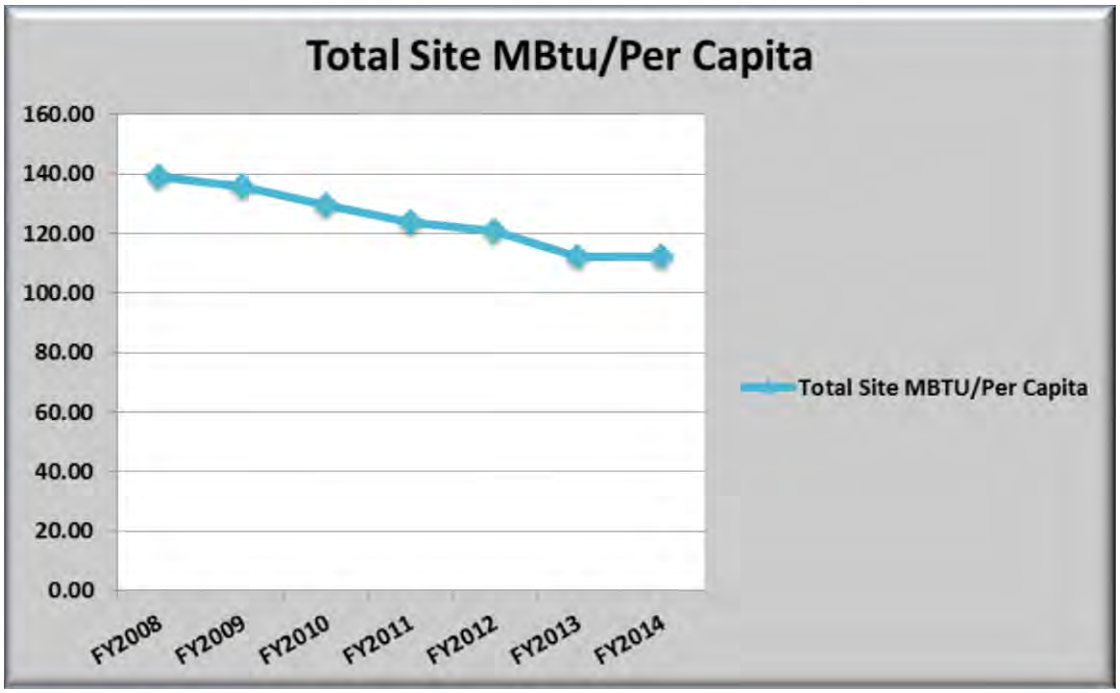


Figure 2.7. Total Site MBTU per Capita

In FY 2014, Sandia accomplished the following energy-conservation measures:

- Designed controls conversion from pneumatic to DDC zone control in Buildings C942, C940, 6585, and 6580
- Constructed controls conversion from pneumatic to DDC zone control in Buildings C914, C940, C943 (Phase A), 836 (Phase A), 897 (Phase A), 886, and 891
- Installed lighting occupancy sensors in Buildings 859, 861, 752, 856, 885, 727, 730, 700, 703, 877, 879, 971, and 720
- Integrated lighting occupancy sensors with the HVAC system to turn off lighting and HVAC to offices when unoccupied; the integrated systems were installed in Buildings 720, 730, 752, 971, and 856
- Constructed Phase A of the 858J and 858N chilled water tie-in project
- Completed 858N energy study that evaluated many energy conservation measures
- Operated most office buildings within a temperature band of 70° to 76°F during standard working hours in buildings connected to the BAS
- Used the BAS to shut off or set back systems during nonstandard working hours in monitored buildings
- Conducted energy audits to identify issues, deficiencies (return building to current design basis), and opportunities to improve energy and water resource efficiency; energy audits were completed for Buildings 758, 860, 892, 836, 957, 750, 809, 891, 1090, 954, 885, 725, 986, 727, 886, 6584, 858S, 899, 6587, 701, 821, 970, 823, 905, 858N, 726, C906 and C907
- Completed Technical Area (TA)-I chilled water infrastructure study
- Continued implementation of the computer power management program on eligible non-mission-critical desktop computers running Microsoft Windows 7 and 8 at SNL locations (see Section 2.7.2)
- Designed and installed HVAC controls in Building 840
- Provided meters to measure PUE in Buildings 725 and 899
- Decontaminated and demolished (D&D) the following:
    - Building C927 (22,001 GSF) at SNL/CA
    - Mobile offices (MOs) 03-100 and 03-101 (12,000 GSF total) at SNL/NV
    - MOs 95, 138, 246, and 247 (4,257 GSF) at SNL/NM

In FY 2014, the construction of Building 730, a new 24,349 GSF IGPP building located south of Building 810 (the building will be LEED Gold certified and meet the Guiding Principles for New Construction), is anticipated to cause an increase in energy consumption, but a decrease in energy intensity. Sandia also constructed Building 1091, a new 15,000 GSF corporate records modular storage building.

In addition, in FY 2014 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 IX software tool version 2.5, which will be used to evaluate energy conservation measures for buildings across the SNL/NM and SNL/CA campuses

- Completed 114 building energy models using eQUEST/DOE2 for SNL/NM and SNL/CA buildings; these building models will be used to look for opportunities to improve efficiency, conserve energy, and evaluate energy conservation measures

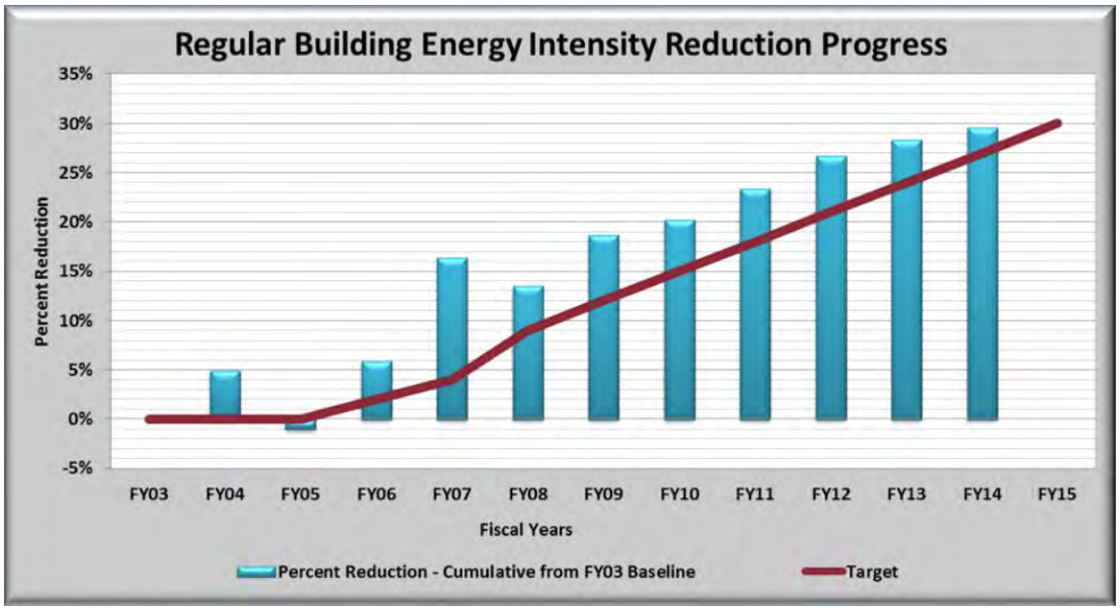


Figure 2.8. SNL Regular Building Energy Intensity Reduction Progress

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 2015 and beyond.

The high levels of electrical demand at night and on weekends (12,000 to 14,000 kilowatt [kW], 60 to 70 percent 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 2015, the following actions will result in a decrease in energy intensity:

- Design controls conversion from pneumatic to zone DDC control in Buildings 872, C906, C910, and C942.
- Convert controls from pneumatic to zone DDC control in Buildings C942, C943 (Phase B), 836 (Phase B), and 897 (Phase B) at SNL/CA.
- Install combined occupancy/HVAC sensors in Buildings 859, 702, 861, 957, 6586, 755, 770, 809, 836, 905, and 954.
- Reduce building and equipment operational time by doing the following:
  - Operate equipment, rooms, 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 eligible non-mission-critical desktop computers running Microsoft Windows 7 and 8 at SNL locations (see Section 2.7.2).
- Implement recommissioning or retro-commissioning based on audit recommendations.

- Remove CRAC units in DCC rooms.
- Make 858N chase ductwork repairs.
- Delamp buildings and install high-efficiency lighting retrofit kits with reflectors.
- Upgrade the FCS programming in Building 870 to be demand-based.
- Install Building 850 heat exchanger/water-side economizer.
- Reduce Building 858N clean room air change rate.
- Construct Building 858N and 858J chilled water tie-in to improve chilled water plant efficiency.
- Develop and implement an energy analytics program to improve building operations.
- Install combination VFD/Pump/5 horsepower motors (pilot project).
- Replace the top 10 inefficient refrigerators with ENERGY STAR refrigerators.
- Design solar hot water (HW) systems for Building 823.
- Perform an energy study at Building 858EF to identify energy conservation measures and associated energy savings for each measure.
- Replace the air handling unit at Building C912.
- Replace the chiller in Building 840.
- Replace the chillers in Building 810 with magnetic-bearing, high-efficiency chillers.
- Replace the boilers in Building 963 with high-efficiency boilers.

In FY 2015, Sandia will construct the following project, which is anticipated to cause an increase in energy consumption but a decrease in energy intensity:

- Construct Building 705, a new 25,000 GSF general plant project (GPP) building in TA-I (the building will be LEED Gold certified and meet the Guiding Principles for New Construction).

The following planned actions will impact energy intensity after FY 2015:

- Construct a new IGPP in SNL/CA.
- 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 6585, 6580, 823, 905, and 857.
- Upgrade the BAS in the remaining SNL/CA buildings.
- Investigate new technologies for lighting and lighting controls.
- Perform a study of all exterior lighting systems at all Sandia locations.
- Install water-side economizers for buildings in TA-IV to shut down chillers in the fall, winter, and spring seasons.
- Continue to apply energy analytics for buildings and plant systems. Analytics will perform diagnostics and set rules to capture operational inefficiencies within buildings, HVAC systems, and plant systems.
- Continue to use IX software tool and eQuest building energy models to identify energy conservation measures and operational conservation measures. These tools will also be used during energy audits and retro-commissioning.
- Improve compressed air operations by implementing recommendations identified in assessments and audits.

- Install water-side economizers for SNL/CA buildings and plant systems to shut down chillers in the winter season.
- Continue to engage line organizations and operations teams to evaluate existing 24/7 operations and identify opportunities for the following:
  - Improve existing 24/7 operations by optimizing the existing operations.
  - Install dedicated systems for 24/7 operations that will improve efficiency.
  - Reduce the 24/7 operations by setting up a schedule.
  - Shut down 24/7 operations by consolidating functions.
- Reduce the lighting power density in buildings by delamping and improving the efficiency of the lighting by installing retrofit kits with reflectors.
- Implement recommissioning or retro-commissioning based on audit recommendations.
- D&D Buildings 867, C9731, and several MOs in SNL/CA for a total of 35,162 GSF. (Building 867 at 19,713 GSF is a relatively small energy consumer.) Building 03-50 at 17,391 GSF and Building 09-52 at 8,324 GSF are scheduled for D&D after FY 2015 at SNL/NV. Building 892 is also slated for D&D within the next 10 years.
- Accommodate new mission work.

Table 2.2 illustrates actual and projected electricity consumption at SNL, and Figure 2.9 provides Sandia's 10-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 FY 2014	Planned FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Total Electricity Consumption (MWh)	279,994	274,394	269,074	264,027	266,667	269,334	272,027	274,748	277,495	280,270
Electricity Consumption (MWh) – Regular Buildings	156,378	153,250	150,279	147,460	148,935	150,424	151,929	153,448	154,982	156,532
Electricity Consumption (MWh) – Excluded Buildings	123,616	121,144	118,795	116,567	117,732	118,910	120,099	121,300	122,513	123,738

Notes:
1. Assumes a 1% increase/year before efficiencies
2. Assumes a 3% decrease/year from FY 2014 actual through FY 2017
3. See the CEDR, Section 3.4, for projected energy efficiencies.
4. See the CEDR, Section 3.3, for projected growth components.

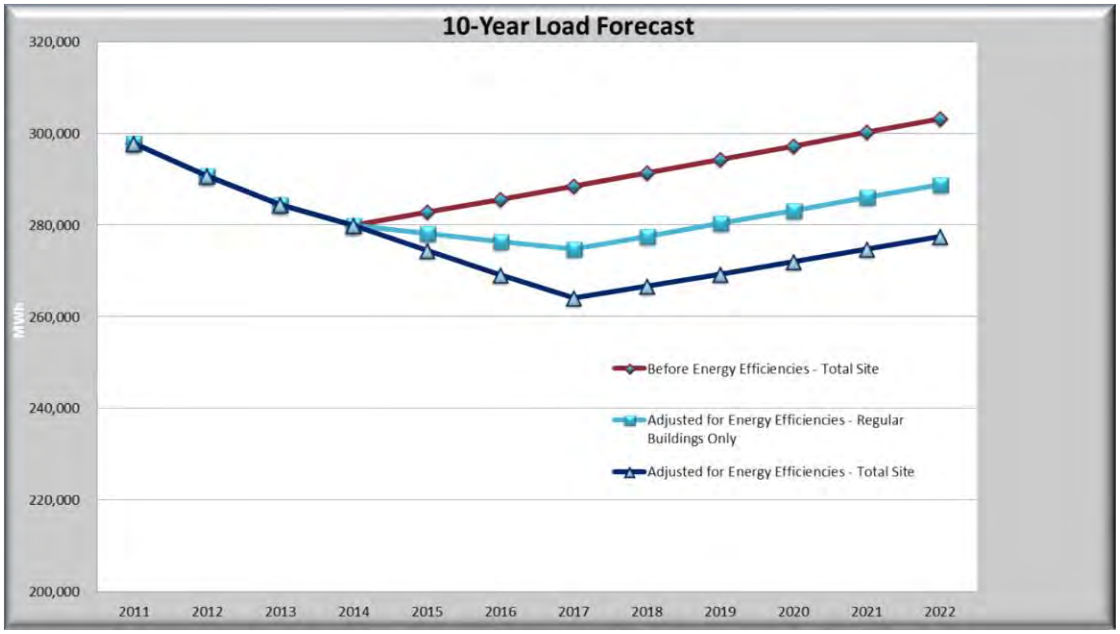


Figure 2.9. SNL 10-Year Load Forecast

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 2016 will mark the end of the second cycle. EISA defines covered facilities as the top 75 percent energy-using buildings. DOE tracks covered facilities at the site level. In FY 2014, Sandia had 57 covered facilities, which equated to approximately 4.58 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 2014 Performance Status

Sandia did not complete 50 percent (cumulative FY 2013 and 2014) of the required EISA Section 432 energy audits for covered facilities on schedule. Sandia only completed 42 percent of its covered facilities and has a plan to complete 100 percent by June 2016. This status is reflected in the CEDR, Sections 3.3 and 11.

Starting in FY 2014, Sandia counted central utility buildings (CUBs) as covered facilities for the purposes of EISA audits. This increased the number of covered facilities to 57. Sandia apportions all the CUB energy use to the buildings served by the CUB. Sandia counts these buildings as required toward the top 75 percent energy-using buildings in addition to the CUBs.

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, most recently in FY 2014, 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 Compliance Tracking System energy conservation measures reporting requirements.

2.2.2.2 Plans and Projected Performance

Sandia's plan to meet EISA audit requirements by June 2015 is shown in the CEDR, Sections 3.3 and 11.

Sandia plans to add an additional checklist for building occupant representatives to identify energy conservation measures and opportunities for process equipment and program operations.

2.2.3 Metering

DOE is required to install metering devices, advanced or standard, for electricity, NG, steam, and water to the maximum extent practicable at all sites in each building and other facilities as well as grounds. This requirement stems from statutes that include the 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 percent of electricity use is metered at an individual building or process level by October 1, 2012, where life-cycle cost effective.
- At least 90 percent of NG, steam, and CW (90 percent for each utility) are metered at an individual building 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 2014 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 2014. See the SNL FY 2014 *Energy and Water Metering Plan* for more information.

Sandia has not achieved the electricity goal and is at high risk for meeting the NG goal by the October 1 deadline.

2.2.3.2 Plans and Projected Performance

Sandia will pursue the planned actions as identified in the SNL FY 2014 *Energy and Water Metering Plan*. If the planned actions are implemented early in FY 2015, Sandia should meet the DOE SSPP and NNSA goals and stretch goals, where life-cycle cost effective, by FY 2016.

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 2014 Performance Status

Sandia has met the intent of the DOE objective for cool roofs. See the CEDR section, "Conservation and RE Measures," for specific new roof-replacement projects.

- SNL/NM has approximately 3,503,603 GSF total roof area; of that area, 132 roofs, or approximately 74 percent (2,593,399 GSF), comply with the "cool roof" definition. The roofs 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, transportable (T)-buildings, or leased space.

- SNL/CA has approximately 602,224 GSF total roof area; of that area, 27 roofs, or approximately 74 percent (444,111 GSF), comply with the "cool roof" definition. The roofs 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 percent 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 2014 at SNL/NM, Sandia completed a cool roof on one building:
    - Building 857S (approximately 10,387 GSF)
- In FY 2014 at SNL/NM, Sandia completed a new building with a cool roof:
    - Building 730 (approximately 7,600 GSF)
- In FY 2014 at SNL/CA, Sandia completed cool roofs on six buildings:
    - Building C923 (approximately 1,134 GSF)
    - Building C925 (approximately 5,851 GSF)
    - Building C929 coating (approximately 23,333 GSF)
    - Building C943 coating (approximately 3,603 GSF)
    - Building C979 coating (approximately 5,022 GSF)
    - Building C983 coating (approximately 1,891 GSF)

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.

- In FY 2015 at SNL/NM, the following buildings have been identified for cool-roof replacement design:
    - Building 802 (approximately 40,000 GSF)
    - Building 890 (approximately 36,800 GSF)
    - Building 963 (approximately 43,900 GSF)
    - Building 840 (approximately 80,000 GSF)
- In FY 2015 at SNL/NM, Sandia will construct a new building with a cool roof:
    - Building 705 (approximately 8,400 GSF)
- In FY 2015 at SNL/CA, the following buildings have been identified for cool-roof coating applications:
    - Building C904 (approximately 5,083 GSF)
    - Building C905 (approximately 18,867 GSF)

2.2.5 HPSB – Existing

The DOE SSPP has identified reporting requirements for HPSBs, new construction, MRs, and existing buildings. Sandia complies with all of these requirements.

2.2.5.1 FY 2014 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 percent of their enduring buildings are compliant with the *Guiding Principles for Federal Leadership in High Performance Sustainable Buildings* by the end of 2015.

EO 13514 and the SSPP clarify the goal to be 15 percent 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 the 15 percent compliance by December 15, 2015, while stipulating continued progress towards 100 percent. See Table 2.3 for target building and GSF numbers.

Sandia is tracking approximately 160 buildings in the U.S. EPA ENERGY STAR system Portfolio Manager using the federal HPSB checklist. These include 49 buildings currently projected to meet or exceed the Guiding Principles goal by FY 2015. In FY 2014, the average percent Guiding Principles complete for the 49 buildings was 89 percent (see Appendix B, Table B-12).

Four buildings met all the Guiding Principles for FY 2014. Another seven are over 90 percent. See Table 2.3 for more 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	193	29
GSF for Buildings >5,000 GSF	FY 2009	6,623,821	993,000	6,727,293	1,009,094

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 percent requirement.

The most difficult Guiding Principles to achieve are energy efficiency, ASHRAE 55 and 62 compliance, indoor fixture replacement, and occupancy sensor installation in limited areas.

Table 2.4. Sandia's Plan to Meet Guiding Principles

	LEED Grandfathered	FY 2010	FY 2011	FY 2012	FY/CY 2013	FY/CY 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)	730 (new) 727 758 726 (CUB)	886 856 859 885 C960 C940 6587 6584 770 962 701 895 705 (new)	836 905 809 C905 827 954 957 6585 C943 (CUB) 861 6586 755 700
# for GP	6	0	2	2	9	4	13	13
Total GP	6	6	8	10	19	23	36	49
% Buildings (> 5,000 GSF)	3.1%	3.1%	4.2%	5.2%	10.1%	11.9%	18.7%	25.4%
GSF	629,746	0	23,047	26,353	124,797	149,200	559,822	569,540
Total GSF	629,746	629,746	652,793	679,146	803,943	953,143	1,363,765	1,933,305
% GSF (>5,000 GSF)	9.5%	9.5%	9.8%	10.2%	12.2%	14.4%	20.4%	29.0%

Notes:

1. Building 705 is a new IGPP at an estimated 25,000 GSF. It will be LEED Gold certified or better. Completion dates are approximate.
2. "Green" buildings have achieved 90% or higher GP compliance.
3. Building count and GSF include CUBs > 5,000 GSF.
4. Three buildings and MOs >5,000 GSF were demolished in FY 2014. No demolition > 5,000 is expected in FY 2015.
5. Building 1091, the Corporate Storage Modular Building, is estimated at 15,000 GSF. A modular building does not meet LEED requirements.

2.2.6 HPSB – New Construction

2.2.6.1 FY 2014 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 HPSB (Guiding Principles), and where the work exceeds $5 million, they must achieve the U.S. Green Building Council's certification of LEED Gold for New Construction. In addition, in accordance with the EPAct 2005, Section 109, all new federal buildings must be designed so that their energy consumption is 30 percent 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," for more information.

Sandia accomplished the following in FY 2014:

- Completed construction of one IGPP, Building 730, which meets the Guiding Principles, and LEED Gold for New Construction is pending; this will bring the total number of LEED for New Construction-certified buildings at SNL to nine

2.2.6.2 Plans and Projected Performance

See the CEDR worksheet, "Building Inventory Changes," for additional information.

Sandia will accomplish the following:

- Meet or exceed LEED Gold for New Construction and Guiding Principles requirements and maximize energy, water, and transportation resource credits to achieve HPSBs.
- Work toward meeting the 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 certification for IGPP Building 705 in FY 2015. This will bring the SNL's total number of LEED for New Construction-certified buildings to ten. Although this building may not comply with all the Guiding Principles requirements, NNSA has determined that it should be counted toward the 15 percent 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 LEED Gold-certified and meet Guiding Principles requirements (and/or ENERGY STAR) and that 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 shown in Table 2.5.

2.2.7.1 FY 2014 Performance Status and Plans and Projected Performance

Table 2.5. Performance Status and Plans and Projected Performance

DOE SSPP Goal/ Sandia Objective	FY 2014 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** • Strengthened the relationship with the Sandia Science and Technology Park (SSTP) in undertaking mutually beneficial planning and development initiatives • Worked with SSTP to develop a consultant Request for Proposal (RFP) for marketing purposes for the Center for Collaboration and Commercialization (3C) initiative • Participated in a workshop at UNM that focused on conceptual design associated with Innovate Albuquerque, which is a partnership for economic development and technology transfer and application between the City of Albuquerque, UNM, the State of New Mexico, and Sandia **SNL/CA** • Collaborated with the City of Livermore Planning Department on projects and outreach, as appropriate, including planning for a new site entrance from Greenville Road to the Livermore Valley Open Campus (LVOC) • Participated in regional planning activities, such as those to support the LVOC	**SNL/NM** • Continue to coordinate with the SSTP on long-range site planning and development policy issues. **SNL/CA** • Continue to participate in regional planning activities to support the LVOC.
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 the 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 the Principles for Sustainable Federal Location Decision. • Continue to examine opportunities to incorporate the Principles for Sustainable Federal Location Decision into lease procurement procedures and lease PREP documentation in consultation with the Sandia Field Office (SFO).
Ensure that planning for new federal facilities or new leases includes consideration of sites that are pedestrian friendly,	**SNL/NM** • In developing plans for proposed projects, continued to ensure the	**SNL/NM** • As plans are refined for proposed projects, continue to ensure the

DOE SSPP Goal/ Sandia Objective	FY 2014 Performance Status	Plans and Projected Performance
near existing employment centers, and accessible to public transit, and emphasize existing central cities and in rural communities, existing or planned town centers.	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	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 (NEPA), as amended (42 U.S.C. 4321 et seq.).	**SNL/NM and SNL/CA** • Ensured that NEPA documentation considered energy usage and alternative energy sources for proposed new or expanded federal facilities	**SNL/NM and SNL/CA** • Ensure that NEPA documentation considers energy usage and alternative energy sources for any proposed new or expanded federal facilities.
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/NM** • Continue to participate in the Mid-Region Council of Governments (MRCOG) Intelligent Transport System Subcommittee and other subcommittees, as appropriate. • Continue to coordinate with KAFB, the City of Albuquerque, and Bernalillo County regarding environmental management of the Tijeras Arroyo. • Continue to coordinate with KAFB on all issues dealing with environmental management.
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 TA-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** • Participated in community meetings, when appropriate	**SNL/NM** • Continue to examine and evaluate potential energy savings for new construction and major renovations.

2.3 Goal 3: Fleet Management

DOE transportation and fleet management goals are as follows:

- Increase alternative fuel consumption by 10 percent annually by FY 2015 from an FY 2005 baseline.
- Decrease fleet petroleum consumption by 2 percent annually by FY 2015 from an FY 2005 baseline.
- Meet the EPAct 1992 AFV acquisition requirement, whereby 100 percent of light-duty vehicles must be AFVs by FY 2015 and thereafter.

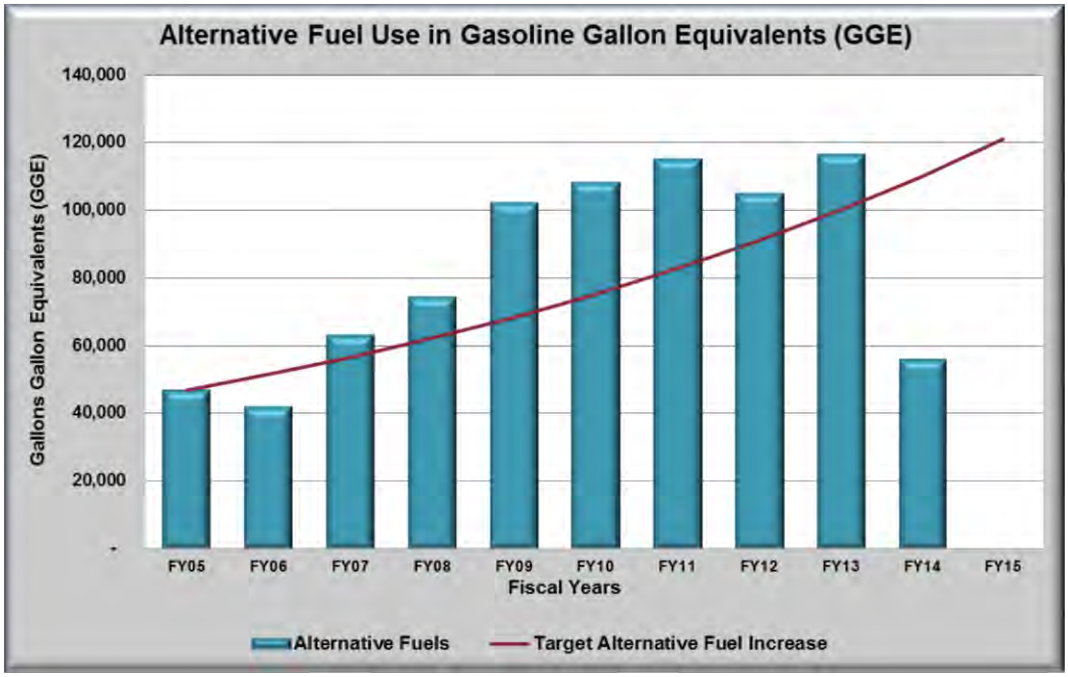
Sandia has accepted DOE's goals as its objectives.

2.3.1 FY 2014 Performance Status

In FY 2014, Sandia experienced a problem with the availability of E-85 fuel at the SNL/NM site, which constituted over 90 percent of the alternative fuel consumed by SNL/NM fleet-managed vehicles in FY 2013. SNL/NM access to E-85 fuel is through KAFB. The KAFB E-85 fuel dispensing system has been out of service since January 2014. This resulted in SNL/NM flex fuel vehicles using regular gasoline instead of E-85 fuel. As of the issuance of this report, the KAFB E-85 dispensing system remains out of service.

Alternative Fuel Consumption Increase

Sandia decreased alternative fuel consumption by 52.1 percent in FY 2014 compared to FY 2013. As a result, Sandia's increase in alternative fuel use is 19.3 percent relative to the FY 2005 baseline (see Figure 2.10).



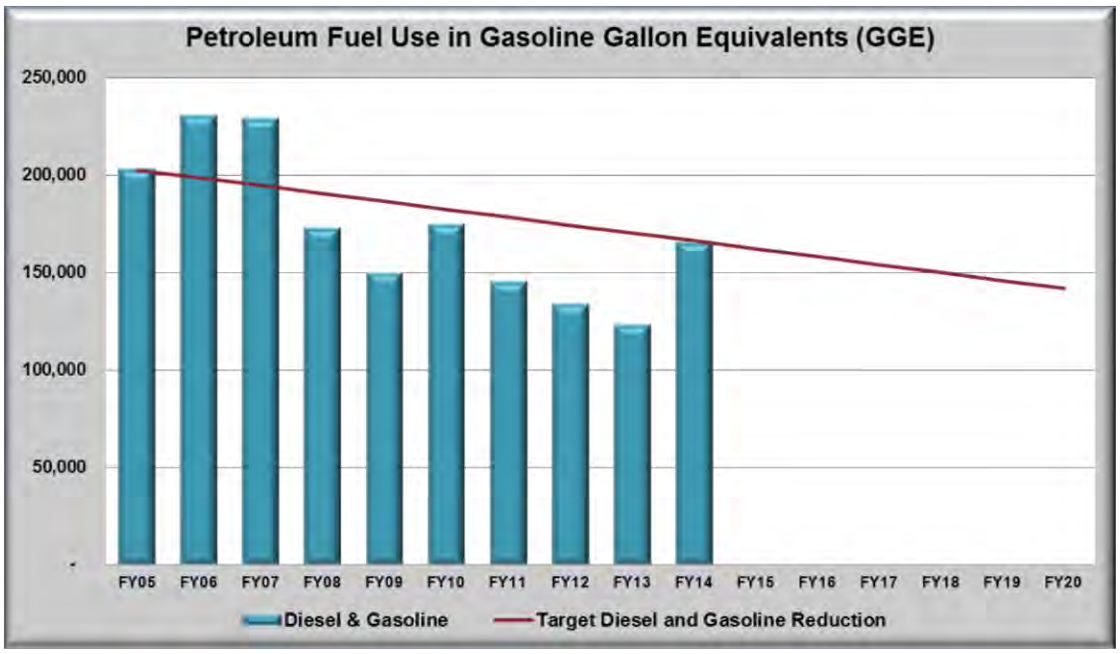
Notes:

- 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 increased petroleum fuel consumption by 34.5 percent in FY 2014 compared to FY 2013. As a result, Sandia's reduction in petroleum fuel use is 18.3 percent relative to the FY 2005 baseline (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 2014, 98 percent 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 percent (See Table 2.6).
- All the acquired AFVs in FY 2014 were flex fuel vehicles that can use E-85 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 received Honorable Mention in The 100 Best Fleets in North America award program for 2014.
- Fueling stations for E-85, B-20, and CNG exist at SNL/NM; however, as described above, SNL/NM had limited access to E-85 fuel in FY 2014. 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."

- Acquire vehicles.
  - Sandia will continue to replace retired fleet vehicles (see Table 2.6).

- High-efficiency vehicles will be purchased or leased when cost competitive and available on the U.S. GSA schedule.

- Reduce diesel and gasoline.
  - Sandia will continue to reduce diesel and gasoline consumption by purchasing AFVs (E-85 and B-20); Sandia will evaluate its fleet to reduce vehicle miles and replace 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%
FY 2014	98.0%

- Increase alternative fuel use.
  - Sandia will continue working with KAFB to re-establish access to the onsite E-85 fueling station and evaluate other potential opportunities for accessing E-85 fuel.
  - 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 percent 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 and 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 9 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 percent of its usage through advanced location meters. These meters register all potable water usage, including ILA. The location metering system was in place prior to the FY 2007 baseline calculation. Sandia does not meter water usage at every 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 2014 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.

The DOE SSPP stipulates that DOE will reduce potable water intensity by no less than 26 percent by FY 2020, relative to an FY 2007 baseline. In addition, the SSPP requires a 20 percent consumption reduction in ILA water by FY 2020 from an 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 2014 Performance Status

Sandia has exceeded the goals set forth by the EO. Currently, Sandia has reduced water intensity by 29.53 percent based on the FY 2007 baseline (see Figures 2.12 and 2.13).

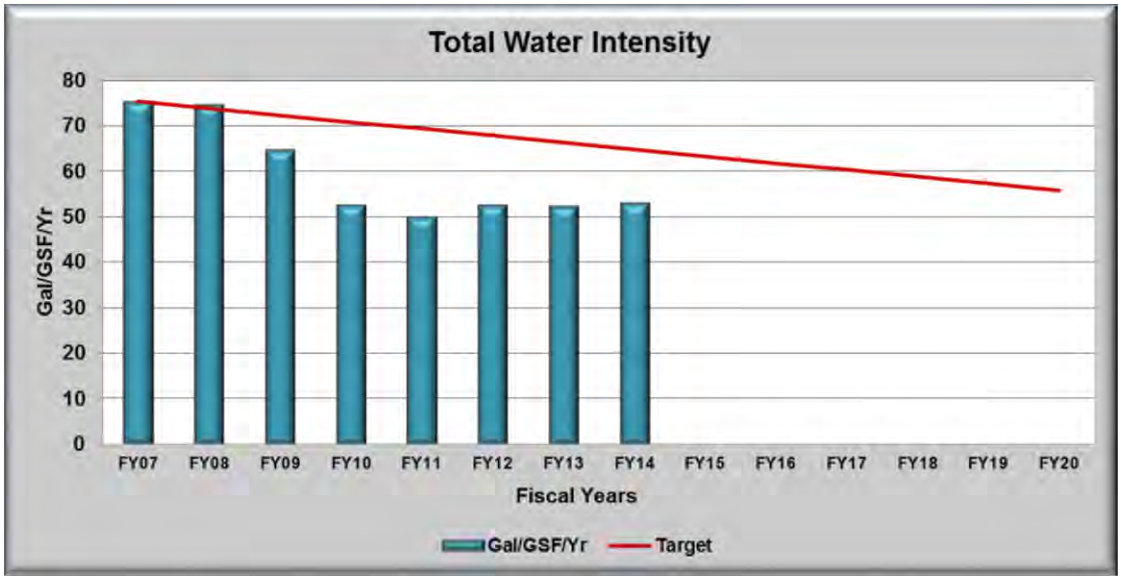


Figure 2.12. SNL Total Water Intensity in Gal/GSF/Yr

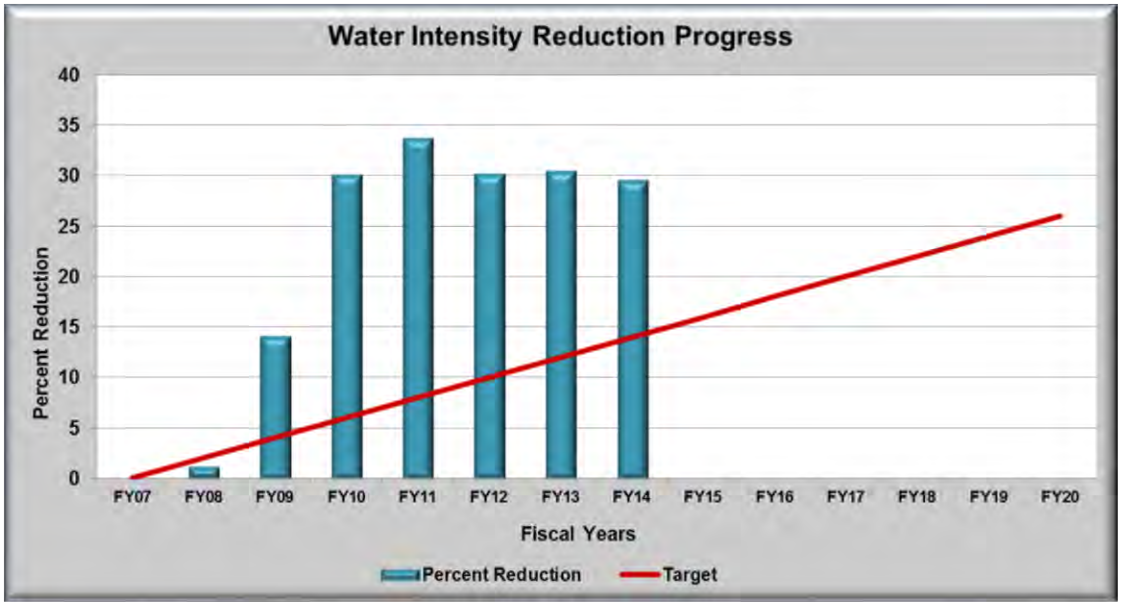


Figure 2.13. SNL Total Water Intensity Reduction Progress

Water is used in various ways across SNL. At SNL/NM, chilled water is used for process and comfort cooling, while 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 2014, cooling tower makeup water accounted for approximately 14 percent of Sandia's water.

The Microsystems and Engineering Sciences Application (MESA) complex deionized (DI) plant water meter shows that approximately 24 percent of Sandia's total water consumption is DI water. While other SNL/NM facilities use DI water, they are not currently metered separately from other building water use; therefore, a reliable approximation of DI water use across the site cannot be made. Based upon LEED criteria, building occupancy, and water audit data for fixture flow, approximately 9 percent of SNL/NM's total water was used for domestic purposes.

There are currently 49 water meters monitoring landscape use. This accounts for about 90 percent of the total site landscaping at SNL/NM. Landscape water metering indicates that roughly 11 percent of site water was used for irrigation. The environmental restoration program used roughly 1 percent of the total for supplemental watering of vegetation covers.

The remaining category, "Unknown," included the following water use:

- 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

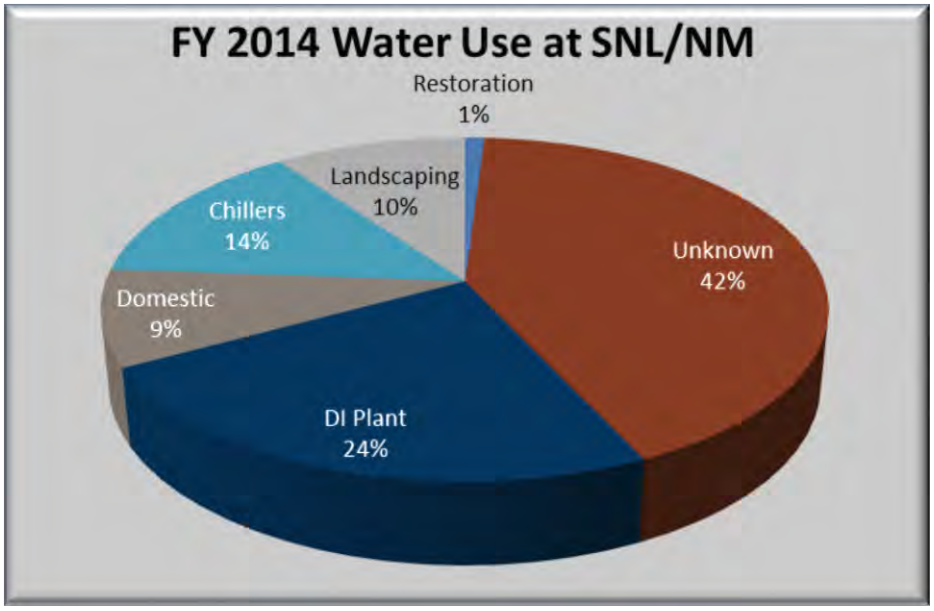


Figure 2.14. SNL/NM FY 2014 Water Use

At SNL/CA, all water uses consist of potable water – irrigation, heating/cooling, domestic, and laboratory use. Most buildings have water meters installed, as do most irrigation lines. SNL/CA initiated a Water System Study during 2014. The purpose of the study was to assess the current condition of the water distribution system and to identify areas of deficiencies. During this effort, broken and missing water meters were identified and corrected. Prior to the study, water meters were not read on a regular basis. Meter reading started in May 2014. The following graph shows SNL/CA's water use for September 2014 as a typical summer month. The SSP for next year will show water use for the entire year.

The "Unknown" category includes system leaks, fire hydrant testing, building fire system testing, and construction activities.

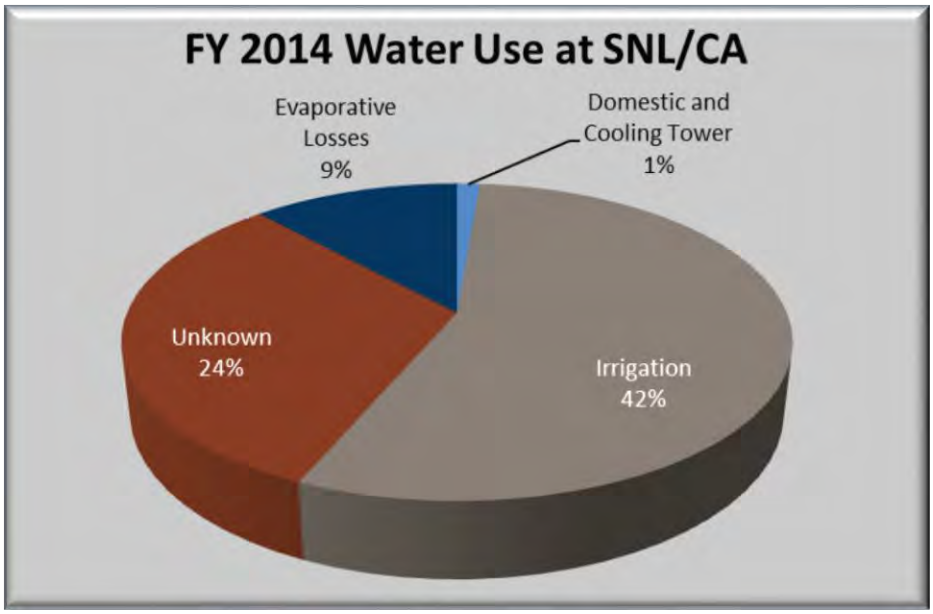


Figure 2.15. SNL/CA September 2014 Water Use

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 process and an 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. Water main breaks (repaired in late FY 2014), the temporarily offline 858 water recycling tanks, and the construction of Building 730 contributed to the increase in FY 2014. See Table 1-5e of the CEDR worksheet, "Funds, Metering, Training," for water meter information.

Sandia also replaced inefficient plumbing fixtures with low-flow fixtures in several buildings to comply with HPSB Guiding Principles.

2.4.1.1 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 where feasible.
- Follow green building guidelines and use recycled water wherever possible to realize water savings when designing and constructing new data centers.

Construction is planned and will increase the amount of reclaim water 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 its energy audits and condition assessments. Findings from these audits range from bathroom retrofits to the elimination of once-through cooling loops. Inefficient and outdated fixtures will be replaced as funding becomes available, particularly in buildings identified to meet HPSB Guiding Principles.

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 following National Pollutant Discharge Elimination System (NPDES) permits:

- 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 2014 Performance Status

See the CEDR worksheet, "Building Inventory Changes."

Sandia accomplished the following in FY 2014:

- Used the *FMOC Design Standards Manual* to develop appropriate plans for six existing buildings to meet the requirements of the *Storm Water Management Guiding Principle for Existing Buildings*

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 percent 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: P2 and Waste Reduction

The SSPP commits DOE to the following P2 goals:

- Divert at least 50 percent of nonhazardous solid waste, excluding C&D debris, by FY 2015 (SNL/CA shall divert at least 80 percent).
- Divert at least 50 percent of C&D materials by FY 2015 (SNL/CA shall divert at least 80 percent).

In California, the Alameda County Ordinance 2012-1 mandates recycling of cardboard, newspaper, white paper, mixed recyclable paper, recyclable glass food and beverage containers, aluminum and metal food and beverage containers, PET (#1) and HDPE (#2) plastic bottles as well as food and other compostables beginning July 1, 2014. If SNL/CA operations generate more than 10% organics, SNL/CA personnel are to provide containers and service of sufficient number, size, and frequency for organics (food scraps and/or compostable paper) and place food scraps and compostable paper in separate organics cart/bin for collection. These requirements were made effective to ensure Alameda County reaches its goal of less than 10% of discards sent to landfills in 2020 are easily recyclable and compostable materials.

Sandia commits to meeting the DOE P2 goals, and Alameda County requirements, and continues its practices to minimize waste generation consistent with EO 13514, the Pollution Prevention Act of 1990, and the Resource Conservation and Recovery Act. The Pollution Prevention Act declared the following hierarchy to be the national policy of the United States:

- 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" (e.g., 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)
- Reducing solid-waste through reuse and continuing identification and diversion of recyclable materials that are currently being disposed
- Improving involvement with the FMOC and Procurement on C&D project reuse and recycling
- Increasing efforts to replace or reduce toxic chemicals in laboratory operations

In California, the Alameda County Ordinance mandates that food and other compostables be recycled beginning July 1, 2014, and requires that recyclables and compostables make up less than 10 percent of material landfilled by 2020.

2.5.1 FY 2014 Performance Status

See the SNL data annually reported in the CEDR. SNL/NM and SNL/CA data are reported separately. Because the SSP represents all SNL locations, the numbers presented here are totals.

- SNL/CA shall divert at least 80 percent and SNL/NM shall divert at least 50 percent of nonhazardous solid waste, excluding C&D debris by FY 2015.
    - SNL/CA solid waste decreased by 23.9 MT in FY 2014, and SNL/NM solid waste decreased by 46 MT, setting a new record low.
    - In FY 2014, SNL/NM diverted 67 percent of nonhazardous solid waste, excluding C&D debris.
    - In FY 2014, SNL/CA diverted 81.5 percent of nonhazardous solid waste, excluding C&D debris.
    - SNL/NM food waste composting continued in FY 2014 from two cafeteria locations and two office trailers. Composting doubled to 12 catered events as part of the advertised "zero waste events."
    - In FY 2014, SNL/CA added recycling of plastics 1–7, plastic bags and wrap, aluminum foil products, and composting of organics.
- SNL/CA shall divert at least 80 percent and SNL/NM shall divert at least 50 percent of C&D waste by FY 2015.
    - SNL Facilities organizations use a construction waste management specification requiring adherence to the waste management hierarchy of reduce, reuse, and recycle.
    - In FY 2014 at SNL/NM, Sandia diverted 80.5 percent of C&D waste.
    - In FY 2014 at SNL/CA, Sandia diverted 97.0 percent of C&D waste, contributing to an increase of 33 percent. This can be attributed to environmental awareness of the

contract representatives and increased relationships between Facilities SDRs and the P2 Program.

- Reduce printing paper use.
    - The JIT paper contract specifies a minimum of 30 percent postconsumer recycled content, but 100 percent recycled content copy paper is also readily available from the vendor for a premium. Evidence shows that 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 to default to grayscale duplex printing. SNL/CA requires management justification for purchasing desktop printers.
    - Instructions for setting network copiers to grayscale duplex printing are located on the internal Copier Fleet website.
- Reduce and minimize the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of.
    - The 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 to reduce the tendency to purchase in bulk.
    - Sandia reviewed internal mission and mission support processes to minimize chemical use.
    - Sandia has a Chemical Exchange Program (CEP) in place, and the JIT Chemical Purchases webpage also steers Members of the Workforce to the CEP as an alternative to new chemical purchases.
    - The corporate procedure on technical work document preparation was revised and submitted for acceptance to address waste minimization and associated required documentation intended to improve compliance with the waste management hierarchy per the corporate procedure on hazardous waste management.
- Implement integrated pest management and other appropriate landscape management practices.
    - Revise the *Integrated Pest Management Plan* to include vegetative pests and SNL/CA requirements.
    - Update service contracts to reflect the plan.

Figure 2.16 provides an illustration of SNL waste and diversion metrics.

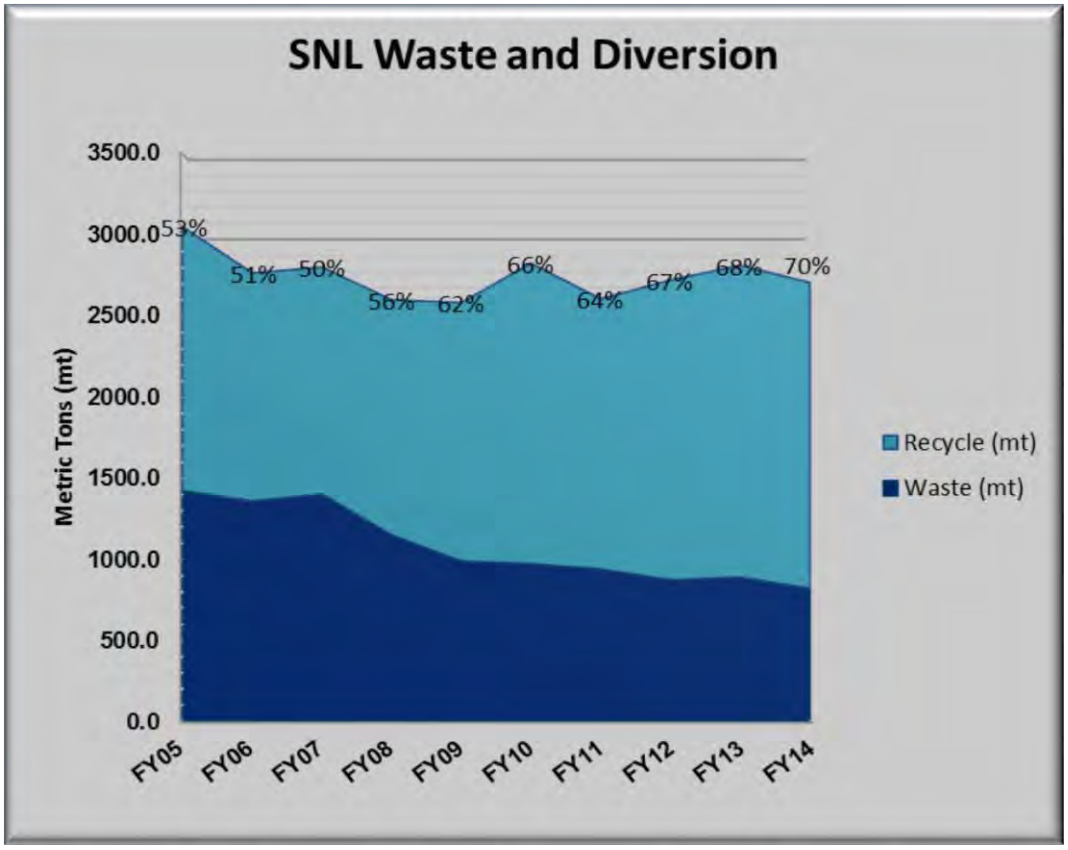


Figure 2.16. SNL Waste and Diversion

2.5.2 Planned and Projected Performance

- Implement initial actions identified in the FY 2014 waste characterization report as EMS objectives.
- Identify reuse streams for C&D waste materials.
- Reduce and minimize the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of and increase CEP participation.
- Implement integrated pest management and other appropriate landscape management practices.

2.6 Goal 6: Sustainable Acquisition

The SSPP commits DOE to the following sustainable acquisition (SA) goals:

- Ensure that 95 percent 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 FEMP-designated), water efficient, and/or biobased; include recycled content; are environmentally preferable, non-ozone depleting products containing recycled content; or are nontoxic or less-toxic alternatives. EPEAT-registered products are addressed under Goal 7.
- 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 2014 Performance Status

SNL purchasing agreements adhere to DEAR Clause 970.5223-7, Sustainable Acquisition Program, contained in the SNL Management and Operating Prime Contract.

The standard clause in all pertinent Sandia JIT purchasing contracts reads as follows:

> B. PRODUCT REQUIREMENTS/GREEN PURCHASING
>
> Per DEAR Clause 970.5223-7, Sustainable Acquisition Program, all applicable products shall be environmentally preferable, which include recycled content, biobased, energy efficient (ENERGY STAR or FEMP-designated products), or water efficient (plumbing) products. Reporting on applicable acquisitions is a requirement in order for Sandia to meet its annual reporting requirements to the Department of Energy.
>
> All desktops, laptops, and computer monitors provided under this contract are required to have achieved Silver registration or higher under the Electronic Products Environmental Assessment Tool (EPEAT), http://www.epeat.net/. EPEAT is a procurement tool designed to help large volume purchasers evaluate, compare, and select desktop computers, laptops, and monitors based upon their environmental attributes as specified in the consensus-based Institute of Electrical and Electronic Engineers Standard for the Environmental Assessment of Personal Computer Products (1680).

The standard clause in all Sandia Firm Fixed Price blanket contracts reads as follows:

> Per DEAR 970.5223-7, Sustainable Acquisition Program, the Contractor shall provide its services in a manner that promotes the expanded use of green products, reduces greenhouse gas emissions, and protects the health and wellbeing of building occupants, service providers, and visitors in the facility. Per DEAR Clause 970.5223-7, all applicable products shall be environmentally sustainable, which include recycled content, biobased, energy efficient (ENERGY STAR or FEMP-designated products), or water efficient (plumbing) products. Details and references to environmentally sustainable products can be found in SNL's Construction Specifications.
>
> Improvements in purchasing include the following:
>
> - As part of the Life-Cycle (Hazardous) Materials Management initiative, Sandia implemented a chemical acquisition process prerequisite that requires review by several SMEs before authorization for the purchase is granted. This will support better utilization of existing inventory, ensure proper storage, and ensure proper attention to end-of-life disposal.

2.6.2 Plans and Projected Performance

Sandia will update corporate policies, processes, and procedures to reflect the incorporation of DEAR Clause 970.5223-7 on SA requirements into the SNL Management and Operating Prime Contract.

- Pursue achieving 95 percent of applicable purchases for recycled content and other sustainable attributes products.
- Add to or update the SA language in Section I for new contracts and, when possible, existing contracts.
- Continue to update construction specifications, design manuals, and other pertinent Facilities documentation.
- Improve reporting of SA priority product purchases in construction contracts.
- Develop a standard quarterly means of tracking and confirming the number of contract actions placed.
- Implement environmental criteria and scoring during contract request for quotation and proposal processes.

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 core data centers to measure a monthly PUE (100 percent by FY 2015).
- Achieve a maximum annual weighted average PUE of 1.4 by FY 2015 in core data centers.
- Provide 100 percent of eligible PCs, laptops, and monitors with power management actively implemented and in use by FY 2012 and continually thereafter.

Other electronic stewardship and data center sustainability measures identified in the FY 2014 SSPP include the following:

- Ensure acquisition of EPEAT-registered (95 percent), ENERGY STAR-qualified (100 percent), and FEMP-designated (95 percent) electronic office products when procuring electronics in eligible product categories.
- Ensure the 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.

Sandia has accepted DOE's goals as its objectives, as applicable.

2.7.1 Data Center Efficiency

2.7.1.1 FY 2014 Performance Status

In FY 2014, Sandia conducted CORE data center assessments at the building level in DOE Green IT. Sandia identified three CORE data center buildings: Buildings 880 Annex, 725, and C912. CORE data center buildings include only those of significant size owned and operated by SNL's Corporate

Computing and Network Services organization. Sandia has also identified non-CORE enduring data centers owned by other Sandia organizations.

Table 2.7. SNL Data Centers

	FY 2013	FY 2014	Notes
Total number of Data Centers (by room)	107	84	Rooms with > 10 servers (approximately)
Total number of CORE Data Centers (by building/by room)	3/16	3/16	Buildings 880A, C912, and 725; all CORE data centers are owned by corporate IT
Total number of non-CORE Data Centers (by room)	91	68	Non-CORE data centers are a mix of corporate IT and line-owned rooms
Total number of Enduring Data Centers (by room)	N/A	85	Includes CORE and non-CORE data centers that are not planned for consolidation in the next 3–5 years
Total number of Enduring Data Centers to be metered (by room)	N/A	22	Enduring data centers with >50 servers are metering candidates; CORE data centers are metered by room

Sandia is at low risk for meeting the CORE data center objective for metering and high risk for meeting the PUE. Started in FY 2013 and continuing in FY 2014, Sandia, working with LANL, completed a white paper that proposed a realistic definition of "data center," a consistent methodology for calculating PUE, and cost effective criteria for metering. Sandia used this definition to determine how many enduring data centers it has and which ones should be metered. See Appendix E for the white paper final draft.

In FY 2014, Sandia implemented the following data center improvements.

Data Center Power Metering and Environmental Monitoring

At SNL/NM, CORE data center locations, such as the Building 880 Annex (880A) and Building 725 power usage, is tracked at the transformer or switchboard level that serves the transformer. Sandia improved CORE data center metering capabilities, as well as automating metered data acquisition and monitoring to enable auto-calculation of efficiency metrics, such as PUEs. In FY 2014, 100 percent 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 in Building 880A.

In FY 2014, Sandia transitioned to a new electrical energy monitoring system for the CORE data centers at SNL/NM. Because of this, Sandia did not have sufficient data to calculate PUEs for Buildings 880A and 725 in FY 2014. The new system will be completely operational in early CY 2015, and Sandia will begin calculating PUE starting in March 2015. Sandia does not have a system in place to calculate PUE for Building C912 because the C912 data center is not separately metered.

Efforts to improve PUE include the following:

- Install a new monitoring system.
- Consolidate rack equipment to reduce the electronics footprint.
- Relocate under-floor cabling to overhead cable trays to improve the efficiency of air flow and distribution in the under floor plenum.
- Refine CRAC unit control set points to increase operating temperature and decrease cooling load demand.

Energy Consumption Reduction

This subsection describes the data center energy use reduction measures Sandia implemented in FY 2014.

Gigabit Passive Optical Network Technology

The gigabit passive optical network (GPON) project to replace powered copper network components with non-powered fiber components completed 100 percent of the total migration effort in FY 2013. Decommissioning activities continued in FY 2014 to divert copper and recyclable components from SNL's landfill/waste streams.

Air Flow Management

Sandia increased the usage of hot/cold aisle containment in NM CORE data centers. Prior to FY 2014, hot/cold aisle containment was used primarily in high performance computer clusters; however, in FY 2014, Sandia implemented AisleLok containment doors/overhead baffles. These doors are attached to end-of-aisle racks wherever needed and are currently used in both the High-Performance Computing (HPC) and Enterprise environments. The energy savings are not as significant as with a built-in containment system, but that is offset by the doors' flexibility to be quickly reconfigured and used.

In FY 2014, Sandia performed a SmartAire fan tile spot cooling test with Tate floor manufacturing. At this time, Sandia continues to deploy spot cooling where applicable and will continue to investigate automating/linking spot cooling to the CRAC units.

Sandia continued to explore new technologies and methods for air flow management and elevated ambient operating temperatures in FY 2014.

Data Center Consolidation Project

Sandia continued the Data Center Consolidation (DCC) project started in FY 2013. In FY 2014, this included identifying and prioritizing opportunities, particularly on the Sandia Restricted Network (SRN) and Sandia Open Network (SON), to eliminate, virtualize, and colocate servers from line-owned data centers and server rooms to corporate data centers. Additionally, in FY 2014, Sandia partially or totally consolidated 10 non-CORE data centers and server rooms. From those 10 rooms, the DCC team processed 623 devices, of which 20 percent moved into the Building 880A CORE data center, 1 percent were virtualized, and the remainder were turned off or virtualized to a non-CORE data center. The largest percentage was turned off. The DCC team also was able to defer a number of proposed equipment purchases to virtualization which reduced the corporate IT footprint.

Enduring data centers, defined as data centers that cannot be consolidated within the next three to five years due to security or mission constraints, were also identified.

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.

Data Center Infrastructure Management

To support DCC and other measures taken to reduce data center energy consumption, the Corporate IT organization began a market survey of Data Center Infrastructure Management (DCIM) tools in FY 2014. Implementation of this tool will provide the holistic view of data center performance (IT and building facilities functions) such that we can maximize opportunities to utilize available energy, equipment and floor space as efficiently as possible.

Server Consolidation/Virtualization Project

The server consolidation/virtualization project (SC/VP) is ongoing since FY 2010 and continues to grow as a service (see Table 2.8). To date, one virtual rack has replaced the services that once ran on five rows of Enterprise racks in Building 880A.

Table 2.8. SNL Virtualized Services

Virtualized Services			
SQL Database	BMC Remedy Ticketing	EIMS Library System	IBM Maximo
Bentley ProjectWise	Business Objects Xlr2	IBM FileNet	Savvion BPM
Forio	Process Dashboard	TEDS – CBM LMS	WFS – Document Library (Stellent)
Reliasoft Tracking Software	Oracle Weblogic GP Java	Sharepoint	RSA DLP
Perseus Survey Generator	Asset Risk Management	Medical Apps	Fleet Management Apps
Symantec	Blackberry Servers	Dropzone	Capp Servers
Web Servers	Terminal Servers	Cyber Scanning Servers	Primavera

Virtualization savings in FY 2014 is estimated at $4.4M based on the cost of the virtual servers minus the cost of the hosts and the annual cost of system partitions. The associated energy savings is estimated at $270K and also considers the cost of the energy (direct power and indirect cooling) consumed by the virtual servers and hosts.

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 2014, equipment purchases included criteria for allowable operating temperatures between 65° 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 the deployment of plate frame heat exchangers has allowed the Building 880A and 725 data centers to increase ambient room operating temperatures to about 55° to 60°F (Building 880) and about 50°F (Building 725).

Efficient Uninterruptible Power Supplies

In FY 2014, Sandia initiated a design study to implement backup power generation that is more energy efficient and reduces the SNL environmental impact over traditional uninterruptible power supplies (UPSs).

Data Center Component Recycle and Reuse

In FY 2014, Sandia continued to seek opportunities to recycle and reuse components, including deployment of recycle containers inside data center staging areas for metals.

Standardization of IT Equipment

In FY 2014, Sandia deployed standardized racks as part of data center consolidation and the enterprise environment. These standardized racks are self-contained units for air-cooled racks requiring no additional cool air delivery.

2.7.1.2 Planned and Projected Performance

Several measures implemented in FY 2014, described in Section 2.7.1.1, *FY 2014 Performance Status*, to improve data center performance, are ongoing and will continue through FY 2015, in addition to the new initiatives described in the following sections.

Data Center Power Metering and Environmental Monitoring

At SNL/NM CORE data center locations, Sandia will continue 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 continue to implement rack-level metering and monitoring for network and enterprise racks in Building 880A. In FY 2015, Sandia plans to configure meters for monitoring capability through the BAS in Building 725. Sandia also anticipates having the ability to perform automated calculations of PUEs for data centers located in Buildings 725 and 880A by March 2015.

Efforts to improve PUE will continue in FY 2015, including the following:

- 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
- Ensure meters are connected to the BAS

In FY 2015, 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.

In FY 2015 Sandia will meter the C912 data center.

Energy Consumption Reduction

This section describes data center energy-use reduction measures that Sandia will implement in FY 2015.

Skybridge Deployment

Skybridge will eventually replace Red Sky. It will have an energy efficient 70 percent liquid cooling system. In FY 2015 it will run side by side with Red Sky, until Red Sky is decommissioned in FY 2016. Skybridge will replace the 48 racks of Red Sky with 36 racks and double the computing power.

Air Flow Management

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 non-CORE data center locations in FY 2015.

In FY 2015, Sandia will continue to test and evaluate new technologies that can provide directional or spot cooling and reduce the demand on CRAC units, thereby reducing 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.

In FY 2015, 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.

In FY 2015, the new units installed in FY 2013 and 2014 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 to the BAS for the capability to monitor and control air flow delivery.

DCC Project

In FY 2015, Sandia will continue to identify and prioritize opportunities to eliminate, virtualize, and colocate servers from non-CORE, line-owned data centers and server rooms to corporate data centers. Additional data centers and server rooms will be decommissioned at all Sandia sites. Because of ongoing mission and security requirements, the 40 percent reduction in data centers is an unrealistic goal for Sandia.

Data Center Infrastructure Management

Upon completion of the market study for a DCIM tool, SNL's Corporate IT personnel will invite the top vendors to perform a proof-of-concept study within the Building 880A CORE data center. In FY 2015, Sandia will select, purchase, and initiate implementation of the DCIM tool in FY 2015.

Server Consolidation/Virtualization Project

The SC/VP project will result 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 2015. It is closely associated with the DCC project.

Review of Availability Requirements for IT 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 2015.

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.

Efficient UPSs

Future plans include reduced reliance on larger UPS systems by using smaller units for critical applications only in Building 725. In FY 2015, Sandia will also develop criteria to determine where and when a UPS is really necessary.

Sandia is also looking at opportunities to utilize fuel cell, flywheel, or other types of backup power generation that are more energy efficient and reduce the SNL environmental impact over traditional UPS power.

Data Center Component Recycle and Reuse

In FY 2015, 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

In FY 2015, Sandia will evaluate the energy efficiency, cost, and risk associated with installing a performance-optimized data center (POD) as an alternative to renovating existing data center facilities.

Standardization of IT Equipment

In FY 2015, Sandia will continue to deploy standardized racks as part of data center consolidation and enterprise environment.

2.7.2 Personal Computer Power Management

2.7.2.1 FY 2014 Performance Status

Sandia monitors power management for PCs through implementation of NightWatchman, a desktop power-management software system. In January 2011, NightWatchman was implemented per a memo from the Corporate Information Officer. When configured, NightWatchman allows Sandia's IT services to manage the power consumption of manageable Windows 7 and greater 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 at any time.

In FY 2014, approximately 9,679 desktop computers at SNL/NM and SNL/CA were eligible for the sleep policy. However, only 3,005 machines participated and were configured with the sleep policy.

2.7.2.2 Plans and Projected Performance

In FY 2015, Sandia will deploy a new power policy process to increase power management on eligible machines. This policy will provide user options for using a local power policy or hosted solution. For machines that are eligible and do not have a power management solution, Sandia will report the status of those machines to the center level for accountability.

2.7.3 Electronic Stewardship – Sustainable Acquisition

The SSPP commits DOE to the following electronic stewardship goals:

- Ensure that 95 percent of eligible electronics acquisitions meet EPEAT standards.

Sandia has accepted DOE's goals as its objectives.

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.

2.7.3.1 FY 2014 Performance Status

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 registered equipment purchasing compliance.

- Computer, monitor, and imaging equipment purchases in FY 2014 were 99 percent EPEAT compliant on $15.44M in applicable computing equipment purchases. Of the EPEAT-compliant equipment purchased, 95 percent were EPEAT Gold registered.
- Applicable imaging equipment purchases (i.e., printers, scanners, and multifunction devices [print/copy/scan]), were 98 percent EPEAT compliant in FY 2014, compared to 93 percent in FY 2013—the first year of the EPEAT-registered imaging equipment requirement.

2.7.3.2 Plans and Projected Performance

Sandia will update corporate policies, processes, and procedures to reflect the incorporation of DEAR Clause 970.5223-7 on SA requirements into the SNL Management and Operating Prime Contract.

- Improve compliance with EPEAT requirements for purchases of thin clients, imaging equipment, and televisions (large-screen LCD).
- Determine criteria for eligible servers.

- Meet ENERGY STAR requirements for more than 80 percent of eligible enterprise server purchases.
- Standardize on no more than 10 models of individual printers (including multifunction devices), all at minimum Silver EPEAT level.
- Expand utilization of networked fleet copiers to meet more than 25 percent of all workforce print/copy/scan/fax needs.

2.8 Goal 8: Renewable Energy

DOE is required to have 7.5 percent of its electricity consumption come from RE sources by FY 2013 and 20 percent by FY 2020. The statute provides for a double bonus if the RE is produced onsite and 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 2014 Performance Status

Sandia meets the electric RE objective through the purchase of RECs and through onsite and existing RE projects and strives to add onsite RE generation capacity when cost effective. See the CEDR worksheets, "Operating Onsite Renewables" and "Purchased Renewables," for more information.

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 2014, these activities generated approximately 308 MWh of electric power from systems totaling 280 kW.

The estimated total RE generation at SNL for FY 2014 is approximately 459 MWh for electric and 445 MMBtu for thermal. Onsite renewable electricity generation represents only 0.328 percent of SNL's total electricity consumption. Because onsite RE generation capacity is limited, Sandia satisfies the required 7.5 percent electricity consumption from RE sources through purchases of RECs (to cover site electric consumption). Sandia will increase the purchase of RECs in subsequent years to meet the 20 percent goal by 2020. Figure 2.17 shows Sandia's renewable electric generation through FY 2014.

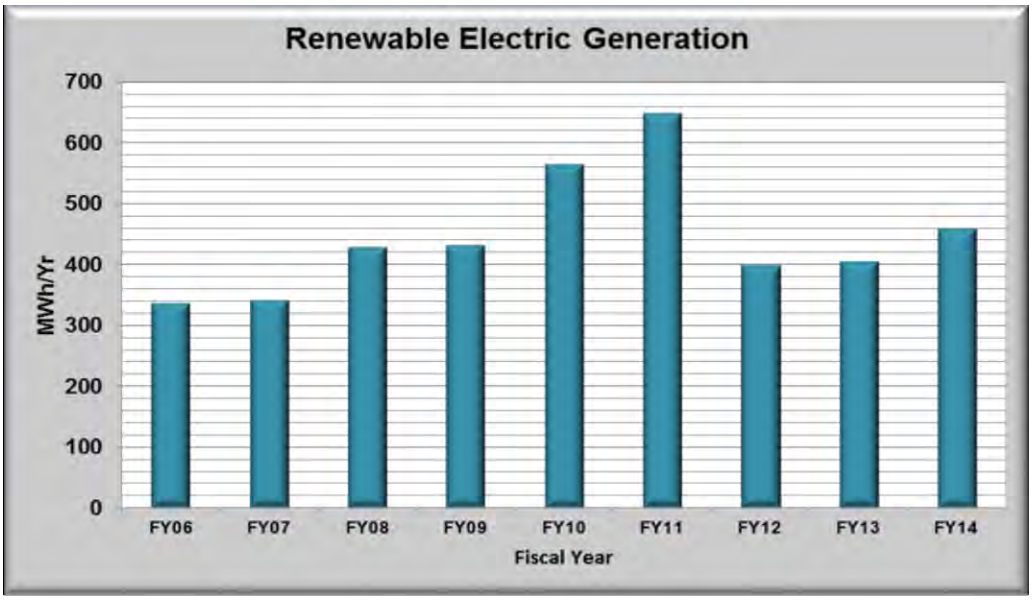


Figure 2.17. SNL Renewable Electric Generation

Actual metered data from some RE systems at SNL was unavailable during FY 2014. Where metered data was unavailable, energy produced by non-metered PV systems was estimated based on the system capacity and an assumed 5 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 RTC at SNL/NM. This test bed allows solar vendors to test their PV systems at the SNL/NM site. This site is located south of the NSTTF Solar Tower and is referred to as Site Zero. A 5,100W system was installed at Site Zero in FY 2014.

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 increases in lighting energy use, and promote solar and LED technologies. In FY 2014, Sandia installed an additional 15 solar-powered LED pathway lights in SNL/CA and a solar-powered LED lighting system for a flag on the SNL/NM site.

Another solar technology that Sandia uses to reduce infrastructure costs and energy are solar-powered carts. Currently, Sandia has a total of 32 solar carts at SNL/NM and SNL/CA.

In FY 2014, Sandia Facilities and R&D organizations collaborated on the following initiatives:

- Completed studies to evaluate PV and energy storage installations

2.8.2 Planned and Projected Performance

Sandia continues to add onsite RE capacity as shown on the CEDR worksheet, “Conservation and RE Measures,” where life-cycle cost effective. Sandia’s projected performance includes the following:

- Install approximately 100,000W of grid-tied PV systems in FY 2015.
- Purchase RECs to meet the goal for FY 2015 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.
- Use SNL locations as test beds for R&D technologies.
- Evaluate microgrid for mission-critical energy-security applications.
- Expand R&D concentrated solar activities at the 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.

Table 2.9 projects RE generation, RECs, and other information over a 10-year period.

