SANDIA REPORT
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Calendar Year 2010

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.

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Groundwater Protection Program

Sandia National Laboratories, New Mexico

September 2011

Prepared by:
Long Term Stewardship Department (4142) and
Environmental Programs (4143)
Groundwater Protection Program (GWPP) in coordination with
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Acknowledgments

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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 Site Office administers the contract and oversees contractor operations at the site. Sandia conducts general groundwater surveillance monitoring at SNL/NM on a site-wide basis as part of the SNL/NM Groundwater Protection Program (GWPP) and site-specific groundwater monitoring at Environmental Restoration (ER) Operations sites with ongoing groundwater investigations. This annual groundwater monitoring report summarizes GWPP and ER Operations data collected during groundwater monitoring events conducted at the following SNL/NM sites through December 31, 2010: Chemical Waste Landfill; Mixed Waste Landfill; Technical Area V study area; Tijeras Arroyo Groundwater study area; and Burn Site Groundwater study area. Environmental monitoring and surveillance programs are required by DOE Order 450.1A, *Environmental Protection Program,* and DOE Manual 231-1A, *Environmental, Safety, and Health Reporting Manual*.

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Chapter Tables

Chapter Tables (continued)

Chapter Figures

Chapter Figures (continued)

Abbreviations and Acronyms

Airport	Albuquerque International Sunport
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
CFR	Code of Federal Regulations
CME	Corrective Measures Evaluation
CMI	Corrective Measures Implementation
CMIP	Corrective Measures Implementation Plan
CMS	Corrective Measures Study
COA	City of Albuquerque
COC	constituent of concern
CWL	Chemical Waste Landfill
CY	Calendar Year
DI	deionized
DO	dissolved oxygen
DOE	U.S. Department of Energy
DRO	diesel range organics
DSS	Drain and Septic System
EB	equipment blank
EDMS	Environmental Data Management System
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
ET	evapotranspirative
FB	field blank
FOP	Field Operating Procedure
FSO	Field Support Operations
FY	Fiscal Year
GEL	GEL Laboratories, Inc.
GRO	gasoline range organics
GWPP	Groundwater Protection Program
HE	high explosive(s)
HPT	High Performance Team
HSWA	Hazardous and Solid Waste Amendments
HWB	Hazardous Waste Bureau
IMWP	Interim Measures Work Plan
IRP	Installation Restoration Program (U.S. Air Force)
"J"	data qualifier (indicating an estimated constituent concentration that was detected but is below the laboratory practical quantitation limit)

Abbreviations and Acronyms (continued)

KAFB	Kirtland Air Force Base
LCS	laboratory control sample
LE	Landfill Excavation
LWDS	Liquid Waste Disposal System
Ma	Mega Annum
MAC	maximum allowable concentration (established by the NMED)
MCL	maximum contaminant level
MDA	minimum detectable activity
MDL	method detection limit
MWL	Mixed Waste Landfill
NAD83	North American Datum of 1983
NAVD88	North American Vertical Datum of 1988
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
NNSA	National Nuclear Security Administration
NOD	Notice of Disapproval
NPN	nitrate plus nitrite
OB	Oversight Bureau
ORP	oxidation-reduction potential
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PGWS	perched groundwater system
PQL	practical quantitation limit
PVC	polyvinyl chloride
QC	quality control
QED™	MicroPurge, low-flow sampling method
RCRA	Resource Conservation and Recovery Act
RDX	hexahydro-trinitro-triazine
RFI	RCRA Facility Investigation
RPD	relative percent difference
Sandia	Sandia Corporation
SAP	Sampling and Analysis Plan
SC	specific conductance
SDWA	Safe Drinking Water Act
SMO	Sample Management Office
SNL/NM	Sandia National Laboratories, New Mexico
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TA	Technical Area
TAG	Tijeras Arroyo Groundwater (Investigation)
TAL	Target Analyte List
TB	trip blank
TCE	trichloroethene (equivalent to trichloroethylene)

Abbreviations and Acronyms (concluded)

TOX	total organic halogens
TPH	total petroleum hydrocarbons
USAF	U.S. Air Force
USGS	U.S. Geological Survey
VA	Veterans Administration
VCM	Voluntary Corrective Measure
VE	Vapor Extraction
VOC	volatile organic compound

Monitoring Well Location Descriptions

AVN-#	Area V (North)	STW-#	Solar Tower (West)
CTF-#	Coyote Test Field	SWTA-#	Southwest Technical Area III
CWL-#	Chemical Waste Landfill	TA1-W-#	Technical Area I (Well)
CYN-#	Lurance Canyon	TA2-NW-#	Technical Area II (Northwest)
LWDS-#	Liquid Waste Disposal	TA2-SW-#	Technical Area II (Southwest)
MP-#	Montessa Park	TA2-W-#	Technical Area II (Well)
MRN-#	Magazine Road North	TAV-#	Technical Area V
MVMWJ	Mountain View Monitoring Well J	TJA-#	Tijeras Arroyo
MVMWK	Mountain View Monitoring Well K	TRE-#	Thunder Road East
MWL-#	Mixed Waste Landfill	TRN-#	Target Road North
NMED-#	New Mexico Environment Department	TRS-#	Target Road South
NWTA3-#	Northwest Technical Area III	TSA-#	Transportation Safeguards Academy
PGS-#	Parade Ground South	WYO-#	Wyoming
PL-#	Power Line Road	12AUP-#	ER Site 12A Underflow Piezometer
SFR-#	South Fence Road		

**** Meteorological Towers***

* SC1	School House	* A-36	TA-III and TA-V
* A-21	TA-I		

Units

°C	degree Celsius	mg/L	milligram(s) per liter
µg/L	microgram(s) per liter	mL	milliliter(s)
µmhos/cm	microhm(s) per centimeter (unit of specific conductance)	mrem/yr	millirem per year
		mV	millivolt(s)
ac-ft	acre feet	NTU	nephelometric turbidity units
ft	foot (feet)	pCi/g	picocuries per gram
ft^3	cubic feet	pCi/L	picocuries per liter
ft^3/yr	cubic feet per year	pH	potential of hydrogen
ft/ft	feet/foot	ppb	part(s) per billion, equivalent to µg/L in water
ft/yr	feet per year		
gal.	gallon(s)	ppbv	part(s) per billion by volume
gpm	gallons per minute	sq km	square kilometer(s)
in./yr	inches per year	sq mi	square mile(s)
m	meter(s)	yr	year(s)

Annual Groundwater Monitoring Report

Executive Summary

Sandia Corporation (Sandia) conducts general groundwater surveillance monitoring at Sandia National Laboratories, New Mexico (SNL/NM) on a site-wide basis as part of the SNL/NM Groundwater Protection Program (GWPP) and site-specific groundwater monitoring at Environmental Restoration (ER) Operations sites with an ongoing groundwater investigation. The SNL/NM facility is located on Kirtland Air Force Base (KAFB).

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

This Annual Groundwater Monitoring Report documents the results of Sandia's groundwater monitoring activities for Calendar Year (CY) 2010. This report is being prepared to meet the environmental reporting requirements for the CY 2010 Annual Site Environmental Report, reporting to regulators and outside agencies as well 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 by Sandia: GWPP site-wide surveillance (Chapter 2.0); Chemical Waste Landfill (CWL) (Chapter 3.0); Mixed Waste Landfill (MWL) (Chapter 4.0); Technical Area (TA)-V (Chapter 5.0); Tijeras Arroyo Groundwater (TAG) (Chapter 6.0); and Burn Site Groundwater (BSG) (Chapter 7.0).

Chapter 1.0 provides the general site description for the SNL/NM facility and describes the regulatory criteria for SNL/NM groundwater monitoring tasks. The regional aquifer supplying the City of Albuquerque (COA) and KAFB 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, which have uplifted along normal faults. KAFB straddles the east side of the basin and is divided approximately in half by 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).

Currently there are five ER Operations groundwater monitoring networks: (1) TA-V; (2) TAG; (3) CWL; (4) MWL; and (5) BSG. At SNL/NM, solid waste management units (SWMUs) are regulated under the Hazardous and Solid Waste Amendment (HSWA) module of the Resource Conservation and Recovery (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. Monitoring performed at the MWL and the three ER Operations groundwater investigations (TA-V, TAG, and BSG Study Areas) are subject to the direction provided by the Compliance Order on Consent (the Order) between the New Mexico Environment Department (NMED), the DOE, and Sandia (NMED April 2004). The CWL is an interim status landfill that has undergone closure in accordance with 20.4.1.600 New Mexico Administrative Code (NMAC), incorporating 40 Code of Federal Regulations (CFR) 265, Subpart G, and the CWL Closure Plan (SNL December 1992, as amended).

Groundwater Quality Monitoring Activities and Results

During CY 2010, groundwater samples were collected from GWPP, CWL, MWL, TA-V, TAG, and BSG monitoring wells. 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 GWPP monitoring wells were also compared with NMED maximum allowable concentrations (MACs) promulgated for groundwater by the State of New Mexico Water Quality Control Commission (NMWQCC). The results are summarized in the following sections, and the data are presented in the attachments following each chapter.

Groundwater Protection Program

Chapter 2.0 documents the results of the CY 2010 groundwater surveillance monitoring activities conducted as part of the SNL/NM GWPP. The surveillance activities include the annual collection and analysis of groundwater samples from 16 monitoring wells and 1 surface water sample from a spring. Water levels were measured at 78 monitoring wells. Water level measurements were obtained either monthly or quarterly depending on the response characteristics of the groundwater system at each well location to pumping or other stresses. Annual sampling of groundwater was conducted during March 2010. Samples collected from all locations were analyzed for Safe Drinking Water Act list volatile organic compounds (VOCs); total organic halogens; total phenols; total alkalinity; nitrate plus nitrite (NPN); total cyanide; major anions; Target Analyte List (TAL) metals plus uranium-234, uranium-235, and uranium-238; mercury; gamma spectroscopy; gross alpha/beta activity; radium-226; and radium-228. Additional samples were collected at selected monitoring wells for analysis of high explosives (HE) and isotopic uranium.

The analytical results for the groundwater samples are similar to the results reported for previous years. No analytical parameters exceed established MCLs or MACs, except for arsenic, beryllium, fluoride, and combined radium-226 and radium-228.

No VOCs or HE compounds were detected above established MCLs or MACs. The HE compound RDX [hexahydro-trinitro-triazine] was detected in the groundwater sample from monitoring well CTF-MW2 at a concentration of 0.170 micrograms per liter (μg/L).

Fluoride was detected above the NMWQCC groundwater protection MAC of 1.6 milligrams per liter (mg/L) at four sampling locations. The concentrations range from 1.62 to 2.44 mg/L. The EPA MCL for fluoride is 4.0 mg/L. Arsenic was detected above the MCL of 0.01 mg/L in the groundwater sample from CTF-MW2 at a concentration of 0.0535 mg/L. Beryllium was detected in the surface water sample from Coyote Springs at a concentration of 0.00713 mg/L. The MCL for beryllium is 0.004 mg/L. Beryllium has been consistently detected in the surface water samples from the springs and is considered to be of natural origin.

Combined radium-226 and radium-228 activity levels in the CTF-MW2 sample exceed the MCL of 5.0 pCi/L. Activity for radium-226 was reported in the sample from CTF-MW2 at 2.16 ± 0.0854 pCi/L and for radium-228 at 7.94 ± 2.10 pCi/L.

Water table elevation measurements were obtained throughout CY 2010 at 78 locations on a monthly and quarterly basis. Water level elevation measurements obtained from 32 representative monitoring wells located west of both the Tijeras fault zone and Sandia fault at KAFB and vicinity were used to construct contours of water table elevation. 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 COA wells located north of the base. A contour map of the differences in the regional water table elevations between the same periods for CY 2010 and CY 2009 indicate the area of greatest decline is in the southeast quadrant of the mapped area.

Water level elevations were also obtained from 19 wells completed in the perched groundwater system (PGWS) to construct a water level elevation contour map. The contours indicate groundwater flow in the PGWS is from the northwest to southeast. Water levels are declining in the northwest and increasing slightly in the east presumably due to the drainage of the system to the east and perhaps some additional recharge from the Tijeras Arroyo.

Chemical Waste Landfill

Chapter 3.0 discusses the CWL semiannual groundwater monitoring activities performed during April and in November and December 2010. Groundwater samples were collected from six monitoring wells in April (CWL-MW2BL, CWL-MW4, CWL-MW5L, CWL-MW5U, CWL-MW6L, and CWL-MW6U) and from four new wells in November and December (CWL-BW5, CWL-MW9, CWL-MW10, CWL-MW11). The samples were analyzed for Title 40, CFR, Section 264, Appendix IX VOCs and total metals plus iron. The NMED DOE Oversight Bureau (OB) participated in both April and November-December 2010 sampling events and received split samples from three CWL monitoring wells (CWL-MW2BL, CWL-MW4, and CWL-MW5U) in April, and from three monitoring wells (CWL-MW9, CWL-MW10, and CWL-MW11) in November and December. Additional samples were collected for total aluminum, calcium, magnesium, manganese, potassium, and sodium at selected well locations to duplicate the NMED DOE OB analyses. No analytes were detected at concentrations exceeding the associated EPA MCLs in any CWL groundwater samples. The analytical results are comparable to historical values.

The negotiations on the NMED Draft Post-Closure Care Permit for the CWL were completed on October 15, 2009, and documented in the settlement agreement and *Final Order In the Matter of Application for a Post-Closure Care Hazardous Waste Permit for the Chemical Waste Landfill, Sandia National Laboratories No. NM5890110518* (Final Order). On October 16, 2009, the NMED issued a *Notice of Approval, Final Remedy and Closure Plan Amendment, Chemical Waste Landfill*. The NMED approval covers the CWL Closure Plan amendment that addresses the replacement of four groundwater monitoring wells (two of which are dual completion wells), the CWL Post-Closure Care Permit, and the CWL Final Remedy. As agreed to in the negotiations and documented in the NMED-approved CWL Closure Plan amendment, 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 in 2010.

The CWL Post-Closure Care Permit takes effect and supersedes the CWL Closure Plan (SNL December 1992) immediately upon NMED approval of the Final CWL RCRA Closure Report. All future groundwater monitoring will be performed in accordance with the requirements in the approved Permit. As defined in Title 20.4.1.500, NMAC, incorporating 40 CFR 264.117(a)(1), the post-closure care period is 30 years. The NMED may shorten or extend this period under 20.4.1.500 NMAC, incorporating 40 CFR 264.117(a)(2).

Mixed Waste Landfill

Chapter 4.0 discusses the MWL quarterly and annual groundwater sampling activities conducted in January, April, and July 2010. Groundwater samples were collected from seven monitoring wells and analyzed for volatile organic compounds (VOCs), Target Analyte List (TAL) metals plus uranium, anions (as bromide, chloride, fluoride, and sulfate), total alkalinity, nitrate plus nitrite (NPN), gamma spectroscopy, gross alpha, gross beta, and tritium. Additional samples were collected and analyzed for SVOCs (January and April), low-level tritium (April), and isotopic uranium and radon-222 (July). The NMED DOE OB participated in all sampling events and received split samples that were submitted to a different laboratory for analysis. During April, the NMED DOE OB requested additional samples for low-level tritium analysis at each location except MWL-BW2. Additional samples were collected for low-level tritium at selected well locations to duplicate the NMED DOE OB analyses. No analytes were detected at concentrations exceeding the associated EPA MCLs in any MWL groundwater samples. The analytical results are comparable to historical values.

Wells MWL-MW7, MWL-MW8, MWL-MW9, and MWL-BW2 were considered new wells and, as required by the Compliance Order on Consent (the Order) (NMED 2004), were sampled a minimum of eight consecutive quarters for a defined suite of parameters in addition to sampling for perchlorate for at least four consecutive quarters. The four consecutive quarters of perchlorate sampling were completed in CY 2009 with no detections at or above the screening level of 4 micrograms per liter (µg/L); therefore, these wells have been removed from the perchlorate monitoring network. The required eight quarterly sampling events were completed in CY 2010. Wells MWL-MW4, MWL-MW5, and MWL-MW6 are preexisting wells and are sampled on an annual basis. All MWL wells are now being sampled annually as required by the Order.

In April 2010 the DOE and Sandia received a letter from the NMED entitled *Toluene Detections in Groundwater*, which required further investigation to determine the source of very low toluene concentrations in some MWL 2008 through early 2010 groundwater samples, including conducting a purging/sampling study of the groundwater along with any other studies necessary to determine the source. DOE/Sandia submitted the *MWL Toluene Investigation Report* in August 2010 and received an NOD with two comments from the NMED in September 2010. The DOE/Sandia NOD response submitted in October 2010 included a revised version of the report and was approved by NMED in January 2011.

The MWL Corrective Measures Implementation (CMI) Report documents the construction of the MWL ET cover and was submitted to the NMED on January 26, 2010. After NMED approval of the CMI Report, DOE and Sandia will revise the 2007 MWL Long-Term Monitoring and Maintenance Plan and submit the revised plan to the NMED for review and approval. The plan will define the long-term monitoring, maintenance, inspection, and repair requirements for the MWL.

Technical Area V Study Area

Chapter 5.0 discusses the TA-V groundwater monitoring activities conducted during CY 2010. Trichloroethene (TCE) and nitrate have been identified as constituents of concern (COCs) in groundwater at the TA-V Groundwater Investigation study area based on detections above the EPA MCL in samples collected from monitoring wells. Currently 12 wells in the TA-V study area are being monitored for water quality and water levels. Table XI-1 of the Order specifies that the sampling frequency for groundwater monitoring at TA-V is quarterly. Unique features of the TA-V study area include low concentrations of TCE and nitrate in a deep alluvial aquifer.

The conceptual site model of contaminant transport at TA-V includes release from the source term, migration through the vadose zone, and movement in groundwater. The potential sources of TCE and/or nitrate in the TA-V study area include wastewater disposal systems and seepage pits. Based on the historical use and disposal of chlorinated solvents, the extent of TCE in groundwater is probably associated with multiple aqueous releases of solvents and subsequent vapor-phase transport through the vadose zone. The slow rate of groundwater flow (4 to 20 ft/yr) is responsible for the present distribution of TCE in the aquifer.

Only NPN and TCE were detected above MCLs in the TA-V study area wells. NPN concentrations exceed the MCL of 10 mg/L in samples from LWDS-MW1 and TAV-MW10, with a maximum concentration of 13.7 mg/L in the sample collected from TAV-MW10 in October 2010.

During CY 2010, TCE exceeded the MCL of 5 µg/L in samples from three wells (LWDS-MW1, TAV-MW6, and TAV-MW10). The maximum concentration of TCE detected during this reporting period is 18.6 µg/L in the sample collected from LWDS-MW1 in October 2010.

The analytical results for this reporting period are consistent with historical concentrations. The current conceptual site model for the TA-V study area does not require modification based on the sampling results for CY 2010.

The following activities took place for the TA-V study area during CY 2010:

- Monthly water level measurements were obtained for all TA-V wells.
- Quarterly groundwater sampling events were conducted at 12 wells in February 2010, May 2010, August/September 2010, and October 2010.
- Quarterly perchlorate screening groundwater sampling and reporting were performed for LWDS-MW1 in February 2010.
- Installed groundwater monitoring wells TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14.

Tijeras Arroyo Groundwater Study Area

Chapter 6.0 addresses groundwater monitoring activities conducted during CY 2010 at the TAG study area. Currently, 21 wells in the TAG study area are being monitored for water quality, and 27 wells are monitored for water levels. Two groundwater systems are present in the TAG study area: the PGWS at approximately 220 to 330 ft bgs, and the regional aquifer groundwater system at approximately 440 to 570 ft bgs. Groundwater monitoring wells are completed either in the PGWS or regional aquifer. Unique features of the TAG area include low concentrations of TCE at scattered locations in the PGWS, and low concentrations of nitrate at scattered locations in the PGWS and regional aquifer.

For CY 2010, wells were sampled in January/February, May, July/August, and October/November. The samples were analyzed for VOCs, NPN, anions, perchlorate, TAL metals (plus uranium), gross alpha/beta activity, tritium, and radionuclides by gamma spectroscopy. Depending on their locations and historical concentrations of COCs, wells were sampled quarterly, semiannually, or annually during this reporting period.

Both TCE and nitrate have been identified as COCs in groundwater at the TAG study area based on historical groundwater monitoring results. Only NPN and TCE were detected above MCLs in samples from TAG study area wells. In CY 2010, NPN concentrations exceeded the MCL of 10 mg/L in samples from TA2-SW1-320, TJA-4, and TJA-7 during all sampling events, with a maximum concentration of 33.3 mg/L in the sample from TJA-7 collected during the October/November 2010 sampling event. NPN concentrations occasionally exceeded the MCL in samples from TJA-2 and TA2-W-19.

During CY 2010, TCE exceeded the MCL of 5 µg/L in one PGWS well, WYO-4. The maximum concentration of TCE detected during this reporting period is 8.94 µg/L in the sample from WYO-4 collected during the October/November 2010 sampling event. TCE concentrations in samples from WYO-4 have slightly exceeded the MCL, and trends are level to slightly increasing over time.

The analytical results for this reporting period are consistent with historical concentrations. The current conceptual site model for the TAG study area does not require modification based on the sampling results for CY 2010.

The following activities took place for the TAG study area during CY 2010:

- Monthly water level measurements were obtained from TAG wells.
- Quarterly groundwater sampling events were conducted at seven wells (TA2-SW1-320, TA2-W-19, TA2-W-26, TJA-2, TJA-4, TJA-7, and WYO-4) in January/February 2010, May 2010, July/August 2010, and October/November 2010.
- Semiannual groundwater sampling was conducted at four wells (TA2-W-01, TA2-W-27, TJA-3, and TJA-6) in January/February 2010 and July/August 2010.
- Annual groundwater sampling was conducted at nine wells (PGS-2, TA1-W-01, TA1-W-02, TA1-W-04, TA1-W-05, TA1-W-06, TA1-W-08, TA2-NW1-595, and WYO-3) in July/August 2010.
- Quarterly perchlorate screening groundwater sampling was conducted at up to five wells (TA1-W-03, TA1-W-06, TA1-W-08, TA2-W-01, and TA2-W-27) in January/February 2010, May 2010, July/August 2010, and October/November 2010.

Burn Site Groundwater Study Area

Chapter 7.0 discusses the groundwater monitoring activities conducted during CY 2010 at the BSG study area, which is located around the active Lurance Canyon Burn Site facility. Groundwater investigations were initiated in 1997 at the request of the NMED after elevated nitrate levels were discovered in the Burn Site Well (a nonpotable production well used for fire suppression). The study area consists of 10 monitoring wells, and samples were collected and analyzed for VOCs, total petroleum hydrocarbons (TPH)-diesel range organics, TPH-gasoline range organics, anions, NPN, TAL metals (plus uranium), gross alpha/beta activity, tritium, and radionuclides by gamma spectroscopy. As required by the NMED, semiannual sampling for perchlorate was conducted at CYN-MW6, and quarterly sampling for perchlorate was conducted at CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12.

Only NPN was detected above MCLs in samples from study area wells. NPN results exceed the MCL of 10 mg/L in samples from CYN-MW1D, CYN-MW3, CYN-MW6, CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12, with a maximum concentration of 36.6 mg/L in the sample from CYN-MW9 collected during the October 2010 sampling event.

Perchlorate was detected above the MDL of 4 μg/L only in samples collected from CYN-MW6. Perchlorate concentrations range from 4.59 to 6.14 μg/L, with all results qualified with "J" by the laboratory as estimated concentrations. Currently, no MCL is established for perchlorate but it is considered a COC because it exceeds the specified screening level/MDL of 4 μg/L in samples from CYN-MW6 (NMED April 2004)

The analytical results for this reporting period are consistent with historical concentrations. The current conceptual site model does not require modification based on the sampling results for CY 2010.

The following activities took place for the BSG study area during CY 2010:

- Quarterly groundwater sampling events were conducted at four wells (CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12) in September 2010 and October/November 2010.

- Semiannual groundwater sampling was conducted at six wells (CYN-MW1D, CYN-MW3, CYN-MW4, CYN-MW6, CYN-MW7, and CYN-MW8) in February/March 2010, May/June 2010, and September 2010.

- Soil sampling activities were completed in July 2010 at 10 deep soil boring locations to determine contaminant sources.

- Four groundwater monitoring wells (CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12) were installed in July 2010 to determine the extent of groundwater contamination.

Future Groundwater Monitoring Events

The groundwater monitoring events conducted on a site-wide basis as part of the SNL/NM GWPP and at site-specific ER Operations sites will continue on a quarterly, semiannual, annual, and biannual basis during CY 2011, as specified by regulatory guidance. The results for these monitoring events will be presented in the Annual Groundwater Monitoring Report for CY 2011.

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1.0 Introduction

Sandia Corporation (Sandia) conducts general groundwater surveillance monitoring at Sandia National Laboratories, New Mexico (SNL/NM) on a site-wide basis as part of the SNL/NM Groundwater Protection Program (GWPP) and site-specific groundwater monitoring at 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 Sandia's groundwater monitoring activities for Calendar Year 2010. Separate chapters focus on the investigation activities at each of the following monitoring networks maintained by Sandia: GWPP site-wide surveillance (Chapter 2.0); Chemical Waste Landfill (CWL) (Chapter 3.0); Mixed Waste Landfill (MWL) (Chapter 4.0), Technical Area (TA)-V (Chapter 5.0), Tijeras Arroyo Groundwater (TAG) (Chapter 6.0), and the Burn Site Groundwater (BSG) (Chapter 7.0).

1.1 Site Description

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

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

1.1.1 Climate

The Albuquerque area is characterized by low precipitation and wide temperature extremes that are typical of high-altitude, dry, continental climates. The average annual precipitation measured at Albuquerque International Sunport is 9.47 inches (National Oceanic and Atmospheric Administration National Weather Service station); half of this precipitation occurs from June through August in the form of brief but intense thunderstorms. Because of the low humidity and generally warm temperatures, the evaporation potential is high.

1.1.2 Geologic Setting

SNL/NM is located near the east-central edge of the Albuquerque Basin on KAFB. 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 square miles (sq mi) in area. 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). 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 southern 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. As shown in 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

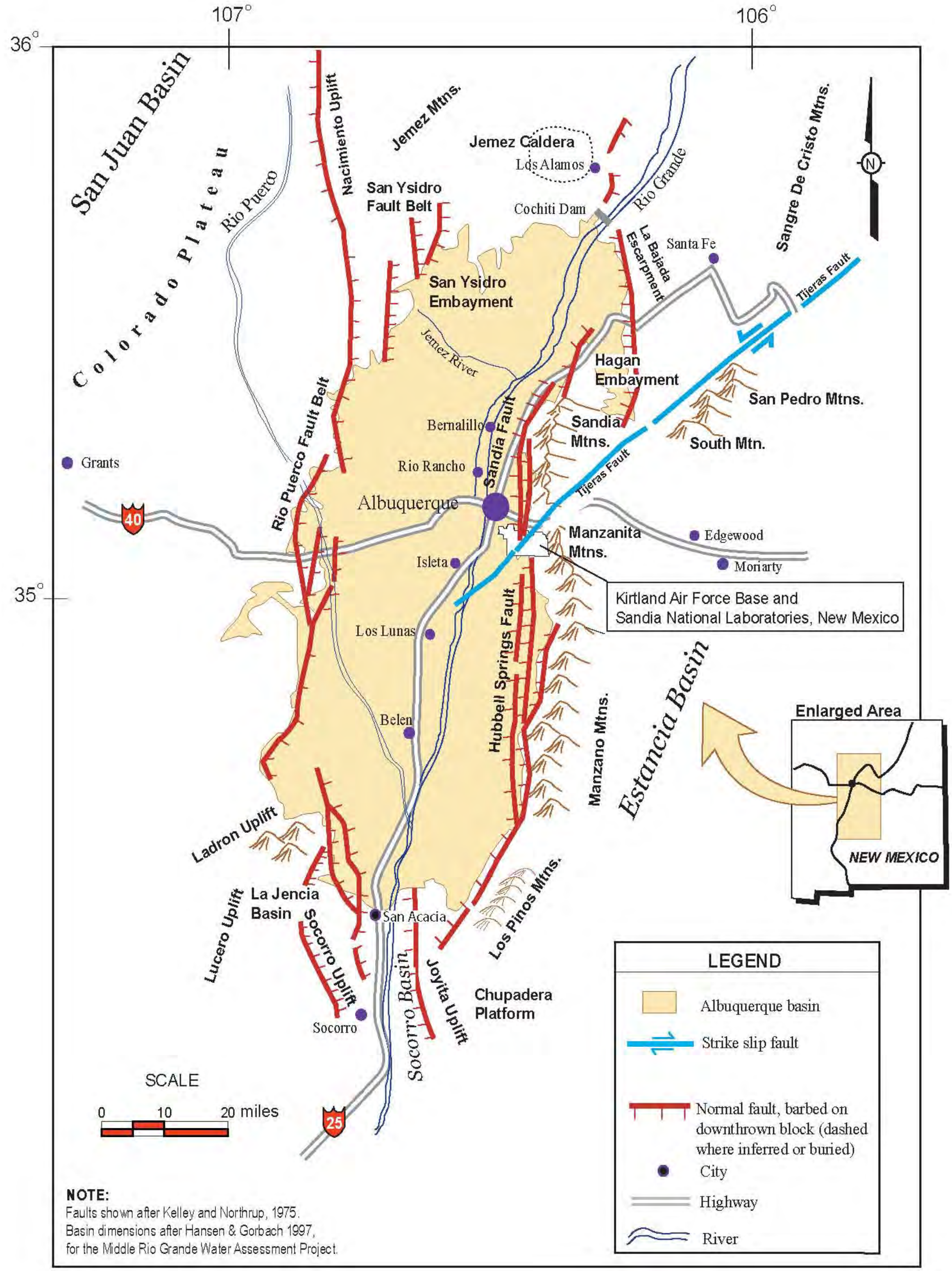

Figure 1-1. Albuquerque Basin, North-Central New Mexico

- 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 eolian 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 (5,000 meters [m]) 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 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.

As shown in 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 Springs fault, 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 Springs fault extends northward from Socorro County and terminates on KAFB in the vicinity of the Tijeras fault. The Sandia and the Hubbell Springs 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 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. Strike-slip motion along the Tijeras fault is thought to be expressed by southwesterly movement of the northern block (left lateral). The Sandia, Hubbell Springs, 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.

1.1.3 Hydrogeology

Figure 1-3 shows three different 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 the map are somewhat arbitrary but identify the approximate hydrologic settings. A deep aquifer is present within the Albuquerque Basin where the regional water table lies at approximately 500 ft (152 m) below ground surface (bgs). A perched groundwater system (perched system) also lies above the regional aquifer in the vicinity of TA-I, TA-II, and TA-IV in the TAG area of concern (AOC). The perched system extends south to the KAFB Golf Course area, north to portions of TA-I, west of TA-II, and east of the KAFB Landfill. Possible explanations for the existence of a perched system are inter-arroyo recharge, irrigation of the golf course and other vegetated areas, water leakage from utility distribution lines, and infiltration from an unlined sewage lagoon system (SNL 1998).