Table 2.9. SNL Renewable Energy Generation

Renewable Energy	Actual FY 2014	Planned FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Renewable Energy (MWh)	456	660	660	660	660	660	660	660	660	660
Renewable Energy Credits (MWh)	24,000	30,800	44,800	44,800	51,800	51,800	58,800	58,800	58,800	58,800
Actual/Planned/ Est. Cost to Install*	131,600	529,260	42,560	42,560	49,209	49,209	55,859	55,859	55,859	55,859
Unit Costs ($/MWh)	$5.48	$17.072	$0.950	$0.950	$0.950	$0.950	$0.950	$0.950	$0.950	$0.950

Notes:
*Costs for REC purchases are estimated beyond FY 2014 and are unknown beyond FY 2020.
Numbers shown are for projects installed in FY 2014. Generation for FY 2015 and beyond is based on the addition of a total of 100kW at the 853 site.

2.9 Goal 9: Climate Change Resilience

In accordance with EO 13514 and subsequent Council on Environmental Quality Implementing Instructions, DOE developed and submitted a *Climate Change Adaptation Plan* in 2012. The DOE *Climate Change Adaptation Plan* directed DOE programs to ensure that all sites address climate change adaptation in their FY 2013 SSPs. DOE updated the plan in 2014, which reaffirmed its commitment to making DOE more resilient to climate change and changed site requirements.

Table 2.10. Current FY 2014 Performance Status and Planned and Projected Performance

DOE Goal/ Sandia Objective	FY 2014 Performance Status	Planned and Projected Performance
Risks to Missions, Operations, and People		
Objective 1: DOE Climate Change Adaptation Screening Assessment	N/A	Sandia will complete the screening assessment survey as much as possible for the NM location by December 8, 2014. Sandia will complete the survey for the CA and NV locations by the end of FY 2015.
Objective 2: Determining Risk	Table 2.11 lists the applicable climate hazards, the Sandia sites where they are relevant, the types of impacts associated with the hazard, an estimate of the risk, and the rationale for that estimate. The information is a high level look at the types of impacts and associated risks that could manifest as a result of climate change at each location. Near term challenges to Sandia locations 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).	Table 2.11 will serve as the foundation from which detailed vulnerability analyses can be implemented over future years, in order to refine the assessments and prioritize the adaptation strategies in a cost effective manner. Better understanding of the potential risks, impacts, and adaptation strategies will allow for building an educational and awareness program for site personnel that is focused and effective. Currently, no such programs exist at any of the locations.
Building Resilience		
Objective 3: Current Activities	Currently, there are no formalized activities specific to addressing climate impacts to Sandia's missions, operations, and people. However, Sandia maintains several activities that implicitly address climate change and that help increase Sandia's resilience to its impacts. Through its Climate and Environment Program, Sandia is involved in research activities that helps Sandia understand and prepare for national security impacts of climate change. These activities include sensing and monitoring, modeling and analysis, carbon management, and water security. Because Sandia's mission includes "anticipating and resolving emerging national security challenges", disruptions in Sandia's operations and mission are themselves a risk to national security. Many of the lessons and tools developed through these activities can be refocused for high-level self-assessments although more detailed analyses may require developing new tools or adapting existing tools to Sandia's specific circumstances. Sandia's standing in the climate change community has led to several of its researchers contributing to the 2013 National Climate Assessment. Sandia also maintains its EMS that is used to identify the	N/A

DOE Goal/ Sandia Objective	FY 2014 Performance Status	Planned and Projected Performance
	environmental consequences of activities, products, and services and develops measureable targets to mitigate potential impacts to the environment. It also serves as a foundation for implementing this SSP as the need arises. The EMS promotes behaviors among the workforce that implicitly aid in increasing Sandia's resilience to climate change such as encouraging: • Alternatives to single-passenger commuting • Implementation of the Federal HPSB Guiding Principles • Certification of new construction projects under the U.S. Green Building Council's LEED Green Building Rating System • Conversion of existing building controls and environment systems • Installation of cool roofs to help reduce heating and cooling power requirements.	
Objective 4: Future Activities	N/A	Sandia plans to conduct a preliminary high-level assessment/analysis of potential major site-specific/local vulnerabilities to climate change in FY 2016. Based on plan findings, Sandia may consider undertaking specific efforts to better quantify, understand, and prioritize those vulnerabilities and/or begin implementing counter measures against local climate change effects at its facilities. Inherent in those assessments will be to identify and update Sandia's climate adaptation-related plans and strategies to address climate change adaptation considerations (e.g., continuity of operations, fire management, infrastructure and construction specifications, etc.). Long-range vulnerabilities due to chronic climate change stresses will also be assessed and used to update Sandia's Long-Range Development Framework to include impacts to Sandia's mission, facilities, and infrastructure. Upon completion of the high-level assessment, Sandia will undergo a thorough, vulnerability risk assessment that includes direct impacts on Sandia's facilities and mission, as well as indirect impacts due to impacts on systems and infrastructure (e.g., electrical and transportation networks leading to Sandia facilities, water supply reliability, natural gas supplies, etc.) that are outside of Sandia's control. Included in this activity will be an economic assessment that will determine the effectiveness of different adaptation strategies by comparing the cost of each strategy to the increase in resiliency that it returns. Sandia will use this information to create for each of its sites a

DOE Goal/ Sandia Objective	FY 2014 Performance Status	Planned and Projected Performance
		prioritized list of adaptation strategies that can be implemented in future development plans.
Objective 5: Real Property and Supply Chain Resilience	Currently, Sandia has no existing procedure or mechanism that considers climate adaptation and resilience into its procurement, acquisition, real property, or leasing decisions.	It is anticipated that the vulnerability risk assessments described in Future Activities in Objective 4 will include vulnerabilities to real property and supply chains. Consideration will need to be given to develop methodologies that can be quickly and easily applied during the procurement process or when acquiring or modifying real property. Identifying back-up sources of goods will need to be included as will identifying alternatives and plans for bringing critical facilities and infrastructure back online as quickly as possible.
Regional and Local Coordination		
Objective 6: Regional and Local Coordination	Through its EC Program Management Unit, Sandia supports DOE/EERE who in turn supports other agencies in the area of climate change research. Locally, Sandia partnered with the Bureau of Reclamation to research the impacts of climate change in the Middle Rio Grande Region of New Mexico, which includes SNL/NM while regionally, Sandia researchers partnered with DOE to generate the first truly integrated assessment of climate risk among the contiguous 48 states. Globally, Sandia leads a global research team that supports the DOE Office of Science Atmospheric Radiation Measurement program, which is DOE's largest global climate change research effort. Sandia has also partnered with the National Aeronautics Space Administration (NASA), National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Agriculture (USDA), and several major academic institutions over the last decade and a half on a range of climate change activities that include cataloging and quantifying global greenhouse gas emissions, high resolution global circulation modeling, developing advanced risk assessment methodologies to evaluate climate uncertainty, and evaluating climate change impacts on human activity.	Sandia is continually pursuing and seeking opportunities for future collaborations and coordination that includes institutions at the local, regional, and national level. As future activities begin to focus on Sandia site specific risks and vulnerabilities, coordination with local and regional authorities will be important to insure the accuracy of our assessments as well as to avoid redundant efforts and/or share data and results.
Modernization of Programs		
Objective 7: Removing and Reforming Barriers	As a leader in climate change risk assessment research, Sandia is on the cutting edge in its use of the latest available data and science to examine climate related vulnerabilities. However, to date, the tools and methodologies developed through these research activities have never been focused inward to examine site specific vulnerabilities to	In order for Sandia to meet current and future objectives regarding climate resiliency, funding must be made available to allow researchers to focus on Sandia-specific needs and circumstances. Several steps have been identified that will help remove the cultural and intellectual barriers to Sandia meeting its climate change objectives:

DOE Goal/ Sandia Objective	FY 2014 Performance Status	Planned and Projected Performance
	Sandia's mission, facilities, and personnel.	1. Sandia management needs to be educated with regards to the economics of climate change vulnerability to help them understand the positive payback that can occur when an effective risk assessment program is implemented. 2. The Sandia workforce also needs to be educated to help them understand the implications of climate related impacts on Sandia's mission, national security, and their own specific tasks. 3. Short-term funding needs to be put in place to allow Sandia researchers to conduct high-level preliminary risk vulnerability assessments at each Sandia site. 4. Long-term funding also needs to be established to periodically update these assessments as new data, methodologies, and/or understanding become available. In addition, long-term funding will be needed to monitor and evaluate any investments or procedural changes that are made to adapt to, or fortify against, the impacts of climate change. It is anticipated that progress towards these goals will be done in an iterative manner using small focused analyses prior to performing full integrated assessments. These small focused analyses can be used to identify the hazards, risks, and consequences that could be addressed in the larger assessments. This also allows for incremental changes to procedures and operations that when implemented over time, will add up to be a fully implemented climate resiliency and adaptation plan. To date, there is no funding for these activities and it is unrealistic to predict that funding will become available without a DOE-level policy change that mandates their completion.

Table 2.11. High-Level Description and Estimate of Climate Risk by Hazard and Location

Identified Risk	Description	Location(s)	Impact	Associated Risks	Affected Policies/ Programs/ Operations	Risk Estimation	Rationale
Wildfire	Increased frequency and intensity due to a decrease in annual precipitation and an increase in daily average temperature	Albuquerque Tonopah	Property damage, human health, loss of infrastructure (water, power, communications, transportation), work stoppage, environmental damage	Increases in peak flood flows due to vegetation losses, irrecoverable damage to sensitive/ expensive facilities, human health due to blowing dust, soil loss and increased erosion	TBD	Medium to high in forested areas Low to medium in grassland areas	Decreases in precipitation and increases in temperature will cause vegetation to dry out. Fuel for wildfires are highest in the forested areas, such as in the Cibola National Forest area of Kirtland, and lowest in the grasslands area. High fuel availability increases the intensity, speed of spreading, and the difficulty in fighting them.
Extreme storm events	While total annual rainfall is projected to decrease due to climate change, rainfall storm events are projected to become more extreme and intense with regards to both rainfall rates and wind speed.	Albuquerque Livermore Tonopah Kauai	Property damage, human health, loss of infrastructure (water, power, communications, transportation), work stoppage, environmental damage	Increased erosion, inability of storm drainage systems to cope	TBD	Medium	Most of the flooding would occur in low lying areas such as the Tijeras arroyo, where there are few facilities, so damage is likely be confined to infrastructure that crosses those areas, such as roads, electrical lines, water lines, etc.. Local flooding in other areas is possible where storm drainage systems have been under-engineered to handle increases in storm intensity. Wind gusts can cause damage to under-engineered facilities or from impacts by blowing debris.
Temperature	Extreme hot and cold temperature events are projected to increase	Albuquerque Livermore Tonopah Kauai	Increased power requirements for heating and cooling, health risks for outdoor workers, equipment damage, and power loss.	Work stoppages due to interruptions in regional power and gas supplies.	TBD	Low to medium	The damages from extreme temperature events will likely be less catastrophic than damages from wildfire or floods but can be more wide spread and affect a greater portion of the workforce.

Identified Risk	Description	Location(s)	Impact	Associated Risks	Affected Policies/ Programs/ Operations	Risk Estimation	Rationale
Drought	The magnitude and intensity of regional droughts are projected to increase	Albuquerque Livermore Tonopah Kauai	Increased power requirements and costs for heating and cooling, disruptions in water supply	Regional water supplies will become strained possibly resulting in water supply disruptions or legislated conservation measures.	TBD	Low to medium	The damages from drought will be less catastrophic than from other hazards but can be more wide spread and affect a greater portion of the workforce.
Sea Level Rise	Mean sea levels are projected to rise with increases in storm surge magnitude	Kauai	Property damage, loss of infrastructure (water, power, communications, transportation), work stoppage	Supply chains cutoff due to seaport and airport damage, salt water intrusion impacting water supply	TBD	Medium	Damages from sea level rise can range from extreme flood events to long-term water supply problems. Extreme events are likely to manifest earlier than the more chronic events.

2.10 Goal 10: Energy Performance Contracts

Sandia does not use energy performance contracts. Several years ago Sandia investigated ESPCs with several vendors. It was determined that because Sandia had already implemented many energy conservation measures, pursuing ESPCs wouldn't be cost effective. Sandia has continued to implement energy conservation measures using corporate funding.

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 2014 Performance Status

In FY 2014, Sandia did the following:

- Allocated $5.0 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 2015, invest $5.0M electric utility cost savings in energy and sustainability projects and R&D support over the next two 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 2014 Performance Status and Projected Performance

See "Training" in Table 1-4 of the CEDR for more information.

Table 4.1. Current Performance Status and Planned and Projected Performance

DOE Goal/ Sandia Objective	FY 2014 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 2014 training and related activities included the following: Energy and Water Management Program Staff • Maintained existing Certified Energy Manager (CEM) certifications. Certified two new CEMs • Maintained LEED AP status. Certified one new LEED Green Associate • Energy Program Manager earned Professional Engineering (PE) • Participated in the Energy Efficiency Working Group of Energy Facilities Contractor Operations Group. • Attended the World Energy Engineering Congress in Washington DC • Energy Program Manager active member in local Energy Engineering Congress chapter. Organized local CEM training and served as organization treasurer Operations and Maintenance Personnel, Building Operators, and Systems Engineers: • No specific energy and water management program training occurred in FY 2014. • Certified three new CEMs 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	Continue outreach and awareness programs. Conduct Guiding Principles training for DOE and non-DOE agencies. Conduct an overview of the Sandia Sustainability Program for SFO to increase employee awareness about energy, water, sustainable acquisition, and pollution prevention.

DOE Goal/ Sandia Objective	FY 2014 Performance Status	Planned and Projected Performance
	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 • Developed internal "SNL Energy and 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)

CEDR Worksheets

Section	Title
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
3.3a	Active Conservation and RE Measures
3.3b	Cancel ECM 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 Municipal Solid Waste
9.1b	Offsite Landfill Municipal Solid Waste
9.1c	Municipal Solid Waste and C&D Diversion
10	Fleet Fuel (optional)
11	Covered Facilities

Note: CEDR worksheets are provided in separate attachments.

APPENDIX B: BASELINE AND CURRENT INFORMATION TABLES

All data is current as of November 10, 2014. 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 1 and 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	351,041	14%	59,174	10%	410,215
14	20,326	1,653	98,794	9,946	140,334	255,371	-27%	58,401	-1%	313,772

Notes: Starting in FY 2013, Scopes 1 and 2 total is reduced by a credit for purchasing RECs.

Energy Consumption and Intensity: FY 2003 Baseline and Current Information

Table B-2. SNL Total Energy Consumption and Energy Intensity

FY	Electricity in (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
14	955.340	.198	349.019	23.694	1,328.25	190,292.71	-.93	-2.32	-19.66	6,980,035

Notes:

- Collected data reflects consumption at NM, CA, and NV locations.
- FY 2009 –2014 includes offsite leases where Sandia pays for energy costs separately from the lease cost.
- Data in this table has been rounded to two or three 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
14	533.563	.198	230.178	23.694	787.63	136,881.21	-.14	-1.84	-29.64	5,754,129

Notes:

- Collected data reflects consumption at NM, CA, and NV locations.
- FY 2009 –2014 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 FY14 GSF: Regular Buildings				
	NM	**CA**	**NV**	**Total**
Reported by HQ	4,649,993	872,373	108,877	5,631,243
Sandia adjusted	4,757,996	874,196	121,937	5,754,129
Note: Sandia moved 726 and 858J to excluded buildings because those CUBs only serve buildings that are in the excluded category. Sandia moved 858K to the excluded buildings because it is part of the 858 complex. Sandia also moved 9980D (Molten Salt) to the excluded buildings.				
SNL FY14 GSF: Excluded Buildings				
	NM	**CA**	**NV**	**Total**
Reported by HQ	1,150,378	—	—	1,150,378
Sandia adjusted	1,225,906	—	—	1,225,906
Note: Sandia added the 2 leased facilities that SNL pays the utilities (Computer Science Research Institute, 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
14	367,805,734	53.15	-29.53	1.32	-37.18	14	6,919,517

Notes:

- FY 2007–2009 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
14	47,548	0	0	8,197	165,586	221,330	27	32.3

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> 5,000 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 2014 Greater than 5,000 GSF

SNL> 5,000 GSF	SNL/NM	SNL/CA	SNL/HI	SNL/NV	Total
Owned	5,368,656	801,373	12,146	41,859	6,224,034
Owned (not in FIMS)	24,880	-	-	-	24,880
Leased offsite	365,884	5,238	-	-	366,122
Leased onsite	-	5,760	-	-	5,760
Permitted	12,997	-	-	-	12,997
Total	**5,767,417**	**812,371**	**12,146**	**41,859**	**6,633,793**

Workforce Information

Table B-10. SNL Total Workforce FY 2008–2014

Location	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014
SNL/CA	1,216	1,175	1,272	1,214	1,269	1,314	1,242
SNL/HI	N/A	N/A	N/A	N/A	N/A	8	12
SNL/NV	N/A	N/A	N/A	N/A	N/A	49	59
SNL/NM							
TA-I	7,139	7,105	7,243	7,457	7291	7,631	7,617
TA-II	575	572	556	541	521	453	512
TA-III	115	111	113	128	131	145	138
TA-IV	835	839	820	767	717	797	782
TA-V	198	198	201	202	197	213	185
26000 Igloo	20	19	20	9	14	14	15
Coyote Test Field	92	101	116	97	93	95	86
Manzano	0	0	0	0	0	0	0
KAFB	93	97	29	103	102	124	115
Leased – NM	1,360	1,168	1,134	1,013	1,062	1,119	1,066
Leased – Other	N/A	N/A	N/A	16	18	16	16
GSA Assigned	N/A	N/A	N/A	3	3	3	4
Subtotal SNL/NM	10,427	10,210	10,232	10,336	10,149	10,610	10,536
Total	**11,643**	**11,385**	**11,504**	**11,550**	**11,418**	**11,981**	**11,849**

Notes:

- Data 10/30/2014 (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 2008–2014

Cost Burdened Amount (M)	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014
Labor	$1,972	$2,050	$2,210	$2,477	$2,562	$2,648	$2,716
Other Direct Costs (ODC)	$1,984	$1,864	$1,985	$1,899	$1,836	$1,959	$2,097
Total	**$3,956**	**$3,913**	**$4,195**	**$4,376**	**$4,398**	**$4,607**	**$4,813**

Notes:

- Data 9/30/2014 (Data Source: SNL Oracle)
- Analytical Reporting Capability (ARC) used to generate budget amount for metric
- SSP SharePoint site

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 Square Foot
						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%**	**15960**
Bldg. 518 – Center for Integrated Nanotechnologies	**Third-Party Green Building Certification**		**06/30/2006**			**100%**	**0%**	**0%**	**0%**	**95929**
Bldg. 6584 – Administrative Center for Test Engineering	**Guiding Principles for Sustainable Existing Building**			**12/31/2014 (?)**		**96%**	**4%**	**0%**	**0%**	**18894**
Bldg. 6585 – Technology Support Center (TSC)	Guiding Principles for Sustainable Existing Building			Beyond 12/15/2015		81%	0%	4%	15%	98193
Bldg. 6586 – Gamma Irradiation Facility (GIF)	Guiding Principles for Sustainable Existing Building			Beyond 12/15/2015		88%	0%	8%	4%	12526
Bldg. 6587 – Photometrics and Data Acquisition Facility	**Guiding Principles for Sustainable Existing Building**			**12/15/2015**		**96%**	**0%**	**4%**	**0%**	**13082**
Bldg. 700 – Advanced Manufacturing Prototyping Facility	Guiding Principles for Sustainable Existing Building			Beyond 12/15/2015		88%	0%	4%	8%	22776
Bldg. 701 – Process and Environmental Tech Laboratory	Guiding Principles for Sustainable Existing Building			12/15/2015		85%	0%	4%	12%	151055
Bldg. 704 – Collaborative Office Building #1	**Third-Party Green Building Certification**	**6/23/2014**			**9/30/2013 (met GP)**	**100%**	**0%**	**0%**	**0%**	**26419**
Bldg. 705 (Proposed New Building)	Third-Party Green Building Certification	12/15/2015				0%	0%	0%	100%	New Building

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 Square Foot
						Yes	No	In Process	Not Assessed	
Bldg. 720 – Ion Beam Laboratory	**Third-Party Green Building Certification**		**07/21/2010**			**100%**	**0%**	**0%**	**0%**	**27854**
Bldg. 726 – SCA Central Utility Building (South of 880)	**Guiding Principles for Sustainable Existing Building**				**9/30/2014**	**100%**	**0%**	**0%**	**0%**	**5568**
Bldg. 727 – INSRC (South of 880)	**Guiding Principles for Sustainable Existing Building**				**5/31/2014**	**100%**	**0%**	**0%**	**0%**	**19949**
Bldg. 730 (New Building Under Construction)	**Third-Party Green Building Certification**	**12/31/2014**			**6/30/2014 (met GP)**	**100%**	**0%**	**0%**	**0%**	**24349**
Bldg. 750 – TAOS MOB (South of 832)	**Third-Party Green Building Certification**		**06/30/2010**			**100%**	**0%**	**0%**	**0%**	**14683**
Bldg. 752 – Space Management Office Building (North of 890)	**Guiding Principles for Sustainable Existing Building**				**9/30/2013**	**100%**	**0%**	**0%**	**0%**	**17167**
Bldg. 753 – Integrated Systems Support Group	**Guiding Principles for Sustainable Existing Building**				**09/30/2012**	**100%**	**0%**	**0%**	**0%**	**8366**
Bldg. 755 – Manufacturing Science Surety Components Instr. Lab	Guiding Principles for Sustainable Existing Building			Beyond 12/15/2015		88%	0%	12%	0%	18667
Bldg. 758 – Limited Office Building One – IGPP#7	**Guiding Principles for Sustainable Existing Building**				**9/30/2014**	**100%**	**0%**	**0%**	**0%**	**19336**
Bldg. 770 – Limited Office Building Three	**Guiding Principles for Sustainable Existing Building**			**12/15/2015**		**92%**	**0%**	**8%**	**0%**	**15699**
Bldg. 809 – High Bay Lab and Machine Shop	Guiding Principles for Sustainable Existing Building			Beyond 12/15/2015		81%	0%	4%	15%	15401
Bldg. 811 –	**Guiding Principles for**				12/1/2013	100%	0%	0%	0%	10560

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 Square Foot
						Yes	No	In Process	Not Assessed	
Administration	**Sustainable Existing Building**									
Bldg. 827 – Primary Standards Lab	Guiding Principles for Sustainable Existing Building			Beyond 12/15/2015		88%	0%	8%	4%	58683
Bldg. 836 – Weapons Engr. and Drafting	Guiding Principles for Sustainable Existing Building			Beyond 12/15/2015		81%	0%	4%	15%	93461
Bldg. 856 – Education and Training	**Guiding Principles for Sustainable Existing Building**			**12/15/2015**		**92%**	**0%**	**8%**	**0%**	**12649**
Bldg. 859 – Rocket System Development Lab	**Guiding Principles for Sustainable Existing Building**			**12/15/2015**		**92%**	**0%**	**8%**	**0%**	**21031**
Bldg. 858EF – MESA Microfab – East Facility	**Third-Party Green Building Certification**		**09/30/2007**			**100%**	**0%**	**0%**	**0%**	**95046**
Bldg. 858EL – MESA MICROLAB – EAST LAB	**Third-Party Green Building Certification**		**04/30/2008**			**100%**	**0%**	**0%**	**0%**	**171500**
Bldg. 858J – MESA Central Utilities Building 1	**Guiding Principles for Sustainable Existing Building**				**11/30/2013**	**100%**	**0%**	**0%**	**0%**	**8925**
Bldg. 861 – Cafeteria	Guiding Principles for Sustainable Existing Building			Beyond 12/15/2015		85%	0%	0%	15%	13914
Bldg. 877 – Independent Vuln. Assessment	**Guiding Principles for Sustainable Existing Building**				**10/31/2013**	**100%**	**0%**	**0%**	**0%**	**9609**
Bldg. 879 – Integrated Mfg. Design Facility	**Guiding Principles for Sustainable Existing Building**				**9/30/2013**	**100%**	**0%**	**0%**	**0%**	**10560**
Bldg. 885 – Facilities	**Guiding Principles for**			**12/15/2015**		**92%**	**0%**	**4%**	**4%**	**5120**

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 Square Foot
						Yes	No	In Process	Not Assessed	
Management and Purchasing	**Sustainable Existing Building**									
Bldg. 886 – Facilities Info Technology Building	**Guiding Principles for Sustainable Existing Building**			**9/30/2014 (?)**		**96%**	**0%**	**4%**	**0%**	**10565**
Bldg. 895 – Robotic Manufacturing Science and Engineering Lab	Guiding Principles for Sustainable Existing Building			12/15/2015		84%	0%	0%	15%	75265.00
Bldg. 898 – Weapons Integration Facility	**Third-Party Green Building Certification**		**05/31/2008**			**100%**	**0%**	**0%**	**0%**	**177216**
Bldg. 899 – Joint Computational Engineering Lab (JCEL)	**Third-Party Green Building Certification**		**05/30/2008**			**100%**	**0%**	**0%**	**0%**	**62201**
Bldg. 899A – JCEL – MESA Ctrl Utility Building (CUB)	**Guiding Principles for Sustainable Existing Building**				**11/15/2013**	**100%**	**0%**	**0%**	**0%**	**6925**
Bldg. 905 – Explosive Component Facility	Guiding Principles for Sustainable Existing Building			Beyond 12/15/2015		77%	0%	0%	23%	101592
Bldg. 954 – Maintenance Warehouse	Guiding Principles for Sustainable Existing Building			Beyond 12/15/2015		77%	0%	0%	23%	36223
Bldg. 957 – Shipping and Receiving	Guiding Principles for Sustainable Existing Building			Beyond 12/15/2015		88%	0%	0%	12%	53323
Bldg. 962 – Strategic Defense Facility	Guiding Principles for Sustainable Existing Building			12/15/2015		88%	0%	0%	12%	151425
Bldg. 969 – TA-IV Secure Office Building	**Guiding Principles for Sustainable Existing Building**				**09/30/2012**	**100%**	**0%**	**0%**	**0%**	**17987**

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 Square Foot
						Yes	No	In Process	Not Assessed	
Bldg. 971 – Emerging Threats	**Guiding Principles for Sustainable Existing Building**				**10/31/2013**	**100%**	**0%**	**0%**	**0%**	**18672**
Bldg. C903 – Combustion Research Comp/Viz (CRCV)	**Third-Party Green Building Certification**		**09/15/2011**			**100%**	**0%**	**0%**	**0%**	**8364**
Bldg. C905 – Combustion Research Office	Guiding Principles for Sustainable Existing Building			Beyond 12/15/2015		42%	0%	35%	23%	37778
Bldg. C940 – Integrated Manufacturing Technology Lab Offices	Guiding Principles for Sustainable Existing Building			12/15/2015		61%	0%	27%	12%	22777
Bldg. C943 – Integrated Manufacturing Technology Lab Equipment Room	Guiding Principles for Sustainable Existing Building			Beyond 12/15/2015		54%	0%	27%	19%	7003
Bldg. C960 – Facilities Management Building	Guiding Principles for Sustainable Existing Building			12/15/2015		61%	0%	31%	8%	12260

APPENDIX C: NNSA EXCLUDED BUILDINGS AND SELF-CERTIFICATION FORM

SNL FY14 GSF: Excluded Buildings				
	NM	**CA**	**NV**	**Total**
Reported by HQ	1,150,378	—	—	1,150,378
Sandia adjusted	1,225,906	—	—	1,225,906
Note: Sandia added the two leased facilities for which SNL pays the utilities (CSRI, Hangar). Total GSF added = 75,838.				

DOE BUILDING EXCLUSION
SELF-CERTIFICATION FORM
FY2015

FROM: Sandia National Laboratories
National Nuclear Security Administration – Sandia Field Office

TO: Sustainability Performance Office

DATE: December 8, 2014

SUBJECT: SELF-CERTIFICATION FORM FOR THE ENERGY INTENSITY GOAL OF EISA 2007

Each buildings or group of buildings excluded under the criteria for a Part G or Part H exclusion is/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 10 November 2014 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 Site Office Official – printed name

Joe Estrada
DOE Site Office Official

12·08·2014
Date

Contact Information:
Joe Estrada
Title: General Engineer, Sustainability Program Manager
Phone: (505) 845-5326
Email: joe.estrada@nnsa.doe.gov

(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
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)

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
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)

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
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)

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
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)

U.S. Department of Energy
Facilities Information Management System
Energy Consuming Excluded Buildings and Trailers List

11/20/2013

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 2015 SITE SUSTAINABILITY COMMITMENTS

Sandia National Laboratories FY 2015 Site Sustainability Commitments

SSPP Goal #	DOE/NNSA Goals and Performance Measures	DOE/NNSA FY 2015 Target	Site FY 2015 Target
GOAL 1: Greenhouse Gas (GHG) Reduction			
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%	-6%	-5%
GOAL 2: Sustainable Buildings			
2.1	30% energy intensity (Btu per GSF) reduction by FY 2015 from an FY 2003 baseline $\frac{58{,}360\ Btu}{194{,}534\ Btu} = 30\%$	-30%	-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 90% steam/gas/chilled water	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 for HPSB by FY 2015 $\frac{29\ Buildings}{193\ Buildings} = 15\%$	15%	15%
2.6	All new construction, major renovations, and alterations of buildings greater than 5,000 GSF must comply with the Guiding Principles		
GOAL 3: Fleet Management			
3.1	10% annual increase in fleet alternative fuel consumption by FY 2015 relative to an FY 2005 baseline $\frac{75{,}328\ gallons}{50{,}219\ gallons} = 150\%$	159%	150%
3.2	2% annual reduction in fleet petroleum consumption by FY 2020 relative to an FY 2005 baseline $\frac{99{,}984\ gallons}{249{,}961\ gallons} = 40\%$	-20%	-40%
3.3	100% of light duty vehicle purchases must consist of AFV by FY 2015 and thereafter (75% FY 2000–2015)	75%	100%

SSPP Goal #	DOE/NNSA Goals and Performance Measures	DOE/NNSA FY 2015 Target	Site FY 2015 Target
GOAL 4: Water Use Efficiency and Management			
4.1	26% potable water intensity (Gallons per gross square foot) reduction by FY 2020 from an FY 2007 baseline $\frac{175{,}647{,}300\ gallons}{585{,}491{,}000\ gallons} = 30\%$	-16%	-30%
4.2	20% water consumption (gallons) reduction of ILA water by FY 2020 from an FY 2010 baseline	-10%	Included in above
GOAL 5: Pollution Prevention and Waste Reduction			
5.1	Divert at least 50% of non-hazardous solid waste, excluding C&D debris, by FY 2015	—	SNL/NM – 65% SNL/CA – 80%
5.2	Divert at least 50% of C&D 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 in 95% of applicable contracts	—	—
GOAL 7: Electronic Stewardship and Data Centers			
7.1	All core data centers are metered to measure a monthly PUE by FY 2015	100%	100%
7.2	Core data centers maximum annual weighted average PUE of 1.4 by FY 2015	1.40	Unknown
7.3	Power Management – 100% of eligible personal computers, laptops, and monitors with power management actively implemented and in use by FY 2012 and continuously thereafter.	100%	Unknown
7.4	Electronic Stewardship – 95% of eligible electronics acquisitions meet EPEAT standards	95%	95%
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 Resilience			
9.1	Address DOE Climate Change Adaptation Plan goals	—	—
GOAL 10: Energy Performance Contracts			
10.1	Utilization of Energy Performance Contracts	—	N/A

APPENDIX E: DATA CENTER WHITE PAPER – FINAL DRAFT

Exceptional service in the national interest

Sandia National Laboratories

Sandia National Laboratories and Los Alamos National Laboratory

Approach to Defining and Metering Data Centers and Calculating Data Center Energy Efficiency

August 2014
Revision 0

Note: This document has **not** been submitted through Sandia National Laboratories' Formal Review and Approval process. Currently, this document is unclassified, not meant for public release.

DRAFT

U.S. DEPARTMENT OF ENERGY | NNSA

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.


DRAFT

Table of Contents

Page

1.0 Introduction 1

2.0 Requirements 1

3.0 Definitions 1

4.0 Discussion 3

4.1 Standard Categorization of Data Center Subsystems 5

4.2 Estimation of Shared Resources 8

4.3 Estimation of Devices Impractical to Measure 8

4.4 Calculating PUE 9

4.5 Weighting PUE 9

5.0 References 9

DRAFT

Change Log

Rev	By	Date	Type	Change Description	Pages
0	Carol Meincke	8/8/14	New	Develop and publish white paper.	All

DRAFT

Acronyms

Acronym	Definition
BTU	British Thermal Unit
CRAC	Computer room air conditioner
CRAH	Computer room air handler
DOE	Department of Energy
DR	Disaster Recovery
FY	Fiscal Year
HVAC	Heating, Ventilating, and Air Conditioning
IT	Information Technology
kW	Kilowatt
kWh	Kilowatt Hour
LANL	Los Alamos National Laboratory
NNSA	National Nuclear Security Administration
NOC	Network Operations Center
OMB	Office of Management and Budget
PDU	Power Distribution Unit
PUE	Power Utilization Effectiveness
Sandia	Sandia National Laboratories
SSP	Site Sustainability Plan
SSPP	Strategic Sustainability Performance Plan
UPS	Uninterruptible Power Supply

DRAFT

DRAFT

1.0 Introduction

The purpose of this white paper is to answer the following questions:

- What is a data center?
- Which rooms should be metered?
- What is Power Utilization Effectiveness (PUE) and what is the best method to consistently measure it?
- What equipment/components should be metered to get an accurate PUE?
- Where should meters be installed to enable effective PUE measurements?
- How is the annual weighted average PUE calculated?

The goal is to determine common definitions for terms such as "data center," "server room," and "server" and to develop a standard, consistent, and repeatable measurement strategy that allows Sandia National Laboratories (Sandia) and Los Alamos National Laboratory (LANL) data center managers, operators, and systems administrators to monitor and improve data center energy efficiency. A consistent measurement approach will also facilitate communication of PUE among data center owners and operators across different locations and sites, different laboratories, and ultimately the National Nuclear Security Administration (NNSA) and Department of Energy (DOE) complex.

2.0 Requirements

The DOE Strategic Sustainability Performance Plan (SSPP) established agency goals associated with data centers in fiscal year (FY) 2011. These goals flow down to NNSA sites through annual DOE and NNSA Site Sustainability Plan (SSP) and Metering Plan guidance documents. The current goals from the FY14 SSP are as follows:

- All data centers are metered to measure a monthly PUE (100 percent by FY15).
- There is a maximum annual weighted average PUE of 1.4 by FY15.

The current goals from the FY13 Metering Plan are as follows:

- Independently meter 40 percent of agency data centers by October 1, 2011, working toward a goal of 100 percent by October 1, 2015.

Sandia and LANL consider the achievement of these goals high risk as the definition of data center is ever changing and unclear, and the methodology to determine PUE is inconsistent.

3.0 Definitions

The SSP and Metering Plan goals use several terms that need further definition. The most critical term is "data center." Over the years, DOE has defined "data center" in a variety of ways in multiple documents:

- In the FY12 SSP Consolidated Energy Data Report, August 2012, DOE defines "data center" as "any facility/structure/room that is greater than or equal to 500 square feet and has one or more racks of computing equipment that perform data processing, data storage, web services, etc. while a server room is defined as any facility/structure/room that is less than 500 square feet with at least one rack of computing equipment."

Further, "regardless of classification, all DOE data centers are required to meet the SSPP performance goals."

- The DOE Sustainability Program Office and the Office of the Chief Information Officer provided the following Office of Management and Budget (OMB) definition for "data center" and recommended SSP data center reporting on September 28, 2012:

  Data center refers to a closet, room, floor, or building for the storage, management, and dissemination of data and information. Such a repository houses computer systems and associated components, such as databases, applications, and storage systems and data stores. A data center generally includes redundant or backup power supplies; redundant data communications connections; environmental controls (e.g., air conditioning, fire suppression); and special security devices housed in, leased (including by cloud providers), owned, collocated, or situated in stand-alone facilities. This definition excludes facilities exclusively devoted to communications and network equipment (e.g., telephone exchanges, telecommunications rooms). Neither square footage nor Uptime Institute tier classifications are required to define a facility as a data center. This definition of a data center applies to all agency [information technology] IT assets, mission or otherwise. See March 2012 OMB Federal Data Center Consolidation Initiative Memorandum for more detail. (This definition is per the OMB Guidance on Exhibits 53 and 300 – Information Technology and E-Government for FY14, http://www.whitehouse.gov/sites/default/files/omb/assets/egov_docs/fy14_guidance_on_exhibits_53_and_300.pdf).

  Note: The OMB definition does not distinguish between a data center and a server room.

Sandia and LANL use the following definitions for server room and data center:

- **Server Room:** Any room, regardless of stated purpose, with one or more servers. Room uses a maximum of 20 kilowatts (kW) total (calculated either by using nameplate data, including all IT-related equipment in the room, or by validating that the power supply to the room is less than 20 kW), does not require cooling beyond the normal heating, ventilating, and air conditioning (HVAC) provided for a standard office, and does not require an uninterruptible power supply (UPS).

  Metering and PUE calculations - No room or IT load sub-metering required. No PUE calculations required.

- **Data Center:** Any room, regardless of stated purpose, with one or more servers. Room uses greater than 20 kW total (calculated using nameplate data, including all IT-related equipment in the room). Rooms dedicated to telecommunications (Interior Distribution Rooms or Main Distribution Rooms) are not considered data centers; however, if these rooms contain non-telecommunications IT equipment (such as servers, etc.) greater than the 20 kW total, then these rooms shall be considered data centers.

  Metering and PUE calculations - Room and IT load sub-metering and PUE calculations required in the top 75 percent of enduring data centers, based on total enduring data center IT equipment energy load. No room or IT load sub-metering or PUE calculations required in the remaining enduring data centers or other rooms meeting the definition of data center.

  Note: Servers kept for spare parts or utilized part time for testing or troubleshooting do not need to be included in the 20 kW calculation.

Sandia and LANL also use the following additional definitions:

- **Server:** A central processing unit that supports a multi-user system.

- **Enduring Data Center:** Data center anticipated to remain active in its current location for more than three years. Enduring data centers may be corporate or line-organization owned, operated, and maintained.
- **Dedicated Data Center:** Standalone data center (room or building)
- **Mixed-Use Data Center:** Mixed use facility that contains one or more "data center" rooms
- **PUE:** PUE is a metric to measure data center energy utilization. It is the ratio of two numbers—total data center energy load over IT equipment energy load.

$$\text{PUE} = \frac{\text{Total Data Center Energy Load}}{\text{IT Equipment Energy Load}}$$

- **Total Data Center Energy Load:** Includes all IT equipment energy plus everything that supports the IT equipment using energy (physical infrastructure, including power delivery components, cooling, lighting, etc.).
- **IT Equipment Energy Load:** Includes all consumption or input energy associated with all IT equipment (computer, storage, and network equipment) and supplemental equipment (switches, monitors, workstations/laptops used to monitor or otherwise control the data center) in the data center. (See detailed description in the Section 4.0.)
- **Network Information System:** Sandia system used to track networked IT equipment

4.0 Discussion

Not all rooms meeting the definition of data center should be metered or track PUE. Sites are already having a difficult time meeting the individual building metering requirements for energy use. Sites have limited budgets for energy conservation measures. Metering is an effective way to measure energy savings but does not save energy. More effective ways to save energy in data centers include increasing room temperature, increasing chilled water temperature and implementing other innovative cooling strategies, installing energy efficient racks and servers, and eliminating and virtualizing servers.

4.1 Metering and PUE Calculation

Sites should carefully consider whether or not to sub-meter individual rooms and, within those rooms, meter individual PDUs to measure IT equipment energy use. For example, if a data center is a candidate for consolidation, metering and monthly PUE calculations should not be a requirement.

If rooms are contiguous (i.e. 880A at Sandia), metering each room separately should not be a requirement. If building energy use is dominated by data center use (i.e. MO324, 325 at Sandia), building data can be used as whole room data.

To effectively meter a data center and calculate PUE, the site has to meter at the outlet of each PDU for IT energy use and meter the whole room for total energy use. If the room uses chilled water, metering the whole room may require an electric meter and a BTU meter; a minimum of two, probably three meters.

The SNL Metering Plan estimates $14K each for an electrical meter unit and installation, $8K for a BTU meter unit and installation for a building (may be more at the room level). LANL estimates may be higher. A minimum of two electric meters (one at room level, one at each PDU to measure IT equipment energy) mean a minimum total cost of $34K to meter a room. Smaller data centers may only use $2 – 5K of energy/year. Should sites spend $34K (or more) to meter a room that uses only $2 – 5K/year in energy cost?

The cost of metering and measuring PUE goes beyond first cost. Life cycle cost issues include:

- Maintaining meters is an on-going cost which sites are struggling with.

DRAFT

- Monitoring meters, collecting the data, analyzing the data, and taking action based on the data is not happening effectively.
- Monthly PUE calculating and reporting.
- Meters do not last forever. Some sites have meters which are no longer supported by the manufacturer, no longer communicate with the BAS, or are at the end of their useful life.
- Meters need calibration. Just having a meter is not enough, it needs to be reading energy use accurately.

Metering and measuring PUE is of minimal benefit in small data centers. Taking a before and after snapshot when changes are made to the data center or when a data center is consolidated may be useful. For many situations, this can be done at the building level (as long the rest of the building remains relatively constant). Monthly PUE measuring is a lot of work for minimal benefit. PUE is not an indication of how much energy is being used.

Sandia and LANL propose that:

> Room and IT load sub-metering and PUE calculations are required in the highest energy using enduring data centers comprising the top 75% of IT energy use, based on total enduring data center IT equipment energy load. No room or IT load sub-metering or PUE calculations required in the remaining enduring data centers or other rooms meeting the definition of data center.
>
> Methodology - Determine all rooms meeting the definition of data center. Determine which ones are enduring. Estimate total IT equipment energy use for each of these rooms and sum. Calculate 75% of total IT equipment energy use. Determine which data centers comprise the top 75% energy users. These will be the ones to fully meter and calculate PUE.

Large corporate data center rooms will dominate the list.

Based on the definitions in Section 3.0 and the previous discussion, those buildings or rooms that need to be metered and their PUE tracked can be determined. This section addresses how to determine the PUE and where to locate the meters.

The benefits of determining data center infrastructure efficiency as part of an effective energy management plan are widely recognized. The PUE metric has emerged as the recognized industry standard. PUE is defined as the ratio of two numbers—**total data center energy load** over **IT equipment energy load:**

$$\text{PUE} = \frac{\text{Total Data Center Energy Load}}{\text{IT Equipment Energy Load}}$$

While it at first appears to be a problem of simply obtaining two measurements and taking their ratio, it is rarely this simple.

The goal is to determine a standard, consistent, and repeatable measurement strategy that allows data center managers and operators to monitor and improve the energy efficiency of their data center. A consistent measurement approach will also facilitate communication of PUEs among data center owners and operators. Caution must be exercised when an organization tries to use PUE to compare different data centers across different locations and sites, different laboratories, and the NNSA and DOE complex; appropriate data analyses must first be conducted to ensure that other factors, such as levels of reliability and climate, are not impacting the PUE.

There are a number of practical issues with establishing the PUE of specific data centers. Some of the issues that can cause difficulty in classifying power-consuming subsystems as IT loads, physical infrastructure, or neither are presented below:

- Devices are encountered in data centers that draw power, but how (or if) the power data should be counted in the efficiency calculations is unclear.

- Certain data center subsystems are not present in some data centers (e.g., outdoor lighting or network operations center [NOC]).
- Some subsystems support a mixed-use facility and are shared with other non-data center functions (e.g., cooling towers and chiller plants). Therefore, the fraction of power attributable to the data center cannot be directly measured and must be estimated. These systems may be measureable with properly placed British thermal unit (BTU) meters.
- Some subsystems are extremely impractical or costly to instrument for power consumption (e.g., power distribution units [PDUs] due to the number of output connections or switchgear)
- Some practical power measurement points include loads that are unrelated to the data center but cannot be separated during measurement.

One or more of the above practical issues are frequently present in typical data centers, especially at the room level, and are almost always present in data centers that exist in a mixed-use facility, like an office building.

For a dedicated data center, the total data center energy in the PUE equation will include all energy sources at the point of utility handoff to the data center owner or operator. For a mixed-use facility data center, the total energy will include all energy required to operate the data center, similar to a dedicated data center, as well as the energy required for cooling, lighting, and data center operations infrastructure support.

Some of the loads will need to be estimated, especially in mixed- use data centers. However, all loads should be measured if possible.

4.2 Standard Categorization of Data Center Subsystems

To perform data center PUE calculations, it is critical to clearly define which energy constitutes **IT equipment energy load** and which energy constitutes **physical infrastructure load**. Some designations are obvious, such as servers and storage devices being IT loads and UPS and cooling/air-handling units being physical infrastructure loads, but there are many power-consuming subsystems in the data center that have a less obvious designation in the efficiency calculation, including personnel spaces, switchgear, and network operations center.

If these power-consuming subsystems are not uniformly classified for all data centers, it will not be possible to directly compare computed efficiency results across different data centers. Although there are ongoing efforts to benchmark data center efficiency, accepted standards for PUE calculations have not been established. Sandia and LANL have, therefore, established standard guidelines for what is considered to be **IT equipment energy load** (included in the PUE "numerator" as part of the total data center energy load and calculated separately to be used as the PUE "denominator"), what is considered to be **physical infrastructure load** (sometimes called site infrastructure and part of the PUE "numerator"), and what is **not included** in data center PUE calculations. In addition, there are often practical issues with obtaining key data required to calculate PUEs.

The following guidelines are applied to construct the categorization system in this paper:

- If managing the energy use of a particular subsystem is a realistic and desirable outcome of data center energy management, then the subsystem load should be included in the PUE metric.
- If it is typically not practical to separate the measurement of a specific load during a measurement process, then it should not be prescribed that the specific load be separated for computation of the metric.

- A comprehensive list of the types of devices found in a data center should be standardized, with a clear assignment of "IT equipment energy load," "physical infrastructure load," or "not included" for the purposes of data center efficiency calculations.

It should also be noted that the PUE becomes more accurate (but more difficult to measure) and results in a higher number the farther "downstream" the IT energy load is measured.

4.2.1 IT Equipment Energy Loads: Data Center IT Subsystems

Data center IT systems considered as part of the IT equipment energy load include the following:

- Servers
- Storage equipment
- Networking gear
- Keyboard video mouse and monitors
- Disaster recovery (DR) IT loads – If DR is on the same site and shares resources with the physical infrastructure, then it must be included as another business process that is supported within the main data center
- IT equipment in NOC – This load consists primarily of computers and displays for data center control; include it in the IT consumption when it is shared within the same facility and it shares grey space resources

4.2.2 IT Equipment Energy Loads: Data Center Power Subsystems

Data center power systems considered as part of the IT equipment energy load include the following:

- PDUs – This is the highest "downstream" level that can be used to measure IT load)
- Disaster recovery power systems
- Rack distribution units
- All step down transformers

4.2.3 Physical Infrastructure Loads: Data Center Power Subsystems

Power subsystems that can be found in a typical data center but are not considered IT equipment energy loads include the following:

- Switchgear and panel boards (outdoor or indoor) – Many sites do not have definitive calculations for determining switchgear power, so it would need to be estimated if included; energy, space, and resources are consumed to provide and operate this equipment and are an essential part of all data centers
- Automatic transfer switches
- Static transfer switches
- Generators, including block heaters, jacket water heaters, strip heaters, generator controls, and generator battery chargers
- UPS

These subsystems are considered infrastructure support.

Often, alternative energy generation systems are "grid-tied" and mask the true total energy use of the data center. If alternate energy generation systems, such as wind turbines and solar panels, augment data center energy use, their energy contribution should be incorporated into PUE.

4.2.4 Physical Infrastructure Loads: Data Center Cooling Subsystems

Various cooling subsystems include, but are not limited to, the following:

- Chillers
- Chilled water pumps (primary, secondary, tertiary)
- Condenser water pumps
- Cooling towers (fans, basin heaters) – In mixed-use facilities, these items may be difficult to separate out; in these cases, a method of estimation of the assigned power to the data center is required
- Water treatment (sand filter pumps and injectors) – Water treatment includes water filtration and chemical systems.
- Pipe freeze protection (heat tape, heat trace, strip heaters)
- Air compressors – Air compressors oftentimes support pneumatic valves in chilled water plants
- Centralized humidifiers (computer room air handlers [CRAH]/computer room air conditioners [CRAC]), including fans, reheat coils, and humidification

In addition to the IT space of the data center, the following units are sometimes used to condition the mechanical and electrical rooms, which should also be accounted for:

- Condensate pumps
- Make-up air/fresh air system power
- Unit heaters – Small heaters (usually ceiling-mounted) are sometimes used in mechanical and electrical rooms during winter months
- Condensers – Condensers are used only for air-cooled CRAC units
- Dry coolers
- Supply fans, including return fans; direct and indirect air economizer; direct and indirect evaporative cooling; water-side economizer; humidifier; in-row, in-rack, and in-chassis cooling solutions
- Cooling for NOC
- Disaster recovery cooling systems
- Well pumps – Water as a resource requires energy to cool, store, and move it and considerable water can be consumed by cooling systems; some data centers pump their own water but others purchase water as a utility that is pumped by remote utility pumps
- Fire pumps
- Boilers

4.2.5 Physical Infrastructure Loads: Data Center Other Subsystems

This category includes lighting, physical security, fire protection, and other devices that are typically found within data centers but do not appear in the previous sections, including the following:

- Lights in the data center's "white space"
- Lights in mechanical and electrical rooms
- Physical security, including fire suppression, water detection, and physical security servers/devices
- Building management systems – This includes computer-based control systems that control and monitor the building's mechanical and electrical equipment, such as ventilation, lighting, power systems, fire systems, and security systems
- Outdoor lights

These loads are not included in the PUE calculation:

- Personnel offices
- Lights in personnel areas of a data center

4.3 Estimation of Shared Resources

Correctly and consistently classifying data center energy loads is an important part of determining the PUE for a data center. However, some devices that consume power and are associated with a data center are shared resources. For example, a data center may share a chiller plant with an adjacent office building, or the data center UPS may also provide power to a call center. As much as possible, these loads should be metered to provide an accurate measurement for PUE calculations. However, even an exact measurement of the energy use of such a shared device may be unhelpful because the losses of that device associated with loads other than the data center should not be included in the PUE.

Oftentimes, when a device is shared, it is omitted from the PUE calculations. However, this omission can result in major errors, especially if the device is a major energy user, such as a chiller. Such an approach invalidates the PUE calculation for benchmarking purposes. A better strategy is to estimate (or indirectly measure) the fraction of the losses of the shared device that are associated with the data center and then use these losses in the PUE calculations. This approach can yield surprisingly accurate results.

These indirect measurements and estimations are typically made during an expert data center energy audit but can be attempted by sophisticated data center operators. Once the technique is established and documented for a specific data center, it is easy to recalculate for future measurements for efficiency trending.

4.4 Estimation of Devices Impractical to Measure

Every power-consuming device in a data center can have its energy use measured. However, it can be complex, expensive, and impractical to measure the energy use of some devices. In many cases, indirect measurement and estimation of devices can support PUE determinations in a practical and cost-effective manner.

4.5 Meter Location

Data centers are often part of a building that has multiple purposes, so it can be impossible to find either a single point to measure the total data center input power or to measure the IT load. This means that the appropriate measurement points to capture all data center energy use need to be identified, and typically the power use data from different subsystems needs to be combined to find the total data center input

DRAFT

power. To further complicate the matter, some of these power measurements may be impractical to obtain, or the devices may be shared with non-data center applications.

Data center IT energy consumption should, at a minimum, be measured at the output of the PDU. PDU output is defined as the output of the PDU that serves IT equipment loads. PDU output does **not** include efficiency losses from the PDU system but does include losses from downstream electrical distribution components. It may include non-IT ancillary devices installed in IT racks, such as fans. If there is non-IT equipment supported by the PDU system (e.g., CRAC/CRAH, in-row coolers, etc.), it must be metered and subtracted from the PDU output reading.

If the data center does not have a PDU, the data center IT loads should be measured from the incoming power source on or before the secondary transformers. If these loads are measured after the transformer load, then the transformer percentage losses should be included in the calculation.

Dedicated data centers and buildings with mixed-use facility data centers should be metered at the data center point of entry for the energy stream. If the building housing a data center uses chilled water from a central utility building, a BTU meter should be installed at the data center point of entry.

4.6 Calculating PUE

PUE is a consumption-based calculation. The IT load is represented by a 12 month total kilowatt hour (kWh) reading of the PDU system output (or sum of outputs if there is more than one PDU system installed). This is a cumulative measurement and requires the use of kWh consumption meters at all measurement points. The total energy must include all energy streams that enter the data center boundary (electricity, natural gas, chilled water, etc.). In a dedicated data center building, this will include all energy captured on utility bills; for a mixed-use facility data center, all the same energy streams must be sub-metered if they cross into the data center boundary. Annual readings should reflect 12 consecutive months of energy data. This measurement method captures the impact of fluctuating IT and cooling loads.

Total annual energy is calculated as the weighted sum of the annual energy consumption for **all** energy types entering the data center at the data center boundary. In a dedicated data center building, this will include all energy captured on utility bills; for a mixed-use facility data center, all the same energy streams must be sub-metered if they cross into the data center boundary, including electricity, natural gas, fuel oil, and district utilities, such as supplied chilled water or condenser water. All energy types must be converted into the same units before they are summed. The total annual energy must also include supporting infrastructure and dedicated ancillary services.

4.7 Weighting PUE

To calculate a weighted PUE, the total input energy of all enduring data centers at a site should be divided by the total IT equipment energy load of all enduring data centers at a site.

5.0 References

- Electrical Efficiency Measurement for Data Centers, White Paper 154, Schneider Electric
- Guidance for Calculation of Efficiency (PUE) in Data Centers, White Paper, Schneider Electric
- Energy Star Portfolio Manager Data Center Guidance, Environmental Protection Agency
- Recommendations for Measuring and Reporting Overall Data Center Efficiency, Version 2 – Measuring PUE for Data Centers

DRAFT

5.0 References

- Energy Essential: Rethinking Power and Cooling for the Modern Data Center, E-Guide. Tech Target
- DOE/IG-0865 Efforts by DOE to Ensure Energy-Efficient Management of its Data Centers, Audit Report, May 2012
- SNL and LANL Facilities and IT staff

DRAFT



Appendix C
2014 Terrestrial Surveillance Results

Table C-1. Summary of radiological results in soil, calendar year 2014.....C-2
Table C-2. Summary of radiological results in sediment, calendar year 2014.....C-8
Table C-3. Summary of thermoluminescent dosimeter measurements, calendar year 2014.....C-10
Table C-4. Summary of nonradiological results in soil, calendar year 2014.....C-11
Table C-5. Summary of nonradiological results in sediment, calendar year 2014.....C-41
Table C-6. Summary of perchlorate results in soil, calendar year 2014.....C-49
NOTES.....C-50

Appendix C presents the terrestrial surveillance results for calendar year 2014.

Table C-1. Summary of radiological results in soil, calendar year 2014

Location Classification	Analyte	Units	Location	Activity	MDA	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Community	Americium-241	pCi/g	C-9	0.0418 ± 0.0642	0.104	U	BD	HASL-300
		pCi/g	C-10	0.0171 ± 0.0864	0.148	U	BD	HASL-300
		pCi/g	C-11	-0.00251 ± 0.0357	0.0495	U	BD	HASL-300
		pCi/g	C-25	0.0351 ± 0.033	0.0454	U	BD	HASL-300
		pCi/g	C-62	-0.00516 ± 0.0652	0.107	U	BD	HASL-300
	Cesium-137	pCi/g	C-9	0.317 ± 0.0329	0.0216		None	HASL-300
		pCi/g	C-10	0.221 ± 0.035	0.0208		None	HASL-300
		pCi/g	C-11	0.0571 ± 0.0168	0.0126		None	HASL-300
		pCi/g	C-25	0.078 ± 0.0306	0.0342		J	HASL-300
		pCi/g	C-62	0.403 ± 0.0378	0.0186		None	HASL-300
	Tritium	pCi/L	C-9	61.8 ± 66	109	U	BD	GL-RAD-A-002
		pCi/L	C-10	71.9 ± 66.9	109	U	BD	GL-RAD-A-002
		pCi/L	C-25	68.9 ± 72.6	120	U	BD	GL-RAD-A-002
		pCi/L	C-62	94.4 ± 70.8	111	U	BD	GL-RAD-A-002
	Uranium	mg/kg	C-9	0.41	0.0362		None	SW846 3050B/6020
		mg/kg	C-10	0.43	0.0336		None	SW846 3050B/6020
		mg/kg	C-11	0.435	0.037	*	J	SW846 3050B/6020
		mg/kg	C-25	0.529	0.0398		None	SW846 3050B/6020
		mg/kg	C-62	0.971	0.0394		None	SW846 3050B/6020
On-Site	Americium-241	pCi/g	S-1	0.0487 ± 0.0348	0.0487	U	BD	HASL-300
		pCi/g	S-2NE	0.0344 ± 0.025	0.0344	U	BD	HASL-300
		pCi/g	S-2NW	0.00792 ± 0.043	0.0383	U	BD	HASL-300
		pCi/g	S-2SE	0.056 ± 0.0588	0.093	U	BD	HASL-300
		pCi/g	S-2SW	0.0159 ± 0.0172	0.0266	U	BD	HASL-300
		pCi/g	S-3	0.0513 ± 0.0626	0.0934	U	BD	HASL-300
		pCi/g	S-6	-0.00779 ± 0.0635	0.107	U	BD	HASL-300
		pCi/g	S-7	0.0197 ± 0.0288	0.0448	U	BD	HASL-300
		pCi/g	S-33	0.0218 ± 0.0246	0.0371	U	BD	HASL-300
		pCi/g	S-34	0.00895 ± 0.0223	0.0368	U	BD	HASL-300
		pCi/g	S-35	0.0424 ± 0.0533	0.0843	U	BD	HASL-300
		pCi/g	S-41	0.0209 ± 0.0321	0.0532	U	BD	HASL-300
		pCi/g	S-42	-0.0147 ± 0.0769	0.125	U	BD	HASL-300

See notes at end of appendix.

Table C-1. Summary of radiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Units	Location	Activity	MDA	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Americium-241	pCi/g	S-43	0.0235 ± 0.0248	0.0366	U	BD	HASL-300
		pCi/g	S-45	0.042 ± 0.0263	0.042	U	BD	HASL-300
		pCi/g	S-46	0.0363 ± 0.0243	0.0363	U	BD	HASL-300
		pCi/g	S-49	0.0161 ± 0.0859	0.148	U	BD	HASL-300
		pCi/g	S-51	0.023 ± 0.0712	0.113	U	BD	HASL-300
		pCi/g	S-52	0.00901 ± 0.0502	0.0859	U	BD	HASL-300
		pCi/g	S-53	0.024 ± 0.0168	0.024	U	BD	HASL-300
		pCi/g	S-54	0.0139 ± 0.0155	0.0246	U	BD	HASL-300
		pCi/g	S-55	0.0216 ± 0.021	0.0313	U	BD	HASL-300
		pCi/g	S-56	0.034 ± 0.0663	0.114	U	BD	HASL-300
		pCi/g	S-57	0.0132 ± 0.0232	0.0323	U	BD	HASL-300
		pCi/g	S-66	0.0295 ± 0.0512	0.0693	U	BD	HASL-300
		pCi/g	S-76	0.0139 ± 0.0164	0.0273	U	BD	HASL-300
		pCi/g	S-77	-0.0156 ± 0.0799	0.107	U	BD	HASL-300
		pCi/g	S-78	0.0716 ± 0.0533	0.0728	U	BD	HASL-300
		pCi/g	S-86	-0.00874 ± 0.0229	0.03	U	BD	HASL-300
		pCi/g	S-92	0.0484 ± 0.0743	0.126	U	BD	HASL-300
	Cesium-137	pCi/g	S-1	0.176 ± 0.0361	0.0282		None	HASL-300
		pCi/g	S-2NE	0.154 ± 0.0222	0.0187		None	HASL-300
		pCi/g	S-2NW	0.0832 ± 0.0145	0.0139		None	HASL-300
		pCi/g	S-2SE	0.131 ± 0.0173	0.0143		None	HASL-300
		pCi/g	S-2SW	0.0856 ± 0.0217	0.0192		None	HASL-300
		pCi/g	S-3	0.136 ± 0.0223	0.0199		None	HASL-300
		pCi/g	S-6	0.0678 ± 0.0179	0.0174		None	HASL-300
		pCi/g	S-7	0.35 ± 0.0559	0.0313		None	HASL-300
		pCi/g	S-33	0.214 ± 0.0372	0.0289		None	HASL-300
		pCi/g	S-34	0.082 ± 0.0223	0.0256		None	HASL-300
		pCi/g	S-35	0.114 ± 0.0214	0.0175		None	HASL-300
		pCi/g	S-41	0.117 ± 0.0189	0.0144		None	HASL-300
		pCi/g	S-42	0.095 ± 0.0246	0.0164		None	HASL-300
		pCi/g	S-43	0.0638 ± 0.0236	0.024		J	HASL-300
		pCi/g	S-45	0.0187 ± 0.0136	0.019	U	BD	HASL-300
		pCi/g	S-46	0.109 ± 0.0213	0.0204		None	HASL-300

See notes at end of appendix.

Table C-1. Summary of radiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Units	Location	Activity	MDA	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Cesium-137	pCi/g	S-49	0.113 ± 0.0211	0.0197		None	HASL-300
		pCi/g	S-51	0.0554 ± 0.0216	0.0224		J	HASL-300
		pCi/g	S-52	0.0252 ± 0.017	0.0158		J	HASL-300
		pCi/g	S-53	0.0529 ± 0.0117	0.0142		None	HASL-300
		pCi/g	S-54	0.0816 ± 0.0171	0.0157		None	HASL-300
		pCi/g	S-55	0.319 ± 0.0337	0.0204		None	HASL-300
		pCi/g	S-56	0.0314 ± 0.0226	0.0277		J	HASL-300
		pCi/g	S-57	0.0302 ± 0.0221	0.023		J	HASL-300
		pCi/g	S-66	0.0499 ± 0.0156	0.0158		None	HASL-300
		pCi/g	S-76	0.0785 ± 0.0224	0.0243		None	HASL-300
		pCi/g	S-77	0.403 ± 0.0404	0.0228		None	HASL-300
		pCi/g	S-78	0.488 ± 0.0551	0.0269		None	HASL-300
		pCi/g	S-86	0.0167 ± 0.0194	0.0287	U	BD	HASL-300
		pCi/g	S-92	0.227 ± 0.0274	0.0161		None	HASL-300
	Tritium	pCi/L	S-1	122 ± 116	189	U	BD	GL-RAD-A-002
		pCi/L	S-2NE	138 ± 110	173	U	BD	GL-RAD-A-002
		pCi/L	S-2NW	6140 ± 930	179		None	GL-RAD-A-002
		pCi/L	S-2SE	9.41 ± 94.2	174	U	BD	GL-RAD-A-002
		pCi/L	S-2SW	74.8 ± 103	175	U	BD	GL-RAD-A-002
		pCi/L	S-3	85.6 ± 89.7	147	U	BD	GL-RAD-A-002
		pCi/L	S-6	108 ± 77.7	120	U	BD	GL-RAD-A-002
		pCi/L	S-7	168 ± 102	147		J	GL-RAD-A-002
		pCi/L	S-33	129 ± 96	147	U	BD	GL-RAD-A-002
		pCi/L	S-34	99.5 ± 91.1	146	U	BD	GL-RAD-A-002
		pCi/L	S-35	80.5 ± 88.6	147	U	BD	GL-RAD-A-002
		pCi/L	S-41	118 ± 114	186	U	BD	GL-RAD-A-002
		pCi/L	S-42	91.1 ± 106	177	U	BD	GL-RAD-A-002
		pCi/L	S-45	79.1 ± 88.4	147	U	BD	GL-RAD-A-002
		pCi/L	S-51	41.4 ± 63.9	110	U	BD	GL-RAD-A-002
		pCi/L	S-52	260 ± 90.3	110		J	GL-RAD-A-002
		pCi/L	S-53	117 ± 108	174	U	BD	GL-RAD-A-002
		pCi/L	S-54	68.6 ± 66.7	109	U	BD	GL-RAD-A-002
		pCi/L	S-55	184 ± 103	147		J	GL-RAD-A-002

See notes at end of appendix.

Table C-1. Summary of radiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Units	Location	Activity	MDA	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Tritium	pCi/L	S-56	35.1 ± 72.9	127	U	BD	GL-RAD-A-002
		pCi/L	S-66	35.9 ± 105	188	U	BD	GL-RAD-A-002
		pCi/L	S-76	93 ± 90.9	148	U	BD	GL-RAD-A-002
		pCi/L	S-77	77.6 ± 88.3	147	U	BD	GL-RAD-A-002
		pCi/L	S-78	180 ± 103	147		J	GL-RAD-A-002
		pCi/L	S-92	68.7 ± 67.7	111	U	BD	GL-RAD-A-002
	Uranium	mg/kg	S-1	0.833	0.0393		None	SW846 3050B/6020
		mg/kg	S-2NE	0.323	0.0367		None	SW846 3050B/6020
		mg/kg	S-2NW	0.32	0.038		None	SW846 3050B/6020
		mg/kg	S-2SE	0.394	0.0385		None	SW846 3050B/6020
		mg/kg	S-2SW	0.399	0.0366		None	SW846 3050B/6020
		mg/kg	S-3	0.437	0.0394		None	SW846 3050B/6020
		mg/kg	S-6	0.316	0.0381		None	SW846 3050B/6020
		mg/kg	S-7	0.392	0.0385		None	SW846 3050B/6020
		mg/kg	S-33	1.24	0.0398		None	SW846 3050B/6020
		mg/kg	S-34	0.87	0.037		None	SW846 3050B/6020
		mg/kg	S-45	0.319	0.0385		None	SW846 3050B/6020
		mg/kg	S-51	0.469	0.0381		None	SW846 3050B/6020
		mg/kg	S-52	0.402	0.0387		None	SW846 3050B/6020
		mg/kg	S-53	0.312	0.0382		None	SW846 3050B/6020
		mg/kg	S-54	0.309	0.037		None	SW846 3050B/6020
		mg/kg	S-55	0.295	0.037		None	SW846 3050B/6020
		mg/kg	S-56	0.324	0.0397		None	SW846 3050B/6020
		mg/kg	S-57	0.893	0.0351		None	SW846 3050B/6020
		mg/kg	S-76	0.341	0.0354		None	SW846 3050B/6020
		mg/kg	S-77	0.404	0.0392		None	SW846 3050B/6020
		mg/kg	S-78	0.37	0.0382		None	SW846 3050B/6020
		mg/kg	S-86	0.566	0.0352		None	SW846 3050B/6020
		mg/kg	S-90	0.294	0.0347		None	SW846 3050B/6020
		mg/kg	S-91	0.439	0.0385		None	SW846 3050B/6020
		mg/kg	S-92	0.388	0.039		None	SW846 3050B/6020

See notes at end of appendix.

Table C-1. Summary of radiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Units	Location	Activity	MDA	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Perimeter	Americium-241	pCi/g	P-4	0.0222 ± 0.0187	0.0269	U	BD	HASL-300
		pCi/g	P-5	0.0269 ± 0.0281	0.0437	U	BD	HASL-300
		pCi/g	P-12	0.024 ± 0.0315	0.0479	U	BD	HASL-300
		pCi/g	P-16	0.036 ± 0.0249	0.0361	U	BD	HASL-300
		pCi/g	P-58	-0.00289 ± 0.0214	0.0257	U	BD	HASL-300
		pCi/g	P-59	-0.0148 ± 0.0538	0.0938	U	BD	HASL-300
		pCi/g	P-61	0.0112 ± 0.0607	0.1	U	BD	HASL-300
		pCi/g	P-63	0.0164 ± 0.0559	0.0928	U	BD	HASL-300
		pCi/g	P-64	0.0226 ± 0.0511	0.083	U	BD	HASL-300
		pCi/g	P-80	0.0211 ± 0.0317	0.0475	U	BD	HASL-300
		pCi/g	P-81	0.00777 ± 0.0423	0.0735	U	BD	HASL-300
		pCi/g	P-82	0.0339 ± 0.0684	0.113	U	BD	HASL-300
		pCi/g	P-87	0-0.00589 ± 0.013	0.0183	U	BD	HASL-300
		pCi/g	P-89	0.0273 ± 0.0441	0.0736	U	BD	HASL-300
	Cesium-137	pCi/g	P-4	0.274 ± 0.0322	0.0207		None	HASL-300
		pCi/g	P-5	0.154 ± 0.0233	0.0161		None	HASL-300
		pCi/g	P-12	0.937 ± 0.0837	0.0181		None	HASL-300
		pCi/g	P-16	0.0797 ± 0.0195	0.0223		None	HASL-300
		pCi/g	P-19	1.04 ± 0.0985	0.0295		None	HASL-300
		pCi/g	P-58	0.0715 ± 0.0158	0.0158		None	HASL-300
		pCi/g	P-59	0.192 ± 0.0314	0.0193		None	HASL-300
		pCi/g	P-61	0.0452 ± 0.0157	0.0151		J	HASL-300
		pCi/g	P-63	0.264 ± 0.0307	0.0209		None	HASL-300
		pCi/g	P-64	0.395 ± 0.0384	0.0184		None	HASL-300
		pCi/g	P-80	0.285 ± 0.03	0.0165		None	HASL-300
		pCi/g	P-81	0.202 ± 0.0209	0.0124		None	HASL-300
		pCi/g	P-82	0.0277 ± 0.0179	0.0199		J	HASL-300
		pCi/g	P-87	0.155 ± 0.0266	0.0181		None	HASL-300
		pCi/g	P-89	0.104 ± 0.0206	0.017		None	HASL-300
	Tritium	pCi/L	P-4	191 ± 105	147		J	GL-RAD-A-002
		pCi/L	P-5	109 ± 92.7	147	U	BD	GL-RAD-A-002
		pCi/L	P-12	51.7 ± 101	178	U	BD	GL-RAD-A-002
		pCi/L	P-19	130 ± 96.1	148	U	BD	GL-RAD-A-002

See notes at end of appendix.

Table C-1. Summary of radiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Units	Location	Activity	MDA	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Perimeter	Tritium	pCi/L	P-59	236 ± 111	147		J	GL-RAD-A-002
		pCi/L	P-61	27 ± 102	184	U	BD	GL-RAD-A-002
		pCi/L	P-63	99 ± 112	186	U	BD	GL-RAD-A-002
		pCi/L	P-64	99.3 ± 108	178	U	BD	GL-RAD-A-002
		pCi/L	P-80	83.7 ± 105	176	U	BD	GL-RAD-A-002
		pCi/L	P-81	8.01 ± 101	187	U	BD	GL-RAD-A-002
		pCi/L	P-87	-39.8 ± 94.9	184	U	BD	GL-RAD-A-002
		pCi/L	P-89	76.1 ± 109	186	U	BD	GL-RAD-A-002
	Uranium	mg/kg	P-4	0.317	0.04		None	SW846 3050B/6020
		mg/kg	P-5	0.257	0.0397		None	SW846 3050B/6020
		mg/kg	P-12	0.588	0.0383		None	SW846 3050B/6020
		mg/kg	P-16	0.524	0.0346		None	SW846 3050B/6020
		mg/kg	P-19	0.539	0.0338		None	SW846 3050B/6020
		mg/kg	P-58	0.848	0.034		None	SW846 3050B/6020
		mg/kg	P-59	0.531	0.0362		None	SW846 3050B/6020
		mg/kg	P-61	0.482	0.0364	*	J	SW846 3050B/6020
		mg/kg	P-63	0.499	0.0388		None	SW846 3050B/6020
		mg/kg	P-64	0.658	0.0366		None	SW846 3050B/6020
		mg/kg	P-80	0.842	0.0376		None	SW846 3050B/6020
	Uranium	mg/kg	P-81	0.416	0.0375		None	SW846 3050B/6020
		mg/kg	P-82	0.709	0.0391		None	SW846 3050B/6020
		mg/kg	P-87	0.222	0.0393		None	SW846 3050B/6020
		mg/kg	P-89	0.291	0.038		None	SW846 3050B/6020

See notes at end of appendix.

Table C-2. Summary of radiological results in sediment, calendar year 2014

Location Classification	Analyte	Units	Location	Activity	MDA	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Community	Americium-241	pCi/g	C-8	0.044 ± 0.0816	0.129	U	BD	HASL-300
		pCi/g	C-68	0.0671 ± 0.0624	0.079	U	BD	HASL-300
	Cesium-137	pCi/g	C-8	0.0785 ± 0.0213	0.0228		None	HASL-300
		pCi/g	C-68	0.0963 ± 0.0172	0.0177		None	HASL-300
	Tritium	pCi/L	C-8	12.4 ± 60.9	110	U	BD	GL-RAD-A-002
		pCi/L	C-68	46.9 ± 70.2	120	U	BD	GL-RAD-A-002
	Uranium	mg/kg	C-8	0.411 ±	0.0375		None	SW846 3050B/6020
		mg/kg	C-68	1 ±	0.0373		None	SW846 3050B/6020
On-Site	Americium-241	pCi/g	S-72	0.041 ± 0.0599	0.0991	U	BD	HASL-300
		pCi/g	S-74N	0.0135 ± 0.025	0.0417	U	BD	HASL-300
		pCi/g	S-75	0.0636 ± 0.0474	0.07	U	BD	HASL-300
		pCi/g	S-79	0.0418 ± 0.0603	0.0829	U	BD	HASL-300
		pCi/g	S-83	0.0281 ± 0.0656	0.107	U	BD	HASL-300
		pCi/g	S-84	0.0505 ± 0.0378	0.0511	U	BD	HASL-300
		pCi/g	S-85	0.00117 ± 0.0227	0.032	U	BD	HASL-300
	Cesium-137	pCi/g	S-72	0.0586 ± 0.0176	0.0211		J	HASL-300
		pCi/g	S-74N	0.00763 ± 0.0143	0.0252	U	BD	HASL-300
		pCi/g	S-75	0.0233 ± 0.00882	0.0117		J	HASL-300
		pCi/g	S-79	0.116 ± 0.0215	0.0193		None	HASL-300
		pCi/g	S-83	0.131 ± 0.023	0.0182		None	HASL-300
		pCi/g	S-84	0.173 ± 0.0218	0.0174		None	HASL-300
		pCi/g	S-85	0.172 ± 0.039	0.0231		None	HASL-300
	Tritium	pCi/L	S-72	119 ± 94.1	147	U	BD	GL-RAD-A-002
		pCi/L	S-74N	43.9 ± 105	185	U	BD	GL-RAD-A-002
		pCi/L	S-75	146 ± 97.8	153	U	BD	GL-RAD-A-002
		pCi/L	S-79	58.1 ± 85.6	147	U	BD	GL-RAD-A-002
		pCi/L	S-83	147 ± 121	192	U	BD	GL-RAD-A-002
		pCi/L	S-85	54.3 ± 85	147	U	BD	GL-RAD-A-002

See notes at end of appendix.

Table C-2. Summary of radiological results in sediment, calendar year 2014 (continued)

Location Classification	Analyte	Units	Location	Activity	MDA	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Uranium	mg/kg	S-72	0.614 ±	0.0382		None	SW846 3050B/6020
		mg/kg	S-74N	1.52 ±	0.037		None	SW846 3050B/6020
		mg/kg	S-75	0.708 ±	0.0372		None	SW846 3050B/6020
		mg/kg	S-79	0.758 ±	0.037		None	SW846 3050B/6020
		mg/kg	S-83	0.712 ±	0.038		None	SW846 3050B/6020
		mg/kg	S-84	0.634 ±	0.0388		None	SW846 3050B/6020
		mg/kg	S-85	0.764 ±	0.0363		None	SW846 3050B/6020
Perimeter	Americium-241	pCi/g	P-60	-0.0547 ± 0.0687	0.109	U	BD	HASL-300
		pCi/g	P-65	0.0172 ± 0.0265	0.0445	U	BD	HASL-300
		pCi/g	P-73	0.061 ± 0.0585	0.0912	U	BD	HASL-300
	Cesium-137	pCi/g	P-60	0.00718 ± 0.00995	0.0156	U	BD	HASL-300
		pCi/g	P-65	0.00992 ± 0.0139	0.0151	U	BD	HASL-300
		pCi/g	P-73	0.0232 ± 0.0135	0.0184		J	HASL-300
	Tritium	pCi/L	P-60	8.8 ± 101	185	U	BD	GL-RAD-A-002
	Uranium	mg/kg	P-60	0.564 ±	0.0373		None	SW846 3050B/6020
		mg/kg	P-65	0.758 ±	0.0364	*	J	SW846 3050B/6020
		mg/kg	P-73	0.57 ±	0.0369		None	SW846 3050B/6020

See notes at end of appendix.

Table C-3. Summary of thermoluminescent dosimeter measurements, calendar year 2014

Location Classification	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	C-10	38.6	1.2	26.3	0.9	25.2	1	34.2	1
	C-11	30.9	0.9	20.9	0.9	20	2.7	27.3	0.9
	C-21	36.6	0.8	19	1.1	25	1.1	33.1	0.9
	C-22	33.3	1	19.4	0.9	21.1	0.8	29.9	0.9
	C-23	32.5	0.7	19.9	1.6	21.2	2.1	30.5	1
	C-24	30.5	0.9	20.5	1.5	17.7	0.9	29	3.6
	C-25	38.8	7.7	22.2	0.9	19.7	0.7	27.9	1.9
	C-26	36.9	0.7	23.4	1	23.8	1	39.9	6.8
	S-27	38.2	4.8	25.7	1	20.5	0.7	30.4	0.7
	C-30	34	1.6	25.8	0.9	22.1	0.8	32.9	1
On-Site	S-1	31.7	1.2	23.3	1	21.2	1	31.5	1
	S-2NW	31.2	1	21.8	1	18.9	1.1	27.8	1.1
	S-3	32.5	1	22.6	1.4	21.2	1.2	31	1
	S-6	29.8	1	19.4	0.9	17.9	1	27.9	3
	S-7	31	1	22.5	1.2	21	2.3	28.7	1
	S-20	31.9	1	26.2	3.8	21.5	0.8	30.4	1
	S-31	32.8	1.7	24	0.9	19.7	0.7	31.4	1.1
	S-41	30.1	1.1	21.4	0.9	19.8	0.7	29	1
	S-42	30.3	1	23.3	0.9	20.5	1	27.8	1
	S-43	30.8	2.2	23.8	2.1	20.1	0.6	31	4.3
	S-45	32	1	23.3	1.4	18.4	0.9	29.4	1.2
	S-45E	33.5	1.4	22.9	1.7	21.3	1.7	30.5	1.7
	S-46	33.2	1.1	24.5	0.9	20.5	1	29.6	1
	S-47	32.7	1.2	24.9	1.5	20.6	1.8	34.8	3.8
	S-48	34.5	2.2	23.3	1	20.2	0.6	30.3	1.2
	S-66	32.5	1	21.9	0.9	20.5	0.7	28.9	1.2
Perimeter	P-4	31.8	5.6	22.5	4.7	22.6	4.8	28.9	1.1
	P-5	29.1	1	20.7	1.1	29.7	2.9	25.2	1
	P-16	35.2	1.1	28.8	0.9	22.6	1.5	37.1	1.1
	P-18	32	1	23.7	1	20	0.7	32.3	2.4
	P-19	35	1.3	23.3	1.1	23.3	1.7	30.1	1
	P-39	33.1	1	22.8	0.9	19.5	1.1	29.9	1
	P-40	31.7	1.8	21.8	0.9	20.1	0.9	29.9	1.2
	P-81	31.1	1.2	22.2	1	20.6	1.2	30.6	1.1

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Community	Aluminum	C-9	16200	136	452		None	SW846 3050B/6020
	Antimony		0.298	0.298	0.904	U	UJ	SW846 3050B/6010B
	Arsenic		3.32	0.181	0.904		None	SW846 3050B/6020
	Barium		180	0.0904	0.362		J	SW846 3050B/6020
	Beryllium		0.623	0.0181	0.0904		None	SW846 3050B/6020
	Cadmium		0.238	0.0181	0.181		None	SW846 3050B/6020
	Calcium		35300	298	904		None	SW846 3050B/6020
	Chromium		13.8	0.181	0.542		None	SW846 3050B/6020
	Cobalt		6.12	0.0542	0.181		None	SW846 3050B/6020
	Copper		11	0.0597	0.181		None	SW846 3050B/6020
	Iron		15200	298	904		J	SW846 3050B/6020
	Lead		17.7	0.0904	0.362		None	SW846 3050B/6020
	Magnesium		4280	1.81	5.42		None	SW846 3050B/6020
	Manganese		341	9.04	45.2		J	SW846 3050B/6020
	Nickel		12	0.0904	0.362		None	SW846 3050B/6020
	Potassium		2210	14.5	54.2		None	SW846 3050B/6020
	Selenium		0.298	0.298	0.904	U	None	SW846 3050B/6020
	Silver		0.0904	0.0904	0.452	U	None	SW846 3050B/6010B
	Sodium		44.9	14.5	45.2	J	None	SW846 3050B/6020
	Thallium		0.098	0.0542	0.362	JB	0.4U	SW846 3050B/6020
	Vanadium		34.3	0.0904	0.452		None	SW846 3050B/6010B
	Zinc		51.7	0.362	1.81	B	J	SW846 3050B/6020
	Aluminum	C-10	19300	126	420		None	SW846 3050B/6020
	Antimony		0.287	0.287	0.871	U	UJ	SW846 3050B/6010B
	Arsenic		2.27	0.168	0.84		None	SW846 3050B/6020
	Barium		118	0.084	0.336		J	SW846 3050B/6020
	Beryllium		0.711	0.0168	0.084		None	SW846 3050B/6020
	Cadmium		0.248	0.0168	0.168		None	SW846 3050B/6020
	Calcium		6910	5.55	16.8		None	SW846 3050B/6020
	Chromium		13.7	0.168	0.504		None	SW846 3050B/6020
	Cobalt		5.78	0.0504	0.168		None	SW846 3050B/6020
	Copper		8.26	0.0555	0.168		None	SW846 3050B/6020
	Iron		16200	277	840		J	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Community	Lead	C-10	10.7	0.084	0.336		None	SW846 3050B/6020
	Magnesium		3130	1.68	5.04		None	SW846 3050B/6020
	Manganese		533	8.4	42		J	SW846 3050B/6020
	Nickel		11.7	0.084	0.336		None	SW846 3050B/6020
	Potassium		2680	13.4	50.4		None	SW846 3050B/6020
	Selenium		0.277	0.277	0.84	U	None	SW846 3050B/6020
	Silver		0.0871	0.0871	0.436	U	None	SW846 3050B/6010B
	Sodium		34.4	13.4	42	J	None	SW846 3050B/6020
	Thallium		0.132	0.0504	0.336	JB	0.4U	SW846 3050B/6020
	Vanadium		31.3	0.0871	0.436		None	SW846 3050B/6010B
	Zinc		40.2	0.336	1.68	B	J	SW846 3050B/6020
	Aluminum	C-11	3740	2.78	9.26	*B	J	SW846 3050B/6020
	Antimony		0.301	0.301	0.912	U	None	SW846 3050B/6010B
	Arsenic		1.43	0.185	0.926		None	SW846 3050B/6020
	Barium		114	0.0926	0.37		J	SW846 3050B/6020
	Beryllium		0.211	0.0185	0.0926		None	SW846 3050B/6020
	Cadmium		0.0911	0.0185	0.185	J	None	SW846 3050B/6020
	Calcium		10100	76.4	231	*	J	SW846 3050B/6020
	Chromium		4.49	0.185	0.556	*N	J+	SW846 3050B/6020
	Cobalt		2.3	0.0556	0.185	*	None	SW846 3050B/6020
	Copper		3.9	0.0611	0.185	*BN	J+	SW846 3050B/6020
	Iron		5040	76.4	231	*	J	SW846 3050B/6020
	Lead		5.08	0.0926	0.37		None	SW846 3050B/6020
	Magnesium		1840	1.85	5.56	*	None	SW846 3050B/6020
	Manganese		229	2.31	11.6		J	SW846 3050B/6020
	Nickel		4.8	0.0926	0.37	*	None	SW846 3050B/6020
	Potassium		1450	14.8	55.6	*	None	SW846 3050B/6020
	Selenium		0.306	0.306	0.926	U	None	SW846 3050B/6020
	Silver		0.0912	0.0912	0.456	U	None	SW846 3050B/6010B
	Sodium		163	14.8	46.3		None	SW846 3050B/6020
	Thallium		0.0676	0.0556	0.37	JB	0.55U	SW846 3050B/6020
	Vanadium		19.2	0.0912	0.456		None	SW846 3050B/6010B
	Zinc		18.3	0.37	1.85	*	J	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Community	Aluminum	C-25	9500	2.98	9.94		None	SW846 3050B/6020
	Antimony		0.298	0.298	0.904	U	UJ	SW846 3050B/6010B
	Arsenic		3.68	0.199	0.994		None	SW846 3050B/6020
	Barium		149	0.0994	0.398		J	SW846 3050B/6020
	Beryllium		0.48	0.0199	0.0994		None	SW846 3050B/6020
	Cadmium		0.232	0.0199	0.199		None	SW846 3050B/6020
	Calcium		53900	328	994		None	SW846 3050B/6020
	Chromium		9.02	0.199	0.596		None	SW846 3050B/6020
	Cobalt		4.17	0.0596	0.199		None	SW846 3050B/6020
	Copper		8.83	0.0656	0.199		None	SW846 3050B/6020
	Iron		9900	6.56	19.9		J	SW846 3050B/6020
	Lead		25.2	0.0994	0.398		None	SW846 3050B/6020
	Magnesium		3240	1.99	5.96		None	SW846 3050B/6020
	Manganese		286	9.94	49.7		J	SW846 3050B/6020
	Nickel		9.46	0.0994	0.398		None	SW846 3050B/6020
	Potassium		2450	15.9	59.6		None	SW846 3050B/6020
	Selenium		0.328	0.328	0.994	U	None	SW846 3050B/6020
	Silver		0.452	0.452	2.26	U	None	SW846 3050B/6010B
	Sodium		83	15.9	49.7		None	SW846 3050B/6020
	Thallium		0.116	0.0596	0.398	JB	0.4U	SW846 3050B/6020
	Vanadium		21.5	0.0904	0.452		None	SW846 3050B/6010B
	Zinc		48.7	0.398	1.99	B	J	SW846 3050B/6020
	Aluminum	C-62	23200	148	493		None	SW846 3050B/6020
	Antimony		0.319	0.319	0.965	U	UJ	SW846 3050B/6010B
	Arsenic		3.52	0.197	0.986		None	SW846 3050B/6020
	Barium		228	4.93	19.7		J	SW846 3050B/6020
	Beryllium		0.908	0.0197	0.0986		None	SW846 3050B/6020
	Cadmium		0.367	0.0197	0.197		None	SW846 3050B/6020
	Calcium		35400	325	986		None	SW846 3050B/6020
	Chromium		20.6	0.197	0.592		None	SW846 3050B/6020
	Cobalt		8.58	0.0592	0.197		None	SW846 3050B/6020
	Copper		12.8	0.0651	0.197		None	SW846 3050B/6020
	Iron		19300	325	986		J	SW846 3050B/6020
	Lead		13.7	0.0986	0.394		None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Community	Magnesium	C-62	4650	1.97	5.92		None	SW846 3050B/6020
	Manganese		592	9.86	49.3		J	SW846 3050B/6020
	Nickel		19	0.0986	0.394		None	SW846 3050B/6020
	Potassium		4340	15.8	59.2		None	SW846 3050B/6020
	Selenium		0.325	0.325	0.986	U	None	SW846 3050B/6020
	Silver		0.0965	0.0965	0.483	U	None	SW846 3050B/6010B
	Sodium		54.4	15.8	49.3		None	SW846 3050B/6020
	Thallium		0.193	0.0592	0.394	JB	0.4U	SW846 3050B/6020
	Vanadium		32.6	0.0965	0.483		None	SW846 3050B/6010B
	Zinc		61.7	0.394	1.97	B	J	SW846 3050B/6020
On-Site	Aluminum	S-1	17000	147	491		J	SW846 3050B/6020
	Antimony		0.319	0.319	0.965	U	None	SW846 3050B/6010B
	Arsenic		2.57	0.196	0.982		None	SW846 3050B/6020
	Barium		173	0.0982	0.393		None	SW846 3050B/6020
	Beryllium		0.613	0.0196	0.0982		None	SW846 3050B/6020
	Cadmium		0.353	0.0196	0.196		None	SW846 3050B/6020
	Calcium		34500	324	982		None	SW846 3050B/6020
	Chromium		12.1	0.196	0.589		None	SW846 3050B/6020
	Cobalt		6.9	0.0589	0.196		None	SW846 3050B/6020
	Copper		14.3	0.0648	0.196		J	SW846 3050B/6020
	Iron		18700	324	982		J	SW846 3050B/6020
	Lead		15.4	0.0982	0.393	N	J	SW846 3050B/6020
	Magnesium		5640	1.96	5.89		J	SW846 3050B/6020
	Manganese		536	9.82	49.1		J	SW846 3050B/6020
	Nickel		12.5	0.0982	0.393		J	SW846 3050B/6020
	Potassium		4850	15.7	58.9		None	SW846 3050B/6020
	Selenium		0.324	0.324	0.982	U	None	SW846 3050B/6020
	Silver		0.0965	0.0965	0.483	U	None	SW846 3050B/6010B
	Sodium		66.5	15.7	49.1		None	SW846 3050B/6020
	Thallium		0.206	0.0589	0.393	J	None	SW846 3050B/6020
	Vanadium		31.6	0.0965	0.483		None	SW846 3050B/6010B
	Zinc		60.7	0.393	1.96		None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Aluminum	S-2NE	7680	2.75	9.17		J	SW846 3050B/6020
	Antimony		0.304	0.304	0.921	U	UJ	SW846 3050B/6010B
	Arsenic		1.33	0.183	0.917		None	SW846 3050B/6020
	Barium		66.1	0.0917	0.367	B	J	SW846 3050B/6020
	Beryllium		0.313	0.0183	0.0917		None	SW846 3050B/6020
	Cadmium		0.197	0.0183	0.183		None	SW846 3050B/6020
	Calcium		4840	6.06	18.3		None	SW846 3050B/6020
	Chromium		6.58	0.183	0.55	B	None	SW846 3050B/6020
	Cobalt		2.49	0.055	0.183		None	SW846 3050B/6020
	Copper		4.86	0.0606	0.183		None	SW846 3050B/6020
	Iron		7630	6.06	18.3		J	SW846 3050B/6020
	Lead		6.4	0.0917	0.367		None	SW846 3050B/6020
	Magnesium		1920	1.83	5.5		None	SW846 3050B/6020
	Manganese		134	0.183	0.917		J	SW846 3050B/6020
	Nickel		4.98	0.0917	0.367		None	SW846 3050B/6020
	Potassium		1790	14.7	55		None	SW846 3050B/6020
	Selenium		0.303	0.303	0.917	U	None	SW846 3050B/6020
	Silver		0.181	0.0921	0.46	J	None	SW846 3050B/6010B
	Sodium		27.7	14.7	45.9	J	None	SW846 3050B/6020
	Thallium		0.0622	0.055	0.367	J	None	SW846 3050B/6020
	Vanadium		17.5	0.0921	0.46		None	SW846 3050B/6010B
	Zinc		21.3	0.367	1.83		J	SW846 3050B/6020
	Aluminum	S-2NW	7300	2.85	9.49		J	SW846 3050B/6020
	Antimony		0.302	0.302	0.916	U	UJ	SW846 3050B/6010B
	Arsenic		1.65	0.19	0.949		None	SW846 3050B/6020
	Barium		73.8	0.0949	0.38	B	J	SW846 3050B/6020
	Beryllium		0.357	0.019	0.0949		None	SW846 3050B/6020
	Cadmium		0.156	0.019	0.19	J	None	SW846 3050B/6020
	Calcium		11500	31.3	94.9		None	SW846 3050B/6020
	Chromium		6.53	0.19	0.569	B	None	SW846 3050B/6020
	Cobalt		2.64	0.0569	0.19		None	SW846 3050B/6020
	Copper		5.33	0.0626	0.19		None	SW846 3050B/6020
	Iron		7410	6.26	19		J	SW846 3050B/6020
	Lead		6.35	0.0949	0.38		None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Magnesium	S-2NW	2230	1.9	5.69		None	SW846 3050B/6020
	Manganese		144	0.19	0.949		J	SW846 3050B/6020
	Nickel		5.37	0.0949	0.38		None	SW846 3050B/6020
	Potassium		1980	15.2	56.9		None	SW846 3050B/6020
	Selenium		0.313	0.313	0.949	U	None	SW846 3050B/6020
	Silver		0.205	0.0916	0.458	J	None	SW846 3050B/6010B
	Sodium		37.2	15.2	47.4	J	None	SW846 3050B/6020
	Thallium		0.0622	0.0569	0.38	J	None	SW846 3050B/6020
	Vanadium		16.3	0.0916	0.458		None	SW846 3050B/6010B
	Zinc		24.5	0.38	1.9		J	SW846 3050B/6020
	Aluminum	S-2SE	9720	14.4	48.1		J	SW846 3050B/6020
	Antimony		0.32	0.32	0.971	U	UJ	SW846 3050B/6010B
	Arsenic		1.96	0.192	0.962		None	SW846 3050B/6020
	Barium		86.2	0.0962	0.385	B	J	SW846 3050B/6020
	Beryllium		0.429	0.0192	0.0962		None	SW846 3050B/6020
	Cadmium		0.452	0.0192	0.192		None	SW846 3050B/6020
	Calcium		10900	31.7	96.2		None	SW846 3050B/6020
	Chromium		7.61	0.192	0.577	B	None	SW846 3050B/6020
	Cobalt		3.05	0.0577	0.192		None	SW846 3050B/6020
	Copper		6.5	0.0635	0.192		None	SW846 3050B/6020
	Iron		8830	6.35	19.2		J	SW846 3050B/6020
	Lead		7.56	0.0962	0.385		None	SW846 3050B/6020
	Magnesium		2590	1.92	5.77		None	SW846 3050B/6020
	Manganese		143	0.192	0.962		J	SW846 3050B/6020
	Nickel		7.23	0.0962	0.385		None	SW846 3050B/6020
	Potassium		2290	15.4	57.7		None	SW846 3050B/6020
	Selenium		0.317	0.317	0.962	U	None	SW846 3050B/6020
	Silver		0.322	0.0971	0.485	J	None	SW846 3050B/6010B
	Sodium		31.7	15.4	48.1	J	None	SW846 3050B/6020
	Thallium		0.0827	0.0577	0.385	J	None	SW846 3050B/6020
	Vanadium		18.5	0.0971	0.485		None	SW846 3050B/6010B
	Zinc		25.8	0.385	1.92		J	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Aluminum	S-2SW	8030	2.74	9.14		J	SW846 3050B/6020
	Antimony		0.311	0.311	0.943	U	UJ	SW846 3050B/6010B
	Arsenic		2.11	0.183	0.914		None	SW846 3050B/6020
	Barium		93.3	0.0914	0.366	B	J	SW846 3050B/6020
	Beryllium		0.347	0.0183	0.0914		None	SW846 3050B/6020
	Cadmium		0.135	0.0183	0.183	J	None	SW846 3050B/6020
	Calcium		11300	30.2	91.4		None	SW846 3050B/6020
	Chromium		7.54	0.183	0.548	B	None	SW846 3050B/6020
	Cobalt		2.73	0.0548	0.183		None	SW846 3050B/6020
	Copper		9.47	0.0603	0.183		None	SW846 3050B/6020
	Iron		8370	6.03	18.3		J	SW846 3050B/6020
	Lead		6.2	0.0914	0.366		None	SW846 3050B/6020
	Magnesium		2270	1.83	5.48		None	SW846 3050B/6020
	Manganese		147	0.183	0.914		J	SW846 3050B/6020
	Nickel		6.01	0.0914	0.366		None	SW846 3050B/6020
	Potassium		1920	14.6	54.8		None	SW846 3050B/6020
	Selenium		0.302	0.302	0.914	U	None	SW846 3050B/6020
	Silver		0.223	0.0943	0.472	J	None	SW846 3050B/6010B
	Sodium		38.3	14.6	45.7	J	None	SW846 3050B/6020
	Thallium		0.0737	0.0548	0.366	J	None	SW846 3050B/6020
	Vanadium		14.3	0.0943	0.472		None	SW846 3050B/6010B
	Zinc		30.7	0.366	1.83		J	SW846 3050B/6020
	Aluminum	S-3	9370	2.96	9.86		J	SW846 3050B/6020
	Antimony		0.324	0.324	0.98	U	None	SW846 3050B/6010B
	Arsenic		3.12	0.197	0.986		None	SW846 3050B/6020
	Barium		182	0.0986	0.394		J	SW846 3050B/6020
	Beryllium		0.393	0.0197	0.0986		None	SW846 3050B/6020
	Cadmium		0.171	0.0197	0.197	J	None	SW846 3050B/6020
	Calcium		48100	81.4	247	*	None	SW846 3050B/6020
	Chromium		7.69	0.197	0.592		None	SW846 3050B/6020
	Cobalt		3.15	0.0592	0.197		None	SW846 3050B/6020
	Copper		6.26	0.0651	0.197		J-	SW846 3050B/6020
	Iron		8590	6.51	19.7		J	SW846 3050B/6020
	Lead		11.8	0.0986	0.394		None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Magnesium	S-3	4440	1.97	5.92		None	SW846 3050B/6020
	Manganese		143	0.197	0.986		None	SW846 3050B/6020
	Nickel		7.18	0.0986	0.394		J-	SW846 3050B/6020
	Potassium		2440	15.8	59.2		None	SW846 3050B/6020
	Selenium		0.325	0.325	0.986	U	None	SW846 3050B/6020
	Silver		0.49	0.49	2.45	U	None	SW846 3050B/6010B
	Sodium		72.5	15.8	49.3		None	SW846 3050B/6020
	Thallium		0.104	0.0592	0.394	JB	0.38U	SW846 3050B/6020
	Vanadium		23.7	0.098	0.49		None	SW846 3050B/6010B
	Zinc		26.7	0.394	1.97		None	SW846 3050B/6020
	Aluminum	S-6	11800	28.6	95.2		None	SW846 3050B/6020
	Antimony		0.319	0.319	0.967	U	UJ	SW846 3050B/6010B
	Arsenic		2.39	0.19	0.952		None	SW846 3050B/6020
	Barium		80.7	0.0952	0.381		J	SW846 3050B/6020
	Beryllium		0.486	0.019	0.0952		None	SW846 3050B/6020
	Cadmium		0.136	0.019	0.19	J	None	SW846 3050B/6020
	Calcium		8720	6.29	19		None	SW846 3050B/6020
	Chromium		8.56	0.19	0.571		None	SW846 3050B/6020
	Cobalt		3.2	0.0571	0.19		None	SW846 3050B/6020
	Copper		7.42	0.0629	0.19		None	SW846 3050B/6020
	Iron		9690	62.9	190		J	SW846 3050B/6020
	Lead		7.28	0.0952	0.381		None	SW846 3050B/6020
	Magnesium		2840	1.9	5.71		None	SW846 3050B/6020
	Manganese		138	0.19	0.952		J	SW846 3050B/6020
	Nickel		7.15	0.0952	0.381		None	SW846 3050B/6020
	Potassium		2440	15.2	57.1		None	SW846 3050B/6020
	Selenium		0.314	0.314	0.952	U	None	SW846 3050B/6020
	Silver		0.0967	0.0967	0.484	U	None	SW846 3050B/6010B
	Sodium		33.3	15.2	47.6	J	None	SW846 3050B/6020
	Thallium		0.109	0.0571	0.381	JB	0.4U	SW846 3050B/6020
	Vanadium		22.9	0.0967	0.484		None	SW846 3050B/6010B
	Zinc		30.6	0.381	1.9	B	J	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Aluminum	S-7	7860	2.89	9.63		J	SW846 3050B/6020
	Antimony		0.303	0.301	0.912	J	None	SW846 3050B/6010B
	Arsenic		1.34	0.193	0.963		None	SW846 3050B/6020
	Barium		58.4	0.0963	0.385		J	SW846 3050B/6020
	Beryllium		0.438	0.0193	0.0963		None	SW846 3050B/6020
	Cadmium		0.15	0.0193	0.193	J	None	SW846 3050B/6020
	Calcium		5840	6.36	19.3	*	None	SW846 3050B/6020
	Chromium		7.54	0.193	0.578		None	SW846 3050B/6020
	Cobalt		2.88	0.0578	0.193		None	SW846 3050B/6020
	Copper		6.03	0.0636	0.193		None	SW846 3050B/6020
	Iron		8320	6.36	19.3		J	SW846 3050B/6020
	Lead		9.71	0.0963	0.385		None	SW846 3050B/6020
	Magnesium		2420	1.93	5.78		None	SW846 3050B/6020
	Manganese		173	0.193	0.963		None	SW846 3050B/6020
	Nickel		5.92	0.0963	0.385		None	SW846 3050B/6020
	Potassium		2300	15.4	57.8		None	SW846 3050B/6020
	Selenium		0.318	0.318	0.963	U	None	SW846 3050B/6020
	Silver		0.0912	0.0912	0.456	U	None	SW846 3050B/6010B
	Sodium		47.2	15.4	48.2	J	None	SW846 3050B/6020
	Thallium		0.101	0.0578	0.385	JB	0.38U	SW846 3050B/6020
	Vanadium		21.2	0.0912	0.456		None	SW846 3050B/6010B
	Zinc		29.9	0.385	1.93		None	SW846 3050B/6020
	Aluminum	S-33	14800	37.4	125		J	SW846 3050B/6020
	Antimony		0.304	0.304	0.923	U	None	SW846 3050B/6010B
	Arsenic		7.83	0.199	0.996		None	SW846 3050B/6020
	Barium		195	0.0996	0.398		J	SW846 3050B/6020
	Beryllium		1.12	0.0199	0.0996		None	SW846 3050B/6020
	Cadmium		0.3	0.0199	0.199		None	SW846 3050B/6020
	Calcium		59800	82.2	249	*	None	SW846 3050B/6020
	Chromium		14.2	0.199	0.598		None	SW846 3050B/6020
	Cobalt		6.29	0.0598	0.199		None	SW846 3050B/6020
	Copper		11.6	0.0657	0.199		None	SW846 3050B/6020
	Iron		14600	82.2	249		J	SW846 3050B/6020
	Lead		14	0.0996	0.398		None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Magnesium	S-33	5800	1.99	5.98		None	SW846 3050B/6020
	Manganese		385	2.49	12.5		None	SW846 3050B/6020
	Nickel		15.6	0.0996	0.398		J-	SW846 3050B/6020
	Potassium		4080	15.9	59.8		None	SW846 3050B/6020
	Selenium		0.329	0.329	0.996	U	None	SW846 3050B/6020
	Silver		0.461	0.461	2.31	U	None	SW846 3050B/6010B
	Sodium		3720	15.9	49.8		None	SW846 3050B/6020
	Thallium		0.174	0.0598	0.398	JB	0.38U	SW846 3050B/6020
	Vanadium		23.1	0.0923	0.461		None	SW846 3050B/6010B
	Zinc		47.9	0.398	1.99		None	SW846 3050B/6020
	Aluminum	S-34	12000	34.7	116		J	SW846 3050B/6020
	Antimony		0.314	0.314	0.952	U	None	SW846 3050B/6010B
	Arsenic		3.81	0.185	0.924		None	SW846 3050B/6020
	Barium		126	0.0924	0.37		J	SW846 3050B/6020
	Beryllium		0.564	0.0185	0.0924		None	SW846 3050B/6020
	Cadmium		0.214	0.0185	0.185		None	SW846 3050B/6020
	Calcium		61400	76.2	231	*	None	SW846 3050B/6020
	Chromium		11.3	0.185	0.555		None	SW846 3050B/6020
	Cobalt		4.95	0.0555	0.185		None	SW846 3050B/6020
	Copper		7.11	0.061	0.185		J-	SW846 3050B/6020
	Iron		12400	76.2	231		J	SW846 3050B/6020
	Lead		9.49	0.0924	0.37		None	SW846 3050B/6020
	Magnesium		3020	1.85	5.55		None	SW846 3050B/6020
	Manganese		378	2.31	11.6		None	SW846 3050B/6020
	Nickel		10.9	0.0924	0.37		J-	SW846 3050B/6020
	Potassium		2580	14.8	55.5		None	SW846 3050B/6020
	Selenium		0.305	0.305	0.924	U	None	SW846 3050B/6020
	Silver		0.0952	0.0952	0.476	U	None	SW846 3050B/6010B
	Sodium		51.6	14.8	46.2		None	SW846 3050B/6020
	Thallium		0.121	0.0555	0.37	JB	0.38U	SW846 3050B/6020
	Vanadium		31.6	0.0952	0.476		None	SW846 3050B/6010B
	Zinc		32.8	0.37	1.85		None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Aluminum	S-45	11000	28.9	96.3		J	SW846 3050B/6020
	Antimony		0.329	0.329	0.996	U	None	SW846 3050B/6010B
	Arsenic		2.86	0.193	0.963		None	SW846 3050B/6020
	Barium		92.4	0.0963	0.385		J	SW846 3050B/6020
	Beryllium		0.444	0.0193	0.0963		None	SW846 3050B/6020
	Cadmium		0.136	0.0193	0.193	J	None	SW846 3050B/6020
	Calcium		18600	63.6	193	*	None	SW846 3050B/6020
	Chromium		8.67	0.193	0.578		None	SW846 3050B/6020
	Cobalt		2.98	0.0578	0.193		None	SW846 3050B/6020
	Copper		7.03	0.0636	0.193		J-	SW846 3050B/6020
	Iron		9230	6.36	19.3		J	SW846 3050B/6020
	Lead		7.21	0.0963	0.385		None	SW846 3050B/6020
	Magnesium		3240	1.93	5.78		None	SW846 3050B/6020
	Manganese		151	0.193	0.963		None	SW846 3050B/6020
	Nickel		6.85	0.0963	0.385		J-	SW846 3050B/6020
	Potassium		2890	15.4	57.8		None	SW846 3050B/6020
	Selenium		0.318	0.318	0.963	U	None	SW846 3050B/6020
	Silver		0.0996	0.0996	0.498	U	None	SW846 3050B/6010B
	Sodium		60.7	15.4	48.2		None	SW846 3050B/6020
	Thallium		0.137	0.0578	0.385	JB	0.38U	SW846 3050B/6020
	Vanadium		21.4	0.0996	0.498		None	SW846 3050B/6010B
	Zinc		27.7	0.385	1.93		None	SW846 3050B/6020
	Aluminum	S-51	12300	35.7	119		J	SW846 3050B/6020
	Antimony		0.315	0.315	0.954	U	None	SW846 3050B/6010B
	Arsenic		2.69	0.19	0.952		None	SW846 3050B/6020
	Barium		89.9	0.0952	0.381		None	SW846 3050B/6020
	Beryllium		0.555	0.019	0.0952		None	SW846 3050B/6020
	Cadmium		0.151	0.019	0.19	J	None	SW846 3050B/6020
	Calcium		15200	78.6	238		None	SW846 3050B/6020
	Chromium		69.5	0.19	0.571		None	SW846 3050B/6020
	Cobalt		3.71	0.0571	0.19		None	SW846 3050B/6020
	Copper		12	0.0629	0.19	BN	J-	SW846 3050B/6020
	Iron		10300	78.6	238	B	J	SW846 3050B/6020
	Lead		11.2	0.0952	0.381		None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Magnesium	S-51	3250	1.9	5.71		J	SW846 3050B/6020
	Manganese		145	0.19	0.952		J	SW846 3050B/6020
	Nickel		8.25	0.0952	0.381		J	SW846 3050B/6020
	Potassium		2410	15.2	57.1		None	SW846 3050B/6020
	Selenium		0.314	0.314	0.952	U	None	SW846 3050B/6020
	Silver		0.15	0.0954	0.477	J	None	SW846 3050B/6010B
	Sodium		56.1	15.2	47.6		None	SW846 3050B/6020
	Thallium		0.126	0.0571	0.381	J	None	SW846 3050B/6020
	Vanadium		19	0.0977	0.488		None	SW846 3050B/6010B
	Zinc		145	0.381	1.9	B	None	SW846 3050B/6020
	Aluminum	S-52	8870	2.9	9.67		None	SW846 3050B/6020
	Antimony		0.322	0.322	0.977	U	UJ	SW846 3050B/6010B
	Arsenic		2.11	0.193	0.967		None	SW846 3050B/6020
	Barium		81.3	0.0967	0.387		J	SW846 3050B/6020
	Beryllium		0.431	0.0193	0.0967		None	SW846 3050B/6020
	Cadmium		0.124	0.0193	0.193	J	None	SW846 3050B/6020
	Calcium		16200	79.8	242		None	SW846 3050B/6020
	Chromium		6.98	0.193	0.58		None	SW846 3050B/6020
	Cobalt		2.95	0.058	0.193		None	SW846 3050B/6020
	Copper		5.86	0.0638	0.193		None	SW846 3050B/6020
	Iron		8650	6.38	19.3		J	SW846 3050B/6020
	Lead		6.45	0.0967	0.387		None	SW846 3050B/6020
	Magnesium		2720	1.93	5.8		None	SW846 3050B/6020
	Manganese		130	0.193	0.967		J	SW846 3050B/6020
	Nickel		6.26	0.0967	0.387		None	SW846 3050B/6020
	Potassium		1740	15.5	58		None	SW846 3050B/6020
	Selenium		0.319	0.319	0.967	U	None	SW846 3050B/6020
	Silver		0.163	0.0977	0.488	J	None	SW846 3050B/6010B
	Sodium		33.6	15.5	48.4	J	None	SW846 3050B/6020
	Thallium		0.129	0.058	0.387	JB	0.4U	SW846 3050B/6020
	Vanadium		20.3	0.0977	0.488		None	SW846 3050B/6010B
	Zinc		29.4	0.387	1.93	B	J	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Aluminum	S-53	7990	2.87	9.56		J	SW846 3050B/6020
	Antimony		0.319	0.319	0.965	U	UJ	SW846 3050B/6010B
	Arsenic		1.71	0.191	0.956		None	SW846 3050B/6020
	Barium		61.4	0.0956	0.382	B	J	SW846 3050B/6020
	Beryllium		0.364	0.0191	0.0956		None	SW846 3050B/6020
	Cadmium		0.118	0.0191	0.191	J	None	SW846 3050B/6020
	Calcium		2590	6.31	19.1		None	SW846 3050B/6020
	Chromium		6.54	0.191	0.574	B	None	SW846 3050B/6020
	Cobalt		2.64	0.0574	0.191		None	SW846 3050B/6020
	Copper		5.11	0.0631	0.191		None	SW846 3050B/6020
	Iron		7460	6.31	19.1		J	SW846 3050B/6020
	Lead		6.68	0.0956	0.382		None	SW846 3050B/6020
	Magnesium		1870	1.91	5.74		None	SW846 3050B/6020
	Manganese		141	0.191	0.956		J	SW846 3050B/6020
	Nickel		5.06	0.0956	0.382		None	SW846 3050B/6020
	Potassium		1700	15.3	57.4		None	SW846 3050B/6020
	Selenium		0.315	0.315	0.956	U	None	SW846 3050B/6020
	Silver		0.21	0.0965	0.483	J	None	SW846 3050B/6010B
	Sodium		29.7	15.3	47.8	J	None	SW846 3050B/6020
	Thallium		0.0793	0.0574	0.382	J	None	SW846 3050B/6020
	Vanadium		19.8	0.0965	0.483		None	SW846 3050B/6010B
	Zinc		31.3	0.382	1.91		J	SW846 3050B/6020
	Aluminum	S-54	9150	2.77	9.24		None	SW846 3050B/6020
	Antimony		0.324	0.324	0.982	U	UJ	SW846 3050B/6010B
	Arsenic		1.59	0.185	0.924		None	SW846 3050B/6020
	Barium		69.9	0.0924	0.37		J	SW846 3050B/6020
	Beryllium		0.438	0.0185	0.0924		None	SW846 3050B/6020
	Cadmium		0.498	0.0185	0.185		None	SW846 3050B/6020
	Calcium		5150	6.1	18.5		None	SW846 3050B/6020
	Chromium		7.58	0.185	0.555		None	SW846 3050B/6020
	Cobalt		3.15	0.0555	0.185		None	SW846 3050B/6020
	Copper		6.61	0.061	0.185		None	SW846 3050B/6020
	Iron		8840	6.1	18.5		J	SW846 3050B/6020
	Lead		10.7	0.0924	0.37		None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Magnesium	S-54	2160	1.85	5.55		None	SW846 3050B/6020
	Manganese		168	0.185	0.924		J	SW846 3050B/6020
	Nickel		7.3	0.0924	0.37		None	SW846 3050B/6020
	Potassium		2140	14.8	55.5		None	SW846 3050B/6020
	Selenium		0.305	0.305	0.924	U	None	SW846 3050B/6020
	Silver		0.0982	0.0982	0.491	U	None	SW846 3050B/6010B
	Sodium		34	14.8	46.2	J	None	SW846 3050B/6020
	Thallium		0.0926	0.0555	0.37	JB	0.4U	SW846 3050B/6020
	Vanadium		18.3	0.0982	0.491		None	SW846 3050B/6010B
	Zinc		32.9	0.37	1.85	B	J	SW846 3050B/6020
	Aluminum	S-55	8660	2.77	9.24		J	SW846 3050B/6020
	Antimony		0.291	0.291	0.882	U	None	SW846 3050B/6010B
	Arsenic		1.6	0.185	0.924		None	SW846 3050B/6020
	Barium		71.3	0.0924	0.37		J	SW846 3050B/6020
	Beryllium		0.394	0.0185	0.0924		None	SW846 3050B/6020
	Cadmium		0.159	0.0185	0.185	J	None	SW846 3050B/6020
	Calcium		4620	6.1	18.5	*	None	SW846 3050B/6020
	Chromium		7.2	0.185	0.555		None	SW846 3050B/6020
	Cobalt		2.77	0.0555	0.185		None	SW846 3050B/6020
	Copper		5.55	0.061	0.185		None	SW846 3050B/6020
	Iron		8040	6.1	18.5		J	SW846 3050B/6020
	Lead		7.59	0.0924	0.37		None	SW846 3050B/6020
	Magnesium		2760	1.85	5.55		None	SW846 3050B/6020
	Manganese		175	0.185	0.924		None	SW846 3050B/6020
	Nickel		5.85	0.0924	0.37		None	SW846 3050B/6020
	Potassium		2430	14.8	55.5		None	SW846 3050B/6020
	Selenium		0.305	0.305	0.924	U	None	SW846 3050B/6020
	Silver		0.0882	0.0882	0.441	U	None	SW846 3050B/6010B
	Sodium		47.1	14.8	46.2		None	SW846 3050B/6020
	Thallium		0.0871	0.0555	0.37	JB	0.38U	SW846 3050B/6020
	Vanadium		21.2	0.0882	0.441		None	SW846 3050B/6010B
	Zinc		25.4	0.37	1.85		None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Aluminum	S-56	5130	2.98	9.92		J	SW846 3050B/6020
	Antimony		0.779	0.319	0.967	J	3.3U	SW846 3050B/6010B
	Arsenic		1.24	0.198	0.992		None	SW846 3050B/6020
	Barium		103	0.0992	0.397	*	J	SW846 3050B/6020
	Beryllium		0.315	0.0198	0.0992		None	SW846 3050B/6020
	Cadmium		0.156	0.0198	0.198	J	None	SW846 3050B/6020
	Calcium		14000	32.7	99.2	*	None	SW846 3050B/6020
	Chromium		5.24	0.198	0.595	B	None	SW846 3050B/6020
	Cobalt		2.41	0.0595	0.198		None	SW846 3050B/6020
	Copper		20.7	0.0655	0.198	*	J	SW846 3050B/6020
	Iron		9280	6.55	19.8	*	J	SW846 3050B/6020
	Lead		4.13	0.0992	0.397		None	SW846 3050B/6020
	Magnesium		1680	1.98	5.95		None	SW846 3050B/6020
	Manganese		524	0.992	4.96	*	J	SW846 3050B/6020
	Nickel		5.09	0.0992	0.397		None	SW846 3050B/6020
	Potassium		1000	15.9	59.5		None	SW846 3050B/6020
	Selenium		0.327	0.327	0.992	U	None	SW846 3050B/6020
	Silver		0.0967	0.0967	0.484	U	None	SW846 3050B/6010B
	Sodium		50.5	15.9	49.6		None	SW846 3050B/6020
	Thallium		0.0718	0.0595	0.397	J	None	SW846 3050B/6020
	Vanadium		13.2	0.0967	0.484		None	SW846 3050B/6010B
	Zinc		47.5	0.397	1.98	B	J	SW846 3050B/6020
	Aluminum	S-57	6490	2.63	8.77		J	SW846 3050B/6020
	Antimony		0.649	0.325	0.986	JB	4.38UJ	SW846 3050B/6010B
	Arsenic		2.57	0.175	0.877		None	SW846 3050B/6020
	Barium		168	0.0877	0.351	*	J	SW846 3050B/6020
	Beryllium		0.331	0.0175	0.0877		None	SW846 3050B/6020
	Cadmium		0.165	0.0175	0.175	J	J+	SW846 3050B/6020
	Calcium		44300	57.9	175		None	SW846 3050B/6020
	Chromium		5.49	0.175	0.526		None	SW846 3050B/6020
	Cobalt		3.42	0.0526	0.175	*	J	SW846 3050B/6020
	Copper		5.97	0.0579	0.175	N	J-	SW846 3050B/6020
	Iron		7180	5.79	17.5		J	SW846 3050B/6020
	Lead		5.98	0.0877	0.351		None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Magnesium	S-57	3540	1.75	5.26		None	SW846 3050B/6020
	Manganese		202	1.75	8.77		J	SW846 3050B/6020
	Nickel		5.39	0.0877	0.351		J-	SW846 3050B/6020
	Potassium		1440	14	52.6		J	SW846 3050B/6020
	Selenium		0.289	0.289	0.877	U	None	SW846 3050B/6020
	Silver		0.11	0.0986	0.493	J	None	SW846 3050B/6010B
	Sodium		62.5	14	43.9		None	SW846 3050B/6020
	Thallium		0.0746	0.0526	0.351	J	None	SW846 3050B/6020
	Vanadium		31.1	0.0986	0.493	*	J	SW846 3050B/6010B
	Zinc		54	0.351	1.75	B	None	SW846 3050B/6020
	Aluminum	S-76	10400	33.2	111		J	SW846 3050B/6020
	Antimony		0.319	0.319	0.965	U	None	SW846 3050B/6010B
	Arsenic		1.75	0.177	0.885		None	SW846 3050B/6020
	Barium		68	0.0885	0.354		J	SW846 3050B/6020
	Beryllium		0.458	0.0177	0.0885		None	SW846 3050B/6020
	Cadmium		0.168	0.0177	0.177	J	None	SW846 3050B/6020
	Calcium		2200	5.84	17.7	*	None	SW846 3050B/6020
	Chromium		8.45	0.177	0.531		None	SW846 3050B/6020
	Cobalt		3.36	0.0531	0.177		None	SW846 3050B/6020
	Copper		7.02	0.0584	0.177		None	SW846 3050B/6020
	Iron		9340	73	221		J	SW846 3050B/6020
	Lead		7.73	0.0885	0.354		None	SW846 3050B/6020
	Magnesium		2660	1.77	5.31		None	SW846 3050B/6020
	Manganese		176	2.21	11.1		None	SW846 3050B/6020
	Nickel		6.69	0.0885	0.354		None	SW846 3050B/6020
	Potassium		2630	14.2	53.1		None	SW846 3050B/6020
	Selenium		0.292	0.292	0.885	U	None	SW846 3050B/6020
	Silver		0.114	0.0965	0.483	J	None	SW846 3050B/6010B
	Sodium		38.4	14.2	44.2	J	None	SW846 3050B/6020
	Thallium		0.104	0.0531	0.354	JB	0.38U	SW846 3050B/6020
	Vanadium		26.2	0.0965	0.483		None	SW846 3050B/6010B
	Zinc		30.4	0.354	1.77		None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Aluminum	S-77	15400	29.4	98		J	SW846 3050B/6020
	Antimony		0.325	0.325	0.986	U	None	SW846 3050B/6010B
	Arsenic		2.49	0.196	0.98		None	SW846 3050B/6020
	Barium		128	0.098	0.392		J	SW846 3050B/6020
	Beryllium		0.588	0.0196	0.098		None	SW846 3050B/6020
	Cadmium		0.252	0.0196	0.196		None	SW846 3050B/6020
	Calcium		21600	64.7	196	*	None	SW846 3050B/6020
	Chromium		10.8	0.196	0.588		None	SW846 3050B/6020
	Cobalt		4.22	0.0588	0.196		None	SW846 3050B/6020
	Copper		9.35	0.0647	0.196		J-	SW846 3050B/6020
	Iron		12200	64.7	196		J	SW846 3050B/6020
	Lead		12.4	0.098	0.392		None	SW846 3050B/6020
	Magnesium		4030	1.96	5.88		None	SW846 3050B/6020
	Manganese		248	1.96	9.8		None	SW846 3050B/6020
	Nickel		9.16	0.098	0.392		J-	SW846 3050B/6020
	Potassium		3620	15.7	58.8		None	SW846 3050B/6020
	Selenium		0.324	0.324	0.98	U	None	SW846 3050B/6020
	Silver		0.0986	0.0986	0.493	U	None	SW846 3050B/6010B
	Sodium		65.8	15.7	49		None	SW846 3050B/6020
	Thallium		0.149	0.0588	0.392	JB	0.38U	SW846 3050B/6020
	Vanadium		24.3	0.0986	0.493		None	SW846 3050B/6010B
	Zinc		37.3	0.392	1.96		None	SW846 3050B/6020
	Aluminum	S-78	9440	2.87	9.56		J	SW846 3050B/6020
	Antimony		0.289	0.289	0.876	U	None	SW846 3050B/6010B
	Arsenic		1.81	0.191	0.956		None	SW846 3050B/6020
	Barium		80.8	0.0956	0.382		J	SW846 3050B/6020
	Beryllium		0.432	0.0191	0.0956		None	SW846 3050B/6020
	Cadmium		0.202	0.0191	0.191		None	SW846 3050B/6020
	Calcium		2610	6.31	19.1	*	None	SW846 3050B/6020
	Chromium		8.65	0.191	0.574		None	SW846 3050B/6020
	Cobalt		3.66	0.0574	0.191		None	SW846 3050B/6020
	Copper		8.8	0.0631	0.191		None	SW846 3050B/6020
	Iron		9950	78.9	239		J	SW846 3050B/6020
	Lead		10.2	0.0956	0.382		None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Magnesium	S-78	2880	1.91	5.74		None	SW846 3050B/6020
	Manganese		221	2.39	12		None	SW846 3050B/6020
	Nickel		7.3	0.0956	0.382		None	SW846 3050B/6020
	Potassium		2480	15.3	57.4		None	SW846 3050B/6020
	Selenium		0.315	0.315	0.956	U	None	SW846 3050B/6020
	Silver		0.0876	0.0876	0.438	U	None	SW846 3050B/6010B
	Sodium		53.5	15.3	47.8		None	SW846 3050B/6020
	Thallium		0.105	0.0574	0.382	JB	0.38U	SW846 3050B/6020
	Vanadium		20.9	0.0876	0.438		None	SW846 3050B/6010B
	Zinc		32.9	0.382	1.91		None	SW846 3050B/6020
	Aluminum	S-86	8750	2.64	8.8		J	SW846 3050B/6020
	Antimony		0.325	0.325	0.984	U	None	SW846 3050B/6010B
	Arsenic		2.09	0.176	0.88		None	SW846 3050B/6020
	Barium		227	0.88	3.52	*	J	SW846 3050B/6020
	Beryllium		0.365	0.0176	0.088		None	SW846 3050B/6020
	Cadmium		0.15	0.0176	0.176	J	J+	SW846 3050B/6020
	Calcium		35400	58.1	176		None	SW846 3050B/6020
	Chromium		6.75	0.176	0.528		None	SW846 3050B/6020
	Cobalt		3.59	0.0528	0.176	*	J	SW846 3050B/6020
	Copper		7.5	0.0581	0.176	N	J-	SW846 3050B/6020
	Iron		8240	5.81	17.6		J	SW846 3050B/6020
	Lead		5.95	0.088	0.352		None	SW846 3050B/6020
	Magnesium		3130	1.76	5.28		None	SW846 3050B/6020
	Manganese		191	1.76	8.8		J	SW846 3050B/6020
	Nickel		5.93	0.088	0.352		J-	SW846 3050B/6020
	Potassium		1890	14.1	52.8		J	SW846 3050B/6020
	Selenium		0.29	0.29	0.88	U	None	SW846 3050B/6020
	Silver		0.244	0.0984	0.492	J	None	SW846 3050B/6010B
	Sodium		52.7	14.1	44		None	SW846 3050B/6020
	Thallium		0.09	0.0528	0.352	J	None	SW846 3050B/6020
	Vanadium		35.9	0.0984	0.492	*	J	SW846 3050B/6010B
	Zinc		24.7	0.352	1.76	B	None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Aluminum	S-90	7400	2.6	8.68		None	SW846 3050B/6020
	Antimony		0.296	0.296	0.898	U	UJ	SW846 3050B/6010B
	Arsenic		1.4	0.174	0.868		None	SW846 3050B/6020
	Barium		58.3	0.0868	0.347		J	SW846 3050B/6020
	Beryllium		0.367	0.0174	0.0868		None	SW846 3050B/6020
	Cadmium		0.149	0.0174	0.174	J	None	SW846 3050B/6020
	Calcium		1180	5.73	17.4		None	SW846 3050B/6020
	Chromium		6.55	0.174	0.521		None	SW846 3050B/6020
	Cobalt		2.59	0.0521	0.174		None	SW846 3050B/6020
	Copper		5.31	0.0573	0.174		None	SW846 3050B/6020
	Iron		7550	5.73	17.4		J	SW846 3050B/6020
	Lead		7.88	0.0868	0.347		None	SW846 3050B/6020
	Magnesium		1750	1.74	5.21		None	SW846 3050B/6020
	Manganese		163	0.174	0.868		J	SW846 3050B/6020
	Nickel		5	0.0868	0.347		None	SW846 3050B/6020
	Potassium		1820	13.9	52.1		None	SW846 3050B/6020
	Selenium		0.286	0.286	0.868	U	None	SW846 3050B/6020
	Silver		0.0898	0.0898	0.449	U	None	SW846 3050B/6010B
	Sodium		26.3	13.9	43.4	J	None	SW846 3050B/6020
	Thallium		0.0903	0.0521	0.347	JB	0.4U	SW846 3050B/6020
	Vanadium		15.7	0.0898	0.449		None	SW846 3050B/6010B
	Zinc		24.7	0.347	1.74	B	J	SW846 3050B/6020
	Aluminum	S-92	8360	2.92	9.75		None	SW846 3050B/6020
	Antimony		0.323	0.323	0.978	U	UJ	SW846 3050B/6010B
	Arsenic		1.55	0.195	0.975		None	SW846 3050B/6020
	Barium		63.1	0.0975	0.39		J	SW846 3050B/6020
	Beryllium		0.416	0.0195	0.0975		None	SW846 3050B/6020
	Cadmium		0.137	0.0195	0.195	J	None	SW846 3050B/6020
	Calcium		1310	6.43	19.5		None	SW846 3050B/6020
	Chromium		7.58	0.195	0.585		None	SW846 3050B/6020
	Cobalt		3.14	0.0585	0.195		None	SW846 3050B/6020
	Copper		5.82	0.0643	0.195		None	SW846 3050B/6020
	Iron		8930	6.43	19.5		J	SW846 3050B/6020
	Lead		8.07	0.0975	0.39		None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Magnesium	S-92	1870	1.95	5.85		None	SW846 3050B/6020
	Manganese		187	0.195	0.975		J	SW846 3050B/6020
	Nickel		5.63	0.0975	0.39		None	SW846 3050B/6020
	Potassium		1850	15.6	58.5		None	SW846 3050B/6020
	Selenium		0.322	0.322	0.975	U	None	SW846 3050B/6020
	Silver		0.0978	0.0978	0.489	U	None	SW846 3050B/6010B
	Sodium		32.7	15.6	48.7	J	None	SW846 3050B/6020
	Thallium		0.0891	0.0585	0.39	JB	0.4U	SW846 3050B/6020
	Vanadium		19.1	0.0978	0.489		None	SW846 3050B/6010B
	Zinc		26.7	0.39	1.95	B	J	SW846 3050B/6020
Perimeter	Aluminum	P-4	8280	3	10		J	SW846 3050B/6020
	Antimony		0.281	0.281	0.852	U	None	SW846 3050B/6010B
	Arsenic		1.65	0.2	1		None	SW846 3050B/6020
	Barium		80.4	0.1	0.4		J	SW846 3050B/6020
	Beryllium		0.35	0.02	0.1		None	SW846 3050B/6020
	Cadmium		0.155	0.02	0.2	J	None	SW846 3050B/6020
	Calcium		11900	82.5	250	*	None	SW846 3050B/6020
	Chromium		7.26	0.2	0.6		None	SW846 3050B/6020
	Cobalt		2.92	0.06	0.2		None	SW846 3050B/6020
	Copper		5.55	0.066	0.2		None	SW846 3050B/6020
	Iron		7850	6.6	20		J	SW846 3050B/6020
	Lead		7.95	0.1	0.4		None	SW846 3050B/6020
	Magnesium		2710	2	6		None	SW846 3050B/6020
	Manganese		167	0.2	1		None	SW846 3050B/6020
	Nickel		5.96	0.1	0.4		None	SW846 3050B/6020
	Potassium		2220	16	60		None	SW846 3050B/6020
	Selenium		0.33	0.33	1	U	None	SW846 3050B/6020
	Silver		0.0852	0.0852	0.426	U	None	SW846 3050B/6010B
	Sodium		47.2	16	50	J	None	SW846 3050B/6020
	Thallium		0.0868	0.06	0.4	JB	0.38U	SW846 3050B/6020
	Vanadium		20.4	0.0852	0.426		None	SW846 3050B/6010B
	Zinc		24.3	0.4	2		None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Perimeter	Aluminum	P-5	7390	2.98	9.92		J	SW846 3050B/6020
	Antimony		0.289	0.289	0.877	U	None	SW846 3050B/6010B
	Arsenic		1.25	0.198	0.992		None	SW846 3050B/6020
	Barium		56.9	0.0992	0.397		J	SW846 3050B/6020
	Beryllium		0.324	0.0198	0.0992		None	SW846 3050B/6020
	Cadmium		0.114	0.0198	0.198	J	None	SW846 3050B/6020
	Calcium		1310	6.55	19.8	*	None	SW846 3050B/6020
	Chromium		6.28	0.198	0.595		None	SW846 3050B/6020
	Cobalt		2.32	0.0595	0.198		None	SW846 3050B/6020
	Copper		4.61	0.0655	0.198		None	SW846 3050B/6020
	Iron		6930	6.55	19.8		J	SW846 3050B/6020
	Lead		6.18	0.0992	0.397		None	SW846 3050B/6020
	Magnesium		1670	1.98	5.95		None	SW846 3050B/6020
	Manganese		135	0.198	0.992		None	SW846 3050B/6020
	Nickel		4.61	0.0992	0.397		None	SW846 3050B/6020
	Potassium		1850	15.9	59.5		None	SW846 3050B/6020
	Selenium		0.327	0.327	0.992	U	None	SW846 3050B/6020
	Silver		0.0877	0.0877	0.439	U	None	SW846 3050B/6010B
	Sodium		32.4	15.9	49.6	J	None	SW846 3050B/6020
	Thallium		0.0754	0.0595	0.397	JB	0.38U	SW846 3050B/6020
	Vanadium		15.3	0.0877	0.439		None	SW846 3050B/6010B
	Zinc		22	0.397	1.98		None	SW846 3050B/6020
	Aluminum	P-12	13900	144	479		J	SW846 3050B/6020
	Antimony		0.324	0.324	0.98	U	None	SW846 3050B/6010B
	Arsenic		2.26	0.192	0.958		None	SW846 3050B/6020
	Barium		123	0.0958	0.383		None	SW846 3050B/6020
	Beryllium		0.518	0.0192	0.0958		None	SW846 3050B/6020
	Cadmium		0.305	0.0192	0.192		None	SW846 3050B/6020
	Calcium		5900	6.32	19.2		None	SW846 3050B/6020
	Chromium		9.98	0.192	0.575		None	SW846 3050B/6020
	Cobalt		5.85	0.0575	0.192		None	SW846 3050B/6020
	Copper		12.9	0.0632	0.192	BN	J-	SW846 3050B/6020
	Iron		12100	316	958	B	J	SW846 3050B/6020
	Lead		15.9	0.0958	0.383		None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Perimeter	Magnesium	P-12	3730	1.92	5.75		J	SW846 3050B/6020
	Manganese		341	9.58	47.9		J	SW846 3050B/6020
	Nickel		8.87	0.0958	0.383		J	SW846 3050B/6020
	Potassium		2810	15.3	57.5		None	SW846 3050B/6020
	Selenium		0.316	0.316	0.958	U	None	SW846 3050B/6020
	Silver		0.121	0.098	0.49	J	None	SW846 3050B/6010B
	Sodium		55.6	15.3	47.9		None	SW846 3050B/6020
	Thallium		0.124	0.0575	0.383	J	None	SW846 3050B/6020
	Vanadium		44.5	0.098	0.49		None	SW846 3050B/6010B
	Zinc		52.4	0.383	1.92	B	None	SW846 3050B/6020
	Aluminum	P-16	10100	130	433		J	SW846 3050B/6020
	Arsenic		1.48	0.173	0.865		None	SW846 3050B/6020
	Barium		62.1	0.0865	0.346		None	SW846 3050B/6020
	Beryllium		0.433	0.0173	0.0865		None	SW846 3050B/6020
	Cadmium		0.0957	0.0173	0.173	J	None	SW846 3050B/6020
	Calcium		4240	5.71	17.3		None	SW846 3050B/6020
	Chromium		5.53	0.173	0.519		None	SW846 3050B/6020
	Cobalt		5.5	0.0519	0.173		None	SW846 3050B/6020
	Copper		7.19	0.0571	0.173	BN	J-	SW846 3050B/6020
	Iron		14100	285	865	B	J	SW846 3050B/6020
	Lead		5.91	0.0865	0.346		None	SW846 3050B/6020
	Magnesium		4320	1.73	5.19		J	SW846 3050B/6020
	Manganese		314	8.65	43.3		J	SW846 3050B/6020
	Nickel		7.12	0.0865	0.346		J	SW846 3050B/6020
	Potassium		2440	13.8	51.9		None	SW846 3050B/6020
	Selenium		0.285	0.285	0.865	U	None	SW846 3050B/6020
	Sodium		36.1	13.8	43.3	J	None	SW846 3050B/6020
	Thallium		0.0931	0.0519	0.346	J	None	SW846 3050B/6020
	Vanadium		34.1	0.0951	0.475		None	SW846 3050B/6010B
	Zinc		43.9	0.346	1.73	B	None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Perimeter	Aluminum	P-19	12500	63.3	211		J	SW846 3050B/6020
	Antimony		0.329	0.329	0.996	U	None	SW846 3050B/6010B
	Arsenic		2.37	0.169	0.845		None	SW846 3050B/6020
	Barium		95.2	0.0845	0.338		J	SW846 3050B/6020
	Beryllium		0.472	0.0169	0.0845		None	SW846 3050B/6020
	Cadmium		0.212	0.0169	0.169		None	SW846 3050B/6020
	Calcium		3400	5.57	16.9	*	None	SW846 3050B/6020
	Chromium		14.7	0.169	0.507		None	SW846 3050B/6020
	Cobalt		5.24	0.0507	0.169		None	SW846 3050B/6020
	Copper		11.5	0.0557	0.169		None	SW846 3050B/6020
	Iron		12800	139	422		J	SW846 3050B/6020
	Lead		19	0.0845	0.338		None	SW846 3050B/6020
	Magnesium		4100	1.69	5.07		None	SW846 3050B/6020
	Manganese		299	4.22	21.1		None	SW846 3050B/6020
	Nickel		11.9	0.0845	0.338		None	SW846 3050B/6020
	Potassium		2710	13.5	50.7		None	SW846 3050B/6020
	Selenium		0.279	0.279	0.845	U	None	SW846 3050B/6020
	Silver		0.0996	0.0996	0.498	U	None	SW846 3050B/6010B
	Sodium		57.4	13.5	42.2		None	SW846 3050B/6020
	Thallium		0.139	0.0507	0.338	JB	0.38U	SW846 3050B/6020
	Vanadium		31.3	0.0996	0.498		None	SW846 3050B/6010B
	Zinc		45	0.338	1.69		None	SW846 3050B/6020
	Aluminum	P-58	12300	128	425		J	SW846 3050B/6020
	Antimony		0.298	0.298	0.903	U	None	SW846 3050B/6010B
	Arsenic		2.92	0.17	0.85		None	SW846 3050B/6020
	Barium		152	0.085	0.34		None	SW846 3050B/6020
	Beryllium		0.48	0.017	0.085		None	SW846 3050B/6020
	Cadmium		0.178	0.017	0.17		None	SW846 3050B/6020
	Calcium		43100	281	850		None	SW846 3050B/6020
	Chromium		8.15	0.17	0.51		None	SW846 3050B/6020
	Cobalt		4.17	0.051	0.17		None	SW846 3050B/6020
	Copper		8.51	0.0561	0.17	BN	J-	SW846 3050B/6020
	Iron		12000	281	850	B	J	SW846 3050B/6020
	Lead		91.2	0.085	0.34		None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Perimeter	Magnesium	P-58	4070	1.7	5.1		J	SW846 3050B/6020
	Manganese		218	8.5	42.5		J	SW846 3050B/6020
	Nickel		7.49	0.085	0.34		J-	SW846 3050B/6020
	Potassium		2750	13.6	51		None	SW846 3050B/6020
	Selenium		0.281	0.281	0.85	U	None	SW846 3050B/6020
	Silver		0.0903	0.0903	0.451	U	None	SW846 3050B/6010B
	Sodium		85.5	13.6	42.5		None	SW846 3050B/6020
	Thallium		0.103	0.051	0.34	J	None	SW846 3050B/6020
	Vanadium		30.3	0.0903	0.451		None	SW846 3050B/6010B
	Zinc		39.5	0.34	1.7	B	None	SW846 3050B/6020
	Aluminum	P-59	6900	2.72	9.06		J	SW846 3050B/6020
	Antimony		0.47	0.302	0.916	JB	4.38UJ	SW846 3050B/6010B
	Arsenic		1.67	0.181	0.906		None	SW846 3050B/6020
	Barium		132	0.0906	0.362	*	J	SW846 3050B/6020
	Beryllium		0.312	0.0181	0.0906		None	SW846 3050B/6020
	Cadmium		0.284	0.0181	0.181		J+	SW846 3050B/6020
	Calcium		21800	59.8	181		None	SW846 3050B/6020
	Chromium		6.23	0.181	0.543		None	SW846 3050B/6020
	Cobalt		2.75	0.0543	0.181	*	J	SW846 3050B/6020
	Copper		7.57	0.0598	0.181	N	J-	SW846 3050B/6020
	Iron		6330	5.98	18.1		J	SW846 3050B/6020
	Lead		26.4	0.906	3.62		None	SW846 3050B/6020
	Magnesium		2540	1.81	5.43		None	SW846 3050B/6020
	Manganese		165	1.81	9.06		J	SW846 3050B/6020
	Nickel		4.94	0.0906	0.362		J-	SW846 3050B/6020
	Potassium		1680	14.5	54.3		J	SW846 3050B/6020
	Selenium		0.299	0.299	0.906	U	None	SW846 3050B/6020
	Silver		0.224	0.0916	0.458	J	None	SW846 3050B/6010B
	Sodium		45.5	14.5	45.3		None	SW846 3050B/6020
	Thallium		0.0639	0.0543	0.362	J	None	SW846 3050B/6020
	Vanadium		26.4	0.0916	0.458	*	J	SW846 3050B/6010B
	Zinc		33.6	0.362	1.81	B	None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Perimeter	Aluminum	P-61	7560	2.73	9.09	*B	J	SW846 3050B/6020
	Antimony		0.412	0.327	0.992	J	None	SW846 3050B/6010B
	Arsenic		2.9	0.182	0.909		None	SW846 3050B/6020
	Barium		363	2.27	9.09		J	SW846 3050B/6020
	Beryllium		0.355	0.0182	0.0909		None	SW846 3050B/6020
	Cadmium		0.175	0.0182	0.182	J	None	SW846 3050B/6020
	Calcium		40100	150	455	*	J	SW846 3050B/6020
	Chromium		6.13	0.182	0.545	*N	J+	SW846 3050B/6020
	Cobalt		3.11	0.0545	0.182	*	None	SW846 3050B/6020
	Copper		5.32	0.06	0.182	*BN	J+	SW846 3050B/6020
	Iron		6840	150	455	*	J	SW846 3050B/6020
	Lead		10.8	0.0909	0.364		None	SW846 3050B/6020
	Magnesium		3440	1.82	5.45	*	None	SW846 3050B/6020
	Manganese		140	0.182	0.909		J	SW846 3050B/6020
	Nickel		6.77	0.0909	0.364	*	J-	SW846 3050B/6020
	Potassium		1640	14.5	54.5	*	None	SW846 3050B/6020
	Selenium		0.3	0.3	0.909	U	None	SW846 3050B/6020
	Silver		0.0992	0.0992	0.496	U	None	SW846 3050B/6010B
	Sodium		71.5	14.5	45.5		None	SW846 3050B/6020
	Thallium		0.105	0.0545	0.364	JB	0.55U	SW846 3050B/6020
	Vanadium		22.6	0.0992	0.496		None	SW846 3050B/6010B
	Zinc		20.9	0.364	1.82	*	J	SW846 3050B/6020
	Aluminum	P-63	14200	36.4	121		J	SW846 3050B/6020
	Antimony		0.32	0.32	0.971	U	None	SW846 3050B/6010B
	Arsenic		2.48	0.194	0.971		None	SW846 3050B/6020
	Barium		144	0.0971	0.388		None	SW846 3050B/6020
	Beryllium		0.557	0.0194	0.0971		None	SW846 3050B/6020
	Cadmium		0.255	0.0194	0.194		None	SW846 3050B/6020
	Calcium		28800	80.1	243		None	SW846 3050B/6020
	Chromium		14.3	0.194	0.583		None	SW846 3050B/6020
	Cobalt		5.6	0.0583	0.194		None	SW846 3050B/6020
	Copper		9.3	0.0641	0.194	BN	J-	SW846 3050B/6020
	Iron		12700	80.1	243	B	J	SW846 3050B/6020
	Lead		11.1	0.0971	0.388		None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Perimeter	Magnesium	P-63	3760	1.94	5.83		J	SW846 3050B/6020
	Manganese		365	9.71	48.5		J	SW846 3050B/6020
	Nickel		10.4	0.0971	0.388		J-	SW846 3050B/6020
	Potassium		2640	15.5	58.3		None	SW846 3050B/6020
	Selenium		0.32	0.32	0.971	U	None	SW846 3050B/6020
	Silver		0.0971	0.0971	0.485	U	None	SW846 3050B/6010B
	Sodium		82.5	15.5	48.5		None	SW846 3050B/6020
	Thallium		0.124	0.0583	0.388	J	None	SW846 3050B/6020
	Vanadium		24.3	0.0971	0.485		None	SW846 3050B/6010B
	Zinc		42.9	0.388	1.94	B	None	SW846 3050B/6020
	Aluminum	P-64	10200	137	458		J	SW846 3050B/6020
	Antimony		0.295	0.295	0.893	U	None	SW846 3050B/6010B
	Arsenic		1.78	0.183	0.916		None	SW846 3050B/6020
	Barium		75.1	0.0916	0.366		None	SW846 3050B/6020
	Beryllium		0.463	0.0183	0.0916		None	SW846 3050B/6020
	Cadmium		0.171	0.0183	0.183	J	None	SW846 3050B/6020
	Calcium		13900	302	916		None	SW846 3050B/6020
	Chromium		5.57	0.183	0.549		None	SW846 3050B/6020
	Cobalt		7.38	0.0549	0.183		None	SW846 3050B/6020
	Copper		10.4	0.0604	0.183	BN	J-	SW846 3050B/6020
	Iron		17600	302	916	B	J	SW846 3050B/6020
	Lead		7.6	0.0916	0.366		None	SW846 3050B/6020
	Magnesium		5930	1.83	5.49		J	SW846 3050B/6020
	Manganese		511	9.16	45.8		J	SW846 3050B/6020
	Nickel		7.04	0.0916	0.366		J	SW846 3050B/6020
	Potassium		1910	14.7	54.9		None	SW846 3050B/6020
	Selenium		0.302	0.302	0.916	U	None	SW846 3050B/6020
	Silver		0.0893	0.0893	0.446	U	None	SW846 3050B/6010B
	Sodium		56.2	14.7	45.8		None	SW846 3050B/6020
	Thallium		0.0857	0.0549	0.366	J	None	SW846 3050B/6020
	Vanadium		24.9	0.0893	0.446		None	SW846 3050B/6010B
	Zinc		60	0.366	1.83	B	None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Perimeter	Aluminum	P-80	18200	141	470		J	SW846 3050B/6020
	Antimony		0.33	0.33	1	U	None	SW846 3050B/6010B
	Arsenic		3.16	0.188	0.94		None	SW846 3050B/6020
	Barium		181	0.094	0.376		None	SW846 3050B/6020
	Beryllium		0.714	0.0188	0.094		None	SW846 3050B/6020
	Cadmium		0.32	0.0188	0.188		None	SW846 3050B/6020
	Calcium		82800	310	940		None	SW846 3050B/6020
	Chromium		16.7	0.188	0.564		None	SW846 3050B/6020
	Cobalt		5.85	0.0564	0.188		None	SW846 3050B/6020
	Copper		10.8	0.062	0.188	BN	J-	SW846 3050B/6020
	Iron		15100	310	940	B	J	SW846 3050B/6020
	Lead		11.2	0.094	0.376		None	SW846 3050B/6020
	Magnesium		5110	1.88	5.64		J	SW846 3050B/6020
	Manganese		373	9.4	47		J	SW846 3050B/6020
	Nickel		14.8	0.094	0.376		J	SW846 3050B/6020
	Potassium		3190	15	56.4		None	SW846 3050B/6020
	Selenium		0.31	0.31	0.94	U	None	SW846 3050B/6020
	Silver		0.1	0.1	0.5	U	None	SW846 3050B/6010B
	Sodium		72.2	15	47		None	SW846 3050B/6020
	Thallium		0.148	0.0564	0.376	J	None	SW846 3050B/6020
	Vanadium		19.7	0.1	0.5		None	SW846 3050B/6010B
	Zinc		46.4	0.376	1.88	B	None	SW846 3050B/6020
	Aluminum	P-81	12600	35.1	117		J	SW846 3050B/6020
	Antimony		0.33	0.33	1	U	None	SW846 3050B/6010B
	Arsenic		1.87	0.187	0.936		None	SW846 3050B/6020
	Barium		79.6	0.0936	0.375		None	SW846 3050B/6020
	Beryllium		0.569	0.0187	0.0936		None	SW846 3050B/6020
	Cadmium		0.153	0.0187	0.187	J	None	SW846 3050B/6020
	Calcium		1760	6.18	18.7		None	SW846 3050B/6020
	Chromium		9.81	0.187	0.562		None	SW846 3050B/6020
	Cobalt		3.79	0.0562	0.187		None	SW846 3050B/6020
	Copper		7.79	0.0618	0.187	BN	J-	SW846 3050B/6020
	Iron		10500	77.2	234	B	J	SW846 3050B/6020
	Lead		9.12	0.0936	0.375		None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Perimeter	Magnesium	P-81	2730	1.87	5.62		J	SW846 3050B/6020
	Manganese		215	2.34	11.7		J	SW846 3050B/6020
	Nickel		7.74	0.0936	0.375		J	SW846 3050B/6020
	Potassium		2990	15	56.2		None	SW846 3050B/6020
	Selenium		0.309	0.309	0.936	U	None	SW846 3050B/6020
	Silver		0.1	0.1	0.5	U	None	SW846 3050B/6010B
	Sodium		44.9	15	46.8	J	None	SW846 3050B/6020
	Thallium		0.119	0.0562	0.375	J	None	SW846 3050B/6020
	Vanadium		21.3	0.1	0.5		None	SW846 3050B/6010B
	Zinc		32.5	0.375	1.87	B	None	SW846 3050B/6020
	Aluminum	P-82	9750	2.93	9.77		J	SW846 3050B/6020
	Antimony		0.592	0.329	0.996	JB	4.38UJ	SW846 3050B/6010B
	Arsenic		3.07	0.195	0.977		None	SW846 3050B/6020
	Barium		201	0.977	3.91	*	J	SW846 3050B/6020
	Beryllium		0.427	0.0195	0.0977		None	SW846 3050B/6020
	Cadmium		0.195	0.0195	0.195	J	J+	SW846 3050B/6020
	Calcium		51600	64.5	195		None	SW846 3050B/6020
	Chromium		7.66	0.195	0.586		None	SW846 3050B/6020
	Cobalt		4.15	0.0586	0.195	*	J	SW846 3050B/6020
	Copper		8.91	0.0645	0.195	N	J-	SW846 3050B/6020
	Iron		9050	6.45	19.5		J	SW846 3050B/6020
	Lead		7.63	0.0977	0.391		None	SW846 3050B/6020
	Magnesium		4210	1.95	5.86		None	SW846 3050B/6020
	Manganese		214	1.95	9.77		J	SW846 3050B/6020
	Nickel		7.42	0.0977	0.391		J-	SW846 3050B/6020
	Potassium		2270	15.6	58.6		J	SW846 3050B/6020
	Selenium		0.322	0.322	0.977	U	None	SW846 3050B/6020
	Silver		0.161	0.0996	0.498	J	None	SW846 3050B/6010B
	Sodium		76.3	15.6	48.8		None	SW846 3050B/6020
	Thallium		0.116	0.0586	0.391	J	None	SW846 3050B/6020
	Vanadium		16.5	0.0996	0.498	*	J	SW846 3050B/6010B
	Zinc		39.2	0.391	1.95	B	None	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Perimeter	Aluminum	P-87	6900	2.95	9.82		J	SW846 3050B/6020
	Antimony		0.327	0.327	0.99	U	None	SW846 3050B/6010B
	Arsenic		1.04	0.196	0.982		None	SW846 3050B/6020
	Barium		52.8	0.0982	0.393		None	SW846 3050B/6020
	Beryllium		0.296	0.0196	0.0982		None	SW846 3050B/6020
	Cadmium		0.124	0.0196	0.196	J	None	SW846 3050B/6020
	Calcium		1610	6.48	19.6		None	SW846 3050B/6020
	Chromium		5.91	0.196	0.589		None	SW846 3050B/6020
	Cobalt		2.29	0.0589	0.196		None	SW846 3050B/6020
	Copper		4.44	0.0648	0.196		J	SW846 3050B/6020
	Iron		6520	6.48	19.6		J	SW846 3050B/6020
	Lead		6.17	0.0982	0.393	N	J	SW846 3050B/6020
	Magnesium		2190	1.96	5.89		J	SW846 3050B/6020
	Manganese		127	0.196	0.982		J	SW846 3050B/6020
	Nickel		4.78	0.0982	0.393		J	SW846 3050B/6020
	Potassium		1730	15.7	58.9		None	SW846 3050B/6020
	Selenium		0.324	0.324	0.982	U	None	SW846 3050B/6020
	Silver		0.099	0.099	0.495	U	None	SW846 3050B/6010B
	Sodium		38.1	15.7	49.1	J	None	SW846 3050B/6020
	Thallium		0.0605	0.0589	0.393	J	None	SW846 3050B/6020
	Vanadium		14.1	0.099	0.495		None	SW846 3050B/6010B
	Zinc		19.8	0.393	1.96		None	SW846 3050B/6020
	Aluminum	P-89	5270	2.85	9.51		J	SW846 3050B/6020
	Antimony		0.311	0.311	0.942	U	None	SW846 3050B/6010B
	Arsenic		1.27	0.19	0.951		None	SW846 3050B/6020
	Barium		64.4	0.0951	0.38		None	SW846 3050B/6020
	Beryllium		0.217	0.019	0.0951		None	SW846 3050B/6020
	Cadmium		0.125	0.019	0.19	J	None	SW846 3050B/6020
	Calcium		4500	6.27	19		None	SW846 3050B/6020
	Chromium		4.53	0.19	0.57		None	SW846 3050B/6020
	Cobalt		1.91	0.057	0.19		None	SW846 3050B/6020
	Copper		27.5	0.0627	0.19		J	SW846 3050B/6020
	Iron		4880	6.27	19		J	SW846 3050B/6020
	Lead		6.57	0.0951	0.38	N	J	SW846 3050B/6020

See notes at end of appendix.

Table C-4. Summary of nonradiological results in soil, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Perimeter	Magnesium	P-89	1510	1.9	5.7		J	SW846 3050B/6020
	Manganese		127	0.19	0.951		J	SW846 3050B/6020
	Nickel		3.61	0.0951	0.38		J	SW846 3050B/6020
	Potassium		1200	15.2	57		None	SW846 3050B/6020
	Selenium		0.314	0.314	0.951	U	None	SW846 3050B/6020
	Silver		0.0942	0.0942	0.471	U	None	SW846 3050B/6010B
	Sodium		59.9	15.2	47.5		None	SW846 3050B/6020
	Thallium		0.057	0.057	0.38	U	None	SW846 3050B/6020
	Vanadium		17.6	0.0942	0.471		None	SW846 3050B/6010B
	Zinc		20.5	0.38	1.9		None	SW846 3050B/6020

See notes at end of appendix.

Table C-5. Summary of nonradiological results in sediment, calendar year 2014

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Community	Aluminum	C-8	6600	2.81	9.36		None	SW846 3050B/6020
	Antimony		0.301	0.301	0.911	U	UJ	SW846 3050B/6010B
	Arsenic		1.93	0.187	0.936		None	SW846 3050B/6020
	Barium		110	0.0936	0.375		J	SW846 3050B/6020
	Beryllium		0.36	0.0187	0.0936		None	SW846 3050B/6020
	Cadmium		0.0946	0.0187	0.187	J	None	SW846 3050B/6020
	Calcium		15200	61.8	187		None	SW846 3050B/6020
	Chromium		4.91	0.187	0.562		None	SW846 3050B/6020
	Cobalt		2.73	0.0562	0.187		None	SW846 3050B/6020
	Copper		4.54	0.0618	0.187		None	SW846 3050B/6020
	Iron		6850	6.18	18.7		J	SW846 3050B/6020
	Lead		4.88	0.0936	0.375		None	SW846 3050B/6020
	Magnesium		2770	1.87	5.62		None	SW846 3050B/6020
	Manganese		185	0.187	0.936		J	SW846 3050B/6020
	Nickel		5.05	0.0936	0.375		None	SW846 3050B/6020
	Potassium		1390	15	56.2		None	SW846 3050B/6020
	Selenium		0.309	0.309	0.936	U	None	SW846 3050B/6020
	Silver		0.0911	0.0911	0.455	U	None	SW846 3050B/6010B
	Sodium		132	15	46.8		None	SW846 3050B/6020
	Thallium		0.0807	0.0562	0.375	JB	0.4U	SW846 3050B/6020
	Vanadium		11.2	0.0911	0.455		None	SW846 3050B/6010B
	Zinc		19.8	0.375	1.87	B	J	SW846 3050B/6020
	Aluminum	C-68	8760	2.8	9.33		None	SW846 3050B/6020
	Antimony		0.281	0.281	0.852	U	UJ	SW846 3050B/6010B
	Arsenic		6.93	0.187	0.933		None	SW846 3050B/6020
	Barium		161	0.0933	0.373		J	SW846 3050B/6020
	Beryllium		0.532	0.0187	0.0933		None	SW846 3050B/6020
	Cadmium		0.27	0.0187	0.187		None	SW846 3050B/6020
	Calcium		91900	308	933		None	SW846 3050B/6020
	Chromium		9.57	0.187	0.56		None	SW846 3050B/6020
	Cobalt		4.19	0.056	0.187		None	SW846 3050B/6020
	Copper		7.09	0.0616	0.187		None	SW846 3050B/6020
	Iron		10500	308	933		J	SW846 3050B/6020

See notes at end of appendix.

Table C-5. Summary of nonradiological results in sediment, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Community	Lead	C-68	10.4	0.0933	0.373		None	SW846 3050B/6020
	Magnesium		3620	1.87	5.6		None	SW846 3050B/6020
	Manganese		356	9.33	46.6		J	SW846 3050B/6020
	Nickel		10.5	0.0933	0.373		None	SW846 3050B/6020
	Potassium		1640	14.9	56		None	SW846 3050B/6020
	Selenium		0.308	0.308	0.933	U	None	SW846 3050B/6020
	Silver		0.426	0.426	2.13	U	None	SW846 3050B/6010B
	Sodium		61.7	14.9	46.6		None	SW846 3050B/6020
	Thallium		0.126	0.056	0.373	JB	0.4U	SW846 3050B/6020
	Vanadium		22.5	0.0852	0.426		None	SW846 3050B/6010B
	Zinc		35.9	0.373	1.87	B	J	SW846 3050B/6020
On-Site	Aluminum	S-72	11400	35.9	120		J	SW846 3050B/6020
	Antimony		0.303	0.303	0.919	U	None	SW846 3050B/6010B
	Arsenic		2.48	0.191	0.956		None	SW846 3050B/6020
	Barium		95.4	0.0956	0.382		J	SW846 3050B/6020
	Beryllium		0.498	0.0191	0.0956		None	SW846 3050B/6020
	Cadmium		0.156	0.0191	0.191	J	None	SW846 3050B/6020
	Calcium		42000	78.9	239	*	None	SW846 3050B/6020
	Chromium		10.7	0.191	0.574		None	SW846 3050B/6020
	Cobalt		4.45	0.0574	0.191		None	SW846 3050B/6020
	Copper		8.42	0.0631	0.191		J-	SW846 3050B/6020
	Iron		10800	78.9	239		J	SW846 3050B/6020
	Lead		8.36	0.0956	0.382		None	SW846 3050B/6020
	Magnesium		3890	1.91	5.74		None	SW846 3050B/6020
	Manganese		267	2.39	12		None	SW846 3050B/6020
	Nickel		8.49	0.0956	0.382		J-	SW846 3050B/6020
	Potassium		2050	15.3	57.4		None	SW846 3050B/6020
	Selenium		0.315	0.315	0.956	U	None	SW846 3050B/6020
	Silver		0.46	0.46	2.3	U	None	SW846 3050B/6010B
	Sodium		217	15.3	47.8		None	SW846 3050B/6020
	Thallium		0.105	0.0574	0.382	JB	0.38U	SW846 3050B/6020
	Vanadium		24.3	0.0919	0.46		None	SW846 3050B/6010B
	Zinc		29.7	0.382	1.91		None	SW846 3050B/6020

See notes at end of appendix.

Table C-5. Summary of nonradiological results in sediment, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Aluminum	S-74N	4170	2.77	9.24		J	SW846 3050B/6020
	Antimony		0.317	0.317	0.96	U	None	SW846 3050B/6010B
	Arsenic		0.752	0.185	0.924	J	None	SW846 3050B/6020
	Barium		48.1	0.0924	0.37		None	SW846 3050B/6020
	Beryllium		0.278	0.0185	0.0924		None	SW846 3050B/6020
	Cadmium		0.0945	0.0185	0.185	J	None	SW846 3050B/6020
	Calcium		30500	305	924		None	SW846 3050B/6020
	Chromium		3.47	0.185	0.555		None	SW846 3050B/6020
	Cobalt		2.68	0.0555	0.185		None	SW846 3050B/6020
	Copper		4.77	0.061	0.185		J-	SW846 3050B/6020
	Iron		8580	305	924		J	SW846 3050B/6020
	Lead		3.88	0.0924	0.37	N	J	SW846 3050B/6020
	Magnesium		2340	1.85	5.55		J	SW846 3050B/6020
	Manganese		216	9.24	46.2		J	SW846 3050B/6020
	Nickel		3.84	0.0924	0.37		J-	SW846 3050B/6020
	Potassium		989	14.8	55.5		None	SW846 3050B/6020
	Selenium		0.305	0.305	0.924	U	None	SW846 3050B/6020
	Silver		0.096	0.096	0.48	U	None	SW846 3050B/6010B
	Sodium		57.2	14.8	46.2		None	SW846 3050B/6020
	Thallium		0.0555	0.0555	0.37	U	None	SW846 3050B/6020
	Vanadium		36.5	0.096	0.48		None	SW846 3050B/6010B
	Zinc		23.7	0.37	1.85		None	SW846 3050B/6020
	Aluminum	S-75	5900	2.79	9.31		J	SW846 3050B/6020
	Antimony		0.319	0.319	0.965	U	None	SW846 3050B/6010B
	Arsenic		1.53	0.186	0.931		None	SW846 3050B/6020
	Barium		55.4	0.0931	0.372		None	SW846 3050B/6020
	Beryllium		0.334	0.0186	0.0931		None	SW846 3050B/6020
	Cadmium		0.121	0.0186	0.186	J	None	SW846 3050B/6020
	Calcium		44900	307	931		None	SW846 3050B/6020
	Chromium		6.83	0.186	0.559		None	SW846 3050B/6020
	Cobalt		3.77	0.0559	0.186		None	SW846 3050B/6020
	Copper		8.88	0.0615	0.186		J	SW846 3050B/6020
	Iron		9020	6.15	18.6		J	SW846 3050B/6020
	Lead		5.46	0.0931	0.372	N	J	SW846 3050B/6020

See notes at end of appendix.

Table C-5. Summary of nonradiological results in sediment, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Magnesium	S-75	3530	1.86	5.59		J	SW846 3050B/6020
	Manganese		206	9.31	46.6		J	SW846 3050B/6020
	Nickel		8.19	0.0931	0.372		J	SW846 3050B/6020
	Potassium		923	14.9	55.9		None	SW846 3050B/6020
	Selenium		0.307	0.307	0.931	U	None	SW846 3050B/6020
	Silver		0.0965	0.0965	0.483	U	None	SW846 3050B/6010B
	Sodium		78.6	14.9	46.6		None	SW846 3050B/6020
	Thallium		0.059	0.0559	0.372	J	None	SW846 3050B/6020
	Vanadium		37	0.0965	0.483		None	SW846 3050B/6010B
	Zinc		25.6	0.372	1.86		None	SW846 3050B/6020
	Aluminum	S-79	8450	2.77	9.24		J	SW846 3050B/6020
	Antimony		1.01	0.309	0.936		None	SW846 3050B/6010B
	Arsenic		2.5	0.185	0.924		None	SW846 3050B/6020
	Barium		120	0.0924	0.37		J	SW846 3050B/6020
	Beryllium		0.453	0.0185	0.0924		None	SW846 3050B/6020
	Cadmium		0.252	0.0185	0.185		None	SW846 3050B/6020
	Calcium		76800	76.2	231	*	None	SW846 3050B/6020
	Chromium		11.2	0.185	0.555		None	SW846 3050B/6020
	Cobalt		4.49	0.0555	0.185		None	SW846 3050B/6020
	Copper		8.46	0.061	0.185		J-	SW846 3050B/6020
	Iron		11000	76.2	231		J	SW846 3050B/6020
	Lead		7.89	0.0924	0.37		None	SW846 3050B/6020
	Magnesium		4140	1.85	5.55		None	SW846 3050B/6020
	Manganese		252	2.31	11.6		None	SW846 3050B/6020
	Nickel		10.5	0.0924	0.37		J-	SW846 3050B/6020
	Potassium		1530	14.8	55.5		None	SW846 3050B/6020
	Selenium		0.305	0.305	0.924	U	None	SW846 3050B/6020
	Silver		0.468	0.468	2.34	U	None	SW846 3050B/6010B
	Sodium		70.2	14.8	46.2		None	SW846 3050B/6020
	Thallium		0.0835	0.0555	0.37	JB	0.38U	SW846 3050B/6020
	Vanadium		22.6	0.0936	0.468		None	SW846 3050B/6010B
	Zinc		29.5	0.37	1.85		None	SW846 3050B/6020

See notes at end of appendix.

Table C-5. Summary of nonradiological results in sediment, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Aluminum	S-83	12500	142	474		J	SW846 3050B/6020
	Antimony		0.315	0.315	0.956	U	None	SW846 3050B/6010B
	Arsenic		2.75	0.19	0.949		None	SW846 3050B/6020
	Barium		162	0.0949	0.38		None	SW846 3050B/6020
	Beryllium		0.485	0.019	0.0949		None	SW846 3050B/6020
	Cadmium		0.244	0.019	0.19		None	SW846 3050B/6020
	Calcium		40400	313	949		None	SW846 3050B/6020
	Chromium		9.05	0.19	0.569		None	SW846 3050B/6020
	Cobalt		4.86	0.0569	0.19		None	SW846 3050B/6020
	Copper		10.5	0.0626	0.19		J	SW846 3050B/6020
	Iron		13400	313	949		J	SW846 3050B/6020
	Lead		11	0.0949	0.38	N	J	SW846 3050B/6020
	Magnesium		5190	1.9	5.69		J	SW846 3050B/6020
	Manganese		298	9.49	47.4		J	SW846 3050B/6020
	Nickel		8.96	0.0949	0.38		J	SW846 3050B/6020
	Potassium		3790	15.2	56.9		None	SW846 3050B/6020
	Selenium		0.313	0.313	0.949	U	None	SW846 3050B/6020
	Silver		0.0956	0.0956	0.478	U	None	SW846 3050B/6010B
	Sodium		73.5	15.2	47.4		None	SW846 3050B/6020
	Thallium		0.152	0.0569	0.38	J	None	SW846 3050B/6020
	Vanadium		23.2	0.0956	0.478		None	SW846 3050B/6010B
	Zinc		48.1	0.38	1.9		None	SW846 3050B/6020
	Aluminum	S-84	13200	146	485		J	SW846 3050B/6020
	Antimony		0.321	0.321	0.973	U	UJ	SW846 3050B/6010B
	Arsenic		2.88	0.194	0.971		None	SW846 3050B/6020
	Barium		123	0.0971	0.388		None	SW846 3050B/6020
	Beryllium		0.563	0.0194	0.0971		None	SW846 3050B/6020
	Cadmium		0.223	0.0194	0.194		None	SW846 3050B/6020
	Calcium		39500	320	971		None	SW846 3050B/6020
	Chromium		12.5	0.194	0.583		None	SW846 3050B/6020
	Cobalt		5.75	0.0583	0.194		None	SW846 3050B/6020
	Copper		13.4	0.0641	0.194	BN	J-	SW846 3050B/6020
	Iron		13500	320	971	B	J	SW846 3050B/6020
	Lead		11.3	0.0971	0.388		None	SW846 3050B/6020

See notes at end of appendix.

Table C-5. Summary of nonradiological results in sediment, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Magnesium	S-84	4880	1.94	5.83		J	SW846 3050B/6020
	Manganese		295	9.71	48.5		J	SW846 3050B/6020
	Nickel		11.2	0.0971	0.388		J-	SW846 3050B/6020
	Potassium		2820	15.5	58.3		None	SW846 3050B/6020
	Selenium		0.32	0.32	0.971	U	None	SW846 3050B/6020
	Silver		0.0973	0.0973	0.486	U	None	SW846 3050B/6010B
	Sodium		87	15.5	48.5		None	SW846 3050B/6020
	Thallium		0.176	0.0583	0.388	J	None	SW846 3050B/6020
	Vanadium		33.1	0.0973	0.486		None	SW846 3050B/6010B
	Zinc		47.8	0.388	1.94	B	None	SW846 3050B/6020
	Aluminum	S-85	12800	34	113		J	SW846 3050B/6020
	Antimony		0.317	0.317	0.96	U	None	SW846 3050B/6010B
	Arsenic		3.07	0.181	0.907		None	SW846 3050B/6020
	Barium		160	0.0907	0.363		J	SW846 3050B/6020
	Beryllium		0.608	0.0181	0.0907		None	SW846 3050B/6020
	Cadmium		0.287	0.0181	0.181		None	SW846 3050B/6020
	Calcium		63600	74.9	227	*	None	SW846 3050B/6020
	Chromium		14.4	0.181	0.544		None	SW846 3050B/6020
	Cobalt		5.3	0.0544	0.181		None	SW846 3050B/6020
	Copper		10.3	0.0599	0.181		None	SW846 3050B/6020
	Iron		12900	74.9	227		J	SW846 3050B/6020
	Lead		11.3	0.0907	0.363		None	SW846 3050B/6020
	Magnesium		4940	1.81	5.44		None	SW846 3050B/6020
	Manganese		255	2.27	11.3		None	SW846 3050B/6020
	Nickel		12.6	0.0907	0.363		J-	SW846 3050B/6020
	Potassium		2400	14.5	54.4		None	SW846 3050B/6020
	Selenium		0.299	0.299	0.907	U	None	SW846 3050B/6020
	Silver		0.48	0.48	2.4	U	None	SW846 3050B/6010B
	Sodium		77	14.5	45.4		None	SW846 3050B/6020
	Thallium		0.127	0.0544	0.363	JB	0.38U	SW846 3050B/6020
	Vanadium		23.8	0.096	0.48		None	SW846 3050B/6010B
	Zinc		41.6	0.363	1.81		None	SW846 3050B/6020

See notes at end of appendix.

Table C-5. Summary of nonradiological results in sediment, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Perimeter	Aluminum	P-60	6340	2.8	9.33		J	SW846 3050B/6020
	Antimony		0.311	0.311	0.943	U	None	SW846 3050B/6010B
	Arsenic		1.48	0.187	0.933		None	SW846 3050B/6020
	Barium		86.6	0.0933	0.373		None	SW846 3050B/6020
	Beryllium		0.301	0.0187	0.0933		None	SW846 3050B/6020
	Cadmium		0.104	0.0187	0.187	J	None	SW846 3050B/6020
	Calcium		18200	308	933		None	SW846 3050B/6020
	Chromium		6.02	0.187	0.56		None	SW846 3050B/6020
	Cobalt		3.28	0.056	0.187		None	SW846 3050B/6020
	Copper		5.26	0.0616	0.187		J-	SW846 3050B/6020
	Iron		8930	6.16	18.7		J	SW846 3050B/6020
	Lead		5.26	0.0933	0.373	N	J	SW846 3050B/6020
	Magnesium		2680	1.87	5.6		J	SW846 3050B/6020
	Manganese		202	9.33	46.6		J	SW846 3050B/6020
	Nickel		5.97	0.0933	0.373		J	SW846 3050B/6020
	Potassium		1410	14.9	56		None	SW846 3050B/6020
	Selenium		0.308	0.308	0.933	U	None	SW846 3050B/6020
	Silver		0.0943	0.0943	0.472	U	None	SW846 3050B/6010B
	Sodium		68	14.9	46.6		None	SW846 3050B/6020
	Thallium		0.0694	0.056	0.373	J	None	SW846 3050B/6020
	Vanadium		29.7	0.0943	0.472		None	SW846 3050B/6010B
	Zinc		23.8	0.373	1.87		None	SW846 3050B/6020
	Aluminum	P-65	3700	2.73	9.09	*B	J	SW846 3050B/6020
	Antimony		0.324	0.324	0.98	U	None	SW846 3050B/6010B
	Arsenic		0.427	0.182	0.909	J	None	SW846 3050B/6020
	Barium		31.4	0.0909	0.364		J	SW846 3050B/6020
	Beryllium		0.236	0.0182	0.0909		None	SW846 3050B/6020
	Cadmium		0.165	0.0182	0.182	J	None	SW846 3050B/6020
	Calcium		39500	150	455	*	J	SW846 3050B/6020
	Chromium		2.59	0.182	0.545	*N	J+	SW846 3050B/6020
	Cobalt		2.91	0.0545	0.182	*	None	SW846 3050B/6020
	Copper		4.63	0.06	0.182	*BN	J+	SW846 3050B/6020
	Iron		8040	150	455	*	J	SW846 3050B/6020
	Lead		3.98	0.0909	0.364		None	SW846 3050B/6020

See notes at end of appendix.

Table C-5. Summary of nonradiological results in sediment, calendar year 2014 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Perimeter	Magnesium	P-65	2480	1.82	5.45	*	None	SW846 3050B/6020
	Manganese		228	4.55	22.7		J	SW846 3050B/6020
	Nickel		3.69	0.0909	0.364	*	J-	SW846 3050B/6020
	Potassium		1320	14.5	54.5	*	None	SW846 3050B/6020
	Selenium		0.3	0.3	0.909	U	None	SW846 3050B/6020
	Silver		0.098	0.098	0.49	U	None	SW846 3050B/6010B
	Sodium		41.2	14.5	45.5	J	None	SW846 3050B/6020
	Thallium		0.0969	0.0545	0.364	JB	0.55U	SW846 3050B/6020
	Vanadium		32	0.098	0.49		None	SW846 3050B/6010B
	Zinc		27.6	0.364	1.82	*	J	SW846 3050B/6020
	Aluminum	P-73	5130	2.77	9.23		J	SW846 3050B/6020
	Antimony		0.306	0.306	0.926	U	None	SW846 3050B/6010B
	Arsenic		0.789	0.185	0.923	J	None	SW846 3050B/6020
	Barium		30.1	0.0923	0.369		None	SW846 3050B/6020
	Beryllium		0.272	0.0185	0.0923		None	SW846 3050B/6020
	Cadmium		0.0974	0.0185	0.185	J	None	SW846 3050B/6020
	Calcium		32300	304	923		None	SW846 3050B/6020
	Chromium		3.51	0.185	0.554		None	SW846 3050B/6020
	Cobalt		3.69	0.0554	0.185		None	SW846 3050B/6020
	Copper		5.26	0.0609	0.185		J-	SW846 3050B/6020
	Iron		10200	304	923		J	SW846 3050B/6020
	Lead		2.89	0.0923	0.369	N	J	SW846 3050B/6020
	Magnesium		3600	1.85	5.54		J	SW846 3050B/6020
	Manganese		271	9.23	46.1		J	SW846 3050B/6020
	Nickel		4.33	0.0923	0.369		J-	SW846 3050B/6020
	Potassium		908	14.8	55.4		None	SW846 3050B/6020
	Selenium		0.304	0.304	0.923	U	None	SW846 3050B/6020
	Silver		0.0926	0.0926	0.463	U	None	SW846 3050B/6010B
	Sodium		37.9	14.8	46.1	J	None	SW846 3050B/6020
	Thallium		0.0554	0.0554	0.369	U	None	SW846 3050B/6020
	Vanadium		7.13	0.0926	0.463		None	SW846 3050B/6010B
	Zinc		32.1	0.369	1.85		None	SW846 3050B/6020

See notes at end of appendix.

Table C-6. Summary of perchlorate results in soil, calendar year 2014

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-site	Perchlorate	S-53	0.0247	0.01	0.04	J	None	EPA 314.0

See notes at end of appendix.

NOTES

Units
mg/kg = milligrams per kilogram
mR = milliroentgen
pCi/g = picocuries per gram
pCi/L = picocuries per liter

Location
N = north
NE = northeast
NW = northwest
SE = southeast
SW = southwest

MDA or MDL
MDA = 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

PQL
PQL = practical quantitation limit; the lowest concentration of analytes in a sample that can be determined reliably within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions

Laboratory Data Qualifier
B = analyte detected in the blank
J = estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
N = a spike was outside limits
U = analyte is absent or below the method detection limit
* = a replicate was outside limits

Data Validation Qualifier
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+ = The associated numerical value is an estimated quantity with a suspected positive base
J- = The associated numerical value is an estimated quantity with a suspected negative base
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

Analytical Method
DOE (U.S. Department of Energy) Environmental Measurements Laboratory. 1997. *The Procedures Manual of the Environmental Measurements Laboratory*, HASL-300, 28th ed., vol. 1. New York, NY: DOE.
EPA (U.S. Environmental Protection Agency). 1986 (and updates). *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed. Washington, D.C.: EPA.
——. 1999. *Determination of Perchlorate in Drinking Water Using Ion Chromatography,* EPA Method 314.0. Cincinnati, OH: EPA National Exposure Research Laboratory Office of Research and Development.
GEL (GEL Laboratories, LLC). 2010. *Standard Operating Procedure GL-RAD-A-002.* Charleston, SC: GEL.



Appendix D
2014 Wastewater Monitoring Results

Table D-1. Summary of inorganic results for permitted sanitary outfalls, February–April 2014 ..... D-2
Table D-2. Summary of radiological results for permitted sanitary outfalls, April 2014 ..... D-11
Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2014 ..... D-15
Table D-4. Summary of volatile organic compound results for permitted sanitary outfalls, October 2014 ..... D-27
Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 ..... D-37
Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 ..... D-64
Table D-7. Summary of inorganic results for permitted sanitary outfalls, August and October 2014 ..... D-87
Table D-8. Summary of radiological results for permitted sanitary outfalls, October 2014 ..... D-93
Table D-9. Summary of volatile organic compound results for permitted sanitary outfalls, October 2014 ..... D-97
Table D-10. Summary of semivolitile organic compound results for permitted sanitary outfalls, October 2014 ..... D-107
NOTES D-119

Appendix D presents the wastewater monitoring results for calendar year 2014.

Table D-1. Summary of inorganic results for permitted sanitary outfalls, February–April 2014

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Regulatory Limit (ABCWUA)	Analytical Method
CINT	2238A	24-Feb-14	095355-011	Cyanide, total		0.00167	U	0.45	SW846 9012B
			095355-012	Cyanide, total		0.00167	U	0.45	SW846 9012B
			095355-010	Cyanide, total		0.00167	U	0.45	SW846 9012B
			095355-009	Cyanide, total		0.00167	U	0.45	SW846 9012B
		25-Feb-14	095356-001	Aluminum	0.0756	0.068	J	900	SW846 3010/6010B
			095356-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			095356-001	Boron	0.0809	0.015			SW846 3010/6010B
			095356-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			095356-001	Chromium	0.0023	0.001	J	4.1	SW846 3010/6010B
			095356-001	Copper	0.0142	0.003		5.3	SW846 3010/6010B
			095356-002	Fluoride	0.918	0.033		36	EPA 300.0
			095356-001	Lead		0.0033	U	1	SW846 3010/6010B
			095356-001	Mercury	0.000068	0.000067	J		SW846 7470A
			095356-001	Molybdenum	0.0358	0.002	B	2	SW846 3010/6010B
			095356-001	Nickel		0.0015	U	2	SW846 3010/6010B
			095356-001	Selenium	0.0125	0.006	J	0.46	SW846 3010/6010B
			095356-001	Silver	0.0101	0.001		5	SW846 3010/6010B
			095356-001	Zinc	0.00436	0.0033	J	2.2	SW846 3010/6010B
		26-Feb-14	095357-001	Aluminum		0.068	U	900	SW846 3010/6010B
			095357-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			095357-001	Boron	0.0831	0.015			SW846 3010/6010B
			095357-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			095357-001	Chromium	0.00203	0.001	J	4.1	SW846 3010/6010B
			095357-001	Copper	0.00357	0.003	J	5.3	SW846 3010/6010B
			095357-002	Fluoride	0.955	0.033		36	EPA 300.0
			095357-001	Lead	0.00581	0.0033	JB	1	SW846 3010/6010B
			095357-001	Mercury		0.000067	U		SW846 7470A
			095357-001	Molybdenum	0.0397	0.002	B	2	SW846 3010/6010B
			095357-001	Nickel		0.0015	U	2	SW846 3010/6010B
			095357-001	Selenium	0.0179	0.006	J	0.46	SW846 3010/6010B
			095357-001	Silver		0.001	U	5	SW846 3010/6010B
			095357-001	Zinc		0.0033	U	2.2	SW846 3010/6010B

See notes at end of appendix.

Table D-1. Summary of inorganic results for permitted sanitary outfalls, February–April 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Regulatory Limit (ABCWUA)	Analytical Method
CINT	2238A	22-Apr-14	095367-007	Ammonia	1.53	0.017			EPA 350.1
		23-Apr-14	095374-007	Ammonia	0.348	0.017			EPA 350.1
WW001	2069A	22-Apr-14	095362-001	Aluminum	0.139	0.068	J	900	SW846 3010/6010B
			095362-007	Ammonia	18.6	0.17			EPA 350.1
			095362-001	Arsenic	0.00562	0.005	J	0.051	SW846 3010/6010B
			095362-001	Boron	0.124	0.015			SW846 3010/6010B
			095362-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			095362-001	Chromium	0.00445	0.001	J	4.1	SW846 3010/6010B
			095362-001	Copper	0.0651	0.003		5.3	SW846 3010/6010B
			095362-002	Fluoride	7.38	0.165		36	EPA 300.0
			095362-001	Lead	0.00688	0.0033	J	1	SW846 3010/6010B
			095362-001	Mercury		0.000067	U		SW846 7470A
			095362-001	Molybdenum	0.0259	0.002		2	SW846 3010/6010B
			095362-001	Nickel	0.00275	0.0015	J	2	SW846 3010/6010B
			095362-001	Selenium	0.014	0.006	J	0.46	SW846 3010/6010B
			095362-001	Silver		0.001	U	5	SW846 3010/6010B
			095362-001	Zinc	0.125	0.0033		2.2	SW846 3010/6010B
		23-Apr-14	095369-001	Aluminum		0.068	U	900	SW846 3010/6010B
			095369-007	Ammonia	11.8	0.17			EPA 350.1
			095369-001	Arsenic	0.00867	0.005	J	0.051	SW846 3010/6010B
			095369-001	Boron	0.0924	0.015			SW846 3010/6010B
			095369-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			095369-001	Chromium	0.00225	0.001	J	4.1	SW846 3010/6010B
			095369-001	Copper	0.0482	0.003		5.3	SW846 3010/6010B
			095369-002	Fluoride	8.48	0.165		36	EPA 300.0
			095369-001	Lead	0.00984	0.0033	JB	1	SW846 3010/6010B
			095369-001	Mercury		0.000067	U		SW846 7470A
			095369-001	Molybdenum	0.0292	0.002		2	SW846 3010/6010B
			095369-001	Nickel	0.00417	0.0015	J	2	SW846 3010/6010B
			095369-001	Selenium	0.0249	0.006	J	0.46	SW846 3010/6010B
			095369-001	Silver		0.001	U	5	SW846 3010/6010B
			095369-001	Zinc	0.0481	0.0033		2.2	SW846 3010/6010B

See notes at end of appendix.

Table D-1. Summary of inorganic results for permitted sanitary outfalls, February–April 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Regulatory Limit (ABCWUA)	Analytical Method
WW006	2069F	21-Apr-14	095358-012	Cyanide, total		0.00167	U	0.45	SW846 9012B
			095358-010	Cyanide, total		0.00167	U	0.45	SW846 9012B
			095358-009	Cyanide, total	0.00168	0.00167	J	0.45	SW846 9012B
			095358-011	Cyanide, total		0.00167	U	0.45	SW846 9012B
		22-Apr-14	095363-001	Aluminum	0.362	0.068		900	SW846 3010/6010B
			095363-007	Ammonia	55.5	0.85			EPA 350.1
			095363-001	Arsenic	0.0102	0.005	J	0.051	SW846 3010/6010B
			095363-001	Boron	0.284	0.015			SW846 3010/6010B
			095363-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			095363-001	Chromium	0.00749	0.001		4.1	SW846 3010/6010B
			095363-001	Copper	0.0535	0.003		5.3	SW846 3010/6010B
			095363-002	Fluoride	0.788	0.033		36	EPA 300.0
			095363-001	Lead		0.0165	U	1	SW846 3010/6010B
			095363-001	Mercury		0.000067	U		SW846 7470A
			095363-001	Molybdenum	0.0171	0.002		2	SW846 3010/6010B
			095363-001	Nickel	0.00264	0.0015	J	2	SW846 3010/6010B
			095363-001	Selenium	0.015	0.006	J	0.46	SW846 3010/6010B
			095363-001	Silver	0.00515	0.001		5	SW846 3010/6010B
			095363-001	Zinc	0.158	0.0033		2.2	SW846 3010/6010B
		23-Apr-14	095370-001	Aluminum	0.161	0.068	J	900	SW846 3010/6010B
			095370-007	Ammonia	65	0.85			EPA 350.1
			095370-001	Arsenic	0.0121	0.005	J	0.051	SW846 3010/6010B
			095370-001	Boron	0.138	0.015			SW846 3010/6010B
			095370-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			095370-001	Chromium	0.00183	0.001	J	4.1	SW846 3010/6010B
			095370-001	Copper	0.0277	0.003		5.3	SW846 3010/6010B
			095370-002	Fluoride	0.714	0.033		36	EPA 300.0
			095370-001	Lead	0.0191	0.0165	JB	1	SW846 3010/6010B
			095370-001	Mercury		0.000067	U		SW846 7470A
			095370-001	Molybdenum	0.0248	0.002		2	SW846 3010/6010B
			095370-001	Nickel	0.00168	0.0015	J	2	SW846 3010/6010B
			095370-001	Selenium	0.025	0.006	J	0.46	SW846 3010/6010B

See notes at end of appendix.

Table D-1. Summary of inorganic results for permitted sanitary outfalls, February–April 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Regulatory Limit (ABCWUA)	Analytical Method
WW006	2069F	23-Apr-14	095370-001	Silver		0.001	U	5	SW846 3010/6010B
			095370-001	Zinc	0.0567	0.0033		2.2	SW846 3010/6010B
WW006 #2	2069F	22-Apr-14	095361-012	Cyanide, total		0.00167	U	0.45	SW846 9012B
			095361-011	Cyanide, total		0.00167	U	0.45	SW846 9012B
			095361-009	Cyanide, total		0.00167	U	0.45	SW846 9012B
			095361-010	Cyanide, total		0.00167	U	0.45	SW846 9012B
WW007	2069G	21-Apr-14	095359-011	Cyanide, total		0.00167	U	0.45	SW846 9012B
			095359-012	Cyanide, total		0.00167	U	0.45	SW846 9012B
			095359-010	Cyanide, total		0.00167	U	0.45	SW846 9012B
			095359-009	Cyanide, total		0.00167	U	0.45	SW846 9012B
		22-Apr-14	095364-001	Aluminum		0.068	U	900	SW846 3010/6010B
			095364-007	Ammonia	3.47	0.085			EPA 350.1
			095364-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			095364-001	Boron	0.0279	0.015	J		SW846 3010/6010B
			095364-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			095364-001	Chromium	0.00142	0.001	J	4.1	SW846 3010/6010B
			095364-001	Copper	0.00304	0.003	J	5.3	SW846 3010/6010B
			095364-002	Fluoride	10.7	0.165		36	EPA 300.0
			095364-001	Lead		0.0165	U	1	SW846 3010/6010B
			095364-001	Mercury		0.000067	U		SW846 7470A
			095364-001	Molybdenum	0.0191	0.002		2	SW846 3010/6010B
			095364-001	Nickel		0.0015	U	2	SW846 3010/6010B
			095364-001	Selenium	0.00648	0.006	J	0.46	SW846 3010/6010B
			095364-001	Silver		0.001	U	5	SW846 3010/6010B
			095364-001	Zinc		0.0033	U	2.2	SW846 3010/6010B
		23-Apr-14	095371-001	Aluminum		0.068	U	900	SW846 3010/6010B
			095371-007	Ammonia	3.42	0.085			EPA 350.1
			095371-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			095371-001	Boron	0.0283	0.015	J		SW846 3010/6010B
			095371-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			095371-001	Chromium	0.00231	0.001	J	4.1	SW846 3010/6010B
			095371-001	Copper	0.00354	0.003	J	5.3	SW846 3010/6010B
			095371-002	Fluoride	9.22	0.165		36	EPA 300.0

See notes at end of appendix.

Table D-1. Summary of inorganic results for permitted sanitary outfalls, February–April 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Regulatory Limit (ABCWUA)	Analytical Method
WW007	2069G	23-Apr-14	095371-001	Lead		0.0165	U	1	SW846 3010/6010B
			095371-001	Mercury		0.000067	U		SW846 7470A
			095371-001	Molybdenum	0.0194	0.002		2	SW846 3010/6010B
			095371-001	Nickel		0.0015	U	2	SW846 3010/6010B
			095371-001	Selenium	0.0172	0.006	J	0.46	SW846 3010/6010B
			095371-001	Silver		0.001	U	5	SW846 3010/6010B
			095371-001	Zinc		0.0033	U	2.2	SW846 3010/6010B
WW008	2069I	25-Feb-14	095354-001	Aluminum	0.0694	0.068	J	900	SW846 3010/6010B
			095354-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			095354-001	Boron	0.0904	0.015			SW846 3010/6010B
			095354-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			095354-001	Chromium	0.00106	0.001	J	4.1	SW846 3010/6010B
			095354-001	Copper	0.0329	0.003		5.3	SW846 3010/6010B
			095354-001	Lead		0.0033	U	1	SW846 3010/6010B
			095354-001	Mercury		0.000067	U		SW846 7470A
			095354-001	Molybdenum	0.00598	0.002	JB	2	SW846 3010/6010B
			095354-001	Nickel	0.0125	0.0015		2	SW846 3010/6010B
			095354-001	Selenium	0.00737	0.006	J	0.46	SW846 3010/6010B
			095354-001	Silver	0.00364	0.001	J	5	SW846 3010/6010B
			095354-001	Zinc	0.0701	0.0033		2.2	SW846 3010/6010B
		7-Mar-14	095582-001	Aluminum	0.0742	0.068	J	900	SW846 3010/6010B
			095582-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			095582-001	Boron	0.0834	0.015			SW846 3010/6010B
			095582-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			095582-001	Chromium	0.00171	0.001	JB	4.1	SW846 3010/6010B
			095582-001	Copper	0.0263	0.003		5.3	SW846 3010/6010B
			095582-001	Lead		0.0033	U	1	SW846 3010/6010B
			095582-001	Mercury		0.000067	U		SW846 7470A
			095582-001	Molybdenum	0.00433	0.002	J	2	SW846 3010/6010B
			095582-001	Nickel	0.0119	0.0015		2	SW846 3010/6010B
			095582-001	Selenium	0.0269	0.006	JB	0.46	SW846 3010/6010B
			095582-001	Silver	0.0034	0.001	J	5	SW846 3010/6010B
			095582-001	Zinc	0.0681	0.0033		2.2	SW846 3010/6010B

See notes at end of appendix.

Table D-1. Summary of inorganic results for permitted sanitary outfalls, February–April 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Regulatory Limit (ABCWUA)	Analytical Method
WW008	2069I	25-Mar-14	095599-001	Aluminum	0.101	0.068	J	900	SW846 3010/6010B
			095599-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			095599-001	Boron	0.122	0.015			SW846 3010/6010B
			095599-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			095599-001	Chromium	0.00116	0.001	J	4.1	SW846 3010/6010B
			095599-001	Copper	0.0308	0.003		5.3	SW846 3010/6010B
			095599-001	Lead		0.033	U	1	SW846 3010/6010B
			095599-001	Mercury		0.000067	U		SW846 7470A
			095599-001	Molybdenum	0.00773	0.002	J	2	SW846 3010/6010B
			095599-001	Nickel	0.00747	0.0015		2	SW846 3010/6010B
			095599-001	Selenium	0.00875	0.006	J	0.46	SW846 3010/6010B
			095599-001	Silver		0.001	U	5	SW846 3010/6010B
			095599-001	Zinc	0.0859	0.0033		2.2	SW846 3010/6010B
		26-Mar-14	095600-001	Aluminum	0.0939	0.068	J	900	SW846 3010/6010B
			095600-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			095600-001	Boron	0.0909	0.015			SW846 3010/6010B
			095600-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			095600-001	Chromium	0.00121	0.001	J	4.1	SW846 3010/6010B
			095600-001	Copper	0.0238	0.003		5.3	SW846 3010/6010B
			095600-001	Lead		0.033	U	1	SW846 3010/6010B
			095600-001	Mercury		0.000067	U		SW846 7470A
			095600-001	Molybdenum	0.0046	0.002	J	2	SW846 3010/6010B
			095600-001	Nickel	0.0059	0.0015		2	SW846 3010/6010B
			095600-001	Selenium		0.006	U	0.46	SW846 3010/6010B
			095600-001	Silver		0.001	U	5	SW846 3010/6010B
			095600-001	Zinc	0.0611	0.0033		2.2	SW846 3010/6010B
		27-Mar-14	095601-001	Aluminum	0.0944	0.068	J	900	SW846 3010/6010B
			095601-001	Arsenic	0.00549	0.005	J	0.051	SW846 3010/6010B
			095601-001	Boron	0.0842	0.015			SW846 3010/6010B
			095601-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			095601-001	Chromium	0.00155	0.001	J	4.1	SW846 3010/6010B
			095601-001	Copper	0.0172	0.003		5.3	SW846 3010/6010B
			095601-001	Lead	0.043	0.033	J	1	SW846 3010/6010B

See notes at end of appendix.

Table D-1. Summary of inorganic results for permitted sanitary outfalls, February–April 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Regulatory Limit (ABCWUA)	Analytical Method
WW008	2069I	27-Mar-14	095601-001	Mercury		0.000067	U		SW846 7470A
			095601-001	Molybdenum	0.00537	0.002	J	2	SW846 3010/6010B
			095601-001	Nickel	0.00805	0.0015		2	SW846 3010/6010B
			095601-001	Selenium	0.011	0.006	J	0.46	SW846 3010/6010B
			095601-001	Silver		0.001	U	5	SW846 3010/6010B
			095601-001	Zinc	0.0369	0.0033		2.2	SW846 3010/6010B
		28-Mar-14	095602-001	Aluminum		0.068	U	900	SW846 3010/6010B
			095602-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			095602-001	Boron	0.0851	0.015			SW846 3010/6010B
			095602-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			095602-001	Chromium		0.001	U	4.1	SW846 3010/6010B
			095602-001	Copper	0.0141	0.003		5.3	SW846 3010/6010B
			095602-001	Lead		0.033	U	1	SW846 3010/6010B
			095602-001	Mercury		0.000067	U		SW846 7470A
			095602-001	Molybdenum	0.00533	0.002	J	2	SW846 3010/6010B
			095602-001	Nickel	0.00701	0.0015		2	SW846 3010/6010B
			095602-001	Selenium		0.006	U	0.46	SW846 3010/6010B
			095602-001	Silver		0.001	U	5	SW846 3010/6010B
			095602-001	Zinc	0.0295	0.0033		2.2	SW846 3010/6010B
		21-Apr-14	095360-011	Cyanide, total		0.00167	U	0.45	SW846 9012B
			095360-009	Cyanide, total		0.00167	U	0.45	SW846 9012B
			095360-010	Cyanide, total	0.00295	0.00167	J	0.45	SW846 9012B
			095360-012	Cyanide, total		0.00167	U	0.45	SW846 9012B
		22-Apr-14	095365-001	Aluminum		0.068	U	900	SW846 3010/6010B
			095365-007	Ammonia	28	0.85			EPA 350.1
			095365-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			095365-001	Boron	0.0714	0.015			SW846 3010/6010B
			095365-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			095365-001	Chromium	0.00121	0.001	J	4.1	SW846 3010/6010B
			095365-001	Copper	0.0463	0.003		5.3	SW846 3010/6010B
			095365-002	Fluoride	0.551	0.033		36	EPA 300.0
			095365-001	Lead		0.0165	U	1	SW846 3010/6010B
			095365-001	Mercury		0.000067	U		SW846 7470A

See notes at end of appendix.

Table D-1. Summary of inorganic results for permitted sanitary outfalls, February–April 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Regulatory Limit (ABCWUA)	Analytical Method
WW008	2069I	22-Apr-14	095365-001	Molybdenum	0.00562	0.002	J	2	SW846 3010/6010B
			095365-001	Nickel	0.00554	0.0015		2	SW846 3010/6010B
			095365-001	Selenium	0.0239	0.006	J	0.46	SW846 3010/6010B
			095365-001	Silver		0.001	U	5	SW846 3010/6010B
			095365-001	Zinc	0.0351	0.0033		2.2	SW846 3010/6010B
		23-Apr-14	095372-001	Aluminum		0.068	U	900	SW846 3010/6010B
			095372-007	Ammonia	27.4	0.85			EPA 350.1
			095372-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			095372-001	Boron	0.0711	0.015			SW846 3010/6010B
			095372-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			095372-001	Chromium	0.00128	0.001	J	4.1	SW846 3010/6010B
			095372-001	Copper	0.0229	0.003		5.3	SW846 3010/6010B
			095372-002	Fluoride	0.548	0.033		36	EPA 300.0
			095372-001	Lead		0.0033	U	1	SW846 3010/6010B
			095372-001	Mercury		0.000067	U		SW846 7470A
			095372-001	Molybdenum	0.00476	0.002	J	2	SW846 3010/6010B
			095372-001	Nickel	0.00443	0.0015	J	2	SW846 3010/6010B
			095372-001	Selenium	0.0256	0.006	J	0.46	SW846 3010/6010B
			095372-001	Silver		0.001	U	5	SW846 3010/6010B
			095372-001	Zinc	0.0339	0.0033		2.2	SW846 3010/6010B
WW011	2069K	22-Apr-14	095366-001	Aluminum	0.12	0.068	J	900	SW846 3010/6010B
			095366-007	Ammonia	19.6	0.17			EPA 350.1
			095366-001	Arsenic	0.0116	0.005	J	0.051	SW846 3010/6010B
			095366-001	Boron	0.171	0.015			SW846 3010/6010B
			095366-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			095366-001	Chromium	0.0294	0.001		4.1	SW846 3010/6010B
			095366-001	Copper	0.0255	0.003		5.3	SW846 3010/6010B
			095366-002	Fluoride	0.873	0.033		36	EPA 300.0
			095366-001	Lead	0.0185	0.0165	J	1	SW846 3010/6010B
			095366-001	Mercury		0.000067	U		SW846 7470A
			095366-001	Molybdenum	0.41	0.002		2	SW846 3010/6010B
			095366-001	Nickel		0.0015	U	2	SW846 3010/6010B
			095366-001	Selenium	0.0136	0.006	J	0.46	SW846 3010/6010B

See notes at end of appendix.

Table D-1. Summary of inorganic results for permitted sanitary outfalls, February–April 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Regulatory Limit (ABCWUA)	Analytical Method
WW011	2069K	22-Apr-14	095366-001	Silver	0.00248	0.001	J	5	SW846 3010/6010B
			095366-001	Zinc	0.0445	0.0033		2.2	SW846 3010/6010B
		23-Apr-14	095373-001	Aluminum	0.0995	0.068	J	900	SW846 3010/6010B
			095373-007	Ammonia	24.2	0.85			EPA 350.1
			095373-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			095373-001	Boron	0.105	0.015			SW846 3010/6010B
			095373-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			095373-001	Chromium	0.00231	0.001	J	4.1	SW846 3010/6010B
			095373-001	Copper	0.0394	0.003		5.3	SW846 3010/6010B
			095373-002	Fluoride	0.901	0.033		36	EPA 300.0
			095373-001	Lead		0.0165	U	1	SW846 3010/6010B
			095373-001	Mercury		0.000067	U		SW846 7470A
			095373-001	Molybdenum	0.141	0.002		2	SW846 3010/6010B
			095373-001	Nickel	0.00297	0.0015	J	2	SW846 3010/6010B
			095373-001	Selenium	0.0112	0.006	J	0.46	SW846 3010/6010B
			095373-001	Silver		0.001	U	5	SW846 3010/6010B
			095373-001	Zinc	0.0499	0.0033		2.2	SW846 3010/6010B

See notes at end of appendix.

Table D-2. Summary of radiological results for permitted sanitary outfalls, April 2014

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Activity (pCi/L)	MDA (pCi/L)	Laboratory Data Qualifiers	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
CINT	2238A	22-Apr-2014	095367-004	Actinium-228	1.22 ± 12.8	13.2	U	300,000	EPA 901.1
			095367-003	Alpha, gross	0.518 ± 5.77	10.4	U		EPA 900.0/SW846 9310
			095367-004	Americium-241	4.09 ± 6.19	9.36	U	200	EPA 901.1
			095367-004	Beryllium-7	2.08 ± 13.3	23.4	U		EPA 901.1
			095367-003	Beta, gross	10.8 ± 4.2	5.89			EPA 900.0/SW846 9310
			095367-004	Bismuth-212	17.1 ± 23	38.8	U		EPA 901.1
			095367-004	Bismuth-214	-5.68 ± 7.57	6.83	U		EPA 901.1
			095367-004	Cesium-137	-0.753 ± 2.84	3.11	U	10,000	EPA 901.1
			095367-004	Cobalt-60	0.586 ± 3.33	2.43	U	30,000	EPA 901.1
			095367-004	Lead-212	0.977 ± 5.41	5.4	U	20,000	EPA 901.1
			095367-004	Lead-214	-4.95 ± 6.99	6.76	U	1,000,000	EPA 901.1
			095367-004	Neptunium-237	-2.77 ± 3.62	5.54	U		EPA 901.1
			095367-004	Potassium-40	11.8 ± 32.2	28.6	U	40,000	EPA 901.1
			095367-004	Radium-223	6.53 ± 32.7	55	U		EPA 901.1
			095367-004	Radium-224	73.5 ± 47.4	73.5	U		EPA 901.1
			095367-004	Radium-226	59.9 ± 76.9	53.1	X	600	EPA 901.1
			095367-004	Radium-228	1.22 ± 12.8	13.2	U	600	EPA 901.1
			095367-004	Sodium-22	-0.0473 ± 1.65	2.94	U		EPA 901.1
			095367-004	Thorium-227	-7.52 ± 13	20.7	U		EPA 901.1
			095367-004	Thorium-231	-13.7 ± 30.9	32.1	U	300	EPA 901.1
			095367-004	Thorium-234	77.3 ± 104	95.9	U	50,000	EPA 901.1
			095367-005	Tritium	-84.1 ± 110	195	U	10,000,000	EPA 906.0 Modified
			095367-004	Uranium-235	0.712 ± 16	16.4	U	3,000	EPA 901.1
			095367-004	Uranium-238	77.3 ± 104	95.9	U	3,000	EPA 901.1
WW001	2069A	22-Apr-2014	095362-004	Actinium-228	10.3 ± 17.6	16.7	U	300,000	EPA 901.1
			095362-003	Alpha, gross	5.49 ± 2.04	2.18			EPA 900.0/SW846 9310
			095362-004	Americium-241	1.69 ± 10.7	18.6	U	200	EPA 901.1
			095362-004	Beryllium-7	-7.19 ± 17.3	29.7	U		EPA 901.1
			095362-003	Beta, gross	13.8 ± 2.98	2.55			EPA 900.0/SW846 9310
			095362-004	Bismuth-212	9.26 ± 27.3	47.8	U		EPA 901.1
			095362-004	Bismuth-214	10.1 ± 8.78	7.07			EPA 901.1
			095362-004	Cesium-137	1.74 ± 2.24	3.56	U	10,000	EPA 901.1

See notes at end of appendix.

Table D-2. Summary of radiological results for permitted sanitary outfalls, April 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Activity (pCi/L)	MDA (pCi/L)	Laboratory Data Qualifiers	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW001	2069A	22-Apr-2014	095362-004	Cobalt-60	-2.41 ± 2.4	3.44	U	30,000	EPA 901.1
			095362-004	Lead-212	1.94 ± 7.36	6.14	U	20,000	EPA 901.1
			095362-004	Lead-214	-9.15 ± 10.9	8.45	U	1,000,000	EPA 901.1
			095362-004	Neptunium-237	1.41 ± 4.05	6.95	U		EPA 901.1
			095362-004	Potassium-40	-20.9 ± 45.7	53.8	U	40,000	EPA 901.1
			095362-004	Radium-223	32.7 ± 41.9	68.8	U		EPA 901.1
			095362-004	Radium-224	49.8 ± 48.1	67.4	U		EPA 901.1
			095362-004	Radium-226	51.7 ± 87.7	67.1	U	600	EPA 901.1
			095362-004	Radium-228	10.3 ± 17.6	16.7	U	600	EPA 901.1
			095362-004	Sodium-22	0.294 ± 2.09	3.74	U		EPA 901.1
			095362-004	Thorium-227	-8.01 ± 15.9	26.3	U		EPA 901.1
			095362-004	Thorium-231	-10.8 ± 25.8	42.5	U	300	EPA 901.1
			095362-004	Thorium-234	-103 ± 147	165	U	50,000	EPA 901.1
			095362-005	Tritium	-52.6 ± 108	189	U	10,000,000	EPA 906.0 Modified
			095362-004	Uranium-235	-3.06 ± 19.1	21.2	U	3,000	EPA 901.1
			095362-004	Uranium-238	-103 ± 147	165	U	3,000	EPA 901.1
WW006	2069F	22-Apr-2014	095363-004	Actinium-228	-10.4 ± 12.2	13.5	U	300,000	EPA 901.1
			095363-003	Alpha, gross	4.26 ± 2	2.71			EPA 900.0/SW846 9310
			095363-004	Americium-241	-2.79 ± 6.05	8.92	U	200	EPA 901.1
			095363-004	Beryllium-7	7.23 ± 15	26.1	U		EPA 901.1
			095363-003	Beta, gross	23.7 ± 4.33	2.1			EPA 900.0/SW846 9310
			095363-004	Bismuth-212	10.4 ± 26.4	45.2	U		EPA 901.1
			095363-004	Bismuth-214	-1.69 ± 7.01	7.46	U		EPA 901.1
			095363-004	Cesium-137	0.134 ± 1.96	3.37	U	10,000	EPA 901.1
			095363-004	Cobalt-60	0.632 ± 2.15	3.38	U	30,000	EPA 901.1
			095363-004	Lead-212	2.31 ± 6.51	5.01	U	20,000	EPA 901.1
			095363-004	Lead-214	-8 ± 7.37	7.13	U	1,000,000	EPA 901.1
			095363-004	Neptunium-237	1.93 ± 3.57	5.97	U		EPA 901.1
			095363-004	Potassium-40	20.4 ± 50.5	32.8	U	40,000	EPA 901.1
			095363-004	Radium-223	-8.1 ± 35.9	59.8	U		EPA 901.1
			095363-004	Radium-224	53.4 ± 43.2	56.7	U		EPA 901.1
			095363-004	Radium-226	73.3 ± 77.4	53.8	X	600	EPA 901.1
			095363-004	Radium-228	-10.4 ± 12.2	13.5	U	600	EPA 901.1

See notes at end of appendix.

Table D-2. Summary of radiological results for permitted sanitary outfalls, April 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Activity (pCi/L)	MDA (pCi/L)	Laboratory Data Qualifiers	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW006	2069F	22-Apr-2014	095363-004	Sodium-22	0.449 ± 1.96	3.55	U		EPA 901.1
			095363-004	Thorium-227	-4.47 ± 13.5	22.6	U		EPA 901.1
			095363-004	Thorium-231	14 ± 19.6	31.7	U	300	EPA 901.1
			095363-004	Thorium-234	42.1 ± 93.1	98.7	U	50,000	EPA 901.1
			095363-005	Tritium	0.175 ± 113	195	U	10,000,000	EPA 906.0 Modified
			095363-004	Uranium-235	0.711 ± 14.5	17.6	U	3,000	EPA 901.1
			095363-004	Uranium-238	42.1 ± 93.1	98.7	U	3,000	EPA 901.1
WW008	2069I	22-Apr-2014	095365-004	Actinium-228	8.81 ± 11.6	12.3	U	300,000	EPA 901.1
			095365-003	Alpha, gross	2.32 ± 1.77	2.8	U		EPA 900.0/SW846 9310
			095365-004	Americium-241	5.27 ± 10.5	16.9	U	200	EPA 901.1
			095365-004	Beryllium-7	9.91 ± 13.5	23.2	U		EPA 901.1
			095365-003	Beta, gross	15.4 ± 2.91	1.66			EPA 900.0/SW846 9310
			095365-004	Bismuth-212	43.6 ± 50.5	43.6	U		EPA 901.1
			095365-004	Bismuth-214	2.89 ± 7.77	5.72	U		EPA 901.1
			095365-004	Cesium-137	0.41 ± 1.74	2.89	U	10,000	EPA 901.1
			095365-004	Cobalt-60	-1.38 ± 1.73	2.74	U	30,000	EPA 901.1
			095365-004	Lead-212	4.42 ± 5.74	5.3	U	20,000	EPA 901.1
			095365-004	Lead-214	-1.71 ± 5.93	6.38	U	1,000,000	EPA 901.1
			095365-004	Neptunium-237	-1.75 ± 5.73	5.6	U		EPA 901.1
			095365-004	Potassium-40	14.2 ± 35.3	30.9	U	40,000	EPA 901.1
			095365-004	Radium-223	15.6 ± 30.8	54.1	U		EPA 901.1
			095365-004	Radium-224	19.5 ± 33.2	49.1	U		EPA 901.1
			095365-004	Radium-226	49.8 ± 75.9	47.8	X	600	EPA 901.1
			095365-004	Radium-228	8.81 ± 11.6	12.3	U	600	EPA 901.1
			095365-004	Sodium-22	-1.72 ± 1.81	2.75	U		EPA 901.1
			095365-004	Thorium-227	-3.98 ± 12.5	20.5	U		EPA 901.1
			095365-004	Thorium-231	18.7 ± 40.6	34.9	U	300	EPA 901.1
			095365-004	Thorium-234	34.3 ± 162	132	U	50,000	EPA 901.1
			095365-005	Tritium	-17.2 ± 131	228	U	10,000,000	EPA 906.0 Modified
			095365-004	Uranium-235	-12 ± 17.3	17	U	3,000	EPA 901.1
			095365-004	Uranium-238	34.3 ± 162	132	U	3,000	EPA 901.1

See notes at end of appendix.

Table D-2. Summary of radiological results for permitted sanitary outfalls, April 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Activity (pCi/L)	MDA (pCi/L)	Laboratory Data Qualifiers	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW011	2069K	22-Apr-2014	095366-004	Actinium-228	-10.4 ± 14	12.7	U	300,000	EPA 901.1
			095366-003	Alpha, gross	6.55 ± 2.69	3.13			EPA 900.0/SW846 9310
			095366-004	Americium-241	-1.79 ± 7.38	11.5	U	200	EPA 901.1
			095366-004	Beryllium-7	-2.84 ± 13.9	23.5	U		EPA 901.1
			095366-003	Beta, gross	32.8 ± 6.1	3.39			EPA 900.0/SW846 9310
			095366-004	Bismuth-212	12.5 ± 37.1	39.7	U		EPA 901.1
			095366-004	Bismuth-214	-2.97 ± 5.81	6.58	U		EPA 901.1
			095366-004	Cesium-137	-2.1 ± 3.81	3.63	U	10,000	EPA 901.1
			095366-004	Cobalt-60	0.789 ± 1.78	3.22	U	30,000	EPA 901.1
			095366-004	Iodine-131	90.7 ± 10.1	4.91			EPA 901.1
			095366-004	Lead-212	2.66 ± 5.79	4.8	U	20,000	EPA 901.1
			095366-004	Lead-214	1.04 ± 5.79	6.89	U	1,000,000	EPA 901.1
			095366-004	Neptunium-237	-0.271 ± 3.22	5.61	U		EPA 901.1
			095366-004	Potassium-40	14.4 ± 41.5	32.7	U	40,000	EPA 901.1
			095366-004	Radium-223	-13.6 ± 32.3	54.7	U		EPA 901.1
			095366-004	Radium-224	6.27 ± 32.1	50.4	U		EPA 901.1
			095366-004	Radium-226	17.8 ± 74.8	53.4	U	600	EPA 901.1
			095366-004	Radium-228	-10.4 ± 14	12.7	U	600	EPA 901.1
			095366-004	Sodium-22	-1.39 ± 1.64	2.54	U		EPA 901.1
			095366-004	Thorium-227	-4.18 ± 12.2	21	U		EPA 901.1
			095366-004	Thorium-231	7.38 ± 37.3	33	U	300	EPA 901.1
			095366-004	Thorium-234	42.1 ± 119	95.8	U	50,000	EPA 901.1
			095366-005	Tritium	-22.3 ± 111	193	U	10,000,000	EPA 906.0 Modified
			095366-004	Uranium-235	-1.23 ± 16.3	17.6	U	3,000	EPA 901.1
			095366-004	Uranium-238	42.1 ± 119	95.8	U	3,000	EPA 901.1

See notes at end of appendix.

Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2014

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
CINT	2238A	23-Apr-2014	095374-008	1,1'-Biphenyl		2.86	NU	SW846 3510C/8270D
			095374-008	Acenaphthene		0.286	NU	SW846 3510C/8270D
			095374-008	Acenaphthylene		0.286	NU	SW846 3510C/8270D
			095374-008	Acetophenone		2.86	U	SW846 3510C/8270D
			095374-008	Anthracene		0.286	NU	SW846 3510C/8270D
			095374-008	Atrazine		2.86	U	SW846 3510C/8270D
			095374-008	Benzaldehyde		2.86	U	SW846 3510C/8270D
			095374-008	Benzo(a)anthracene		0.286	NU	SW846 3510C/8270D
			095374-008	Benzo(a)pyrene		0.286	NU	SW846 3510C/8270D
			095374-008	Benzo(b)fluoranthene		0.286	NU	SW846 3510C/8270D
			095374-008	Benzo(ghi)perylene		0.286	U	SW846 3510C/8270D
			095374-008	Benzo(k)fluoranthene		0.286	NU	SW846 3510C/8270D
			095374-008	Bromophenyl phenyl ether, 4-		2.86	U	SW846 3510C/8270D
			095374-008	Butylbenzyl phthalate		2.86	U	SW846 3510C/8270D
			095374-008	Caprolactam		2.86	U	SW846 3510C/8270D
			095374-008	Carbazole		0.286	U	SW846 3510C/8270D
			095374-008	Chloro-3-methylphenol, 4-		2.86	U	SW846 3510C/8270D
			095374-008	Chlorobenzenamine, 4-		3.14	U	SW846 3510C/8270D
			095374-008	Chloroethoxy)methane, bis(2-		2.86	U	SW846 3510C/8270D
			095374-008	Chloroethyl)ether, bis(2-		2.86	U	SW846 3510C/8270D
			095374-008	Chloroisopropyl ether, bis-		2.86	U	SW846 3510C/8270D
			095374-008	Chloronaphthalene, 2-		0.39	NU	SW846 3510C/8270D
			095374-008	Chlorophenol, 2-		2.86	U	SW846 3510C/8270D
			095374-008	Chlorophenyl phenyl ether, 4-		2.86	U	SW846 3510C/8270D
			095374-008	Chrysene		0.286	NU	SW846 3510C/8270D
			095374-008	Cresol, m,p-		3.52	U	SW846 3510C/8270D
			095374-008	Cresol, o-		2.86	U	SW846 3510C/8270D
			095374-008	Di-n-butyl phthalate		2.86	U	SW846 3510C/8270D
			095374-008	Di-n-octyl phthalate		2.86	U	SW846 3510C/8270D
			095374-008	Dibenz[a,h]anthracene		0.286	U	SW846 3510C/8270D
			095374-008	Dibenzofuran		2.86	NU	SW846 3510C/8270D
			095374-008	Dichlorobenzidine, 3,3'-		2.86	U	SW846 3510C/8270D
			095374-008	Dichlorophenol, 2,4-		2.86	U	SW846 3510C/8270D

See notes at end of appendix.

Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
CINT	2238A	23-Apr-2014	095374-008	Diethylphthalate		2.86	NU	SW846 3510C/8270D
			095374-008	Dimethylphenol, 2,4-		2.86	U	SW846 3510C/8270D
			095374-008	Dimethylphthalate		2.86	U	SW846 3510C/8270D
			095374-008	Dinitro-o-cresol		2.86	*NU	SW846 3510C/8270D
			095374-008	Dinitrophenol, 2,4-		4.76	NU	SW846 3510C/8270D
			095374-008	Dinitrotoluene, 2,4-		2.86	U	SW846 3510C/8270D
			095374-008	Dinitrotoluene, 2,6-		2.86	U	SW846 3510C/8270D
			095374-008	Dioxane, 1,4-		2.86	U	SW846 3510C/8270D
			095374-008	Diphenyl amine		2.86	U	SW846 3510C/8270D
			095374-008	Ethylhexyl)phthalate, bis(2-		2.86	U	SW846 3510C/8270D
			095374-008	Fluoranthene		0.286	U	SW846 3510C/8270D
			095374-008	Fluorene		0.286	U	SW846 3510C/8270D
			095374-008	Hexachlorobenzene		2.86	NU	SW846 3510C/8270D
			095374-008	Hexachlorobutadiene		2.86	U	SW846 3510C/8270D
			095374-008	Hexachlorocyclopentadiene		2.86	NU	SW846 3510C/8270D
			095374-008	Hexachloroethane		2.86	U	SW846 3510C/8270D
			095374-008	Indeno(1,2,3-c,d)pyrene		0.286	U	SW846 3510C/8270D
			095374-008	Isophorone		3.33	U	SW846 3510C/8270D
			095374-008	Methylnaphthalene, 2-		0.286	U	SW846 3510C/8270D
			095374-008	Naphthalene		0.286	U	SW846 3510C/8270D
			095374-008	Nitro-benzene		2.86	U	SW846 3510C/8270D
			095374-008	Nitroaniline, 2-		2.86	U	SW846 3510C/8270D
			095374-008	Nitroaniline, 3-		2.86	U	SW846 3510C/8270D
			095374-008	Nitroaniline, 4-		2.86	U	SW846 3510C/8270D
			095374-008	Nitrophenol, 2-		2.86	U	SW846 3510C/8270D
			095374-008	Nitrophenol, 4-		2.86	U	SW846 3510C/8270D
			095374-008	Nitrosodipropylamine, n-		2.86	U	SW846 3510C/8270D
			095374-008	Pentachlorophenol		2.86	U	SW846 3510C/8270D
			095374-008	Phenanthrene		0.286	NU	SW846 3510C/8270D
			095374-008	Phenol		2.86	U	SW846 3510C/8270D
			095374-008	Pyrene		0.286	U	SW846 3510C/8270D
			095374-008	Trichlorobenzene, 1,2,4-		2.86	U	SW846 3510C/8270D
			095374-008	Trichlorophenol, 2,4,5-		2.86	U	SW846 3510C/8270D
			095374-008	Trichlorophenol, 2,4,6-		2.86	NU	SW846 3510C/8270D

See notes at end of appendix.

Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW001	2069A	23-Apr-2014	095369-008	1,1'-Biphenyl		3	U	SW846 3510C/8270D
			095369-008	Acenaphthene		0.3	U	SW846 3510C/8270D
			095369-008	Acenaphthylene		0.3	U	SW846 3510C/8270D
			095369-008	Acetophenone		3	U	SW846 3510C/8270D
			095369-008	Anthracene		0.3	U	SW846 3510C/8270D
			095369-008	Atrazine		3	U	SW846 3510C/8270D
			095369-008	Benzaldehyde		3	U	SW846 3510C/8270D
			095369-008	Benzo(a)anthracene		0.3	U	SW846 3510C/8270D
			095369-008	Benzo(a)pyrene		0.3	U	SW846 3510C/8270D
			095369-008	Benzo(b)fluoranthene		0.3	U	SW846 3510C/8270D
			095369-008	Benzo(ghi)perylene		0.3	U	SW846 3510C/8270D
			095369-008	Benzo(k)fluoranthene		0.3	U	SW846 3510C/8270D
			095369-008	Bromophenyl phenyl ether, 4-		3	U	SW846 3510C/8270D
			095369-008	Butylbenzyl phthalate		3	U	SW846 3510C/8270D
			095369-008	Caprolactam		3	U	SW846 3510C/8270D
			095369-008	Carbazole		0.3	U	SW846 3510C/8270D
			095369-008	Chloro-3-methylphenol, 4-		3	U	SW846 3510C/8270D
			095369-008	Chlorobenzenamine, 4-		3.3	U	SW846 3510C/8270D
			095369-008	Chloroethoxy)methane, bis(2-		3	U	SW846 3510C/8270D
			095369-008	Chloroethyl)ether, bis(2-		3	U	SW846 3510C/8270D
			095369-008	Chloroisopropyl ether, bis-		3	U	SW846 3510C/8270D
			095369-008	Chloronaphthalene, 2-		0.41	U	SW846 3510C/8270D
			095369-008	Chlorophenol, 2-		3	U	SW846 3510C/8270D
			095369-008	Chlorophenyl phenyl ether, 4-		3	U	SW846 3510C/8270D
			095369-008	Chrysene		0.3	U	SW846 3510C/8270D
			095369-008	Cresol, m,p-		3.7	U	SW846 3510C/8270D
			095369-008	Cresol, o-		3	U	SW846 3510C/8270D
			095369-008	Di-n-butyl phthalate		3	U	SW846 3510C/8270D
			095369-008	Di-n-octyl phthalate		3	U	SW846 3510C/8270D
			095369-008	Dibenz[a,h]anthracene		0.3	U	SW846 3510C/8270D
			095369-008	Dibenzofuran		3	U	SW846 3510C/8270D
			095369-008	Dichlorobenzidine, 3,3'-		3	U	SW846 3510C/8270D
			095369-008	Dichlorophenol, 2,4-		3	U	SW846 3510C/8270D
			095369-008	Diethylphthalate		3	U	SW846 3510C/8270D

See notes at end of appendix.

Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW001	2069A	23-Apr-2014	095369-008	Dimethylphenol, 2,4-		3	U	SW846 3510C/8270D
			095369-008	Dimethylphthalate		3	U	SW846 3510C/8270D
			095369-008	Dinitro-o-cresol		3	U	SW846 3510C/8270D
			095369-008	Dinitrophenol, 2,4-		5	U	SW846 3510C/8270D
			095369-008	Dinitrotoluene, 2,4-		3	U	SW846 3510C/8270D
			095369-008	Dinitrotoluene, 2,6-		3	U	SW846 3510C/8270D
			095369-008	Dioxane, 1,4-		3	U	SW846 3510C/8270D
			095369-008	Diphenyl amine		3	U	SW846 3510C/8270D
			095369-008	Ethylhexyl)phthalate, bis(2-		3	U	SW846 3510C/8270D
			095369-008	Fluoranthene		0.3	U	SW846 3510C/8270D
			095369-008	Fluorene		0.3	U	SW846 3510C/8270D
			095369-008	Hexachlorobenzene		3	U	SW846 3510C/8270D
			095369-008	Hexachlorobutadiene		3	U	SW846 3510C/8270D
			095369-008	Hexachlorocyclopentadiene		3	U	SW846 3510C/8270D
			095369-008	Hexachloroethane		3	U	SW846 3510C/8270D
			095369-008	Indeno(1,2,3-c,d)pyrene		0.3	U	SW846 3510C/8270D
			095369-008	Isophorone		3.5	U	SW846 3510C/8270D
			095369-008	Methylnaphthalene, 2-		0.3	U	SW846 3510C/8270D
			095369-008	Naphthalene		0.3	U	SW846 3510C/8270D
			095369-008	Nitro-benzene		3	U	SW846 3510C/8270D
			095369-008	Nitroaniline, 2-		3	U	SW846 3510C/8270D
			095369-008	Nitroaniline, 3-		3	U	SW846 3510C/8270D
			095369-008	Nitroaniline, 4-		3	U	SW846 3510C/8270D
			095369-008	Nitrophenol, 2-		3	U	SW846 3510C/8270D
			095369-008	Nitrophenol, 4-		3	U	SW846 3510C/8270D
			095369-008	Nitrosodipropylamine, n-		3	U	SW846 3510C/8270D
			095369-008	Pentachlorophenol		3	U	SW846 3510C/8270D
			095369-008	Phenanthrene		0.3	U	SW846 3510C/8270D
			095369-008	Phenol		3	U	SW846 3510C/8270D
			095369-008	Pyrene		0.3	U	SW846 3510C/8270D
			095369-008	Trichlorobenzene, 1,2,4-		3	U	SW846 3510C/8270D
			095369-008	Trichlorophenol, 2,4,5-		3	U	SW846 3510C/8270D
			095369-008	Trichlorophenol, 2,4,6-		3	U	SW846 3510C/8270D

See notes at end of appendix.

Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW006	2069F	23-Apr-2014	095370-008	1,1'-Biphenyl		3	NU	SW846 3510C/8270D
			095370-008	Acenaphthene		0.3	NU	SW846 3510C/8270D
			095370-008	Acenaphthylene		0.3	NU	SW846 3510C/8270D
			095370-008	Acetophenone		3	U	SW846 3510C/8270D
			095370-008	Anthracene		0.3	NU	SW846 3510C/8270D
			095370-008	Atrazine		3	U	SW846 3510C/8270D
			095370-008	Benzaldehyde		3	U	SW846 3510C/8270D
			095370-008	Benzo(a)anthracene		0.3	NU	SW846 3510C/8270D
			095370-008	Benzo(a)pyrene		0.3	NU	SW846 3510C/8270D
			095370-008	Benzo(b)fluoranthene		0.3	NU	SW846 3510C/8270D
			095370-008	Benzo(ghi)perylene		0.3	U	SW846 3510C/8270D
			095370-008	Benzo(k)fluoranthene		0.3	NU	SW846 3510C/8270D
			095370-008	Bromophenyl phenyl ether, 4-		3	U	SW846 3510C/8270D
			095370-008	Butylbenzyl phthalate		3	U	SW846 3510C/8270D
			095370-008	Caprolactam		3	U	SW846 3510C/8270D
			095370-008	Carbazole		0.3	U	SW846 3510C/8270D
			095370-008	Chloro-3-methylphenol, 4-		3	U	SW846 3510C/8270D
			095370-008	Chlorobenzenamine, 4-		3.3	U	SW846 3510C/8270D
			095370-008	Chloroethoxy)methane, bis(2-		3	U	SW846 3510C/8270D
			095370-008	Chloroethyl)ether, bis(2-		3	U	SW846 3510C/8270D
			095370-008	Chloroisopropyl ether, bis-		3	U	SW846 3510C/8270D
			095370-008	Chloronaphthalene, 2-		0.41	NU	SW846 3510C/8270D
			095370-008	Chlorophenol, 2-		3	U	SW846 3510C/8270D
			095370-008	Chlorophenyl phenyl ether, 4-		3	U	SW846 3510C/8270D
			095370-008	Chrysene		0.3	NU	SW846 3510C/8270D
			095370-008	Cresol, m,p-		3.7	U	SW846 3510C/8270D
			095370-008	Cresol, o-		3	U	SW846 3510C/8270D
			095370-008	Di-n-butyl phthalate		3	U	SW846 3510C/8270D
			095370-008	Di-n-octyl phthalate		3	U	SW846 3510C/8270D
			095370-008	Dibenz[a,h]anthracene		0.3	U	SW846 3510C/8270D
			095370-008	Dibenzofuran		3	NU	SW846 3510C/8270D
			095370-008	Dichlorobenzidine, 3,3'-		3	U	SW846 3510C/8270D
			095370-008	Dichlorophenol, 2,4-		3	U	SW846 3510C/8270D
			095370-008	Diethylphthalate		3	NU	SW846 3510C/8270D

See notes at end of appendix.

Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW006	2069F	23-Apr-2014	095370-008	Dimethylphenol, 2,4-		3	U	SW846 3510C/8270D
			095370-008	Dimethylphthalate		3	U	SW846 3510C/8270D
			095370-008	Dinitro-o-cresol		3	*NU	SW846 3510C/8270D
			095370-008	Dinitrophenol, 2,4-		5	NU	SW846 3510C/8270D
			095370-008	Dinitrotoluene, 2,4-		3	U	SW846 3510C/8270D
			095370-008	Dinitrotoluene, 2,6-		3	U	SW846 3510C/8270D
			095370-008	Dioxane, 1,4-		3	U	SW846 3510C/8270D
			095370-008	Diphenyl amine		3	U	SW846 3510C/8270D
			095370-008	Ethylhexyl)phthalate, bis(2-		3	U	SW846 3510C/8270D
			095370-008	Fluoranthene		0.3	U	SW846 3510C/8270D
			095370-008	Fluorene		0.3	U	SW846 3510C/8270D
			095370-008	Hexachlorobenzene		3	NU	SW846 3510C/8270D
			095370-008	Hexachlorobutadiene		3	U	SW846 3510C/8270D
			095370-008	Hexachlorocyclopentadiene		3	NU	SW846 3510C/8270D
			095370-008	Hexachloroethane		3	U	SW846 3510C/8270D
			095370-008	Indeno(1,2,3-c,d)pyrene		0.3	U	SW846 3510C/8270D
			095370-008	Isophorone		3.5	U	SW846 3510C/8270D
			095370-008	Methylnaphthalene, 2-		0.3	U	SW846 3510C/8270D
			095370-008	Naphthalene		0.3	U	SW846 3510C/8270D
			095370-008	Nitro-benzene		3	U	SW846 3510C/8270D
			095370-008	Nitroaniline, 2-		3	U	SW846 3510C/8270D
			095370-008	Nitroaniline, 3-		3	U	SW846 3510C/8270D
			095370-008	Nitroaniline, 4-		3	U	SW846 3510C/8270D
			095370-008	Nitrophenol, 2-		3	U	SW846 3510C/8270D
			095370-008	Nitrophenol, 4-		3	U	SW846 3510C/8270D
			095370-008	Nitrosodipropylamine, n-		3	U	SW846 3510C/8270D
			095370-008	Pentachlorophenol		3	U	SW846 3510C/8270D
			095370-008	Phenanthrene		0.3	NU	SW846 3510C/8270D
			095370-008	Phenol		3	U	SW846 3510C/8270D
			095370-008	Pyrene		0.3	U	SW846 3510C/8270D
			095370-008	Trichlorobenzene, 1,2,4-		3	U	SW846 3510C/8270D
			095370-008	Trichlorophenol, 2,4,5-		3	U	SW846 3510C/8270D
			095370-008	Trichlorophenol, 2,4,6-		3	NU	SW846 3510C/8270D

See notes at end of appendix.

Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW007	2069G	23-Apr-2014	095371-008	1,1'-Biphenyl		2.86	NU	SW846 3510C/8270D
			095371-008	Acenaphthene		0.286	NU	SW846 3510C/8270D
			095371-008	Acenaphthylene		0.286	NU	SW846 3510C/8270D
			095371-008	Acetophenone		2.86	U	SW846 3510C/8270D
			095371-008	Anthracene		0.286	NU	SW846 3510C/8270D
			095371-008	Atrazine		2.86	U	SW846 3510C/8270D
			095371-008	Benzaldehyde		2.86	U	SW846 3510C/8270D
			095371-008	Benzo(a)anthracene		0.286	NU	SW846 3510C/8270D
			095371-008	Benzo(a)pyrene		0.286	NU	SW846 3510C/8270D
			095371-008	Benzo(b)fluoranthene		0.286	NU	SW846 3510C/8270D
			095371-008	Benzo(ghi)perylene		0.286	U	SW846 3510C/8270D
			095371-008	Benzo(k)fluoranthene		0.286	NU	SW846 3510C/8270D
			095371-008	Bromophenyl phenyl ether, 4-		2.86	U	SW846 3510C/8270D
			095371-008	Butylbenzyl phthalate		2.86	U	SW846 3510C/8270D
			095371-008	Caprolactam		2.86	U	SW846 3510C/8270D
			095371-008	Carbazole		0.286	U	SW846 3510C/8270D
			095371-008	Chloro-3-methylphenol, 4-		2.86	U	SW846 3510C/8270D
			095371-008	Chlorobenzenamine, 4-		3.14	U	SW846 3510C/8270D
			095371-008	Chloroethoxy)methane, bis(2-		2.86	U	SW846 3510C/8270D
			095371-008	Chloroethyl)ether, bis(2-		2.86	U	SW846 3510C/8270D
			095371-008	Chloroisopropyl ether, bis-		2.86	U	SW846 3510C/8270D
			095371-008	Chloronaphthalene, 2-		0.39	NU	SW846 3510C/8270D
			095371-008	Chlorophenol, 2-		2.86	U	SW846 3510C/8270D
			095371-008	Chlorophenyl phenyl ether, 4-		2.86	U	SW846 3510C/8270D
			095371-008	Chrysene		0.286	NU	SW846 3510C/8270D
			095371-008	Cresol, m,p-		3.52	U	SW846 3510C/8270D
			095371-008	Cresol, o-		2.86	U	SW846 3510C/8270D
			095371-008	Di-n-butyl phthalate		2.86	U	SW846 3510C/8270D
			095371-008	Di-n-octyl phthalate		2.86	U	SW846 3510C/8270D
			095371-008	Dibenz[a,h]anthracene		0.286	U	SW846 3510C/8270D
			095371-008	Dibenzofuran		2.86	NU	SW846 3510C/8270D
			095371-008	Dichlorobenzidine, 3,3'-		2.86	U	SW846 3510C/8270D
			095371-008	Dichlorophenol, 2,4-		2.86	U	SW846 3510C/8270D
			095371-008	Diethylphthalate		2.86	NU	SW846 3510C/8270D

See notes at end of appendix.

Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW007	2069G	23-Apr-2014	095371-008	Dimethylphenol, 2,4-		2.86	U	SW846 3510C/8270D
			095371-008	Dimethylphthalate		2.86	U	SW846 3510C/8270D
			095371-008	Dinitro-o-cresol		2.86	*NU	SW846 3510C/8270D
			095371-008	Dinitrophenol, 2,4-		4.76	NU	SW846 3510C/8270D
			095371-008	Dinitrotoluene, 2,4-		2.86	U	SW846 3510C/8270D
			095371-008	Dinitrotoluene, 2,6-		2.86	U	SW846 3510C/8270D
			095371-008	Dioxane, 1,4-		2.86	U	SW846 3510C/8270D
			095371-008	Diphenyl amine		2.86	U	SW846 3510C/8270D
			095371-008	Ethylhexyl)phthalate, bis(2-		2.86	U	SW846 3510C/8270D
			095371-008	Fluoranthene		0.286	U	SW846 3510C/8270D
			095371-008	Fluorene		0.286	U	SW846 3510C/8270D
			095371-008	Hexachlorobenzene		2.86	NU	SW846 3510C/8270D
			095371-008	Hexachlorobutadiene		2.86	U	SW846 3510C/8270D
			095371-008	Hexachlorocyclopentadiene		2.86	NU	SW846 3510C/8270D
			095371-008	Hexachloroethane		2.86	U	SW846 3510C/8270D
			095371-008	Indeno(1,2,3-c,d)pyrene		0.286	U	SW846 3510C/8270D
			095371-008	Isophorone		3.33	U	SW846 3510C/8270D
			095371-008	Methylnaphthalene, 2-		0.286	U	SW846 3510C/8270D
			095371-008	Naphthalene		0.286	U	SW846 3510C/8270D
			095371-008	Nitro-benzene		2.86	U	SW846 3510C/8270D
			095371-008	Nitroaniline, 2-		2.86	U	SW846 3510C/8270D
			095371-008	Nitroaniline, 3-		2.86	U	SW846 3510C/8270D
			095371-008	Nitroaniline, 4-		2.86	U	SW846 3510C/8270D
			095371-008	Nitrophenol, 2-		2.86	U	SW846 3510C/8270D
			095371-008	Nitrophenol, 4-		2.86	U	SW846 3510C/8270D
			095371-008	Nitrosodipropylamine, n-		2.86	U	SW846 3510C/8270D
			095371-008	Pentachlorophenol		2.86	U	SW846 3510C/8270D
			095371-008	Phenanthrene		0.286	NU	SW846 3510C/8270D
			095371-008	Phenol		2.86	U	SW846 3510C/8270D
			095371-008	Pyrene		0.286	U	SW846 3510C/8270D
			095371-008	Trichlorobenzene, 1,2,4-		2.86	U	SW846 3510C/8270D
			095371-008	Trichlorophenol, 2,4,5-		2.86	U	SW846 3510C/8270D
			095371-008	Trichlorophenol, 2,4,6-		2.86	NU	SW846 3510C/8270D

See notes at end of appendix.

Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW008	2069I	23-Apr-2014	095372-008	1,1'-Biphenyl		3	Uh	SW846 3510C/8270D
			095372-008	Acenaphthene		0.3	Uh	SW846 3510C/8270D
			095372-008	Acenaphthylene		0.3	Uh	SW846 3510C/8270D
			095372-008	Acetophenone		3	*NUh	SW846 3510C/8270D
			095372-008	Anthracene		0.3	Uh	SW846 3510C/8270D
			095372-008	Atrazine		3	Uh	SW846 3510C/8270D
			095372-008	Benzaldehyde		3	Uh	SW846 3510C/8270D
			095372-008	Benzo(a)anthracene		0.3	Uh	SW846 3510C/8270D
			095372-008	Benzo(a)pyrene		0.3	Uh	SW846 3510C/8270D
			095372-008	Benzo(b)fluoranthene		0.3	Uh	SW846 3510C/8270D
			095372-008	Benzo(ghi)perylene		0.3	Uh	SW846 3510C/8270D
			095372-008	Benzo(k)fluoranthene		0.3	Uh	SW846 3510C/8270D
			095372-008	Bromophenyl phenyl ether, 4-		3	Uh	SW846 3510C/8270D
			095372-008	Butylbenzyl phthalate		3	Uh	SW846 3510C/8270D
			095372-008	Caprolactam		3	Uh	SW846 3510C/8270D
			095372-008	Carbazole		0.3	Uh	SW846 3510C/8270D
			095372-008	Chloro-3-methylphenol, 4-		3	Uh	SW846 3510C/8270D
			095372-008	Chlorobenzenamine, 4-		3.3	Uh	SW846 3510C/8270D
			095372-008	Chloroethoxy)methane, bis(2-		3	Uh	SW846 3510C/8270D
			095372-008	Chloroethyl)ether, bis(2-		3	Uh	SW846 3510C/8270D
			095372-008	Chloroisopropyl ether, bis-		3	Uh	SW846 3510C/8270D
			095372-008	Chloronaphthalene, 2-		0.41	Uh	SW846 3510C/8270D
			095372-008	Chlorophenol, 2-		3	Uh	SW846 3510C/8270D
			095372-008	Chlorophenyl phenyl ether, 4-		3	Uh	SW846 3510C/8270D
			095372-008	Chrysene		0.3	Uh	SW846 3510C/8270D
			095372-008	Cresol, m,p-		3.7	Uh	SW846 3510C/8270D
			095372-008	Cresol, o-		3	Uh	SW846 3510C/8270D
			095372-008	Di-n-butyl phthalate		3	Uh	SW846 3510C/8270D
			095372-008	Di-n-octyl phthalate		3	Uh	SW846 3510C/8270D
			095372-008	Dibenz[a,h]anthracene		0.3	Uh	SW846 3510C/8270D
			095372-008	Dibenzofuran		3	Uh	SW846 3510C/8270D
			095372-008	Dichlorobenzidine, 3,3'-		3	Uh	SW846 3510C/8270D
			095372-008	Dichlorophenol, 2,4-		3	Uh	SW846 3510C/8270D
			095372-008	Diethylphthalate		3	Uh	SW846 3510C/8270D

See notes at end of appendix.

Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW008	2069I	23-Apr-2014	095372-008	Dimethylphenol, 2,4-		3	Uh	SW846 3510C/8270D
			095372-008	Dimethylphthalate		3	Uh	SW846 3510C/8270D
			095372-008	Dinitro-o-cresol		3	*NUh	SW846 3510C/8270D
			095372-008	Dinitrophenol, 2,4-		5	NUh	SW846 3510C/8270D
			095372-008	Dinitrotoluene, 2,4-		3	Uh	SW846 3510C/8270D
			095372-008	Dinitrotoluene, 2,6-		3	Uh	SW846 3510C/8270D
			095372-008	Dioxane, 1,4-		3	Uh	SW846 3510C/8270D
			095372-008	Diphenyl amine		3	Uh	SW846 3510C/8270D
			095372-008	Ethylhexyl)phthalate, bis(2-		3	Uh	SW846 3510C/8270D
			095372-008	Fluoranthene		0.3	Uh	SW846 3510C/8270D
			095372-008	Fluorene		0.3	Uh	SW846 3510C/8270D
			095372-008	Hexachlorobenzene		3	Uh	SW846 3510C/8270D
			095372-008	Hexachlorobutadiene		3	Uh	SW846 3510C/8270D
			095372-008	Hexachlorocyclopentadiene		3	Uh	SW846 3510C/8270D
			095372-008	Hexachloroethane		3	Uh	SW846 3510C/8270D
			095372-008	Indeno(1,2,3-c,d)pyrene		0.3	Uh	SW846 3510C/8270D
			095372-008	Isophorone		3.5	Uh	SW846 3510C/8270D
			095372-008	Methylnaphthalene, 2-		0.3	Uh	SW846 3510C/8270D
			095372-008	Naphthalene		0.3	Uh	SW846 3510C/8270D
			095372-008	Nitro-benzene		3	Uh	SW846 3510C/8270D
			095372-008	Nitroaniline, 2-		3	Uh	SW846 3510C/8270D
			095372-008	Nitroaniline, 3-		3	Uh	SW846 3510C/8270D
			095372-008	Nitroaniline, 4-		3	Uh	SW846 3510C/8270D
			095372-008	Nitrophenol, 2-		3	Uh	SW846 3510C/8270D
			095372-008	Nitrophenol, 4-		3	Uh	SW846 3510C/8270D
			095372-008	Nitrosodipropylamine, n-		3	Uh	SW846 3510C/8270D
			095372-008	Pentachlorophenol		3	*Uh	SW846 3510C/8270D
			095372-008	Phenanthrene		0.3	Uh	SW846 3510C/8270D
			095372-008	Phenol		3	Uh	SW846 3510C/8270D
			095372-008	Pyrene		0.3	Uh	SW846 3510C/8270D
			095372-008	Trichlorobenzene, 1,2,4-		3	Uh	SW846 3510C/8270D
			095372-008	Trichlorophenol, 2,4,5-		3	Uh	SW846 3510C/8270D
			095372-008	Trichlorophenol, 2,4,6-		3	*Uh	SW846 3510C/8270D

See notes at end of appendix.

Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW011	2069K	23-Apr-2014	095373-008	1,1'-Biphenyl		2.88	NU	SW846 3510C/8270D
			095373-008	Acenaphthene		0.288	NU	SW846 3510C/8270D
			095373-008	Acenaphthylene		0.288	NU	SW846 3510C/8270D
			095373-008	Acetophenone		2.88	U	SW846 3510C/8270D
			095373-008	Anthracene		0.288	NU	SW846 3510C/8270D
			095373-008	Atrazine		2.88	U	SW846 3510C/8270D
			095373-008	Benzaldehyde		2.88	U	SW846 3510C/8270D
			095373-008	Benzo(a)anthracene		0.288	NU	SW846 3510C/8270D
			095373-008	Benzo(a)pyrene		0.288	NU	SW846 3510C/8270D
			095373-008	Benzo(b)fluoranthene		0.288	NU	SW846 3510C/8270D
			095373-008	Benzo(ghi)perylene		0.288	U	SW846 3510C/8270D
			095373-008	Benzo(k)fluoranthene		0.288	NU	SW846 3510C/8270D
			095373-008	Bromophenyl phenyl ether, 4-		2.88	U	SW846 3510C/8270D
			095373-008	Butylbenzyl phthalate		2.88	U	SW846 3510C/8270D
			095373-008	Caprolactam		2.88	U	SW846 3510C/8270D
			095373-008	Carbazole		0.288	U	SW846 3510C/8270D
			095373-008	Chloro-3-methylphenol, 4-		2.88	U	SW846 3510C/8270D
			095373-008	Chlorobenzenamine, 4-		3.17	U	SW846 3510C/8270D
			095373-008	Chloroethoxy)methane, bis(2-		2.88	U	SW846 3510C/8270D
			095373-008	Chloroethyl)ether, bis(2-		2.88	U	SW846 3510C/8270D
			095373-008	Chloroisopropyl ether, bis-		2.88	U	SW846 3510C/8270D
			095373-008	Chloronaphthalene, 2-		0.394	NU	SW846 3510C/8270D
			095373-008	Chlorophenol, 2-		2.88	U	SW846 3510C/8270D
			095373-008	Chlorophenyl phenyl ether, 4-		2.88	U	SW846 3510C/8270D
			095373-008	Chrysene		0.288	NU	SW846 3510C/8270D
			095373-008	Cresol, m,p-		3.56	U	SW846 3510C/8270D
			095373-008	Cresol, o-		2.88	U	SW846 3510C/8270D
			095373-008	Di-n-butyl phthalate		2.88	U	SW846 3510C/8270D
			095373-008	Di-n-octyl phthalate		2.88	U	SW846 3510C/8270D
			095373-008	Dibenz[a,h]anthracene		0.288	U	SW846 3510C/8270D
			095373-008	Dibenzofuran		2.88	NU	SW846 3510C/8270D
			095373-008	Dichlorobenzidine, 3,3'-		2.88	U	SW846 3510C/8270D
			095373-008	Dichlorophenol, 2,4-		2.88	U	SW846 3510C/8270D
			095373-008	Diethylphthalate		2.88	NU	SW846 3510C/8270D

See notes at end of appendix.

Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW011	2069K	23-Apr-2014	095373-008	Dimethylphenol, 2,4-		2.88	U	SW846 3510C/8270D
			095373-008	Dimethylphthalate		2.88	U	SW846 3510C/8270D
			095373-008	Dinitro-o-cresol		2.88	*NU	SW846 3510C/8270D
			095373-008	Dinitrophenol, 2,4-		4.81	NU	SW846 3510C/8270D
			095373-008	Dinitrotoluene, 2,4-		2.88	U	SW846 3510C/8270D
			095373-008	Dinitrotoluene, 2,6-		2.88	U	SW846 3510C/8270D
			095373-008	Dioxane, 1,4-		2.88	U	SW846 3510C/8270D
			095373-008	Diphenyl amine		2.88	U	SW846 3510C/8270D
			095373-008	Ethylhexyl)phthalate, bis(2-		2.88	U	SW846 3510C/8270D
			095373-008	Fluoranthene		0.288	U	SW846 3510C/8270D
			095373-008	Fluorene		0.288	U	SW846 3510C/8270D
			095373-008	Hexachlorobenzene		2.88	NU	SW846 3510C/8270D
			095373-008	Hexachlorobutadiene		2.88	U	SW846 3510C/8270D
			095373-008	Hexachlorocyclopentadiene		2.88	NU	SW846 3510C/8270D
			095373-008	Hexachloroethane		2.88	U	SW846 3510C/8270D
			095373-008	Indeno(1,2,3-c,d)pyrene		0.288	U	SW846 3510C/8270D
			095373-008	Isophorone		3.37	U	SW846 3510C/8270D
			095373-008	Methylnaphthalene, 2-		0.288	U	SW846 3510C/8270D
			095373-008	Naphthalene		0.288	U	SW846 3510C/8270D
			095373-008	Nitro-benzene		2.88	U	SW846 3510C/8270D
			095373-008	Nitroaniline, 2-		2.88	U	SW846 3510C/8270D
			095373-008	Nitroaniline, 3-		2.88	U	SW846 3510C/8270D
			095373-008	Nitroaniline, 4-		2.88	U	SW846 3510C/8270D
			095373-008	Nitrophenol, 2-		2.88	U	SW846 3510C/8270D
			095373-008	Nitrophenol, 4-		2.88	U	SW846 3510C/8270D
			095373-008	Nitrosodipropylamine, n-		2.88	U	SW846 3510C/8270D
			095373-008	Pentachlorophenol		2.88	U	SW846 3510C/8270D
			095373-008	Phenanthrene		0.288	NU	SW846 3510C/8270D
			095373-008	Phenol		2.88	U	SW846 3510C/8270D
			095373-008	Pyrene		0.288	U	SW846 3510C/8270D
			095373-008	Trichlorobenzene, 1,2,4-		2.88	U	SW846 3510C/8270D
			095373-008	Trichlorophenol, 2,4,5-		2.88	U	SW846 3510C/8270D
			095373-008	Trichlorophenol, 2,4,6-		2.88	NU	SW846 3510C/8270D

See notes at end of appendix.

Table D-4. Summary of volatile organic compound results for permitted sanitary outfalls, October 2014

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
CINT	2238A	22-Apr-2014	095367-006	Acetone	5.87	3	J	SW846 8260B
			095367-006	Benzene		0.3	U	SW846 8260B
			095367-006	Bromochloromethane		0.3	U	SW846 8260B
			095367-006	Bromodichloromethane	0.84	0.3	J	SW846 8260B
			095367-006	Bromoform	8.08	0.3		SW846 8260B
			095367-006	Bromomethane		0.3	U	SW846 8260B
			095367-006	Butanone, 2-		2	U	SW846 8260B
			095367-006	Carbon disulfide		1.5	U	SW846 8260B
			095367-006	Carbon tetrachloride		0.3	U	SW846 8260B
			095367-006	Chlorobenzene		0.3	U	SW846 8260B
			095367-006	Chloroethane		0.3	U	SW846 8260B
			095367-006	Chloroform	1.07	0.3		SW846 8260B
			095367-006	Chloromethane		0.3	U	SW846 8260B
			095367-006	Cyclohexane		0.3	U	SW846 8260B
			095367-006	Dibromo-3-chloropropane, 1,2-		0.3	U	SW846 8260B
			095367-006	Dibromochloromethane	1.48	0.3		SW846 8260B
			095367-006	Dibromoethane, 1,2-		0.3	U	SW846 8260B
			095367-006	Dichlorobenzene, 1,2-		0.3	U	SW846 8260B
			095367-006	Dichlorobenzene, 1,3-		0.3	U	SW846 8260B
			095367-006	Dichlorobenzene, 1,4-		0.3	U	SW846 8260B
			095367-006	Dichlorodifluoromethane		0.3	U	SW846 8260B
			095367-006	Dichloroethane, 1,1-		0.3	U	SW846 8260B
			095367-006	Dichloroethane, 1,2-		0.3	U	SW846 8260B
			095367-006	Dichloroethene, 1,1-		0.3	U	SW846 8260B
			095367-006	Dichloroethene, cis-1,2-		0.3	U	SW846 8260B
			095367-006	Dichloroethene, trans-1,2-		0.3	U	SW846 8260B
			095367-006	Dichloropropane, 1,2-		0.3	U	SW846 8260B
			095367-006	Dichloropropene, cis-1,3-		0.3	U	SW846 8260B
			095367-006	Dichloropropene, trans-1,3-		0.3	U	SW846 8260B
			095367-006	Ethyl benzene		0.3	U	SW846 8260B
			095367-006	Hexanone, 2-		2.2	U	SW846 8260B
			095367-006	Isopropylbenzene		0.3	U	SW846 8260B
			095367-006	Methyl Acetate		1.5	U	SW846 8260B

See notes at end of appendix.

Table D-4. Summary of volatile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
CINT	2238A	22-Apr-2014	095367-006	Methylcyclohexane		3	U	SW846 8260B
			095367-006	Methylene chloride		3	U	SW846 8260B
			095367-006	Pentanone, 4-methyl-, 2-		1.5	U	SW846 8260B
			095367-006	Styrene		0.3	U	SW846 8260B
			095367-006	Tert-butyl methyl ether		0.3	U	SW846 8260B
			095367-006	Tetrachloroethane, 1,1,2,2-		0.3	U	SW846 8260B
			095367-006	Tetrachloroethene		0.3	U	SW846 8260B
			095367-006	Toluene		0.3	U	SW846 8260B
			095367-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-		1.5	U	SW846 8260B
			095367-006	Trichlorobenzene, 1,2,3-		0.3	U	SW846 8260B
			095367-006	Trichlorobenzene, 1,2,4-		0.3	U	SW846 8260B
			095367-006	Trichloroethane, 1,1,1-		0.3	U	SW846 8260B
			095367-006	Trichloroethane, 1,1,2-		0.3	U	SW846 8260B
			095367-006	Trichloroethene		0.3	U	SW846 8260B
			095367-006	Trichlorofluoromethane		0.3	U	SW846 8260B
			095367-006	Vinyl chloride		0.3	U	SW846 8260B
			095367-006	Xylene		0.3	U	SW846 8260B
			095367-006	Xylene, m- & p-		0.3	U	SW846 8260B
			095367-006	Xylene, o-		0.3	U	SW846 8260B
WW001	2069A	22-Apr-2014	095362-006	Acetone	98.9	2.5	N	SW846 8260B
			095362-006	Benzene		0.3	U	SW846 8260B
			095362-006	Bromochloromethane		0.3	U	SW846 8260B
			095362-006	Bromodichloromethane		0.3	U	SW846 8260B
			095362-006	Bromoform	0.6	0.3	J	SW846 8260B
			095362-006	Bromomethane		0.3	U	SW846 8260B
			095362-006	Butanone, 2-		2	U	SW846 8260B
			095362-006	Carbon disulfide		1.5	U	SW846 8260B
			095362-006	Carbon tetrachloride		0.3	U	SW846 8260B
			095362-006	Chlorobenzene		0.3	U	SW846 8260B
			095362-006	Chloroethane		0.3	U	SW846 8260B
			095362-006	Chloroform		0.3	U	SW846 8260B
			095362-006	Chloromethane		0.3	U	SW846 8260B
			095362-006	Cyclohexane		0.3	U	SW846 8260B
			095362-006	Dibromo-3-chloropropane, 1,2-		0.5	U	SW846 8260B

See notes at end of appendix.

Table D-4. Summary of volatile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW001	2069A	22-Apr-2014	095362-006	Dibromochloromethane		0.3	U	SW846 8260B
			095362-006	Dibromoethane, 1,2-		0.3	U	SW846 8260B
			095362-006	Dichlorobenzene, 1,2-		0.3	U	SW846 8260B
			095362-006	Dichlorobenzene, 1,3-		0.3	U	SW846 8260B
			095362-006	Dichlorobenzene, 1,4-		0.3	U	SW846 8260B
			095362-006	Dichlorodifluoromethane		0.3	U	SW846 8260B
			095362-006	Dichloroethane, 1,1-		0.3	U	SW846 8260B
			095362-006	Dichloroethane, 1,2-		0.3	U	SW846 8260B
			095362-006	Dichloroethene, 1,1-		0.3	U	SW846 8260B
			095362-006	Dichloroethene, cis-1,2-		0.3	U	SW846 8260B
			095362-006	Dichloroethene, trans-1,2-		0.3	U	SW846 8260B
			095362-006	Dichloropropane, 1,2-		0.3	U	SW846 8260B
			095362-006	Dichloropropene, cis-1,3-		0.3	U	SW846 8260B
			095362-006	Dichloropropene, trans-1,3-		0.3	U	SW846 8260B
			095362-006	Ethyl benzene		0.3	U	SW846 8260B
			095362-006	Hexanone, 2-		2.2	U	SW846 8260B
			095362-006	Isopropylbenzene		0.3	U	SW846 8260B
			095362-006	Methyl Acetate		1.5	U	SW846 8260B
			095362-006	Methylcyclohexane		0.3	U	SW846 8260B
			095362-006	Methylene chloride		1.7	U	SW846 8260B
			095362-006	Pentanone, 4-methyl-, 2-		1.5	U	SW846 8260B
			095362-006	Styrene		0.3	U	SW846 8260B
			095362-006	Tert-butyl methyl ether		0.3	U	SW846 8260B
			095362-006	Tetrachloroethane, 1,1,2,2-		0.3	U	SW846 8260B
			095362-006	Tetrachloroethene		0.3	U	SW846 8260B
			095362-006	Toluene		0.3	U	SW846 8260B
			095362-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-		1.5	U	SW846 8260B
			095362-006	Trichlorobenzene, 1,2,3-		0.3	U	SW846 8260B
			095362-006	Trichlorobenzene, 1,2,4-		0.3	U	SW846 8260B
			095362-006	Trichloroethane, 1,1,1-		0.3	U	SW846 8260B
			095362-006	Trichloroethane, 1,1,2-		0.3	U	SW846 8260B
			095362-006	Trichloroethene		0.3	U	SW846 8260B
			095362-006	Trichlorofluoromethane		0.3	U	SW846 8260B
			095362-006	Vinyl chloride		0.3	U	SW846 8260B

See notes at end of appendix.

Table D-4. Summary of volatile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW001	2069A	22-Apr-2014	095362-006	Xylene		0.3	U	SW846 8260B
			095362-006	Xylene, m- & p-		0.3	U	SW846 8260B
			095362-006	Xylene, o-		0.3	U	SW846 8260B
WW006	2069F	22-Apr-2014	095363-006	Acetone	18.6	3		SW846 8260B
			095363-006	Benzene		0.3	U	SW846 8260B
			095363-006	Bromochloromethane		0.3	U	SW846 8260B
			095363-006	Bromodichloromethane		0.3	U	SW846 8260B
			095363-006	Bromoform		0.3	U	SW846 8260B
			095363-006	Bromomethane		0.3	U	SW846 8260B
			095363-006	Butanone, 2-	2.6	2	J	SW846 8260B
			095363-006	Carbon disulfide		1.5	U	SW846 8260B
			095363-006	Carbon tetrachloride		0.3	U	SW846 8260B
			095363-006	Chlorobenzene		0.3	U	SW846 8260B
			095363-006	Chloroethane		0.3	U	SW846 8260B
			095363-006	Chloroform	0.52	0.3	J	SW846 8260B
			095363-006	Chloromethane		0.3	U	SW846 8260B
			095363-006	Cyclohexane		0.3	U	SW846 8260B
			095363-006	Dibromo-3-chloropropane, 1,2-		0.3	U	SW846 8260B
			095363-006	Dibromochloromethane		0.3	U	SW846 8260B
			095363-006	Dibromoethane, 1,2-		0.3	U	SW846 8260B
			095363-006	Dichlorobenzene, 1,2-		0.3	U	SW846 8260B
			095363-006	Dichlorobenzene, 1,3-		0.3	U	SW846 8260B
			095363-006	Dichlorobenzene, 1,4-		0.3	U	SW846 8260B
			095363-006	Dichlorodifluoromethane		0.3	U	SW846 8260B
			095363-006	Dichloroethane, 1,1-		0.3	U	SW846 8260B
			095363-006	Dichloroethane, 1,2-		0.3	U	SW846 8260B
			095363-006	Dichloroethene, 1,1-		0.3	U	SW846 8260B
			095363-006	Dichloroethene, cis-1,2-		0.3	U	SW846 8260B
			095363-006	Dichloroethene, trans-1,2-		0.3	U	SW846 8260B
			095363-006	Dichloropropane, 1,2-		0.3	U	SW846 8260B
			095363-006	Dichloropropene, cis-1,3-		0.3	U	SW846 8260B
			095363-006	Dichloropropene, trans-1,3-		0.3	U	SW846 8260B
			095363-006	Ethyl benzene		0.3	U	SW846 8260B

See notes at end of appendix.

Table D-4. Summary of volatile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW006	2069F	22-Apr-2014	095363-006	Hexanone, 2-		2.2	U	SW846 8260B
			095363-006	Isopropylbenzene		0.3	U	SW846 8260B
			095363-006	Methyl Acetate		1.5	U	SW846 8260B
			095363-006	Methylcyclohexane		3	U	SW846 8260B
			095363-006	Methylene chloride		3	U	SW846 8260B
			095363-006	Pentanone, 4-methyl-, 2-		1.5	U	SW846 8260B
			095363-006	Styrene		0.3	U	SW846 8260B
			095363-006	Tert-butyl methyl ether		0.3	U	SW846 8260B
			095363-006	Tetrachloroethane, 1,1,2,2-		0.3	U	SW846 8260B
			095363-006	Tetrachloroethene		0.3	U	SW846 8260B
			095363-006	Toluene		0.3	U	SW846 8260B
			095363-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-		1.5	U	SW846 8260B
			095363-006	Trichlorobenzene, 1,2,3-		0.3	U	SW846 8260B
			095363-006	Trichlorobenzene, 1,2,4-		0.3	U	SW846 8260B
			095363-006	Trichloroethane, 1,1,1-		0.3	U	SW846 8260B
			095363-006	Trichloroethane, 1,1,2-		0.3	U	SW846 8260B
			095363-006	Trichloroethene		0.3	U	SW846 8260B
			095363-006	Trichlorofluoromethane		0.3	U	SW846 8260B
			095363-006	Vinyl chloride		0.3	U	SW846 8260B
			095363-006	Xylene		0.3	U	SW846 8260B
			095363-006	Xylene, m- & p-		0.3	U	SW846 8260B
			095363-006	Xylene, o-		0.3	U	SW846 8260B
WW007	2069G	22-Apr-2014	095364-006	Acetone	143	3		SW846 8260B
			095364-006	Benzene		0.3	U	SW846 8260B
			095364-006	Bromochloromethane		0.3	U	SW846 8260B
			095364-006	Bromodichloromethane		0.3	U	SW846 8260B
			095364-006	Bromoform		0.3	U	SW846 8260B
			095364-006	Bromomethane		0.3	U	SW846 8260B
			095364-006	Butanone, 2-		2	U	SW846 8260B
			095364-006	Carbon disulfide		1.5	U	SW846 8260B
			095364-006	Carbon tetrachloride		0.3	U	SW846 8260B
			095364-006	Chlorobenzene		0.3	U	SW846 8260B
			095364-006	Chloroethane		0.3	U	SW846 8260B
			095364-006	Chloroform		0.3	U	SW846 8260B

See notes at end of appendix.

Table D-4. Summary of volatile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW007	2069G	22-Apr-2014	095364-006	Chloromethane		0.3	U	SW846 8260B
			095364-006	Cyclohexane		0.3	U	SW846 8260B
			095364-006	Dibromo-3-chloropropane, 1,2-		0.3	U	SW846 8260B
			095364-006	Dibromochloromethane		0.3	U	SW846 8260B
			095364-006	Dibromoethane, 1,2-		0.3	U	SW846 8260B
			095364-006	Dichlorobenzene, 1,2-		0.3	U	SW846 8260B
			095364-006	Dichlorobenzene, 1,3-		0.3	U	SW846 8260B
			095364-006	Dichlorobenzene, 1,4-		0.3	U	SW846 8260B
			095364-006	Dichlorodifluoromethane		0.3	U	SW846 8260B
			095364-006	Dichloroethane, 1,1-		0.3	U	SW846 8260B
			095364-006	Dichloroethane, 1,2-		0.3	U	SW846 8260B
			095364-006	Dichloroethene, 1,1-		0.3	U	SW846 8260B
			095364-006	Dichloroethene, cis-1,2-		0.3	U	SW846 8260B
			095364-006	Dichloroethene, trans-1,2-		0.3	U	SW846 8260B
			095364-006	Dichloropropane, 1,2-		0.3	U	SW846 8260B
			095364-006	Dichloropropene, cis-1,3-		0.3	U	SW846 8260B
			095364-006	Dichloropropene, trans-1,3-		0.3	U	SW846 8260B
			095364-006	Ethyl benzene		0.3	U	SW846 8260B
			095364-006	Hexanone, 2-		2.2	U	SW846 8260B
			095364-006	Isopropylbenzene		0.3	U	SW846 8260B
			095364-006	Methyl Acetate		1.5	U	SW846 8260B
			095364-006	Methylcyclohexane		3	U	SW846 8260B
			095364-006	Methylene chloride		3	U	SW846 8260B
			095364-006	Pentanone, 4-methyl-, 2-		1.5	U	SW846 8260B
			095364-006	Styrene		0.3	U	SW846 8260B
			095364-006	Tert-butyl methyl ether		0.3	U	SW846 8260B
			095364-006	Tetrachloroethane, 1,1,2,2-		0.3	U	SW846 8260B
			095364-006	Tetrachloroethene		0.3	U	SW846 8260B
			095364-006	Toluene		0.3	U	SW846 8260B
			095364-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-		1.5	U	SW846 8260B
			095364-006	Trichlorobenzene, 1,2,3-		0.3	U	SW846 8260B
			095364-006	Trichlorobenzene, 1,2,4-		0.3	U	SW846 8260B
			095364-006	Trichloroethane, 1,1,1-		0.3	U	SW846 8260B
			095364-006	Trichloroethane, 1,1,2-		0.3	U	SW846 8260B

See notes at end of appendix.

Table D-4. Summary of volatile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW007	2069G	22-Apr-2014	095364-006	Trichloroethene		0.3	U	SW846 8260B
			095364-006	Trichlorofluoromethane		0.3	U	SW846 8260B
			095364-006	Vinyl chloride		0.3	U	SW846 8260B
			095364-006	Xylene		0.3	U	SW846 8260B
			095364-006	Xylene, m- & p-		0.3	U	SW846 8260B
			095364-006	Xylene, o-		0.3	U	SW846 8260B
WW008	2069I	22-Apr-2014	095365-006	Acetone	3.86	3	J	SW846 8260B
			095365-006	Benzene		0.3	U	SW846 8260B
			095365-006	Bromochloromethane		0.3	U	SW846 8260B
			095365-006	Bromodichloromethane		0.3	U	SW846 8260B
			095365-006	Bromoform		0.3	U	SW846 8260B
			095365-006	Bromomethane		0.3	U	SW846 8260B
			095365-006	Butanone, 2-		2	U	SW846 8260B
			095365-006	Carbon disulfide		1.5	U	SW846 8260B
			095365-006	Carbon tetrachloride		0.3	U	SW846 8260B
			095365-006	Chlorobenzene		0.3	U	SW846 8260B
			095365-006	Chloroethane		0.3	U	SW846 8260B
			095365-006	Chloroform		0.3	U	SW846 8260B
			095365-006	Chloromethane		0.3	U	SW846 8260B
			095365-006	Cyclohexane		0.3	U	SW846 8260B
			095365-006	Dibromo-3-chloropropane, 1,2-		0.3	U	SW846 8260B
			095365-006	Dibromochloromethane		0.3	U	SW846 8260B
			095365-006	Dibromoethane, 1,2-		0.3	U	SW846 8260B
			095365-006	Dichlorobenzene, 1,2-		0.3	U	SW846 8260B
			095365-006	Dichlorobenzene, 1,3-		0.3	U	SW846 8260B
			095365-006	Dichlorobenzene, 1,4-		0.3	U	SW846 8260B
			095365-006	Dichlorodifluoromethane		0.3	U	SW846 8260B
			095365-006	Dichloroethane, 1,1-		0.3	U	SW846 8260B
			095365-006	Dichloroethane, 1,2-		0.3	U	SW846 8260B
			095365-006	Dichloroethene, 1,1-		0.3	U	SW846 8260B
			095365-006	Dichloroethene, cis-1,2-		0.3	U	SW846 8260B
			095365-006	Dichloroethene, trans-1,2-		0.3	U	SW846 8260B
			095365-006	Dichloropropane, 1,2-		0.3	U	SW846 8260B
			095365-006	Dichloropropene, cis-1,3-		0.3	U	SW846 8260B

See notes at end of appendix.

Table D-4. Summary of volatile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW008	2069I	22-Apr-2014	095365-006	Dichloropropene, trans-1,3-		0.3	U	SW846 8260B
			095365-006	Ethyl benzene		0.3	U	SW846 8260B
			095365-006	Hexanone, 2-		2.2	U	SW846 8260B
			095365-006	Isopropylbenzene		0.3	U	SW846 8260B
			095365-006	Methyl Acetate		1.5	U	SW846 8260B
			095365-006	Methylcyclohexane		3	U	SW846 8260B
			095365-006	Methylene chloride		3	U	SW846 8260B
			095365-006	Pentanone, 4-methyl-, 2-		1.5	U	SW846 8260B
			095365-006	Styrene		0.3	U	SW846 8260B
			095365-006	Tert-butyl methyl ether		0.3	U	SW846 8260B
			095365-006	Tetrachloroethane, 1,1,2,2-		0.3	U	SW846 8260B
			095365-006	Tetrachloroethene		0.3	U	SW846 8260B
			095365-006	Toluene		0.3	U	SW846 8260B
			095365-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-		1.5	U	SW846 8260B
			095365-006	Trichlorobenzene, 1,2,3-		0.3	U	SW846 8260B
			095365-006	Trichlorobenzene, 1,2,4-		0.3	U	SW846 8260B
			095365-006	Trichloroethane, 1,1,1-		0.3	U	SW846 8260B
			095365-006	Trichloroethane, 1,1,2-		0.3	U	SW846 8260B
			095365-006	Trichloroethene		0.3	U	SW846 8260B
			095365-006	Trichlorofluoromethane		0.3	U	SW846 8260B
			095365-006	Vinyl chloride		0.3	U	SW846 8260B
			095365-006	Xylene		0.3	U	SW846 8260B
			095365-006	Xylene, m- & p-		0.3	U	SW846 8260B
			095365-006	Xylene, o-		0.3	U	SW846 8260B
WW011	2069K	22-Apr-2014	095366-006	Acetone	9.08	3	J	SW846 8260B
			095366-006	Benzene		0.3	U	SW846 8260B
			095366-006	Bromochloromethane		0.3	U	SW846 8260B
			095366-006	Bromodichloromethane		0.3	U	SW846 8260B
			095366-006	Bromoform	0.35	0.3	J	SW846 8260B
			095366-006	Bromomethane		0.3	U	SW846 8260B
			095366-006	Butanone, 2-		2	U	SW846 8260B
			095366-006	Carbon disulfide		1.5	U	SW846 8260B
			095366-006	Carbon tetrachloride		0.3	U	SW846 8260B

See notes at end of appendix.

Table D-4. Summary of volatile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW011	2069K	22-Apr-2014	095366-006	Chlorobenzene		0.3	U	SW846 8260B
			095366-006	Chloroethane		0.3	U	SW846 8260B
			095366-006	Chloroform	0.81	0.3	J	SW846 8260B
			095366-006	Chloromethane		0.3	U	SW846 8260B
			095366-006	Cyclohexane		0.3	U	SW846 8260B
			095366-006	Dibromo-3-chloropropane, 1,2-		0.3	U	SW846 8260B
			095366-006	Dibromochloromethane		0.3	U	SW846 8260B
			095366-006	Dibromoethane, 1,2-		0.3	U	SW846 8260B
			095366-006	Dichlorobenzene, 1,2-		0.3	U	SW846 8260B
			095366-006	Dichlorobenzene, 1,3-		0.3	U	SW846 8260B
			095366-006	Dichlorobenzene, 1,4-		0.3	U	SW846 8260B
			095366-006	Dichlorodifluoromethane		0.3	U	SW846 8260B
			095366-006	Dichloroethane, 1,1-		0.3	U	SW846 8260B
			095366-006	Dichloroethane, 1,2-		0.3	U	SW846 8260B
			095366-006	Dichloroethene, 1,1-		0.3	U	SW846 8260B
			095366-006	Dichloroethene, cis-1,2-		0.3	U	SW846 8260B
			095366-006	Dichloroethene, trans-1,2-		0.3	U	SW846 8260B
			095366-006	Dichloropropane, 1,2-		0.3	U	SW846 8260B
			095366-006	Dichloropropene, cis-1,3-		0.3	U	SW846 8260B
			095366-006	Dichloropropene, trans-1,3-		0.3	U	SW846 8260B
			095366-006	Ethyl benzene		0.3	U	SW846 8260B
			095366-006	Hexanone, 2-		2.2	U	SW846 8260B
			095366-006	Isopropylbenzene		0.3	U	SW846 8260B
			095366-006	Methyl Acetate		1.5	U	SW846 8260B
			095366-006	Methylcyclohexane		3	U	SW846 8260B
			095366-006	Methylene chloride		3	U	SW846 8260B
			095366-006	Pentanone, 4-methyl-, 2-		1.5	U	SW846 8260B
			095366-006	Styrene		0.3	U	SW846 8260B
			095366-006	Tert-butyl methyl ether		0.3	U	SW846 8260B
			095366-006	Tetrachloroethane, 1,1,2,2-		0.3	U	SW846 8260B
			095366-006	Tetrachloroethene		0.3	U	SW846 8260B
			095366-006	Toluene		0.3	U	SW846 8260B
			095366-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-		1.5	U	SW846 8260B
			095366-006	Trichlorobenzene, 1,2,3-		0.3	U	SW846 8260B

See notes at end of appendix.

Table D-4. Summary of volatile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW011	2069K	22-Apr-2014	095366-006	Trichlorobenzene, 1,2,4-		0.3	U	SW846 8260B
			095366-006	Trichloroethane, 1,1,1-		0.3	U	SW846 8260B
			095366-006	Trichloroethane, 1,1,2-		0.3	U	SW846 8260B
			095366-006	Trichloroethene		0.3	U	SW846 8260B
			095366-006	Trichlorofluoromethane		0.3	U	SW846 8260B
			095366-006	Vinyl chloride		0.3	U	SW846 8260B
			095366-006	Xylene		0.3	U	SW846 8260B
			095366-006	Xylene, m- & p-		0.3	U	SW846 8260B
			095366-006	Xylene, o-		0.3	U	SW846 8260B

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW001	2069A	Aluminum	0.068	900	SW846 3010/6010B
		Aluminum	0.0704	900	SW846 3010/6010B
		Aluminum	0.137	900	SW846 3010/6010B
		Aluminum	0.139	900	SW846 3010/6010B
		Aluminum Average	*0.104*		
		Aluminum StdDev	*0.040*		
		Aluminum Min	*0.068*		
		Aluminum Max	*0.139*		
		Ammonia	11.8		EPA 350.1
		Ammonia	14.4		EPA 350.1
		Ammonia	15.9		EPA 350.1
		Ammonia	18.6		EPA 350.1
		Ammonia Average	*15.175*		
		Ammonia StdDev	*2.843*		
		Ammonia Min	*11.800*		
		Ammonia Max	*18.6*		
		Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic	0.00562	0.051	SW846 3010/6010B
		Arsenic	0.00867	0.051	SW846 3010/6010B
		Arsenic Average	*0.006*		
		Arsenic StdDev	*0.002*		
		Arsenic Min	*0.005*		
		Arsenic Max	*0.00867*		
		Boron	0.0698		SW846 3010/6010B
		Boron	0.0852		SW846 3010/6010B
		Boron	0.0924		SW846 3010/6010B
		Boron	0.124		SW846 3010/6010B
		Boron Average	*0.093*		
		Boron StdDev	*0.023*		
		Boron Min	*0.070*		
		Boron Max	*0.124*		

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW001	2069A	Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium Average	*0.001*		
		Cadmium StdDev	*0.000*		
		Cadmium Min	*0.001*		
		Cadmium Max	*0.001*		
		Chromium	0.00225	4.1	SW846 3010/6010B
		Chromium	0.00381	4.1	SW846 3010/6010B
		Chromium	0.00432	4.1	SW846 3010/6010B
		Chromium	0.00445	4.1	SW846 3010/6010B
		Chromium Average	*0.004*		
		Chromium StdDev	*0.001*		
		Chromium Min	*0.002*		
		Chromium Max	*0.00445*		
		Copper	0.0147	5.3	SW846 3010/6010B
		Copper	0.0252	5.3	SW846 3010/6010B
		Copper	0.0482	5.3	SW846 3010/6010B
		Copper	0.0651	5.3	SW846 3010/6010B
		Copper Average	*0.038*		
		Copper StdDev	*0.023*		
		Copper Min	*0.015*		
		Copper Max	*0.0651*		
		Fluoride	5.01	36	EPA 300.0
		Fluoride	5.45	36	EPA 300.0
		Fluoride	7.38	36	EPA 300.0
		Fluoride	8.48	36	EPA 300.0
		Fluoride Average	*6.580*		
		Fluoride StdDev	*1.632*		
		Fluoride Min	*5.010*		
		Fluoride Max	*8.48*		

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW001	2069A	Lead	0.00688	1	SW846 3010/6010B
		Lead	0.00984	1	SW846 3010/6010B
		Lead	0.0101	1	SW846 3010/6010B
		Lead	0.0162	1	SW846 3010/6010B
		Lead Average	*0.011*		
		Lead StdDev	*0.004*		
		Lead Min	*0.007*		
		Lead Max	*0.0162*		
		Mercury	0.000067		SW846 7470A
		Mercury	0.000067		SW846 7470A
		Mercury	0.000067		SW846 7470A
		Mercury	0.000067		SW846 7470A
		Mercury Average	*0.000*		
		Mercury StdDev	*0.000*		
		Mercury Min	*0.000*		
		Mercury Max	*0.000067*		
		Molybdenum	0.0178	2	SW846 3010/6010B
		Molybdenum	0.0187	2	SW846 3010/6010B
		Molybdenum	0.0259	2	SW846 3010/6010B
		Molybdenum	0.0292	2	SW846 3010/6010B
		Molybdenum Average	*0.023*		
		Molybdenum StdDev	*0.006*		
		Molybdenum Min	*0.018*		
		Molybdenum Max	*0.0292*		
		Nickel	0.0015	2	SW846 3010/6010B
		Nickel	0.0015	2	SW846 3010/6010B
		Nickel	0.00275	2	SW846 3010/6010B
		Nickel	0.00417	2	SW846 3010/6010B
		Nickel Average	*0.002*		
		Nickel StdDev	*0.001*		
		Nickel Min	*0.002*		
		Nickel Max	*0.00417*		

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW001	2069A	Selenium	0.006	0.46	SW846 3010/6010B
		Selenium	0.00609	0.46	SW846 3010/6010B
		Selenium	0.014	0.46	SW846 3010/6010B
		Selenium	0.0249	0.46	SW846 3010/6010B
		Selenium Average	*0.013*		
		Selenium StdDev	*0.009*		
		Selenium Min	*0.006*		
		Selenium Max	*0.0249*		
		Silver	0.001	5	SW846 3010/6010B
		Silver	0.001	5	SW846 3010/6010B
		Silver	0.001	5	SW846 3010/6010B
		Silver	0.001	5	SW846 3010/6010B
		Silver Average	*0.001*		
		Silver StdDev	*0.000*		
		Silver Min	*0.001*		
		Silver Max	*0.001*		
		Zinc	0.0333	2.2	SW846 3010/6010B
		Zinc	0.0481	2.2	SW846 3010/6010B
		Zinc	0.0516	2.2	SW846 3010/6010B
		Zinc	0.125	2.2	SW846 3010/6010B
		Zinc Average	*0.065*		
		Zinc StdDev	*0.041*		
		Zinc Min	*0.033*		
		Zinc Max	*0.125*		
WW006	2069F	Aluminum	0.161	900	SW846 3010/6010B
		Aluminum	0.272	900	SW846 3010/6010B
		Aluminum	0.293	900	SW846 3010/6010B
		Aluminum	0.362	900	SW846 3010/6010B
		Aluminum Average	*0.272*		
		Aluminum StdDev	*0.083*		
		Aluminum Min	*0.161*		
		Aluminum Max	*0.362*		

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW006	2069F	Ammonia	42.3		EPA 350.1
		Ammonia	53.5		EPA 350.1
		Ammonia	55.5		EPA 350.1
		Ammonia	65		EPA 350.1
		Ammonia Average	*54.075*		
		Ammonia StdDev	*9.316*		
		Ammonia Min	*42.300*		
		Ammonia Max	*65*		
		Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic	0.0102	0.051	SW846 3010/6010B
		Arsenic	0.0121	0.051	SW846 3010/6010B
		Arsenic Average	*0.008*		
		Arsenic StdDev	*0.004*		
		Arsenic Min	*0.005*		
		Arsenic Max	*0.0121*		
		Boron	0.115		SW846 3010/6010B
		Boron	0.138		SW846 3010/6010B
		Boron	0.159		SW846 3010/6010B
		Boron	0.284		SW846 3010/6010B
		Boron Average	*0.174*		
		Boron StdDev	*0.076*		
		Boron Min	*0.115*		
		Boron Max	*0.284*		
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium Average	*0.001*		
		Cadmium StdDev	*0.000*		
		Cadmium Min	*0.001*		
		Cadmium Max	*0.001*		

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW006	2069F	Chromium	0.00168	4.1	SW846 3010/6010B
		Chromium	0.00183	4.1	SW846 3010/6010B
		Chromium	0.00447	4.1	SW846 3010/6010B
		Chromium	0.00749	4.1	SW846 3010/6010B
		Chromium Average	*0.004*		
		Chromium StdDev	*0.003*		
		Chromium Min	*0.002*		
		Chromium Max	*0.00749*		
		Copper	0.0277	5.3	SW846 3010/6010B
		Copper	0.0304	5.3	SW846 3010/6010B
		Copper	0.0449	5.3	SW846 3010/6010B
		Copper	0.0535	5.3	SW846 3010/6010B
		Copper Average	*0.039*		
		Copper StdDev	*0.012*		
		Copper Min	*0.028*		
		Copper Max	*0.0535*		
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00168	0.45	SW846 9012B
		Cyanide, total	0.00458	0.45	SW846 9012B
		Cyanide, total	0.00482	0.45	SW846 9012B
		Cyanide, total Average	*0.002*		
		Cyanide, total StdDev	*0.001*		
		Cyanide, total Min	*0.002*		
		Cyanide, total Max	*0.00482*		
		Fluoride	0.687	36	EPA 300.0
		Fluoride	0.714	36	EPA 300.0
		Fluoride	0.775	36	EPA 300.0
		Fluoride	0.788	36	EPA 300.0
		Fluoride Average	*0.741*		
		Fluoride StdDev	*0.048*		

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW006	2069F	*Fluoride Min*	*0.687*		
		Fluoride Max	*0.788*		
		Lead	0.0033	1	SW846 3010/6010B
		Lead	0.0033	1	SW846 3010/6010B
		Lead	0.0165	1	SW846 3010/6010B
		Lead	0.0191	1	SW846 3010/6010B
		Lead Average	*0.011*		
		Lead StdDev	*0.008*		
		Lead Min	*0.003*		
		Lead Max	*0.0191*		
		Mercury	0.000067		SW846 7470A
		Mercury	0.000067		SW846 7470A
		Mercury	0.000067		SW846 7470A
		Mercury	0.000067		SW846 7470A
		Mercury Average	*0.000*		
		Mercury StdDev	*0.000*		
		Mercury Min	*0.000*		
		Mercury Max	*0.000067*		
		Molybdenum	0.0171	2	SW846 3010/6010B
		Molybdenum	0.0248	2	SW846 3010/6010B
		Molybdenum	0.0407	2	SW846 3010/6010B
		Molybdenum	0.048	2	SW846 3010/6010B
		Molybdenum Average	*0.033*		
		Molybdenum StdDev	*0.014*		
		Molybdenum Min	*0.017*		
		Molybdenum Max	*0.048*		
		Nickel	0.002	2	SW846 3010/6010B
		Nickel	0.002	2	SW846 3010/6010B
		Nickel	0.00242	2	SW846 3010/6010B
		Nickel	0.00264	2	SW846 3010/6010B
		Nickel Average	*0.002*		
		Nickel StdDev	*0.000*		
		Nickel Min	*0.002*		
		Nickel Max	*0.00264*		

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW006	2069F	Selenium	0.006	0.46	SW846 3010/6010B
		Selenium	0.006	0.46	SW846 3010/6010B
		Selenium	0.015	0.46	SW846 3010/6010B
		Selenium	0.025	0.46	SW846 3010/6010B
		Selenium Average	*0.013*		
		Selenium StdDev	*0.009*		
		Selenium Min	*0.006*		
		Selenium Max	*0.025*		
		Silver	0.001	5	SW846 3010/6010B
		Silver	0.001	5	SW846 3010/6010B
		Silver	0.001	5	SW846 3010/6010B
		Silver	0.00515	5	SW846 3010/6010B
		Silver Average	*0.002*		
		Silver StdDev	*0.002*		
		Silver Min	*0.001*		
		Silver Max	*0.00515*		
		Zinc	0.0567	2.2	SW846 3010/6010B
		Zinc	0.158	2.2	SW846 3010/6010B
		Zinc	0.236	2.2	SW846 3010/6010B
		Zinc	0.388	2.2	SW846 3010/6010B
		Zinc Average	*0.210*		
		Zinc StdDev	*0.140*		
		Zinc Min	*0.057*		
		Zinc Max	*0.388*		
WW006 #2	2069F	Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00199	0.45	SW846 9012B
		Cyanide, total	0.00292	0.45	SW846 9012B
		Cyanide, total	0.00297	0.45	SW846 9012B
		Cyanide, total Average	*0.002*		
		Cyanide, total StdDev	*0.001*		

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW006 #2	2069F	*Cyanide, total Min*	*0.002*		
		Cyanide, total Max	*0.00297*		
WW007	2069G	Aluminum	0.068	900	SW846 3010/6010B
		Aluminum	0.068	900	SW846 3010/6010B
		Aluminum	0.068	900	SW846 3010/6010B
		Aluminum	0.0747	900	SW846 3010/6010B
		Aluminum Average	*0.070*		
		Aluminum StdDev	*0.003*		
		Aluminum Min	*0.068*		
		Aluminum Max	*0.0747*		
		Ammonia	3.04		EPA 350.1
		Ammonia	3.42		EPA 350.1
		Ammonia	3.47		EPA 350.1
		Ammonia	3.48		EPA 350.1
		Ammonia Average	*3.353*		
		Ammonia StdDev	*0.210*		
		Ammonia Min	*3.040*		
		Ammonia Max	*3.48*		
		Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic Average	*0.005*		
		Arsenic StdDev	*0.000*		
		Arsenic Min	*0.005*		
		Arsenic Max	*0.005*		
		Boron	0.0261		SW846 3010/6010B
		Boron	0.0279		SW846 3010/6010B
		Boron	0.0283		SW846 3010/6010B
		Boron	0.0289		SW846 3010/6010B
		Boron Average	*0.028*		
		Boron StdDev	*0.001*		
		Boron Min	*0.026*		
		Boron Max	*0.0289*		

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW007	2069G	Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium Average	*0.001*		
		Cadmium StdDev	*0.000*		
		Cadmium Min	*0.001*		
		Cadmium Max	*0.001*		
		Chromium	0.00142	4.1	SW846 3010/6010B
		Chromium	0.00182	4.1	SW846 3010/6010B
		Chromium	0.00185	4.1	SW846 3010/6010B
		Chromium	0.00231	4.1	SW846 3010/6010B
		Chromium Average	*0.002*		
		Chromium StdDev	*0.000*		
		Chromium Min	*0.001*		
		Chromium Max	*0.00231*		
		Copper	0.003	5.3	SW846 3010/6010B
		Copper	0.003	5.3	SW846 3010/6010B
		Copper	0.00304	5.3	SW846 3010/6010B
		Copper	0.00354	5.3	SW846 3010/6010B
		Copper Average	*0.003*		
		Copper StdDev	*0.000*		
		Copper Min	*0.003*		
		Copper Max	*0.00354*		
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00532	0.45	SW846 9012B

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW007	2069G	*Cyanide, total Average*	*0.002*		
		Cyanide, total StdDev	*0.001*		
		Cyanide, total Min	*0.002*		
		Cyanide, total Max	*0.00532*		
		Fluoride	7.68	36	EPA 300.0
		Fluoride	8.51	36	EPA 300.0
		Fluoride	9.22	36	EPA 300.0
		Fluoride	10.7	36	EPA 300.0
		Fluoride Average	*9.028*		
		Fluoride StdDev	*1.280*		
		Fluoride Min	*7.680*		
		Fluoride Max	*10.7*		
		Lead	0.0033	1	SW846 3010/6010B
		Lead	0.0033	1	SW846 3010/6010B
		Lead	0.0165	1	SW846 3010/6010B
		Lead	0.0165	1	SW846 3010/6010B
		Lead Average	*0.010*		
		Lead StdDev	*0.008*		
		Lead Min	*0.003*		
		Lead Max	*0.0165*		
		Mercury	0.000067		SW846 7470A
		Mercury	0.000067		SW846 7470A
		Mercury	0.000067		SW846 7470A
		Mercury	0.000067		SW846 7470A
		Mercury Average	*0.000*		
		Mercury StdDev	*0.000*		
		Mercury Min	*0.000*		
		Mercury Max	*0.000067*		

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW007	2069G	Molybdenum	0.0169	2	SW846 3010/6010B
		Molybdenum	0.0178	2	SW846 3010/6010B
		Molybdenum	0.0191	2	SW846 3010/6010B
		Molybdenum	0.0194	2	SW846 3010/6010B
		Molybdenum Average	*0.018*		
		Molybdenum StdDev	*0.001*		
		Molybdenum Min	*0.017*		
		Molybdenum Max	*0.0194*		
		Nickel	0.0015	2	SW846 3010/6010B
		Nickel	0.0015	2	SW846 3010/6010B
		Nickel	0.0015	2	SW846 3010/6010B
		Nickel	0.0015	2	SW846 3010/6010B
		Nickel Average	*0.002*		
		Nickel StdDev	*0.000*		
		Nickel Min	*0.002*		
		Nickel Max	*0.0015*		
		Selenium	0.006	0.46	SW846 3010/6010B
		Selenium	0.006	0.46	SW846 3010/6010B
		Selenium	0.00648	0.46	SW846 3010/6010B
		Selenium	0.0172	0.46	SW846 3010/6010B
		Selenium Average	*0.009*		
		Selenium StdDev	*0.006*		
		Selenium Min	*0.006*		
		Selenium Max	*0.0172*		
		Silver	0.001	5	SW846 3010/6010B
		Silver	0.001	5	SW846 3010/6010B
		Silver	0.001	5	SW846 3010/6010B
		Silver	0.001	5	SW846 3010/6010B
		Silver Average	*0.001*		
		Silver StdDev	*0.000*		
		Silver Min	*0.001*		
		Silver Max	*0.001*		

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW007	2069G	Zinc	0.0033	2.2	SW846 3010/6010B
		Zinc	0.0033	2.2	SW846 3010/6010B
		Zinc	0.00525	2.2	SW846 3010/6010B
		Zinc	0.00676	2.2	SW846 3010/6010B
		Zinc Average	*0.005*		
		Zinc StdDev	*0.002*		
		Zinc Min	*0.003*		
		Zinc Max	*0.00676*		
WW008	2069I	Aluminum	0.068	900	SW846 3010/6010B
		Aluminum	0.068	900	SW846 3010/6010B
		Aluminum	0.068	900	SW846 3010/6010B
		Aluminum	0.0694	900	SW846 3010/6010B
		Aluminum	0.0742	900	SW846 3010/6010B
		Aluminum	0.0939	900	SW846 3010/6010B
		Aluminum	0.0944	900	SW846 3010/6010B
		Aluminum	0.101	900	SW846 3010/6010B
		Aluminum	0.14	900	SW846 3010/6010B
		Aluminum	0.454	900	SW846 3010/6010B
		Aluminum Average	*0.123*		
		Aluminum StdDev	*0.118*		
		Aluminum Min	*0.068*		
		Aluminum Max	*0.454*		
		Ammonia	27.4		EPA 350.1
		Ammonia	28		EPA 350.1
		Ammonia	56.5		EPA 350.1
		Ammonia	61.5		EPA 350.1
		Ammonia Average	*43.350*		
		Ammonia StdDev	*18.188*		
		Ammonia Min	*27.400*		
		Ammonia Max	*61.5*		
		Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic	0.005	0.051	SW846 3010/6010B

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW008	2069I	Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic	0.00549	0.051	SW846 3010/6010B
		Arsenic Average	*0.005*		
		Arsenic StdDev	*0.000*		
		Arsenic Min	*0.005*		
		Arsenic Max	*0.00549*		
		Boron	0.0711		SW846 3010/6010B
		Boron	0.0714		SW846 3010/6010B
		Boron	0.0834		SW846 3010/6010B
		Boron	0.0842		SW846 3010/6010B
		Boron	0.0851		SW846 3010/6010B
		Boron	0.0904		SW846 3010/6010B
		Boron	0.0909		SW846 3010/6010B
		Boron	0.106		SW846 3010/6010B
		Boron	0.117		SW846 3010/6010B
		Boron	0.122		SW846 3010/6010B
		Boron Average	*0.092*		
		Boron StdDev	*0.018*		
		Boron Min	*0.071*		
		Boron Max	*0.122*		
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium Average	*0.001*		
		Cadmium StdDev	*0.000*		

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW008	2069I	*Cadmium Min*	*0.001*		
		Cadmium Max	*0.001*		
		Chromium	0.001	4.1	SW846 3010/6010B
		Chromium	0.001	4.1	SW846 3010/6010B
		Chromium	0.00106	4.1	SW846 3010/6010B
		Chromium	0.00116	4.1	SW846 3010/6010B
		Chromium	0.00121	4.1	SW846 3010/6010B
		Chromium	0.00121	4.1	SW846 3010/6010B
		Chromium	0.00128	4.1	SW846 3010/6010B
		Chromium	0.00155	4.1	SW846 3010/6010B
		Chromium	0.00171	4.1	SW846 3010/6010B
		Chromium	0.00219	4.1	SW846 3010/6010B
		Chromium Average	*0.001*		
		Chromium StdDev	*0.000*		
		Chromium Min	*0.001*		
		Chromium Max	*0.00219*		
		Copper	0.0141	5.3	SW846 3010/6010B
		Copper	0.0172	5.3	SW846 3010/6010B
		Copper	0.0229	5.3	SW846 3010/6010B
		Copper	0.0238	5.3	SW846 3010/6010B
		Copper	0.0263	5.3	SW846 3010/6010B
		Copper	0.0308	5.3	SW846 3010/6010B
		Copper	0.0329	5.3	SW846 3010/6010B
		Copper	0.0463	5.3	SW846 3010/6010B
		Copper	0.12	5.3	SW846 3010/6010B
		Copper	0.491	5.3	SW846 3010/6010B
		Copper Average	*0.083*		
		Copper StdDev	*0.147*		
		Copper Min	*0.014*		
		Copper Max	*0.491*		
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00249	0.45	SW846 9012B

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW008	2069I	Cyanide, total	0.00295	0.45	SW846 9012B
		Cyanide, total	0.00356	0.45	SW846 9012B
		Cyanide, total	0.00383	0.45	SW846 9012B
		Cyanide, total Average	*0.002*		
		Cyanide, total StdDev	*0.001*		
		Cyanide, total Min	*0.002*		
		Cyanide, total Max	*0.00383*		
		Fluoride	0.548	36	EPA 300.0
		Fluoride	0.551	36	EPA 300.0
		Fluoride	0.648	36	EPA 300.0
		Fluoride	0.69	36	EPA 300.0
		Fluoride Average	*0.609*		
		Fluoride StdDev	*0.071*		
		Fluoride Min	*0.548*		
		Fluoride Max	*0.69*		
		Lead	0.0033	1	SW846 3010/6010B
		Lead	0.0033	1	SW846 3010/6010B
		Lead	0.0033	1	SW846 3010/6010B
		Lead	0.0033	1	SW846 3010/6010B
		Lead	0.0033	1	SW846 3010/6010B
		Lead	0.0165	1	SW846 3010/6010B
		Lead	0.033	1	SW846 3010/6010B
		Lead	0.033	1	SW846 3010/6010B
		Lead	0.033	1	SW846 3010/6010B
		Lead	0.043	1	SW846 3010/6010B
		Lead Average	*0.018*		
		Lead StdDev	*0.016*		
		Lead Min	*0.003*		
		Lead Max	*0.043*		
		Mercury	0.000067		SW846 7470A
		Mercury	0.000067		SW846 7470A
		Mercury	0.000067		SW846 7470A
		Mercury	0.000067		SW846 7470A
		Mercury	0.000067		SW846 7470A
		Mercury	0.000067		SW846 7470A

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW008	2069I	Mercury	0.000067		SW846 7470A
		Mercury	0.000067		SW846 7470A
		Mercury	0.000067		SW846 7470A
		Mercury	0.000067		SW846 7470A
		Mercury Average	*0.000*		
		Mercury StdDev	*0.000*		
		Mercury Min	*0.000*		
		Mercury Max	*0.000067*		
		Molybdenum	0.00433	2	SW846 3010/6010B
		Molybdenum	0.0046	2	SW846 3010/6010B
		Molybdenum	0.00476	2	SW846 3010/6010B
		Molybdenum	0.00533	2	SW846 3010/6010B
		Molybdenum	0.00537	2	SW846 3010/6010B
		Molybdenum	0.00552	2	SW846 3010/6010B
		Molybdenum	0.00562	2	SW846 3010/6010B
		Molybdenum	0.00575	2	SW846 3010/6010B
		Molybdenum	0.00598	2	SW846 3010/6010B
		Molybdenum	0.00773	2	SW846 3010/6010B
		Molybdenum Average	*0.005*		
		Molybdenum StdDev	*0.001*		
		Molybdenum Min	*0.004*		
		Molybdenum Max	*0.00773*		
		Nickel	0.00443	2	SW846 3010/6010B
		Nickel	0.00554	2	SW846 3010/6010B
		Nickel	0.0059	2	SW846 3010/6010B
		Nickel	0.00612	2	SW846 3010/6010B
		Nickel	0.00701	2	SW846 3010/6010B
		Nickel	0.00747	2	SW846 3010/6010B
		Nickel	0.00805	2	SW846 3010/6010B
		Nickel	0.0117	2	SW846 3010/6010B
		Nickel	0.0119	2	SW846 3010/6010B
		Nickel	0.0125	2	SW846 3010/6010B

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW008	2069I	*Nickel Average*	*0.008*		
		Nickel StdDev	*0.003*		
		Nickel Min	*0.004*		
		Nickel Max	*0.0125*		
		Selenium	0.006	0.46	SW846 3010/6010B
		Selenium	0.006	0.46	SW846 3010/6010B
		Selenium	0.006	0.46	SW846 3010/6010B
		Selenium	0.006	0.46	SW846 3010/6010B
		Selenium	0.00737	0.46	SW846 3010/6010B
		Selenium	0.00875	0.46	SW846 3010/6010B
		Selenium	0.011	0.46	SW846 3010/6010B
		Selenium	0.0239	0.46	SW846 3010/6010B
		Selenium	0.0256	0.46	SW846 3010/6010B
		Selenium	0.0269	0.46	SW846 3010/6010B
		Selenium Average	*0.013*		
		Selenium StdDev	*0.009*		
		Selenium Min	*0.006*		
		Selenium Max	*0.0269*		
		Silver	0.001	5	SW846 3010/6010B
		Silver	0.001	5	SW846 3010/6010B
		Silver	0.001	5	SW846 3010/6010B
		Silver	0.001	5	SW846 3010/6010B
		Silver	0.001	5	SW846 3010/6010B
		Silver	0.001	5	SW846 3010/6010B
		Silver	0.001	5	SW846 3010/6010B
		Silver	0.001	5	SW846 3010/6010B
		Silver	0.0034	5	SW846 3010/6010B
		Silver	0.00364	5	SW846 3010/6010B
		Silver Average	*0.002*		
		Silver StdDev	*0.001*		
		Silver Min	*0.001*		
		Silver Max	*0.00364*		

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW008	2069I	Zinc	0.0295	2.2	SW846 3010/6010B
		Zinc	0.0339	2.2	SW846 3010/6010B
		Zinc	0.0351	2.2	SW846 3010/6010B
		Zinc	0.0369	2.2	SW846 3010/6010B
		Zinc	0.0583	2.2	SW846 3010/6010B
		Zinc	0.0611	2.2	SW846 3010/6010B
		Zinc	0.0681	2.2	SW846 3010/6010B
		Zinc	0.0701	2.2	SW846 3010/6010B
		Zinc	0.0859	2.2	SW846 3010/6010B
		Zinc	0.123	2.2	SW846 3010/6010B
		Zinc Average	*0.060*		
		Zinc StdDev	*0.029*		
		Zinc Min	*0.030*		
		Zinc Max	*0.123*		
WW011	2069K	Aluminum	0.0995	900	SW846 3010/6010B
		Aluminum	0.114	900	SW846 3010/6010B
		Aluminum	0.12	900	SW846 3010/6010B
		Aluminum	0.17	900	SW846 3010/6010B
		Aluminum Average	*0.126*		
		Aluminum StdDev	*0.031*		
		Aluminum Min	*0.100*		
		Aluminum Max	*0.17*		
		Ammonia	19.6		EPA 350.1
		Ammonia	20.3		EPA 350.1
		Ammonia	24.2		EPA 350.1
		Ammonia	25		EPA 350.1
		Ammonia Average	*22.275*		
		Ammonia StdDev	*2.720*		
		Ammonia Min	*19.600*		
		Ammonia Max	*25*		

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW011	2069K	Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic	0.0116	0.051	SW846 3010/6010B
		Arsenic Average	*0.007*		
		Arsenic StdDev	*0.003*		
		Arsenic Min	*0.005*		
		Arsenic Max	*0.0116*		
		Boron	0.0738		SW846 3010/6010B
		Boron	0.0742		SW846 3010/6010B
		Boron	0.105		SW846 3010/6010B
		Boron	0.171		SW846 3010/6010B
		Boron Average	*0.106*		
		Boron StdDev	*0.046*		
		Boron Min	*0.074*		
		Boron Max	*0.171*		
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium Average	*0.001*		
		Cadmium StdDev	*0.000*		
		Cadmium Min	*0.001*		
		Cadmium Max	*0.001*		
		Chromium	0.00231	4.1	SW846 3010/6010B
		Chromium	0.00282	4.1	SW846 3010/6010B
		Chromium	0.00298	4.1	SW846 3010/6010B
		Chromium	0.0294	4.1	SW846 3010/6010B
		Chromium Average	*0.009*		
		Chromium StdDev	*0.013*		
		Chromium Min	*0.002*		
		Chromium Max	*0.0294*		

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW011	2069K	Copper	0.0255	5.3	SW846 3010/6010B
		Copper	0.0293	5.3	SW846 3010/6010B
		Copper	0.0295	5.3	SW846 3010/6010B
		Copper	0.0394	5.3	SW846 3010/6010B
		Copper Average	*0.031*		
		Copper StdDev	*0.006*		
		Copper Min	*0.026*		
		Copper Max	*0.0394*		
		Fluoride	0.572	36	EPA 300.0
		Fluoride	0.616	36	EPA 300.0
		Fluoride	0.873	36	EPA 300.0
		Fluoride	0.901	36	EPA 300.0
		Fluoride Average	*0.741*		
		Fluoride StdDev	*0.170*		
		Fluoride Min	*0.572*		
		Fluoride Max	*0.901*		
		Lead	0.0033	1	SW846 3010/6010B
		Lead	0.0033	1	SW846 3010/6010B
		Lead	0.0165	1	SW846 3010/6010B
		Lead	0.0185	1	SW846 3010/6010B
		Lead Average	*0.010*		
		Lead StdDev	*0.008*		
		Lead Min	*0.003*		
		Lead Max	*0.0185*		
		Mercury	0.000067		SW846 7470A
		Mercury	0.000067		SW846 7470A
		Mercury	0.000067		SW846 7470A
		Mercury	0.000067		SW846 7470A
		Mercury Average	*0.000*		
		Mercury StdDev	*0.000*		
		Mercury Min	*0.000*		
		Mercury Max	*0.000067*		

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW011	2069K	Molybdenum	0.0188	2	SW846 3010/6010B
		Molybdenum	0.0218	2	SW846 3010/6010B
		Molybdenum	0.141	2	SW846 3010/6010B
		Molybdenum	0.41	2	SW846 3010/6010B
		Molybdenum Average	*0.148*		
		Molybdenum StdDev	*0.184*		
		Molybdenum Min	*0.019*		
		Molybdenum Max	*0.41*		
		Nickel	0.0015	2	SW846 3010/6010B
		Nickel	0.0015	2	SW846 3010/6010B
		Nickel	0.0015	2	SW846 3010/6010B
		Nickel	0.00297	2	SW846 3010/6010B
		Nickel Average	*0.002*		
		Nickel StdDev	*0.001*		
		Nickel Min	*0.002*		
		Nickel Max	*0.00297*		
		Selenium	0.006	0.46	SW846 3010/6010B
		Selenium	0.006	0.46	SW846 3010/6010B
		Selenium	0.0112	0.46	SW846 3010/6010B
		Selenium	0.0136	0.46	SW846 3010/6010B
		Selenium Average	*0.009*		
		Selenium StdDev	*0.004*		
		Selenium Min	*0.006*		
		Selenium Max	*0.0136*		
		Silver	0.001	5	SW846 3010/6010B
		Silver	0.001	5	SW846 3010/6010B
		Silver	0.001	5	SW846 3010/6010B
		Silver	0.00248	5	SW846 3010/6010B
		Silver Average	*0.001*		
		Silver StdDev	*0.001*		
		Silver Min	*0.001*		
		Silver Max	*0.00248*		

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
WW011	2069K	Zinc	0.0445	2.2	SW846 3010/6010B
		Zinc	0.0499	2.2	SW846 3010/6010B
		Zinc	0.0777	2.2	SW846 3010/6010B
		Zinc	0.149	2.2	SW846 3010/6010B
		Zinc Average	*0.080*		
		Zinc StdDev	*0.048*		
		Zinc Min	*0.045*		
		Zinc Max	*0.149*		
CINT	2238A	Aluminum	0.068	900	SW846 3010/6010B
		Aluminum	0.068	900	SW846 3010/6010B
		Aluminum	0.0756	900	SW846 3010/6010B
		Aluminum	0.115	900	SW846 3010/6010B
		Aluminum Average	*0.082*		
		Aluminum StdDev	*0.023*		
		Aluminum Min	*0.068*		
		Aluminum Max	*0.115*		
		Ammonia	0.348		EPA 350.1
		Ammonia	0.451		EPA 350.1
		Ammonia	1.01		EPA 350.1
		Ammonia	1.53		EPA 350.1
		Ammonia Average	*0.835*		
		Ammonia StdDev	*0.547*		
		Ammonia Min	*0.348*		
		Ammonia Max	*1.53*		
		Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic	0.005	0.051	SW846 3010/6010B
		Arsenic Average	*0.005*		
		Arsenic StdDev	*0.000*		
		Arsenic Min	*0.005*		
		Arsenic Max	*0.005*		

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
CINT	2238A	Boron	0.0428		SW846 3010/6010B
		Boron	0.049		SW846 3010/6010B
		Boron	0.0809		SW846 3010/6010B
		Boron	0.0831		SW846 3010/6010B
		Boron Average	*0.064*		
		Boron StdDev	*0.021*		
		Boron Min	*0.043*		
		Boron Max	*0.0831*		
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium	0.001	0.05	SW846 3010/6010B
		Cadmium Average	*0.001*		
		Cadmium StdDev	*0.000*		
		Cadmium Min	*0.001*		
		Cadmium Max	*0.001*		
		Chromium	0.001	4.1	SW846 3010/6010B
		Chromium	0.00194	4.1	SW846 3010/6010B
		Chromium	0.00203	4.1	SW846 3010/6010B
		Chromium	0.0023	4.1	SW846 3010/6010B
		Chromium Average	*0.002*		
		Chromium StdDev	*0.001*		
		Chromium Min	*0.001*		
		Chromium Max	*0.0023*		
		Copper	0.00357	5.3	SW846 3010/6010B
		Copper	0.00715	5.3	SW846 3010/6010B
		Copper	0.0142	5.3	SW846 3010/6010B
		Copper	0.0157	5.3	SW846 3010/6010B
		Copper Average	*0.010*		
		Copper StdDev	*0.006*		
		Copper Min	*0.004*		
		Copper Max	*0.0157*		

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
CINT	2238A	Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total	0.00167	0.45	SW846 9012B
		Cyanide, total Average	*0.002*		
		Cyanide, total StdDev	*0.000*		
		Cyanide, total Min	*0.002*		
		Cyanide, total Max	*0.00167*		
		Fluoride	0.906	36	EPA 300.0
		Fluoride	0.918	36	EPA 300.0
		Fluoride	0.955	36	EPA 300.0
		Fluoride	1.07	36	EPA 300.0
		Fluoride Average	*0.962*		
		Fluoride StdDev	*0.075*		
		Fluoride Min	*0.906*		
		Fluoride Max	*1.07*		
		Lead	0.0033	1	SW846 3010/6010B
		Lead	0.0033	1	SW846 3010/6010B
		Lead	0.0033	1	SW846 3010/6010B
		Lead	0.00581	1	SW846 3010/6010B
		Lead Average	*0.004*		
		Lead StdDev	*0.001*		
		Lead Min	*0.003*		
		Lead Max	*0.00581*		

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
CINT	2238A	Mercury	0.000067		SW846 7470A
		Mercury	0.000067		SW846 7470A
		Mercury	0.000067		SW846 7470A
		Mercury	0.000068		SW846 7470A
		Mercury Average	*0.000*		
		Mercury StdDev	*0.000*		
		Mercury Min	*0.000*		
		Mercury Max	*0.000068*		
		Molybdenum	0.0203	2	SW846 3010/6010B
		Molybdenum	0.0223	2	SW846 3010/6010B
		Molybdenum	0.0358	2	SW846 3010/6010B
		Molybdenum	0.0397	2	SW846 3010/6010B
		Molybdenum Average	*0.030*		
		Molybdenum StdDev	*0.010*		
		Molybdenum Min	*0.020*		
		Molybdenum Max	*0.0397*		
		Nickel	0.0015	2	SW846 3010/6010B
		Nickel	0.0015	2	SW846 3010/6010B
		Nickel	0.0015	2	SW846 3010/6010B
		Nickel	0.0015	2	SW846 3010/6010B
		Nickel Average	*0.002*		
		Nickel StdDev	*0.000*		
		Nickel Min	*0.002*		
		Nickel Max	*0.0015*		
		Selenium	0.006	0.46	SW846 3010/6010B
		Selenium	0.0107	0.46	SW846 3010/6010B
		Selenium	0.0125	0.46	SW846 3010/6010B
		Selenium	0.0179	0.46	SW846 3010/6010B
		Selenium Average	*0.012*		
		Selenium StdDev	*0.005*		
		Selenium Min	*0.006*		
		Selenium Max	*0.0179*		

See notes at end of appendix.

Table D-5. Summary of nonradiological (inorganic) results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Result (mg/L)	Regulatory Limit (ABCWUA)	Analytical Method
CINT	2238A	Silver	0.001	5	SW846 3010/6010B
		Silver	0.001	5	SW846 3010/6010B
		Silver	0.001	5	SW846 3010/6010B
		Silver	0.0101	5	SW846 3010/6010B
		Silver Average	*0.003*		
		Silver StdDev	*0.005*		
		Silver Min	*0.001*		
		Silver Max	*0.0101*		
		Zinc	0.0033	2.2	SW846 3010/6010B
		Zinc	0.0033	2.2	SW846 3010/6010B
		Zinc	0.0033	2.2	SW846 3010/6010B
		Zinc	0.00436	2.2	SW846 3010/6010B
		Zinc Average	*0.004*		
		Zinc StdDev	*0.001*		
		Zinc Min	*0.003*		
		Zinc Max	*0.00436*		

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW001	2069A	Actinium-228	-4.44	300,000	EPA 901.1
		Actinium-228	10.3	300,000	EPA 901.1
		Actinium-228 Average	*2.930*		
		Actinium-228 StdDev	*10.423*		
		Actinium-228 Min	*-4.440*		
		Actinium-228 Max	*10.3*		
		Alpha, gross	2.45		EPA 900.0; SW846 9310
		Alpha, gross	5.49		EPA 900.0; SW846 9310
		Alpha, gross Average	*3.970*		
		Alpha, gross StdDev	*2.150*		
		Alpha, gross Min	*2.450*		
		Alpha, gross Max	*5.49*		
		Americium-241	-0.17	200	EPA 901.1
		Americium-241	1.69	200	EPA 901.1
		Americium-241 Average	*0.760*		
		Americium-241 StdDev	*1.315*		
		Americium-241 Min	*-0.170*		
		Americium-241 Max	*1.69*		
		Beryllium-7	-7.19		EPA 901.1
		Beryllium-7	-0.399		EPA 901.1
		Beryllium-7 Average	*-3.795*		
		Beryllium-7 StdDev	*4.802*		
		Beryllium-7 Min	*-7.190*		
		Beryllium-7 Max	*-0.399*		
		Beta, gross	10		EPA 900.0; SW846 9310
		Beta, gross	13.8		EPA 900.0; SW846 9310
		Beta, gross Average	*11.900*		
		Beta, gross StdDev	*2.687*		
		Beta, gross Min	*10.000*		
		Beta, gross Max	*13.8*		

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW001	2069A	Bismuth-212	9.26		EPA 901.1
		Bismuth-212	24.2		EPA 901.1
		Bismuth-212 Average	*16.730*		
		Bismuth-212 StdDev	*10.564*		
		Bismuth-212 Min	*9.260*		
		Bismuth-212 Max	*24.2*		
		Bismuth-214	-7.09		EPA 901.1
		Bismuth-214	10.1		EPA 901.1
		Bismuth-214 Average	*1.505*		
		Bismuth-214 StdDev	*12.155*		
		Bismuth-214 Min	*-7.090*		
		Bismuth-214 Max	*10.1*		
		Cesium-137	1.74	10,000	EPA 901.1
		Cesium-137	2.93	10,000	EPA 901.1
		Cesium-137 Average	*2.335*		
		Cesium-137 StdDev	*0.841*		
		Cesium-137 Min	*1.740*		
		Cesium-137 Max	*2.93*		
		Cobalt-60	-2.41	30,000	EPA 901.1
		Cobalt-60	0.447	30,000	EPA 901.1
		Cobalt-60 Average	*-0.982*		
		Cobalt-60 StdDev	*2.020*		
		Cobalt-60 Min	*-2.410*		
		Cobalt-60 Max	*0.447*		
		Lead-212	1.87	20,000	EPA 901.1
		Lead-212	1.94	20,000	EPA 901.1
		Lead-212 Average	*1.905*		
		Lead-212 StdDev	*0.049*		
		Lead-212 Min	*1.870*		
		Lead-212 Max	*1.94*		
		Lead-214	-9.15	1,000,000	EPA 901.1
		Lead-214	-1.17	1,000,000	EPA 901.1
		Lead-214 Average	*-5.160*		
		Lead-214 StdDev	*5.643*		

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW001	2069A	*Lead-214 Min*	*-9.150*		
		Lead-214 Max	*-1.17*		
		Neptunium-237	-1.35		EPA 901.1
		Neptunium-237	1.41		EPA 901.1
		Neptunium-237 Average	*0.030*		
		Neptunium-237 StdDev	*1.952*		
		Neptunium-237 Min	*-1.350*		
		Neptunium-237 Max	*1.41*		
		Potassium-40	-20.9	40,000	EPA 901.1
		Potassium-40	46.4	40,000	EPA 901.1
		Potassium-40 Average	*12.750*		
		Potassium-40 StdDev	*47.588*		
		Potassium-40 Min	*-20.900*		
		Potassium-40 Max	*46.4*		
		Radium-223	-9.17		EPA 901.1
		Radium-223	32.7		EPA 901.1
		Radium-223 Average	*11.765*		
		Radium-223 StdDev	*29.607*		
		Radium-223 Min	*-9.170*		
		Radium-223 Max	*32.7*		
		Radium-224	-28.2		EPA 901.1
		Radium-224	49.8		EPA 901.1
		Radium-224 Average	*10.800*		
		Radium-224 StdDev	*55.154*		
		Radium-224 Min	*-28.200*		
		Radium-224 Max	*49.8*		
		Radium-226	51.7	600	EPA 901.1
		Radium-226	74.7	600	EPA 901.1
		Radium-226 Average	*63.200*		
		Radium-226 StdDev	*16.263*		
		Radium-226 Min	*51.700*		
		Radium-226 Max	*74.7*		

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW001	2069A	Radium-228	-4.44	600	EPA 901.1
		Radium-228	10.3	600	EPA 901.1
		Radium-228 Average	*2.930*		
		Radium-228 StdDev	*10.423*		
		Radium-228 Min	*-4.440*		
		Radium-228 Max	*10.3*		
		Sodium-22	-0.103		EPA 901.1
		Sodium-22	0.294		EPA 901.1
		Sodium-22 Average	*0.096*		
		Sodium-22 StdDev	*0.281*		
		Sodium-22 Min	*-0.103*		
		Sodium-22 Max	*0.294*		
		Thorium-227	-8.01		EPA 901.1
		Thorium-227	10		EPA 901.1
		Thorium-227 Average	*0.995*		
		Thorium-227 StdDev	*12.735*		
		Thorium-227 Min	*-8.010*		
		Thorium-227 Max	*10*		
		Thorium-231	-10.8	300	EPA 901.1
		Thorium-231	-6.1	300	EPA 901.1
		Thorium-231 Average	*-8.450*		
		Thorium-231 StdDev	*3.323*		
		Thorium-231 Min	*-10.800*		
		Thorium-231 Max	*-6.1*		
		Thorium-234	-103	50,000	EPA 901.1
		Thorium-234	32.8	50,000	EPA 901.1
		Thorium-234 Average	*-35.100*		
		Thorium-234 StdDev	*96.025*		
		Thorium-234 Min	*-103.000*		
		Thorium-234 Max	*32.8*		

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW001	2069A	Tritium	-52.6	10,000,000	EPA 906.0 Modified
		Tritium	-45.8	10,000,000	EPA 906.0 Modified
		Tritium Average	*-49.200*		
		Tritium StdDev	*4.808*		
		Tritium Min	*-52.600*		
		Tritium Max	*-45.8*		
		Uranium-235	-3.06	3,000	EPA 901.1
		Uranium-235	16.3	3,000	EPA 901.1
		Uranium-235 Average	*6.620*		
		Uranium-235 StdDev	*13.690*		
		Uranium-235 Min	*-3.060*		
		Uranium-235 Max	*16.3*		
		Uranium-238	-103	3,000	EPA 901.1
		Uranium-238	32.8	3,000	EPA 901.1
		Uranium-238 Average	*-35.100*		
		Uranium-238 StdDev	*96.025*		
		Uranium-238 Min	*-103.000*		
		Uranium-238 Max	*32.8*		
WW006	2069F	Actinium-228	-10.4	300,000	EPA 901.1
		Actinium-228	5.48	300,000	EPA 901.1
		Actinium-228 Average	*-2.460*		
		Actinium-228 StdDev	*11.229*		
		Actinium-228 Min	*-10.400*		
		Actinium-228 Max	*5.48*		
		Alpha, gross	3.63		EPA 900.0; SW846 9310
		Alpha, gross	4.26		EPA 900.0; SW846 9310
		Alpha, gross Average	*3.945*		
		Alpha, gross StdDev	*0.445*		
		Alpha, gross Min	*3.630*		
		Alpha, gross Max	*4.26*		
		Americium-241	-2.79	200	EPA 901.1
		Americium-241	0.916	200	EPA 901.1

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW006	2069F	*Americium-241 Average*	*-0.937*		
		Americium-241 StdDev	*2.621*		
		Americium-241 Min	*-2.790*		
		Americium-241 Max	*0.916*		
		Beryllium-7	-6.03		EPA 901.1
		Beryllium-7	7.23		EPA 901.1
		Beryllium-7 Average	*0.600*		
		Beryllium-7 StdDev	*9.376*		
		Beryllium-7 Min	*-6.030*		
		Beryllium-7 Max	*7.23*		
		Beta, gross	23.7		EPA 900.0; SW846 9310
		Beta, gross	26.7		EPA 900.0; SW846 9310
		Beta, gross Average	*25.200*		
		Beta, gross StdDev	*2.121*		
		Beta, gross Min	*23.700*		
		Beta, gross Max	*26.7*		
		Bismuth-212	-26.2		EPA 901.1
		Bismuth-212	10.4		EPA 901.1
		Bismuth-212 Average	*-7.900*		
		Bismuth-212 StdDev	*25.880*		
		Bismuth-212 Min	*-26.200*		
		Bismuth-212 Max	*10.4*		
		Bismuth-214	-1.69		EPA 901.1
		Bismuth-214	3.32		EPA 901.1
		Bismuth-214 Average	*0.815*		
		Bismuth-214 StdDev	*3.543*		
		Bismuth-214 Min	*-1.690*		
		Bismuth-214 Max	*3.32*		
		Cesium-137	0.134	10,000	EPA 901.1
		Cesium-137	0.974	10,000	EPA 901.1
		Cesium-137 Average	*0.554*		
		Cesium-137 StdDev	*0.594*		
		Cesium-137 Min	*0.134*		
		Cesium-137 Max	*0.974*		

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW006	2069F	Cobalt-60	-1.47	30,000	EPA 901.1
		Cobalt-60	0.632	30,000	EPA 901.1
		Cobalt-60 Average	*-0.419*		
		Cobalt-60 StdDev	*1.486*		
		Cobalt-60 Min	*-1.470*		
		Cobalt-60 Max	*0.632*		
		Lead-212	-1.66	20,000	EPA 901.1
		Lead-212	2.31	20,000	EPA 901.1
		Lead-212 Average	*0.325*		
		Lead-212 StdDev	*2.807*		
		Lead-212 Min	*-1.660*		
		Lead-212 Max	*2.31*		
		Lead-214	-8	1,000,000	EPA 901.1
		Lead-214	1.06	1,000,000	EPA 901.1
		Lead-214 Average	*-3.470*		
		Lead-214 StdDev	*6.406*		
		Lead-214 Min	*-8.000*		
		Lead-214 Max	*1.06*		
		Neptunium-237	-0.331		EPA 901.1
		Neptunium-237	1.93		EPA 901.1
		Neptunium-237 Average	*0.800*		
		Neptunium-237 StdDev	*1.599*		
		Neptunium-237 Min	*-0.331*		
		Neptunium-237 Max	*1.93*		
		Potassium-40	20.4	40,000	EPA 901.1
		Potassium-40	22.6	40,000	EPA 901.1
		Potassium-40 Average	*21.500*		
		Potassium-40 StdDev	*1.556*		
		Potassium-40 Min	*20.400*		
		Potassium-40 Max	*22.6*		

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW006	2069F	Radium-223	-8.1		EPA 901.1
		Radium-223	-0.259		EPA 901.1
		Radium-223 Average	*-4.180*		
		Radium-223 StdDev	*5.544*		
		Radium-223 Min	*-8.100*		
		Radium-223 Max	*-0.259*		
		Radium-224	18.2		EPA 901.1
		Radium-224	53.4		EPA 901.1
		Radium-224 Average	*35.800*		
		Radium-224 StdDev	*24.890*		
		Radium-224 Min	*18.200*		
		Radium-224 Max	*53.4*		
		Radium-226	15.8	600	EPA 901.1
		Radium-226	73.3	600	EPA 901.1
		Radium-226 Average	*44.550*		
		Radium-226 StdDev	*40.659*		
		Radium-226 Min	*15.800*		
		Radium-226 Max	*73.3*		
		Radium-228	-10.4	600	EPA 901.1
		Radium-228	5.48	600	EPA 901.1
		Radium-228 Average	*-2.460*		
		Radium-228 StdDev	*11.229*		
		Radium-228 Min	*-10.400*		
		Radium-228 Max	*5.48*		
		Sodium-22	-0.0111		EPA 901.1
		Sodium-22	0.449		EPA 901.1
		Sodium-22 Average	*0.219*		
		Sodium-22 StdDev	*0.325*		
		Sodium-22 Min	*-0.011*		
		Sodium-22 Max	*0.449*		
		Thorium-227	-4.47		EPA 901.1
		Thorium-227	4.23		EPA 901.1
		Thorium-227 Average	*-0.120*		
		Thorium-227 StdDev	*6.152*		

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW006	2069F	*Thorium-227 Min*	*-4.470*		
		Thorium-227 Max	*4.23*		
		Thorium-231	3.4	300	EPA 901.1
		Thorium-231	14	300	EPA 901.1
		Thorium-231 Average	*8.700*		
		Thorium-231 StdDev	*7.495*		
		Thorium-231 Min	*3.400*		
		Thorium-231 Max	*14*		
		Thorium-234	10.7	50,000	EPA 901.1
		Thorium-234	42.1	50,000	EPA 901.1
		Thorium-234 Average	*26.400*		
		Thorium-234 StdDev	*22.203*		
		Thorium-234 Min	*10.700*		
		Thorium-234 Max	*42.1*		
		Tritium	0.175	10,000,000	EPA 906.0 Modified
		Tritium	12.4	10,000,000	EPA 906.0 Modified
		Tritium Average	*6.288*		
		Tritium StdDev	*8.644*		
		Tritium Min	*0.175*		
		Tritium Max	*12.4*		
		Uranium-235	-20.6	3,000	EPA 901.1
		Uranium-235	0.711	3,000	EPA 901.1
		Uranium-235 Average	*-9.945*		
		Uranium-235 StdDev	*15.069*		
		Uranium-235 Min	*-20.600*		
		Uranium-235 Max	*0.711*		
		Uranium-238	10.7	3,000	EPA 901.1
		Uranium-238	42.1	3,000	EPA 901.1
		Uranium-238 Average	*26.400*		
		Uranium-238 StdDev	*22.203*		
		Uranium-238 Min	*10.700*		
		Uranium-238 Max	*42.1*		

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW008	2069	Actinium-228	-0.194	300,000	EPA 901.1
		Actinium-228	8.81	300,000	EPA 901.1
		Actinium-228 Average	*4.308*		
		Actinium-228 StdDev	*6.367*		
		Actinium-228 Min	*-0.194*		
		Actinium-228 Max	*8.81*		
		Alpha, gross	2.32		EPA 900.0; SW846 9310
		Alpha, gross	2.64		EPA 900.0; SW846 9310
		Alpha, gross Average	*2.480*		
		Alpha, gross StdDev	*0.226*		
		Alpha, gross Min	*2.320*		
		Alpha, gross Max	*2.64*		
		Americium-241	-3.95	200	EPA 901.1
		Americium-241	5.27	200	EPA 901.1
		Americium-241 Average	*0.660*		
		Americium-241 StdDev	*6.520*		
		Americium-241 Min	*-3.950*		
		Americium-241 Max	*5.27*		
		Beryllium-7	-5.71		EPA 901.1
		Beryllium-7	9.91		EPA 901.1
		Beryllium-7 Average	*2.100*		
		Beryllium-7 StdDev	*11.045*		
		Beryllium-7 Min	*-5.710*		
		Beryllium-7 Max	*9.91*		
	2069I	Beta, gross	15.4		EPA 900.0; SW846 9310
		Beta, gross	31.9		EPA 900.0; SW846 9310
		Beta, gross Average	*23.650*		
		Beta, gross StdDev	*11.667*		
		Beta, gross Min	*15.400*		
		Beta, gross Max	*31.9*		

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW008	2069I	Bismuth-212	-67.8		EPA 901.1
		Bismuth-212	43.6		EPA 901.1
		Bismuth-212 Average	*-12.100*		
		Bismuth-212 StdDev	*78.772*		
		Bismuth-212 Min	*-67.800*		
		Bismuth-212 Max	*43.6*		
		Bismuth-214	2.89		EPA 901.1
		Bismuth-214	3.56		EPA 901.1
		Bismuth-214 Average	*3.225*		
		Bismuth-214 StdDev	*0.474*		
		Bismuth-214 Min	*2.890*		
		Bismuth-214 Max	*3.56*		
		Cesium-137	-2.46	10,000	EPA 901.1
		Cesium-137	0.41	10,000	EPA 901.1
		Cesium-137 Average	*-1.025*		
		Cesium-137 StdDev	*2.029*		
		Cesium-137 Min	*-2.460*		
		Cesium-137 Max	*0.41*		
		Cobalt-60	-2.25	30,000	EPA 901.1
		Cobalt-60	-1.38	30,000	EPA 901.1
		Cobalt-60 Average	*-1.815*		
		Cobalt-60 StdDev	*0.615*		
		Cobalt-60 Min	*-2.250*		
		Cobalt-60 Max	*-1.38*		
		Lead-212	1.07	20,000	EPA 901.1
		Lead-212	4.42	20,000	EPA 901.1
		Lead-212 Average	*2.745*		
		Lead-212 StdDev	*2.369*		
		Lead-212 Min	*1.070*		
		Lead-212 Max	*4.42*		
		Lead-214	-4.56	1,000,000	EPA 901.1
		Lead-214	-1.71	1,000,000	EPA 901.1
		Lead-214 Average	*-3.135*		
		Lead-214 StdDev	*2.015*		

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW008	2069I	*Lead-214 Min*	*-4.560*		
		Lead-214 Max	*-1.71*		
		Neptunium-237	-1.75		EPA 901.1
		Neptunium-237	4.04		EPA 901.1
		Neptunium-237 Average	*1.145*		
		Neptunium-237 StdDev	*4.094*		
		Neptunium-237 Min	*-1.750*		
		Neptunium-237 Max	*4.04*		
		Potassium-40	14.2	40,000	EPA 901.1
		Potassium-40	18.1	40,000	EPA 901.1
		Potassium-40 Average	*16.150*		
		Potassium-40 StdDev	*2.758*		
		Potassium-40 Min	*14.200*		
		Potassium-40 Max	*18.1*		
		Radium-223	-0.105		EPA 901.1
		Radium-223	15.6		EPA 901.1
		Radium-223 Average	*7.748*		
		Radium-223 StdDev	*11.105*		
		Radium-223 Min	*-0.105*		
		Radium-223 Max	*15.6*		
		Radium-224	19.5		EPA 901.1
		Radium-224	28.5		EPA 901.1
		Radium-224 Average	*24.000*		
		Radium-224 StdDev	*6.364*		
		Radium-224 Min	*19.500*		
		Radium-224 Max	*28.5*		
		Radium-226	-60.9	600	EPA 901.1
		Radium-226	49.8	600	EPA 901.1
		Radium-226 Average	*-5.550*		
		Radium-226 StdDev	*78.277*		
		Radium-226 Min	*-60.900*		
		Radium-226 Max	*49.8*		

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW008	2069I	Radium-228	-0.194	600	EPA 901.1
		Radium-228	8.81	600	EPA 901.1
		Radium-228 Average	*4.308*		
		Radium-228 StdDev	*6.367*		
		Radium-228 Min	*-0.194*		
		Radium-228 Max	*8.81*		
		Sodium-22	-1.72		EPA 901.1
		Sodium-22	-1.41		EPA 901.1
		Sodium-22 Average	*-1.565*		
		Sodium-22 StdDev	*0.219*		
		Sodium-22 Min	*-1.720*		
		Sodium-22 Max	*-1.41*		
		Thorium-227	-7.05		EPA 901.1
		Thorium-227	-3.98		EPA 901.1
		Thorium-227 Average	*-5.515*		
		Thorium-227 StdDev	*2.171*		
		Thorium-227 Min	*-7.050*		
		Thorium-227 Max	*-3.98*		
		Thorium-231	9.36	300	EPA 901.1
		Thorium-231	18.7	300	EPA 901.1
		Thorium-231 Average	*14.030*		
		Thorium-231 StdDev	*6.604*		
		Thorium-231 Min	*9.360*		
		Thorium-231 Max	*18.7*		
		Thorium-234	-50.1	50,000	EPA 901.1
		Thorium-234	34.3	50,000	EPA 901.1
		Thorium-234 Average	*-7.900*		
		Thorium-234 StdDev	*59.680*		
		Thorium-234 Min	*-50.100*		
		Thorium-234 Max	*34.3*		

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW008	2069I	Tritium	-34	10,000,000	EPA 906.0 Modified
		Tritium	-17.2	10,000,000	EPA 906.0 Modified
		Tritium Average	*-25.600*		
		Tritium StdDev	*11.879*		
		Tritium Min	*-34.000*		
		Tritium Max	*-17.2*		
		Uranium-235	-12	3,000	EPA 901.1
		Uranium-235	-5.36	3,000	EPA 901.1
		Uranium-235 Average	*-8.680*		
		Uranium-235 StdDev	*4.695*		
		Uranium-235 Min	*-12.000*		
		Uranium-235 Max	*-5.36*		
		Uranium-238	-50.1	3,000	EPA 901.1
		Uranium-238	34.3	3,000	EPA 901.1
		Uranium-238 Average	*-7.900*		
		Uranium-238 StdDev	*59.680*		
		Uranium-238 Min	*-50.100*		
		Uranium-238 Max	*34.3*		
WW011	2069K	Actinium-228	-10.4	300,000	EPA 901.1
		Actinium-228	-2.45	300,000	EPA 901.1
		Actinium-228 Average	*-6.425*		
		Actinium-228 StdDev	*5.621*		
		Actinium-228 Min	*-10.400*		
		Actinium-228 Max	*-2.45*		
		Alpha, gross	4.15		EPA 900.0; SW846 9310
		Alpha, gross	6.55		EPA 900.0; SW846 9310
		Alpha, gross Average	*5.350*		
		Alpha, gross StdDev	*1.697*		
		Alpha, gross Min	*4.150*		
		Alpha, gross Max	*6.55*		
		Americium-241	-1.79	200	EPA 901.1
		Americium-241	2.15	200	EPA 901.1
		Americium-241 Average	*0.180*		
		Americium-241 StdDev	*2.786*		

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW011	2069K	*Americium-241 Min*	*-1.790*		
		Americium-241 Max	*2.15*		
		Beryllium-7	-2.84		EPA 901.1
		Beryllium-7	6.69		EPA 901.1
		Beryllium-7 Average	*1.925*		
		Beryllium-7 StdDev	*6.739*		
		Beryllium-7 Min	*-2.840*		
		Beryllium-7 Max	*6.69*		
		Beta, gross	31.8		EPA 900.0; SW846 9310
		Beta, gross	32.8		EPA 900.0; SW846 9310
		Beta, gross Average	32.300		
		Beta, gross StdDev	0.707		
		Beta, gross Min	31.800		
		Beta, gross Max	32.8		
		Bismuth-212	-24.3		EPA 901.1
		Bismuth-212	12.5		EPA 901.1
		Bismuth-212 Average	*-5.900*		
		Bismuth-212 StdDev	*26.022*		
		Bismuth-212 Min	*-24.300*		
		Bismuth-212 Max	*12.5*		
		Bismuth-214	-2.97		EPA 901.1
		Bismuth-214	0.899		EPA 901.1
		Bismuth-214 Average	*-1.036*		
		Bismuth-214 StdDev	*2.736*		
		Bismuth-214 Min	*-2.970*		
		Bismuth-214 Max	*0.899*		
		Cesium-137	-2.1	10,000	EPA 901.1
		Cesium-137	2.13	10,000	EPA 901.1
		Cesium-137 Average	*0.015*		
		Cesium-137 StdDev	*2.991*		
		Cesium-137 Min	*-2.100*		
		Cesium-137 Max	*2.13*		

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW011	2069K	Cobalt-60	-0.699	30,000	EPA 901.1
		Cobalt-60	0.789	30,000	EPA 901.1
		Cobalt-60 Average	*0.045*		
		Cobalt-60 StdDev	*1.052*		
		Cobalt-60 Min	*-0.699*		
		Cobalt-60 Max	*0.789*		
		Iodine-131	90.7		EPA 901.1
		Iodine-131 Average	*90.700*		
		Iodine-131 StdDev	*Not applicable*		
		Iodine-131 Min	*90.700*		
		Iodine-131 Max	*90.7*		
		Lead-212	2.66	20,000	EPA 901.1
		Lead-212	5.05	20,000	EPA 901.1
		Lead-212 Average	*3.855*		
		Lead-212 StdDev	*1.690*		
		Lead-212 Min	*2.660*		
		Lead-212 Max	*5.05*		
		Lead-214	-7.85	1,000,000	EPA 901.1
		Lead-214	1.04	1,000,000	EPA 901.1
		Lead-214 Average	*-3.405*		
		Lead-214 StdDev	*6.286*		
		Lead-214 Min	*-7.850*		
		Lead-214 Max	*1.04*		
		Neptunium-237	-0.271		EPA 901.1
		Neptunium-237	0.163		EPA 901.1
		Neptunium-237 Average	-0.054		
		Neptunium-237 StdDev	0.307		
		Neptunium-237 Min	-0.271		
		Neptunium-237 Max	0.163		

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW011	2069K	Potassium-40	14.4	40,000	EPA 901.1
		Potassium-40	18.2	40,000	EPA 901.1
		Potassium-40 Average	*16.300*		
		Potassium-40 StdDev	*2.687*		
		Potassium-40 Min	*14.400*		
		Potassium-40 Max	*18.2*		
		Radium-223	-13.6		EPA 901.1
		Radium-223	7.75		EPA 901.1
		Radium-223 Average	*-2.925*		
		Radium-223 StdDev	*15.097*		
		Radium-223 Min	*-13.600*		
		Radium-223 Max	*7.75*		
		Radium-224	6.27		EPA 901.1
		Radium-224	26.7		EPA 901.1
		Radium-224 Average	*16.485*		
		Radium-224 StdDev	*14.446*		
		Radium-224 Min	*6.270*		
		Radium-224 Max	*26.7*		
		Radium-226	17.8	600	EPA 901.1
		Radium-226	18.5	600	EPA 901.1
		Radium-226 Average	*18.150*		
		Radium-226 StdDev	*0.495*		
		Radium-226 Min	*17.800*		
		Radium-226 Max	*18.5*		
		Radium-228	-10.4	600	EPA 901.1
		Radium-228	-2.45	600	EPA 901.1
		Radium-228 Average	*-6.425*		
		Radium-228 StdDev	*5.621*		
		Radium-228 Min	*-10.400*		
		Radium-228 Max	*-2.45*		
		Sodium-22	-1.39		EPA 901.1
		Sodium-22	-0.19		EPA 901.1
		Sodium-22 Average	*-0.790*		
		Sodium-22 StdDev	*0.849*		

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW011	2069K	*Sodium-22 Min*	*-1.390*		
		Sodium-22 Max	*-0.19*		
		Thorium-227	-6.32		EPA 901.1
		Thorium-227	-4.18		EPA 901.1
		Thorium-227 Average	*-5.250*		
		Thorium-227 StdDev	*1.513*		
		Thorium-227 Min	*-6.320*		
		Thorium-227 Max	*-4.18*		
		Thorium-231	5.98	300	EPA 901.1
		Thorium-231	7.38	300	EPA 901.1
		Thorium-231 Average	*6.680*		
		Thorium-231 StdDev	*0.990*		
		Thorium-231 Min	*5.980*		
		Thorium-231 Max	*7.38*		
		Thorium-234	-38.7	50,000	EPA 901.1
		Thorium-234	42.1	50,000	EPA 901.1
		Thorium-234 Average	*1.700*		
		Thorium-234 StdDev	*57.134*		
		Thorium-234 Min	*-38.700*		
		Thorium-234 Max	*42.1*		
		Tritium	-22.3	10,000,000	EPA 906.0 Modified
		Tritium	-8.1	10,000,000	EPA 906.0 Modified
		Tritium Average	*-15.200*		
		Tritium StdDev	*10.041*		
		Tritium Min	*-22.300*		
		Tritium Max	*-8.1*		
		Uranium-235	-1.23	3,000	EPA 901.1
		Uranium-235	3.02	3,000	EPA 901.1
		Uranium-235 Average	*0.895*		
		Uranium-235 StdDev	*3.005*		
		Uranium-235 Min	*-1.230*		
		Uranium-235 Max	*3.02*		

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW011	2069K	Uranium-238	-38.7	3,000	EPA 901.1
		Uranium-238	42.1	3,000	EPA 901.1
		Uranium-238 Average	*1.700*		
		Uranium-238 StdDev	*57.134*		
		Uranium-238 Min	*-38.700*		
		Uranium-238 Max	*42.1*		
CINT	2238A	Actinium-228	-14.6	300,000	EPA 901.1
		Actinium-228	1.22	300,000	EPA 901.1
		Actinium-228 Average	*-6.690*		
		Actinium-228 StdDev	*11.186*		
		Actinium-228 Min	*-14.600*		
		Actinium-228 Max	*1.22*		
		Alpha, gross	-0.284		EPA 900.0; SW846 9310
		Alpha, gross	0.518		EPA 900.0; SW846 9310
		Alpha, gross Average	*0.117*		
		Alpha, gross StdDev	*0.567*		
		Alpha, gross Min	*-0.284*		
		Alpha, gross Max	*0.518*		
		Americium-241	4.09	200	EPA 901.1
		Americium-241	5.31	200	EPA 901.1
		Americium-241 Average	*4.700*		
		Americium-241 StdDev	*0.863*		
		Americium-241 Min	*4.090*		
		Americium-241 Max	*5.31*		
		Beryllium-7	1.27		EPA 901.1
		Beryllium-7	2.08		EPA 901.1
		Beryllium-7 Average	*1.675*		
		Beryllium-7 StdDev	*0.573*		
		Beryllium-7 Min	*1.270*		
		Beryllium-7 Max	*2.08*		

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
CINT	2238A	Beta, gross	0.27		EPA 900.0; SW846 9310
		Beta, gross	10.8		EPA 900.0; SW846 9310
		Beta, gross Average	*5.535*		
		Beta, gross StdDev	*7.446*		
		Beta, gross Min	*0.270*		
		Beta, gross Max	*10.8*		
		Bismuth-212	8.12		EPA 901.1
		Bismuth-212	17.1		EPA 901.1
		Bismuth-212 Average	*12.610*		
		Bismuth-212 StdDev	*6.350*		
		Bismuth-212 Min	*8.120*		
		Bismuth-212 Max	*17.1*		
		Bismuth-214	-5.68		EPA 901.1
		Bismuth-214	3.81		EPA 901.1
		Bismuth-214 Average	*-0.935*		
		Bismuth-214 StdDev	*6.710*		
		Bismuth-214 Min	*-5.680*		
		Bismuth-214 Max	*3.81*		
		Cesium-137	-0.753	10,000	EPA 901.1
		Cesium-137	2.48	10,000	EPA 901.1
		Cesium-137 Average	*0.864*		
		Cesium-137 StdDev	*2.286*		
		Cesium-137 Min	*-0.753*		
		Cesium-137 Max	*2.48*		
		Cobalt-60	0.496	30,000	EPA 901.1
		Cobalt-60	0.586	30,000	EPA 901.1
		Cobalt-60 Average	*0.541*		
		Cobalt-60 StdDev	*0.064*		
		Cobalt-60 Min	*0.496*		
		Cobalt-60 Max	*0.586*		

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
CINT	2238A	Lead-212	0.977	20,000	EPA 901.1
		Lead-212	2.1	20,000	EPA 901.1
		Lead-212 Average	*1.539*		
		Lead-212 StdDev	*0.794*		
		Lead-212 Min	*0.977*		
		Lead-212 Max	*2.1*		
		Lead-214	-4.95	1,000,000	EPA 901.1
		Lead-214	3.54	1,000,000	EPA 901.1
		Lead-214 Average	*-0.705*		
		Lead-214 StdDev	*6.003*		
		Lead-214 Min	*-4.950*		
		Lead-214 Max	*3.54*		
		Neptunium-237	-2.77		EPA 901.1
		Neptunium-237	-1.35		EPA 901.1
		Neptunium-237 Average	*-2.060*		
		Neptunium-237 StdDev	*1.004*		
		Neptunium-237 Min	*-2.770*		
		Neptunium-237 Max	*-1.35*		
		Potassium-40	-16.2	40,000	EPA 901.1
		Potassium-40	11.8	40,000	EPA 901.1
		Potassium-40 Average	*-2.200*		
		Potassium-40 StdDev	*19.799*		
		Potassium-40 Min	*-16.200*		
		Potassium-40 Max	*11.8*		
		Radium-223	0.236		EPA 901.1
		Radium-223	6.53		EPA 901.1
		Radium-223 Average	*3.383*		
		Radium-223 StdDev	*4.451*		
		Radium-223 Min	*0.236*		
		Radium-223 Max	*6.53*		
		Radium-224	24.4		EPA 901.1
		Radium-224	73.5		EPA 901.1
		Radium-224 Average	*48.950*		
		Radium-224 StdDev	*34.719*		

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
CINT	2238A	*Radium-224 Min*	*24.400*		
		Radium-224 Max	*73.5*		
		Radium-226	-41.2	600	EPA 901.1
		Radium-226	59.9	600	EPA 901.1
		Radium-226 Average	*9.350*		
		Radium-226 StdDev	*71.488*		
		Radium-226 Min	*-41.200*		
		Radium-226 Max	*59.9*		
		Radium-228	-14.6	600	EPA 901.1
		Radium-228	1.22	600	EPA 901.1
		Radium-228 Average	*-6.690*		
		Radium-228 StdDev	*11.186*		
		Radium-228 Min	*-14.600*		
		Radium-228 Max	*1.22*		
		Sodium-22	-0.0473		EPA 901.1
		Sodium-22	0.427		EPA 901.1
		Sodium-22 Average	*0.190*		
		Sodium-22 StdDev	*0.335*		
		Sodium-22 Min	*-0.047*		
		Sodium-22 Max	*0.427*		
		Thorium-227	-7.52		EPA 901.1
		Thorium-227	-5.68		EPA 901.1
		Thorium-227 Average	*-6.600*		
		Thorium-227 StdDev	*1.301*		
		Thorium-227 Min	*-7.520*		
		Thorium-227 Max	*-5.68*		
		Thorium-231	-13.7	300	EPA 901.1
		Thorium-231	8.97	300	EPA 901.1
		Thorium-231 Average	*-2.365*		
		Thorium-231 StdDev	*16.030*		
		Thorium-231 Min	*-13.700*		
		Thorium-231 Max	*8.97*		

See notes at end of appendix.

Table D-6. Summary of radiological results for permitted sanitary outfalls, calendar year 2014 (continued)

Station	Permit Number	Analyte	Activity (pCi/L)	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
CINT	2238A	Thorium-234	-1.82	50,000	EPA 901.1
		Thorium-234	77.3	50,000	EPA 901.1
		Thorium-234 Average	*37.740*		
		Thorium-234 StdDev	*55.946*		
		Thorium-234 Min	*-1.820*		
		Thorium-234 Max	*77.3*		
		Tritium	-99.9	10,000,000	EPA 906.0 Modified
		Tritium	-84.1	10,000,000	EPA 906.0 Modified
		Tritium Average	*-92.000*		
		Tritium StdDev	*11.172*		
		Tritium Min	*-99.900*		
		Tritium Max	*-84.1*		
		Uranium-235	-6.97	3,000	EPA 901.1
		Uranium-235	0.712	3,000	EPA 901.1
		Uranium-235 Average	*-3.129*		
		Uranium-235 StdDev	*5.432*		
		Uranium-235 Min	*-6.970*		
		Uranium-235 Max	*0.712*		
		Uranium-238	-1.82	3,000	EPA 901.1
		Uranium-238	77.3	3,000	EPA 901.1
		Uranium-238 Average	*37.740*		
		Uranium-238 StdDev	*55.946*		
		Uranium-238 Min	*-1.820*		
		Uranium-238 Max	*77.3*		

See notes at end of appendix.

Table D-7. Summary of inorganic results for permitted sanitary outfalls, August and October 2014

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Regulatory Limit (ABCWUA)	Analytical Method
CINT	2238A	25-Aug-2014	096473-011	Cyanide, total		0.00167	U	0.45	SW846 9012B
			096473-012	Cyanide, total		0.00167	U	0.45	SW846 9012B
			096473-010	Cyanide, total		0.00167	U	0.45	SW846 9012B
			096473-009	Cyanide, total		0.00167	U	0.45	SW846 9012B
		26-Aug-2014	096474-001	Aluminum	0.115	0.068	J	900	SW846 3010/6010B
			096474-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			096474-001	Boron	0.049	0.015	J		SW846 3010/6010B
			096474-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			096474-001	Chromium		0.001	U	4.1	SW846 3010/6010B
			096474-001	Copper	0.0157	0.003		5.3	SW846 3010/6010B
			096474-002	Fluoride	0.906	0.033		36	EPA 300.0
			096474-001	Lead		0.0033	U	1	SW846 3010/6010B
			096474-001	Mercury		0.000067	U		SW846 7470A
			096474-001	Molybdenum	0.0223	0.002		2	SW846 3010/6010B
			096474-001	Nickel		0.0015	U	2	SW846 3010/6010B
			096474-001	Selenium	0.0107	0.006	JB	0.46	SW846 3010/6010B
			096474-001	Silver		0.001	U	5	SW846 3010/6010B
			096474-001	Zinc		0.0033	U	2.2	SW846 3010/6010B
		27-Aug-2014	096475-001	Aluminum		0.068	U	900	SW846 3010/6010B
			096475-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			096475-001	Boron	0.0428	0.015	J		SW846 3010/6010B
			096475-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			096475-001	Chromium	0.00194	0.001	J	4.1	SW846 3010/6010B
			096475-001	Copper	0.00715	0.003	J	5.3	SW846 3010/6010B
			096475-002	Fluoride	1.07	0.033		36	EPA 300.0
			096475-001	Lead		0.0033	U	1	SW846 3010/6010B
			096475-001	Mercury		0.000067	U		SW846 7470A
			096475-001	Molybdenum	0.0203	0.002		2	SW846 3010/6010B
			096475-001	Nickel		0.0015	U	2	SW846 3010/6010B
			096475-001	Selenium		0.006	U	0.46	SW846 3010/6010B
			096475-001	Silver		0.001	U	5	SW846 3010/6010B
			096475-001	Zinc		0.0033	U	2.2	SW846 3010/6010B

See notes at end of appendix.

Table D-7. Summary of inorganic results for permitted sanitary outfalls, August and October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Regulatory Limit (ABCWUA)	Analytical Method
CINT	2238A	28-Oct-2014	096485-007	Ammonia	0.451	0.017			EPA 350.1
		29-Oct-2014	096492-007	Ammonia	1.01	0.017			EPA 350.1
WW001	2069A	28-Oct-2014	096480-001	Aluminum	0.137	0.068	J	900	SW846 3010/6010B
			096480-007	Ammonia	15.9	0.17			EPA 350.1
			096480-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			096480-001	Boron	0.0852	0.015			SW846 3010/6010B
			096480-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			096480-001	Chromium	0.00432	0.001	J	4.1	SW846 3010/6010B
			096480-001	Copper	0.0252	0.003		5.3	SW846 3010/6010B
			096480-002	Fluoride	5.01	0.066		36	EPA 300.0
			096480-001	Lead	0.0162	0.0033		1	SW846 3010/6010B
			096480-001	Mercury		0.000067	U		SW846 7470A
			096480-001	Molybdenum	0.0178	0.002		2	SW846 3010/6010B
			096480-001	Nickel		0.0015	U	2	SW846 3010/6010B
			096480-001	Selenium		0.006	U	0.46	SW846 3010/6010B
			096480-001	Silver		0.001	U	5	SW846 3010/6010B
			096480-001	Zinc	0.0516	0.0033	B	2.2	SW846 3010/6010B
		29-Oct-2014	096487-001	Aluminum	0.0704	0.068	J	900	SW846 3010/6010B
			096487-007	Ammonia	14.4	0.17			EPA 350.1
			096487-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			096487-001	Boron	0.0698	0.015			SW846 3010/6010B
			096487-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			096487-001	Chromium	0.00381	0.001	J	4.1	SW846 3010/6010B
			096487-001	Copper	0.0147	0.003		5.3	SW846 3010/6010B
			096487-002	Fluoride	5.45	0.066		36	EPA 300.0
			096487-001	Lead	0.0101	0.0033		1	SW846 3010/6010B
			096487-001	Mercury		0.000067	U		SW846 7470A
			096487-001	Molybdenum	0.0187	0.002		2	SW846 3010/6010B
			096487-001	Nickel		0.0015	U	2	SW846 3010/6010B
			096487-001	Selenium	0.00609	0.006	J	0.46	SW846 3010/6010B
			096487-001	Silver		0.001	U	5	SW846 3010/6010B
			096487-001	Zinc	0.0333	0.0033	B	2.2	SW846 3010/6010B

See notes at end of appendix.

Table D-7. Summary of inorganic results for permitted sanitary outfalls, August and October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Regulatory Limit (ABCWUA)	Analytical Method
WW006	2069F	27-Oct-2014	096476-010	Cyanide, total		0.00167	U	0.45	SW846 9012B
			096476-011	Cyanide, total		0.00167	U	0.45	SW846 9012B
			096476-012	Cyanide, total	0.00458	0.00167	J	0.45	SW846 9012B
			096476-009	Cyanide, total	0.00482	0.00167	J	0.45	SW846 9012B
		28-Oct-2014	096481-001	Aluminum	0.293	0.068		900	SW846 3010/6010B
			096481-007	Ammonia	53.5	0.85			EPA 350.1
			096481-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			096481-001	Boron	0.159	0.015			SW846 3010/6010B
			096481-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			096481-001	Chromium	0.00447	0.001	J	4.1	SW846 3010/6010B
			096481-001	Copper	0.0449	0.003		5.3	SW846 3010/6010B
			096481-002	Fluoride	0.775	0.033		36	EPA 300.0
			096481-001	Lead		0.0033	U	1	SW846 3010/6010B
			096481-001	Mercury		0.000067	U		SW846 7470A
			096481-001	Molybdenum	0.0477	0.002		2	SW846 3010/6010B
			096481-001	Nickel	0.00242	0.0015	J	2	SW846 3010/6010B
			096481-001	Selenium		0.006	U	0.46	SW846 3010/6010B
			096481-001	Silver		0.001	U	5	SW846 3010/6010B
			096481-001	Zinc	0.388	0.0033	B	2.2	SW846 3010/6010B
		29-Oct-2014	096488-001	Aluminum	0.272	0.068		900	SW846 3010/6010B
			096488-007	Ammonia	42.3	0.85			EPA 350.1
			096488-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			096488-001	Boron	0.115	0.015			SW846 3010/6010B
			096488-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			096488-001	Chromium	0.00168	0.001	J	4.1	SW846 3010/6010B
			096488-001	Copper	0.0304	0.003		5.3	SW846 3010/6010B
			096488-002	Fluoride	0.687	0.033		36	EPA 300.0
			096488-001	Lead		0.0033	U	1	SW846 3010/6010B
			096488-001	Mercury		0.000067	U		SW846 7470A
			096488-001	Molybdenum	0.0407	0.002		2	SW846 3010/6010B
			096488-001	Nickel	0.00171	0.0015	J	2	SW846 3010/6010B
			096488-001	Selenium		0.006	U	0.46	SW846 3010/6010B
			096488-001	Silver		0.001	U	5	SW846 3010/6010B
			096488-001	Zinc	0.236	0.0033	B	2.2	SW846 3010/6010B

See notes at end of appendix.

Table D-7. Summary of inorganic results for permitted sanitary outfalls, August and October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Regulatory Limit (ABCWUA)	Analytical Method
WW006 #2	2069F	28-Oct-2014	096479-011	Cyanide, total		0.00167	U	0.45	SW846 9012B
			096479-009	Cyanide, total	0.00297	0.00167	J	0.45	SW846 9012B
			096479-010	Cyanide, total	0.00199	0.00167	J	0.45	SW846 9012B
			096479-012	Cyanide, total	0.00292	0.00167	J	0.45	SW846 9012B
WW007	2069G	27-Oct-2014	096477-011	Cyanide, total		0.00167	U	0.45	SW846 9012B
			096477-012	Cyanide, total		0.00167	U	0.45	SW846 9012B
			096477-009	Cyanide, total		0.00167	U	0.45	SW846 9012B
			096477-010	Cyanide, total	0.00532	0.00167		0.45	SW846 9012B
		28-Oct-2014	096482-001	Aluminum		0.068	U	900	SW846 3010/6010B
			096482-007	Ammonia	3.04	0.085			EPA 350.1
			096482-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			096482-001	Boron	0.0261	0.015	J		SW846 3010/6010B
			096482-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			096482-001	Chromium	0.00185	0.001	J	4.1	SW846 3010/6010B
			096482-001	Copper		0.003	U	5.3	SW846 3010/6010B
			096482-002	Fluoride	7.68	0.066		36	EPA 300.0
			096482-001	Lead		0.0033	U	1	SW846 3010/6010B
			096482-001	Mercury		0.000067	U		SW846 7470A
			096482-001	Molybdenum	0.0169	0.002		2	SW846 3010/6010B
			096482-001	Nickel		0.0015	U	2	SW846 3010/6010B
			096482-001	Selenium		0.006	U	0.46	SW846 3010/6010B
			096482-001	Silver		0.001	U	5	SW846 3010/6010B
			096482-001	Zinc	0.00525	0.0033	JB	2.2	SW846 3010/6010B
		29-Oct-2014	096489-001	Aluminum	0.0747	0.068	J	900	SW846 3010/6010B
			096489-007	Ammonia	3.48	0.085			EPA 350.1
			096489-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			096489-001	Boron	0.0289	0.015	J		SW846 3010/6010B
			096489-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			096489-001	Chromium	0.00182	0.001	J	4.1	SW846 3010/6010B
			096489-001	Copper		0.003	U	5.3	SW846 3010/6010B
			096489-002	Fluoride	8.51	0.066		36	EPA 300.0
			096489-001	Lead		0.0033	U	1	SW846 3010/6010B
			096489-001	Mercury		0.000067	U		SW846 7470A
			096489-001	Molybdenum	0.0178	0.002		2	SW846 3010/6010B

See notes at end of appendix.

Table D-7. Summary of inorganic results for permitted sanitary outfalls, August and October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Regulatory Limit (ABCWUA)	Analytical Method
WW007	2069G	29-Oct-2014	096489-001	Nickel		0.0015	U	2	SW846 3010/6010B
			096489-001	Selenium		0.006	U	0.46	SW846 3010/6010B
			096489-001	Silver		0.001	U	5	SW846 3010/6010B
			096489-001	Zinc	0.00676	0.0033	JB	2.2	SW846 3010/6010B
WW008	2069I	27-Oct-2014	096478-012	Cyanide, total		0.00167	U	0.45	SW846 9012B
			096478-011	Cyanide, total	0.00249	0.00167	J	0.45	SW846 9012B
			096478-010	Cyanide, total	0.00383	0.00167	J	0.45	SW846 9012B
			096478-009	Cyanide, total	0.00356	0.00167	J	0.45	SW846 9012B
		28-Oct-2014	096483-001	Aluminum	0.454	0.068		900	SW846 3010/6010B
		29-Oct-2014	096483-007	Ammonia	56.5	0.85			EPA 350.1
			096483-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			096483-001	Boron	0.106	0.015			SW846 3010/6010B
			096483-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			096483-001	Chromium	0.00219	0.001	J	4.1	SW846 3010/6010B
			096483-001	Copper	0.491	0.003		5.3	SW846 3010/6010B
			096483-002	Fluoride	0.69	0.033		36	EPA 300.0
			096483-001	Lead		0.0033	U	1	SW846 3010/6010B
			096483-001	Mercury		0.000067	U		SW846 7470A
			096483-001	Molybdenum	0.00575	0.002	J	2	SW846 3010/6010B
			096483-001	Nickel	0.0117	0.0015		2	SW846 3010/6010B
			096483-001	Selenium		0.006	U	0.46	SW846 3010/6010B
			096483-001	Silver		0.001	U	5	SW846 3010/6010B
			096483-001	Zinc	0.123	0.0033	B	2.2	SW846 3010/6010B
			096490-001	Aluminum	0.14	0.068	J	900	SW846 3010/6010B
			096490-007	Ammonia	61.5	0.85			EPA 350.1
			096490-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			096490-001	Boron	0.117	0.015			SW846 3010/6010B
			096490-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			096490-001	Chromium		0.001	U	4.1	SW846 3010/6010B
			096490-001	Copper	0.12	0.003		5.3	SW846 3010/6010B
			096490-002	Fluoride	0.648	0.033		36	EPA 300.0
			096490-001	Lead		0.0033	U	1	SW846 3010/6010B
			096490-001	Mercury		0.000067	U		SW846 7470A
			096490-001	Molybdenum	0.00552	0.002	J	2	SW846 3010/6010B

See notes at end of appendix.

Table D-7. Summary of inorganic results for permitted sanitary outfalls, August and October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Regulatory Limit (ABCWUA)	Analytical Method
WW008	2069I	29-Oct-2014	096490-001	Nickel	0.00612	0.0015		2	SW846 3010/6010B
			096490-001	Selenium		0.006	U	0.46	SW846 3010/6010B
			096490-001	Silver		0.001	U	5	SW846 3010/6010B
			096490-001	Zinc	0.0583	0.0033	B	2.2	SW846 3010/6010B
WW011	2069K	28-Oct-2014	096484-001	Aluminum	0.114	0.068	J	900	SW846 3010/6010B
			096484-007	Ammonia	25	0.85			EPA 350.1
			096484-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
			096484-001	Boron	0.0742	0.015			SW846 3010/6010B
			096484-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			096484-001	Chromium	0.00298	0.001	J	4.1	SW846 3010/6010B
			096484-001	Copper	0.0295	0.003		5.3	SW846 3010/6010B
			096484-002	Fluoride	0.616	0.033		36	EPA 300.0
			096484-001	Lead		0.0033	U	1	SW846 3010/6010B
			096484-001	Mercury		0.000067	U		SW846 7470A
			096484-001	Molybdenum	0.0188	0.002		2	SW846 3010/6010B
			096484-001	Nickel		0.0015	U	2	SW846 3010/6010B
			096484-001	Selenium		0.006	U	0.46	SW846 3010/6010B
			096484-001	Silver		0.001	U	5	SW846 3010/6010B
			096484-001	Zinc	0.149	0.0033	B	2.2	SW846 3010/6010B
		29-Oct-2014	096491-001	Aluminum	0.17	0.068	J	900	SW846 3010/6010B
			096491-007	Ammonia	20.3	0.85			EPA 350.1
			096491-001	Arsenic		0.005	U	0.051	SW846 3010/6010B
WW011	2069K	29-Oct-2014	096491-001	Boron	0.0738	0.015			SW846 3010/6010B
			096491-001	Cadmium		0.001	U	0.05	SW846 3010/6010B
			096491-001	Chromium	0.00282	0.001	J	4.1	SW846 3010/6010B
			096491-001	Copper	0.0293	0.003		5.3	SW846 3010/6010B
			096491-002	Fluoride	0.572	0.033		36	EPA 300.0
			096491-001	Lead		0.0033	U	1	SW846 3010/6010B
			096491-001	Mercury		0.000067	U		SW846 7470A
			096491-001	Molybdenum	0.0218	0.002		2	SW846 3010/6010B
			096491-001	Nickel		0.0015	U	2	SW846 3010/6010B
			096491-001	Selenium		0.006	U	0.46	SW846 3010/6010B
			096491-001	Silver		0.001	U	5	SW846 3010/6010B
			096491-001	Zinc	0.0777	0.0033	B	2.2	SW846 3010/6010B

See notes at end of appendix.

Table D-8. Summary of radiological results for permitted sanitary outfalls, October 2014

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Activity (pCi/L)	MDA (pCi/L)	Laboratory Data Qualifiers	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
CINT	2238A	28-Oct-2014	096485-004	Actinium-228	-14.6 ± 13.6	10.6	U	300,000	EPA 901.1
			096485-003	Alpha, gross	-0.284 ± 0.5	.949	U		EPA 900.0/SW846 9310
			096485-004	Americium-241	5.31 ± 10.2	17	U	200	EPA 901.1
			096485-004	Beryllium-7	1.27 ± 13.4	23.8	U		EPA 901.1
			096485-003	Beta, gross	0.27 ± 0.57	.986	U		EPA 900.0/SW846 9310
			096485-004	Bismuth-212	8.12 ± 21.8	38	U		EPA 901.1
			096485-004	Bismuth-214	3.81 ± 6.63	5.41	U		EPA 901.1
			096485-004	Cesium-137	2.48 ± 3.81	2.78	U	10,000	EPA 901.1
			096485-004	Cobalt-60	0.496 ± 1.75	3.12	U	30,000	EPA 901.1
			096485-004	Lead-212	2.1 ± 5.29	5.59	U	20,000	EPA 901.1
			096485-004	Lead-214	3.54 ± 6.66	7.14	U	1,000,000	EPA 901.1
			096485-004	Neptunium-237	-1.35 ± 3.28	5.41	U		EPA 901.1
			096485-004	Potassium-40	-16.2 ± 35.5	38.9	U	40,000	EPA 901.1
			096485-004	Radium-223	0.236 ± 32.1	54.7	U		EPA 901.1
			096485-004	Radium-224	24.4 ± 49.1	54.4	U		EPA 901.1
			096485-004	Radium-226	-41.2 ± 67.1	72.9	U	600	EPA 901.1
			096485-004	Radium-228	-14.6 ± 13.6	10.6	U	600	EPA 901.1
			096485-004	Sodium-22	0.427 ± 1.59	2.86	U		EPA 901.1
			096485-004	Thorium-227	-5.68 ± 12.5	20.8	U		EPA 901.1
			096485-004	Thorium-231	8.97 ± 35.5	39.8	U	300	EPA 901.1
			096485-004	Thorium-234	-1.82 ± 159	157	U	50,000	EPA 901.1
			096485-005	Tritium	-99.9 ± 96.9	176	U	10,000,000	EPA 906.0 Modified
			096485-004	Uranium-235	-6.97 ± 15.6	17.8	U	3,000	EPA 901.1
			096485-004	Uranium-238	-1.82 ± 159	157	U	3,000	EPA 901.1
WW001	2069A	28-Oct-2014	096480-004	Actinium-228	-4.44 ± 11.4	14	U	300,000	EPA 901.1
			096480-003	Alpha, gross	2.45 ± 2.37	3.85	U		EPA 900.0/SW846 9310
			096480-004	Americium-241	-0.17 ± 10.4	16.2	U	200	EPA 901.1
			096480-004	Beryllium-7	-.399 ± 17.4	30.1	U		EPA 901.1
			096480-003	Beta, gross	10 ± 3.21	4.27			EPA 900.0/SW846 9310
			096480-004	Bismuth-212	24.2 ± 34.8	50.8	U		EPA 901.1
			096480-004	Bismuth-214	-7.09 ± 7.67	7.67	U		EPA 901.1
			096480-004	Cesium-137	2.93 ± 2.53	3.54	U	10,000	EPA 901.1

See notes at end of appendix.

Table D-8. Summary of radiological results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Activity (pCi/L)	MDA (pCi/L)	Laboratory Data Qualifiers	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW001	2069A	28-Oct-2014	096480-004	Cobalt-60	0.447 ± 1.92	3.4	U	30,000	EPA 901.1
			096480-004	Lead-212	1.87 ± 5.72	5.79	U	20,000	EPA 901.1
			096480-004	Lead-214	-1.17 ± 7.73	8.18	U	1,000,000	EPA 901.1
			096480-004	Neptunium-237	-1.35 ± 4.06	6.99	U		EPA 901.1
			096480-004	Potassium-40	46.4 ± 36.5	32.3		40,000	EPA 901.1
			096480-004	Radium-223	-9.17 ± 38.9	67.5	U		EPA 901.1
			096480-004	Radium-224	-28.2 ± 56.8	62.9	U		EPA 901.1
			096480-004	Radium-226	74.7 ± 83.7	77.7	U	600	EPA 901.1
			096480-004	Radium-228	-4.44 ± 11.4	14	U	600	EPA 901.1
			096480-004	Sodium-22	-0.103 ± 1.79	3.14	U		EPA 901.1
			096480-004	Thorium-227	10 ± 16.4	26.7	U		EPA 901.1
			096480-004	Thorium-231	-6.1 ± 36	42.5	U	300	EPA 901.1
			096480-004	Thorium-234	32.8 ± 123	131	U	50,000	EPA 901.1
			096480-005	Tritium	-45.8 ± 93.8	167	U	10,000,000	EPA 906.0 Modified
			096480-004	Uranium-235	16.3 ± 12.7	19	U	3,000	EPA 901.1
			096480-004	Uranium-238	32.8 ± 123	131	U	3,000	EPA 901.1
WW006	2069F	28-Oct-2014	096481-004	Actinium-228	5.48 ± 7.28	9.44	U	300,000	EPA 901.1
			096481-003	Alpha, gross	3.63 ± 2.22	3.24			EPA 900.0/SW846 9310
			096481-004	Americium-241	0.916 ± 5.96	8.92	U	200	EPA 901.1
			096481-004	Beryllium-7	-6.03 ± 11.9	20.2	U		EPA 901.1
			096481-003	Beta, gross	26.7 ± 4.93	2.64			EPA 900.0/SW846 9310
			096481-004	Bismuth-212	-26.2 ± 33.2	34.6	U		EPA 901.1
			096481-004	Bismuth-214	3.32 ± 6.64	4.87	U		EPA 901.1
			096481-004	Cesium-137	0.974 ± 1.57	2.74	U	10,000	EPA 901.1
			096481-004	Cobalt-60	-1.47 ± 2.31	2.69	U	30,000	EPA 901.1
			096481-004	Lead-212	-1.66 ± 5.05	5.05	U	20,000	EPA 901.1
			096481-004	Lead-214	1.06 ± 5.32	6.33	U	1,000,000	EPA 901.1
			096481-004	Neptunium-237	-0.331 ± 3.05	5.01	U		EPA 901.1
			096481-004	Potassium-40	22.6 ± 36.2	25.8	U	40,000	EPA 901.1
			096481-004	Radium-223	-0.259 ± 28.3	48.4	U		EPA 901.1
			096481-004	Radium-224	18.2 ± 22.1	50.6	U		EPA 901.1
			096481-004	Radium-226	15.8 ± 67.8	67.2	U	600	EPA 901.1
			096481-004	Radium-228	5.48 ± 7.28	9.44	U	600	EPA 901.1

See notes at end of appendix.

Table D-8. Summary of radiological results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Activity (pCi/L)	MDA (pCi/L)	Laboratory Data Qualifiers	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW006	2069F	28-Oct-2014	096481-004	Sodium-22	-0.0111±1.41	2.57	U		EPA 901.1
			096481-004	Thorium-227	4.23 ± 11.2	19.2	U		EPA 901.1
			096481-004	Thorium-231	3.4 ± 28.6	27.5	U	300	EPA 901.1
			096481-004	Thorium-234	10.7 ± 84.7	76.4	U	50,000	EPA 901.1
			096481-005	Tritium	12.4 ± 99	172	U	10,000,000	EPA 906.0 Modified
			096481-004	Uranium-235	-20.6 ± 20.2	15.7	U	3,000	EPA 901.1
			096481-004	Uranium-238	10.7 ± 84.7	76.4	U	3,000	EPA 901.1
WW008	2069I	28-Oct-2014	096483-004	Actinium-228	-0.194 ± 13.9	14.4	U	300,000	EPA 901.1
			096483-003	Alpha, gross	2.64 ± 1.8	2.36			EPA 900.0/SW846 9310
			096483-004	Americium-241	-3.95 ± 10.8	16.3	U	200	EPA 901.1
			096483-004	Beryllium-7	-5.71 ± 21.7	37.1	U		EPA 901.1
			096483-003	Beta, gross	31.9 ± 5.5	1.62			EPA 900.0/SW846 9310
			096483-004	Bismuth-212	-67.8 ± 44.2	48.2	U		EPA 901.1
			096483-004	Bismuth-214	3.56 ± 5.06	7.3	U		EPA 901.1
			096483-004	Cesium-137	-2.46 ± 3.95	3.68	U	10,000	EPA 901.1
			096483-004	Cobalt-60	-2.25 ± 2.08	2.79	U	30,000	EPA 901.1
			096483-004	Lead-212	1.07 ± 5.78	6.52	U	20,000	EPA 901.1
			096483-004	Lead-214	-4.56 ± 7.26	8.11	U	1,000,000	EPA 901.1
			096483-004	Neptunium-237	4.04 ± 4.81	6.94	U		EPA 901.1
			096483-004	Potassium-40	18.1 ± 41.9	29.1	U	40,000	EPA 901.1
			096483-004	Radium-223	-0.105 ± 39	68.5	U		EPA 901.1
			096483-004	Radium-224	28.5 ± 45.6	65.5	U		EPA 901.1
			096483-004	Radium-226	-60.9 ± 75.1	76.6	U	600	EPA 901.1
			096483-004	Radium-228	-0.194 ± 13.9	14.4	U	600	EPA 901.1
			096483-004	Sodium-22	-1.41 ± 1.99	3.15	U		EPA 901.1
			096483-004	Thorium-227	-7.05 ± 15.9	25.8	U		EPA 901.1
			096483-004	Thorium-231	9.36 ± 43	41.4	U	300	EPA 901.1
			096483-004	Thorium-234	-50.1 ± 127	149	U	50,000	EPA 901.1
			096483-005	Tritium	-34 ± 99.8	177	U	10,000,000	EPA 906.0 Modified
			096483-004	Uranium-235	-5.36 ± 19.2	20.5	U	3,000	EPA 901.1
			096483-004	Uranium-238	-50.1 ± 127	149	U	3,000	EPA 901.1

See notes at end of appendix.

Table D-8. Summary of radiological results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Activity (pCi/L)	MDA (pCi/L)	Laboratory Data Qualifiers	ABCWUA SUWCO Limits (Monthly Average)	Analytical Method
WW011	2069K	28-Oct-2014	096484-004	Actinium-228	-2.45 ± 11.4	12.3	U	300,000	EPA 901.1
			096484-003	Alpha, gross	4.15 ± 2.35	3.37			EPA 900.0/SW846 9310
			096484-004	Americium-241	2.15 ± 4.73	8.12	U	200	EPA 901.1
			096484-004	Beryllium-7	6.69 ± 13.6	22.8	U		EPA 901.1
			096484-003	Beta, gross	31.8 ± 5.7	2.19			EPA 900.0/SW846 9310
			096484-004	Bismuth-212	-24.3 ± 45.8	37.7	U		EPA 901.1
			096484-004	Bismuth-214	0.899 ± 7.7	6.82	U		EPA 901.1
			096484-004	Cesium-137	2.13 ± 2.28	2.77	U	10,000	EPA 901.1
			096484-004	Cobalt-60	-0.699 ± 1.78	3.03	U	30,000	EPA 901.1
			096484-004	Lead-212	5.05 ± 5.88	5.41	U	20,000	EPA 901.1
			096484-004	Lead-214	-7.85 ± 6.5	6.32	U	1,000,000	EPA 901.1
			096484-004	Neptunium-237	0.163 ± 3.18	5.11	U		EPA 901.1
			096484-004	Potassium-40	18.2 ± 38.9	27.7	U	40,000	EPA 901.1
			096484-004	Radium-223	7.75 ± 35.8	50.8	U		EPA 901.1
			096484-004	Radium-224	26.7 ± 24.2	48	U		EPA 901.1
			096484-004	Radium-226	18.5 ± 57.1	68	U	600	EPA 901.1
			096484-004	Radium-228	-2.45 ± 11.4	12.3	U	600	EPA 901.1
			096484-004	Sodium-22	-0.19 ± 1.63	2.76	U		EPA 901.1
			096484-004	Thorium-227	-6.32 ± 12.5	19.4	U		EPA 901.1
			096484-004	Thorium-231	5.98 ± 29.6	30.4	U	300	EPA 901.1
			096484-004	Thorium-234	-38.7 ± 85.3	94.3	U	50,000	EPA 901.1
			096484-005	Tritium	-8.1 ± 97.8	171	U	10,000,000	EPA 906.0 Modified
			096484-004	Uranium-235	3.02 ± 17.7	16	U	3,000	EPA 901.1
			096484-004	Uranium-238	-38.7 ± 85.3	94.3	U	3,000	EPA 901.1

See notes at end of appendix.

Table D-9. Summary of volatile organic compound results for permitted sanitary outfalls, October 2014

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
CINT	2238A	28-Oct-2014	096485-006	Acetone	5.74	2.5	J	SW846 8260B
			096485-006	Benzene		0.3	U	SW846 8260B
			096485-006	Bromochloromethane		0.3	U	SW846 8260B
			096485-006	Bromodichloromethane	0.46	0.3	J	SW846 8260B
			096485-006	Bromoform	1.28	0.3		SW846 8260B
			096485-006	Bromomethane		0.3	U	SW846 8260B
			096485-006	Butanone, 2-		2	U	SW846 8260B
			096485-006	Carbon disulfide		1.5	U	SW846 8260B
			096485-006	Carbon tetrachloride		0.3	U	SW846 8260B
			096485-006	Chlorobenzene		0.3	U	SW846 8260B
			096485-006	Chloroethane		0.3	U	SW846 8260B
			096485-006	Chloroform	0.81	0.3	J	SW846 8260B
			096485-006	Chloromethane		0.3	U	SW846 8260B
			096485-006	Cyclohexane		0.3	U	SW846 8260B
			096485-006	Dibromo-3-chloropropane, 1,2-		0.5	U	SW846 8260B
			096485-006	Dibromochloromethane		0.3	U	SW846 8260B
			096485-006	Dibromoethane, 1,2-		0.3	U	SW846 8260B
			096485-006	Dichlorobenzene, 1,2-		0.3	U	SW846 8260B
			096485-006	Dichlorobenzene, 1,3-		0.3	U	SW846 8260B
			096485-006	Dichlorobenzene, 1,4-		0.3	U	SW846 8260B
			096485-006	Dichlorodifluoromethane		0.3	U	SW846 8260B
			096485-006	Dichloroethane, 1,1-		0.3	U	SW846 8260B
			096485-006	Dichloroethane, 1,2-		0.3	U	SW846 8260B
			096485-006	Dichloroethene, 1,1-		0.3	U	SW846 8260B
			096485-006	Dichloroethene, cis-1,2-		0.3	U	SW846 8260B
			096485-006	Dichloroethene, trans-1,2-		0.3	U	SW846 8260B
			096485-006	Dichloropropane, 1,2-		0.3	U	SW846 8260B
			096485-006	Dichloropropene, cis-1,3-		0.3	U	SW846 8260B
			096485-006	Dichloropropene, trans-1,3-		0.3	U	SW846 8260B
			096485-006	Ethyl benzene		0.3	U	SW846 8260B
			096485-006	Hexanone, 2-		2.2	U	SW846 8260B
			096485-006	Isopropylbenzene		0.3	U	SW846 8260B
			096485-006	Methyl Acetate		1.5	U	SW846 8260B

See notes at end of appendix.

Table D-9. Summary of volatile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
CINT	2238A	28-Oct-2014	096485-006	Methylcyclohexane		0.3	U	SW846 8260B
			096485-006	Methylene chloride		1.7	U	SW846 8260B
			096485-006	Pentanone, 4-methyl-, 2-		1.5	U	SW846 8260B
			096485-006	Styrene		0.3	U	SW846 8260B
			096485-006	Tert-butyl methyl ether		0.3	U	SW846 8260B
			096485-006	Tetrachloroethane, 1,1,2,2-		0.3	U	SW846 8260B
			096485-006	Tetrachloroethene		0.3	U	SW846 8260B
			096485-006	Toluene		0.3	U	SW846 8260B
			096485-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-		1.5	U	SW846 8260B
			096485-006	Trichlorobenzene, 1,2,3-		0.3	U	SW846 8260B
			096485-006	Trichlorobenzene, 1,2,4-		0.3	U	SW846 8260B
			096485-006	Trichloroethane, 1,1,1-		0.3	U	SW846 8260B
			096485-006	Trichloroethane, 1,1,2-		0.3	U	SW846 8260B
			096485-006	Trichloroethene		0.3	U	SW846 8260B
			096485-006	Trichlorofluoromethane		0.3	U	SW846 8260B
			096485-006	Vinyl chloride		0.3	U	SW846 8260B
			096485-006	Xylene		0.3	U	SW846 8260B
			096485-006	Xylene, m- & p-		0.3	U	SW846 8260B
			096485-006	Xylene, o-		0.3	U	SW846 8260B
WW001	2069A	28-Oct-2014	096480-006	Acetone	56.2	2.5		SW846 8260B
			096480-006	Benzene		0.3	U	SW846 8260B
			096480-006	Bromochloromethane		0.3	U	SW846 8260B
			096480-006	Bromodichloromethane		0.3	U	SW846 8260B
			096480-006	Bromoform	0.65	0.3	J	SW846 8260B
			096480-006	Bromomethane		0.3	U	SW846 8260B
			096480-006	Butanone, 2-		2	U	SW846 8260B
			096480-006	Carbon disulfide		1.5	U	SW846 8260B
			096480-006	Carbon tetrachloride		0.3	U	SW846 8260B
			096480-006	Chlorobenzene		0.3	U	SW846 8260B
			096480-006	Chloroethane		0.3	U	SW846 8260B
			096480-006	Chloroform		0.3	U	SW846 8260B
			096480-006	Chloromethane		0.3	U	SW846 8260B
			096480-006	Cyclohexane		0.3	U	SW846 8260B
			096480-006	Dibromo-3-chloropropane, 1,2-		0.5	U	SW846 8260B

See notes at end of appendix.

Table D-9. Summary of volatile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW001	2069A	28-Oct-2014	096480-006	Dibromochloromethane		0.3	U	SW846 8260B
			096480-006	Dibromoethane, 1,2-		0.3	U	SW846 8260B
			096480-006	Dichlorobenzene, 1,2-		0.3	U	SW846 8260B
			096480-006	Dichlorobenzene, 1,3-		0.3	U	SW846 8260B
			096480-006	Dichlorobenzene, 1,4-		0.3	U	SW846 8260B
			096480-006	Dichlorodifluoromethane		0.3	U	SW846 8260B
			096480-006	Dichloroethane, 1,1-		0.3	U	SW846 8260B
			096480-006	Dichloroethane, 1,2-		0.3	U	SW846 8260B
			096480-006	Dichloroethene, 1,1-		0.3	U	SW846 8260B
			096480-006	Dichloroethene, cis-1,2-		0.3	U	SW846 8260B
			096480-006	Dichloroethene, trans-1,2-		0.3	U	SW846 8260B
			096480-006	Dichloropropane, 1,2-		0.3	U	SW846 8260B
			096480-006	Dichloropropene, cis-1,3-		0.3	U	SW846 8260B
			096480-006	Dichloropropene, trans-1,3-		0.3	U	SW846 8260B
			096480-006	Ethyl benzene		0.3	U	SW846 8260B
			096480-006	Hexanone, 2-		2.2	U	SW846 8260B
			096480-006	Isopropylbenzene		0.3	U	SW846 8260B
			096480-006	Methyl Acetate		1.5	U	SW846 8260B
			096480-006	Methylcyclohexane		0.3	U	SW846 8260B
			096480-006	Methylene chloride		1.7	U	SW846 8260B
			096480-006	Pentanone, 4-methyl-, 2-		1.5	U	SW846 8260B
			096480-006	Styrene		0.3	U	SW846 8260B
			096480-006	Tert-butyl methyl ether		0.3	U	SW846 8260B
			096480-006	Tetrachloroethane, 1,1,2,2-		0.3	U	SW846 8260B
			096480-006	Tetrachloroethene		0.3	U	SW846 8260B
			096480-006	Toluene		0.3	U	SW846 8260B
			096480-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-		1.5	U	SW846 8260B
			096480-006	Trichlorobenzene, 1,2,3-		0.3	U	SW846 8260B
			096480-006	Trichlorobenzene, 1,2,4-		0.3	U	SW846 8260B
			096480-006	Trichloroethane, 1,1,1-		0.3	U	SW846 8260B
			096480-006	Trichloroethane, 1,1,2-		0.3	U	SW846 8260B
			096480-006	Trichloroethene		0.3	U	SW846 8260B
			096480-006	Trichlorofluoromethane		0.3	U	SW846 8260B
			096480-006	Vinyl chloride		0.3	U	SW846 8260B

See notes at end of appendix.

Table D-9. Summary of volatile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW001	2069A	28-Oct-2014	096480-006	Xylene		0.3	U	SW846 8260B
			096480-006	Xylene, m- & p-		0.3	U	SW846 8260B
			096480-006	Xylene, o-		0.3	U	SW846 8260B
WW006	2069F	28-Oct-2014	096481-006	Acetone	10.7	2.5		SW846 8260B
			096481-006	Benzene		0.3	U	SW846 8260B
			096481-006	Bromochloromethane		0.3	U	SW846 8260B
			096481-006	Bromodichloromethane		0.3	U	SW846 8260B
			096481-006	Bromoform		0.3	U	SW846 8260B
			096481-006	Bromomethane		0.3	U	SW846 8260B
			096481-006	Butanone, 2-		2	U	SW846 8260B
			096481-006	Carbon disulfide		1.5	U	SW846 8260B
			096481-006	Carbon tetrachloride		0.3	U	SW846 8260B
			096481-006	Chlorobenzene		0.3	U	SW846 8260B
			096481-006	Chloroethane		0.3	U	SW846 8260B
			096481-006	Chloroform		0.3	U	SW846 8260B
			096481-006	Chloromethane		0.3	U	SW846 8260B
			096481-006	Cyclohexane		0.3	U	SW846 8260B
			096481-006	Dibromo-3-chloropropane, 1,2-		0.5	U	SW846 8260B
			096481-006	Dibromochloromethane		0.3	U	SW846 8260B
			096481-006	Dibromoethane, 1,2-		0.3	U	SW846 8260B
			096481-006	Dichlorobenzene, 1,2-		0.3	U	SW846 8260B
			096481-006	Dichlorobenzene, 1,3-		0.3	U	SW846 8260B
			096481-006	Dichlorobenzene, 1,4-		0.3	U	SW846 8260B
			096481-006	Dichlorodifluoromethane		0.3	U	SW846 8260B
			096481-006	Dichloroethane, 1,1-		0.3	U	SW846 8260B
			096481-006	Dichloroethane, 1,2-		0.3	U	SW846 8260B
			096481-006	Dichloroethene, 1,1-		0.3	U	SW846 8260B
			096481-006	Dichloroethene, cis-1,2-		0.3	U	SW846 8260B
			096481-006	Dichloroethene, trans-1,2-		0.3	U	SW846 8260B
			096481-006	Dichloropropane, 1,2-		0.3	U	SW846 8260B
			096481-006	Dichloropropene, cis-1,3-		0.3	U	SW846 8260B
			096481-006	Dichloropropene, trans-1,3-		0.3	U	SW846 8260B
			096481-006	Ethyl benzene		0.3	U	SW846 8260B
			096481-006	Hexanone, 2-		2.2	U	SW846 8260B

See notes at end of appendix.

Table D-9. Summary of volatile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW006	2069F	28-Oct-2014	096481-006	Isopropylbenzene		0.3	U	SW846 8260B
			096481-006	Methyl Acetate		1.5	U	SW846 8260B
			096481-006	Methylcyclohexane		0.3	U	SW846 8260B
			096481-006	Methylene chloride		1.7	U	SW846 8260B
			096481-006	Pentanone, 4-methyl-, 2-		1.5	U	SW846 8260B
			096481-006	Styrene		0.3	U	SW846 8260B
			096481-006	Tert-butyl methyl ether		0.3	U	SW846 8260B
			096481-006	Tetrachloroethane, 1,1,2,2-		0.3	U	SW846 8260B
			096481-006	Tetrachloroethene		0.3	U	SW846 8260B
			096481-006	Toluene		0.3	U	SW846 8260B
			096481-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-		1.5	U	SW846 8260B
			096481-006	Trichlorobenzene, 1,2,3-		0.3	U	SW846 8260B
			096481-006	Trichlorobenzene, 1,2,4-		0.3	U	SW846 8260B
			096481-006	Trichloroethane, 1,1,1-		0.3	U	SW846 8260B
			096481-006	Trichloroethane, 1,1,2-		0.3	U	SW846 8260B
			096481-006	Trichloroethene		0.3	U	SW846 8260B
			096481-006	Trichlorofluoromethane		0.3	U	SW846 8260B
			096481-006	Vinyl chloride		0.3	U	SW846 8260B
			096481-006	Xylene		0.3	U	SW846 8260B
			096481-006	Xylene, m- & p-		0.3	U	SW846 8260B
			096481-006	Xylene, o-		0.3	U	SW846 8260B
WW007	2069G	28-Oct-2014	096482-006	Acetone	14.4	2.5		SW846 8260B
			096482-006	Benzene		0.3	U	SW846 8260B
			096482-006	Bromochloromethane		0.3	U	SW846 8260B
			096482-006	Bromodichloromethane		0.3	U	SW846 8260B
			096482-006	Bromoform		0.3	U	SW846 8260B
			096482-006	Bromomethane		0.3	U	SW846 8260B
			096482-006	Butanone, 2-		2	U	SW846 8260B
			096482-006	Carbon disulfide		1.5	U	SW846 8260B
			096482-006	Carbon tetrachloride		0.3	U	SW846 8260B
			096482-006	Chlorobenzene		0.3	U	SW846 8260B
			096482-006	Chloroethane		0.3	U	SW846 8260B
			096482-006	Chloroform		0.3	U	SW846 8260B
			096482-006	Chloromethane		0.3	U	SW846 8260B

See notes at end of appendix.

Table D-9. Summary of volatile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW007	2069G	28-Oct-2014	096482-006	Cyclohexane		0.3	U	SW846 8260B
			096482-006	Dibromo-3-chloropropane, 1,2-		0.5	U	SW846 8260B
			096482-006	Dibromochloromethane		0.3	U	SW846 8260B
			096482-006	Dibromoethane, 1,2-		0.3	U	SW846 8260B
			096482-006	Dichlorobenzene, 1,2-		0.3	U	SW846 8260B
			096482-006	Dichlorobenzene, 1,3-		0.3	U	SW846 8260B
			096482-006	Dichlorobenzene, 1,4-		0.3	U	SW846 8260B
			096482-006	Dichlorodifluoromethane		0.3	U	SW846 8260B
			096482-006	Dichloroethane, 1,1-		0.3	U	SW846 8260B
			096482-006	Dichloroethane, 1,2-		0.3	U	SW846 8260B
			096482-006	Dichloroethene, 1,1-		0.3	U	SW846 8260B
			096482-006	Dichloroethene, cis-1,2-		0.3	U	SW846 8260B
			096482-006	Dichloroethene, trans-1,2-		0.3	U	SW846 8260B
			096482-006	Dichloropropane, 1,2-		0.3	U	SW846 8260B
			096482-006	Dichloropropene, cis-1,3-		0.3	U	SW846 8260B
			096482-006	Dichloropropene, trans-1,3-		0.3	U	SW846 8260B
			096482-006	Ethyl benzene		0.3	U	SW846 8260B
			096482-006	Hexanone, 2-		2.2	U	SW846 8260B
			096482-006	Isopropylbenzene		0.3	U	SW846 8260B
			096482-006	Methyl Acetate		1.5	U	SW846 8260B
			096482-006	Methylcyclohexane		0.3	U	SW846 8260B
			096482-006	Methylene chloride		1.7	U	SW846 8260B
			096482-006	Pentanone, 4-methyl-, 2-		1.5	U	SW846 8260B
			096482-006	Styrene		0.3	U	SW846 8260B
			096482-006	Tert-butyl methyl ether		0.3	U	SW846 8260B
			096482-006	Tetrachloroethane, 1,1,2,2-		0.3	U	SW846 8260B
			096482-006	Tetrachloroethene		0.3	U	SW846 8260B
			096482-006	Toluene		0.3	U	SW846 8260B
			096482-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-		1.5	U	SW846 8260B
			096482-006	Trichlorobenzene, 1,2,3-		0.3	U	SW846 8260B
			096482-006	Trichlorobenzene, 1,2,4-		0.3	U	SW846 8260B
			096482-006	Trichloroethane, 1,1,1-		0.3	U	SW846 8260B
			096482-006	Trichloroethane, 1,1,2-		0.3	U	SW846 8260B
			096482-006	Trichloroethene		0.3	U	SW846 8260B

See notes at end of appendix.

Table D-9. Summary of volatile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW007	2069G	28-Oct-2014	096482-006	Trichlorofluoromethane		0.3	U	SW846 8260B
			096482-006	Vinyl chloride		0.3	U	SW846 8260B
			096482-006	Xylene		0.3	U	SW846 8260B
			096482-006	Xylene, m- & p-		0.3	U	SW846 8260B
			096482-006	Xylene, o-		0.3	U	SW846 8260B
WW008	2069I	28-Oct-2014	096483-006	Acetone	31.3	2.5		SW846 8260B
			096483-006	Benzene		0.3	U	SW846 8260B
			096483-006	Bromochloromethane		0.3	U	SW846 8260B
			096483-006	Bromodichloromethane		0.3	U	SW846 8260B
			096483-006	Bromoform		0.3	U	SW846 8260B
			096483-006	Bromomethane		0.3	U	SW846 8260B
			096483-006	Butanone, 2-		2	U	SW846 8260B
			096483-006	Carbon disulfide		1.5	U	SW846 8260B
			096483-006	Carbon tetrachloride		0.3	U	SW846 8260B
			096483-006	Chlorobenzene		0.3	U	SW846 8260B
			096483-006	Chloroethane		0.3	U	SW846 8260B
			096483-006	Chloroform		0.3	U	SW846 8260B
			096483-006	Chloromethane		0.3	U	SW846 8260B
			096483-006	Cyclohexane		0.3	U	SW846 8260B
			096483-006	Dibromo-3-chloropropane, 1,2-		0.5	U	SW846 8260B
			096483-006	Dibromochloromethane		0.3	U	SW846 8260B
			096483-006	Dibromoethane, 1,2-		0.3	U	SW846 8260B
			096483-006	Dichlorobenzene, 1,2-		0.3	U	SW846 8260B
			096483-006	Dichlorobenzene, 1,3-		0.3	U	SW846 8260B
			096483-006	Dichlorobenzene, 1,4-		0.3	U	SW846 8260B
			096483-006	Dichlorodifluoromethane		0.3	U	SW846 8260B
			096483-006	Dichloroethane, 1,1-		0.3	U	SW846 8260B
			096483-006	Dichloroethane, 1,2-		0.3	U	SW846 8260B
			096483-006	Dichloroethene, 1,1-		0.3	U	SW846 8260B
			096483-006	Dichloroethene, cis-1,2-		0.3	U	SW846 8260B
			096483-006	Dichloroethene, trans-1,2-		0.3	U	SW846 8260B
			096483-006	Dichloropropane, 1,2-		0.3	U	SW846 8260B
			096483-006	Dichloropropene, cis-1,3-		0.3	U	SW846 8260B
			096483-006	Dichloropropene, trans-1,3-		0.3	U	SW846 8260B

See notes at end of appendix.

Table D-9. Summary of volatile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW008	2069I	28-Oct-2014	096483-006	Ethyl benzene		0.3	U	SW846 8260B
			096483-006	Hexanone, 2-		2.2	U	SW846 8260B
			096483-006	Isopropylbenzene		0.3	U	SW846 8260B
			096483-006	Methyl Acetate		1.5	U	SW846 8260B
			096483-006	Methylcyclohexane		0.3	U	SW846 8260B
			096483-006	Methylene chloride		1.7	U	SW846 8260B
			096483-006	Pentanone, 4-methyl-, 2-		1.5	U	SW846 8260B
			096483-006	Styrene		0.3	U	SW846 8260B
			096483-006	Tert-butyl methyl ether		0.3	U	SW846 8260B
			096483-006	Tetrachloroethane, 1,1,2,2-		0.3	U	SW846 8260B
			096483-006	Tetrachloroethene		0.3	U	SW846 8260B
			096483-006	Toluene		0.3	U	SW846 8260B
			096483-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-		1.5	U	SW846 8260B
			096483-006	Trichlorobenzene, 1,2,3-		0.3	U	SW846 8260B
			096483-006	Trichlorobenzene, 1,2,4-		0.3	U	SW846 8260B
			096483-006	Trichloroethane, 1,1,1-		0.3	U	SW846 8260B
			096483-006	Trichloroethane, 1,1,2-		0.3	U	SW846 8260B
			096483-006	Trichloroethene		0.3	U	SW846 8260B
			096483-006	Trichlorofluoromethane		0.3	U	SW846 8260B
			096483-006	Vinyl chloride		0.3	U	SW846 8260B
			096483-006	Xylene		0.3	U	SW846 8260B
			096483-006	Xylene, m- & p-		0.3	U	SW846 8260B
			096483-006	Xylene, o-		0.3	U	SW846 8260B
WW011	2069K	28-Oct-2014	096484-006	Acetone	4.34	2.5	J	SW846 8260B
			096484-006	Benzene		0.3	U	SW846 8260B
			096484-006	Bromochloromethane		0.3	U	SW846 8260B
			096484-006	Bromodichloromethane		0.3	U	SW846 8260B
			096484-006	Bromoform		0.3	U	SW846 8260B
			096484-006	Bromomethane		0.3	U	SW846 8260B
			096484-006	Butanone, 2-		2	U	SW846 8260B
			096484-006	Carbon disulfide		1.5	U	SW846 8260B
			096484-006	Carbon tetrachloride		0.3	U	SW846 8260B
			096484-006	Chlorobenzene		0.3	U	SW846 8260B
			096484-006	Chloroethane		0.3	U	SW846 8260B

See notes at end of appendix.

Table D-9. Summary of volatile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW011	2069K	28-Oct-2014	096484-006	Chloroform		0.3	U	SW846 8260B
			096484-006	Chloromethane		0.3	U	SW846 8260B
			096484-006	Cyclohexane		0.3	U	SW846 8260B
			096484-006	Dibromo-3-chloropropane, 1,2-		0.5	U	SW846 8260B
			096484-006	Dibromochloromethane		0.3	U	SW846 8260B
			096484-006	Dibromoethane, 1,2-		0.3	U	SW846 8260B
			096484-006	Dichlorobenzene, 1,2-		0.3	U	SW846 8260B
			096484-006	Dichlorobenzene, 1,3-		0.3	U	SW846 8260B
			096484-006	Dichlorobenzene, 1,4-		0.3	U	SW846 8260B
			096484-006	Dichlorodifluoromethane		0.3	U	SW846 8260B
			096484-006	Dichloroethane, 1,1-		0.3	U	SW846 8260B
			096484-006	Dichloroethane, 1,2-		0.3	U	SW846 8260B
			096484-006	Dichloroethene, 1,1-		0.3	U	SW846 8260B
			096484-006	Dichloroethene, cis-1,2-		0.3	U	SW846 8260B
			096484-006	Dichloroethene, trans-1,2-		0.3	U	SW846 8260B
			096484-006	Dichloropropane, 1,2-		0.3	U	SW846 8260B
			096484-006	Dichloropropene, cis-1,3-		0.3	U	SW846 8260B
			096484-006	Dichloropropene, trans-1,3-		0.3	U	SW846 8260B
			096484-006	Ethyl benzene		0.3	U	SW846 8260B
			096484-006	Hexanone, 2-		2.2	U	SW846 8260B
			096484-006	Isopropylbenzene		0.3	U	SW846 8260B
			096484-006	Methyl Acetate		1.5	U	SW846 8260B
			096484-006	Methylcyclohexane		0.3	U	SW846 8260B
			096484-006	Methylene chloride		1.7	U	SW846 8260B
			096484-006	Pentanone, 4-methyl-, 2-		1.5	U	SW846 8260B
			096484-006	Styrene		0.3	U	SW846 8260B
			096484-006	Tert-butyl methyl ether		0.3	U	SW846 8260B
			096484-006	Tetrachloroethane, 1,1,2,2-		0.3	U	SW846 8260B
			096484-006	Tetrachloroethene		0.3	U	SW846 8260B
			096484-006	Toluene		0.3	U	SW846 8260B
			096484-006	Trichloro-1,2,2-trifluoroethane, 1,1,2-		1.5	U	SW846 8260B
			096484-006	Trichlorobenzene, 1,2,3-		0.3	U	SW846 8260B
			096484-006	Trichlorobenzene, 1,2,4-		0.3	U	SW846 8260B
			096484-006	Trichloroethane, 1,1,1-		0.3	U	SW846 8260B

See notes at end of appendix.

Table D-9. Summary of volatile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW011	2069K	28-Oct-2014	096484-006	Trichloroethane, 1,1,2-		0.3	U	SW846 8260B
			096484-006	Trichloroethene		0.3	U	SW846 8260B
			096484-006	Trichlorofluoromethane		0.3	U	SW846 8260B
			096484-006	Vinyl chloride		0.3	U	SW846 8260B
			096484-006	Xylene		0.3	U	SW846 8260B
			096484-006	Xylene, m- & p-		0.3	U	SW846 8260B
			096484-006	Xylene, o-		0.3	U	SW846 8260B

See notes at end of appendix.

Table D-10. Summary of semivolitile organic compound results for permitted sanitary outfalls, October 2014

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
CINT	2238A	29-Oct-2014	096492-008	1,1'-Biphenyl		3.26	U	SW846 3510C/8270D
			096492-008	Acenaphthene		0.326	U	SW846 3510C/8270D
			096492-008	Acenaphthylene		0.326	U	SW846 3510C/8270D
			096492-008	Acetophenone		3.26	U	SW846 3510C/8270D
			096492-008	Anthracene		0.326	U	SW846 3510C/8270D
			096492-008	Atrazine		3.26	U	SW846 3510C/8270D
			096492-008	Benzaldehyde		3.26	U	SW846 3510C/8270D
			096492-008	Benzo(a)anthracene		0.326	U	SW846 3510C/8270D
			096492-008	Benzo(a)pyrene		0.326	U	SW846 3510C/8270D
			096492-008	Benzo(b)fluoranthene		0.326	U	SW846 3510C/8270D
			096492-008	Benzo(ghi)perylene		0.326	U	SW846 3510C/8270D
			096492-008	Benzo(k)fluoranthene		0.326	U	SW846 3510C/8270D
			096492-008	Bromophenyl phenyl ether, 4-		3.26	U	SW846 3510C/8270D
			096492-008	Butylbenzyl phthalate		3.26	U	SW846 3510C/8270D
			096492-008	Caprolactam		3.26	U	SW846 3510C/8270D
			096492-008	Carbazole		0.326	U	SW846 3510C/8270D
			096492-008	Chloro-3-methylphenol, 4-		3.26	U	SW846 3510C/8270D
			096492-008	Chlorobenzenamine, 4-		3.59	U	SW846 3510C/8270D
			096492-008	Chloroethoxy)methane, bis(2-		3.26	U	SW846 3510C/8270D
			096492-008	Chloroethyl)ether, bis(2-		3.26	U	SW846 3510C/8270D
			096492-008	Chloroisopropyl ether, bis-		3.26	U	SW846 3510C/8270D
			096492-008	Chloronaphthalene, 2-		0.446	U	SW846 3510C/8270D
			096492-008	Chlorophenol, 2-		3.26	U	SW846 3510C/8270D
			096492-008	Chlorophenyl phenyl ether, 4-		3.26	U	SW846 3510C/8270D
			096492-008	Chrysene		0.326	U	SW846 3510C/8270D
			096492-008	Cresol, m,p-		4.02	U	SW846 3510C/8270D
			096492-008	Cresol, o-		3.26	U	SW846 3510C/8270D
			096492-008	Di-n-butyl phthalate		3.26	U	SW846 3510C/8270D
			096492-008	Di-n-octyl phthalate		3.26	U	SW846 3510C/8270D
			096492-008	Dibenz[a,h]anthracene		0.326	U	SW846 3510C/8270D
			096492-008	Dibenzofuran		3.26	U	SW846 3510C/8270D
			096492-008	Dichlorobenzidine, 3,3'-		3.26	NU	SW846 3510C/8270D
			096492-008	Dichlorophenol, 2,4-		3.26	U	SW846 3510C/8270D

See notes at end of appendix.

Table D-10. Summary of semivolitile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
CINT	2238A	29-Oct-2014	096492-008	Diethylphthalate		3.26	U	SW846 3510C/8270D
			096492-008	Dimethylphenol, 2,4-		3.26	U	SW846 3510C/8270D
			096492-008	Dimethylphthalate		3.26	U	SW846 3510C/8270D
			096492-008	Dinitro-o-cresol		3.26	U	SW846 3510C/8270D
			096492-008	Dinitrophenol, 2,4-		5.43	U	SW846 3510C/8270D
			096492-008	Dinitrotoluene, 2,4-		3.26	U	SW846 3510C/8270D
			096492-008	Dinitrotoluene, 2,6-		3.26	U	SW846 3510C/8270D
			096492-008	Dioxane, 1,4-		3.26	U	SW846 3510C/8270D
			096492-008	Diphenyl amine		3.26	U	SW846 3510C/8270D
			096492-008	Ethylhexyl)phthalate, bis(2-		3.26	U	SW846 3510C/8270D
			096492-008	Fluoranthene		0.326	U	SW846 3510C/8270D
			096492-008	Fluorene		0.326	U	SW846 3510C/8270D
			096492-008	Hexachlorobenzene		3.26	U	SW846 3510C/8270D
			096492-008	Hexachlorobutadiene		3.26	U	SW846 3510C/8270D
			096492-008	Hexachlorocyclopentadiene		3.26	U	SW846 3510C/8270D
			096492-008	Hexachloroethane		3.26	U	SW846 3510C/8270D
			096492-008	Indeno(1,2,3-c,d)pyrene		0.326	U	SW846 3510C/8270D
			096492-008	Isophorone		3.8	U	SW846 3510C/8270D
			096492-008	Methylnaphthalene, 2-		0.326	U	SW846 3510C/8270D
			096492-008	Naphthalene		0.326	U	SW846 3510C/8270D
			096492-008	Nitro-benzene		3.26	U	SW846 3510C/8270D
			096492-008	Nitroaniline, 2-		3.26	NU	SW846 3510C/8270D
			096492-008	Nitroaniline, 3-		3.26	U	SW846 3510C/8270D
			096492-008	Nitroaniline, 4-		3.26	U	SW846 3510C/8270D
			096492-008	Nitrophenol, 2-		3.26	U	SW846 3510C/8270D
			096492-008	Nitrophenol, 4-		3.26	U	SW846 3510C/8270D
			096492-008	Nitrosodipropylamine, n-		3.26	U	SW846 3510C/8270D
			096492-008	Pentachlorophenol		3.26	U	SW846 3510C/8270D
			096492-008	Phenanthrene		0.326	U	SW846 3510C/8270D
			096492-008	Phenol		3.26	U	SW846 3510C/8270D
			096492-008	Pyrene		0.326	U	SW846 3510C/8270D
			096492-008	Trichlorobenzene, 1,2,4-		3.26	U	SW846 3510C/8270D
			096492-008	Trichlorophenol, 2,4,5-		3.26	U	SW846 3510C/8270D
			096492-008	Trichlorophenol, 2,4,6-		3.26	U	SW846 3510C/8270D

See notes at end of appendix.

Table D-10. Summary of semivolitile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW001	2069A	29-Oct-2014	096487-008	1,1'-Biphenyl		3	U	SW846 3510C/8270D
			096487-008	Acenaphthene		0.3	U	SW846 3510C/8270D
			096487-008	Acenaphthylene		0.3	U	SW846 3510C/8270D
			096487-008	Acetophenone		3	U	SW846 3510C/8270D
			096487-008	Anthracene		0.3	U	SW846 3510C/8270D
			096487-008	Atrazine		3	U	SW846 3510C/8270D
			096487-008	Benzaldehyde		3	U	SW846 3510C/8270D
			096487-008	Benzo(a)anthracene		0.3	U	SW846 3510C/8270D
			096487-008	Benzo(a)pyrene		0.3	U	SW846 3510C/8270D
			096487-008	Benzo(b)fluoranthene		0.3	U	SW846 3510C/8270D
			096487-008	Benzo(ghi)perylene		0.3	U	SW846 3510C/8270D
			096487-008	Benzo(k)fluoranthene		0.3	U	SW846 3510C/8270D
			096487-008	Bromophenyl phenyl ether, 4-		3	U	SW846 3510C/8270D
			096487-008	Butylbenzyl phthalate		3	U	SW846 3510C/8270D
			096487-008	Caprolactam		3	U	SW846 3510C/8270D
			096487-008	Carbazole		0.3	U	SW846 3510C/8270D
			096487-008	Chloro-3-methylphenol, 4-		3	U	SW846 3510C/8270D
			096487-008	Chlorobenzenamine, 4-		3.3	U	SW846 3510C/8270D
			096487-008	Chloroethoxy)methane, bis(2-		3	U	SW846 3510C/8270D
			096487-008	Chloroethyl)ether, bis(2-		3	U	SW846 3510C/8270D
			096487-008	Chloroisopropyl ether, bis-		3	U	SW846 3510C/8270D
			096487-008	Chloronaphthalene, 2-		0.41	U	SW846 3510C/8270D
			096487-008	Chlorophenol, 2-		3	U	SW846 3510C/8270D
			096487-008	Chlorophenyl phenyl ether, 4-		3	U	SW846 3510C/8270D
			096487-008	Chrysene		0.3	U	SW846 3510C/8270D
			096487-008	Cresol, m,p-		3.7	U	SW846 3510C/8270D
			096487-008	Cresol, o-		3	U	SW846 3510C/8270D
			096487-008	Di-n-butyl phthalate		3	U	SW846 3510C/8270D
			096487-008	Di-n-octyl phthalate		3	U	SW846 3510C/8270D
			096487-008	Dibenz[a,h]anthracene		0.3	U	SW846 3510C/8270D
			096487-008	Dibenzofuran		3	U	SW846 3510C/8270D
			096487-008	Dichlorobenzidine, 3,3'-		3	NU	SW846 3510C/8270D
			096487-008	Dichlorophenol, 2,4-		3	U	SW846 3510C/8270D
			096487-008	Diethylphthalate		3	U	SW846 3510C/8270D

See notes at end of appendix.

Table D-10. Summary of semivolitile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW001	2069A	29-Oct-2014	096487-008	Dimethylphenol, 2,4-		3	U	SW846 3510C/8270D
			096487-008	Dimethylphthalate		3	U	SW846 3510C/8270D
			096487-008	Dinitro-o-cresol		3	U	SW846 3510C/8270D
			096487-008	Dinitrophenol, 2,4-		5	U	SW846 3510C/8270D
			096487-008	Dinitrotoluene, 2,4-		3	U	SW846 3510C/8270D
			096487-008	Dinitrotoluene, 2,6-		3	U	SW846 3510C/8270D
			096487-008	Dioxane, 1,4-		3	U	SW846 3510C/8270D
			096487-008	Diphenyl amine		3	U	SW846 3510C/8270D
			096487-008	Ethylhexyl)phthalate, bis(2-		3	U	SW846 3510C/8270D
			096487-008	Fluoranthene		0.3	U	SW846 3510C/8270D
			096487-008	Fluorene		0.3	U	SW846 3510C/8270D
			096487-008	Hexachlorobenzene		3	U	SW846 3510C/8270D
			096487-008	Hexachlorobutadiene		3	U	SW846 3510C/8270D
			096487-008	Hexachlorocyclopentadiene		3	U	SW846 3510C/8270D
			096487-008	Hexachloroethane		3	U	SW846 3510C/8270D
			096487-008	Indeno(1,2,3-c,d)pyrene		0.3	U	SW846 3510C/8270D
			096487-008	Isophorone		3.5	U	SW846 3510C/8270D
			096487-008	Methylnaphthalene, 2-		0.3	U	SW846 3510C/8270D
			096487-008	Naphthalene		0.3	U	SW846 3510C/8270D
			096487-008	Nitro-benzene		3	U	SW846 3510C/8270D
			096487-008	Nitroaniline, 2-		3	NU	SW846 3510C/8270D
			096487-008	Nitroaniline, 3-		3	U	SW846 3510C/8270D
			096487-008	Nitroaniline, 4-		3	U	SW846 3510C/8270D
			096487-008	Nitrophenol, 2-		3	U	SW846 3510C/8270D
			096487-008	Nitrophenol, 4-		3	U	SW846 3510C/8270D
			096487-008	Nitrosodipropylamine, n-		3	U	SW846 3510C/8270D
			096487-008	Pentachlorophenol		3	U	SW846 3510C/8270D
			096487-008	Phenanthrene		0.3	U	SW846 3510C/8270D
			096487-008	Phenol		3	U	SW846 3510C/8270D
			096487-008	Pyrene		0.3	U	SW846 3510C/8270D
			096487-008	Trichlorobenzene, 1,2,4-		3	U	SW846 3510C/8270D
			096487-008	Trichlorophenol, 2,4,5-		3	U	SW846 3510C/8270D
			096487-008	Trichlorophenol, 2,4,6-		3	U	SW846 3510C/8270D

See notes at end of appendix.

Table D-10. Summary of semivolitile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW006	2069F	29-Oct-2014	096488-008	1,1'-Biphenyl		3.06	U	SW846 3510C/8270D
			096488-008	Acenaphthene		0.306	U	SW846 3510C/8270D
			096488-008	Acenaphthylene		0.306	U	SW846 3510C/8270D
			096488-008	Acetophenone		3.06	U	SW846 3510C/8270D
			096488-008	Anthracene		0.306	U	SW846 3510C/8270D
			096488-008	Atrazine		3.06	U	SW846 3510C/8270D
			096488-008	Benzaldehyde	6.95	3.06	J	SW846 3510C/8270D
			096488-008	Benzo(a)anthracene		0.306	U	SW846 3510C/8270D
			096488-008	Benzo(a)pyrene		0.306	U	SW846 3510C/8270D
			096488-008	Benzo(b)fluoranthene		0.306	U	SW846 3510C/8270D
			096488-008	Benzo(ghi)perylene		0.306	U	SW846 3510C/8270D
			096488-008	Benzo(k)fluoranthene		0.306	U	SW846 3510C/8270D
			096488-008	Bromophenyl phenyl ether, 4-		3.06	U	SW846 3510C/8270D
			096488-008	Butylbenzyl phthalate		3.06	U	SW846 3510C/8270D
			096488-008	Caprolactam		3.06	U	SW846 3510C/8270D
			096488-008	Carbazole		0.306	U	SW846 3510C/8270D
			096488-008	Chloro-3-methylphenol, 4-		3.06	U	SW846 3510C/8270D
			096488-008	Chlorobenzenamine, 4-		3.37	U	SW846 3510C/8270D
			096488-008	Chloroethoxy)methane, bis(2-		3.06	U	SW846 3510C/8270D
			096488-008	Chloroethyl)ether, bis(2-		3.06	U	SW846 3510C/8270D
			096488-008	Chloroisopropyl ether, bis-		3.06	U	SW846 3510C/8270D
			096488-008	Chloronaphthalene, 2-		0.418	U	SW846 3510C/8270D
			096488-008	Chlorophenol, 2-		3.06	U	SW846 3510C/8270D
			096488-008	Chlorophenyl phenyl ether, 4-		3.06	U	SW846 3510C/8270D
			096488-008	Chrysene		0.306	U	SW846 3510C/8270D
			096488-008	Cresol, m,p-		3.78	U	SW846 3510C/8270D
			096488-008	Cresol, o-		3.06	U	SW846 3510C/8270D
			096488-008	Di-n-butyl phthalate		3.06	U	SW846 3510C/8270D
			096488-008	Di-n-octyl phthalate		3.06	U	SW846 3510C/8270D
			096488-008	Dibenz[a,h]anthracene		0.306	U	SW846 3510C/8270D
			096488-008	Dibenzofuran		3.06	U	SW846 3510C/8270D
			096488-008	Dichlorobenzidine, 3,3'-		3.06	NU	SW846 3510C/8270D
			096488-008	Dichlorophenol, 2,4-		3.06	U	SW846 3510C/8270D
			096488-008	Diethylphthalate		3.06	U	SW846 3510C/8270D

See notes at end of appendix.

Table D-10. Summary of semivolitile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW006	2069F	29-Oct-2014	096488-008	Dimethylphenol, 2,4-		3.06	U	SW846 3510C/8270D
			096488-008	Dimethylphthalate		3.06	U	SW846 3510C/8270D
			096488-008	Dinitro-o-cresol		3.06	U	SW846 3510C/8270D
			096488-008	Dinitrophenol, 2,4-		5.1	U	SW846 3510C/8270D
			096488-008	Dinitrotoluene, 2,4-		3.06	U	SW846 3510C/8270D
			096488-008	Dinitrotoluene, 2,6-		3.06	U	SW846 3510C/8270D
			096488-008	Dioxane, 1,4-		3.06	U	SW846 3510C/8270D
			096488-008	Diphenyl amine		3.06	U	SW846 3510C/8270D
			096488-008	Ethylhexyl)phthalate, bis(2-	48.3	3.06		SW846 3510C/8270D
			096488-008	Fluoranthene		0.306	U	SW846 3510C/8270D
			096488-008	Fluorene		0.306	U	SW846 3510C/8270D
			096488-008	Hexachlorobenzene		3.06	U	SW846 3510C/8270D
			096488-008	Hexachlorobutadiene		3.06	U	SW846 3510C/8270D
			096488-008	Hexachlorocyclopentadiene		3.06	U	SW846 3510C/8270D
			096488-008	Hexachloroethane		3.06	U	SW846 3510C/8270D
			096488-008	Indeno(1,2,3-c,d)pyrene		0.306	U	SW846 3510C/8270D
			096488-008	Isophorone		3.57	U	SW846 3510C/8270D
			096488-008	Methylnaphthalene, 2-		0.306	U	SW846 3510C/8270D
			096488-008	Naphthalene		0.306	U	SW846 3510C/8270D
			096488-008	Nitro-benzene		3.06	U	SW846 3510C/8270D
			096488-008	Nitroaniline, 2-		3.06	NU	SW846 3510C/8270D
			096488-008	Nitroaniline, 3-		3.06	U	SW846 3510C/8270D
			096488-008	Nitroaniline, 4-		3.06	U	SW846 3510C/8270D
			096488-008	Nitrophenol, 2-		3.06	U	SW846 3510C/8270D
			096488-008	Nitrophenol, 4-		3.06	U	SW846 3510C/8270D
			096488-008	Nitrosodipropylamine, n-		3.06	U	SW846 3510C/8270D
			096488-008	Pentachlorophenol		3.06	U	SW846 3510C/8270D
			096488-008	Phenanthrene		0.306	U	SW846 3510C/8270D
			096488-008	Phenol		3.06	U	SW846 3510C/8270D
			096488-008	Pyrene		0.306	U	SW846 3510C/8270D
			096488-008	Trichlorobenzene, 1,2,4-		3.06	U	SW846 3510C/8270D
			096488-008	Trichlorophenol, 2,4,5-		3.06	U	SW846 3510C/8270D
			096488-008	Trichlorophenol, 2,4,6-		3.06	U	SW846 3510C/8270D

See notes at end of appendix.

Table D-10. Summary of semivolitile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW007	2069G	29-Oct-2014	096489-008	1,1'-Biphenyl		3.26	U	SW846 3510C/8270D
			096489-008	Acenaphthene		0.326	U	SW846 3510C/8270D
			096489-008	Acenaphthylene		0.326	U	SW846 3510C/8270D
			096489-008	Acetophenone		3.26	U	SW846 3510C/8270D
			096489-008	Anthracene		0.326	U	SW846 3510C/8270D
			096489-008	Atrazine		3.26	U	SW846 3510C/8270D
			096489-008	Benzaldehyde		3.26	U	SW846 3510C/8270D
			096489-008	Benzo(a)anthracene		0.326	U	SW846 3510C/8270D
			096489-008	Benzo(a)pyrene		0.326	U	SW846 3510C/8270D
			096489-008	Benzo(b)fluoranthene		0.326	U	SW846 3510C/8270D
			096489-008	Benzo(ghi)perylene		0.326	U	SW846 3510C/8270D
			096489-008	Benzo(k)fluoranthene		0.326	U	SW846 3510C/8270D
			096489-008	Bromophenyl phenyl ether, 4-		3.26	U	SW846 3510C/8270D
			096489-008	Butylbenzyl phthalate		3.26	U	SW846 3510C/8270D
			096489-008	Caprolactam		3.26	U	SW846 3510C/8270D
			096489-008	Carbazole		0.326	U	SW846 3510C/8270D
			096489-008	Chloro-3-methylphenol, 4-		3.26	U	SW846 3510C/8270D
			096489-008	Chlorobenzenamine, 4-		3.59	U	SW846 3510C/8270D
			096489-008	Chloroethoxy)methane, bis(2-		3.26	U	SW846 3510C/8270D
			096489-008	Chloroethyl)ether, bis(2-		3.26	U	SW846 3510C/8270D
			096489-008	Chloroisopropyl ether, bis-		3.26	U	SW846 3510C/8270D
			096489-008	Chloronaphthalene, 2-		0.446	U	SW846 3510C/8270D
			096489-008	Chlorophenol, 2-		3.26	U	SW846 3510C/8270D
			096489-008	Chlorophenyl phenyl ether, 4-		3.26	U	SW846 3510C/8270D
			096489-008	Chrysene		0.326	U	SW846 3510C/8270D
			096489-008	Cresol, m,p-		4.02	U	SW846 3510C/8270D
			096489-008	Cresol, o-		3.26	U	SW846 3510C/8270D
			096489-008	Di-n-butyl phthalate		3.26	U	SW846 3510C/8270D
			096489-008	Di-n-octyl phthalate		3.26	U	SW846 3510C/8270D
			096489-008	Dibenz[a,h]anthracene		0.326	U	SW846 3510C/8270D
			096489-008	Dibenzofuran		3.26	U	SW846 3510C/8270D
			096489-008	Dichlorobenzidine, 3,3'-		3.26	NU	SW846 3510C/8270D
			096489-008	Dichlorophenol, 2,4-		3.26	U	SW846 3510C/8270D
			096489-008	Diethylphthalate		3.26	U	SW846 3510C/8270D

See notes at end of appendix.

Table D-10. Summary of semivolitile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW007	2069G	29-Oct-2014	096489-008	Dimethylphenol, 2,4-		3.26	U	SW846 3510C/8270D
			096489-008	Dimethylphthalate		3.26	U	SW846 3510C/8270D
			096489-008	Dinitro-o-cresol		3.26	U	SW846 3510C/8270D
			096489-008	Dinitrophenol, 2,4-		5.43	U	SW846 3510C/8270D
			096489-008	Dinitrotoluene, 2,4-		3.26	U	SW846 3510C/8270D
			096489-008	Dinitrotoluene, 2,6-		3.26	U	SW846 3510C/8270D
			096489-008	Dioxane, 1,4-		3.26	U	SW846 3510C/8270D
			096489-008	Diphenyl amine		3.26	U	SW846 3510C/8270D
			096489-008	Ethylhexyl)phthalate, bis(2-		3.26	U	SW846 3510C/8270D
			096489-008	Fluoranthene		0.326	U	SW846 3510C/8270D
			096489-008	Fluorene		0.326	U	SW846 3510C/8270D
			096489-008	Hexachlorobenzene		3.26	U	SW846 3510C/8270D
			096489-008	Hexachlorobutadiene		3.26	U	SW846 3510C/8270D
			096489-008	Hexachlorocyclopentadiene		3.26	U	SW846 3510C/8270D
			096489-008	Hexachloroethane		3.26	U	SW846 3510C/8270D
			096489-008	Indeno(1,2,3-c,d)pyrene		0.326	U	SW846 3510C/8270D
			096489-008	Isophorone		3.8	U	SW846 3510C/8270D
			096489-008	Methylnaphthalene, 2-		0.326	U	SW846 3510C/8270D
			096489-008	Naphthalene		0.326	U	SW846 3510C/8270D
			096489-008	Nitro-benzene		3.26	U	SW846 3510C/8270D
			096489-008	Nitroaniline, 2-		3.26	NU	SW846 3510C/8270D
			096489-008	Nitroaniline, 3-		3.26	U	SW846 3510C/8270D
			096489-008	Nitroaniline, 4-		3.26	U	SW846 3510C/8270D
			096489-008	Nitrophenol, 2-		3.26	U	SW846 3510C/8270D
			096489-008	Nitrophenol, 4-		3.26	U	SW846 3510C/8270D
			096489-008	Nitrosodipropylamine, n-		3.26	U	SW846 3510C/8270D
			096489-008	Pentachlorophenol		3.26	U	SW846 3510C/8270D
			096489-008	Phenanthrene		0.326	U	SW846 3510C/8270D
			096489-008	Phenol		3.26	U	SW846 3510C/8270D
			096489-008	Pyrene		0.326	U	SW846 3510C/8270D
			096489-008	Trichlorobenzene, 1,2,4-		3.26	U	SW846 3510C/8270D
			096489-008	Trichlorophenol, 2,4,5-		3.26	U	SW846 3510C/8270D
			096489-008	Trichlorophenol, 2,4,6-		3.26	U	SW846 3510C/8270D

See notes at end of appendix.

Table D-10. Summary of semivolitile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW008	2069I	29-Oct-2014	096490-008	1,1'-Biphenyl		3.03	U	SW846 3510C/8270D
			096490-008	Acenaphthene		0.303	U	SW846 3510C/8270D
			096490-008	Acenaphthylene		0.303	U	SW846 3510C/8270D
			096490-008	Acetophenone		3.03	U	SW846 3510C/8270D
			096490-008	Anthracene		0.303	U	SW846 3510C/8270D
			096490-008	Atrazine		3.03	U	SW846 3510C/8270D
			096490-008	Benzaldehyde		3.03	U	SW846 3510C/8270D
			096490-008	Benzo(a)anthracene		0.303	U	SW846 3510C/8270D
			096490-008	Benzo(a)pyrene		0.303	U	SW846 3510C/8270D
			096490-008	Benzo(b)fluoranthene		0.303	U	SW846 3510C/8270D
			096490-008	Benzo(ghi)perylene		0.303	U	SW846 3510C/8270D
			096490-008	Benzo(k)fluoranthene		0.303	U	SW846 3510C/8270D
			096490-008	Bromophenyl phenyl ether, 4-		3.03	U	SW846 3510C/8270D
			096490-008	Butylbenzyl phthalate		3.03	U	SW846 3510C/8270D
			096490-008	Caprolactam		3.03	U	SW846 3510C/8270D
			096490-008	Carbazole		0.303	U	SW846 3510C/8270D
			096490-008	Chloro-3-methylphenol, 4-		3.03	U	SW846 3510C/8270D
			096490-008	Chlorobenzenamine, 4-		3.33	U	SW846 3510C/8270D
			096490-008	Chloroethoxy)methane, bis(2-		3.03	U	SW846 3510C/8270D
			096490-008	Chloroethyl)ether, bis(2-		3.03	U	SW846 3510C/8270D
			096490-008	Chloroisopropyl ether, bis-		3.03	U	SW846 3510C/8270D
			096490-008	Chloronaphthalene, 2-		0.414	U	SW846 3510C/8270D
			096490-008	Chlorophenol, 2-		3.03	U	SW846 3510C/8270D
			096490-008	Chlorophenyl phenyl ether, 4-		3.03	U	SW846 3510C/8270D
			096490-008	Chrysene		0.303	U	SW846 3510C/8270D
			096490-008	Cresol, m,p-		3.74	U	SW846 3510C/8270D
			096490-008	Cresol, o-		3.03	U	SW846 3510C/8270D
			096490-008	Di-n-butyl phthalate		3.03	U	SW846 3510C/8270D
			096490-008	Di-n-octyl phthalate		3.03	U	SW846 3510C/8270D
			096490-008	Dibenz[a,h]anthracene		0.303	U	SW846 3510C/8270D
			096490-008	Dibenzofuran		3.03	U	SW846 3510C/8270D
			096490-008	Dichlorobenzidine, 3,3'-		3.03	NU	SW846 3510C/8270D
			096490-008	Dichlorophenol, 2,4-		3.03	U	SW846 3510C/8270D
			096490-008	Diethylphthalate		3.03	U	SW846 3510C/8270D

See notes at end of appendix.

Table D-10. Summary of semivolitile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW008	2069I	29-Oct-2014	096490-008	Dimethylphenol, 2,4-		3.03	U	SW846 3510C/8270D
			096490-008	Dimethylphthalate		3.03	U	SW846 3510C/8270D
			096490-008	Dinitro-o-cresol		3.03	U	SW846 3510C/8270D
			096490-008	Dinitrophenol, 2,4-		5.05	U	SW846 3510C/8270D
			096490-008	Dinitrotoluene, 2,4-		3.03	U	SW846 3510C/8270D
			096490-008	Dinitrotoluene, 2,6-		3.03	U	SW846 3510C/8270D
			096490-008	Dioxane, 1,4-		3.03	U	SW846 3510C/8270D
			096490-008	Diphenyl amine		3.03	U	SW846 3510C/8270D
			096490-008	Ethylhexyl)phthalate, bis(2-		3.03	U	SW846 3510C/8270D
			096490-008	Fluoranthene		0.303	U	SW846 3510C/8270D
			096490-008	Fluorene		0.303	U	SW846 3510C/8270D
			096490-008	Hexachlorobenzene		3.03	U	SW846 3510C/8270D
			096490-008	Hexachlorobutadiene		3.03	U	SW846 3510C/8270D
			096490-008	Hexachlorocyclopentadiene		3.03	U	SW846 3510C/8270D
			096490-008	Hexachloroethane		3.03	U	SW846 3510C/8270D
			096490-008	Indeno(1,2,3-c,d)pyrene		0.303	U	SW846 3510C/8270D
			096490-008	Isophorone		3.54	U	SW846 3510C/8270D
			096490-008	Methylnaphthalene, 2-		0.303	U	SW846 3510C/8270D
			096490-008	Naphthalene		0.303	U	SW846 3510C/8270D
			096490-008	Nitro-benzene		3.03	U	SW846 3510C/8270D
			096490-008	Nitroaniline, 2-		3.03	NU	SW846 3510C/8270D
			096490-008	Nitroaniline, 3-		3.03	U	SW846 3510C/8270D
			096490-008	Nitroaniline, 4-		3.03	U	SW846 3510C/8270D
			096490-008	Nitrophenol, 2-		3.03	U	SW846 3510C/8270D
			096490-008	Nitrophenol, 4-		3.03	U	SW846 3510C/8270D
			096490-008	Nitrosodipropylamine, n-		3.03	U	SW846 3510C/8270D
			096490-008	Pentachlorophenol		3.03	U	SW846 3510C/8270D
			096490-008	Phenanthrene		0.303	U	SW846 3510C/8270D
			096490-008	Phenol		3.03	U	SW846 3510C/8270D
			096490-008	Pyrene		0.303	U	SW846 3510C/8270D
			096490-008	Trichlorobenzene, 1,2,4-		3.03	U	SW846 3510C/8270D
			096490-008	Trichlorophenol, 2,4,5-		3.03	U	SW846 3510C/8270D
			096490-008	Trichlorophenol, 2,4,6-		3.03	U	SW846 3510C/8270D

See notes at end of appendix.

Table D-10. Summary of semivolitile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW011	2069K	29-Oct-2014	096491-008	1,1'-Biphenyl		3.03	U	SW846 3510C/8270D
			096491-008	Acenaphthene		0.303	U	SW846 3510C/8270D
			096491-008	Acenaphthylene		0.303	U	SW846 3510C/8270D
			096491-008	Acetophenone		3.03	U	SW846 3510C/8270D
			096491-008	Anthracene		0.303	U	SW846 3510C/8270D
			096491-008	Atrazine		3.03	U	SW846 3510C/8270D
			096491-008	Benzaldehyde		3.03	U	SW846 3510C/8270D
			096491-008	Benzo(a)anthracene		0.303	U	SW846 3510C/8270D
			096491-008	Benzo(a)pyrene		0.303	U	SW846 3510C/8270D
			096491-008	Benzo(b)fluoranthene		0.303	U	SW846 3510C/8270D
			096491-008	Benzo(ghi)perylene		0.303	U	SW846 3510C/8270D
			096491-008	Benzo(k)fluoranthene		0.303	U	SW846 3510C/8270D
			096491-008	Bromophenyl phenyl ether, 4-		3.03	U	SW846 3510C/8270D
			096491-008	Butylbenzyl phthalate		3.03	U	SW846 3510C/8270D
			096491-008	Caprolactam		3.03	U	SW846 3510C/8270D
			096491-008	Carbazole		0.303	U	SW846 3510C/8270D
			096491-008	Chloro-3-methylphenol, 4-		3.03	U	SW846 3510C/8270D
			096491-008	Chlorobenzenamine, 4-		3.33	U	SW846 3510C/8270D
			096491-008	Chloroethoxy)methane, bis(2-		3.03	U	SW846 3510C/8270D
			096491-008	Chloroethyl)ether, bis(2-		3.03	U	SW846 3510C/8270D
			096491-008	Chloroisopropyl ether, bis-		3.03	U	SW846 3510C/8270D
			096491-008	Chloronaphthalene, 2-		0.414	U	SW846 3510C/8270D
			096491-008	Chlorophenol, 2-		3.03	U	SW846 3510C/8270D
			096491-008	Chlorophenyl phenyl ether, 4-		3.03	U	SW846 3510C/8270D
			096491-008	Chrysene		0.303	U	SW846 3510C/8270D
			096491-008	Cresol, m,p-		3.74	U	SW846 3510C/8270D
			096491-008	Cresol, o-		3.03	U	SW846 3510C/8270D
			096491-008	Di-n-butyl phthalate		3.03	U	SW846 3510C/8270D
			096491-008	Di-n-octyl phthalate		3.03	U	SW846 3510C/8270D
			096491-008	Dibenz[a,h]anthracene		0.303	U	SW846 3510C/8270D
			096491-008	Dibenzofuran		3.03	U	SW846 3510C/8270D
			096491-008	Dichlorobenzidine, 3,3'-		3.03	NU	SW846 3510C/8270D
			096491-008	Dichlorophenol, 2,4-		3.03	U	SW846 3510C/8270D
			096491-008	Diethylphthalate		3.03	U	SW846 3510C/8270D

See notes at end of appendix.

Table D-10. Summary of semivolitile organic compound results for permitted sanitary outfalls, October 2014 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW011	2069K	29-Oct-2014	096491-008	Dimethylphenol, 2,4-		3.03	U	SW846 3510C/8270D
			096491-008	Dimethylphthalate		3.03	U	SW846 3510C/8270D
			096491-008	Dinitro-o-cresol		3.03	U	SW846 3510C/8270D
			096491-008	Dinitrophenol, 2,4-		5.05	U	SW846 3510C/8270D
			096491-008	Dinitrotoluene, 2,4-		3.03	U	SW846 3510C/8270D
			096491-008	Dinitrotoluene, 2,6-		3.03	U	SW846 3510C/8270D
			096491-008	Dioxane, 1,4-		3.03	U	SW846 3510C/8270D
			096491-008	Diphenyl amine		3.03	U	SW846 3510C/8270D
			096491-008	Ethylhexyl)phthalate, bis(2-		3.03	U	SW846 3510C/8270D
			096491-008	Fluoranthene		0.303	U	SW846 3510C/8270D
			096491-008	Fluorene		0.303	U	SW846 3510C/8270D
			096491-008	Hexachlorobenzene		3.03	U	SW846 3510C/8270D
			096491-008	Hexachlorobutadiene		3.03	U	SW846 3510C/8270D
			096491-008	Hexachlorocyclopentadiene		3.03	U	SW846 3510C/8270D
			096491-008	Hexachloroethane		3.03	U	SW846 3510C/8270D
			096491-008	Indeno(1,2,3-c,d)pyrene		0.303	U	SW846 3510C/8270D
			096491-008	Isophorone		3.54	U	SW846 3510C/8270D
			096491-008	Methylnaphthalene, 2-		0.303	U	SW846 3510C/8270D
			096491-008	Naphthalene		0.303	U	SW846 3510C/8270D
			096491-008	Nitro-benzene		3.03	U	SW846 3510C/8270D
			096491-008	Nitroaniline, 2-		3.03	NU	SW846 3510C/8270D
			096491-008	Nitroaniline, 3-		3.03	U	SW846 3510C/8270D
			096491-008	Nitroaniline, 4-		3.03	U	SW846 3510C/8270D
			096491-008	Nitrophenol, 2-		3.03	U	SW846 3510C/8270D
			096491-008	Nitrophenol, 4-		3.03	U	SW846 3510C/8270D
			096491-008	Nitrosodipropylamine, n-		3.03	U	SW846 3510C/8270D
			096491-008	Pentachlorophenol		3.03	U	SW846 3510C/8270D
			096491-008	Phenanthrene		0.303	U	SW846 3510C/8270D
			096491-008	Phenol		3.03	U	SW846 3510C/8270D
			096491-008	Pyrene		0.303	U	SW846 3510C/8270D
			096491-008	Trichlorobenzene, 1,2,4-		3.03	U	SW846 3510C/8270D
			096491-008	Trichlorophenol, 2,4,5-		3.03	U	SW846 3510C/8270D
			096491-008	Trichlorophenol, 2,4,6-		3.03	U	SW846 3510C/8270D

See notes at end of appendix.

NOTES

Units
µg/L = micrograms per liter
mg/L = milligrams per liter
pCi/L = picocuries per liter

Station
CINT = Center for Integrated Nanotechnologies
WW = wastewater

Analyte
max = maximum
min = minimum
std dev = standard deviation

MDA or MDL
MDA = 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

Laboratory Data Qualifier
B = analyte detected in the blank
h = analytical holding time was exceeded
J = estimated value, the analyte concentration fell above the effective MDL and below the effective practical quantitation limit
N = a spike was outside limits
U = analyte is absent or below the method detection limit
X = data rejected due to peak not meeting identification criteria
* = a replicate was outside limits

Regulatory Limit
ABCWUA = Albuquerque Bernalillo County Water Utility Authority
SUWCO = Sewer Use and Waste Control Ordinance

Analytical Method
EPA (U.S. Environmental Protection Agency). 1980. *Prescribed Procedures for the Measurement of Radioactivity in Drinking Water.* EPA 600-4-80-032. Method 900.0, Method 901.1, Method 906.0. Washington, D.C.: EPA.
———. 1986 (and updates). *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed. Washington, D.C.: EPA.
———. 1993. *Determination of Ammonia Nitrogen by Semi-Automated Colorimetry,* EPA 350.1. Cincinnati, OH: EPA Environmental Monitoring Systems Laboratory Office of Research and Development.
———. 1993. *Determination of Inorganic Anions by Ion Chromatography,* EPA 300.0. Cincinnati, OH: EPA Environmental Monitoring Systems Laboratory Office of Research and Development.



Appendix E
2014 Stormwater Sampling Results

Table E-1. Environmental surveillance stormwater sampling results, calendar year 2014.....E-2
Table E-2. Multi-Sector General Permit stormwater sampling results, calendar year 2014 ..... E-16
NOTES..... E-37

Appendix E presents the stormwater sampling results for calendar year 2014.

Table E-1. Environmental surveillance stormwater sampling results, calendar year 2014

Sampling Point	Sample Date	Analyte	Units	Result	Error	MDL/Lc	PQL/MDA	Sample Preparation
SWSP-07	17-Jul-14	Alpha, gross	pCi/L	12.9	5.61	1.2	3.89	Unfiltered
		Aluminum	mg/L	5.01		0.015	0.05	Filtered
		Antimony	mg/L	<0.001		0.001	0.003	Filtered
		Arsenic	mg/L	<0.0017		0.0017	0.005	Filtered
		Barium	mg/L	0.114		0.0006	0.002	Filtered
		Beryllium	mg/L	0.000203		0.0002	0.0005	Filtered
		Beta, gross	pCi/L	22.8	4.13	0.911	1.89	Unfiltered
		Cadmium	mg/L	<0.00011		0.00011	0.001	Filtered
		Chromium	mg/L	0.00487		0.002	0.01	Filtered
		Cobalt	mg/L	0.00201		0.0001	0.001	Filtered
		Copper	mg/L	0.00793		0.00035	0.001	Filtered
		Lead	mg/L	0.00281		0.0005	0.002	Filtered
		Manganese	mg/L	0.051		0.001	0.005	Filtered
		Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered
		Nickel	mg/L	0.00497		0.0005	0.002	Filtered
		Selenium	mg/L	<0.0015		0.0015	0.005	Filtered
		Silver	mg/L	<0.0002		0.0002	0.001	Filtered
		Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Uranium-233/234	pCi/L	0.217	0.0734	0.0401	0.0917	Unfiltered
		Uranium-238	pCi/L	0.319	0.0848	0.0397	0.0909	Unfiltered
		Vanadium	mg/L	0.00922		0.001	0.005	Filtered
		Zinc	mg/L	0.0138		0.0035	0.01	Filtered
	4-Aug-14	Alpha, gross	pCi/L	2.97	1.96	1.39	2.96	Unfiltered
		Aluminum	mg/L	1.82		0.015	0.05	Filtered
		Antimony	mg/L	<0.001		0.001	0.003	Filtered
		Arsenic	mg/L	<0.0017		0.0017	0.005	Filtered
		Barium	mg/L	0.0896		0.0006	0.002	Filtered
		Beryllium	mg/L	<0.0002		0.0002	0.0005	Filtered
		Beta, gross	pCi/L	15.2	2.9	0.748	1.56	Unfiltered
		Cadmium	mg/L	0.000153		0.00011	0.001	Filtered
		Chromium	mg/L	0.00224		0.002	0.01	Filtered
		Cobalt	mg/L	0.0013		0.0001	0.001	Filtered
		Copper	mg/L	0.00569		0.00035	0.001	Filtered

See notes at end of appendix.

Table E-1. Environmental surveillance stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Units	Result	Error	MDL/Lc	PQL/MDA	Sample Preparation
SWSP-07	4-Aug-14	Lead	mg/L	0.00129		0.0005	0.002	Filtered
		Manganese	mg/L	0.0209		0.001	0.005	Filtered
		Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered
		Nickel	mg/L	0.00363		0.0005	0.002	Filtered
		Selenium	mg/L	<0.0015		0.0015	0.005	Filtered
		Silver	mg/L	<0.0002		0.0002	0.001	Filtered
		Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Vanadium	mg/L	0.00694		0.001	0.005	Filtered
		Zinc	mg/L	0.00657		0.0035	0.01	Filtered
	23-Sep-14	Alpha, gross	pCi/L	33.1	8.14	2.47	5.6	Unfiltered
		Aluminum	mg/L	0.783		0.015	0.05	Filtered
		Antimony	mg/L	<0.001		0.001	0.003	Filtered
		Arsenic	mg/L	<0.0017		0.0017	0.005	Filtered
		Barium	mg/L	0.0712		0.0006	0.002	Filtered
		Beryllium	mg/L	<0.0002		0.0002	0.0005	Filtered
		Beta, gross	pCi/L	38.8	8.73	4.05	8.32	Unfiltered
		Cadmium	mg/L	<0.00011		0.00011	0.001	Filtered
		Chromium	mg/L	0.00356		0.002	0.01	Filtered
		Cobalt	mg/L	0.000929		0.0001	0.001	Filtered
		Copper	mg/L	0.00528		0.00035	0.001	Filtered
		Lead	mg/L	0.000632		0.0005	0.002	Filtered
		Manganese	mg/L	0.00978		0.001	0.005	Filtered
		Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered
		Nickel	mg/L	0.00257		0.0005	0.002	Filtered
		Selenium	mg/L	<0.0015		0.0015	0.005	Filtered
		Silver	mg/L	<0.0002		0.0002	0.001	Filtered
		Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Uranium-233/234	pCi/L	0.81	0.204	0.0853	0.194	Unfiltered
		Uranium-238	pCi/L	1.43	0.294	0.0407	0.105	Unfiltered
		Vanadium	mg/L	0.00649		0.001	0.005	Filtered
		Zinc	mg/L	0.00756		0.0035	0.01	Filtered

See notes at end of appendix.

Table E-1. Environmental surveillance stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Units	Result	Error	MDL/Lc	PQL/MDA	Sample Preparation
SWSP-07	13-Oct-14	Alpha, gross	pCi/L	7.57	2.18	0.987	2.15	Unfiltered
		Aluminum	mg/L	0.435		0.015	0.05	Filtered
		Antimony	mg/L	<0.001		0.001	0.003	Filtered
		Arsenic	mg/L	0.00221		0.0017	0.005	Filtered
		Barium	mg/L	0.11		0.0006	0.002	Filtered
		Beryllium	mg/L	<0.0002		0.0002	0.0005	Filtered
		Beta, gross	pCi/L	25.1	4.43	0.685	1.43	Unfiltered
		Cadmium	mg/L	0.000112		0.00011	0.001	Filtered
		Chromium	mg/L	<0.002		0.002	0.01	Filtered
		Cobalt	mg/L	0.00158		0.0001	0.001	Filtered
		Copper	mg/L	0.00714		0.00035	0.001	Filtered
		Lead	mg/L	<0.0005		0.0005	0.002	Filtered
		Manganese	mg/L	0.0191		0.001	0.005	Filtered
		Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered
		Nickel	mg/L	0.00332		0.0005	0.002	Filtered
		Selenium	mg/L	<0.0015		0.0015	0.005	Filtered
		Silver	mg/L	<0.0002		0.0002	0.001	Filtered
		Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Uranium-233/234	pCi/L	0.753	0.196	0.107	0.24	Unfiltered
		Uranium-238	pCi/L	0.8	0.203	0.051	0.128	Unfiltered
		Vanadium	mg/L	0.00462		0.001	0.005	Filtered
		Zinc	mg/L	0.00918		0.0035	0.01	Filtered
SWSP-09	2-Jul-14	Alpha, gross	pCi/L	199	41.6	8.46	19.2	Unfiltered
		Aluminum	mg/L	0.0656		0.015	0.05	Filtered
		Antimony	mg/L	0.00346		0.001	0.003	Filtered
		Arsenic	mg/L	<0.0017		0.0017	0.005	Filtered
		Barium	mg/L	0.0626		0.0006	0.002	Filtered
		Beryllium	mg/L	<0.0002		0.0002	0.0005	Filtered
		Beta, gross	pCi/L	156	31.5	9.26	19.2	Unfiltered
		Cadmium	mg/L	<0.00011		0.00011	0.001	Filtered
		Cesium-137	pCi/L	5.35	2.63	1.43	2.98	Unfiltered
		Chromium	mg/L	<0.002		0.002	0.01	Filtered
		Cobalt	mg/L	0.00119		0.0001	0.001	Filtered
		Copper	mg/L	0.00711		0.00035	0.001	Filtered
		Lead	mg/L	<0.0005		0.0005	0.002	Filtered

See notes at end of appendix.

Table E-1. Environmental surveillance stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Units	Result	Error	MDL/Lc	PQL/MDA	Sample Preparation
SWSP-09	2-Jul-14	Manganese	mg/L	0.0358		0.001	0.005	Filtered
		Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered
		Nickel	mg/L	0.00295		0.0005	0.002	Filtered
		Selenium	mg/L	<0.0015		0.0015	0.005	Filtered
		Silver	mg/L	<0.0002		0.0002	0.001	Filtered
		Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Vanadium	mg/L	0.0043		0.001	0.005	Filtered
		Zinc	mg/L	0.00393		0.0035	0.01	Filtered
	15-Jul-14	Uranium-233/234	pCi/L	24.6	4.84	1.63	3.65	Unfiltered
		Uranium-238	pCi/L	36.3	6.35	1.43	3.26	Unfiltered
	4-Aug-14	Alpha, gross	pCi/L	13.1	8.62	5.79	12.8	Unfiltered
		Aluminum	mg/L	6.21		0.015	0.05	Filtered
		Antimony	mg/L	0.0036		0.001	0.003	Filtered
		Arsenic	mg/L	<0.0017		0.0017	0.005	Filtered
		Barium	mg/L	0.0822		0.0006	0.002	Filtered
		Beryllium	mg/L	0.000253		0.0002	0.0005	Filtered
		Beta, gross	pCi/L	38.4	13.1	8.5	17.6	Unfiltered
		Cadmium	mg/L	<0.00011		0.00011	0.001	Filtered
		Chromium	mg/L	0.00837		0.002	0.01	Filtered
		Cobalt	mg/L	0.00194		0.0001	0.001	Filtered
		Copper	mg/L	0.00536		0.00035	0.001	Filtered
		Lead	mg/L	0.00421		0.0005	0.002	Filtered
		Manganese	mg/L	0.0803		0.001	0.005	Filtered
		Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered
		Nickel	mg/L	0.00506		0.0005	0.002	Filtered
		Selenium	mg/L	<0.0015		0.0015	0.005	Filtered
		Silver	mg/L	<0.0002		0.0002	0.001	Filtered
		Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Vanadium	mg/L	0.0165		0.001	0.005	Filtered
		Zinc	mg/L	0.0193		0.0035	0.01	Filtered
	27-Aug-14	Uranium-233/234	pCi/L	0.302	0.118	0.0869	0.199	Unfiltered
		Uranium-238	pCi/L	0.531	0.156	0.0452	0.115	Unfiltered

See notes at end of appendix.

Table E-1. Environmental surveillance stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Units	Result	Error	MDL/Lc	PQL/MDA	Sample Preparation
SWSP-11	8-Jul-14	Aluminum	mg/L	2.1		0.015	0.05	Filtered
		Antimony	mg/L	0.00418		0.001	0.003	Filtered
		Arsenic	mg/L	0.00342		0.0017	0.005	Filtered
		Barium	mg/L	0.0916		0.0006	0.002	Filtered
		Beryllium	mg/L	<0.0002		0.0002	0.0005	Filtered
		Cadmium	mg/L	0.000407		0.00011	0.001	Filtered
		Chromium	mg/L	0.00306		0.002	0.01	Filtered
		Cobalt	mg/L	0.00175		0.0001	0.001	Filtered
		Copper	mg/L	0.0173		0.00035	0.001	Filtered
		Lead	mg/L	0.0017		0.0005	0.002	Filtered
		Manganese	mg/L	0.0939		0.001	0.005	Filtered
		Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered
		Nickel	mg/L	0.00808		0.0005	0.002	Filtered
		Selenium	mg/L	<0.0015		0.0015	0.005	Filtered
		Silver	mg/L	0.000624		0.0002	0.001	Filtered
		Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Vanadium	mg/L	0.0151		0.001	0.005	Filtered
		Zinc	mg/L	0.0283		0.0035	0.01	Filtered
	4-Aug-14	Aluminum	mg/L	0.997		0.015	0.05	Filtered
		Antimony	mg/L	<0.001		0.001	0.003	Filtered
		Arsenic	mg/L	<0.0017		0.0017	0.005	Filtered
		Barium	mg/L	0.0765		0.0006	0.002	Filtered
		Beryllium	mg/L	<0.0002		0.0002	0.0005	Filtered
		Cadmium	mg/L	0.000341		0.00011	0.001	Filtered
		Chromium	mg/L	0.00218		0.002	0.01	Filtered
		Cobalt	mg/L	0.00126		0.0001	0.001	Filtered
		Copper	mg/L	0.0193		0.00035	0.001	Filtered
		Lead	mg/L	0.000704		0.0005	0.002	Filtered
		Manganese	mg/L	0.0322		0.001	0.005	Filtered
		Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered
		Nickel	mg/L	0.00595		0.0005	0.002	Filtered
		Selenium	mg/L	<0.0015		0.0015	0.005	Filtered
		Silver	mg/L	0.000481		0.0002	0.001	Filtered

See notes at end of appendix.

Table E-1. Environmental surveillance stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Units	Result	Error	MDL/Lc	PQL/MDA	Sample Preparation
SWSP-11	4-Aug-14	Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Vanadium	mg/L	0.00587		0.001	0.005	Filtered
		Zinc	mg/L	0.00463		0.0035	0.01	Filtered
SWSP-20	4-Aug-14	Aluminum	mg/L	0.419		0.015	0.05	Filtered
		Antimony	mg/L	<0.001		0.001	0.003	Filtered
		Arsenic	mg/L	<0.0017		0.0017	0.005	Filtered
		Barium	mg/L	0.0563		0.0006	0.002	Filtered
		Beryllium	mg/L	<0.0002		0.0002	0.0005	Filtered
		Cadmium	mg/L	<0.00011		0.00011	0.001	Filtered
		Chromium	mg/L	<0.002		0.002	0.01	Filtered
		Cobalt	mg/L	0.000221		0.0001	0.001	Filtered
		Copper	mg/L	0.00317		0.00035	0.001	Filtered
		Lead	mg/L	<0.0005		0.0005	0.002	Filtered
		Manganese	mg/L	0.00565		0.001	0.005	Filtered
		Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered
		Nickel	mg/L	0.000961		0.0005	0.002	Filtered
		Selenium	mg/L	<0.0015		0.0015	0.005	Filtered
		Silver	mg/L	<0.0002		0.0002	0.001	Filtered
		Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Vanadium	mg/L	0.00483		0.001	0.005	Filtered
		Zinc	mg/L	<0.0035		0.0035	0.01	Filtered
	22-Aug-14	Alpha, gross	pCi/L	21.7	4.53	1.13	2.45	Unfiltered
		Beta, gross	pCi/L	29.6	5.27	1.25	2.57	Unfiltered
		Uranium-233/234	pCi/L	0.819	0.212	0.0927	0.212	Unfiltered
		Uranium-238	pCi/L	2.55	0.446	0.0482	0.123	Unfiltered
	29-Sep-14	Alpha, gross	pCi/L	6.57	1.49	0.434	0.95	Unfiltered
		Aluminum	mg/L	0.234		0.015	0.05	Filtered
		Antimony	mg/L	<0.001		0.001	0.003	Filtered
		Arsenic	mg/L	0.0022		0.0017	0.005	Filtered
		Barium	mg/L	0.0755		0.0006	0.002	Filtered
		Beryllium	mg/L	<0.0002		0.0002	0.0005	Filtered
		Beta, gross	pCi/L	13.2	2.36	0.507	1.04	Unfiltered
		Cadmium	mg/L	<0.00011		0.00011	0.001	Filtered
		Chromium	mg/L	<0.002		0.002	0.01	Filtered
		Cobalt	mg/L	0.000775		0.0001	0.001	Filtered

See notes at end of appendix.

Table E-1. Environmental surveillance stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Units	Result	Error	MDL/Lc	PQL/MDA	Sample Preparation
SWSP-20	29-Sep-14	Copper	mg/L	0.00982		0.00035	0.001	Filtered
		Lead	mg/L	<0.0005		0.0005	0.002	Filtered
		Manganese	mg/L	0.00519		0.001	0.005	Filtered
		Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered
		Nickel	mg/L	0.00171		0.0005	0.002	Filtered
		Selenium	mg/L	<0.0015		0.0015	0.005	Filtered
		Silver	mg/L	<0.0002		0.0002	0.001	Filtered
		Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Uranium-233/234	pCi/L	0.301	0.117	0.106	0.237	Unfiltered
		Uranium-238	pCi/L	0.864	0.21	0.0503	0.126	Unfiltered
		Vanadium	mg/L	0.0053		0.001	0.005	Filtered
		Zinc	mg/L	0.00757		0.0035	0.01	Filtered
SWSP-21	25-Aug-14	Alpha, gross	pCi/L	21.5	6.31	2.87	6.12	Unfiltered
		Beta, gross	pCi/L	48.7	9.04	2.46	5.05	Unfiltered
		Uranium-233/234	pCi/L	1.91	0.358	0.0907	0.207	Unfiltered
		Uranium-238	pCi/L	2.41	0.426	0.0472	0.12	Unfiltered
	29-Sep-14	Aluminum	mg/L	0.43		0.015	0.05	Filtered
		Antimony	mg/L	<0.001		0.001	0.003	Filtered
		Arsenic	mg/L	0.00222		0.0017	0.005	Filtered
		Barium	mg/L	0.0544		0.0006	0.002	Filtered
		Beryllium	mg/L	<0.0002		0.0002	0.0005	Filtered
		Cadmium	mg/L	<0.00011		0.00011	0.001	Filtered
		Chromium	mg/L	<0.002		0.002	0.01	Filtered
		Cobalt	mg/L	0.000748		0.0001	0.001	Filtered
		Copper	mg/L	0.00769		0.00035	0.001	Filtered
		Lead	mg/L	<0.0005		0.0005	0.002	Filtered
		Manganese	mg/L	0.00581		0.001	0.005	Filtered
		Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered
		Nickel	mg/L	0.00143		0.0005	0.002	Filtered
		Selenium	mg/L	<0.0015		0.0015	0.005	Filtered
		Silver	mg/L	<0.0002		0.0002	0.001	Filtered
		Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Vanadium	mg/L	0.00577		0.001	0.005	Filtered
		Zinc	mg/L	0.00583		0.0035	0.01	Filtered

See notes at end of appendix.

Table E-1. Environmental surveillance stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Units	Result	Error	MDL/Lc	PQL/MDA	Sample Preparation
SWSP-24	8-Jul-14	Aluminum	mg/L	<0.015		0.015	0.05	Filtered
		Antimony	mg/L	0.00278		0.001	0.003	Filtered
		Arsenic	mg/L	0.00666		0.0017	0.005	Filtered
		Barium	mg/L	0.0408		0.0006	0.002	Filtered
		Beryllium	mg/L	<0.0002		0.0002	0.0005	Filtered
		Cadmium	mg/L	<0.00011		0.00011	0.001	Filtered
		Chromium	mg/L	<0.002		0.002	0.01	Filtered
		Cobalt	mg/L	0.000349		0.0001	0.001	Filtered
		Copper	mg/L	0.0088		0.00035	0.001	Filtered
		Lead	mg/L	<0.0005		0.0005	0.002	Filtered
		Manganese	mg/L	0.0337		0.001	0.005	Filtered
		Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered
		Nickel	mg/L	0.00192		0.0005	0.002	Filtered
		Selenium	mg/L	<0.0015		0.0015	0.005	Filtered
		Silver	mg/L	<0.0002		0.0002	0.001	Filtered
		Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Vanadium	mg/L	0.00568		0.001	0.005	Filtered
		Zinc	mg/L	0.0338		0.0035	0.01	Filtered
	4-Aug-14	Aluminum	mg/L	0.0309		0.015	0.05	Filtered
		Antimony	mg/L	0.00205		0.001	0.003	Filtered
		Arsenic	mg/L	<0.0017		0.0017	0.005	Filtered
		Barium	mg/L	0.0193		0.0006	0.002	Filtered
		Beryllium	mg/L	<0.0002		0.0002	0.0005	Filtered
		Cadmium	mg/L	<0.00011		0.00011	0.001	Filtered
		Chromium	mg/L	<0.002		0.002	0.01	Filtered
		Cobalt	mg/L	<0.0001		0.0001	0.001	Filtered
		Copper	mg/L	0.00368		0.00035	0.001	Filtered
		Lead	mg/L	<0.0005		0.0005	0.002	Filtered
		Manganese	mg/L	0.00106		0.001	0.005	Filtered
		Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered
		Nickel	mg/L	0.000547		0.0005	0.002	Filtered
		Selenium	mg/L	<0.0015		0.0015	0.005	Filtered
		Silver	mg/L	<0.0002		0.0002	0.001	Filtered

See notes at end of appendix.

Table E-1. Environmental surveillance stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Units	Result	Error	MDL/Lc	PQL/MDA	Sample Preparation
SWSP-24	4-Aug-14	Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Vanadium	mg/L	<0.001		0.001	0.005	Filtered
		Zinc	mg/L	<0.0035		0.0035	0.01	Filtered
	18-Sep-14	Aluminum	mg/L	<0.015		0.015	0.05	Filtered
		Antimony	mg/L	0.00212		0.001	0.003	Filtered
		Arsenic	mg/L	0.00334		0.0017	0.005	Filtered
		Barium	mg/L	0.116		0.0006	0.002	Filtered
		Beryllium	mg/L	<0.0002		0.0002	0.0005	Filtered
		Cadmium	mg/L	<0.00011		0.00011	0.001	Filtered
		Chromium	mg/L	<0.002		0.002	0.01	Filtered
		Cobalt	mg/L	0.00011		0.0001	0.001	Filtered
		Copper	mg/L	0.00454		0.00035	0.001	Filtered
		Lead	mg/L	<0.0005		0.0005	0.002	Filtered
		Manganese	mg/L	<0.001		0.001	0.005	Filtered
		Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered
		Nickel	mg/L	0.000994		0.0005	0.002	Filtered
		Selenium	mg/L	<0.0015		0.0015	0.005	Filtered
		Silver	mg/L	<0.0002		0.0002	0.001	Filtered
		Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Vanadium	mg/L	0.0076		0.001	0.005	Filtered
		Zinc	mg/L	0.00843		0.0035	0.01	Filtered
	9-Oct-14	Aluminum	mg/L	0.0241		0.015	0.05	Filtered
		Antimony	mg/L	0.0283		0.001	0.003	Filtered
		Arsenic	mg/L	<0.0017		0.0017	0.005	Filtered
		Barium	mg/L	0.0262		0.0006	0.002	Filtered
		Beryllium	mg/L	<0.0002		0.0002	0.0005	Filtered
		Cadmium	mg/L	0.000383		0.00011	0.001	Filtered
		Chromium	mg/L	<0.002		0.002	0.01	Filtered
		Cobalt	mg/L	0.000204		0.0001	0.001	Filtered
		Copper	mg/L	0.00959		0.00035	0.001	Filtered
		Lead	mg/L	<0.0005		0.0005	0.002	Filtered
		Manganese	mg/L	0.0128		0.001	0.005	Filtered
		Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered
		Nickel	mg/L	0.0019		0.0005	0.002	Filtered
		Selenium	mg/L	<0.0015		0.0015	0.005	Filtered

See notes at end of appendix.

Table E-1. Environmental surveillance stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Units	Result	Error	MDL/Lc	PQL/MDA	Sample Preparation
SWSP-24	9-Oct-14	Silver	mg/L	<0.0002		0.0002	0.001	Filtered
		Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Vanadium	mg/L	0.00421		0.001	0.005	Filtered
		Zinc	mg/L	0.0154		0.0035	0.01	Filtered
SWSP-25	8-Jul-14	Aluminum	mg/L	0.0239		0.015	0.05	Filtered
		Antimony	mg/L	<0.001		0.001	0.003	Filtered
		Arsenic	mg/L	0.00314		0.0017	0.005	Filtered
		Barium	mg/L	0.0724		0.0006	0.002	Filtered
		Beryllium	mg/L	<0.0002		0.0002	0.0005	Filtered
		Cadmium	mg/L	<0.00011		0.00011	0.001	Filtered
		Chromium	mg/L	<0.002		0.002	0.01	Filtered
		Cobalt	mg/L	0.000867		0.0001	0.001	Filtered
		Copper	mg/L	0.00743		0.00035	0.001	Filtered
		Lead	mg/L	<0.0005		0.0005	0.002	Filtered
		Manganese	mg/L	0.047		0.001	0.005	Filtered
		Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered
		Nickel	mg/L	0.00194		0.0005	0.002	Filtered
		Selenium	mg/L	<0.0015		0.0015	0.005	Filtered
		Silver	mg/L	<0.0002		0.0002	0.001	Filtered
		Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Vanadium	mg/L	0.00635		0.001	0.005	Filtered
		Zinc	mg/L	0.0297		0.0035	0.01	Filtered
	14-Aug-14	Aluminum	mg/L	<0.015		0.015	0.05	Filtered
		Antimony	mg/L	0.00143		0.001	0.003	Filtered
		Arsenic	mg/L	0.0033		0.0017	0.005	Filtered
		Barium	mg/L	0.0447		0.0006	0.002	Filtered
		Beryllium	mg/L	<0.0002		0.0002	0.0005	Filtered
		Cadmium	mg/L	0.000299		0.00011	0.001	Filtered
		Chromium	mg/L	<0.002		0.002	0.01	Filtered
		Cobalt	mg/L	<0.0001		0.0001	0.001	Filtered
		Copper	mg/L	0.00592		0.00035	0.001	Filtered
		Lead	mg/L	<0.0005		0.0005	0.002	Filtered
		Manganese	mg/L	<0.001		0.001	0.005	Filtered
		Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered
		Nickel	mg/L	0.00101		0.0005	0.002	Filtered

See notes at end of appendix.

Table E-1. Environmental surveillance stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Units	Result	Error	MDL/Lc	PQL/MDA	Sample Preparation
SWSP-25	14-Aug-14	Selenium	mg/L	<0.0015		0.0015	0.005	Filtered
		Silver	mg/L	<0.0002		0.0002	0.001	Filtered
		Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Vanadium	mg/L	0.00209		0.001	0.005	Filtered
		Zinc	mg/L	0.00402		0.0035	0.01	Filtered
	18-Sep-14	Aluminum	mg/L	0.0928		0.015	0.05	Filtered
		Antimony	mg/L	0.00327		0.001	0.003	Filtered
		Arsenic	mg/L	0.00294		0.0017	0.005	Filtered
		Barium	mg/L	0.0562		0.0006	0.002	Filtered
		Beryllium	mg/L	<0.0002		0.0002	0.0005	Filtered
		Cadmium	mg/L	<0.00011		0.00011	0.001	Filtered
		Chromium	mg/L	<0.002		0.002	0.01	Filtered
		Cobalt	mg/L	0.000141		0.0001	0.001	Filtered
		Copper	mg/L	0.0138		0.00035	0.001	Filtered
		Lead	mg/L	<0.0005		0.0005	0.002	Filtered
		Manganese	mg/L	0.00215		0.001	0.005	Filtered
		Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered
		Nickel	mg/L	0.00115		0.0005	0.002	Filtered
		Selenium	mg/L	<0.0015		0.0015	0.005	Filtered
		Silver	mg/L	<0.0002		0.0002	0.001	Filtered
		Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Vanadium	mg/L	0.00448		0.001	0.005	Filtered
		Zinc	mg/L	0.017		0.0035	0.01	Filtered
	13-Oct-14	Aluminum	mg/L	0.0248		0.015	0.05	Filtered
		Antimony	mg/L	0.00186		0.001	0.003	Filtered
		Arsenic	mg/L	0.00283		0.0017	0.005	Filtered
		Barium	mg/L	0.0491		0.0006	0.002	Filtered
		Beryllium	mg/L	<0.0002		0.0002	0.0005	Filtered
		Cadmium	mg/L	<0.00011		0.00011	0.001	Filtered
		Chromium	mg/L	<0.002		0.002	0.01	Filtered
		Cobalt	mg/L	<0.0001		0.0001	0.001	Filtered
		Copper	mg/L	0.0116		0.00035	0.001	Filtered
		Lead	mg/L	<0.0005		0.0005	0.002	Filtered
		Manganese	mg/L	0.00118		0.001	0.005	Filtered
		Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered

See notes at end of appendix.

Table E-1. Environmental surveillance stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Units	Result	Error	MDL/Lc	PQL/MDA	Sample Preparation
SWSP-25	13-Oct-14	Nickel	mg/L	0.000874		0.0005	0.002	Filtered
		Selenium	mg/L	<0.0015		0.0015	0.005	Filtered
		Silver	mg/L	<0.0002		0.0002	0.001	Filtered
		Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Vanadium	mg/L	0.00289		0.001	0.005	Filtered
		Zinc	mg/L	0.0357		0.0035	0.01	Filtered
SWSP-26	8-Jul-14	Aluminum	mg/L	0.268		0.015	0.05	Filtered
		Antimony	mg/L	0.0468		0.001	0.003	Filtered
		Arsenic	mg/L	0.0295		0.0017	0.005	Filtered
		Barium	mg/L	0.132		0.0006	0.002	Filtered
		Beryllium	mg/L	<0.0002		0.0002	0.0005	Filtered
		Cadmium	mg/L	0.00163		0.00011	0.001	Filtered
		Chromium	mg/L	<0.002		0.002	0.01	Filtered
		Cobalt	mg/L	0.00294		0.0001	0.001	Filtered
		Copper	mg/L	0.0127		0.00035	0.001	Filtered
		Lead	mg/L	0.00071		0.0005	0.002	Filtered
		Manganese	mg/L	0.263		0.001	0.005	Filtered
		Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered
		Nickel	mg/L	0.00465		0.0005	0.002	Filtered
		Selenium	mg/L	<0.0015		0.0015	0.005	Filtered
		Silver	mg/L	<0.0002		0.0002	0.001	Filtered
		Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Vanadium	mg/L	0.00735		0.001	0.005	Filtered
		Zinc	mg/L	0.0941		0.0035	0.01	Filtered
SWSP-28	8-Jul-14	Aluminum	mg/L	0.592		0.015	0.05	Filtered
		Antimony	mg/L	<0.001		0.001	0.003	Filtered
		Arsenic	mg/L	0.00236		0.0017	0.005	Filtered
		Barium	mg/L	0.103		0.0006	0.002	Filtered
		Beryllium	mg/L	<0.0002		0.0002	0.0005	Filtered
		Cadmium	mg/L	<0.00011		0.00011	0.001	Filtered
		Chromium	mg/L	<0.002		0.002	0.01	Filtered
		Cobalt	mg/L	0.000945		0.0001	0.001	Filtered
		Copper	mg/L	0.00327		0.00035	0.001	Filtered
		Lead	mg/L	0.000732		0.0005	0.002	Filtered
		Manganese	mg/L	0.0612		0.001	0.005	Filtered

See notes at end of appendix.

Table E-1. Environmental surveillance stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Units	Result	Error	MDL/Lc	PQL/MDA	Sample Preparation
SWSP-28	8-Jul-14	Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered
		Nickel	mg/L	0.00221		0.0005	0.002	Filtered
		Selenium	mg/L	<0.0015		0.0015	0.005	Filtered
		Silver	mg/L	<0.0002		0.0002	0.001	Filtered
		Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Vanadium	mg/L	0.00973		0.001	0.005	Filtered
		Zinc	mg/L	0.0222		0.0035	0.01	Filtered
SWSP-30	17-Jul-14	Aluminum	mg/L	<0.015		0.015	0.05	Filtered
		Antimony	mg/L	<0.001		0.001	0.003	Filtered
		Arsenic	mg/L	<0.0017		0.0017	0.005	Filtered
		Barium	mg/L	0.0423		0.0006	0.002	Filtered
		Beryllium	mg/L	<0.0002		0.0002	0.0005	Filtered
		Cadmium	mg/L	<0.00011		0.00011	0.001	Filtered
		Chromium	mg/L	<0.002		0.002	0.01	Filtered
		Cobalt	mg/L	<0.0001		0.0001	0.001	Filtered
		Copper	mg/L	0.00324		0.00035	0.001	Filtered
		Lead	mg/L	<0.0005		0.0005	0.002	Filtered
		Manganese	mg/L	0.0015		0.001	0.005	Filtered
		Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered
		Nickel	mg/L	0.00826		0.0005	0.002	Filtered
		Selenium	mg/L	<0.0015		0.0015	0.005	Filtered
		Silver	mg/L	<0.0002		0.0002	0.001	Filtered
		Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Vanadium	mg/L	0.00167		0.001	0.005	Filtered
		Zinc	mg/L	0.00913		0.0035	0.01	Filtered
	4-Aug-14	Aluminum	mg/L	0.0154		0.015	0.05	Filtered
		Antimony	mg/L	0.00242		0.001	0.003	Filtered
		Arsenic	mg/L	<0.0017		0.0017	0.005	Filtered
		Barium	mg/L	0.0342		0.0006	0.002	Filtered
		Beryllium	mg/L	<0.0002		0.0002	0.0005	Filtered
		Cadmium	mg/L	<0.00011		0.00011	0.001	Filtered
		Chromium	mg/L	<0.002		0.002	0.01	Filtered
		Cobalt	mg/L	<0.0001		0.0001	0.001	Filtered
		Copper	mg/L	0.00401		0.00035	0.001	Filtered
		Lead	mg/L	<0.0005		0.0005	0.002	Filtered

See notes at end of appendix.

Table E-1. Environmental surveillance stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Units	Result	Error	MDL/Lc	PQL/MDA	Sample Preparation
SWSP-30	4-Aug-14	Manganese	mg/L	0.00235		0.001	0.005	Filtered
		Mercury	mg/L	<0.000067		0.000067	0.0002	Filtered
		Nickel	mg/L	0.00218		0.0005	0.002	Filtered
		Selenium	mg/L	<0.0015		0.0015	0.005	Filtered
		Silver	mg/L	<0.0002		0.0002	0.001	Filtered
		Thallium	mg/L	<0.00045		0.00045	0.002	Filtered
		Vanadium	mg/L	0.00122		0.001	0.005	Filtered
		Zinc	mg/L	0.00815		0.0035	0.01	Filtered

See notes at end of appendix.

Table E-2. Multi-Sector General Permit stormwater sampling results, calendar year 2014

Sampling Point	Sample Date	Analyte	Result	MDL	PQL
SWSP-02	15-Jul-14	Aluminum, total recoverable	1.18	0.015	0.05
		Ammonia	0.554	0.017	0.05
		Arsenic, total recoverable	<0.0017	0.0017	0.005
		Cadmium, total recoverable	<0.00011	0.00011	0.001
		Chemical oxygen demand	271	6.67	20
		Copper, total recoverable	0.00496	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005
		Iron, total recoverable	0.951	0.033	0.1
		Lead, total recoverable	0.00233	0.0005	0.002
		Magnesium, total recoverable	2.29	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Nitrate, total recoverable	0.313	0.033	0.1
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Solids, total suspended	18.5	0.76	3.33
		Zinc, total recoverable	0.0293	0.0035	0.01
	4-Aug-14	Aluminum, total recoverable	1.62	0.015	0.05
		Ammonia	0.211	0.017	0.05
		Arsenic, total recoverable	0.00315	0.0017	0.005
		Cadmium, total recoverable	<0.00011	0.00011	0.001
		Chemical oxygen demand	43	6.67	20
		Copper, total recoverable	0.00432	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005
		Iron, total recoverable	1.3	0.033	0.1
		Lead, total recoverable	0.00348	0.0005	0.002
		Magnesium, total recoverable	3.85	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Nitrate, total recoverable	0.453	0.033	0.1
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Solids, total suspended	32.4	1.14	5
		Zinc, total recoverable	0.0382	0.0035	0.01

See notes at end of appendix.

Table E-2. Multi-Sector General Permit stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL
SWSP-02	29-Sep-14	Aluminum, total recoverable	0.643	0.015	0.05
		Ammonia	0.228	0.017	0.05
		Arsenic, total recoverable	0.00497	0.0017	0.005
		Cadmium, total recoverable	0.000124	0.00011	0.001
		Chemical oxygen demand	88.6	6.67	20
		Copper, total recoverable	0.00729	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005
		Iron, total recoverable	0.485	0.033	0.1
		Lead, total recoverable	0.0023	0.0005	0.002
		Magnesium, total recoverable	3.75	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Solids, total suspended	19.4	1.14	5
		Zinc, total recoverable	0.0349	0.0035	0.01
	21-Oct-14	Aluminum, total recoverable	0.573	0.015	0.05
		Ammonia	0.46	0.017	0.05
		Arsenic, total recoverable	0.00217	0.0017	0.005
		Cadmium, total recoverable	<0.00011	0.00011	0.001
		Chemical oxygen demand	60.8	6.67	20
		Copper, total recoverable	0.00691	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005
		Iron, total recoverable	0.528	0.033	0.1
		Lead, total recoverable	0.00106	0.0005	0.002
		Magnesium, total recoverable	3.4	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Solids, total suspended	9.8	0.57	2.5
		Zinc, total recoverable	0.0197	0.0035	0.01
SWSP-05	8-Jul-14	Aluminum, total recoverable	8.83	0.015	0.05
		Aluminum, total recoverable	9.75	0.015	0.05
		Ammonia	1.48	0.017	0.05
		Arsenic, total recoverable	0.00323	0.0017	0.005

See notes at end of appendix.

Table E-2. Multi-Sector General Permit stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL
SWSP-05	8-Jul-14	Arsenic, total recoverable	0.00395	0.0017	0.005
		Cadmium, total recoverable	0.000398	0.00011	0.001
		Cadmium, total recoverable	0.000473	0.00011	0.001
		Chemical oxygen demand	264	6.67	20
		Copper, total recoverable	0.0288	0.00035	0.001
		Copper, total recoverable	0.0315	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005
		Iron, total recoverable	6.55	0.033	0.1
		Iron, total recoverable	7.43	0.033	0.1
		Lead, total recoverable	0.0187	0.0005	0.002
		Lead, total recoverable	0.0206	0.0005	0.002
		Magnesium, total recoverable	4.17	0.01	0.03
		Magnesium, total recoverable	4.56	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	0.00026	0.0002	0.001
		Silver, total recoverable	<0.0002	0.0002	0.001
		Solids, total suspended	220	5.18	22.7
		Zinc, total recoverable	0.245	0.0035	0.01
		Zinc, total recoverable	0.246	0.0035	0.01
	4-Aug-14	Aluminum, total recoverable	4.7	0.015	0.05
		Ammonia	0.424	0.017	0.05
		Arsenic, total recoverable	<0.0017	0.0017	0.005
		Cadmium, total recoverable	0.000161	0.00011	0.001
		Chemical oxygen demand	35.1	6.67	20
		Copper, total recoverable	0.00757	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005
		Iron, total recoverable	3.14	0.033	0.1
		Lead, total recoverable	0.00517	0.0005	0.002
		Magnesium, total recoverable	2.16	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005

See notes at end of appendix.

Table E-2. Multi-Sector General Permit stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL
SWSP-05	4-Aug-14	Silver, total recoverable	<0.0002	0.0002	0.001
		Solids, total suspended	106	2.28	10
		Zinc, total recoverable	0.0448	0.0035	0.01
	18-Sep-14	Aluminum, total recoverable	1.86	0.015	0.05
		Ammonia	0.273	0.017	0.05
		Arsenic, total recoverable	0.0029	0.0017	0.005
		Cadmium, total recoverable	0.0002	0.00011	0.001
		Chemical oxygen demand	141	6.67	20
		Copper, total recoverable	0.0143	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005
		Iron, total recoverable	1.29	0.033	0.1
		Lead, total recoverable	0.0036	0.0005	0.002
		Magnesium, total recoverable	2.48	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Solids, total suspended	52	2.28	10
		Zinc, total recoverable	0.0721	0.0035	0.01
	21-Oct-14	Aluminum, total recoverable	2.5	0.015	0.05
		Ammonia	0.49	0.017	0.05
		Arsenic, total recoverable	<0.0017	0.0017	0.005
		Cadmium, total recoverable	0.000203	0.00011	0.001
		Chemical oxygen demand	83.8	6.67	20
		Copper, total recoverable	0.0116	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005
		Iron, total recoverable	1.85	0.033	0.1
		Lead, total recoverable	0.00427	0.0005	0.002
		Magnesium, total recoverable	1.6	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Solids, total suspended	41.8	1.43	6.25
		Zinc, total recoverable	0.0775	0.0035	0.01

See notes at end of appendix.

Table E-2. Multi-Sector General Permit stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL
SWSP-06	2-Jul-14	Aluminum, total recoverable	221	0.15	0.5
		Ammonia	29	0.425	1.25
		Arsenic, total recoverable	0.0409	0.0017	0.005
		Cadmium, total recoverable	0.00475	0.00011	0.001
		Chemical oxygen demand	10600	333	1000
		Copper, total recoverable	0.129	0.00035	0.001
		Iron, total recoverable	199	6.6	20
		Lead, total recoverable	0.181	0.0005	0.002
		Magnesium, total recoverable	83.2	0.1	0.3
		Mercury, total recoverable	0.00106	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	0.000864	0.0002	0.001
		Zinc, total recoverable	0.602	0.0035	0.01
	17-Jul-14	Cyanide, total	<0.00167	0.00167	0.005
	4-Aug-14	Aluminum, total recoverable	12	0.015	0.05
		Ammonia	0.177	0.017	0.05
		Arsenic, total recoverable	0.00289	0.0017	0.005
		Cadmium, total recoverable	0.000244	0.00011	0.001
		Chemical oxygen demand	58.8	6.67	20
		Copper, total recoverable	0.0198	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005
		Iron, total recoverable	8.27	0.033	0.1
		Lead, total recoverable	0.0591	0.0005	0.002
		Magnesium, total recoverable	6.16	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.0516	0.0035	0.01
SWSP-07	17-Jul-14	Aluminum, total recoverable	5.01	0.015	0.05
		Arsenic, total recoverable	<0.0017	0.0017	0.005
		Cadmium, total recoverable	<0.00011	0.00011	0.001
		Copper, total recoverable	0.00793	0.00035	0.001
		Iron, total recoverable	3.68	0.033	0.1
		Lead, total recoverable	0.00281	0.0005	0.002

See notes at end of appendix.

Table E-2. Multi-Sector General Permit stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL
SWSP-07	17-Jul-14	Magnesium, total recoverable	2.95	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.0138	0.0035	0.01
	4-Aug-14	Aluminum, total recoverable	1.82	0.015	0.05
		Arsenic, total recoverable	<0.0017	0.0017	0.005
		Cadmium, total recoverable	0.000153	0.00011	0.001
		Copper, total recoverable	0.00569	0.00035	0.001
		Iron, total recoverable	1.49	0.033	0.1
		Lead, total recoverable	0.00129	0.0005	0.002
		Magnesium, total recoverable	2.22	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.00657	0.0035	0.01
	23-Sep-14	Aluminum, total recoverable	0.783	0.015	0.05
		Arsenic, total recoverable	<0.0017	0.0017	0.005
		Cadmium, total recoverable	<0.00011	0.00011	0.001
		Copper, total recoverable	0.00528	0.00035	0.001
		Iron, total recoverable	0.633	0.033	0.1
		Lead, total recoverable	0.000632	0.0005	0.002
		Magnesium, total recoverable	1.7	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.00756	0.0035	0.01
	13-Oct-14	Aluminum, total recoverable	0.435	0.015	0.05
		Arsenic, total recoverable	0.00221	0.0017	0.005
		Cadmium, total recoverable	0.000112	0.00011	0.001
		Copper, total recoverable	0.00714	0.00035	0.001
		Iron, total recoverable	0.295	0.033	0.1
		Lead, total recoverable	<0.0005	0.0005	0.002
		Magnesium, total recoverable	2.17	0.01	0.03

See notes at end of appendix.

Table E-2. Multi-Sector General Permit stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL
SWSP-07	13-Oct-14	Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.00918	0.0035	0.01
SWSP-09	2-Jul-14	Aluminum, total recoverable	0.0656	0.015	0.05
		Arsenic, total recoverable	<0.0017	0.0017	0.005
		Cadmium, total recoverable	<0.00011	0.00011	0.001
		Copper, total recoverable	0.00711	0.00035	0.001
		Iron, total recoverable	0.143	0.033	0.1
		Lead, total recoverable	<0.0005	0.0005	0.002
		Magnesium, total recoverable	2.21	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.00393	0.0035	0.01
	4-Aug-14	Aluminum, total recoverable	6.21	0.015	0.05
		Arsenic, total recoverable	<0.0017	0.0017	0.005
		Cadmium, total recoverable	<0.00011	0.00011	0.001
		Copper, total recoverable	0.00536	0.00035	0.001
		Iron, total recoverable	4.66	0.033	0.1
		Lead, total recoverable	0.00421	0.0005	0.002
		Magnesium, total recoverable	2.37	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.0193	0.0035	0.01
SWSP-10	2-Jul-14	Aluminum, total recoverable	36.7	0.015	0.05
		Ammonia	0.923	0.017	0.05
		Arsenic, total recoverable	0.0134	0.0017	0.005
		Cadmium, total recoverable	0.000891	0.00011	0.001
		Chemical oxygen demand	237	6.67	20
		Copper, total recoverable	0.0264	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005
		Iron, total recoverable	32.8	0.33	1

See notes at end of appendix.

Table E-2. Multi-Sector General Permit stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL
SWSP-10	2-Jul-14	Lead, total recoverable	0.0303	0.0005	0.002
		Magnesium, total recoverable	13.7	0.01	0.03
		Mercury, total recoverable	0.00062	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.12	0.0035	0.01
	4-Aug-14	Aluminum, total recoverable	32.1	0.015	0.05
		Ammonia	0.44	0.017	0.05
		Arsenic, total recoverable	0.00567	0.0017	0.005
		Cadmium, total recoverable	0.000558	0.00011	0.001
		Chemical oxygen demand	85.1	6.67	20
		Copper, total recoverable	0.0276	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005
		Iron, total recoverable	23.8	0.033	0.1
		Lead, total recoverable	0.107	0.0005	0.002
		Magnesium, total recoverable	11.1	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.0942	0.0035	0.01
	23-Sep-14	Aluminum, total recoverable	29.2	0.015	0.05
		Ammonia	0.328	0.017	0.05
		Arsenic, total recoverable	0.00836	0.0017	0.005
		Cadmium, total recoverable	0.000609	0.00011	0.001
		Chemical oxygen demand	94	6.67	20
		Copper, total recoverable	0.0253	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005
		Iron, total recoverable	22.7	0.033	0.1
		Lead, total recoverable	0.0401	0.0005	0.002
		Magnesium, total recoverable	8.65	0.01	0.03
		Mercury, total recoverable	0.000077	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.106	0.0035	0.01

See notes at end of appendix.

Table E-2. Multi-Sector General Permit stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL
SWSP-11	8-Jul-14	Aluminum, total recoverable	2.1	0.015	0.05
		Aluminum, total recoverable	6.39	0.015	0.05
		Ammonia	0.987	0.017	0.05
		Arsenic, total recoverable	0.00342	0.0017	0.005
		Arsenic, total recoverable	0.00572	0.0017	0.005
		Cadmium, total recoverable	0.000407	0.00011	0.001
		Cadmium, total recoverable	0.00101	0.00011	0.001
		Chemical oxygen demand	144	6.67	20
		Copper, total recoverable	0.0173	0.00035	0.001
		Copper, total recoverable	0.0267	0.00035	0.001
		Cyanide, total	0.122	0.00167	0.005
		Iron, total recoverable	1.64	0.033	0.1
		Iron, total recoverable	4.7	0.033	0.1
		Lead, total recoverable	0.0017	0.0005	0.002
		Lead, total recoverable	0.00494	0.0005	0.002
		Magnesium, total recoverable	3.29	0.01	0.03
		Magnesium, total recoverable	4.55	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	0.000624	0.0002	0.001
		Silver, total recoverable	0.00199	0.0002	0.001
		Solids, total suspended	213	6.33	27.8
		Zinc, total recoverable	0.0283	0.0035	0.01
		Zinc, total recoverable	0.0405	0.0035	0.01
	4-Aug-14	Aluminum, total recoverable	0.997	0.015	0.05
		Aluminum, total recoverable	13.8	0.015	0.05
		Ammonia	0.557	0.017	0.05
		Arsenic, total recoverable	<0.0017	0.0017	0.005
		Cadmium, total recoverable	0.000341	0.00011	0.001
		Cadmium, total recoverable	0.00218	0.00011	0.001
		Chemical oxygen demand	45.6	6.67	20
		Copper, total recoverable	0.0193	0.00035	0.001
		Copper, total recoverable	0.0394	0.00035	0.001
		Cyanide, total	0.0182	0.00167	0.005

See notes at end of appendix.

Table E-2. Multi-Sector General Permit stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL
SWSP-11	4-Aug-14	Iron, total recoverable	0.888	0.033	0.1
		Iron, total recoverable	9.4	0.033	0.1
		Lead, total recoverable	0.000704	0.0005	0.002
		Lead, total recoverable	0.00949	0.0005	0.002
		Magnesium, total recoverable	2.35	0.01	0.03
		Magnesium, total recoverable	6.02	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	0.000481	0.0002	0.001
		Silver, total recoverable	0.00419	0.0002	0.001
		Solids, total suspended	502	9.5	41.7
		Zinc, total recoverable	0.00463	0.0035	0.01
		Zinc, total recoverable	0.0543	0.0035	0.01
SWSP-13	14-Jul-14	Aluminum, total recoverable	20.7	0.015	0.05
		Ammonia	0.98	0.017	0.05
		Arsenic, total recoverable	0.00624	0.0017	0.005
		Cadmium, total recoverable	0.000569	0.00011	0.001
		Chemical oxygen demand	146	6.67	20
		Copper, total recoverable	0.025	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005
		Iron, total recoverable	13.1	0.033	0.1
		Lead, total recoverable	0.103	0.0025	0.01
		Magnesium, total recoverable	4.98	0.01	0.03
		Mercury, total recoverable	0.000163	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.0794	0.0035	0.01
	25-Aug-14	Chemical oxygen demand	67.6	6.67	20
	27-Aug-14	Aluminum, total recoverable	28.9	0.015	0.05
		Ammonia	0.626	0.017	0.05
		Arsenic, total recoverable	0.00634	0.0017	0.005
		Cadmium, total recoverable	0.00506	0.00011	0.001
		Copper, total recoverable	0.046	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005

See notes at end of appendix.

Table E-2. Multi-Sector General Permit stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL
SWSP-13	27-Aug-14	Iron, total recoverable	20	0.033	0.1
		Lead, total recoverable	0.102	0.0005	0.002
		Magnesium, total recoverable	7.38	0.01	0.03
		Mercury, total recoverable	0.000342	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	0.000381	0.0002	0.001
		Zinc, total recoverable	0.103	0.0035	0.01
SWSP-14	17-Jul-14	Aluminum, total recoverable	95.2	0.15	0.5
		Arsenic, total recoverable	0.0216	0.0017	0.005
		Cadmium, total recoverable	0.00267	0.00011	0.001
		Copper, total recoverable	0.0683	0.00035	0.001
		Iron, total recoverable	71.8	0.33	1
		Lead, total recoverable	0.335	0.005	0.02
		Magnesium, total recoverable	28.3	0.01	0.03
		Mercury, total recoverable	0.000257	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	0.000533	0.0002	0.001
		Zinc, total recoverable	0.305	0.0035	0.01
	4-Aug-14	Chemical oxygen demand	367	6.67	20
SWSP-16	8-Jul-14	Aluminum, total recoverable	55.2	0.15	0.5
		Ammonia	0.761	0.017	0.05
		Arsenic, total recoverable	0.0128	0.0017	0.005
		Cadmium, total recoverable	0.000977	0.00011	0.001
		Chemical oxygen demand	210	6.67	20
		Copper, total recoverable	0.0299	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005
		Iron, total recoverable	40.8	0.033	0.1
		Lead, total recoverable	0.0426	0.0005	0.002
		Magnesium, total recoverable	18	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.179	0.0035	0.01

See notes at end of appendix.

Table E-2. Multi-Sector General Permit stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL
SWSP-17	8-Jul-14	Aluminum, total recoverable	133	0.75	2.5
		Arsenic, total recoverable	0.0208	0.0017	0.005
		Cadmium, total recoverable	0.00338	0.00011	0.001
		Copper, total recoverable	0.0951	0.00035	0.001
		Cyanide, total	0.00234	0.00167	0.005
		Iron, total recoverable	93.4	1.65	5
		Lead, total recoverable	0.117	0.0005	0.002
		Magnesium, total recoverable	33.1	0.01	0.03
		Mercury, total recoverable	0.000113	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	0.000963	0.0002	0.001
		Zinc, total recoverable	0.357	0.0035	0.01
	4-Aug-14	Aluminum, total recoverable	5.93	0.015	0.05
		Ammonia	0.266	0.017	0.05
		Arsenic, total recoverable	<0.0017	0.0017	0.005
		Cadmium, total recoverable	0.000143	0.00011	0.001
		Chemical oxygen demand	690	6.67	20
		Copper, total recoverable	0.00497	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005
		Iron, total recoverable	3.53	0.033	0.1
		Lead, total recoverable	0.00525	0.0005	0.002
		Magnesium, total recoverable	2.04	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.0267	0.0035	0.01
SWSP-19	8-Jul-14	Aluminum, total recoverable	3.15	0.015	0.05
		Ammonia	1.48	0.017	0.05
		Arsenic, total recoverable	0.00633	0.0017	0.005
		Cadmium, total recoverable	0.000209	0.00011	0.001
		Chemical oxygen demand	263	6.67	20
		Copper, total recoverable	0.00643	0.00035	0.001
		Cyanide, total	0.00253	0.00167	0.005
		Iron, total recoverable	2.22	0.033	0.1

See notes at end of appendix.

Table E-2. Multi-Sector General Permit stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL
SWSP-19	8-Jul-14	Lead, total recoverable	0.00202	0.0005	0.002
		Magnesium, total recoverable	8.16	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.0439	0.0035	0.01
	25-Aug-14	Aluminum, total recoverable	2.57	0.015	0.05
		Ammonia	0.156	0.017	0.05
		Arsenic, total recoverable	0.00347	0.0017	0.005
		Cadmium, total recoverable	<0.00011	0.00011	0.001
		Chemical oxygen demand	64.4	6.67	20
		Copper, total recoverable	0.00564	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005
		Iron, total recoverable	1.89	0.033	0.1
		Lead, total recoverable	0.0015	0.0005	0.002
		Magnesium, total recoverable	8.69	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.0109	0.0035	0.01
SWSP-20	4-Aug-14	Aluminum, total recoverable	0.419	0.015	0.05
		Arsenic, total recoverable	<0.0017	0.0017	0.005
		Cadmium, total recoverable	<0.00011	0.00011	0.001
		Copper, total recoverable	0.00317	0.00035	0.001
		Iron, total recoverable	0.367	0.033	0.1
		Lead, total recoverable	<0.0005	0.0005	0.002
		Magnesium, total recoverable	1.2	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	<0.0035	0.0035	0.01
	29-Sep-14	Aluminum, total recoverable	0.234	0.015	0.05
		Arsenic, total recoverable	0.0022	0.0017	0.005
		Cadmium, total recoverable	<0.00011	0.00011	0.001

See notes at end of appendix.

Table E-2. Multi-Sector General Permit stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL
SWSP-20	29-Sep-14	Copper, total recoverable	0.00982	0.00035	0.001
		Iron, total recoverable	0.172	0.033	0.1
		Lead, total recoverable	<0.0005	0.0005	0.002
		Magnesium, total recoverable	1.61	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.00757	0.0035	0.01
SWSP-21	29-Sep-14	Aluminum, total recoverable	0.43	0.015	0.05
		Arsenic, total recoverable	0.00222	0.0017	0.005
		Cadmium, total recoverable	<0.00011	0.00011	0.001
		Copper, total recoverable	0.00769	0.00035	0.001
		Iron, total recoverable	0.274	0.033	0.1
		Lead, total recoverable	<0.0005	0.0005	0.002
		Magnesium, total recoverable	1.49	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.00583	0.0035	0.01
SWSP-22	25-Aug-14	Chemical oxygen demand	190	6.67	20
SWSP-24	8-Jul-14	Aluminum, total recoverable	<0.015	0.015	0.05
		Arsenic, total recoverable	0.00666	0.0017	0.005
		Cadmium, total recoverable	<0.00011	0.00011	0.001
		Copper, total recoverable	0.0088	0.00035	0.001
		Iron, total recoverable	0.0847	0.033	0.1
		Lead, total recoverable	<0.0005	0.0005	0.002
		Magnesium, total recoverable	1.01	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.0338	0.0035	0.01
	4-Aug-14	Aluminum, total recoverable	0.0309	0.015	0.05
		Arsenic, total recoverable	<0.0017	0.0017	0.005
		Cadmium, total recoverable	<0.00011	0.00011	0.001

See notes at end of appendix.

Table E-2. Multi-Sector General Permit stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL
SWSP-24	4-Aug-14	Copper, total recoverable	0.00368	0.00035	0.001
		Iron, total recoverable	<0.033	0.033	0.1
		Lead, total recoverable	<0.0005	0.0005	0.002
		Magnesium, total recoverable	0.417	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	<0.0035	0.0035	0.01
	18-Sep-14	Aluminum, total recoverable	<0.015	0.015	0.05
		Arsenic, total recoverable	0.00334	0.0017	0.005
		Cadmium, total recoverable	<0.00011	0.00011	0.001
		Copper, total recoverable	0.00454	0.00035	0.001
		Iron, total recoverable	0.0557	0.033	0.1
		Lead, total recoverable	<0.0005	0.0005	0.002
		Magnesium, total recoverable	5.49	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.00843	0.0035	0.01
	9-Oct-14	Aluminum, total recoverable	0.0241	0.015	0.05
		Arsenic, total recoverable	<0.0017	0.0017	0.005
		Cadmium, total recoverable	0.000383	0.00011	0.001
		Copper, total recoverable	0.00959	0.00035	0.001
		Iron, total recoverable	0.0513	0.033	0.1
		Lead, total recoverable	<0.0005	0.0005	0.002
		Magnesium, total recoverable	1.16	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.0154	0.0035	0.01
SWSP-25	8-Jul-14	Aluminum, total recoverable	0.0239	0.015	0.05
		Arsenic, total recoverable	0.00314	0.0017	0.005
		Cadmium, total recoverable	<0.00011	0.00011	0.001
		Copper, total recoverable	0.00743	0.00035	0.001

See notes at end of appendix.

Table E-2. Multi-Sector General Permit stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL
SWSP-25	8-Jul-14	Iron, total recoverable	0.0785	0.033	0.1
		Lead, total recoverable	<0.0005	0.0005	0.002
		Magnesium, total recoverable	2.46	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.0297	0.0035	0.01
	14-Aug-14	Aluminum, total recoverable	<0.015	0.015	0.05
		Arsenic, total recoverable	0.0033	0.0017	0.005
		Cadmium, total recoverable	0.000299	0.00011	0.001
		Copper, total recoverable	0.00592	0.00035	0.001
		Iron, total recoverable	0.0423	0.033	0.1
		Lead, total recoverable	<0.0005	0.0005	0.002
		Magnesium, total recoverable	1.23	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.00402	0.0035	0.01
	18-Sep-14	Aluminum, total recoverable	0.0928	0.015	0.05
		Arsenic, total recoverable	0.00294	0.0017	0.005
		Cadmium, total recoverable	<0.00011	0.00011	0.001
		Copper, total recoverable	0.0138	0.00035	0.001
		Iron, total recoverable	0.0837	0.033	0.1
		Lead, total recoverable	<0.0005	0.0005	0.002
		Magnesium, total recoverable	2.77	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.017	0.0035	0.01
	13-Oct-14	Aluminum, total recoverable	0.0248	0.015	0.05
		Arsenic, total recoverable	0.00283	0.0017	0.005
		Cadmium, total recoverable	<0.00011	0.00011	0.001
		Copper, total recoverable	0.0116	0.00035	0.001
		Iron, total recoverable	<0.033	0.033	0.1

See notes at end of appendix.

Table E-2. Multi-Sector General Permit stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL
SWSP-25	13-Oct-14	Lead, total recoverable	<0.0005	0.0005	0.002
		Magnesium, total recoverable	2.57	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.0357	0.0035	0.01
SWSP-26	8-Jul-14	Aluminum, total recoverable	0.268	0.015	0.05
		Arsenic, total recoverable	0.0295	0.0017	0.005
		Cadmium, total recoverable	0.00163	0.00011	0.001
		Copper, total recoverable	0.0127	0.00035	0.001
		Iron, total recoverable	0.307	0.033	0.1
		Lead, total recoverable	0.00071	0.0005	0.002
		Magnesium, total recoverable	4.24	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.0941	0.0035	0.01
SWSP-28	8-Jul-14	Aluminum, total recoverable	0.592	0.015	0.05
		Arsenic, total recoverable	0.00236	0.0017	0.005
		Cadmium, total recoverable	<0.00011	0.00011	0.001
		Copper, total recoverable	0.00327	0.00035	0.001
		Iron, total recoverable	0.522	0.033	0.1
		Lead, total recoverable	0.000732	0.0005	0.002
		Magnesium, total recoverable	2.66	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.0222	0.0035	0.01
SWSP-30	17-Jul-14	Aluminum, total recoverable	<0.015	0.015	0.05
		Arsenic, total recoverable	<0.0017	0.0017	0.005
		Cadmium, total recoverable	<0.00011	0.00011	0.001
		Copper, total recoverable	0.00324	0.00035	0.001
		Iron, total recoverable	0.0855	0.033	0.1
		Lead, total recoverable	<0.0005	0.0005	0.002

See notes at end of appendix.

Table E-2. Multi-Sector General Permit stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL
SWSP-30	17-Jul-14	Magnesium, total recoverable	1.72	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.00913	0.0035	0.01
	4-Aug-14	Aluminum, total recoverable	0.0154	0.015	0.05
		Arsenic, total recoverable	<0.0017	0.0017	0.005
		Cadmium, total recoverable	<0.00011	0.00011	0.001
		Copper, total recoverable	0.00401	0.00035	0.001
		Iron, total recoverable	0.0605	0.033	0.1
		Lead, total recoverable	<0.0005	0.0005	0.002
		Magnesium, total recoverable	0.962	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.00815	0.0035	0.01
SWSP-31	8-Jul-14	Aluminum, total recoverable	<0.015	0.015	0.05
		Arsenic, total recoverable	0.00406	0.0017	0.005
		Cadmium, total recoverable	<0.00011	0.00011	0.001
		Copper, total recoverable	0.00566	0.00035	0.001
		Iron, total recoverable	0.0986	0.033	0.1
		Lead, total recoverable	<0.0005	0.0005	0.002
		Magnesium, total recoverable	31	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	0.00167	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.0161	0.0035	0.01
	4-Aug-14	Aluminum, total recoverable	0.723	0.015	0.05
		Arsenic, total recoverable	<0.0017	0.0017	0.005
		Cadmium, total recoverable	<0.00011	0.00011	0.001
		Copper, total recoverable	0.00315	0.00035	0.001
		Iron, total recoverable	0.738	0.033	0.1
		Lead, total recoverable	0.000536	0.0005	0.002
		Magnesium, total recoverable	2.13	0.01	0.03

See notes at end of appendix.

Table E-2. Multi-Sector General Permit stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL
SWSP-31	4-Aug-14	Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.00478	0.0035	0.01
SWSP-32	8-Jul-14	Aluminum, total recoverable	13	0.015	0.05
		Ammonia	0.773	0.017	0.05
		Arsenic, total recoverable	0.00449	0.0017	0.005
		Cadmium, total recoverable	0.000389	0.00011	0.001
		Chemical oxygen demand	169	6.67	20
		Copper, total recoverable	0.0128	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005
		Iron, total recoverable	8.59	0.033	0.1
		Lead, total recoverable	0.0113	0.0005	0.002
		Magnesium, total recoverable	7.08	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Nitrate, total recoverable	0.479	0.033	0.1
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Solids, total suspended	406	10.6	46.3
		Zinc, total recoverable	0.076	0.0035	0.01
	4-Aug-14	Aluminum, total recoverable	5.03	0.015	0.05
		Arsenic, total recoverable	<0.0017	0.0017	0.005
		Cadmium, total recoverable	0.000216	0.00011	0.001
		Chemical oxygen demand	45.6	6.67	20
		Copper, total recoverable	0.00716	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005
		Iron, total recoverable	3.19	0.033	0.1
		Lead, total recoverable	0.00468	0.0005	0.002
		Magnesium, total recoverable	3.82	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Nitrate, total recoverable	0.698	0.033	0.1
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001

See notes at end of appendix.

Table E-2. Multi-Sector General Permit stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL
SWSP-32	4-Aug-14	Solids, total suspended	98.4	1.14	5
		Zinc, total recoverable	0.0444	0.0035	0.01
	6-Aug-14	Ammonia	0.659	0.017	0.05
	13-Oct-14	Aluminum, total recoverable	6.66	0.015	0.05
		Ammonia	0.17	0.017	0.05
		Arsenic, total recoverable	0.00459	0.0017	0.005
		Cadmium, total recoverable	0.000267	0.00011	0.001
		Chemical oxygen demand	45.6	6.67	20
		Copper, total recoverable	0.00892	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005
		Iron, total recoverable	4.1	0.033	0.1
		Lead, total recoverable	0.00655	0.0005	0.002
		Magnesium, total recoverable	5.42	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Solids, total suspended	249	5.7	25
		Zinc, total recoverable	0.0413	0.0035	0.01
SWSP-33	17-Jul-14	Aluminum, total recoverable	26.2	0.015	0.05
		Ammonia	0.289	0.017	0.05
		Arsenic, total recoverable	0.00809	0.0017	0.005
		Cadmium, total recoverable	0.00035	0.00011	0.001
		Chemical oxygen demand	151	6.67	20
		Copper, total recoverable	0.016	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005
		Iron, total recoverable	17.1	0.033	0.1
		Lead, total recoverable	0.0146	0.0005	0.002
		Magnesium, total recoverable	8.79	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Solids, total suspended	434	11.4	50
		Zinc, total recoverable	0.0756	0.0035	0.01

See notes at end of appendix.

Table E-2. Multi-Sector General Permit stormwater sampling results, calendar year 2014 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL
SWSP-33	27-Aug-14	Aluminum, total recoverable	31.7	0.015	0.05
		Ammonia	0.498	0.017	0.05
		Arsenic, total recoverable	0.00736	0.0017	0.005
		Cadmium, total recoverable	0.000278	0.00011	0.001
		Chemical oxygen demand	106	6.67	20
		Copper, total recoverable	0.0197	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005
		Iron, total recoverable	19.2	0.033	0.1
		Lead, total recoverable	0.0133	0.0005	0.002
		Magnesium, total recoverable	10.2	0.01	0.03
		Mercury, total recoverable	0.000201	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	<0.0002	0.0002	0.001
		Zinc, total recoverable	0.0645	0.0035	0.01
SWSP-34	4-Aug-14	Aluminum, total recoverable	25.2	0.015	0.05
		Ammonia	0.431	0.017	0.05
		Arsenic, total recoverable	0.00348	0.0017	0.005
		Cadmium, total recoverable	0.00165	0.00011	0.001
		Chemical oxygen demand	40.4	6.67	20
		Copper, total recoverable	0.022	0.00035	0.001
		Cyanide, total	<0.00167	0.00167	0.005
		Iron, total recoverable	15.2	0.033	0.1
		Lead, total recoverable	0.0141	0.0005	0.002
		Magnesium, total recoverable	9.54	0.01	0.03
		Mercury, total recoverable	<0.000067	0.000067	0.0002
		Selenium, total recoverable	<0.0015	0.0015	0.005
		Silver, total recoverable	0.000868	0.0002	0.001
		Zinc, total recoverable	0.081	0.0035	0.01

See notes at end of appendix.

NOTES

Sampling Point
SWSP = stormwater sampling point

Units
mg/L = milligrams per liter
pCi/L = picocuries per liter

MDA or MDL
MDA = 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
Lc = critical level

PQL
PQL = practical quantitation limit; the lowest concentration of analytes in a sample that can be determined reliably within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions