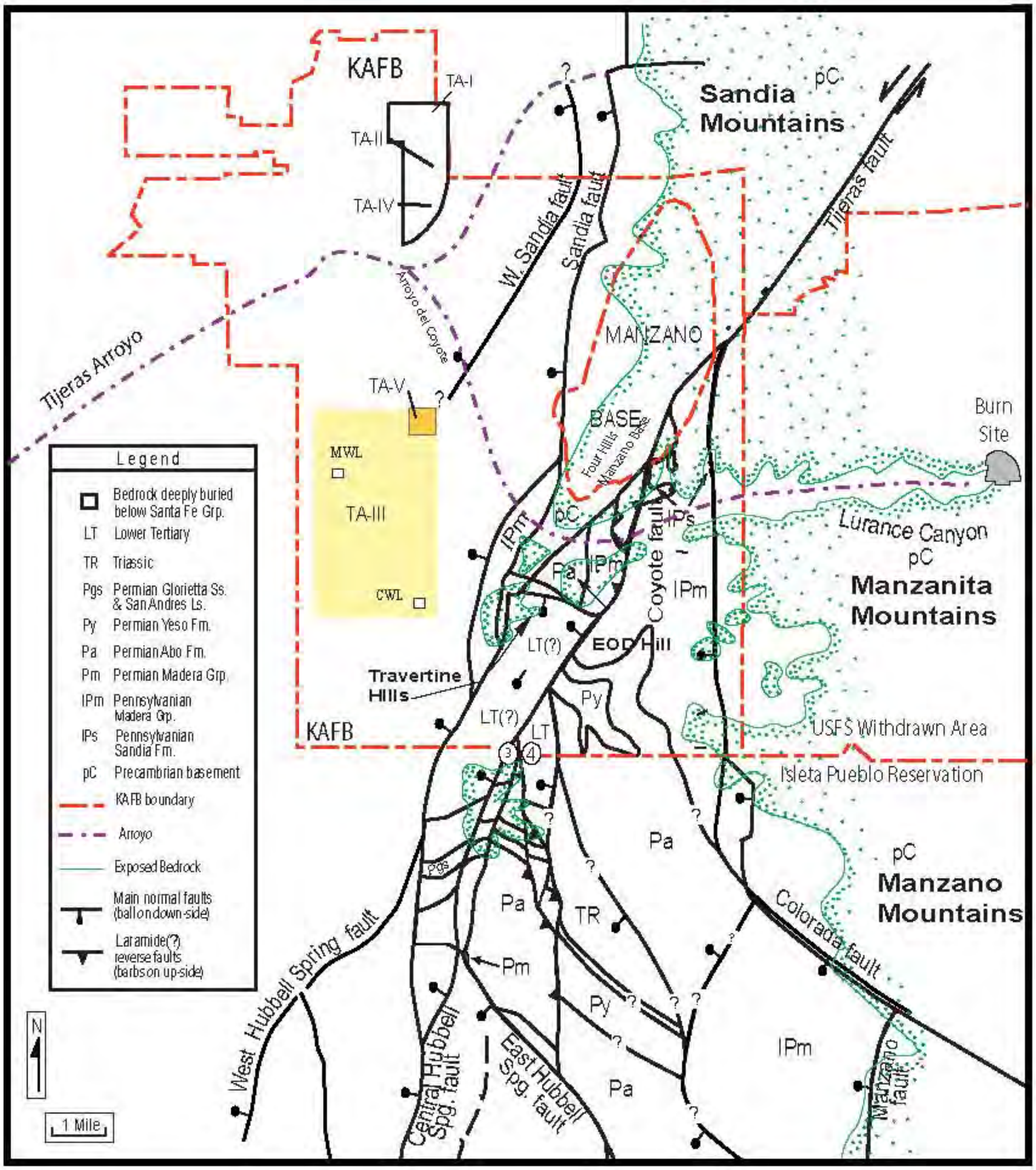

Figure 1-2. Generalized Geology in the Vicinity of SNL/NM and KAFB (Van Hart 2003)

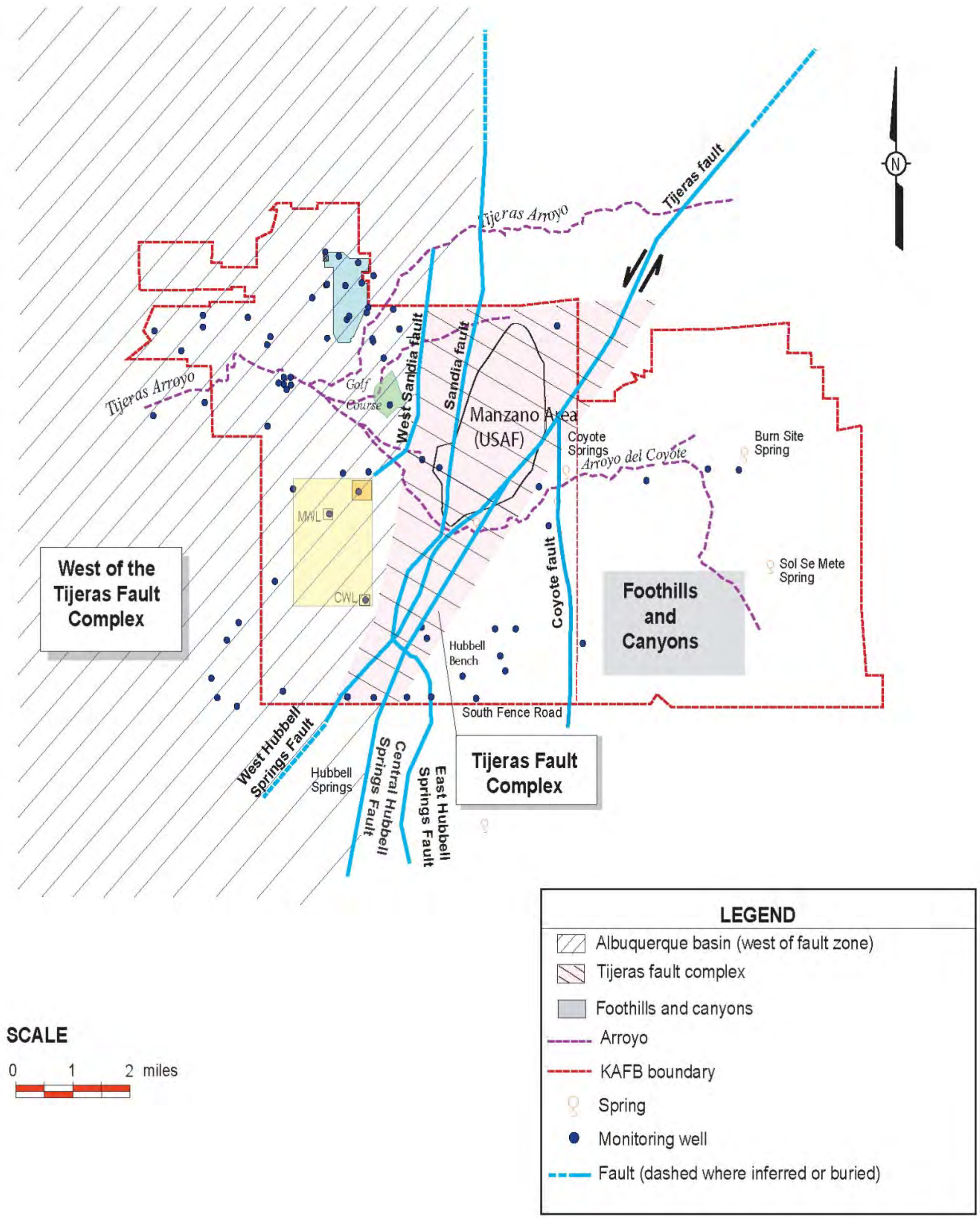

Figure 1-3. Hydrogeologically Distinct Areas Primarily Controlled by Faults (Modified from SNL 1995)

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 (14 to 99 m) bgs. Most of the 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. The groundwater gradient is relatively steep, 0.03 feet per foot (ft/ft), in crossing the Tijeras fault complex from east to west. The elevation change in the water levels is 350 ft (106 m) over 15,840 ft (4,828 m). 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 ft/ft. The historic direction of regional groundwater flow within the basin was westward from the mountains toward the Rio Grande. However, due to groundwater pumping by KAFB and COA, a depression in the water table has created a broad trough originating at the well fields in the northwest end of KAFB. The impact of the seasonal variation in water production by both KAFB and COA wells can be observed as fluctuations in the water levels of some SNL/NM and KAFB monitoring wells as far east and south as TA-III.

1.1.4 Surface Water Hydrology

The Rio Grande, located approximately 8 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 (2,832 kilometers) 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 that flow for short periods from runoff after storm events or during the spring melt of mountain snow packs. 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 storms that usually occur from June through August. The Tijeras Arroyo, above the confluence with Arroyo del Coyote, drains about 80 sq mi (207 square kilometer [sq km]), while Arroyo del Coyote drains about 39 sq mi (101 sq km) (USACE 1979). The total watershed for the Tijeras Arroyo, which includes the Sandia and Manzanita Mountains and portions of KAFB, is approximately 126 sq mi (336 sq km). All active SNL/NM facilities are located outside the 100-year floodplain of both Tijeras Arroyo and Arroyo del Coyote (USACE 1979).

Several springs on KAFB are associated with the uplifts on the east side of the basin: (1) Coyote 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 Springs (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 within the major arroyos. However, the amount of recharge occurring in the foothills and canyons is not well characterized. The estimated recharge for that portion of Tijeras Arroyo on KAFB is estimated to be up to 2.2 million cubic feet per year (ft^3/yr) (50 acre ft [ac-ft]/yr) (SNL 1998). The best estimate for the groundwater recharge associated with Arroyo del Coyote is 0.4 million ft^3/yr (9.2 ac-ft/yr). Infiltration studies conducted by the ER Site-Wide Hydrogeologic Characterization Project determined that recharge is negligible due to the high rate of evapotranspiration for most other areas on KAFB, generally alluvial slopes and flat areas within the basin (SNL 1998).

1.2 Groundwater Monitoring

Extensive groundwater monitoring is conducted at KAFB. The U.S. Air Force (USAF) Installation Restoration Program has a large monitoring well network associated with several closed landfills and a closed sewage lagoon. Additional KAFB wells are sited to monitor and characterize several nitrate plumes and an extensive jet fuel/aviation gasoline plume on the base. Sandia monitors groundwater on KAFB at locations associated with DOE-owned facilities and sites permitted by the USAF for DOE use. Groundwater monitoring by Sandia is conducted by ER Operations and the GWPP. Figure 1-4 illustrates the extensive monitoring well network at KAFB. Table 1-1 lists the CY 2010 sampling events conducted at the GWPP and ER Operations monitoring networks maintained at SNL/NM.

Table 1-1. Sample Collection Events for Groundwater Quality Monitoring at SNL/NM from January through December 2010

Sampling Event	GWPP	CWL	MWL	TA-V	TAG	BSG
Jan 10			√		√	
Feb 10				√	√	√
Mar 10	√					√
Apr 10		√	√			
May 10					√	√
Jun 10				√		√
Jul 10			√		√	
Aug 10				√	√	
Sep 10				√		√
Oct 10				√		√
Nov 10		√			√	√
Dec 10		√				

NOTES:

BSG = Burn Site Groundwater.
CWL = Chemical Waste Landfill.
GWPP = Groundwater Protection Program.
MWL = Mixed Waste Landfill.
SNL/NM = Sandia National Laboratories, New Mexico.
TA-V = Technical Area Five.
TAG = Tijeras Area Groundwater.

Water quality and groundwater analytical results for the GWPP and SNL/NM ER Operations monitoring activities are summarized in Table 1-2. Detected analytes that exceed the EPA drinking water regulatory criteria for samples collected by SNL/NM personnel during groundwater monitoring activities in CY 2010 are listed in Table 1-3.

1.2.1 Environmental Restoration Operations Monitoring

SNL/NM 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 five ER Operations groundwater monitoring networks: (1) CWL; (2) MWL; (3) TA-V; (4) TAG; and (5) BSG. The ER Operations groundwater monitoring wells are located upgradient and downgradient of known legacy surface contamination sites with associated groundwater contamination.

1.2.2 Groundwater Protection Program Monitoring

The SNL/NM GWPP 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 SNL/NM operations on groundwater.

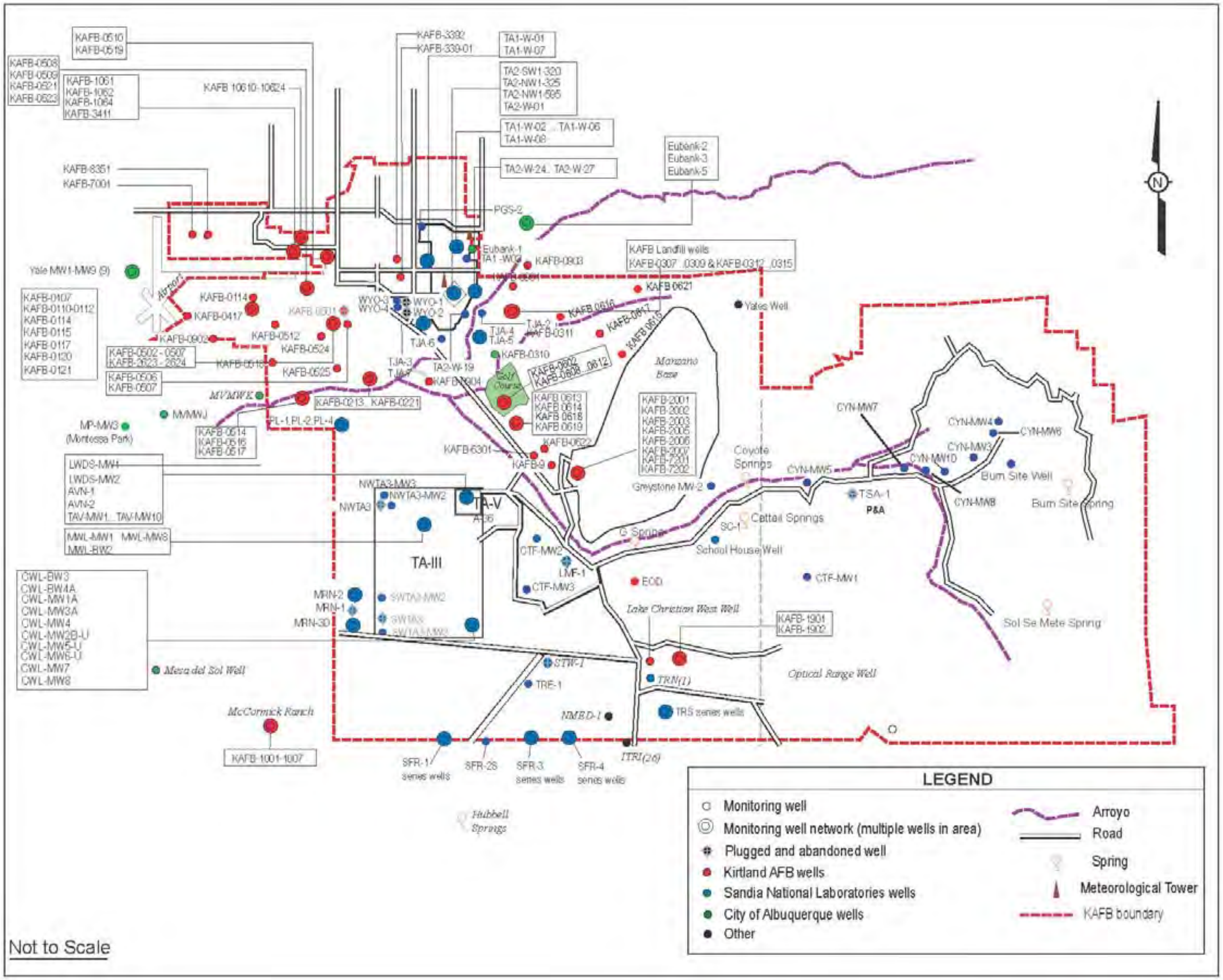

Figure 1-4. Wells and Springs within SNL/NM and KAFB

Table 1-2. Summary of SNL/NM Groundwater Monitoring Results during CY 2010

	SNL/NM Groundwater Monitoring
Number of Active Wells Monitored	76
Number of Analyses Performed	13,038
Percent of Nondetected Results	81.45 %

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	171	0	5.95	8.98	7.39	0.3496	NE
Specific Conductivity in μmhos/cm	171	0	379	4274	768.1	498.1	NE
Temperature in °C	171	0	12.09	25.66	18.97	2.779	NE
Turbidity in NTU	171	0	0.07	132	3.25	14.75	NE
Detected Organic Compounds in μg/L							
Acetone	1	163	7.91	7.91	7.91	N/A	NE
Bromodichloromethane	1	183	0.530	0.530	0.530	N/A	NE
Carbon disulfide	2	166	1.58	2.00	1.79	0.297	NE
Chloroform	10	174	0.250	0.730	0.479	0.1777	NE
Chloromethane	9	175	0.320	31.8	3.87	10.47	NE
Dibromochloromethane	1	183	0.390	0.390	0.390	N/A	NE
1,1-Dichloroethane	11	173	0.390	1.17	0.667	0.2769	NE
1,1-Dichloroethene	1	183	0.640	0.640	0.640	N/A	7.0
cis-1,2-Dichloroethene	33	138	0.310	3.63	1.79	0.963	70
Gasoline Range Organics	5	30	17.6	27.6	21.3	4.48	NE
RDX	1	16	0.170	0.170	0.170	N/A	NE
Tetrachloroethene	9	175	0.320	1.23	0.804	0.2896	5.0
Toluene	9	175	0.250	1.45	0.539	0.429	1,000
Trichloroethene	66	118	0.353	18.6	5.62	5.815	5.0

Refer to footnotes at end of table.

Table 1-2. Summary of SNL/NM Groundwater Monitoring Results during CY 2010 *(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	36	78	0.0103	0.505	0.0458	0.0872	NE
Antimony	6	115	0.000617	0.00372	0.00159	0.001353	0.006
Arsenic	12	109	0.00151	0.0535	0.00647	0.01482	0.010
Barium	121	0	0.010	0.311	0.0832	0.04410	2.0
Beryllium	2	119	0.00011	0.00713	0.00362	0.00497	0.004
Cadmium	7	114	0.000124	0.000417	0.000256	0.000097	0.005
Calcium	124	0	36.4	384	92.86	59.85	NE
Chromium	19	102	0.00253	0.0263	0.00616	0.00666	0.100
Cobalt	64	57	0.0001	0.0102	0.000653	0.001578	NE
Copper	58	63	0.000471	0.00762	0.00150	0.001406	NE
Iron	113	8	0.045	8.36	0.348	0.8195	NE
Lead	2	119	0.00052	0.000578	0.000549	0.000041	NE
Magnesium	124	0	4.03	93.0	23.69	13.11	NE
Manganese	52	60	0.0010	3.08	0.137	0.4828	NE
Nickel	112	9	0.00073	0.252	0.00544	0.02409	NE
Potassium	124	0	1.56	43.0	4.56	4.460	NE
Selenium	84	37	0.00104	0.0304	0.00472	0.006071	0.050
Silver	1	120	0.00193	0.00193	0.00193	N/A	NE
Sodium	124	0	1.02	1180	58.67	109.65	NE
Thallium	3	118	0.000508	0.00124	0.000840	0.000371	0.002
Uranium	108	0	0.000295	0.0258	0.00595	0.003835	0.030
Vanadium	25	96	0.00304	0.0111	0.00560	0.002309	NE
Zinc	62	59	0.0028	0.735	0.0333	0.1036	NE

Refer to footnotes at end of table.

Table 1-2. Summary of SNL/NM Groundwater Monitoring Results during CY 2010 *(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 as N	167	7	0.149	36.6	7.84	7.808	10
Bromide	88	2	0.138	3.32	0.620	0.6343	NE
Chloride	90	0	9.51	489	64.71	76.61	NE
Fluoride	90	0	0.227	2.44	0.846	0.4413	4.0
Sulfate	90	0	13.8	1810	118.4	214.5	NE
Total Organic Halogens	4	16	0.00868	0.0567	0.0306	0.01975	NE
Total phenols	5	15	0.00176	0.0036	0.00232	0.000759	NE
Perchlorate	2	25	0.00459	0.00614	0.00537	0.001096	NE
Alkalinity as CACO3	63	0	69.0	1490	221.6	211.6	NE
Alkalinity, Bicarbonate	12	0	72.9	296	230.3	53.3	NE
Detected Radiochemistry Activities in pCi/L							
Alpha, gross (uncorrected)	79	10	1.59	76.2	9.40	10.62	15.0
Beta, gross	77	12	1.47	50.9	5.85	6.071	4 mrem/yr
Potassium-40	5	83	40.3	93.9	58.8	20.60	NE
Radium-226	9	11	0.319	2.16	0.703	0.581	5.0
Radium-228	11	9	0.472	7.94	1.37	2.235	5.0
Radon-222	11	2	82.0	2100	532	558	NE
Uranium-233/234	25	0	0.510	56.2	14.11	12.65	NE
Uranium-235/236	23	2	0.0413	0.721	0.261	0.1572	NE
Uranium-238	25	0	0.110	8.59	2.98	1.692	NE

NOTES:

°C = Degree(s) Celsius.
µg/L = Microgram(s) per liter.
µmhos/cm = Micromhos per centimeter.
4 mrem/yr = Any combination of beta- and/or gamma-emitting radionuclides (as dose rate).
CACO3 = Calcium as carbon carbonate.
MCL = Maximum contaminant level. Established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11(b)), National Primary Drinking Water Standards (EPA, July 2010).
mg/L = Milligram(s) per liter.
N = Nitrogen.
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).
uncorrected = Gross alpha results reported as uncorrected values (result includes the uranium and radon activities).
RDX = Hexahydro-trinitro-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 from January through December 2010

Analyte	Well	Exceedance	Date
Arsenic MCL = 0.010 mg/L	CTF-MW2	0.0535 mg/L	March 2010
Beryllium MCL = 0.004 mg/L	Coyote Springs	0.00713 mg/L	March 2010
Nitrate plus Nitrite (as Nitrogen) MCL = 10.0 mg/L	CYN-MW1D	13.4 mg/L	February 2010
		12.2 mg/L	September 2010
	CYN-MW1D (Reanalysis)	12.4 mg/L	February 2010
	CYN-MW3	10.4 mg/L	March 2010
		12.0 mg/L	September 2010
	CYN-MW6	35.2 mg/L	March 2010
		29.9 mg/L	September 2010
	CYN-MW9	30.1 mg/L	September 2010
		36.6 mg/L	October 2010
	CYN-MW9 (Duplicate)	30.1 mg/L	September 2010
	CYN-MW10	11.0 mg/L	September 2010
		11.4 mg/L	November 2010
	CYN-MW10 (Duplicate)	11.4 mg/L	November 2010
	CYN-MW11	10.6 mg/L	November 2010
	CYN-MW12	12.2 mg/L	September 2010
		14.4 mg/L	October 2010
	LWDS-MW1	10.9 mg/L	February 2010
		11.0 mg/L	June 2010
		11.0 mg/L	September 2010
		12.0 mg/L	October 2010
	LWDS-MW1 (Duplicate)	12.1 mg/L	October 2010
	TA2-SW1-320	21.6 mg/L	January 2010
		23.0 mg/L	May 2010
		21.4 mg/L	July 2010
		22.4 mg/L	November 2010
	TA2-W-19	10.1 mg/L	May 2010
		10.5 mg/L	August 2010
		10.1 mg/L	November 2010
	TA2-W-19 (Duplicate)	10.6 mg/L	August 2010
	TJA-2	10.5 mg/L	January 2010
		10.4 mg/L	May 2010
		10.8 mg/L	August 2010
	TJA-4	29.5 mg/L	January 2010
		28.0 mg/L	May 2010
		27.7 mg/L	August 2010
	TJA-4 (Duplicate)	29.2 mg/L	January 2010
		28.4 mg/L	May 2010
	TJA-7	21.0 mg/L	January 2010
		23.7 mg/L	May 2010
		22.9 mg/L	August 2010
	TJA-7 (Duplicate)	33.3 mg/L	November 2010
	TAV-MW10	10.1 mg/L	February 2010
		10.5 mg/L	June 2010
		10.4 mg/L	September 2010
		13.7 mg/L	October 2010
	TAV-MW10 (Duplicate)	10.8 mg/L	June 2010

Refer to footnotes at end of table.

Table 1-3. Summary of Exceedances for SNL/NM Groundwater Monitoring Wells Sampled from January through December 2010 *(Concluded)*

Analyte	Well	Exceedance	Date
Trichloroethene MCL = 5.0 µg/L	LWDS-MW1	16.9 µg/L	February 2010
		14.4 µg/L	June 2010
		12.6 µg/L	September 2010
		18.5 µg/L	October 2010
	LWDS-MW1 (Duplicate)	18.6 µg/L	October 2010
	TAV-MW6	12.6 µg/L	February 2010
		11.9 µg/L	June 2010
		12.0 µg/L	September 2010
		11.8 µg/L	October 2010
	TAV-MW10	14.8 µg/L	February 2010
		14.7 µg/L	June 2010
		14.9 µg/L	September 2010
		13.1 µg/L	October 2010
	TAV-MW10 (Duplicate)	14.7 µg/L	February 2010
		14.7 µg/L	June 2010
	WYO-4	8.34 µg/L	January 2010
		6.47 µg/L	May 2010
		8.80 µg/L	August 2010
		8.94 µg/L	November 2010
Radium-226/228 MCL = 5.0 pCi/L	CTF-MW2	10.10 pCi/L	March 2010

NOTES:

µg/L = Microgram(s) per liter.
mg/L = Milligram(s) per liter.
MCL = Maximum contaminant level.
pCi/L = Picocuries per liter.
SNL/NM = Sandia National Laboratories, New Mexico.

1.2.3 Groundwater Monitoring Regulatory Criteria and DOE Orders

Groundwater monitoring performed by GWPP and ER Operations are directed based on three different sets of regulations and requirements. Groundwater surveillance conducted by the GWPP is directed by DOE Order 450.1A, *Environmental Protection Program* (DOE 2008) and DOE Manual 231.1A, *Environmental, Safety, and Health Reporting Manual* (DOE 2004). Groundwater monitoring results for both GWPP and ER Operations 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 solid waste management units (SWMUs).

At SNL/NM, SWMUs are regulated under the HSWA module of the 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. Monitoring performed at the MWL and other groundwater monitoring activities (e.g., TA-V, TAG, and BSG investigations) are currently performed in compliance with the requirements of the Order.

The CWL is being closed as a regulated unit that operated under an interim RCRA permit. Groundwater monitoring at the CWL is currently conducted according to the requirements of the New Mexico Environment Department (NMED)-approved closure plan for the unit.

Three of the ER Operations groundwater investigations are under the direction of the Compliance Order on Consent (the Order) between the NMED, Sandia, and the DOE (NMED 2004). The three AOCs (TA-V, TAG, and BSG) must comply with requirements set forth in the Order for site characterization and the development of a Corrective Measures Evaluation (CME) for each of these sites. The Order also contains schedules that define dates for the delivery of plans and reports related to the TA-V, TAG, and BSG AOCs, and, accordingly, the DOE/NNSA and Sandia were required to complete CME Reports for the TA-V, TAG, and BSG AOCs by September 30, 2005. The NMED is the regulatory agency responsible for enforcing the requirements identified in the Order for each of the three CMEs. During Fiscal Year 2004, CME Work Plans were submitted to the NMED for each of these three sites that summarize prior work, identify potential source areas, and conduct screening of technologies that result in identification of remedial alternatives that will undergo a full evaluation during the CME process (SNL 2004a, 2004b, and 2004c). The Order also extends NMED regulatory jurisdiction to the siting and installation of new groundwater monitoring wells and the abandonment of existing wells at SNL/NM.

1.3 References

DOE 2008 — U.S. Department of Energy (DOE), 2008. *Environmental Protection Program*, DOE Order 450.1A, U.S. Department of Energy, Washington, D.C., June 4.

DOE 2004 — U.S. Department of Energy (DOE), 2004. *Environment, Safety, and Health Reporting Manual,* DOE Order 231.1A Chg. 2, U.S. Department of Energy, Washington, D.C., March 19 2004

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.

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.

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. Pazzagua and S. Lucas (eds.), *New Mexico Geological Society, Fiftieth Annual Field Conference*, New Mexico Geological Society, Socorro, New Mexico, September.

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 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.

SNL 2004a Sandia National Laboratories/New Mexico (SNL/NM), 2004. *Corrective Measures Evaluation Work Plan, Tijeras Arroyo Groundwater*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico, July.

SNL 2004b Sandia National Laboratories/New Mexico (SNL/NM), 2004. *Corrective Measures Evaluation Work Plan*, *Technical Area V Groundwater*, *Revision 0*, SAND Report SAND2004-6113, Sandia National Laboratories, Albuquerque, New Mexico, December.

SNL 2004c Sandia National Laboratories/New Mexico (SNL/NM), 2004. *Corrective Measures Evaluation Work Plan for Sandia National Laboratories/New Mexico Burn Site*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico, June.

SNL 1998 Sandia National Laboratories/New Mexico (SNL/NM), 1998. *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.

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 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.

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2.0 Groundwater Protection Program

2.1 Introduction

This chapter documents the results of the Calendar Year (CY) 2010 groundwater surveillance monitoring activities conducted as part of the Sandia National Laboratories, New Mexico (SNL/NM) Groundwater Protection Program (GWPP). The surveillance activities include the annual collection and analysis of groundwater samples from 16 monitoring wells and 1 surface water sample from a spring. Water levels were measured at 78 monitoring wells. Water level measurements were obtained either monthly or quarterly depending on the response characteristics of the groundwater system at each well location to pumping or other stresses.

The purpose of the GWPP 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, the GWPP performs the following tasks:

- Determines the effects of SNL/NM operations on groundwater through groundwater quality sampling and analysis and water level measurements.
- Records and maintains groundwater data in a database.
- Maintains GWPP documents and records and ensures that all necessary reports are submitted to the appropriate agencies in a timely manner.
- Prepares and maintains Administrative (AOP) and Field Operating Procedures (FOPs) 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 Discharge Program to prevent groundwater contamination.
- Develops groundwater education and community outreach programs.
- Provides stakeholders an annual update of groundwater data at SNL/NM through the *Annual Groundwater Monitoring Report*.

The groundwater surveillance monitoring involves completing the following objectives:

- Establishing baseline water quality and groundwater flow information for the groundwater system at SNL/NM.
- Determining the impact, if any, of SNL/NM's operations on the quality and quantity of groundwater.
- Demonstrating compliance with all federal, state, and local groundwater requirements.

The GWPP is responsible for tracking information on all wells operated by Sandia Corporation (Sandia), including Environmental Restoration (ER) Operations (formerly ER Project) monitoring wells and characterization boreholes. The GWPP Well Registry and Oversight Task were established to ensure that all wells operated by Sandia are properly constructed and maintained to protect groundwater resources (NMOSE 2005). The GWPP Project Lead works with well owners to review new 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 of a well or borehole is required. The goal is to provide full life-cycle management of monitoring wells and boreholes. Additional information for the GWPP is provided in the SNL/NM GWPP Plan (SNL 2009a)

2.2 Regulatory Criteria

Sandia is required by U.S. Department of Energy (DOE) Order 450.1A to develop and implement a site-wide Groundwater Protection Management Program (DOE 2008). Groundwater surveillance is one element within DOE's overall Environmental Protection Program. The implementation of a successful GWPP includes all elements of the Integrated Safety Management System and relevant elements of the facilities Environmental Management System to ensure that:

- Possible sources of current and future groundwater contamination are identified and the potential for future contamination is evaluated.
- All applicable federal, state, and DOE requirements are met.
- Appropriate groundwater protection goals are established for all affected or potentially affected groundwater consistent with water quality and current or likely future use.
- Strategies for predicting and preventing future contamination and for controlling existing contamination are developed.
- The history of GWPP activities is documented for future site management.
- The quality of ambient groundwater and vadose zone conditions at the site are documented.
- Environmental monitoring with surveillance program elements for the groundwater and the vadose zone, including ambient subsurface conditions, are described.
- The way the monitoring program provides the information needed to predict and respond to potential contamination associated with significant site aspects and to achieve groundwater protection goals is prescribed.

In April 2004, a Compliance Order on Consent (the Order) (NMED 2004) became effective between the DOE, Sandia and the New Mexico Environment Department (NMED). Among other requirements primarily affecting ER sites, the Order mandates 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 the DOE and Sandia are required to evaluate the nature and extent of perchlorate contamination and report the results in a Resource Conservation and Recovery Act Corrective Measures Evaluation. Sampling and analysis of the noncompliant well will continue on a quarterly basis until at least four consecutive nondetections are obtained (NMED 2004).

The NMED DOE Oversight Bureau (OB) splits groundwater samples collected by the GWPP. 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 Sandia Site Office. 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
NMWQCC[1] Standards for Groundwater (20 6.2.3103A NMAC Human Health Standards) (NMED 2001)	MAC	NMWQCC
DOE Drinking Water Guidelines for Radioisotopes[2] (DOE Order 5400.5)	DCG	DOE (1993)

NOTES: [1] 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 direct human health risks.

[2] 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 than EPA's 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.

2.3 Scope of Activities

2.3.1 Groundwater Quality Surveillance Monitoring

Annual sampling of groundwater was conducted during the period from March 5 to March 29, 2010. Samples were collected from 16 wells and 1 spring. Groundwater surveillance samples were collected from the following monitoring wells: CTF-MW1, CTF-MW2, CTF-MW3, Eubank-1, 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. The analytical results for the groundwater samples are presented in Attachment 2A. Well locations are shown in Figure 2B-1 (Attachment 2B).

Samples collected from all locations were analyzed for the following analytes:

- Safe Drinking Water Act (SDWA) list volatile organic compounds (VOCs)
- Total organic halogens (TOX)
- Total phenols
- Total alkalinity
- Nitrate plus nitrite (NPN)
- Total cyanide

- Major anions (chloride, bromide, fluoride, and sulfate)
- Target Analyte List (TAL) metals plus uranium-234, uranium-235, and uranium-238
- Mercury
- Gamma spectroscopy
- Gross alpha and beta activity
- Radium-226 and radium-228
- Isotopic uranium (U-234, U-235, and U-238), selected wells only
- Radon 222, selected wells only

Analysis for high explosive (HE) compounds was conducted on groundwater samples collected from wells CTF-MW2, CTF-MW3, SFR-2S, SWTA3-MW3, SWTA3-MW4, and TRE-1. These wells are associated with the Dynamic Explosives Test Site located in the Coyote Canyon Test Field. All samples were filtered in the field using in-line filters of 0.45-micron pore size, except those for VOCs, HE, and mercury fractions. Duplicate samples were submitted for all analyses from NWTA3-MW3D and SWTA3-MW3.

The NMED DOE OB collected split samples with Sandia at Coyote Springs, CTF-MW2, SFR-2S, and TRE-1. The NMED DOE OB analytical results are not reported in this document but are available through the DOE/Sandia Site Office.

Groundwater level monitoring is a means to assess the physical changes of the groundwater system over time. This includes changes in the local water table, the quantity of water available, as well as the direction and speed of groundwater movement. The GWPP gathers groundwater level measurements from a large network of wells within and around Kirtland Air Force Base (KAFB). In addition to wells owned by the DOE, data is solicited for U.S. Air Force (USAF) Installation Restoration Program (IRP), City of Albuquerque (COA), and U.S. Geological Service (USGS) wells (Figure 1-4). Water levels in wells were measured quarterly or monthly during CY 2010, depending on the data source and well characteristics.

The water table elevation provides a direct measure of the amount of water in storage in the aquifer. Changing water table elevations reflect the difference between recharge and withdrawal from the aquifer. In addition, the rate of change of water levels at a monitoring well screened across the water table provides a reliable measure of the useful lifetime of the well.

Groundwater recharge is difficult to measure directly. Precipitation can be used as an indirect measure of recharge potential. Available precipitation also impacts demand on groundwater withdrawal. Water quantities pumped by the KAFB and COA water supply wells represent the primary groundwater withdrawal from the regional aquifer at this location. Water level elevation data collected during a common time period at a group of representative wells are analyzed, and the data are interpolated and plotted as groundwater elevation contours. From this water table map, groundwater flow directions can be identified and horizontal gradients can be determined. Specific results for annual precipitation, water production, and the impact on the water table are discussed in Section 2.6.2.

2.3.2 Monitoring Well Installation

No new monitoring wells were installed by the GWPP during CY 2010.

2.4 Field Methods and Measurements

2.4.1 Groundwater Sampling

The GWPP monitoring procedures, as required by the Groundwater Surveillance Task, are consistent with procedures identified in the U.S. Environmental Protection Agency (EPA) technical enforcement guidance document (EPA 1986). The EPA procedures are included in the GWPP Sampling and Analysis Plan (SAP) (SNL 2006), which provides general requirements for data quality objectives, field operations, sample documentation and custody, quality control (QC), reporting, and data management. Specific sampling instructions for the annual surveillance monitoring event are conveyed to the SNL/NM Field Support Operations (FSO) and Sample Management Office (SMO) as provided in the Mini-SAP (SNL 2010). The Mini-SAP is prepared by the Sampling Coordinator at the request of the GWPP Project Lead and provides detailed information on the wells to be sampled, the analyses to be conducted, the methods to be used, and any special conditions that may apply.

2.4.2 Sample Collection, Handling, and Analysis

Groundwater samples are collected using a nitrogen gas-powered, portable, piston pump (Bennett™). Surface water samples from Coyote Springs are collected using a peristaltic pump. With the exception of samples collected for HE compound, VOC, and mercury analyses, samples are filtered through a 0.45-micron cartridge filter inserted into the pump discharge line. Samples are filtered to determine dissolved constituents in the groundwater to compare with New Mexico Water Quality Control Commission (NMWQCC) groundwater standards, which are based on dissolved contaminants (Section 20.6.2, New Mexico Administrative Code). Sampling is conducted annually. Sample collection is conducted according to the instructions and requirements specified in FOP 05-01, *Long-Term Environmental Stewardship Groundwater Monitoring Well Sampling and Field Analytical Measurements* (SNL 2007a).

The SNL/NM SMO processes environmental samples collected by both the GWPP and ER Operations. The SMO orders sample containers, issues sample control and tracking numbers, tracks the chain-of-custody, and reviews analytical results returned from the laboratories for laboratory contract compliance (SNL 2007b). All groundwater samples are analyzed by off-site laboratories using EPA-specified protocols.

2.4.3 Field Water Quality Measurements

Field water quality measurements are obtained at the time of sample collection. Groundwater is pumped to the surface and into a flow-through cell containing measurement probes for various field instruments. Table 2-2 lists the field parameters. Consecutive measurements of temperature, pH, turbidity, and specific conductance (SC) are collected until these values are within the acceptance range of the stabilization parameters shown in Table 2-2. Stability of the measured parameters indicates sufficient water has been removed from the well to replace water that may have stagnated in the well bore with formation water, and a representative groundwater sample can be collected. In addition to groundwater stability measurements, other field parameters measured include alkalinity, dissolved oxygen (DO), and oxidation-reduction potential (ORP). All purge water is placed into 55-gallon containers and stored at the FSO facility waste accumulation area pending analysis of groundwater samples and subsequent determination of the appropriate disposal path for the water.

2.4.4 Water Level Measurements

Water level measurements are conducted at a frequency of monthly or quarterly for a network of 78 SNL/NM monitoring wells located on DOE property and on permitted land from KAFB. Sampling frequency for each well is determined by the response of the local water table to well pumping or other temporal stresses. Where seasonal pumping stresses impose a periodic response on the local water table, the measurement frequency is monthly. If the water table is relatively stable, the measurement frequency for wells is quarterly. Water level measurements are conducted according to the instructions and requirements specified in FOP 03-02, *Groundwater Level Data Acquisition and Management*, Rev. 02 (SNL 2007c)

Table 2-2. Field Water Quality Parameters Measured at GWPP 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%.
Turbidity (NTU)	Stability measure: Four consecutive measurements within 10% or < 5 NTU.
Alkalinity[1]	Measured in mL $CaCO_3$. Alkalinity titrations are performed in the field at the time of sample collection.
Sample Flow Rate	Measured in gpm
Dissolved Oxygen	Percentage of saturation value and/or measured in mg/L
Oxidation-Reduction Potential	Measured in mV

NOTE: [1]Alkalinity results for field measurements are provided in Attachment 2A, Table 2A-8, and laboratory-derived alkalinity values are reported in Table 2A-3 for comparison.

°C = Degree(s) Celsius.
$CaCO_3$ = Calcium carbonate.
gpm = Gallon(s) per minute.
GWPP = Groundwater Protection Program.
µmhos/cm = Microhm(s) per centimeter.
mg/L = Milligram(s) per liter.
mL = Milliliter(s).
mV = Millivolt(s).
NTU = Nephelometric turbidity units.

2.5 Analytical Methods

Analytical methods for groundwater samples are identified in the Mini-SAP for the specific analytes for the CY 2010 sampling event (SNL 2010). The methods are defined in EPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* Update IV of the Third Edition (EPA 2008). Other analyses are conducted using methods developed by the EPA Office of Groundwater and Drinking Water. The SMO provides oversight of the contract laboratories to ensure that proper methods are applied within SMO-specified performance criteria (SNL 2007b).

2.6 Summary of Monitoring Results

2.6.1 Analytical Results

Groundwater and surface water samples were submitted to GEL Laboratories, Inc. (GEL) for both chemical and radiological analysis. In addition, SNL/NM FSO personnel performed field alkalinity measurements. 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 and NMED maximum allowable concentrations (MACs) for human health standards of groundwater as promulgated by the NMWQCC (NMED 2001). Analytical reports from GEL, including certificates of analyses, analytical methods, MDLs, practical quantitation limits (PQLs), minimal detectable activity (MDA) values, critical levels, dates of analyses, results of QC analyses, and data validation findings are filed in the SNL/NM Customer Funded Records Center. Analytical results, laboratory QC qualifiers, and third-party validation qualifiers are posted to 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 March 2010. No VOCs or HE compounds were detected at concentrations above established MCLs or MACs in any groundwater sample. Chloroform, chloromethane, bromodichloromethane, and dibromochloromethane were the only VOCs detected above the laboratory

MDLs but below reporting limits or PQLs. Consequently the concentration values reported by the laboratory are qualified with “J” as estimated concentrations.

Chloroform was detected at a concentration of 0.730 μg/L in the sample from CTF-MW3 and at 0.600 μg/L in the sample from TRE-1. Chloromethane was detected in the PL-4 and SWTA3-MW3 samples at concentrations of 0.320 and 0.400 μg/L, respectively. The duplicate sample from PL-4 contained no chloromethane at a detectable level. Toluene was qualified as not detected during data validation in samples from Coyote Springs, PL-4, and SFR-2S due to the presence of toluene in associated laboratory method blank samples. Therefore, a validation qualifier of “U” is assigned to the data.

The only HE compound detected was hexahydro-trinitro-triazine (RDX). The concentration of RDX detected in the sample from CTF-MW2 was reported at 0.170 μg/L; however, this value was qualified as estimated with “J” as detected but not reliably quantifiable. Table 2A-2 (Attachment 2A) lists the laboratory MDLs for VOC and HE compounds associated with the applied analytical methods.

Table 2A-3 (Attachment 2A) summarizes alkalinity, major anions (as bromide, chloride, fluoride, and sulfate), NPN, TOX, total phenols, and total cyanide results. None of the analytes listed were detected above established MCLs or MACs, except fluoride. Fluoride was detected above the MAC of 1.6 milligrams per liter (mg/L) in samples from Coyote Springs, CTF-MW2, CTF-MW3, and SFR-4T at concentrations ranging from 1.62 to 2.44 mg/L. Elevated fluoride concentrations are routinely observed in monitoring wells in the eastern half of KAFB. This is an area of shallow groundwater and elevated bedrock containing fluoride-bearing minerals. The time trend plots for wells exceeding the MCL for fluoride concentrations are presented in Figures 2B-2 through 2B-5 (Attachment 2B).

Detections of TOX were reported in samples from six wells and Coyote Springs. The results for TOX were qualified during data validation as not detected in samples from three of the wells due to contamination in initial calibration and continuing calibration blank samples. The surviving validated TOX detections occurred in Coyote Springs, CTF-MW2, Greystone-MW2, and SFR-4T samples at concentrations of 0.0567, 0.0289, 0.00868, and 0.0283 mg/L respectively. The result for the Greystone-MW2 sample is “J” qualified because the concentration is less than the PQL but greater than the MDL.

Total phenol was detected in the samples from Eubank-1, Greystone-MW2, MRN-3D, SWTA3-MW2, and TRE-1 at “J” level concentrations. The results for PL-4 were qualified as not detected during data validation due to contamination in the associated equipment blank sample. NPN was detected in all the well samples above associated MDLs, except for the sample obtained from CTF-MW2. The NPN results for SWTA3-MW3 were qualified as not detected during data validation because the associated equipment blank (EB) was found to be contaminated. None of the well samples yielded detections for total cyanide.

Samples from GWPP monitoring wells were analyzed for TAL metals plus uranium. No metal parameters, other than arsenic and beryllium, were detected above established regulatory limits in any groundwater sample. Arsenic was detected above the MCL of 0.01 mg/L in the sample from CTF-MW2 at a concentration of 0.0535 mg/L. The time trend plot for arsenic concentrations in well CTF-MW2 is shown in Figure 2B-6 (Attachment 2B). Beryllium was detected above the MCL of 0.004 mg/L in the sample from Coyote Springs at a concentration of 0.00713 mg/L. The time trend plot for beryllium concentrations in Coyote Springs is shown in Figure 2B-7 (Attachment 2B). Dissolved TAL metal results are summarized in Table 2A-4 (Attachment 2A). Both the arsenic result for CTF-MW2 and the beryllium result for Coyote Springs are consistent with prior years of monitoring data as is demonstrated in the trend plots.

Mercury was analyzed from unfiltered samples and 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).

Gamma spectroscopy results for short-list of gamma radiation emitting radioisotopes (americium-241, cesium-137, cobalt-60, and potassium-40) are summarized in Table 2A-6 (Attachment 2A). All isotope activities are less than associated MDA values, except for potassium-40. Potassium-40 was reported above the MDA in the samples from CTF-MW1, CTF-MW3, PL-4 (duplicate), and SFR-2S at activities of 56.4 ± 24.7, 54.7 ± 18.6, 48.8 ± 22.7, and 93.9 ± 26.8 picoCuries/liter (pCi/L).

Radioisotopic results are summarized in Table 2A-7 (Attachment 2A). Analyses for alpha- and beta-emitting radioisotopes included gross alpha and gross beta activity, radium-226, radium-228, and radon-222. Isotopic uranium (U-233/234, U-235/236, and U-238) analysis was conducted on those samples from wells that previously had high gross alpha activity or are located where groundwater is in contact with bedrock which contains minerals that are high in naturally occurring radioisotopes. The MCL value of 15 pCi/L does not include the contribution of the uranium or radon activity. The analytical procedure removes the radon from the sample; hence, the laboratory-reported gross alpha result must be corrected by removing only the uranium activity in the sample. For wells where isotopic uranium activity was measured, the activity value was subtracted directly to correct the gross alpha results. For other wells, the uranium concentration obtained from the TAL metal analysis was converted to uranium activity using a conversion factor of 670 picocuries per milligram (EPA 2000). The corrected gross alpha activity results are all below the MCL of 15 pCi/L, with a maximum value of 10.76 pCi/L. Gross beta activity results do not exceed established MCLs. Combined radium-226 and radium-228 activity results from the CTF-MW2 sample exceed the MCL of 5.0 pCi/L. Activity for radium-226 was reported at 2.16 ± 0.0854 pCi/L and for radium-228 at 7.94 ± 2.10 pCi/L in the sample from CTF-MW2. Figure 2B-8 (Attachment 2B) shows the time trend plot for radium-226 and radium-228 activity levels in CTF-MW2.

The NMED DOE OB representatives collected additional samples for isotopic uranium at Coyote Springs and monitoring wells CTF-MW2, SFR-2S, and TRE-1 at the same time SNL/NM personnel collected samples from these wells. SNL/NM personnel collected samples for isotopic uranium at these wells to ensure a consistent level of quality with the NMED DOE OB.

Table 2A-8 (Attachment 2A) summarizes field water quality measurements collected prior to sampling and field alkalinity titration results. Field water quality measurements include water level, turbidity, pH, temperature, SC, ORP, and DO. The water level was measured with a Solinst® water level indicator. Groundwater temperature, SC, ORP, DO, and pH were measured using an YSI™ Model 620 water quality meter. Turbidity was measured with a HACH™ Model 2100P portable turbidity meter.

2.6.2 Water Level Measurements

During CY 2010, water levels were measured in 189 monitoring wells; SNL/NM GWPP personnel measured levels in 78 of these wells. Data were provided by the USAF IRP, the COA, and the USGS for the remainder of the wells. The water level data are maintained in the EDMS. Water level data for CY 2010 for SNL/NM wells is provided in Table 2A-9 (Attachment 2A). The total number of wells represented in the database, listed by the respective organization, is provided in Table 2-3.

Table 2-3. Water Levels Measured in Monitoring Wells by SNL/NM and Other Organizations

Total Wells	Measuring Agency	Well Owner	Location
78	SNL/NM GWPP	DOE/NNSA	Site-wide surveillance network wells, CWL, MWL, TA-V, TAG Investigation, and Burn Site Groundwater Area
101	USAF IRP Program	KAFB	IRP Long-term Monitoring Program
7	COA	COA	Eubank Landfill north of KAFB and Yale Avenue Landfill west of KAFB
1	SNL/NM GWPP	COA	Eubank 1, West of Eubank Landfill
1	USGS	New Mexico State Engineer's Office	Mesa del Sol well
1	USGS	COA	MP-MW3 (Montessa Park) well

NOTES:

COA	= City of Albuquerque.
CWL	= Chemical Waste Landfill.
DOE	= U.S. Department of Energy.
GWPP	= Groundwater Protection Program.
IRP	= Installation Restoration Program.
KAFB	= Kirtland Air Force Base.
MWL	= Mixed Waste Landfill.
NNSA	= National Nuclear Security Administration.
SNL/NM	= Sandia National Laboratories, New Mexico.
TA-V	= Technical Area V.
TAG	= Tijeras Arroyo Groundwater.
USAF	= U.S. Air Force.
USGS	= U.S. Geological Survey.

2.6.2.1 Groundwater Recharge and Withdrawal

Factors influencing water level elevation changes include potential recharge from precipitation and groundwater withdrawal by production wells.

Annual Precipitation

The regional climate for the Albuquerque Basin area is semiarid. Long-term average precipitation ranges from 9.0 inches per year (in./yr) (30-year norm) at Albuquerque International Sunport (Airport) 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. For CY 2010, the wettest months were June through October. Precipitation data relevant to KAFB hydrogeology are available from four locations. Three meteorological towers are used to measure on-site precipitation at KAFB: the A21 tower located in Technical Area (TA)-II; the A36 tower located in TA-III; and the SC1 tower located near Schoolhouse Well in the foothills of the Manzanita Mountains (Figure 1-4). The fourth source is the National Weather Service station at the Airport, adjacent to KAFB.

Annual precipitation during CY 2010 at the four sites is shown in Table 2-4. Data for CY 2009 is also presented for comparison. The 8.96 inches of precipitation measured at the Airport during CY 2010 is 2.29 inches greater than the corresponding period for the previous year; it is also 0.51 inches below the 30-year norm of 9.47 inches. Monthly distribution of precipitation during CY 2010 at the four locations is shown in Figure 2C-1 (Attachment 2C). Figure 2C-2 shows the annual distribution of precipitation at these four locations for the period from January 2002 to December 2010.

Table 2-4. CY 2009–CY 2010 Precipitation Data at KAFB

Site	A21	A36	SC1	Airport
CY09	6.83	7.97	9.24	6.67
CY10	9.47	9.67	11.17	8.96

NOTES: Data are in inches of rainfall.
Airport = Albuquerque International Sunport.
CY = Calendar Year.
KAFB = Kirtland Air Force Base.

Groundwater Withdrawal

KAFB production wells are screened over a depth from about 500 to 2,000 feet (ft) below ground surface (bgs) and extract groundwater from the upper and middle unit of the Santa Fe Group. During CY 2010, KAFB pumped groundwater primarily from seven water supply wells.

KAFB supplies all the water for SNL/NM and other DOE facilities located on KAFB. Figure 2C-3 (Attachment 2C) shows the CY 2010 monthly production for KAFB water supply wells. The highest level of production was in July at 124,551,000 gallons (gal.); the lowest occurred in February at 34,537,000 gal. The variability in production in response to demand is reflected in the cyclic fluctuation of water levels in monitoring wells within the region of influence of these pumping wells and is evident when shown in hydrographs. Figure 2C-4 shows the CY 2010 monthly production for each KAFB water supply well. Figure 2C-5 shows the trend of total annual groundwater production at KAFB for all wells, starting with 2001. Table 2-5 provides a comparison of water pumped during CY 2010 to the previous year.

Table 2-5. Total KAFB Groundwater Well Production

Units	CY 2009	CY 2010
Million gal.	890	900
ac-ft	2,731	2,763

NOTES:
ac-ft = 325,851 gal.
CY = Calendar Year.
gal. = Gallon(s).
KAFB = Kirtland Air Force Base.

2.6.2.2 Water Table Elevations

Construction of Regional Water Table Elevation Contour Map

Water level data for monitoring wells installed by the DOE and Sandia, USAF IRP, COA, and the State of New Mexico were used to construct the CY 2010 regional water table elevation contour map shown in Figure 2C-6 (Attachment 2C). The extent of the contoured area was constructed using September through October 2010 static water level elevation data from 32 wells completed in the regional aquifer underlying the western portion of KAFB. These wells are screened across the regional water table in the upper unit of the Santa Fe Group. The West Sandia Fault and the Tijeras fault complex (Figures 1-2 and 1-3) approximate the eastern boundary of the area in Figure 2C-6. These bounding faults are assumed to act as barriers to groundwater flow into the central basin from foothills to the east. The contours are developed using Surfer software (Golden 2002). The wells and the relevant data used to construct the contour map are listed in Table 2C-1 in Attachment 2C. Four-year hydrographs for these wells are provided in Figures 2C-8 through 2C-10.

Regional Groundwater Flow System

In general, the open-to-the-north, U-shaped contour lines depicted in Figure 2C-6 (Attachment 2C) define an elongated depression in the water table with a north-south orientation. This depression or trough extends as far south as Isleta Pueblo Reservation. The KAFB and COA Ridgecrest production well fields are located near the northern boundary of KAFB. The depression of the water table is the result of the withdrawal of groundwater by the water supply wells. The contour line gradient indicates groundwater flow towards these supply wells. The flat gradient in the middle of the trough is characteristic of flow through the highly permeable sediments of the Ancestral Rio Grande fluvial deposits, which are the most productive aquifer material in this area. The contours define the collective zones of influence of these large well fields. The direction of groundwater flow in the vicinity of KAFB (west of the Tijeras fault complex), as inferred from the contour lines, is toward the center of the trough and then to the north.

The relatively steep gradients in the water table along the eastern edge of the map are partially due to increased ground surface elevation defining the eastern extent of the Albuquerque Basin and the presence of faults, shown in Figures 1-2 and 1-3. The faults also present a hydrologic barrier to the westward movement of groundwater. The dashed contour lines in the southeast corner of Figure 2C-6 are inferred contours of groundwater elevations impacted by the Tijeras fault zone, which intersects the map at this location. Very little change is apparent when comparing the contours mapped in CY 2009 to those of the current reporting year, CY 2010.

Figure 2C-7 (Attachment 2C) maps contours of changes in water level elevations in the regional aquifer observed during CY 2010 from the same period of measurement in CY 2009. Areas of greatest declines in the water table are in the southeast quadrant of the mapped area. The water level decline over the past year in monitoring well CWL-BW3 was 1.26 ft. The four-year trend for this well is approximately 0.58 ft/year (ft/yr) as determined from the hydrograph presented in Figure 2C-8. The wells in the northern and western portions of KAFB in Figure 2C-7 show an increase in groundwater elevation. The area of increasing water levels has expanded significantly from the previous year. In the northeast, the water level in well Eubank-5 is up 1.49 ft from the corresponding period in CY 2009 (Figure 2C-9). This increase may be attributed to recharge from Tijeras Arroyo or resulting from draining of the perched groundwater system (PGWS) described in the following section. In the northwest, the water level in monitoring well KAFB-0118 is up 1.37 ft over the level measured in October 2009. The four-year trend for this well shows a decrease of 0.47 ft/yr.

Perched Groundwater System

During monitoring well installation for groundwater characterization at TA-II in 1993, a shallow water-bearing zone was encountered at a depth of 300 ft bgs. This was 200 ft above the regional water table at this location. The installation of additional wells completed in this shallow water-bearing zone defined the boundaries of the extent of the PGWS, which is approximately 3.5 square miles. The western extent is to the west side of the former KAFB sewage lagoons. The northern limits coincide with the northern edge of TA-I. To the east, the PGWS has been confirmed in the USAF IRP monitoring wells east of the KAFB Landfill. The southern extent appears to be south of the golf course along the north side of Pennsylvania Avenue.

The elevation data to the first water level of the PGWS are contoured in Figure 2C-11 (Attachment 2C). The contour map was constructed using data from 19 monitoring wells (Table 2C-2) completed in the defined area. The contours indicate a gradient in the PGWS to the east-southeast. Correlation of lithologic information obtained from boreholes drilled during monitoring well installations indicates a layer of fine sediments that dips to the southeast (Van Hart 2001) and may serve as the perching horizon.

Figure 2C-12 (Attachment 2C) illustrates the change in water level elevations in the PGWS during the period of CY 2010. In general water levels appear to be decreasing throughout the PGWS except for a slight increase in the southeast area. The changes in water level are dominated by the effects in monitoring wells TA1-W-03 and WYO-4. The drop in water level in TA1-W-03 was 2.4 ft during CY 2010. The majority of the decrease occurred in the first quarter of the year. The decrease coincides with the redevelopment of the well during February 2010. The hydrograph (Figure 2C-13) indicates the water level in the well did not recover to the predevelopment level. The four-year trend in the well is 0.69 ft/yr, although the decrease in water level elevation appears to have accelerated during the last half of CY 2010. The water level elevation decrease in WYO-4 is 1.4 ft during the current year. Based on the hydrograph, the rate of decline in water level elevation in the well has slowed beginning in early CY 2009. In Figure 2C-12, the solid-line contours represent water level elevation decreases over the course of CY 2010; the dashed lines in the southeast half of the map represent increasing water levels.

Monitoring Well Hydrographs

This section discusses recent trends in water levels in the vicinity of SNL/NM, as demonstrated in the hydrographs for wells used to construct the regional water table contours in Figure 2C-6 and the PGWS contours in Figure 2C-11 (Attachment 2C). The wells are listed in Tables 2C-1 and 2C-2. The water level data for these wells are representative of water levels at KAFB west of the Tijeras fault zone and the Sandia fault. Hydrographs represent graphical plots of water levels at a monitoring location over time. Data from quarterly and monthly water level measurements are used to construct the hydrographs. These hydrographs illustrate water level changes over the time period from 2007 through 2010. Figures 2C-8 through 2C-10 depict the hydrographs of wells representing the regional aquifer, and Figures 2C-13 and 2C-14 show the hydrographs for the PGWS.

2.7 Quality Control Results

The QC samples are collected in the field at the time of environmental sample collection. Field QC samples include duplicate, trip blank (TB), EB, and field blank (FB) samples. Field QC samples are used to monitor the sampling process. EB samples are used to verify sampling equipment decontamination procedures. Duplicate samples are used to measure the precision of the sampling process. FB samples are used to assess whether contamination of the samples resulted from ambient field conditions. TB samples are used to determine whether VOCs contaminated the sample during preparation, transportation, and handling prior to receipt by the analytical laboratory.

2.7.1 Field Quality Control Samples

2.7.1.1 Duplicate Environmental Samples

Duplicate environmental samples were collected from NWTA-MW3D, PL-4, and SWTA3-MW3 and analyzed for all parameters 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.

Relative percent difference calculations of environmental samples and duplicate samples were performed for detected chemical analytes only.

2.7.1.2 Trip Blank Samples

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. The TBs consist of laboratory reagent grade water with hydrochloric acid preservative contained in 40-milliliter (mL) volatile organic analysis vials prepared by the analytical laboratory, which accompany the empty sample containers supplied by the laboratory. TBs were brought to the field and accompanied each sample shipment. A total of 20 TB samples were submitted with the March 2010 samples. No VOCs were detected above MDLs in any TB sample, except for toluene. Toluene was detected in four TB samples; however, the results were qualified as not detected during data validation due to associated laboratory method blank contamination.

2.7.1.3 Equipment Blank Samples

The sampling pump and tubing bundle were decontaminated prior to insertion into monitoring wells. The following solutions were pumped through the sampling system: 5 gallons of deionized (DI) water mixed with 20 mL of nonphosphate laboratory detergent; 5 gallons of DI water; 5 gallons of DI water mixed with 20 mL reagent grade nitric acid; and 15 gallons of DI water. In addition, the outside of the pump tubing was rinsed with DI water. The EB or rinsate samples are collected to verify the effectiveness of the equipment decontamination process.

EB samples were collected prior to well purging and sampling at NWTA3-MW3D, PL-4, and SWTA3-MW3. Samples were analyzed for both chemical and radiological parameters. Various VOCs and metals, total alkalinity, chloride, NPN, total phenol, and radium-228 were detected in EB samples. No corrective action was required for the detected organic compounds as these compounds were not detected in the associated environmental samples. No corrective action was required for chloride, alkalinity, calcium, magnesium, sodium, thallium, zinc, or radium as these parameters either were not detected in the associated environmental samples or were detected at concentrations greater than five times the EB result. Total phenol, NPN, and copper were detected at concentrations less than five times the associated environmental sampling results. The associated environmental sampling results were qualified as not detected during data validation for total phenol in the PL-4 samples, NPN in the SWTA3-MW3 samples, and copper in the NWTA3-MW3D samples.

2.7.1.4 Field Blank Samples

Three FB samples were collected for VOCs to assess whether contamination of the samples resulted from ambient conditions during sample collection. Field samples were prepared by pouring DI water into sample containers at the MRN-2, SWTA3-MW2, and SWTA3-MW4 sampling points to simulate the transfer of environmental samples from the sampling system to the sample container. No VOCs were detected in any FB sample, except for bromodichloromethane, bromoform, chloroform, and dibromochloromethane. No corrective action was necessary as these compounds were not detected above laboratory MDLs in the associated environmental samples.

2.7.2 Laboratory Quality Control 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. Table 2-6 shows the types of QC samples that accompany groundwater quality samples in the sampling and analysis process. Reported laboratory analytical and QC data are reviewed against quality assurance requirements specified in AOP-003, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL 2007d). Quality assurance validation is conducted on all laboratory-reported data by a third-party consultant. The validation process evaluates the laboratory analytical processes and laboratory QC results for consistency with the specified analytical methods and contract requirements.

Table 2-6. QC Sample Types for Groundwater Sampling and Analysis

QC Sample Type	Description
Field QC	
Equipment blanks(1)	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 sampling process.
Trip blanks	Determine whether contamination by VOCs occurred during sample handling, shipment, or storage by submitting deionized water samples with environmental samples for VOC analysis.
Field Blanks	Assess whether contamination of the VOC samples had resulted from ambient field conditions.
Laboratory QC	
Method blanks	Determine contaminants introduced during the sample preparation and handling process in the laboratory.
LCS	Monitor the accuracy and precision of the laboratory's analytical method using laboratory-prepared samples spiked with a known concentration of an analyte. These samples are analyzed in the same batch with the groundwater samples. LCS results are reported as a percent recovery.
Batch matrix spike and matrix spike duplicate samples	Measure the effects of chemical spikes added to an existing sample to determine the sample matrix effect. (The matrix is groundwater.)

NOTE: (1)Equipment blanks are collected for selected wells only.
LCS = Laboratory control sample.
QC = Quality control.
VOC = Volatile organic compound.

2.8 Variances and Nonconformances

No variances occurred during the CY 2010 annual groundwater surveillance monitoring event.

2.9 Summary and Conclusions

The annual groundwater surveillance monitoring sampling event was conducted during March 2010. Groundwater samples were collected from 16 monitoring wells and 1 spring. The analytical results for the groundwater samples are similar to the results reported for previous years. No VOCs or HE compounds were detected above established MCLs or MACs. The HE compound RDX was detected in the groundwater sample from monitoring well CTF-MW2 at a concentration of 0.170 µg/L.

Fluoride was detected above the NMWQCC groundwater protection standard of 1.6 mg/L (NMED 2001). The elevated fluoride concentrations were detected in samples from wells CTF-MW2, CTF-MW3, SFR-4T, and SWTA3-MW4. The water sample from Coyote Springs also contained elevated fluoride levels. The concentrations range from 1.62 to 2.44 mg/L. The EPA SDWA-regulated MCL for fluoride is 4.0 mg/L.

Arsenic was detected above the MCL of 0.01 mg/L in the groundwater sample from CTF-MW2 at a concentration of 0.0535 mg/L. Beryllium was detected in the surface water sample from Coyote Springs at a concentration of 0.00713 mg/L. The MCL for beryllium is 0.004 mg/L. Beryllium has been consistently detected in the surface water samples from the springs and is considered to be of natural origin.

Upon applying the appropriate correction for uranium to the gross alpha results, none of the samples exceeded the MCL of 15 pCi/L. Combined radium-226 and radium-228 activities from the CTF-MW2 sample exceeded the MCL of 5.0 pCi/L. Radium-226 was reported in the sample from CTF-MW2 at 2.16 ± 0.0854 pCi/L and radium-228 at 7.94 ± 2.10 pCi/L.

Water table elevation measurements were obtained throughout CY 2010 at 78 locations on a monthly and quarterly basis. Water level elevation measurements obtained from 32 representative monitoring wells west of the Tijeras fault zone and west of the Sandia fault at KAFB and vicinity were used to construct contours of water table elevation. 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 COA wells north of the base. A contour map of the differences in the regional water table between the same periods in CY 2010 and CY 2009 indicate the area of greatest decline is in the southeast quadrant of the mapped area. The water level decline over the past year in monitoring well CWL-BW3 is 1.26 ft. The area of increasing water levels has expanded significantly from the previous year. In the northeast, the water level in well Eubank-5 is up 1.49 ft from the corresponding period in CY 2009 (Figure 2C-7). In the northwest, the water level in monitoring well KAFB-0118 is up 1.37 ft over the level measured in October 2009 (Figure 2C-7).

Water level elevations were also obtained for wells completed in the PGWS. Nineteen wells were used to construct a water level elevation contour map for the PGWS. The contours indicate groundwater flow in the PGWS is from the northwest to the southeast. Water levels are declining in the northwest and increasing slightly in the east (Figure 2C-12) presumably due to the drainage of the system to the east and perhaps some additional recharge from the Tijeras Arroyo.

2.10 References

DOE 2008 U.S. Department of Energy (DOE), 2008. *Environmental Protection Program*, DOE Order 450.1A, U.S. Department of Energy, Washington, D.C., June 4.

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 2008 U.S. Environmental Protection Agency (EPA), 2008. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Update IV of 3rd ed., U.S. Environmental Protection Agency, Washington, D.C.

EPA 2000 U.S. Environmental Protection Agency (EPA). *National Drinking Water Regulations,* Final Rule 65 FR236; December 7.

EPA 1986 U.S. Environmental Protection Agency (EPA), 1986. *RCRA Groundwater Monitoring Technical Enforcement Guidance Document (TEGD)*, Office of Solid Waste, OSWER-9950.1, U.S. Environmental Protection Agency, Washington, D.C., September.

Golden 2002 Golden Software, Inc, 2002. *Surface Mapping System*, V. 8, Golden Software, Inc.

NMED 2004 New Mexico Environment Department (NMED), 2004. *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order*, New Mexico Environment Department, Santa Fe, New Mexico, April 29.

NMED 2001 New Mexico Environment Department (NMED), 2001. *New Mexico Water Quality Control Commission Regulations,* Section 20.6.2 of the New Mexico Administrative Code, *Environmental Protection, Water Quality, Groundwater and Surface Water Protection*, New Mexico Environment Department, Santa Fe, New Mexico, January 15.

NMOSE 2005 New Mexico Office of the State Engineer (NMOSE), 2005. *Rules and Regulations Governing Well Driller Licensing; Construction, Repair and Plugging of Wells*, Office of the State Engineer, Santa Fe, New Mexico, August 31.

SNL 2010 Sandia National Laboratories/New Mexico (SNL/NM), 2010. *Groundwater Protection Program Mini-SAP for FY10 Annual Groundwater Surveillance*, Sandia National Laboratories, Albuquerque, New Mexico, March.

SNL 2009a Sandia National Laboratories/New Mexico (SNL/NM), 2009. *SNL/NM Groundwater Protection Program Plan*, Sandia National Laboratories, Albuquerque, New Mexico, September.

SNL 2009b Sandia National Laboratories/New Mexico (SNL/NM), 2009. *Summary Report for Monitoring Well Plug and Abandonment and Installation, Decommissioning of Groundwater Monitoring Wells PL-1 and PL-3, Installation of Groundwater Groundwater Monitoring Well PL-4*, Sandia National Laboratories, Albuquerque, New Mexico, November.

SNL 2007a Sandia National Laboratories/New Mexico (SNL/NM), 2007. *Long-Term Environmental Stewardship Groundwater Monitoring Well Sampling and Field Analytical Measurements*, FOP 05-01, Revision 00, Sandia National Laboratories, Albuquerque, New Mexico, August.

SNL 2007b Sandia National Laboratories/New Mexico (SNL/NM), 2007. *Procedure for Completing the Contract Verification Review*, SMO-05-03, Issue 03, Sandia National Laboratories, Albuquerque, New Mexico, April 30.

SNL 2007c Sandia National Laboratories/New Mexico (SNL/NM), 2007. *Groundwater Level Data Acquisition and Management*, FOP 03-02, Rev. 02, Sandia National Laboratories, Albuquerque, New Mexico, November 26.

SNL 2007d Sandia National Laboratories/New Mexico (SNL/NM), 2007. *Data Validation Procedure for Chemical and Radiochemical Data,* AOP 00-03, Revision 2, Sandia National Laboratories, Albuquerque, New Mexico, July 16.

SNL 2006 Sandia National Laboratories/New Mexico (SNL/NM), 2006. *Sampling and Analysis Plan, FY06, SNL/NM Groundwater Protection Program, Annual Groundwater Surveillance*, Sandia National Laboratories, Albuquerque, New Mexico, January 18.

Van Hart 2001 Van Hart, D., 2001, *Shallow Groundwater System Investigation – Tijeras Arroyo and Vicinity,* Consultant's Report by GRAM, Inc., prepared for Sandia National Laboratories, Albuquerque, New Mexico.

Attachment 2A
Groundwater Protection Program
Analytical Results Tables

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Attachment 2A Tables

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Table 2A-1
Summary of Detected Volatile Organic and High Explosive Compounds, Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

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]
Coyote Spring 29-Mar-10	Toluene	0.440	0.250	1.00	1000	750	B, J	1.0U	088545-001	SW846-8260
CTF-MW2 15-Mar-10	RDX	0.170	0.104	0.325	NE	NE	J	J+	088516-024	SW846-8330
CTF-MW3 10-Mar-10	Bromodichloromethane	0.530	0.250	1.00	NE	NE	J		088507-001	SW846-8260
	Chloroform	0.730	0.250	1.00	NE	100	J		088507-001	SW846-8260
	Dibromochloromethane	0.390	0.300	1.00	NE	NE	J		088507-001	SW846-8260
PL-4 11-Mar-10	Chloromethane	0.320	0.300	1.00	NE	NE	J		088511-001	SW846-8260
	Toluene	0.430	0.250	1.00	1000	750	B, J	1.0U	088511-001	SW846-8260
PL-4 (Duplicate) 11-Mar-10	Toluene	0.360	0.250	1.00	1000	750	B, J	1.0U	088512-001	SW846-8260
SFR-2S 08-Mar-10	Toluene	0.360	0.250	1.00	1000	750	B, J	1.0U	088503-001	SW846-8260
SWTA3-MW3 16-Mar-10	Chloromethane	0.400	0.300	1.00	NE	NE	J		088520-001	SW846-8260
TRE-1 09-Mar-10	Chloroform	0.600	0.250	1.00	NE	100	J		088505-001	SW846-8260

Refer to footnotes on page 2A-47.

Table 2A-2
Method Detection Limits for Volatile Organic and High Explosive Compounds, Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

Analyte	Method Detection Limit (µg/L)	Analytical Method[g]	Analyte	Method Detection Limit (µg/L)	Analytical Method[g]
1,1,1,2-Tetrachloroethane	0.300	SW846-8260	Dibromomethane	0.300	SW846-8260
1,1,1-Trichloroethane	0.325	SW846-8260	Dichlorodifluoromethane	0.300	SW846-8260
1,1,2,2-Tetrachloroethane	0.250	SW846-8260	Ethyl benzene	0.250	SW846-8260
1,1,2-Trichloroethane	0.250	SW846-8260	Hexachlorobutadiene	0.300	SW846-8260
1,1-Dichloroethane	0.300	SW846-8260	Isopropylbenzene	0.250	SW846-8260
1,1-Dichloroethene	0.300	SW846-8260	Methylene chloride	3.00	SW846-8260
1,1-Dichloropropene	0.250	SW846-8260	Naphthalene	0.250	SW846-8260
1,2,3-Trichlorobenzene	0.332	SW846-8260	Styrene	0.250	SW846-8260
1,2,3-Trichloropropane	0.300	SW846-8260	Tert-butyl methyl ether	0.250	SW846-8260
1,2,4-Trichlorobenzene	0.300	SW846-8260	Tetrachloroethene	0.300	SW846-8260
1,2,4-Trimethylbenzene	0.250	SW846-8260	Toluene	0.250	SW846-8260
1,2-Dibromo-3-chloropropane	0.300	SW846-8260	Trichloroethene	0.250	SW846-8260
1,2-Dibromoethane	0.250	SW846-8260	Trichlorofluoromethane	0.300	SW846-8260
1,2-Dichlorobenzene	0.250	SW846-8260	Vinyl acetate	1.50	SW846-8260
1,2-Dichloroethane	0.250	SW846-8260	Vinyl chloride	0.500	SW846-8260
1,2-Dichloropropane	0.250	SW846-8260	cis-1,2-Dichloroethene	0.300	SW846-8260
1,3,5-Trimethylbenzene	0.250	SW846-8260	cis-1,3-Dichloropropene	0.250	SW846-8260
1,3-Dichlorobenzene	0.250	SW846-8260	m-, p-Xylene	0.500	SW846-8260
1,3-Dichloropropane	0.300	SW846-8260	n-Butylbenzene	0.250	SW846-8260
1,4-Dichlorobenzene	0.250	SW846-8260	n-Propylbenzene	0.250	SW846-8260
2,2-Dichloropropane	0.300	SW846-8260	o-Xylene	0.300	SW846-8260
2-Butanone	1.25	SW846-8260	sec-Butylbenzene	0.250	SW846-8260
2-Chlorotoluene	0.250	SW846-8260	tert-Butylbenzene	0.250	SW846-8260
2-Hexanone	1.25	SW846-8260	trans-1,2-Dichloroethene	0.300	SW846-8260
4-Chlorotoluene	0.250	SW846-8260	trans-1,3-Dichloropropene	0.250	SW846-8260
4-Isopropyltoluene	0.250	SW846-8260	1,3,5-Trinitrobenzene	0.104	SW846-8321A
4-Methyl-, 2-Pentanone	1.25	SW846-8260	1,3-Dinitrobenzene	0.104	SW846-8321A
Benzene	0.300	SW846-8260	2,4,6-Trinitrotoluene	0.104	SW846-8321A
Bromobenzene	0.250	SW846-8260	2,4-Dinitrotoluene	0.104	SW846-8321A
Bromochloromethane	0.300	SW846-8260	2,6-Dinitrotoluene	0.0779	SW846-8321A
Bromodichloromethane	0.250	SW846-8260	2-Amino-4,6-dinitrotoluene	0.104	SW846-8321A
Bromoform	0.250	SW846-8260	2-Nitrotoluene	0.104	SW846-8321A
Bromomethane	0.300	SW846-8260	3-Nitrotoluene	0.104	SW846-8321A

Refer to footnotes on page 2A-47.

Table 2A-2 *(Concluded)*
Method Detection Limits for Volatile Organic Compounds and High Explosives, Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

Analyte	Method Detection Limit (μg/L)	Analytical Method[g]	Analyte	Method Detection Limit (μg/L)	Analytical Method[g]
Carbon disulfide	1.25	SW846-8260	4-Amino-2,6-dinitrotoluene	0.104	SW846-8321A
Carbon tetrachloride	0.300	SW846-8260	4-Nitrotoluene	0.104	SW846-8321A
Chlorobenzene	0.250	SW846-8260	HMX	0.104	SW846-8321A
Chloroethane	0.300	SW846-8260	Nitro-benzene	0.104	SW846-8321A
Chloroform	0.250	SW846-8260	Pentaerythritol tetranitrate	0.130	SW846-8321A
Chloromethane	0.300	SW846-8260	RDX	0.104	SW846-8321A
Dibromochloromethane	0.300	SW846-8260	Tetryl	0.130	SW846-8321A

Refer to footnotes on page 2A-47.

Table 2A-3
Summary of Alkalinity, Anions, Nitrate plus Nitrate, Total Organic Halogens, Total Phenols, and Total Cyanide Results, Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

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	Alkalinity as CaCO3	1030	0.725	1.00	NE	NE	B		088545-016	SM 2320B
29-Mar-10	Bromide	2.07	0.066	0.200	NE	NE			088545-016	SW846 9056
	Chloride	489	3.30	10.0	NE	NE			088545-016	SW846 9056
	Fluoride	**1.62**	0.033	0.100	4.00	1.60			088545-016	SW846 9056
	Sulfate	129	5.00	20.0	NE	NE			088545-016	SW846 9056
	Nitrate plus nitrite	0.414	0.050	0.250	10.0	10.0			088545-018	EPA 353.2
	Total Organic Halogens	0.0567	0.00312	0.010	NE	NE			088545-003	SW846 9020
	Total Phenol	ND	0.0016	0.005	NE	NE	U	UJ	088545-026	SW846 9066
	Total Cyanide	ND	0.0017	0.005	0.200	0.200	U		088545-027	SW846 9012
CTF-MW1	Alkalinity as CaCO3	193	0.725	1.00	NE	NE	B		088526-016	SM 2320B
18-Mar-10	Bromide	0.626	0.066	0.200	NE	NE			088526-016	SW846 9056
	Chloride	37.2	0.660	2.00	NE	NE			088526-016	SW846 9056
	Fluoride	1.29	0.033	0.100	4.00	1.60			088526-016	SW846 9056
	Sulfate	74.6	1.00	4.00	NE	NE			088526-016	SW846 9056
	Nitrate plus nitrite	7.58	0.250	1.25	10.0	10.0			088526-018	EPA 353.2
	Total Organic Halogens	ND	0.00312	0.010	NE	NE	U		088526-003	SW846 9020
	Total Phenol	ND	0.0017	0.005	NE	NE	U	UJ	088526-026	SW846 9066
	Total Cyanide	ND	0.00166	0.005	0.200	0.200	U		088526-027	SW846 9012
CTF-MW2	Alkalinity as CaCO3	1490	0.725	1.00	NE	NE	B		088516-016	SM 2320B
15-Mar-10	Bromide	0.291	0.066	0.200	NE	NE			088516-016	SW846 9056
	Chloride	403	3.30	10.0	NE	NE		J	088516-016	SW846 9056
	Fluoride	**1.71**	0.033	0.100	4.00	1.60			088516-016	SW846 9056
	Sulfate	150	5.00	20.0	NE	NE		J	088516-016	SW846 9056
	Nitrate plus nitrite	ND	0.050	0.250	10.0	10.0	U		088516-018	EPA 353.2
	Total Organic Halogens	0.0289	0.00312	0.010	NE	NE			088516-003	SW846 9020
	Total Phenol	ND	0.0017	0.005	NE	NE	U	UJ	088516-026	SW846 9066
	Total Cyanide	ND	0.00166	0.005	0.200	0.200	U		088516-027	SW846 9012
CTF-MW3	Alkalinity as CaCO3	345	0.725	1.00	NE	NE			088507-016	SM 2320B
10-Mar-10	Bromide	1.14	0.066	0.200	NE	NE			088507-016	SW846 9056
	Chloride	110	6.60	20.0	NE	NE		J	088507-016	SW846 9056
	Fluoride	**2.21**	0.033	0.100	4.00	1.60			088507-016	SW846 9056
	Sulfate	452	10.0	40.0	NE	NE		J	088507-016	SW846 9056
	Nitrate plus nitrite	5.54	0.100	0.500	10.0	10.0			088507-018	EPA 353.2
	Total Organic Halogens	0.0101	0.00312	0.010	NE	NE		0.018UJ	088507-003	SW846 9020
	Total Phenol	ND	0.0017	0.005	NE	NE	U		088507-026	SW846 9066
	Total Cyanide	ND	0.00166	0.005	0.200	0.200	U	UJ	088507-027	SW846 9012

Refer to footnotes on page 2A-47.

Table 2A-3 *(Continued)*
Summary of Alkalinity, Anions, Nitrate plus Nitrate, Total Organic Halogens, Total Phenols, and Total Cyanide Results, Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

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]
Eubank-1	Alkalinity as CaCO3	176	0.725	1.00	NE	NE			088501-016	SM 2320B
05-Mar-10	Bromide	0.206	0.066	0.200	NE	NE			088501-016	SW846 9056
	Chloride	12.1	0.066	0.200	NE	NE			088501-016	SW846 9056
	Fluoride	0.416	0.033	0.100	4.00	1.60			088501-016	SW846 9056
	Sulfate	67.5	1.00	4.00	NE	NE			088501-016	SW846 9056
	Nitrate plus nitrite	2.14	0.050	0.250	10.0	10.0			088501-018	EPA 353.2
	Total Organic Halogens	ND	0.00312	0.010	NE	NE	U		088501-003	SW846 9020
	Total Phenol	0.00176	0.0017	0.005	NE	NE	J		088501-026	SW846 9066
	Total Cyanide	ND	0.00166	0.005	0.200	0.200	U	UJ	088501-027	SW846 9012
Greystone-MW2	Alkalinity as CaCO3	441	0.725	1.00	NE	NE			088531-016	SM 2320B
22-Mar-10	Bromide	0.651	0.066	0.200	NE	NE			088531-016	SW846 9056
	Chloride	106	0.660	2.00	NE	NE			088531-016	SW846 9056
	Fluoride	0.776	0.033	0.100	4.00	1.60			088531-016	SW846 9056
	Sulfate	47.2	1.00	4.00	NE	NE			088531-016	SW846 9056
	Nitrate plus nitrite	4.30	0.250	1.25	10.0	10.0			088531-018	EPA 353.2
	Total Organic Halogens	0.00868	0.00312	0.010	NE	NE	J		088531-003	SW846 9020
	Total Phenol	0.00206	0.0016	0.005	NE	NE	J	NJ-	088531-026	SW846 9066
	Total Cyanide	ND	0.00166	0.005	0.200	0.200	U		088531-027	SW846 9012
MRN-2	Alkalinity as CaCO3	151	0.725	1.00	NE	NE			088535-016	SM 2320B
24-Mar-10	Bromide	0.200	0.066	0.200	NE	NE	J		088535-016	SW846 9056
	Chloride	13.8	0.066	0.200	NE	NE			088535-016	SW846 9056
	Fluoride	0.581	0.033	0.100	4.00	1.60			088535-016	SW846 9056
	Sulfate	47.9	0.500	2.00	NE	NE			088535-016	SW846 9056
	Nitrate plus nitrite	4.30	0.250	1.25	10.0	10.0			088535-018	EPA 353.2
	Total Organic Halogens	ND	0.00312	0.010	NE	NE	U		088535-003	SW846 9020
	Total Phenol	ND	0.0016	0.005	NE	NE	U	UJ	088535-026	SW846 9066
	Total Cyanide	ND	0.00166	0.005	0.200	0.200	U		088535-027	SW846 9012
MRN-3D	Alkalinity as CaCO3	161	0.725	1.00	NE	NE			088538-016	SM 2320B
25-Mar-10	Bromide	0.241	0.066	0.200	NE	NE			088538-016	SW846 9056
	Chloride	14.6	0.066	0.200	NE	NE			088538-016	SW846 9056
	Fluoride	0.469	0.033	0.100	4.00	1.60			088538-016	SW846 9056
	Sulfate	69.9	0.500	2.00	NE	NE			088538-016	SW846 9056
	Nitrate plus nitrite	1.79	0.100	0.500	10.0	10.0			088538-018	EPA 353.2
	Total Organic Halogens	ND	0.00312	0.010	NE	NE	U		088538-003	SW846 9020
	Total Phenol	0.00179	0.0016	0.005	NE	NE	J	NJ-	088538-026	SW846 9066
	Total Cyanide	ND	0.00166	0.005	0.200	0.200	U		088538-027	SW846 9012

Refer to footnotes on page 2A-47.

Table 2A-3 *(Continued)*
Summary of Alkalinity, Anions, Nitrate plus Nitrate, Total Organic Halogens, Total Phenols, and Total Cyanide Results, Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

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	Alkalinity as CaCO3	132	0.725	1.00	NE	NE	B, H		088542-016	SM 2320B
26-Mar-10	Bromide	0.158	0.066	0.200	NE	NE	J		088542-016	SW846 9056
	Chloride	11.0	0.066	0.200	NE	NE			088542-016	SW846 9056
	Fluoride	0.720	0.033	0.100	4.00	1.60			088542-016	SW846 9056
	Sulfate	51.7	0.200	0.800	NE	NE			088542-016	SW846 9056
	Nitrate plus nitrite	1.01	0.050	0.250	10.0	10.0			088542-018	EPA 353.2
	Total Organic Halogens	ND	0.00312	0.010	NE	NE	U		088542-003	SW846 9020
	Total Phenol	ND	0.0016	0.005	NE	NE	U	UJ	088542-026	SW846 9066
	Total Cyanide	ND	0.0017	0.005	0.200	0.200	U		088542-027	SW846 9012
NWTA3-MW3D (Duplicate)	Alkalinity as CaCO3	131	0.725	1.00	NE	NE	B, H		088543-016	SM 2320B
26-Mar-10	Bromide	0.160	0.066	0.200	NE	NE	J		088543-016	SW846 9056
	Chloride	11.0	0.066	0.200	NE	NE			088543-016	SW846 9056
	Fluoride	0.793	0.033	0.100	4.00	1.60			088543-016	SW846 9056
	Sulfate	51.6	0.200	0.800	NE	NE			088543-016	SW846 9056
	Nitrate plus nitrite	1.01	0.050	0.250	10.0	10.0			088543-018	EPA 353.2
	Total Organic Halogens	ND	0.00312	0.010	NE	NE	U		088543-003	SW846 9020
	Total Phenol	ND	0.0016	0.005	NE	NE	U	UJ	088543-026	SW846 9066
	Total Cyanide	ND	0.0017	0.005	0.200	0.200	U		088543-027	SW846 9012
PL-2	Alkalinity as CaCO3	146	0.725	1.00	NE	NE	B		088514-016	SM 2320B
12-Mar-10	Bromide	0.213	0.066	0.200	NE	NE			088514-016	SW846 9056
	Chloride	14.3	0.066	0.200	NE	NE			088514-016	SW846 9056
	Fluoride	0.513	0.033	0.100	4.00	1.60			088514-016	SW846 9056
	Sulfate	64.1	0.500	2.00	NE	NE			088514-016	SW846 9056
	Nitrate plus nitrite	2.55	0.100	0.500	10.0	10.0			088514-018	EPA 353.2
	Total Organic Halogens	ND	0.00312	0.010	NE	NE	U		088514-003	SW846 9020
	Total Phenol	ND	0.0017	0.005	NE	NE	U	UJ	088514-026	SW846 9066
	Total Cyanide	ND	0.00166	0.005	0.200	0.200	U		088514-027	SW846 9012
PL-4	Alkalinity as CaCO3	170	0.725	1.00	NE	NE			088511-016	SM 2320B
11-Mar-10	Bromide	0.236	0.066	0.200	NE	NE			088511-016	SW846 9056
	Chloride	16.0	0.066	0.200	NE	NE			088511-016	SW846 9056
	Fluoride	0.416	0.033	0.100	4.00	1.60			088511-016	SW846 9056
	Sulfate	57.8	1.00	4.00	NE	NE			088511-016	SW846 9056
	Nitrate plus nitrite	3.52	0.100	0.500	10.0	10.0			088511-018	EPA 353.2
	Total Organic Halogens	ND	0.00312	0.010	NE	NE	U		088511-003	SW846 9020
	Total Phenol	0.0025	0.0017	0.005	NE	NE	J	0.013U	088511-026	SW846 9066
	Total Cyanide	ND	0.00166	0.005	0.200	0.200	U	UJ	088511-027	SW846 9012

Refer to footnotes on page 2A-47.

Table 2A-3 *(Continued)*
Summary of Alkalinity, Anions, Nitrate plus Nitrate, Total Organic Halogens, Total Phenols, and Total Cyanide Results, Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
PL-4 (Duplicate) 11-Mar-10	Alkalinity as CaCO3	168	0.725	1.00	NE	NE			088512-016	SM 2320B
	Bromide	0.233	0.066	0.200	NE	NE			088512-016	SW846 9056
	Chloride	16.0	0.066	0.200	NE	NE			088512-016	SW846 9056
	Fluoride	0.420	0.033	0.100	4.00	1.60			088512-016	SW846 9056
	Sulfate	59.8	1.00	4.00	NE	NE			088512-016	SW846 9056
	Nitrate plus nitrite	3.51	0.100	0.500	10.0	10.0			088512-018	EPA 353.2
	Total Organic Halogens	ND	0.00312	0.010	NE	NE	U		088512-003	SW846 9020
	Total Phenol	0.00623	0.0017	0.005	NE	NE		0.013U	088512-026	SW846 9066
	Total Cyanide	ND	0.00166	0.005	0.200	0.200	U	UJ	088512-027	SW846 9012
SFR-2S 08-Mar-10	Alkalinity as CaCO3	389	0.725	1.00	NE	NE			088503-016	SM 2320B
	Bromide	ND	0.660	2.00	NE	NE	U		088503-016	SW846 9056
	Chloride	117	0.660	2.00	NE	NE			088503-016	SW846 9056
	Fluoride	1.43	0.033	0.100	4.00	1.60			088503-016	SW846 9056
	Sulfate	65.0	1.00	4.00	NE	NE			088503-016	SW846 9056
	Nitrate plus nitrite	0.890	0.050	0.250	10.0	10.0			088503-018	EPA 353.2
	Total Organic Halogens	0.0114	0.00312	0.010	NE	NE		0.018UJ	088503-003	SW846 9020
	Total Phenol	ND	0.0017	0.005	NE	NE	U		088503-026	SW846 9066
	Total Cyanide	ND	0.00166	0.005	0.200	0.200	U	UJ	088503-027	SW846 9012
SFR-4T 23-Mar-10	Alkalinity as CaCO3	104	0.725	1.00	NE	NE			088533-016	SM 2320B
	Bromide	1.50	0.066	0.200	NE	NE			088533-016	SW846 9056
	Chloride	168	6.60	20.0	NE	NE		J	088533-016	SW846 9056
	Fluoride	**2.44**	0.033	0.100	4.00	1.60			088533-016	SW846 9056
	Sulfate	1810	10.0	40.0	NE	NE		J	088533-016	SW846 9056
	Nitrate plus nitrite	0.250	0.050	0.250	10.0	10.0	J		088533-018	EPA 353.2
	Total Organic Halogens	0.0283	0.00312	0.010	NE	NE			088533-003	SW846 9020
	Total Phenol	ND	0.0016	0.005	NE	NE	U	UJ	088533-026	SW846 9066
	Total Cyanide	ND	0.00166	0.005	0.200	0.200	U		088533-027	SW846 9012
SWTA3-MW2 19-Mar-10	Alkalinity as CaCO3	164	0.725	1.00	NE	NE			088528-016	SM 2320B
	Bromide	0.211	0.066	0.200	NE	NE			088528-016	SW846 9056
	Chloride	13.3	0.066	0.200	NE	NE			088528-016	SW846 9056
	Fluoride	0.922	0.033	0.100	4.00	1.60			088528-016	SW846 9056
	Sulfate	51.9	0.500	2.00	NE	NE			088528-016	SW846 9056
	Nitrate plus nitrite	0.780	0.050	0.250	10.0	10.0			088528-018	EPA 353.2
	Total Organic Halogens	ND	0.00312	0.010	NE	NE	U		088528-003	SW846 9020
	Total Phenol	0.0036	0.0016	0.005	NE	NE	J	NJ-	088528-026	SW846 9066
	Total Cyanide	ND	0.00166	0.005	0.200	0.200	U		088528-027	SW846 9012

Refer to footnotes on page 2A-47.

Table 2A-3 *(Concluded)*
Summary of Alkalinity, Anions, Nitrate plus Nitrate, Total Organic Halogens, Total Phenols, and Total Cyanide Results, Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

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	Alkalinity as CaCO3	160	0.725	1.00	NE	NE	B		088520-016	SM 2320B
16-Mar-10	Bromide	0.192	0.066	0.200	NE	NE	J		088520-016	SW846 9056
	Chloride	13.6	0.066	0.200	NE	NE			088520-016	SW846 9056
	Fluoride	1.19	0.033	0.100	4.00	1.60			088520-016	SW846 9056
	Sulfate	59.8	0.500	2.00	NE	NE			088520-016	SW846 9056
	Nitrate plus nitrite	0.580	0.050	0.250	10.0	10.0		0.32U	088520-018	EPA 353.2
	Total Organic Halogens	ND	0.00312	0.010	NE	NE	U		088520-003	SW846 9020
	Total Phenol	ND	0.0017	0.005	NE	NE	U	UJ	088520-026	SW846 9066
	Total Cyanide	ND	0.00166	0.005	0.200	0.200	U		088520-027	SW846 9012
SWTA3-MW3 (Duplicate)	Alkalinity as CaCO3	156	0.725	1.00	NE	NE	B		088521-016	SM 2320B
16-Mar-10	Bromide	0.195	0.066	0.200	NE	NE	J		088521-016	SW846 9056
	Chloride	13.6	0.066	0.200	NE	NE			088521-016	SW846 9056
	Fluoride	1.21	0.033	0.100	4.00	1.60			088521-016	SW846 9056
	Sulfate	58.2	0.500	2.00	NE	NE			088521-016	SW846 9056
	Nitrate plus nitrite	0.570	0.050	0.250	10.0	10.0		0.32U	088521-018	EPA 353.2
	Total Organic Halogens	ND	0.00312	0.010	NE	NE	U		088521-003	SW846 9020
	Total Phenol	ND	0.0017	0.005	NE	NE	U	UJ	088521-026	SW846 9066
	Total Cyanide	ND	0.00166	0.005	0.200	0.200	U		088521-027	SW846 9012
SWTA3-MW4	Alkalinity as CaCO3	170	0.725	1.00	NE	NE	B		088523-016	SM 2320B
17-Mar-10	Bromide	0.189	0.066	0.200	NE	NE	J		088523-016	SW846 9056
	Chloride	14.9	0.066	0.200	NE	NE			088523-016	SW846 9056
	Fluoride	1.56	0.033	0.100	4.00	1.60			088523-016	SW846 9056
	Sulfate	47.3	0.500	2.00	NE	NE			088523-016	SW846 9056
	Nitrate plus nitrite	1.23	0.100	0.500	10.0	10.0			088523-018	EPA 353.2
	Total Organic Halogens	ND	0.00312	0.010	NE	NE	U		088523-003	SW846 9020
	Total Phenol	ND	0.0017	0.005	NE	NE	U	UJ	088523-026	SW846 9066
	Total Cyanide	ND	0.00166	0.005	0.200	0.200	U		088523-027	SW846 9012
TRE-1	Alkalinity as CaCO3	485	0.725	1.00	NE	NE			088505-016	SM 2320B
09-Mar-10	Bromide	ND	0.660	2.00	NE	NE	U		088505-016	SW846 9056
	Chloride	131	0.660	2.00	NE	NE			088505-016	SW846 9056
	Fluoride	1.37	0.033	0.100	4.00	1.60			088505-016	SW846 9056
	Sulfate	95.1	1.00	4.00	NE	NE			088505-016	SW846 9056
	Nitrate plus nitrite	2.16	0.050	0.250	10.0	10.0			088505-018	EPA 353.2
	Total Organic Halogens	0.00928	0.00312	0.010	NE	NE	J	0.018UJ	088505-003	SW846 9020
	Total Phenol	0.00238	0.0017	0.005	NE	NE	J		088505-026	SW846 9066
	Total Cyanide	ND	0.00166	0.005	0.200	0.200	U	UJ	088505-027	SW846 9012

Refer to footnotes on page 2A-47.

Table 2A-4
Summary of Dissolved (Filtered) Metal Results,
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

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	0.224	0.010	0.030	NE	NE	B	0.054U	088545-009	SW846 6020
29-Mar-10	Antimony	ND	0.0005	0.003	0.006	NE	U		088545-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	0.100	U		088545-009	SW846 6020
	Barium	0.0422	0.0005	0.002	2.00	1.00	B		088545-009	SW846 6020
	Beryllium	**0.00713**	0.0001	0.0005	0.004	NE			088545-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		088545-009	SW846 6020
	Calcium	290	0.200	2.00	NE	NE	B	J	088545-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	0.050	U		088545-009	SW846 6020
	Cobalt	0.0102	0.0001	0.001	NE	NE		J+	088545-009	SW846 6020
	Copper	0.0018	0.0003	0.001	NE	NE		J+	088545-009	SW846 6020
	Iron	1.31	0.010	0.100	NE	NE			088545-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		088545-009	SW846 6020
	Magnesium	70.8	0.050	0.150	NE	NE		J	088545-009	SW846 6020
	Manganese	1.51	0.010	0.050	NE	NE			088545-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	0.002	U		088545-009	SW846 7470
	Nickel	0.0319	0.0005	0.002	NE	NE		J+	088545-009	SW846 6020
	Potassium	27.9	0.080	0.300	NE	NE			088545-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	0.050	U	UJ	088545-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		088545-009	SW846 6020
	Sodium	449	0.800	2.50	NE	NE			088545-009	SW846 6020
	Thallium	0.00124	0.0003	0.001	0.002	NE			088545-009	SW846 6020
	Uranium	0.00655	0.00005	0.0002	0.030	5.00			088545-009	SW846 6020
	Uranium-234	ND	0.00001	0.00005	NE	NE	U		088545-009	SW846 6020
	Uranium-235	0.000045	0.00001	0.00007	NE	NE	J	J+	088545-009	SW846 6020
	Uranium-238	0.0065	0.00005	0.0002	NE	NE			088545-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	NE	U		088545-009	SW846 6020
	Zinc	0.0458	0.0026	0.010	NE	NE		J+	088545-009	SW846 6020

Refer to footnotes on page 2A-47.

Table 2A-4 *(Continued)*
Summary of Dissolved (Filtered) Metal Results,
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

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]
CTF-MW1	Aluminum	0.0112	0.010	0.030	NE	NE	J		088526-009	SW846 6020
18-Mar-10	Antimony	ND	0.0005	0.003	0.006	NE	U		088526-009	SW846 6020
	Arsenic	0.00224	0.0015	0.005	0.010	0.100	J		088526-009	SW846 6020
	Barium	0.0479	0.0005	0.002	2.00	1.00	B		088526-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		088526-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		088526-009	SW846 6020
	Calcium	96.6	0.400	4.00	NE	NE	B		088526-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	0.050	U		088526-009	SW846 6020
	Cobalt	0.000373	0.0001	0.001	NE	NE	B, J	0.00052U	088526-009	SW846 6020
	Copper	0.000623	0.0003	0.001	NE	NE	B, J	0.0016U	088526-009	SW846 6020
	Iron	0.262	0.010	0.100	NE	NE	B		088526-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		088526-009	SW846 6020
	Magnesium	19.2	0.005	0.015	NE	NE	B		088526-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		088526-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	0.002	U		088526-009	SW846 7470
	Nickel	0.00257	0.0005	0.002	NE	NE			088526-009	SW846 6020
	Potassium	1.72	0.080	0.300	NE	NE			088526-009	SW846 6020
	Selenium	0.00427	0.001	0.005	0.050	0.050	J		088526-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		088526-009	SW846 6020
	Sodium	33.8	0.080	0.250	NE	NE			088526-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		088526-009	SW846 6020
	Uranium	0.00965	0.00005	0.0002	0.030	5.00			088526-009	SW846 6020
	Uranium-234	ND	0.00001	0.00005	NE	NE	U		088526-009	SW846 6020
	Uranium-235	0.000068	0.00001	0.00007	NE	NE	J		088526-009	SW846 6020
	Uranium-238	0.00958	0.00005	0.0002	NE	NE			088526-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	NE	U		088526-009	SW846 6020
	Zinc	0.00279	0.0026	0.010	NE	NE	B, J	0.018U	088526-009	SW846 6020

Refer to footnotes on page 2A-47.

Table 2A-4 *(Continued)*
Summary of Dissolved (Filtered) Metal Results,
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

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]
CTF-MW2	Aluminum	0.0942	0.010	0.030	NE	NE			088516-009	SW846 6020
15-Mar-10	Antimony	ND	0.0005	0.003	0.006	NE	U		088516-009	SW846 6020
	Arsenic	**0.0535**	0.0015	0.005	0.010	0.100			088516-009	SW846 6020
	Barium	0.0747	0.0005	0.002	2.00	1.00	B		088516-009	SW846 6020
	Beryllium	0.00191	0.0001	0.0005	0.004	NE		0.0026U	088516-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		088516-009	SW846 6020
	Calcium	384	0.400	4.00	NE	NE	B		088516-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	0.050	U		088516-009	SW846 6020
	Cobalt	0.00718	0.0001	0.001	NE	NE	B		088516-009	SW846 6020
	Copper	0.0011	0.0003	0.001	NE	NE	B	0.0016U	088516-009	SW846 6020
	Iron	2.29	0.010	0.100	NE	NE	B		088516-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		088516-009	SW846 6020
	Magnesium	93.0	0.100	0.300	NE	NE	B	J	088516-009	SW846 6020
	Manganese	3.08	0.020	0.100	NE	NE			088516-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	0.002	U		088516-009	SW846 7470
	Nickel	0.0182	0.0005	0.002	NE	NE			088516-009	SW846 6020
	Potassium	43.0	0.080	0.300	NE	NE			088516-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	0.050	U		088516-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		088516-009	SW846 6020
	Sodium	1.02	0.080	0.250	NE	NE			088516-009	SW846 6020
	Thallium	0.00109	0.0003	0.001	0.002	NE		0.0018U	088516-009	SW846 6020
	Uranium	0.0258	0.00005	0.0002	0.030	5.00			088516-009	SW846 6020
	Uranium-234	0.00001	0.00001	0.00005	NE	NE	J		088516-009	SW846 6020
	Uranium-235	0.000181	0.00001	0.00007	NE	NE			088516-009	SW846 6020
	Uranium-238	0.0256	0.00005	0.0002	NE	NE			088516-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	NE	U		088516-009	SW846 6020
	Zinc	0.00994	0.0026	0.010	NE	NE	B, J	0.018U	088516-009	SW846 6020

Refer to footnotes on page 2A-47.

Table 2A-4 *(Continued)*
Summary of Dissolved (Filtered) Metal Results,
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

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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]
CTF-MW3	Aluminum	ND	0.050	0.150	NE	NE	U		088507-009	SW846 6020
10-Mar-10	Antimony	ND	0.0005	0.003	0.006	NE	U		088507-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	0.100	U		088507-009	SW846 6020
	Barium	0.0296	0.0005	0.002	2.00	1.00			088507-009	SW846 6020
	Beryllium	ND	0.0005	0.0025	0.004	NE	U		088507-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		088507-009	SW846 6020
	Calcium	192	0.100	1.00	NE	NE	B		088507-009	SW846 6020
	Chromium	ND	0.0125	0.050	0.100	0.050	U		088507-009	SW846 6020
	Cobalt	ND	0.0005	0.005	NE	NE	U		088507-009	SW846 6020
	Copper	ND	0.0015	0.005	NE	NE	U		088507-009	SW846 6020
	Iron	0.277	0.050	0.500	NE	NE	J		088507-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		088507-009	SW846 6020
	Magnesium	49.7	0.025	0.075	NE	NE		J	088507-009	SW846 6020
	Manganese	ND	0.005	0.025	NE	NE	U		088507-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	0.002	U	UJ	088507-009	SW846 7470
	Nickel	0.00337	0.0025	0.010	NE	NE	J	J+	088507-009	SW846 6020
	Potassium	11.6	0.400	1.50	NE	NE			088507-009	SW846 6020
	Selenium	0.0218	0.001	0.005	0.050	0.050			088507-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		088507-009	SW846 6020
	Sodium	177	0.400	1.25	NE	NE			088507-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		088507-009	SW846 6020
	Uranium	0.00872	0.00005	0.0002	0.030	5.00			088507-009	SW846 6020
	Uranium-234	ND	0.00001	0.00005	NE	NE	U		088507-009	SW846 6020
	Uranium-235	0.000062	0.00001	0.00007	NE	NE	J		088507-009	SW846 6020
	Uranium-238	0.00866	0.00005	0.0002	NE	NE			088507-009	SW846 6020
	Vanadium	ND	0.015	0.050	NE	NE	U	UJ	088507-009	SW846 6020
	Zinc	0.00465	0.0026	0.010	NE	NE	J	J+	088507-009	SW846 6020

Refer to footnotes on page 2A-47.

Table 2A-4 *(Continued)*
Summary of Dissolved (Filtered) Metal Results,
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

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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]
Eubank-1	Aluminum	ND	0.050	0.150	NE	NE	U		088501-009	SW846 6020
05-Mar-10	Antimony	ND	0.0005	0.003	0.006	NE	U		088501-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	0.100	U		088501-009	SW846 6020
	Barium	0.0445	0.0005	0.002	2.00	1.00			088501-009	SW846 6020
	Beryllium	ND	0.0005	0.0025	0.004	NE	U		088501-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		088501-009	SW846 6020
	Calcium	75.5	0.100	1.00	NE	NE	B		088501-009	SW846 6020
	Chromium	ND	0.0125	0.050	0.100	0.050	U		088501-009	SW846 6020
	Cobalt	ND	0.0005	0.005	NE	NE	U		088501-009	SW846 6020
	Copper	0.00377	0.0015	0.005	NE	NE	B, J		088501-009	SW846 6020
	Iron	0.109	0.050	0.500	NE	NE	J		088501-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		088501-009	SW846 6020
	Magnesium	10.7	0.025	0.075	NE	NE		J	088501-009	SW846 6020
	Manganese	ND	0.005	0.025	NE	NE	U		088501-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	0.002	U	UJ	088501-009	SW846 7470
	Nickel	0.00563	0.0025	0.010	NE	NE	J		088501-009	SW846 6020
	Potassium	1.73	0.400	1.50	NE	NE			088501-009	SW846 6020
	Selenium	0.00234	0.001	0.005	0.050	0.050	J		088501-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		088501-009	SW846 6020
	Sodium	25.3	0.400	1.25	NE	NE			088501-009	SW846 6020
	Thallium	0.000394	0.0003	0.001	0.002	NE	J	0.0018U	088501-009	SW846 6020
	Uranium	0.00266	0.00005	0.0002	0.030	5.00			088501-009	SW846 6020
	Uranium-234	ND	0.00001	0.00005	NE	NE	U		088501-009	SW846 6020
	Uranium-235	0.000019	0.00001	0.00007	NE	NE	J		088501-009	SW846 6020
	Uranium-238	0.00264	0.00005	0.0002	NE	NE			088501-009	SW846 6020
	Vanadium	ND	0.015	0.050	NE	NE	U	UJ	088501-009	SW846 6020
	Zinc	0.00452	0.0026	0.010	NE	NE	J	J+	088501-009	SW846 6020

Refer to footnotes on page 2A-47.

Table 2A-4 *(Continued)*
Summary of Dissolved (Filtered) Metal Results,
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

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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	0.010	0.030	NE	NE	U		088531-009	SW846 6020
22-Mar-10	Antimony	ND	0.0005	0.003	0.006	NE	U		088531-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	0.100	U		088531-009	SW846 6020
	Barium	0.144	0.0005	0.002	2.00	1.00			088531-009	SW846 6020
	Beryllium	0.000105	0.0001	0.0005	0.004	NE	J		088531-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		088531-009	SW846 6020
	Calcium	144	0.100	1.00	NE	NE			088531-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	0.050	U		088531-009	SW846 6020
	Cobalt	0.000737	0.0001	0.001	NE	NE	J		088531-009	SW846 6020
	Copper	0.000924	0.0003	0.001	NE	NE	J		088531-009	SW846 6020
	Iron	0.474	0.010	0.100	NE	NE			088531-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		088531-009	SW846 6020
	Magnesium	26.6	0.005	0.015	NE	NE		J	088531-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		088531-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	0.002	U		088531-009	SW846 7470
	Nickel	0.0044	0.0005	0.002	NE	NE			088531-009	SW846 6020
	Potassium	5.30	0.080	0.300	NE	NE			088531-009	SW846 6020
	Selenium	0.00283	0.001	0.005	0.050	0.050	J		088531-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		088531-009	SW846 6020
	Sodium	92.4	0.400	1.25	NE	NE			088531-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		088531-009	SW846 6020
	Uranium	0.0077	0.00005	0.0002	0.030	5.00			088531-009	SW846 6020
	Uranium-234	ND	0.00001	0.00005	NE	NE	U		088531-009	SW846 6020
	Uranium-235	0.000054	0.00001	0.00007	NE	NE	J		088531-009	SW846 6020
	Uranium-238	0.00765	0.00005	0.0002	NE	NE			088531-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	NE	U		088531-009	SW846 6020
	Zinc	ND	0.0026	0.010	NE	NE	U		088531-009	SW846 6020

Refer to footnotes on page 2A-47.

Table 2A-4 *(Continued)*
Summary of Dissolved (Filtered) Metal Results,
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

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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	0.010	0.030	NE	NE	U		088535-009	SW846 6020
24-Mar-10	Antimony	ND	0.0005	0.003	0.006	NE	U		088535-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	0.100	U		088535-009	SW846 6020
	Barium	0.0558	0.0005	0.002	2.00	1.00			088535-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		088535-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		088535-009	SW846 6020
	Calcium	46.1	0.020	0.200	NE	NE			088535-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	0.050	U		088535-009	SW846 6020
	Cobalt	0.00206	0.0001	0.001	NE	NE			088535-009	SW846 6020
	Copper	0.000883	0.0003	0.001	NE	NE	J		088535-009	SW846 6020
	Iron	0.210	0.010	0.100	NE	NE			088535-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		088535-009	SW846 6020
	Magnesium	15.5	0.005	0.015	NE	NE		J	088535-009	SW846 6020
	Manganese	0.00361	0.001	0.005	NE	NE	J		088535-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	0.002	U		088535-009	SW846 7470
	Nickel	0.00174	0.0005	0.002	NE	NE	J		088535-009	SW846 6020
	Potassium	3.60	0.080	0.300	NE	NE			088535-009	SW846 6020
	Selenium	0.00166	0.001	0.005	0.050	0.050	J		088535-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		088535-009	SW846 6020
	Sodium	22.4	0.080	0.250	NE	NE			088535-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		088535-009	SW846 6020
	Uranium	0.00361	0.00005	0.0002	0.030	5.00			088535-009	SW846 6020
	Uranium-234	ND	0.00001	0.00005	NE	NE	U		088535-009	SW846 6020
	Uranium-235	0.000024	0.00001	0.00007	NE	NE	J		088535-009	SW846 6020
	Uranium-238	0.00358	0.00005	0.0002	NE	NE			088535-009	SW846 6020
	Vanadium	0.00495	0.003	0.010	NE	NE	J		088535-009	SW846 6020
	Zinc	0.00285	0.0026	0.010	NE	NE	J		088535-009	SW846 6020

Refer to footnotes on page 2A-47.

Table 2A-4 *(Continued)*
Summary of Dissolved (Filtered) Metal Results,
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

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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	0.010	0.030	NE	NE	U		088538-009	SW846 6020
25-Mar-10	Antimony	ND	0.0005	0.003	0.006	NE	U		088538-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	0.100	U		088538-009	SW846 6020
	Barium	0.119	0.0005	0.002	2.00	1.00			088538-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		088538-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		088538-009	SW846 6020
	Calcium	61.2	0.100	1.00	NE	NE			088538-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	0.050	U		088538-009	SW846 6020
	Cobalt	0.000277	0.0001	0.001	NE	NE	J		088538-009	SW846 6020
	Copper	0.00148	0.0003	0.001	NE	NE			088538-009	SW846 6020
	Iron	0.223	0.010	0.100	NE	NE			088538-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		088538-009	SW846 6020
	Magnesium	13.9	0.005	0.015	NE	NE		J	088538-009	SW846 6020
	Manganese	0.0762	0.001	0.005	NE	NE			088538-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	0.002	U		088538-009	SW846 7470
	Nickel	0.00261	0.0005	0.002	NE	NE			088538-009	SW846 6020
	Potassium	4.66	0.080	0.300	NE	NE			088538-009	SW846 6020
	Selenium	0.00185	0.001	0.005	0.050	0.050	J		088538-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		088538-009	SW846 6020
	Sodium	28.0	0.400	1.25	NE	NE			088538-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		088538-009	SW846 6020
	Uranium	0.00365	0.00005	0.0002	0.030	5.00			088538-009	SW846 6020
	Uranium-234	ND	0.00001	0.00005	NE	NE	U		088538-009	SW846 6020
	Uranium-235	0.000027	0.00001	0.00007	NE	NE	J		088538-009	SW846 6020
	Uranium-238	0.00362	0.00005	0.0002	NE	NE			088538-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	NE	U		088538-009	SW846 6020
	Zinc	0.300	0.0026	0.010	NE	NE			088538-009	SW846 6020

Refer to footnotes on page 2A-47.

Table 2A-4 *(Continued)*
Summary of Dissolved (Filtered) Metal Results,
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

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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	0.0136	0.010	0.030	NE	NE	B, J	0.054U	088542-009	SW846 6020
26-Mar-10	Antimony	ND	0.0005	0.003	0.006	NE	U		088542-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	0.100	U		088542-009	SW846 6020
	Barium	0.0878	0.0005	0.002	2.00	1.00	B		088542-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		088542-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		088542-009	SW846 6020
	Calcium	36.9	0.020	0.200	NE	NE	B	J	088542-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	0.050	U		088542-009	SW846 6020
	Cobalt	0.000112	0.0001	0.001	NE	NE	J		088542-009	SW846 6020
	Copper	0.000812	0.0003	0.001	NE	NE	J	0.0063U	088542-009	SW846 6020
	Iron	0.167	0.010	0.100	NE	NE			088542-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		088542-009	SW846 6020
	Magnesium	7.98	0.005	0.015	NE	NE		J	088542-009	SW846 6020
	Manganese	0.00103	0.001	0.005	NE	NE	J		088542-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	0.002	U		088542-009	SW846 7470
	Nickel	0.00139	0.0005	0.002	NE	NE	J		088542-009	SW846 6020
	Potassium	3.47	0.080	0.300	NE	NE			088542-009	SW846 6020
	Selenium	0.00123	0.001	0.005	0.050	0.050	J		088542-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		088542-009	SW846 6020
	Sodium	39.0	0.080	0.250	NE	NE			088542-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		088542-009	SW846 6020
	Uranium	0.00354	0.00005	0.0002	0.030	5.00			088542-009	SW846 6020
	Uranium-234	ND	0.00001	0.00005	NE	NE	U		088542-009	SW846 6020
	Uranium-235	0.000025	0.00001	0.00007	NE	NE	J	J+	088542-009	SW846 6020
	Uranium-238	0.00352	0.00005	0.0002	NE	NE			088542-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	NE	U		088542-009	SW846 6020
	Zinc	0.0193	0.0026	0.010	NE	NE			088542-009	SW846 6020

Refer to footnotes on page 2A-47.

Table 2A-4 *(Continued)*
Summary of Dissolved (Filtered) Metal Results,
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

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 (Duplicate) 26-Mar-10	Aluminum	0.0113	0.010	0.030	NE	NE	B, J		088543-009	SW846 6020
	Antimony	ND	0.0005	0.003	0.006	NE	U		088543-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	0.100	U		088543-009	SW846 6020
	Barium	0.0835	0.0005	0.002	2.00	1.00	B		088543-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		088543-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		088543-009	SW846 6020
	Calcium	36.4	0.020	0.200	NE	NE	B	J	088543-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	0.050	U		088543-009	SW846 6020
	Cobalt	0.0001	0.0001	0.001	NE	NE	J		088543-009	SW846 6020
	Copper	0.000804	0.0003	0.001	NE	NE	J	0.0063U	088543-009	SW846 6020
	Iron	0.175	0.010	0.100	NE	NE			088543-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		088543-009	SW846 6020
	Magnesium	7.82	0.005	0.015	NE	NE		J	088543-009	SW846 6020
	Manganese	0.0011	0.001	0.005	NE	NE	J		088543-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	0.002	U		088543-009	SW846 7470
	Nickel	0.0014	0.0005	0.002	NE	NE	J		088543-009	SW846 6020
	Potassium	3.57	0.080	0.300	NE	NE			088543-009	SW846 6020
	Selenium	0.00121	0.001	0.005	0.050	0.050	J		088543-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		088543-009	SW846 6020
	Sodium	33.7	0.080	0.250	NE	NE			088543-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		088543-009	SW846 6020
	Uranium	0.00338	0.00005	0.0002	0.030	5.00			088543-009	SW846 6020
	Uranium-234	ND	0.00001	0.00005	NE	NE	U		088543-009	SW846 6020
	Uranium-235	0.000023	0.00001	0.00007	NE	NE	J	J+	088543-009	SW846 6020
	Uranium-238	0.00336	0.00005	0.0002	NE	NE			088543-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	NE	U		088543-009	SW846 6020
	Zinc	0.0206	0.0026	0.010	NE	NE			088543-009	SW846 6020

Refer to footnotes on page 2A-47.

Table 2A-4 *(Continued)*
Summary of Dissolved (Filtered) Metal Results,
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

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	0.010	0.030	NE	NE	U		088514-009	SW846 6020
12-Mar-10	Antimony	ND	0.0005	0.003	0.006	NE	U		088514-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	0.100	U		088514-009	SW846 6020
	Barium	0.082	0.0005	0.002	2.00	1.00	B		088514-009	SW846 6020
	Beryllium	0.000132	0.0001	0.0005	0.004	NE	J	0.0026U	088514-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		088514-009	SW846 6020
	Calcium	67.2	0.400	4.00	NE	NE	B		088514-009	SW846 6020
	Chromium	0.00297	0.0025	0.010	0.100	0.050	J		088514-009	SW846 6020
	Cobalt	0.000116	0.0001	0.001	NE	NE	B, J	0.00052U	088514-009	SW846 6020
	Copper	0.000811	0.0003	0.001	NE	NE	B, J	0.0016U	088514-009	SW846 6020
	Iron	0.141	0.010	0.100	NE	NE	B	0.15U	088514-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		088514-009	SW846 6020
	Magnesium	10.3	0.005	0.015	NE	NE	B		088514-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		088514-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	0.002	U		088514-009	SW846 7470
	Nickel	0.00477	0.0005	0.002	NE	NE			088514-009	SW846 6020
	Potassium	3.32	0.080	0.300	NE	NE			088514-009	SW846 6020
	Selenium	0.00222	0.001	0.005	0.050	0.050	J		088514-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		088514-009	SW846 6020
	Sodium	30.0	0.080	0.250	NE	NE			088514-009	SW846 6020
	Thallium	0.000502	0.0003	0.001	0.002	NE	J	0.0018U	088514-009	SW846 6020
	Uranium	0.00333	0.00005	0.0002	0.030	5.00			088514-009	SW846 6020
	Uranium-234	ND	0.00001	0.00005	NE	NE	U		088514-009	SW846 6020
	Uranium-235	0.000022	0.00001	0.00007	NE	NE	J		088514-009	SW846 6020
	Uranium-238	0.00331	0.00005	0.0002	NE	NE			088514-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	NE	U		088514-009	SW846 6020
	Zinc	0.0126	0.0026	0.010	NE	NE	B	0.018U	088514-009	SW846 6020

Refer to footnotes on page 2A-47.

Table 2A-4 *(Continued)*
Summary of Dissolved (Filtered) Metal Results,
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

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	0.050	0.150	NE	NE	U		088511-009	SW846 6020
11-Mar-10	Antimony	ND	0.0005	0.003	0.006	NE	U		088511-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	0.100	U		088511-009	SW846 6020
	Barium	0.070	0.0005	0.002	2.00	1.00			088511-009	SW846 6020
	Beryllium	ND	0.0005	0.0025	0.004	NE	U		088511-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		088511-009	SW846 6020
	Calcium	66.1	0.100	1.00	NE	NE	B		088511-009	SW846 6020
	Chromium	ND	0.0125	0.050	0.100	0.050	U		088511-009	SW846 6020
	Cobalt	ND	0.0005	0.005	NE	NE	U		088511-009	SW846 6020
	Copper	ND	0.0015	0.005	NE	NE	U		088511-009	SW846 6020
	Iron	0.0944	0.050	0.500	NE	NE	J		088511-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		088511-009	SW846 6020
	Magnesium	11.9	0.025	0.075	NE	NE		J	088511-009	SW846 6020
	Manganese	0.125	0.005	0.025	NE	NE			088511-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	0.002	U	UJ	088511-009	SW846 7470
	Nickel	ND	0.0025	0.010	NE	NE	U		088511-009	SW846 6020
	Potassium	4.88	0.400	1.50	NE	NE			088511-009	SW846 6020
	Selenium	0.00107	0.001	0.005	0.050	0.050	J		088511-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		088511-009	SW846 6020
	Sodium	24.9	0.400	1.25	NE	NE			088511-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		088511-009	SW846 6020
	Uranium	0.00315	0.00005	0.0002	0.030	5.00			088511-009	SW846 6020
	Uranium-234	ND	0.00001	0.00005	NE	NE	U		088511-009	SW846 6020
	Uranium-235	0.000022	0.00001	0.00007	NE	NE	J		088511-009	SW846 6020
	Uranium-238	0.00313	0.00005	0.0002	NE	NE			088511-009	SW846 6020
	Vanadium	ND	0.015	0.050	NE	NE	U	UJ	088511-009	SW846 6020
	Zinc	ND	0.0026	0.010	NE	NE	U		088511-009	SW846 6020

Refer to footnotes on page 2A-47.

Table 2A-4 *(Continued)*
Summary of Dissolved (Filtered) Metal Results,
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

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Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL/MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
PL-4 (Duplicate) 11-Mar-10	Aluminum	ND	0.050	0.150	NE	NE	U		088512-009	SW846 6020
	Antimony	ND	0.0005	0.003	0.006	NE	U		088512-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	0.100	U		088512-009	SW846 6020
	Barium	0.0717	0.0005	0.002	2.00	1.00			088512-009	SW846 6020
	Beryllium	ND	0.0005	0.0025	0.004	NE	U		088512-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		088512-009	SW846 6020
	Calcium	53.5	0.100	1.00	NE	NE	B		088512-009	SW846 6020
	Chromium	ND	0.0125	0.050	0.100	0.050	U		088512-009	SW846 6020
	Cobalt	ND	0.0005	0.005	NE	NE	U		088512-009	SW846 6020
	Copper	ND	0.0015	0.005	NE	NE	U		088512-009	SW846 6020
	Iron	0.0811	0.050	0.500	NE	NE	J		088512-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		088512-009	SW846 6020
	Magnesium	10.7	0.025	0.075	NE	NE		J	088512-009	SW846 6020
	Manganese	0.102	0.005	0.025	NE	NE			088512-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	0.002	U	UJ	088512-009	SW846 7470
	Nickel	ND	0.0025	0.010	NE	NE	U		088512-009	SW846 6020
	Potassium	4.21	0.400	1.50	NE	NE			088512-009	SW846 6020
	Selenium	0.0015	0.001	0.005	0.050	0.050	J		088512-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		088512-009	SW846 6020
	Sodium	20.4	0.400	1.25	NE	NE			088512-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		088512-009	SW846 6020
	Uranium	0.00325	0.00005	0.0002	0.030	5.00			088512-009	SW846 6020
	Uranium-234	ND	0.00001	0.00005	NE	NE	U		088512-009	SW846 6020
	Uranium-235	0.000022	0.00001	0.00007	NE	NE	J		088512-009	SW846 6020
	Uranium-238	0.00323	0.00005	0.0002	NE	NE			088512-009	SW846 6020
	Vanadium	ND	0.015	0.050	NE	NE	U	UJ	088512-009	SW846 6020
	Zinc	0.00302	0.0026	0.010	NE	NE	J	J+	088512-009	SW846 6020

Refer to footnotes on page 2A-47.

Table 2A-4 *(Continued)*
Summary of Dissolved (Filtered) Metal Results,
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

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	0.0916	0.050	0.150	NE	NE	B, J	0.63U	088503-009	SW846 6020
08-Mar-10	Antimony	ND	0.0005	0.003	0.006	NE	U		088503-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	0.100	U		088503-009	SW846 6020
	Barium	0.0575	0.0005	0.002	2.00	1.00			088503-009	SW846 6020
	Beryllium	ND	0.0005	0.0025	0.004	NE	U		088503-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		088503-009	SW846 6020
	Calcium	128	0.100	1.00	NE	NE	B		088503-009	SW846 6020
	Chromium	ND	0.0125	0.050	0.100	0.050	U		088503-009	SW846 6020
	Cobalt	0.00076	0.0005	0.005	NE	NE	J		088503-009	SW846 6020
	Copper	0.00362	0.0015	0.005	NE	NE	B, J	J+	088503-009	SW846 6020
	Iron	0.172	0.050	0.500	NE	NE	J		088503-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		088503-009	SW846 6020
	Magnesium	36.8	0.025	0.075	NE	NE		J	088503-009	SW846 6020
	Manganese	0.00582	0.005	0.025	NE	NE	J	J+	088503-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	0.002	U	UJ	088503-009	SW846 7470
	Nickel	0.0433	0.0025	0.010	NE	NE		J+	088503-009	SW846 6020
	Potassium	7.82	0.400	1.50	NE	NE			088503-009	SW846 6020
	Selenium	0.00197	0.001	0.005	0.050	0.050	J		088503-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		088503-009	SW846 6020
	Sodium	75.9	0.400	1.25	NE	NE			088503-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		088503-009	SW846 6020
	Uranium	0.0154	0.00005	0.0002	0.030	5.00			088503-009	SW846 6020
	Uranium-234	ND	0.00001	0.00005	NE	NE	U		088503-009	SW846 6020
	Uranium-235	0.000109	0.00001	0.00007	NE	NE			088503-009	SW846 6020
	Uranium-238	0.0153	0.00005	0.0002	NE	NE			088503-009	SW846 6020
	Vanadium	ND	0.015	0.050	NE	NE	U	UJ	088503-009	SW846 6020
	Zinc	0.00561	0.0026	0.010	NE	NE	J	J+	088503-009	SW846 6020

Refer to footnotes on page 2A-47.

Table 2A-4 *(Continued)*
Summary of Dissolved (Filtered) Metal Results,
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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	0.010	0.030	NE	NE	U		088533-009	SW846 6020
23-Mar-10	Antimony	ND	0.0005	0.003	0.006	NE	U		088533-009	SW846 6020
	Arsenic	0.00194	0.0015	0.005	0.010	0.100	J		088533-009	SW846 6020
	Barium	0.010	0.0005	0.002	2.00	1.00			088533-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		088533-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		088533-009	SW846 6020
	Calcium	65.8	0.100	1.00	NE	NE			088533-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	0.050	U		088533-009	SW846 6020
	Cobalt	0.00025	0.0001	0.001	NE	NE	J		088533-009	SW846 6020
	Copper	0.00762	0.0003	0.001	NE	NE			088533-009	SW846 6020
	Iron	0.236	0.010	0.100	NE	NE			088533-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		088533-009	SW846 6020
	Magnesium	4.03	0.005	0.015	NE	NE		J	088533-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		088533-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	0.002	U		088533-009	SW846 7470
	Nickel	0.00424	0.0005	0.002	NE	NE			088533-009	SW846 6020
	Potassium	2.84	0.080	0.300	NE	NE			088533-009	SW846 6020
	Selenium	0.00282	0.001	0.005	0.050	0.050	J		088533-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		088533-009	SW846 6020
	Sodium	1180	4.00	12.5	NE	NE		J	088533-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		088533-009	SW846 6020
	Uranium	0.000295	0.00005	0.0002	0.030	5.00			088533-009	SW846 6020
	Uranium-234	ND	0.00001	0.00005	NE	NE	U		088533-009	SW846 6020
	Uranium-235	ND	0.00001	0.00007	NE	NE	U		088533-009	SW846 6020
	Uranium-238	0.000295	0.00005	0.0002	NE	NE			088533-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	NE	U		088533-009	SW846 6020
	Zinc	0.0225	0.0026	0.010	NE	NE			088533-009	SW846 6020

Refer to footnotes on page 2A-47.

Table 2A-4 *(Continued)*
Summary of Dissolved (Filtered) Metal Results,
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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	0.010	0.030	NE	NE	U		088528-009	SW846 6020
19-Mar-10	Antimony	ND	0.0005	0.003	0.006	NE	U		088528-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	0.100	U		088528-009	SW846 6020
	Barium	0.074	0.0005	0.002	2.00	1.00			088528-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		088528-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		088528-009	SW846 6020
	Calcium	41.4	0.020	0.200	NE	NE			088528-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	0.050	U		088528-009	SW846 6020
	Cobalt	0.000212	0.0001	0.001	NE	NE	J		088528-009	SW846 6020
	Copper	0.000965	0.0003	0.001	NE	NE	J		088528-009	SW846 6020
	Iron	0.174	0.010	0.100	NE	NE			088528-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		088528-009	SW846 6020
	Magnesium	14.0	0.005	0.015	NE	NE		J	088528-009	SW846 6020
	Manganese	0.00135	0.001	0.005	NE	NE	J		088528-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	0.002	U		088528-009	SW846 7470
	Nickel	0.00165	0.0005	0.002	NE	NE	J		088528-009	SW846 6020
	Potassium	4.39	0.080	0.300	NE	NE			088528-009	SW846 6020
	Selenium	0.00159	0.001	0.005	0.050	0.050	J		088528-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		088528-009	SW846 6020
	Sodium	35.1	0.080	0.250	NE	NE			088528-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		088528-009	SW846 6020
	Uranium	0.00332	0.00005	0.0002	0.030	5.00			088528-009	SW846 6020
	Uranium-234	ND	0.00001	0.00005	NE	NE	U		088528-009	SW846 6020
	Uranium-235	0.000023	0.00001	0.00007	NE	NE	J		088528-009	SW846 6020
	Uranium-238	0.00329	0.00005	0.0002	NE	NE			088528-009	SW846 6020
	Vanadium	0.00312	0.003	0.010	NE	NE	J		088528-009	SW846 6020
	Zinc	ND	0.0026	0.010	NE	NE	U		088528-009	SW846 6020

Refer to footnotes on page 2A-47.

Table 2A-4 *(Continued)*
Summary of Dissolved (Filtered) Metal Results,
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

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	0.010	0.030	NE	NE	U		088520-009	SW846 6020
16-Mar-10	Antimony	ND	0.0005	0.003	0.006	NE	U		088520-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	0.100	U		088520-009	SW846 6020
	Barium	0.0599	0.0005	0.002	2.00	1.00	B		088520-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		088520-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		088520-009	SW846 6020
	Calcium	39.2	0.020	0.200	NE	NE	B		088520-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	0.050	U		088520-009	SW846 6020
	Cobalt	0.000154	0.0001	0.001	NE	NE	B, J	0.00052U	088520-009	SW846 6020
	Copper	0.000571	0.0003	0.001	NE	NE	B, J	0.0016U	088520-009	SW846 6020
	Iron	0.135	0.010	0.100	NE	NE	B	0.15U	088520-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		088520-009	SW846 6020
	Magnesium	11.6	0.005	0.015	NE	NE	B		088520-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		088520-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	0.002	U		088520-009	SW846 7470
	Nickel	0.00112	0.0005	0.002	NE	NE	J		088520-009	SW846 6020
	Potassium	4.60	0.080	0.300	NE	NE			088520-009	SW846 6020
	Selenium	0.00116	0.001	0.005	0.050	0.050	J		088520-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		088520-009	SW846 6020
	Sodium	47.8	1.60	5.00	NE	NE			088520-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		088520-009	SW846 6020
	Uranium	0.00214	0.00005	0.0002	0.030	5.00			088520-009	SW846 6020
	Uranium-234	ND	0.00001	0.00005	NE	NE	U		088520-009	SW846 6020
	Uranium-235	0.000014	0.00001	0.00007	NE	NE	J		088520-009	SW846 6020
	Uranium-238	0.00212	0.00005	0.0002	NE	NE			088520-009	SW846 6020
	Vanadium	0.00584	0.003	0.010	NE	NE	J		088520-009	SW846 6020
	Zinc	0.00331	0.0026	0.010	NE	NE	B, J	0.018U	088520-009	SW846 6020

Refer to footnotes on page 2A-47.

Table 2A-4 *(Continued)*
Summary of Dissolved (Filtered) Metal Results,
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

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 (Duplicate) 16-Mar-10	Aluminum	ND	0.010	0.030	NE	NE	U		088521-009	SW846 6020
	Antimony	ND	0.0005	0.003	0.006	NE	U		088521-009	SW846 6020
	Arsenic	0.00181	0.0015	0.005	0.010	0.100	J		088521-009	SW846 6020
	Barium	0.0589	0.0005	0.002	2.00	1.00	B		088521-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		088521-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		088521-009	SW846 6020
	Calcium	41.3	0.400	4.00	NE	NE	B		088521-009	SW846 6020
	Chromium	0.00279	0.0025	0.010	0.100	0.050	J		088521-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	NE	U		088521-009	SW846 6020
	Copper	0.000479	0.0003	0.001	NE	NE	B, J	0.0016U	088521-009	SW846 6020
	Iron	0.105	0.010	0.100	NE	NE	B	0.15U	088521-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		088521-009	SW846 6020
	Magnesium	11.3	0.005	0.015	NE	NE	B		088521-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		088521-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	0.002	U		088521-009	SW846 7470
	Nickel	0.00114	0.0005	0.002	NE	NE	J		088521-009	SW846 6020
	Potassium	4.38	0.080	0.300	NE	NE			088521-009	SW846 6020
	Selenium	0.00104	0.001	0.005	0.050	0.050	J		088521-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		088521-009	SW846 6020
	Sodium	48.6	1.60	5.00	NE	NE			088521-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		088521-009	SW846 6020
	Uranium	0.00222	0.00005	0.0002	0.030	5.00			088521-009	SW846 6020
	Uranium-234	ND	0.00001	0.00005	NE	NE	U		088521-009	SW846 6020
	Uranium-235	0.000014	0.00001	0.00007	NE	NE	J		088521-009	SW846 6020
	Uranium-238	0.00221	0.00005	0.0002	NE	NE			088521-009	SW846 6020
	Vanadium	ND	0.060	0.200	NE	NE	U		088521-009	SW846 6020
	Zinc	ND	0.0026	0.010	NE	NE	U		088521-009	SW846 6020

Refer to footnotes on page 2A-47.

Table 2A-4 *(Continued)*
Summary of Dissolved (Filtered) Metal Results,
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

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	0.010	0.030	NE	NE	U		088523-009	SW846 6020
17-Mar-10	Antimony	ND	0.0005	0.003	0.006	NE	U		088523-009	SW846 6020
	Arsenic	0.00195	0.0015	0.005	0.010	0.100	J		088523-009	SW846 6020
	Barium	0.0525	0.0005	0.002	2.00	1.00	B		088523-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		088523-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		088523-009	SW846 6020
	Calcium	39.1	0.400	4.00	NE	NE	B		088523-009	SW846 6020
	Chromium	0.00337	0.0025	0.010	0.100	0.050	J		088523-009	SW846 6020
	Cobalt	0.000107	0.0001	0.001	NE	NE	B, J	0.00052U	088523-009	SW846 6020
	Copper	0.000473	0.0003	0.001	NE	NE	B, J	0.0016U	088523-009	SW846 6020
	Iron	0.107	0.010	0.100	NE	NE	B	0.15U	088523-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		088523-009	SW846 6020
	Magnesium	10.3	0.005	0.015	NE	NE	B		088523-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		088523-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	0.002	U		088523-009	SW846 7470
	Nickel	0.00117	0.0005	0.002	NE	NE	J		088523-009	SW846 6020
	Potassium	4.45	0.080	0.300	NE	NE			088523-009	SW846 6020
	Selenium	0.0011	0.001	0.005	0.050	0.050	J		088523-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		088523-009	SW846 6020
	Sodium	60.7	1.60	5.00	NE	NE			088523-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		088523-009	SW846 6020
	Uranium	0.00206	0.00005	0.0002	0.030	5.00			088523-009	SW846 6020
	Uranium-234	ND	0.00001	0.00005	NE	NE	U		088523-009	SW846 6020
	Uranium-235	0.000014	0.00001	0.00007	NE	NE	J		088523-009	SW846 6020
	Uranium-238	0.00205	0.00005	0.0002	NE	NE			088523-009	SW846 6020
	Vanadium	ND	0.060	0.200	NE	NE	U		088523-009	SW846 6020
	Zinc	0.00487	0.0026	0.010	NE	NE	B, J	0.018U	088523-009	SW846 6020

Refer to footnotes on page 2A-47.

Table 2A-4 *(Concluded)*
Summary of Dissolved (Filtered) Metal Results,
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

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	0.050	0.150	NE	NE	U		088505-009	SW846 6020
09-Mar-10	Antimony	ND	0.0005	0.003	0.006	NE	U		088505-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	0.100	U		088505-009	SW846 6020
	Barium	0.0452	0.0005	0.002	2.00	1.00			088505-009	SW846 6020
	Beryllium	ND	0.0005	0.0025	0.004	NE	U		088505-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.010	U		088505-009	SW846 6020
	Calcium	166	0.100	1.00	NE	NE	B		088505-009	SW846 6020
	Chromium	ND	0.0125	0.050	0.100	0.050	U		088505-009	SW846 6020
	Cobalt	ND	0.0005	0.005	NE	NE	U		088505-009	SW846 6020
	Copper	ND	0.0015	0.005	NE	NE	U		088505-009	SW846 6020
	Iron	0.216	0.050	0.500	NE	NE	J		088505-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.050	U		088505-009	SW846 6020
	Magnesium	36.8	0.025	0.075	NE	NE		J	088505-009	SW846 6020
	Manganese	ND	0.005	0.025	NE	NE	U		088505-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	0.002	U	UJ	088505-009	SW846 7470
	Nickel	0.00263	0.0025	0.010	NE	NE	J	J+	088505-009	SW846 6020
	Potassium	6.75	0.400	1.50	NE	NE			088505-009	SW846 6020
	Selenium	0.00236	0.001	0.005	0.050	0.050	J		088505-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.050	U		088505-009	SW846 6020
	Sodium	109	0.400	1.25	NE	NE			088505-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		088505-009	SW846 6020
	Uranium	0.0166	0.00005	0.0002	0.030	5.00			088505-009	SW846 6020
	Uranium-234	ND	0.00001	0.00005	NE	NE	U		088505-009	SW846 6020
	Uranium-235	0.000122	0.00001	0.00007	NE	NE			088505-009	SW846 6020
	Uranium-238	0.0165	0.00005	0.0002	NE	NE			088505-009	SW846 6020
	Vanadium	ND	0.015	0.050	NE	NE	U	UJ	088505-009	SW846 6020
	Zinc	0.0031	0.0026	0.010	NE	NE	J	J+	088505-009	SW846 6020

Refer to footnotes on page 2A-47.

Table 2A-5
Summary of Total (Unfiltered) Mercury Results (EPA Method[g] SW846-7470), Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Sample Date	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.
Coyote Spring	29-Mar-10	ND	0.000066	0.0002	0.002	0.002	U		088545-010
CTF-MW1	18-Mar-10	ND	0.000066	0.0002	0.002	0.002	U		088526-010
CTF-MW2	15-Mar-10	ND	0.000066	0.0002	0.002	0.002	U		088516-010
CTF-MW3	10-Mar-10	ND	0.000066	0.0002	0.002	0.002	U	UJ	088507-010
Eubank-1	05-Mar-10	ND	0.000066	0.0002	0.002	0.002	U	UJ	088501-010
Greystone-MW2	22-Mar-10	ND	0.000066	0.0002	0.002	0.002	U		088531-010
MRN-2	24-Mar-10	ND	0.000066	0.0002	0.002	0.002	U		088535-010
MRN-3D	25-Mar-10	ND	0.000066	0.0002	0.002	0.002	U		088538-010
NWTA3-MW3D	26-Mar-10	ND	0.000066	0.0002	0.002	0.002	U		088542-010
NWTA3-MW3D (Duplicate)	26-Mar-10	ND	0.000066	0.0002	0.002	0.002	U		088543-010
PL-2	12-Mar-10	ND	0.000066	0.0002	0.002	0.002	U		088514-010
PL-4	11-Mar-10	ND	0.000066	0.0002	0.002	0.002	U	UJ	088511-010
PL-4 (Duplicate)	11-Mar-10	ND	0.000066	0.0002	0.002	0.002	U	UJ	088512-010
SFR-2S	08-Mar-10	ND	0.000066	0.0002	0.002	0.002	U	UJ	088503-010
SFR-4T	23-Mar-10	ND	0.000066	0.0002	0.002	0.002	U		088533-010
SWTA3-MW2	19-Mar-10	ND	0.000066	0.0002	0.002	0.002	U		088528-010
SWTA3-MW3	16-Mar-10	ND	0.000066	0.0002	0.002	0.002	U		088520-010
SWTA3-MW3 (Duplicate)	16-Mar-10	ND	0.000066	0.0002	0.002	0.002	U		088521-010
SWTA3-MW4	17-Mar-10	ND	0.000066	0.0002	0.002	0.002	U		088523-010
TRE-1	09-Mar-10	ND	0.000066	0.0002	0.002	0.002	U	UJ	088505-010

Refer to footnotes on page 2A-47.

Table 2A-6
Summary of Gamma-Emitting Radionuclides/Short List (EPA Method[g] 901.0), Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL/MAC[d] (pCi/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.
Coyote Spring	Americium-241	-0.0669 ± 5.81	9.43	4.72	NE	NE	U	BD	088545-033
29-Mar-10	Cesium-137	0.120 ± 1.52	2.54	1.27	NE	NE	U	BD	088545-033
	Cobalt-60	1.72 ± 1.71	3.03	1.52	NE	NE	U	BD	088545-033
	Potassium-40	6.55 ± 36.7	42.3	21.1	NE	NE	U	BD	088545-033
CTF-MW1	Americium-241	-0.165 ± 5.32	8.93	4.47	NE	NE	U	BD	088526-033
18-Mar-10	Cesium-137	0.829 ± 1.51	2.66	1.33	NE	NE	U	BD	088526-033
	Cobalt-60	1.86 ± 1.70	3.01	1.51	NE	NE	U	BD	088526-033
	Potassium-40	56.4 ± 24.7	25.6	12.8	NE	NE		J	088526-033
CTF-MW2	Americium-241	-56.2 ± 20.2	27.3	13.7	NE	NE	U	BD	088516-033
15-Mar-10	Cesium-137	1.15 ± 2.10	3.55	1.78	NE	NE	U	BD	088516-033
	Cobalt-60	0.194 ± 2.09	3.46	1.73	NE	NE	U	BD	088516-033
	Potassium-40	12.4 ± 45.7	54.8	27.4	NE	NE	U	BD	088516-033
CTF-MW3	Americium-241	1.75 ± 5.32	9.00	4.51	NE	NE	U	BD	088507-033
10-Mar-10	Cesium-137	-1.72 ± 1.56	2.53	1.26	NE	NE	U	BD	088507-033
	Cobalt-60	1.40 ± 1.67	2.92	1.46	NE	NE	U	BD	088507-033
	Potassium-40	54.7 ± 18.6	54.7	18.1	NE	NE		J	088507-033
Eubank-1	Americium-241	-4.41 ± 13.1	22.1	11.1	NE	NE	U	BD	088501-033
05-Mar-10	Cesium-137	1.31 ± 1.91	3.35	1.67	NE	NE	U	BD	088501-033
	Cobalt-60	0.507 ± 1.96	3.38	1.69	NE	NE	U	BD	088501-033
	Potassium-40	-34.9 ± 38.3	47.0	23.5	NE	NE	U	BD	088501-033
Greystone-MW2	Americium-241	-2.5 ± 4.02	4.36	2.18	NE	NE	U	BD	088531-033
22-Mar-10	Cesium-137	-4.96 ± 4.46	5.25	2.63	NE	NE	U	BD	088531-033
	Cobalt-60	-0.573 ± 3.46	3.66	1.83	NE	NE	U	BD	088531-033
	Potassium-40	8.97 ± 39.2	44.2	22.1	NE	NE	U	BD	088531-033
MRN-2	Americium-241	-3.12 ± 4.95	5.13	2.57	NE	NE	U	BD	088535-033
24-Mar-10	Cesium-137	0.0852 ± 2.48	4.06	2.03	NE	NE	U	BD	088535-033
	Cobalt-60	-1.11 ± 4.24	4.33	2.17	NE	NE	U	BD	088535-033
	Potassium-40	27.3 ± 25.6	46.6	23.3	NE	NE	U	BD	088535-033
MRN-3D	Americium-241	0.308 ± 5.39	9.05	4.53	NE	NE	U	BD	088538-033
25-Mar-10	Cesium-137	-0.151 ± 1.50	2.56	1.28	NE	NE	U	BD	088538-033
	Cobalt-60	0.706 ± 1.67	2.83	1.42	NE	NE	U	BD	088538-033
	Potassium-40	10.5 ± 36.1	36.5	18.3	NE	NE	U	BD	088538-033
NWTA3-MW3D	Americium-241	-10.5 ± 10.4	17.0	8.51	NE	NE	U	BD	088542-033
26-Mar-10	Cesium-137	-0.659 ± 2.08	3.44	1.72	NE	NE	U	BD	088542-033
	Cobalt-60	1.05 ± 2.24	3.86	1.93	NE	NE	U	BD	088542-033
	Potassium-40	-16.8 ± 39.0	45.2	22.6	NE	NE	U	BD	088542-033

Refer to footnotes on page 2A-47.

Table 2A-6 *(Continued)*
Summary of Gamma-Emitting Radionuclides/Short List (EPA Method[g] 901.0), Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL/MAC[d] (pCi/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.
NWTA3-MW3D (Duplicate)	Americium-241	5.55 ± 13.3	22.9	11.5	NE	NE	U	BD	088543-033
26-Mar-10	Cesium-137	0.0953 ± 1.83	3.13	1.57	NE	NE	U	BD	088543-033
	Cobalt-60	0.161 ± 1.93	3.29	1.64	NE	NE	U	BD	088543-033
	Potassium-40	-37.4 ± 41.0	49.7	24.9	NE	NE	U	BD	088543-033
PL-2	Americium-241	-33.6 ± 11.6	17.7	8.84	NE	NE	U	BD	088514-033
12-Mar-10	Cesium-137	-0.982 ± 1.93	3.22	1.61	NE	NE	U	BD	088514-033
	Cobalt-60	0.878 ± 1.81	3.17	1.59	NE	NE	U	BD	088514-033
	Potassium-40	-22.5 ± 42.9	43.9	22.0	NE	NE	U	BD	088514-033
PL-4	Americium-241	-32.1 ± 11.6	17.9	8.95	NE	NE	U	BD	088511-033
11-Mar-10	Cesium-137	0.545 ± 2.01	3.46	1.73	NE	NE	U	BD	088511-033
	Cobalt-60	0.775 ± 1.85	3.23	1.61	NE	NE	U	BD	088511-033
	Potassium-40	15.6 ± 36.3	45.6	22.8	NE	NE	U	BD	088511-033
PL-4 (Duplicate)	Americium-241	-6.14 ± 11.0	18.7	9.35	NE	NE	U	BD	088512-033
11-Mar-10	Cesium-137	-2.89 ± 3.77	4.00	2.00	NE	NE	U	BD	088512-033
	Cobalt-60	0.603 ± 1.83	3.19	1.60	NE	NE	U	BD	088512-033
	Potassium-40	48.8 ± 22.7	48.8	21.6	NE	NE		J	088512-033
SFR-2S	Americium-241	-3.38 ± 6.20	9.04	4.52	NE	NE	U	BD	088503-033
08-Mar-10	Cesium-137	0.097 ± 1.59	2.64	1.32	NE	NE	U	BD	088503-033
	Cobalt-60	0.600 ± 1.71	2.91	1.46	NE	NE	U	BD	088503-033
	Potassium-40	93.9 ± 26.8	25.5	12.8	NE	NE			088503-033
SFR-4T	Americium-241	-1.85 ± 7.69	12.9	6.46	NE	NE	U	BD	088533-033
23-Mar-10	Cesium-137	0.319 ± 1.73	2.95	1.48	NE	NE	U	BD	088533-033
	Cobalt-60	0.779 ± 1.82	3.14	1.57	NE	NE	U	BD	088533-033
	Potassium-40	-40.1 ± 35.5	42.8	21.4	NE	NE	U	BD	088533-033
SWTA3-MW2	Americium-241	-21.1 ± 7.63	11.7	5.85	NE	NE	U	BD	088528-033
19-Mar-10	Cesium-137	-0.538 ± 1.86	3.04	1.52	NE	NE	U	BD	088528-033
	Cobalt-60	1.25 ± 1.84	3.24	1.62	NE	NE	U	BD	088528-033
	Potassium-40	-10.9 ± 38.2	43.5	21.8	NE	NE	U	BD	088528-033
SWTA3-MW3	Americium-241	4.35 ± 11.3	19.7	9.87	NE	NE	U	BD	088520-033
16-Mar-10	Cesium-137	-3.32 ± 3.41	3.90	1.95	NE	NE	U	BD	088520-033
	Cobalt-60	0.195 ± 2.01	3.45	1.73	NE	NE	U	BD	088520-033
	Potassium-40	-15 ± 37.5	42.1	21.1	NE	NE	U	BD	088520-033
SWTA3-MW3 (Duplicate)	Americium-241	-15.1 ± 7.56	12.0	5.99	NE	NE	U	BD	088521-033
16-Mar-10	Cesium-137	1.01 ± 1.91	3.25	1.62	NE	NE	U	BD	088521-033
	Cobalt-60	1.52 ± 1.92	3.39	1.70	NE	NE	U	BD	088521-033
	Potassium-40	-2.18 ± 39.4	45.6	22.8	NE	NE	U	BD	088521-033

Refer to footnotes on page 2A-47.

Table 2A-6 *(Concluded)*
Summary of Gamma-Emitting Radionuclides/Short List (EPA Method[g] 901.0), Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL/MAC[d] (pCi/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.
SWTA3-MW4	Americium-241	-3.8 ± 5.00	5.04	2.52	NE	NE	U	BD	088523-033
17-Mar-10	Cesium-137	-2.47 ± 3.66	3.98	1.99	NE	NE	U	BD	088523-033
	Cobalt-60	-1.49 ± 4.24	4.44	2.22	NE	NE	U	BD	088523-033
	Potassium-40	6.62 ± 47.0	50.1	25.1	NE	NE	U	BD	088523-033
TRE-1	Americium-241	3.05 ± 2.97	5.26	2.63	NE	NE	U	BD	088505-033
09-Mar-10	Cesium-137	-2.4 ± 4.27	3.95	1.98	NE	NE	U	BD	088505-033
	Cobalt-60	1.07 ± 2.41	4.26	2.13	NE	NE	U	BD	088505-033
	Potassium-40	33.5 ± 41.8	50.0	25.0	NE	NE	U	BD	088505-033

Refer to footnotes on page 2A-47.

Table 2A-7
Summary of Radioisotopic Results,
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL/MAC[d] (pCi/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
Coyote Spring	Gross Alpha	-1.16	NA	NA	15	NE	NA	None	088545-034	EPA 900.0
29-Mar-10	Gross Beta	19.6 ± 4.88	4.77	2.26	4mrem/yr	NE			088545-034	EPA 900.0
	Radium-226	0.112 ± 0.182	0.322	0.127	5	30	U	BD	088545-038	EPA 903.1
	Radium-228	0.529 ± 0.350	0.494	0.221	5	30		J	088545-039	EPA 904.0
	Radon-222	45.7 ± 40.1	64.2	30.4	NE	NE	U	BD	088545-040	SM 7500 Rn B
	Uranium-233/234	11.0 ± 1.67	0.0783	0.0332	NE	NE			088545-035	DOE HASL-300
	Uranium-235/236	0.109 ± 0.0525	0.0615	0.0234	NE	NE		BD	088545-035	DOE HASL-300
	Uranium-238	2.35 ± 0.397	0.0554	0.0217	NE	NE			088545-035	DOE HASL-300
CTF-MW1	Gross Alpha	-2.24	NA	NA	15	NE	NA	None	088526-034	EPA 900.0
18-Mar-10	Gross Beta	3.27 ± 0.970	0.998	0.467	4mrem/yr	NE			088526-034	EPA 900.0
	Radium-226	0.348 ± 0.229	0.252	0.0954	5	30		J	088526-038	EPA 903.1
	Radium-228	0.423 ± 0.319	0.463	0.202	5	30	U	BD	088526-039	EPA 904.0
	Radon-222	489 ± 121	61.6	29.1	NE	NE			088526-040	SM 7500 Rn B
	Uranium-233/234	23.6 ± 3.35	0.0547	0.0232	NE	NE			088526-035	DOE HASL-300
	Uranium-235/236	0.281 ± 0.076	0.0429	0.0163	NE	NE			088526-035	DOE HASL-300
	Uranium-238	3.56 ± 0.540	0.0387	0.0152	NE	NE			088526-035	DOE HASL-300
CTF-MW2	Gross Alpha	10.76	NA	NA	15	NE	NA	None	088516-034	EPA 900.0
15-Mar-10	Gross Beta	50.9 ± 10.7	6.94	3.28	4mrem/yr	NE			088516-034	EPA 900.0
	Radium-226	**2.16 ± 0.0854**	0.405	0.160	5	30			088516-038	EPA 903.1
	Radium-228	**7.94 ± 2.10**	0.555	0.267	5	30			088516-039	EPA 904.0
	Radon-222	81.5 ± 42.6	60.2	28.4	NE	NE		J	088516-040	SM 7500 Rn B
	Uranium-233/234	56.2 ± 8.04	0.0628	0.0266	NE	NE			088516-035	DOE HASL-300
	Uranium-235/236	0.654 ± 0.141	0.0493	0.0187	NE	NE			088516-035	DOE HASL-300
	Uranium-238	8.59 ± 1.27	0.0444	0.0174	NE	NE			088516-035	DOE HASL-300
CTF-MW3	Gross Alpha	-0.99	NA	NA	15	NE	NA	None	088507-034	EPA 900.0
10-Mar-10	Gross Beta	12.4 ± 3.92	5.14	2.50	4mrem/yr	NE		J	088507-034	EPA 900.0
	Radium-226	0.349 ± 0.289	0.418	0.166	5	30	U	BD	088507-038	EPA 903.1
	Radium-228	2.19 ± 0.739	0.480	0.210	5	30			088507-039	EPA 904.0
	Radon-222	763 ± 180	64.7	30.7	NE	NE			088507-040	SM 7500 Rn B
	Uranium-233/234	11.4 ± 1.64	0.0518	0.022	NE	NE			088507-035	DOE HASL-300
	Uranium-235/236	0.209 ± 0.0635	0.0406	0.0154	NE	NE			088507-035	DOE HASL-300
	Uranium-238	2.98 ± 0.456	0.0366	0.0144	NE	NE			088507-035	DOE HASL-300

Refer to footnotes on page 2A-47.

Table 2A-7 *(Continued)*
Summary of Radioisotopic Results,
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL/MAC[d] (pCi/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
Eubank-1	Gross Alpha	2.22	NA	NA	15	NE	NA	None	088501-034	EPA 900.0
05-Mar-10	Gross Beta	3.77 ± 1.23	1.65	0.804	4mrem/yr	NE		J	088501-034	EPA 900.0
	Radium-226	0.994 ± 0.540	0.618	0.252	5	30		J	088501-038	EPA 903.1
	Radium-228	0.472 ± 0.327	0.464	0.205	5	30		J	088501-039	EPA 904.0
Greystone-MW2	Gross Alpha	-2.83	NA	NA	15	NE	NA	None	088531-034	EPA 900.0
22-Mar-10	Gross Beta	4.09 ± 1.41	1.81	0.862	4mrem/yr	NE		J	088531-034	EPA 900.0
	Radium-226	0.479 ± 0.259	0.241	0.0829	5	30		J	088531-038	EPA 903.1
	Radium-228	0.344 ± 0.290	0.439	0.193	5	30	U	BD	088531-039	EPA 904.0
	Radon-222	2100 ± 468	64.0	30.4	NE	NE			088531-040	SM 7500 Rn B
	Uranium-233/234	10.1 ± 1.46	0.054	0.0229	NE	NE			088531-035	DOE HASL-300
	Uranium-235/236	0.184 ± 0.0585	0.0424	0.0161	NE	NE			088531-035	DOE HASL-300
	Uranium-238	2.33 ± 0.366	0.0382	0.015	NE	NE			088531-035	DOE HASL-300
MRN-2	Gross Alpha	2.84	NA	NA	15	NE	NA	None	088535-034	EPA 900.0
24-Mar-10	Gross Beta	2.83 ± 0.838	0.998	0.479	4mrem/yr	NE		J	088535-034	EPA 900.0
	Radium-226	0.0982 ± 0.215	0.403	0.152	5	30	U	BD	088535-038	EPA 903.1
	Radium-228	0.404 ± 0.316	0.469	0.207	5	30	U	BD	088535-039	EPA 904.0
MRN-3D	Gross Alpha	-0.10	NA	NA	15	NE	NA	None	088538-034	EPA 900.0
25-Mar-10	Gross Beta	4.51 ± 1.09	0.996	0.471	15	NE			088538-034	EPA 900.0
	Radium-226	0.445 ± 0.251	0.237	0.0814	5	30		J	088538-038	EPA 903.1
	Radium-228	0.472 ± 0.318	0.453	0.204	5	30		J	088538-039	EPA 904.0
NWTA3-MW3D	Gross Alpha	2.12	NA	NA	15	NE	NA	None	088542-034	EPA 900.0
26-Mar-10	Gross Beta	2.98 ± 0.895	0.996	0.467	15	NE		J	088542-034	EPA 900.0
	Radium-226	0.0861 ± 0.181	0.330	0.133	5	30	U	BD	088542-038	EPA 903.1
	Radium-228	0.192 ± 0.285	0.484	0.215	5	30	U	BD	088542-039	EPA 904.0
NWTA3-MW3D (Duplicate)	Gross Alpha	0.91	NA	NA	15	NE	NA	None	088543-034	EPA 900.0
26-Mar-10	Gross Beta	2.81 ± 0.898	0.990	0.457	15	NE		J	088543-034	EPA 900.0
	Radium-226	0.145 ± 0.167	0.267	0.0972	5	30	U	BD	088543-038	EPA 903.1
	Radium-228	0.477 ± 0.341	0.498	0.225	5	30	U	BD	088543-039	EPA 904.0
PL-2	Gross Alpha	2.53	NA	NA	15	NE	NA	None	088514-034	EPA 900.0
12-Mar-10	Gross Beta	2.45 ± 0.866	0.982	0.445	15	NE		J	088514-034	EPA 900.0
	Radium-226	0.115 ± 0.189	0.333	0.132	5	30	U	BD	088514-038	EPA 903.1
	Radium-228	0.492 ± 0.318	0.419	0.177	5	30		J	088514-039	EPA 904.0

Refer to footnotes on page 2A-47.

Table 2A-7 *(Continued)*
Summary of Radioisotopic Results,
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL/MAC[d] (pCi/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
PL-4	Gross Alpha	3.67	NA	NA	15	NE	NA	None	088511-034	EPA 900.0
11-Mar-10	Gross Beta	7.39 ± 1.71	1.74	0.849	15	NE			088511-034	EPA 900.0
	Radium-226	0.245 ± 0.260	0.411	0.160	5	30	U	BD	088511-038	EPA 903.1
	Radium-228	0.609 ± 0.359	0.496	0.228	5	30		NJ+	088511-039	EPA 904.0
PL-4 (Duplicate)	Gross Alpha	3.07	NA	NA	15	NE	NA	None	088512-034	EPA 900.0
11-Mar-10	Gross Beta	6.92 ± 1.67	1.80	0.880	15	NE			088512-034	EPA 900.0
	Radium-226	0.496 ± 0.335	0.366	0.133	5	30		J	088512-038	EPA 903.1
	Radium-228	0.746 ± 0.388	0.470	0.207	5	30		NJ+	088512-039	EPA 904.0
SFR-2S	Gross Alpha	-1.29	NA	NA	15	NE	NA	None	088503-034	EPA 900.0
08-Mar-10	Gross Beta	10.0 ± 2.99	3.68	1.79	4mrem/yr	NE		J	088503-034	EPA 900.0
	Radium-226	0.626 ± 0.408	0.504	0.203	5	30		J	088503-038	EPA 903.1
	Radium-228	0.424 ± 0.319	0.474	0.215	5	30	U	BD	088503-039	EPA 904.0
	Radon-222	292 ± 81.8	64.8	30.7	NE	NE		J	088503-040	SM 7500 Rn B
	Uranium-233/234	20.2 ± 2.90	0.0571	0.0242	NE	NE			088503-035	DOE HASL-300
	Uranium-235/236	0.337 ± 0.086	0.0448	0.017	NE	NE			088503-035	DOE HASL-300
	Uranium-238	5.35 ± 0.798	0.0403	0.0158	NE	NE			088503-035	DOE HASL-300
SFR-4T	Gross Alpha	-1.46	NA	NA	15	NE	NA	None	088533-034	EPA 900.0
23-Mar-10	Gross Beta	0.732 ± 3.32	5.78	2.74	4mrem/yr	NE	U	BD	088533-034	EPA 900.0
	Radium-226	0.0262 ± 0.171	0.351	0.136	5	30	U	BD	088533-038	EPA 903.1
	Radium-228	0.356 ± 0.312	0.482	0.215	5	30	U	BD	088533-039	EPA 904.0
	Radon-222	-41.6 ± 35.2	66.4	31.6	NE	NE	U	BD	088533-040	SM 7500 Rn B
	Uranium-233/234	0.512 ± 0.110	0.0611	0.0259	NE	NE			088533-035	DOE HASL-300
	Uranium-235/236	0.017 ± 0.0168	0.048	0.0182	NE	NE	U	BD	088533-035	DOE HASL-300
	Uranium-238	0.110 ± 0.0412	0.0432	0.0169	NE	NE		J	088533-035	DOE HASL-300
SWTA3-MW2	Gross Alpha	1.68	NA	NA	15	NE	NA	None	088528-034	EPA 900.0
19-Mar-10	Gross Beta	3.88 ± 0.992	0.993	0.472	4mrem/yr	NE			088528-034	EPA 900.0
	Radium-226	0.464 ± 0.302	0.395	0.159	5	30		J	088528-038	EPA 903.1
	Radium-228	0.288 ± 0.292	0.468	0.212	5	30	U	BD	088528-039	EPA 904.0
SWTA3-MW3	Gross Alpha	2.43	NA	NA	15	NE	NA	None	088520-034	EPA 900.0
16-Mar-10	Gross Beta	4.06 ± 1.08	0.996	0.458	4mrem/yr	NE			088520-034	EPA 900.0
	Radium-226	0.0458 ± 0.191	0.370	0.151	5	30	U	BD	088520-038	EPA 903.1
	Radium-228	0.186 ± 0.249	0.419	0.179	5	30	U	BD	088520-039	EPA 904.0

Refer to footnotes on page 2A-47.

Table 2A-7 *(Concluded)*
Summary of Radioisotopic Results,
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL/MAC[d] (pCi/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SWTA3-MW3 (Duplicate) 16-Mar-10	Gross Alpha	2.08	NA	NA	15	NE	NA	None	088521-034	EPA 900.0
	Gross Beta	3.28 ± 0.975	0.984	0.450	15	NE			088521-034	EPA 900.0
	Radium-226	-0.0674 ± 0.159	0.363	0.148	5	30	U	BD	088521-038	EPA 903.1
	Radium-228	0.514 ± 0.323	0.416	0.174	5	30		NJ+	088521-039	EPA 904.0
SWTA3-MW4 17-Mar-10	Gross Alpha	2.64	NA	NA	15	NE	NA	None	088523-034	EPA 900.0
	Gross Beta	3.38 ± 0.977	0.981	0.451	4mrem/yr	NE			088523-034	EPA 900.0
	Radium-226	0.119 ± 0.143	0.228	0.0783	5	30	U	BD	088523-038	EPA 903.1
	Radium-228	0.523 ± 0.325	0.413	0.173	5	30		J	088523-039	EPA 904.0
TRE-1 09-Mar-10	Gross Alpha	1.28	NA	NA	15	NE	NA	None	088505-034	EPA 900.0
	Gross Beta	11.4 ± 3.66	4.78	2.33	4mrem/yr	NE		J	088505-034	EPA 900.0
	Radium-226	0.319 ± 0.234	0.278	0.0955	5	30		J	088505-038	EPA 903.1
	Radium-228	0.596 ± 0.348	0.489	0.229	5	30		J	088505-039	EPA 904.0
	Radon-222	637 ± 154	67.0	31.7	NE	NE		J	088505-040	SM 7500 Rn B
	Uranium-233/234	22.1 ± 3.15	0.0546	0.0231	NE	NE			088505-035	DOE HASL-300
	Uranium-235/236	0.376 ± 0.0915	0.0429	0.0163	NE	NE			088505-035	DOE HASL-300
	Uranium-238	5.54 ± 0.820	0.0386	0.0151	NE	NE			088505-035	DOE HASL-300

Refer to footnotes on page 2A-47.

Table 2A-8
Summary of Field Water Quality Measurements[h], Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/ New Mexico

Calendar Year 2010

Well ID	Sample Date	Sampling Type	Initial Depth to water (fbtoc)	Sampling Depth (fbtoc)	Purge Volume (gal)	Temperature (^{0}C)	Specific Conductivity (μmho/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (%Sat)	Alkalinity (mg/L $CaCO_3$ at 4.5 pH)
Coyote Spring	29-Mar-10	n/a	n/a	n/a	n/a	12.09	3175	243.7	5.95	1.09	20.0	1200
CTF-MW1	18-Mar-10	Bennett Pump	237.13	260	25	16.83	678	259.9	7.25	0.26	73.6	180
CTF-MW2	15-Mar-10	Bennett Pump	43.73	130	37	14.59	3601	99.8	6.01	1.09	0.7	1150
CTF-MW3	10-Mar-10	Bennett Pump	305.71	360	51	16.35	1711	246.8	6.84	0.42	74.5	270
Eubank-1	05-Mar-10	Bennett Pump	552.00	605	72	18.05	492	203.9	7.33	0.58	84.5	150
Greystone-MW2	22-Mar-10	Bennett Pump	51.86	80	37	15.36	1166	260.4	6.92	0.34	70.4	370
MRN-2	24-Mar-10	Bennett Pump	435.15	441	18	16.87	440	257.2	7.46	0.63	72.9	120
MRN-3D	25-Mar-10	Bennett Pump	435.79	680	41	19.10	472	128.2	7.42	2.64	43.7	130
NWTA3-MW3D	26-Mar-10	Bennett Pump	467.46	673	41	18.75	379	208.9	7.57	1.70	48.0	125
PL-2	12-Mar-10	Bennett Pump	469.84	597	41	17.97	450	242.1	7.63	0.51	64.6	130
PL-4	11-Mar-10	Bennett Pump	468.48	492	49	16.46	482	80.4	7.33	2.99	60.4	110
SFR-2S	08-Mar-10	Bennett Pump	99.57	118	28	13.16	1131	157.8	6.75	25.6	78.8	275
SFR-4T	23-Mar-10	Bennett Pump	147.77	359	48	15.37	4274	165.7	7.92	0.38	11.0	100
SWTA3-MW2	19-Mar-10	Bennett Pump	449.88	474	40	18.4	440	220.1	7.50	3.70	48.0	160
SWTA3-MW3	16-Mar-10	Bennett Pump	447.73	639	37	19.21	451	228.8	7.50	1.05	49.3	140
SWTA3-MW4	17-Mar-10	Bennett Pump	448.28	457	37	19.07	458	233.5	7.53	0.44	47.7	155
TRE-1	09-Mar-10	Bennett Pump	175.80	294	76	16.46	1345	255.7	6.59	0.27	72.1	350

Refer to footnotes on page 2A-47.

Table 2A-9
Calendar Year 2010 Groundwater Levels
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/ New Mexico

Calendar Year 2010

Well Name	Measurement Point*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AVN-1	5440.27	520.99			521.21			521.40			521.57		
CTF-MW1	6079.96	236.95			237.07			237.20			237.37		
CTF-MW2	5575.93	43.76			43.72			43.73			43.75		
CTF-MW3	5520.15	305.94			305.95			306.14			306.36		
CWL-BW3	5430.23	504.20		504.25				504.69			505.21		
CWL-BW4A	5431.36	504.84		504.92									
CWL-BW5	5432.12							508.11			508.63		
CWL-MW10	5421.91							497.67			498.03		
CWL-MW11	5420.57							496.91			497.47		
CWL-MW2BL	5419.39	498.59		498.72				498.92			499.42		
CWL-MW2BU	5419.42	494.04											
CWL-MW4	5420.33	497.31		497.4									
CWL-MW5L	5415.80	495.46		495.53									
CWL-MW5U	5416.01	490.23		490.37									
CWL-MW6L	5417.13	497.24		497.36									
CWL-MW6U	5416.78	490.60		490.68									
CWL-MW7	5419.51	512.31		512.45				512.67			513.13		
CWL-MW8	5419.26	511.90		512.04				512.27			512.71		
CWL-MW9	5423.45							500.78			501.26		
CYN-MW10	6342.78								121.08				
CYN-MW11	6371.74								96.66				
CYN-MW12	6342.49								205.78				
CYN-MW1D	6239.69	324.69			324.87			325.08			325.31		
CYN-MW3	6313.26	125.93			126.79			127.17			127.5		
CYN-MW4	6455.91	218.03			218.79			219.58			220.29		
CYN-MW5	5981.56	107.00			106.87			107.19			107.24		
CYN-MW6	6343.37	147.49			148.41			148.76			149.33		

Refer to footnote at end of table.

Table 2A-9 *(Continued)*
Calendar Year 2010 Groundwater Levels
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/ New Mexico

Calendar Year 2010

Well Name	Measurement Point *	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
CYN-MW7	6216.44	299.69			299.88			300.03			300.32		
CYN-MW8	6230.21	315.33			315.52			315.68			315.96		
CYN-MW9	6358.00								163.63				
EUBANK-1	5457.35	551.96	551.89	551.76	551.74	551.64	551.83	551.92	551.86	551.76	551.88	551.79	551.53
GREYSTONE-MW2	5811.53	52.32			51.83			52.63			53.4		
LWDS-MW1	5421.05	499.00			499.01			499.17			499.5		
LWDS-MW2	5409.68	488.13			488.24			488.47			488.57		
MRN-2	5305.51	435.09	435.13	435.09	435.1	434.94	435.16	435.22	435.36	435.37	435.53	435.75	435.5
MRN-3D	5306.67	435.63	435.64	435.58	435.58	435.44	435.75	435.83	435.95	435.97	436.12	436.29	435.97
MWL-BW2	5388.35	477.99	477.94	477.99	477.95	478.03	478.03	478.24	478.17	478.19	478.28	478.36	478.34
MWL-MW4	5389.03				500.58			500.73			500.92		
MWL-MW5	5379.89	493.05			492.9			493.21			493.28		
MWL-MW6	5372.64	487.01			486.85			487.16			487.22		
MWL-MW7	5380.63	489.18	488.90	489.07	488.93	489.09	489.12	489.26	489.19	489.09	489.3	489.44	489.25
MWL-MW8	5382.00	490.87	490.56	490.77	490.56	490.75	490.77	490.82	490.83	490.74	490.92	491.07	490.9
MWL-MW9	5379.24	491.44	491.14	491.31	491.11	491.36	491.38	491.46	491.45	491.36	491.55	491.69	491.51
NWTA3-MW2	5334.82	468.31	468.22	468.31	468.46	468.19	468.37	468.34	468.56	468.55	468.66	468.92	468.6
NWTA3-MW3D	5338.13	467.62	467.49	467.57	467.7	467.49	467.62	467.7	467.87	467.91	468.02	468.22	467.82
PGS-2	5405.62	553.28	552.73	552.44	552.3	553.01	553.43	554.73	554.32	555.14	555.3	554.67	553.36
PL-2	5333.34	469.77	468.57		469.58			470.13			470.36		
PL-4	5332.31			468.46	468.48	468.39	468.5	468.75	468.7	468.6	468.99	468.57	468.93
SCHOOL HOUSE WELL	5793.66	95.47			95.4			95.36			95.65		
SFR-1D	5396.46	138.99			139.09			139.15			139.23		
SFR-1S	5396.49	89.37			89.44			89.49			89.55		
SFR-2S	5430.10	99.50			99.69			99.7			99.93		

Refer to footnote at end of table.

Table 2A-9 *(Continued)*
Calendar Year 2010 Groundwater Levels
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/ New Mexico

Calendar Year 2010

Well Name	Measurement Point *	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SFR-3D	5495.27	160.74			160.74			160.75			160.87		
SFR-3P	5496.96	160.65			160.85			160.84			161.07		
SFR-3S	5495.57	159.86			159.84			159.84			160.03		
SFR-3T	5495.99	69.97			70.29			70.06			70.03		
SFR-4P	5570.66	151.67			153.93			153.54			152.56		
SFR-4T	5571.28	148.28			169.9			152.09			149.83		
SWTA3-MW2	5322.93	449.93	449.99	450.05	450.23	449.94	450.1	450.15	450.32	450.33	450.42	450.65	450.35
SWTA3-MW3	5321.27	447.13	447.18	447.22	447.39	447.16	447.32	447.37	447.55	447.6	447.68	447.87	447.57
SWTA3-MW4	5322.14	447.67	447.73	447.77	447.94	447.67	447.85	447.88	448.07	448.1	448.2	448.4	448.11
TA1-W-01	5401.15	544.73	544.35	544.41	544.24	543.9	544.19	544.31	544.54	544.72	544.98	544.63	544.51
TA1-W-02	5413.95	525.85			525.13			525.35			525.55		
TA1-W-03	5454.36	345.29			346.6			346.94			347.23		
TA1-W-04	5458.31	572.96	572.66	572.46	572.17	571.86	571.94	572.06	572.19	572.23	572.29	572.39	571.92
TA1-W-05	5431.17	572.32	571.60	571.37	571.04	572.49	573.4	575.26	574.62	575.95	576	574.76	572.72
TA1-W-06	5414.43	305.44			305.51			305.62			305.87		
TA1-W-07	5402.25	285.01	285.05	285.24	285.27	285.08	285.26	285.22	285.34	285.33	285.48	285.27	285.41
TA1-W-08	5431.52	308.42			308.48			308.73			308.77		
TA2-NW1-325	5419.27		315.84		315.93			316.04			316.17		
TA2-NW1-595	5418.59	525.04			525.01			525.37			525.61		
TA2-SW1-320	5409.18	315.63			316.25			316.39			316.52		
TA2-W-01	5417.32	324.58			325.23			325.34					
TA2-W-19	5348.54	269.56	269.43	269.56	269.78	269.67	269.79	269.9	269.88	269.88	269.9	270.08	269.96
TA2-W-24	5360.99	444.72			444.49			444.66			444.45		
TA2-W-25	5372.19	472.31	472.00	472.09	471.8	471.74	471.95	472.2	472.09	472.05	472.16	472.16	471.76
TA2-W-26	5373.10	283.65			283.64			284.03			284.16		
TA2-W-27	5360.18	277.14			277.55			277.8			277.83		

Refer to footnote at end of table.

Table 2A-9 *(Concluded)*
Calendar Year 2010 Groundwater Levels
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/ New Mexico

Calendar Year 2010

Well Name	Measurement Point *	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
TAV-MW10	5434.30	512.71	512.61	512.7	512.77	512.92	512.87	512.9	513.1	513.05	513.23	513.11	513.26
TAV-MW2	5424.60	502.82			502.89			503.19			503.43		
TAV-MW3	5461.53	541.63			541.63			542.05			542.25		
TAV-MW4	5425.16	503.33			503.48			503.71			503.86		
TAV-MW5	5405.98	484.87			484.96			485.2			485.24		
TAV-MW6	5428.44	506.85			506.93			507.08			507.4		
TAV-MW7	5427.67	509.52			509.61			509.76			510.1		
TAV-MW8	5414.27	491.99			492.05			492.19			492.53		
TAV-MW9	5413.54	495.72			495.79			495.96			496.21		
TJA-2	5350.53	274.85			275.45			275.57			275.59		
TJA-3	5387.89	498.48			498.95			499.05			499.03		
TJA-4	5338.49	303.30			303.05			303.03			302.83		
TJA-5	5338.66	268.81			268.93			269.07			268.97		
TJA-6	5340.49	451.02	450.99	451.06	451.13	450.96	451.09	451.2	451.15	451.08	451.09	451.24	451.08
TJA-7	5388.60	302.17			302.26			302.46			302.47		
TRE-1	5494.58	175.83			175.94			176.05			176.17		
TRN-1	5732.95	91.74			91.86			91.89			92.01		
TRS-1D	5777.13	126.52			126.7			127.1			126.69		
TRS-1S	5777.40	134.00			134.11			134.22			134.23		
TRS-2	5778.09	134.59			134.66			134.79			134.8		
WYO-3	5389.42	532.19	531.99	531.93	531.71	531.5	531.58	531.78	531.89	532.1	532.23	532.32	532.09
WYO-4	5389.90	289.49			289.38			289.85			290.14		

* Measurement point was mathematically converted to NAD27 using National Geodetic Survey approved software.

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Footnotes for Groundwater Protection Program Groundwater Surveillance Task Tables

[a]Result and/or Activity

- Values in bold exceed the established MCL and/or MAC.
- ND = not detected (at method detection limit).
- Activities of zero or less are considered to be not detected.
- Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 1-4)
- μg/L = micrograms per liter
- mg/L = milligrams per liter
- pCi/L = picocuries per liter

[b]MDL or MDA

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.

The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level

NA = not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

[c]PQL or Critical Level

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.

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.

[d]MCL/MAC

- Maximum contaminant level. Established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11, Supbart B), National Primary Drinking Water Standards, EPA, May 2009.
- Maximum Allowable Concentration in groundwater for the contaminants specified in 20 NMAC 6.2, Sec 3103, Human Health Standards.
- NE = not established.
- 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).
- 5 pCi/L = combined radium-226 and radium-228 activities.
- 30 pCi/L = combined radium-226 and radium-228 activities.

[e]Laboratory Qualifier

B = Analyte is detected in associated laboratory method blank.
H = Analytical holding time was exceeded.
J = Amount detected is below the practical quantitation limit (PQL).
NA = Not applicable for gross alpha activities.
U = Analyte is absent or below the method detection limit.

[f]Validation Qualifier

If cell is blank, then all quality control samples meet 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 associate value is an estimated quantity.
J+ = The associated numerical value is an estimated quantity with suspected positive bias.

Footnotes for Groundwater Protection Program Groundwater Surveillance Task Tables (Concluded)

[f]Validation Qualifier (continued)

None	=	No data validation for corrected gross alpha activity.
NJ+	=	Presumptive evidence of the presence of the material at an estimated quantity with a suspected positive bias.
NJ-	=	Presumptive evidence of the presence of the material at an estimated quantity with a suspected negative bias.
U	=	The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
UJ	=	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

[g]Analytical Method

- EPA, 1979, *Methods for Chemical Analysis of Water and Wastes*, EPA-600/4-79-020, U.S. Environmental Protection Agency, Cincinnati, Ohio..
- EPA, 1980, *Prescribed Procedures for Measurement of Radioactivity in Drinking Water,* EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio
- EPA, 2008, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*," SW-846, Update IV of 3rd ed., U.S. Environmental Protection Agency, Washington, D.C.
- U.S. Environmental Protection Agency, Washington, D.C.; or Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B.
- U.S. Department of Energy, Environmental Measurements Laboratory, 1990, *EML Procedures Manual,* 27th ed., Vol. 1, Rev. 1992, HASL-300.
- Beckman, 1988, *Standard Methods for the Examination of Water and Wastewater,* 7500-Rn B Method, 20th eEd.,LS5000TD Liquid Scintillation System Operation Manual, May.

[h]Field Water Quality Measurements

- Field measurements collected prior to sampling.

°C	=	degrees Celsius.
% Sat	=	percent saturation.
fbtoc	=	feet below top of casing.
gal	=	gallons.
μmho/cm	=	micromhos per centimeter.
mg/L	=	milligrams per liter.
mV	=	millivolts.
NTU	=	nephelometric turbidity units.
pH	=	potential of hydrogen (negative logarithm of the hydrogen ion concentration).

Attachment 2B
Groundwater Protection Program
Monitoring Network Map and Plots

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Attachment 2B Monitoring Network Map and Plots

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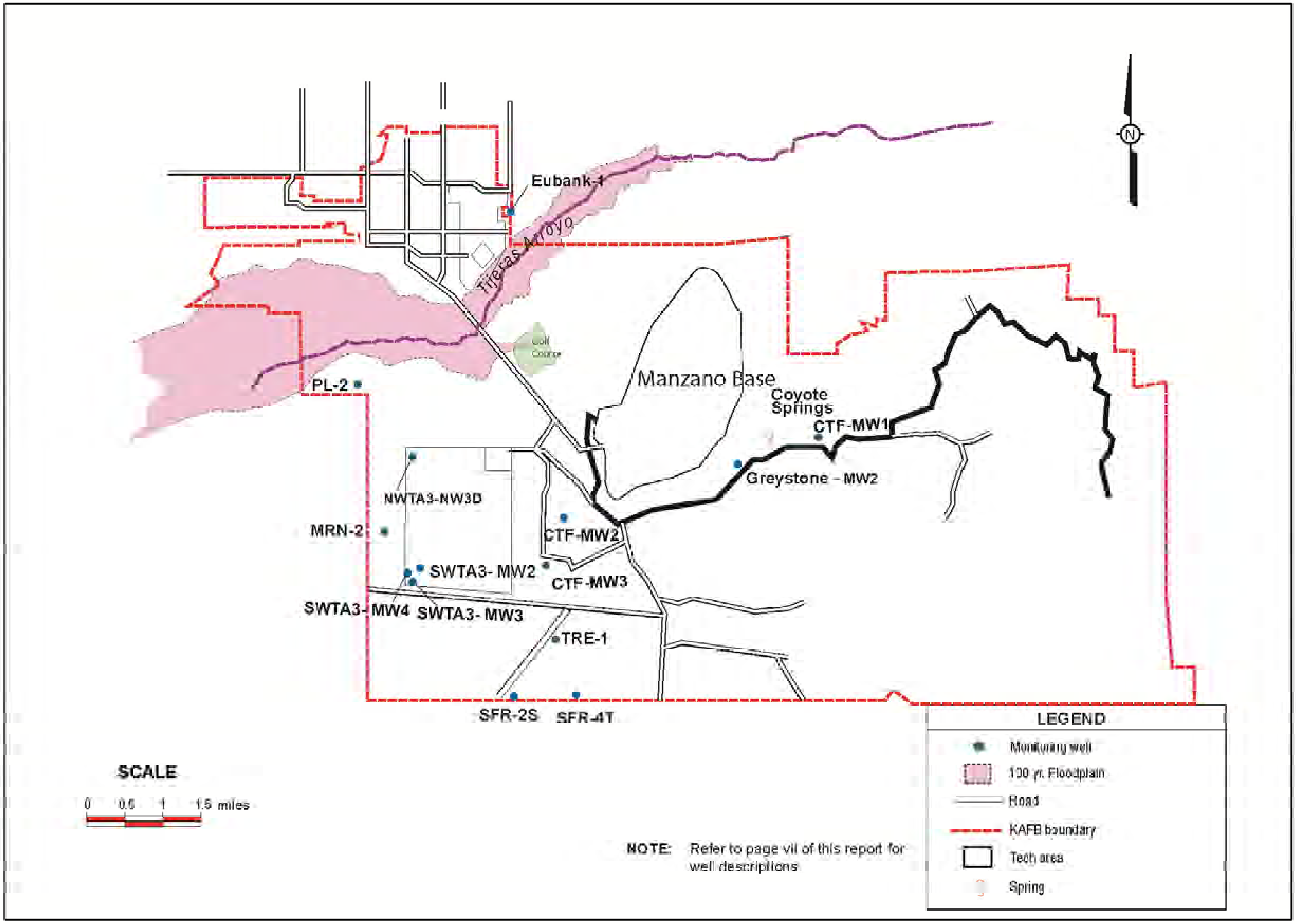

Figure 2B-1. Groundwater Protection Program (GWPP) Water Quality Monitoring Network

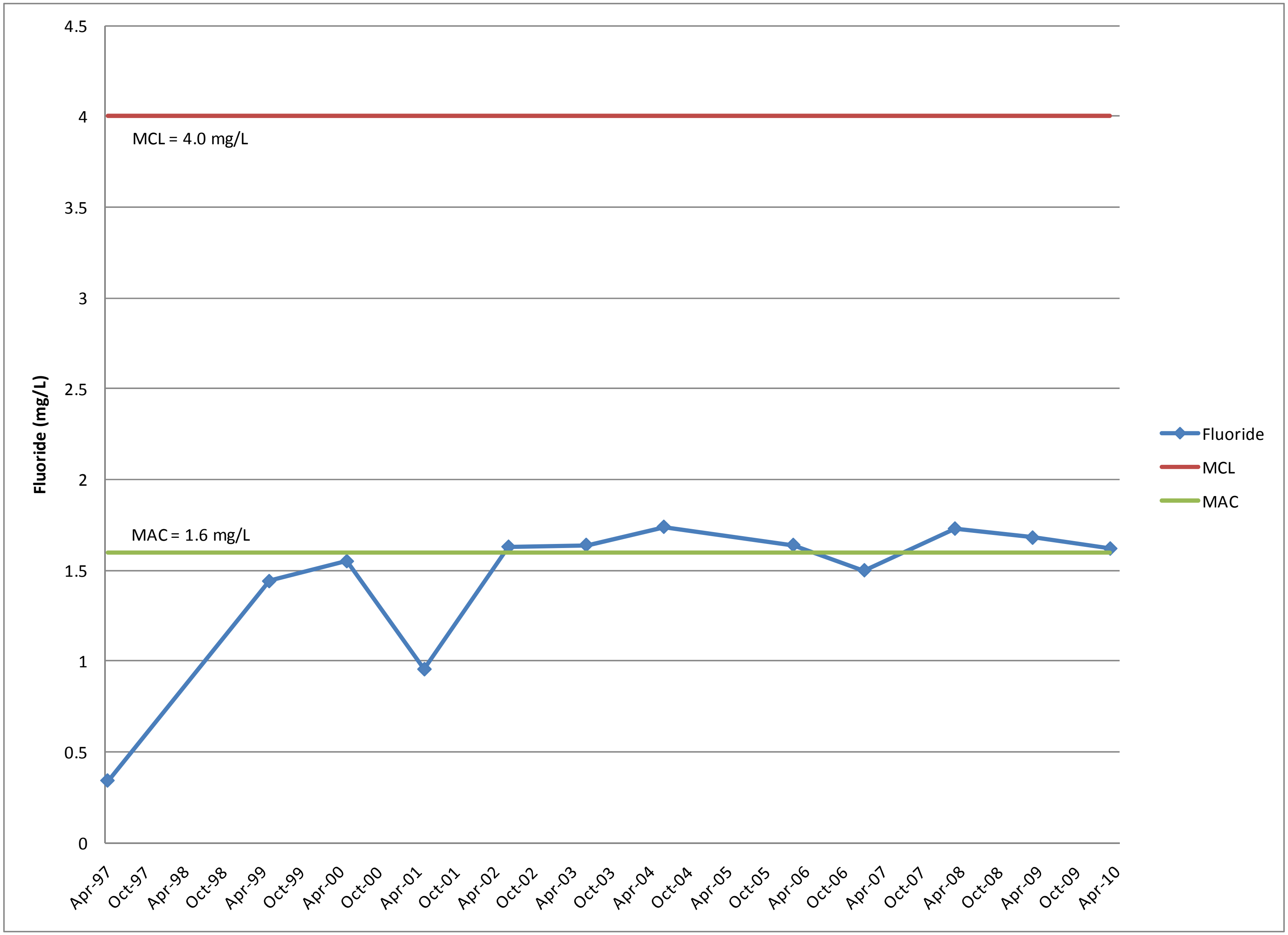

Figure 2B-2. Fluoride Concentrations, Coyote Springs

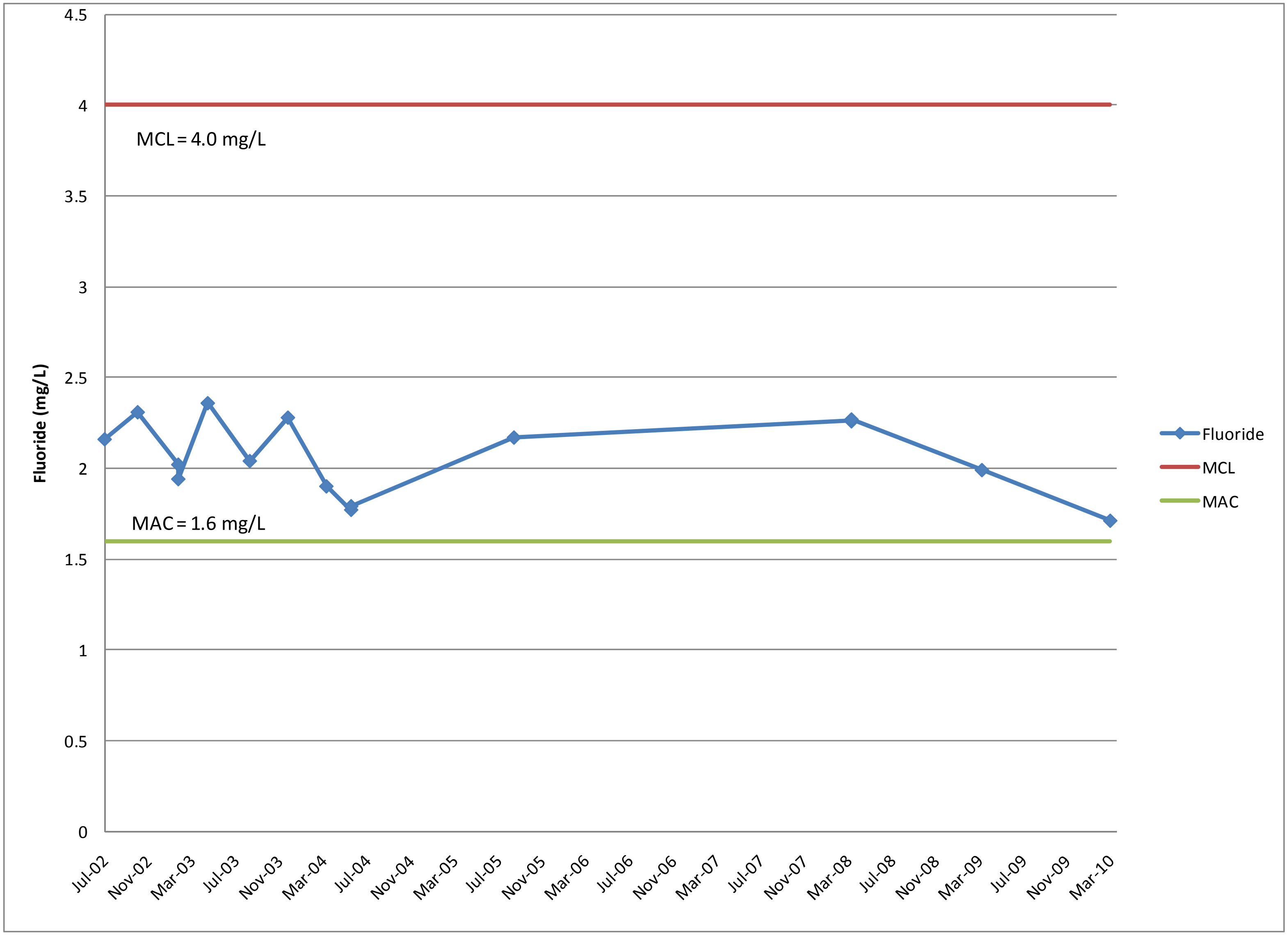

Figure 2B-3. Fluoride Concentrations, CTF-MW2

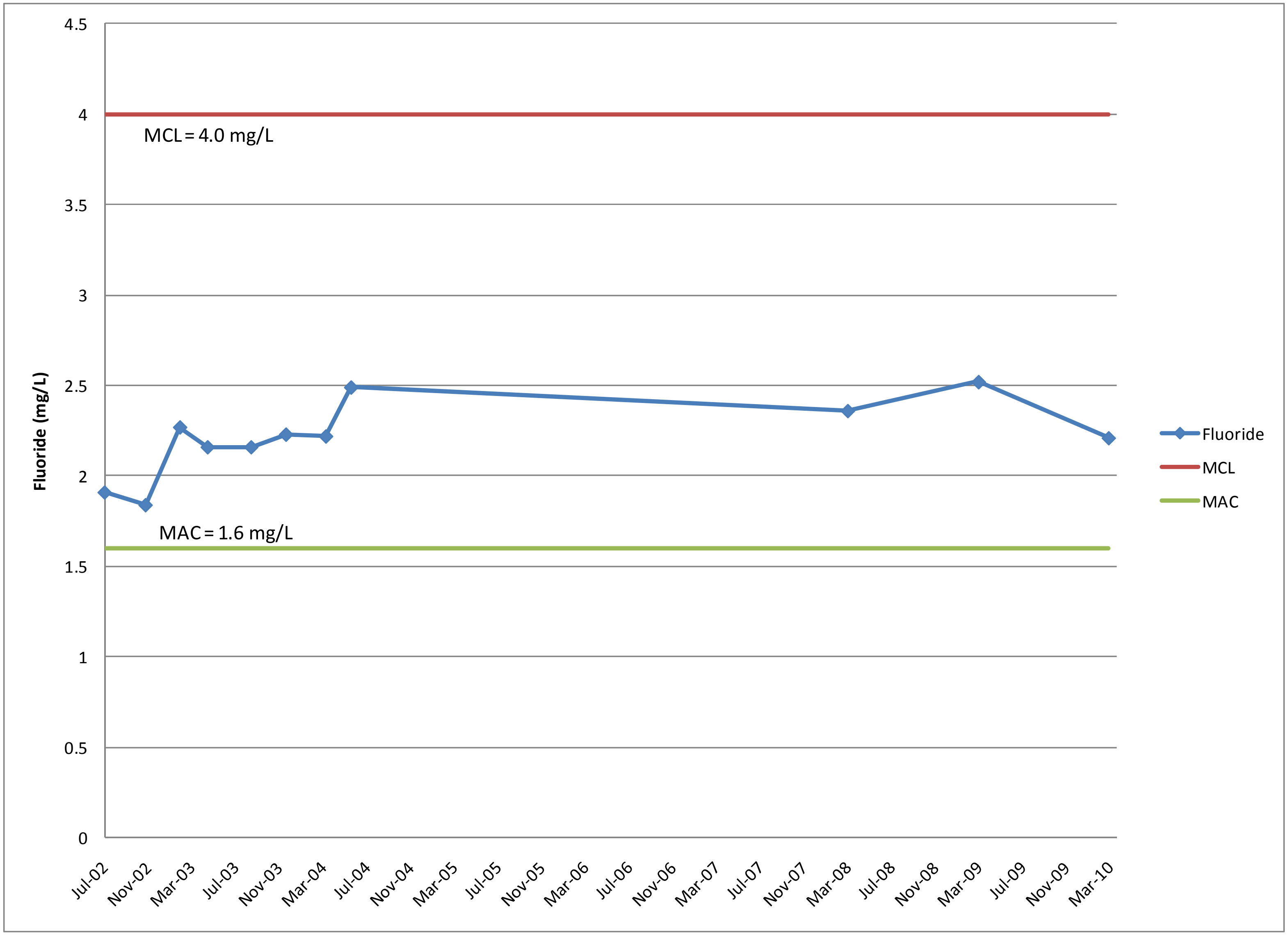

Figure 2B-4. Fluoride Concentrations, CTF-MW3

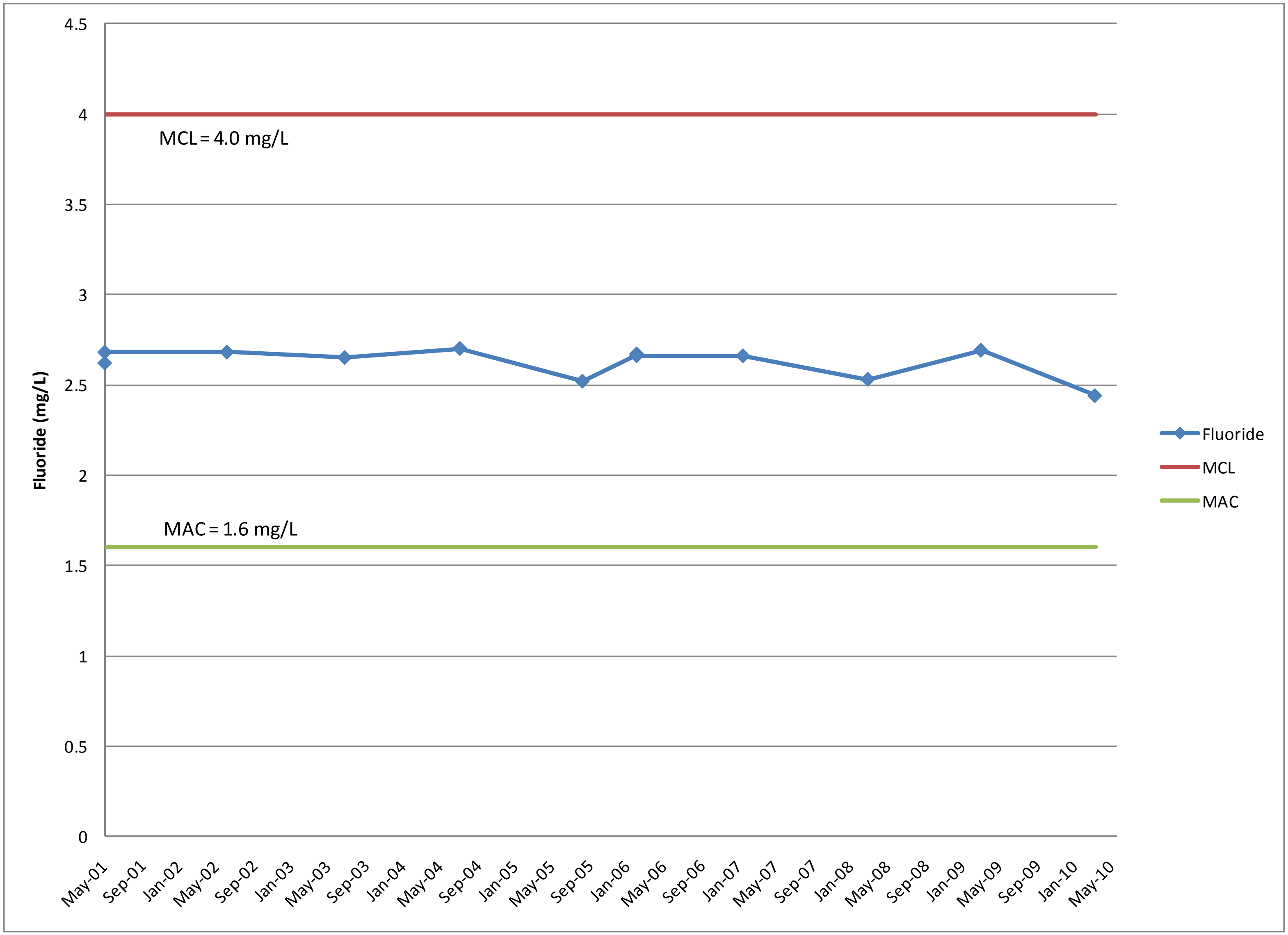

Figure 2B-5. Fluoride Concentrations, SFR-4T

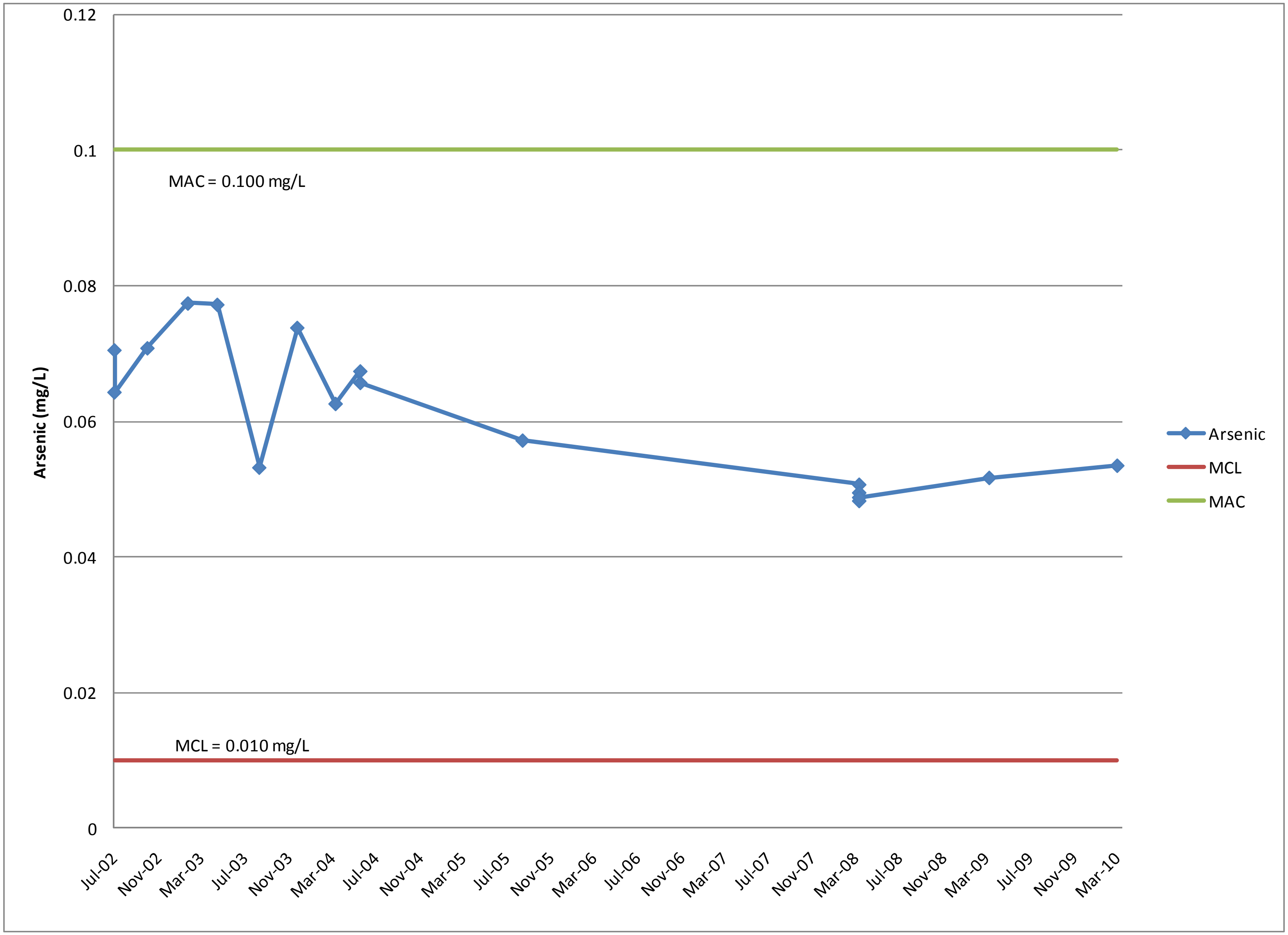

Figure 2B-6. Arsenic Concentrations, CTF-MW2

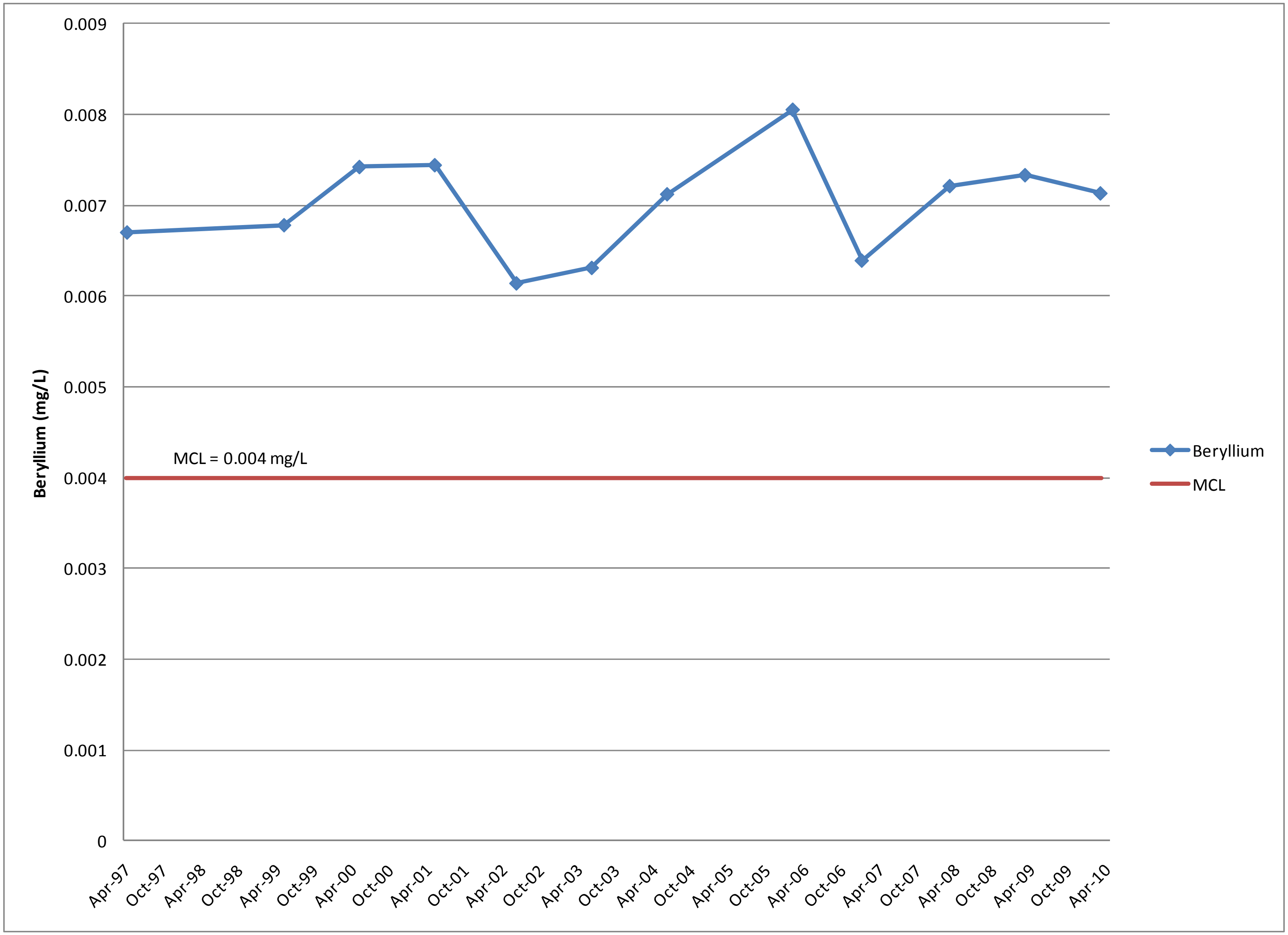

Figure 2B-7. Beryllium Concentrations, Coyote Springs

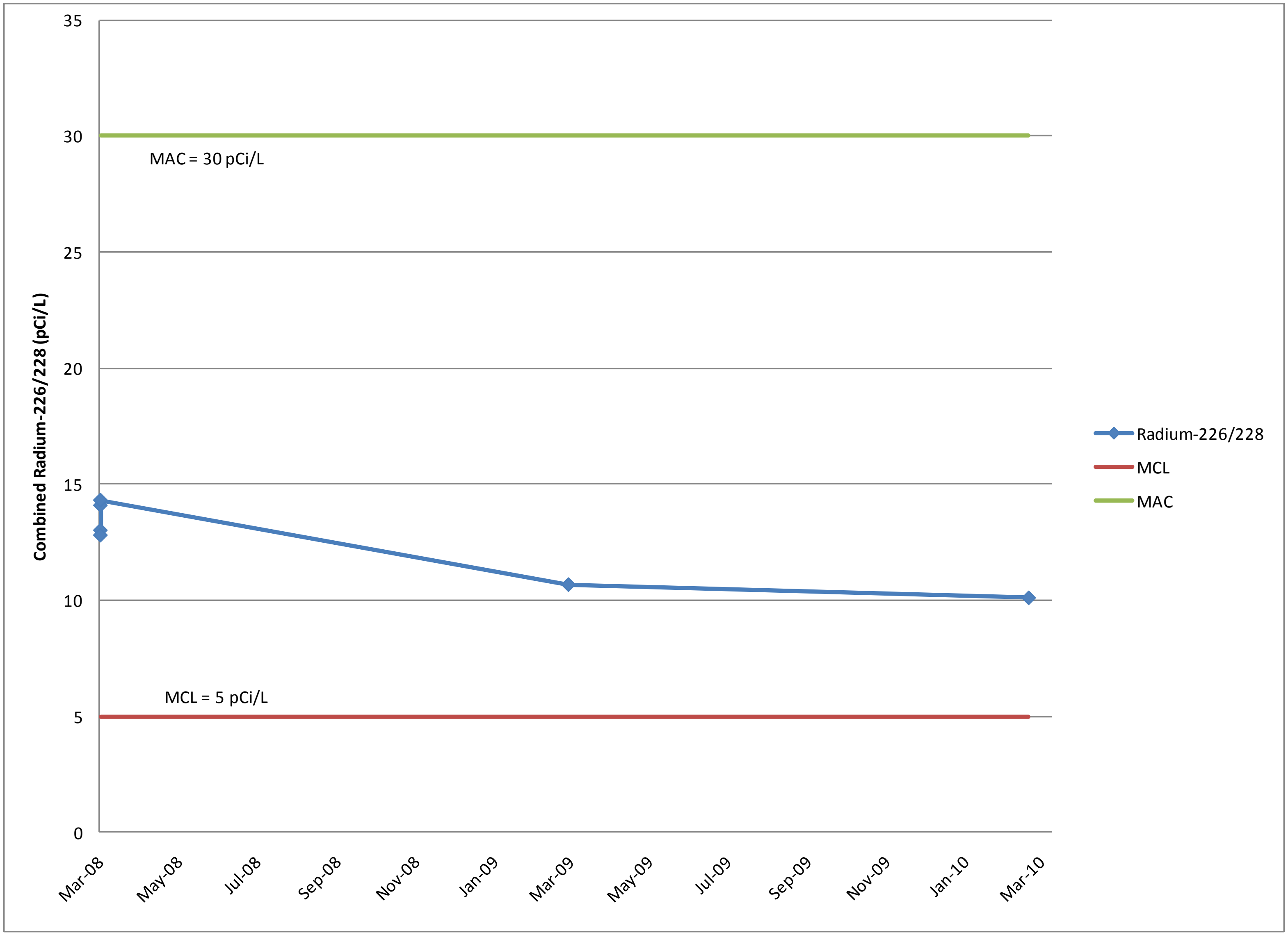

Figure 2B-8. Radium-226/228 Activities, CTF-MW2

Attachment 2C
Groundwater Protection Program
Charts, Maps, and Hydrographs

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Attachment 2C Charts, Maps, and Hydrographs

Attachment 2C Tables

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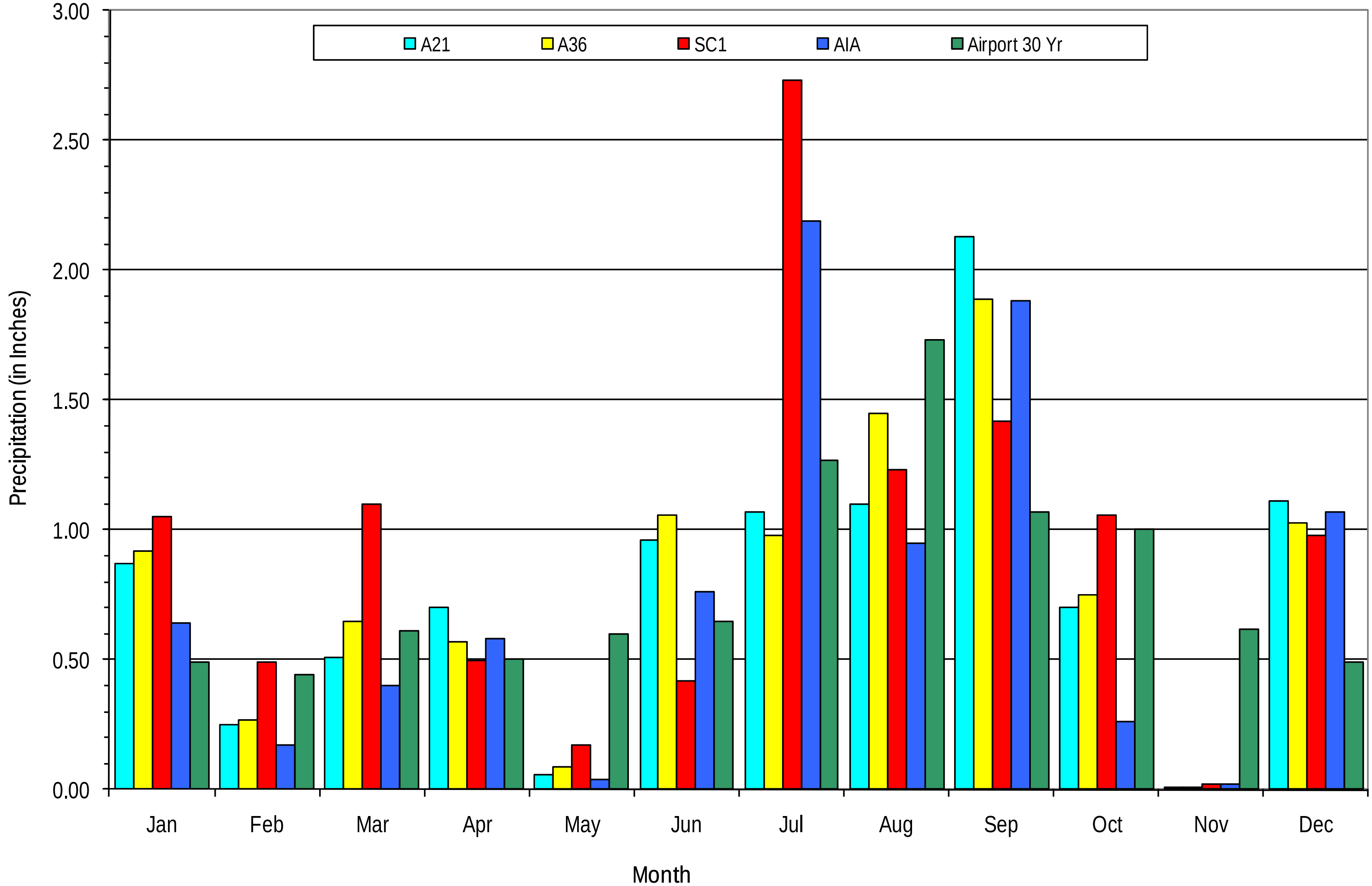

Figure 2C-1. Precipitation Data for SNL/NM, CY10

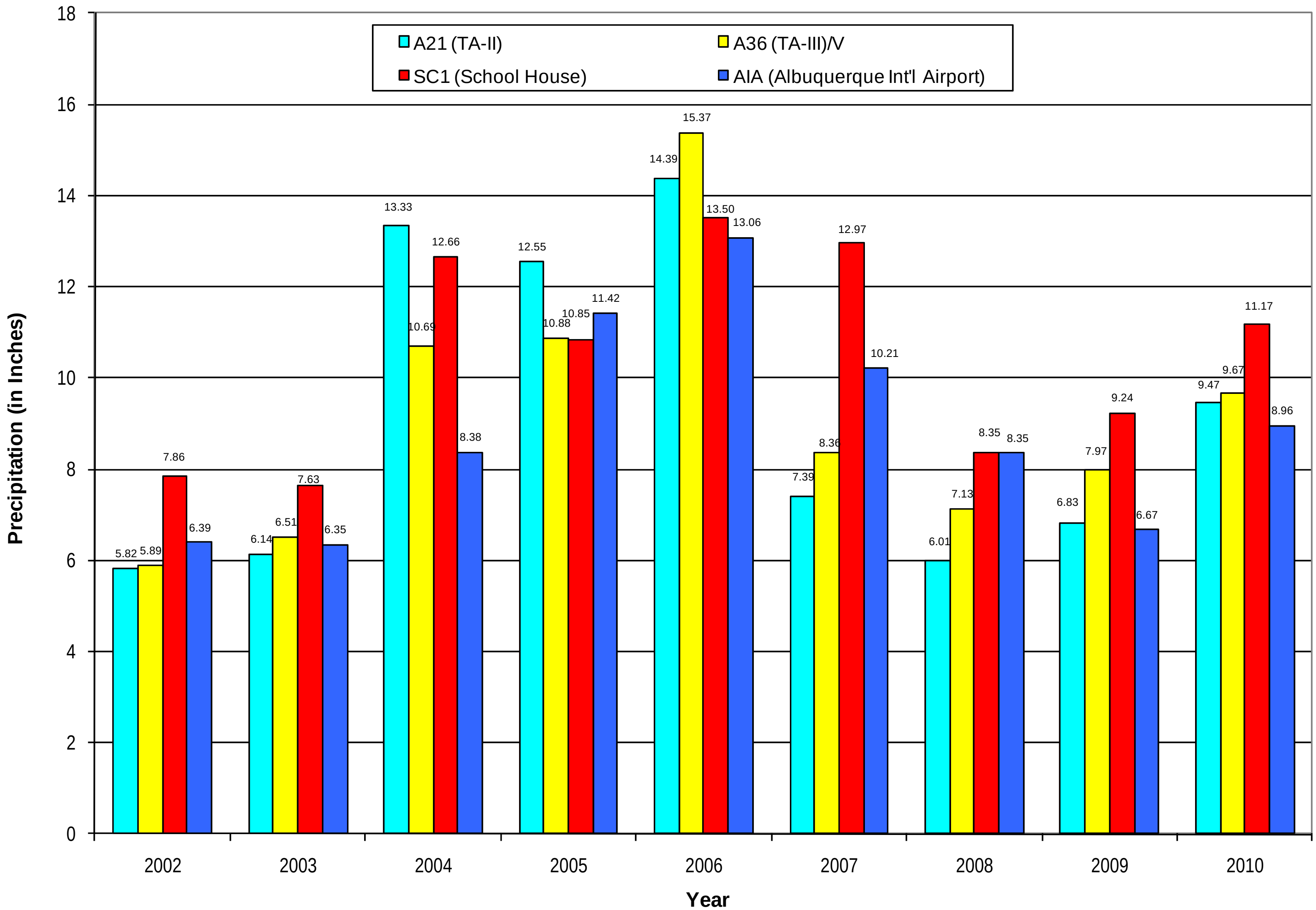

Figure 2C-2. Annual Precipitation Data for SNL/NM, January 2002 to December 2010

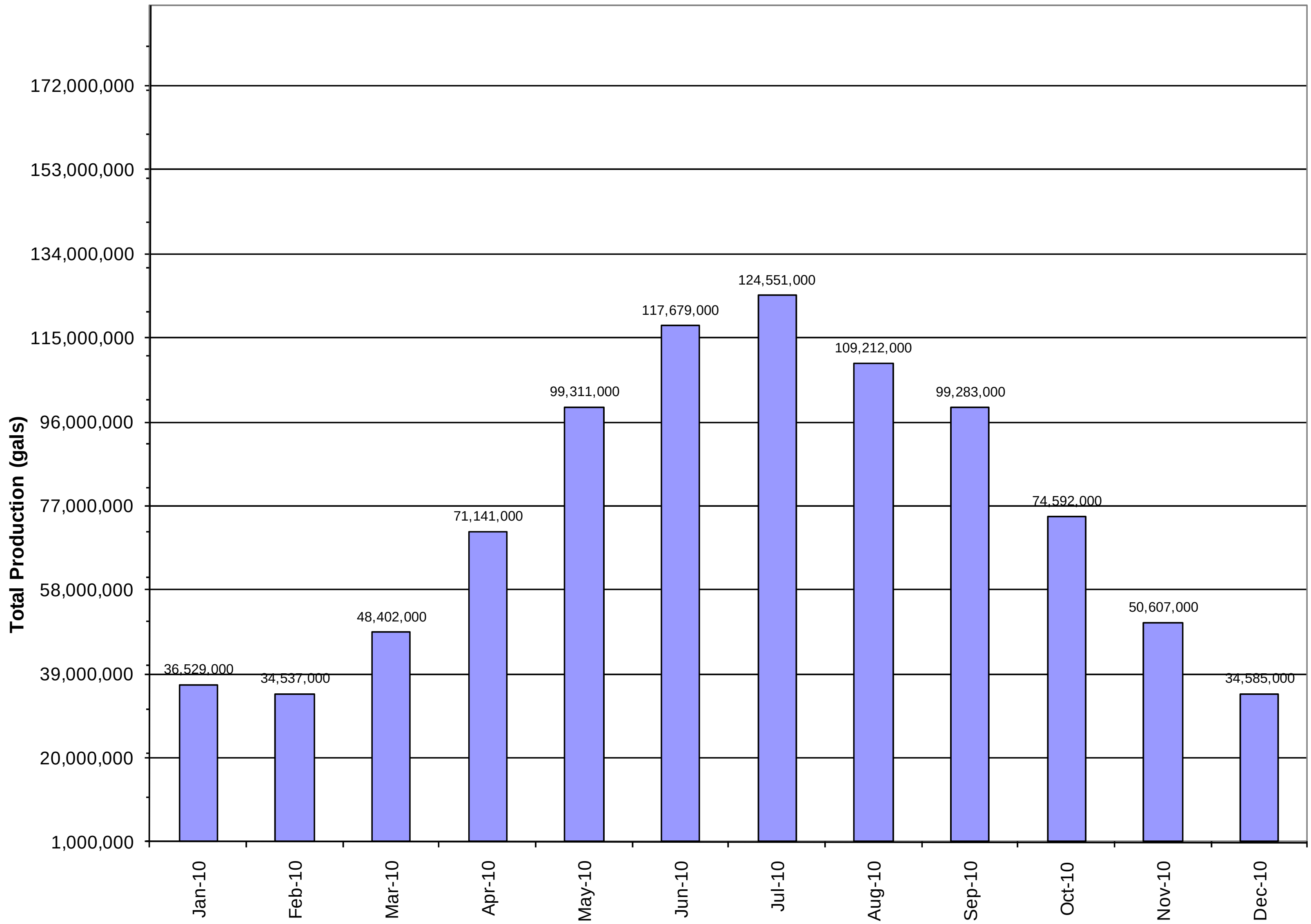

Figure 2C-3. Monthly Groundwater Pumped by KAFB Water Supply Wells, CY10

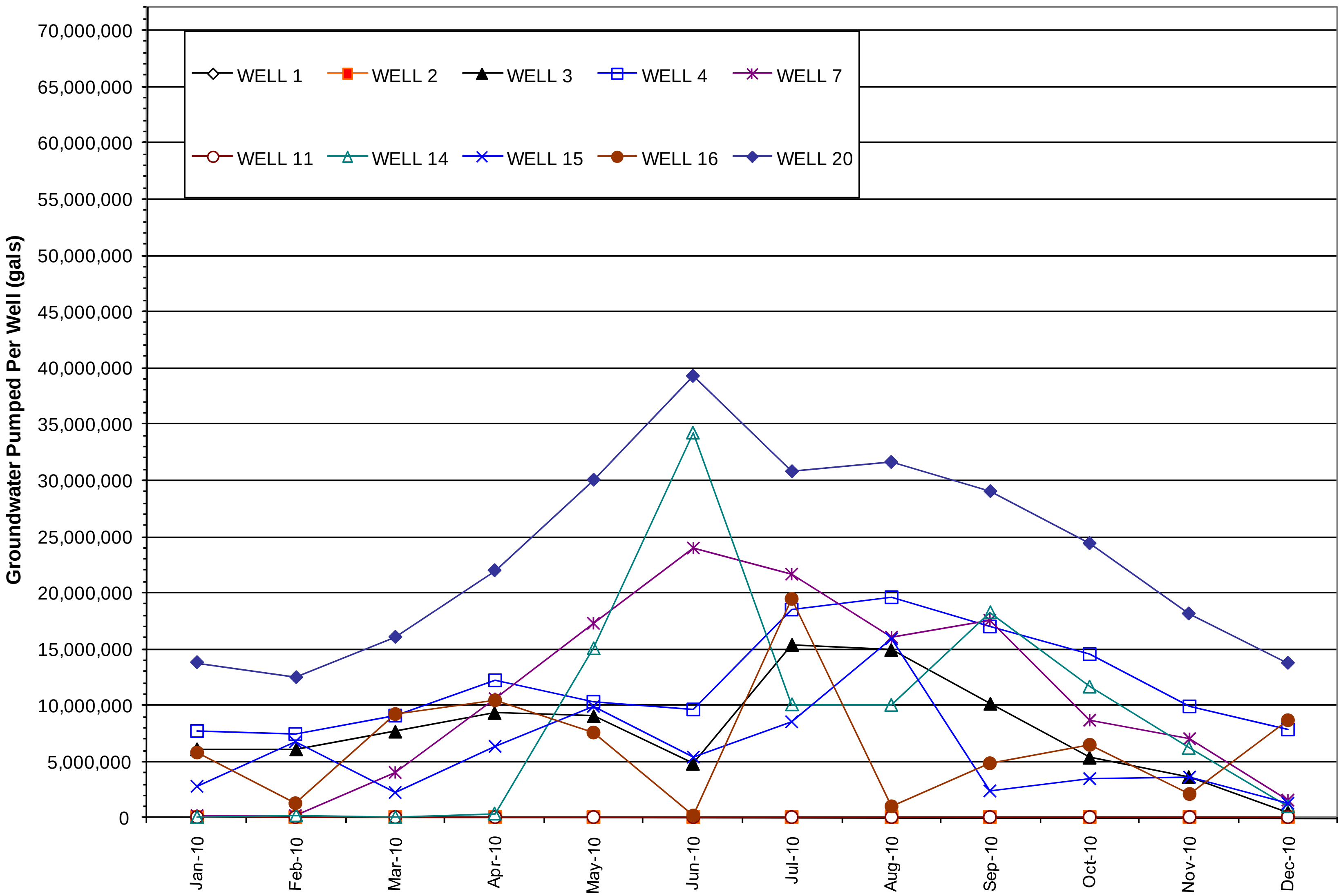

Figure 2C-4. Groundwater Pumped by KAFB Water Supply Wells, CY10

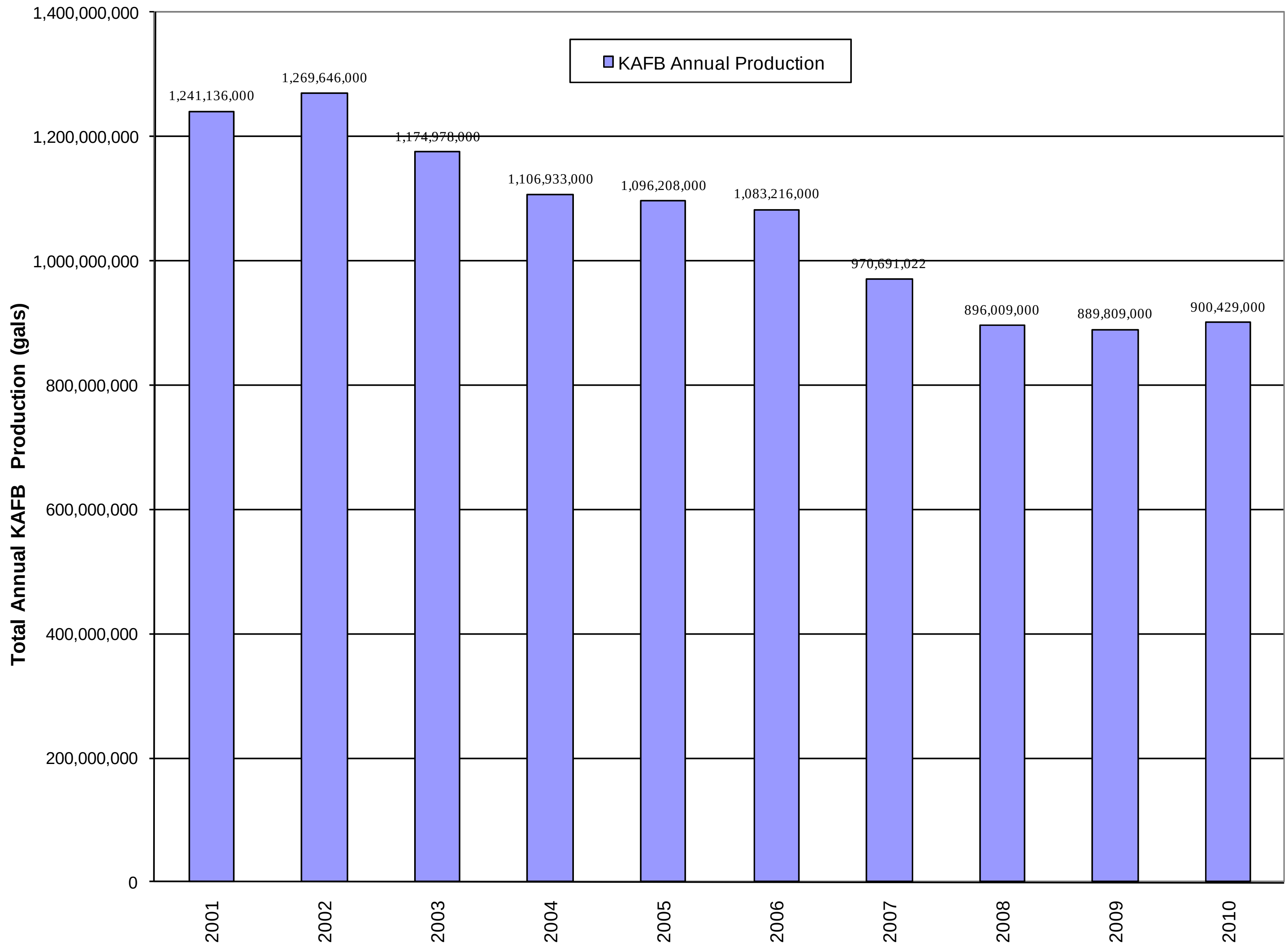

Figure 2C-5. Annual Groundwater Pumped by KAFB Water Supply Wells, 2001 to 2010

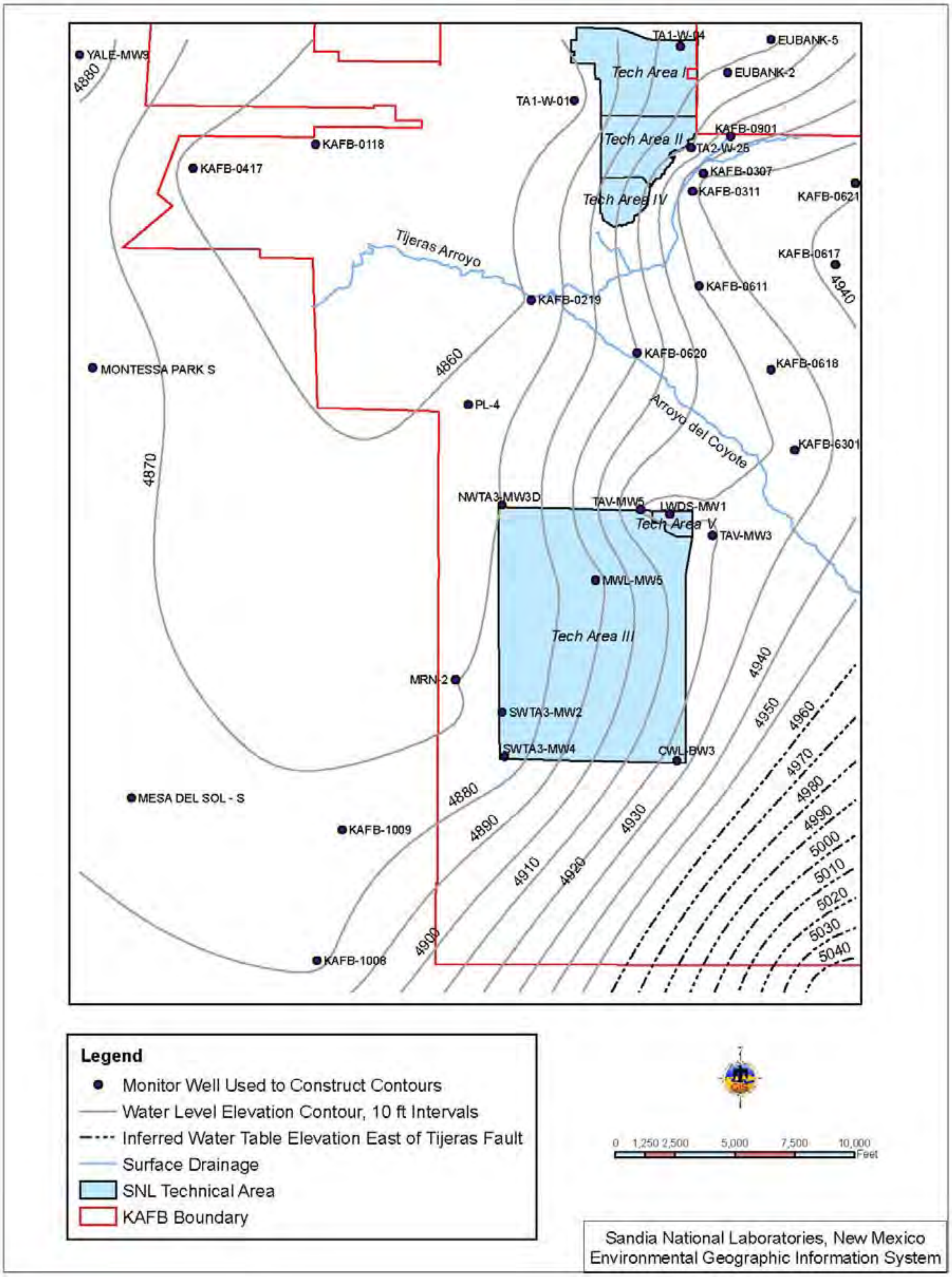

Figure 2C-6. CY10 Regional Groundwater Water Table Elevations

Table 2C-1. Regional Groundwater Table Elevations, CY10

Well Name	X_EASTING	Y_NORTHING	Fall 2009	Fall 2010	CY 2010- CY 2009
CWL-BW3	414685.90	1444689.45	4,926.28	4,925.02	-1.26
EUBANK-2	416809.00	1473598.00	4,890.27	4,891.27	1.00
EUBANK-5	418625.00	1474996.00	4,885.93	4,887.42	1.49
KAFB-0118	399534.00	1470587.00	4,854.82	4,856.19	1.37
KAFB-0219	408577.24	1464046.26	4,860.62	4,860.61	-0.01
KAFB-0307	415788.78	1469357.80	4,928.94	4,929.68	0.74
KAFB-0311	415320.18	1468610.50	4,927.78	4,928.53	0.75
KAFB-0417	394402.40	1469586.90	4,857.12	4,856.96	-0.16
KAFB-0617	421324.11	1465525.50	4,941.62	4,942.17	0.55
KAFB-0901	416928.14	1470927.94	4,914.52	4,915.12	0.60
KAFB-1008	399585.21	1436306.14	4,878.50	4,877.94	-0.56
KAFB-1009	400641.89	1441800.61	4,874.62	4,874.30	-0.32
KAFB-6301	419610.17	1457740.36	4,922.20	4,921.02	-1.18
LWDS-MW1	414375.03	1455057.43	4,922.42	4,921.55	-0.87
Mesa Del Sol-S	391812.80	1443144.80	4,876.60	4,876.87	0.27
Montessa Prk-S	390193.5	1461202.5	4,877.50	4,877.79	0.29
MRN-2	405393.35	1448095.73	4,870.68	4,869.98	-0.70
MWL-MW5	411261.94	1452294.82	4,887.07	4,886.61	-0.46
NWTA3-MW3D	407349.625	1455450.75	4,870.62	4,870.11	-0.51
SWTA3-MW2	407487.74	1447230.54	4,873.06	4,872.51	-0.55
SWTA3-MW4	407465.86	1444885.57	4,874.46	4,873.94	-0.52
TA1-W-01	410373.39	1472422.88	4,856.17	4,856.17	0.00
TA1-W-04	414813.45	1474707.30	4,884.90	4,886.02	1.12
TA2-W-25	415262.01	1470439.03	4,899.74	4,900.03	0.29
TAV-MW3	416156.07	1454168.25	4,920.57	4,919.28	-1.29
TAV-MW5	413141.76	1455269.73	4,921.76	4,920.74	-1.02
YALE-MW9	389646.00	1474349.00	4,885.84	4,885.56	-0.28
KAFB-0611	415618.6	1464643.94	4,921.67	4,921.41	-0.26
KAFB-0618	418616.36	1461129.44	4,923.87	4,923.96	0.09
KAFB-0620	413010.94	1461828.18	4,889.58	4,889.67	0.09
KAFB-0621	422157.5	1468963	4,937.53	4,938.66	1.13
PL-4	405929.58	1459651.14	4,863.88	4,863.32	-0.56

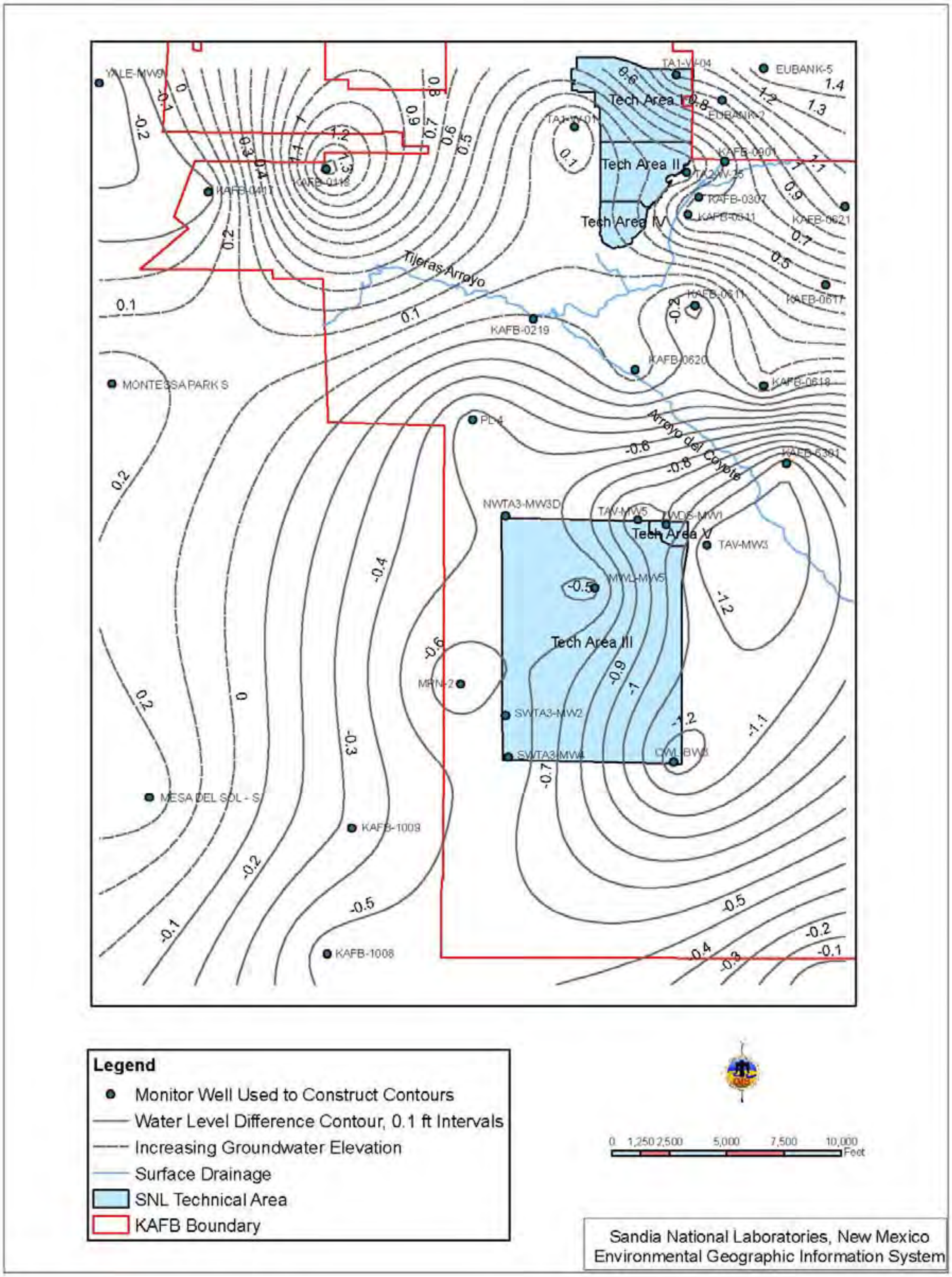

Figure 2C-7. Regional Groundwater Table Elevation Difference, CY10–CY09

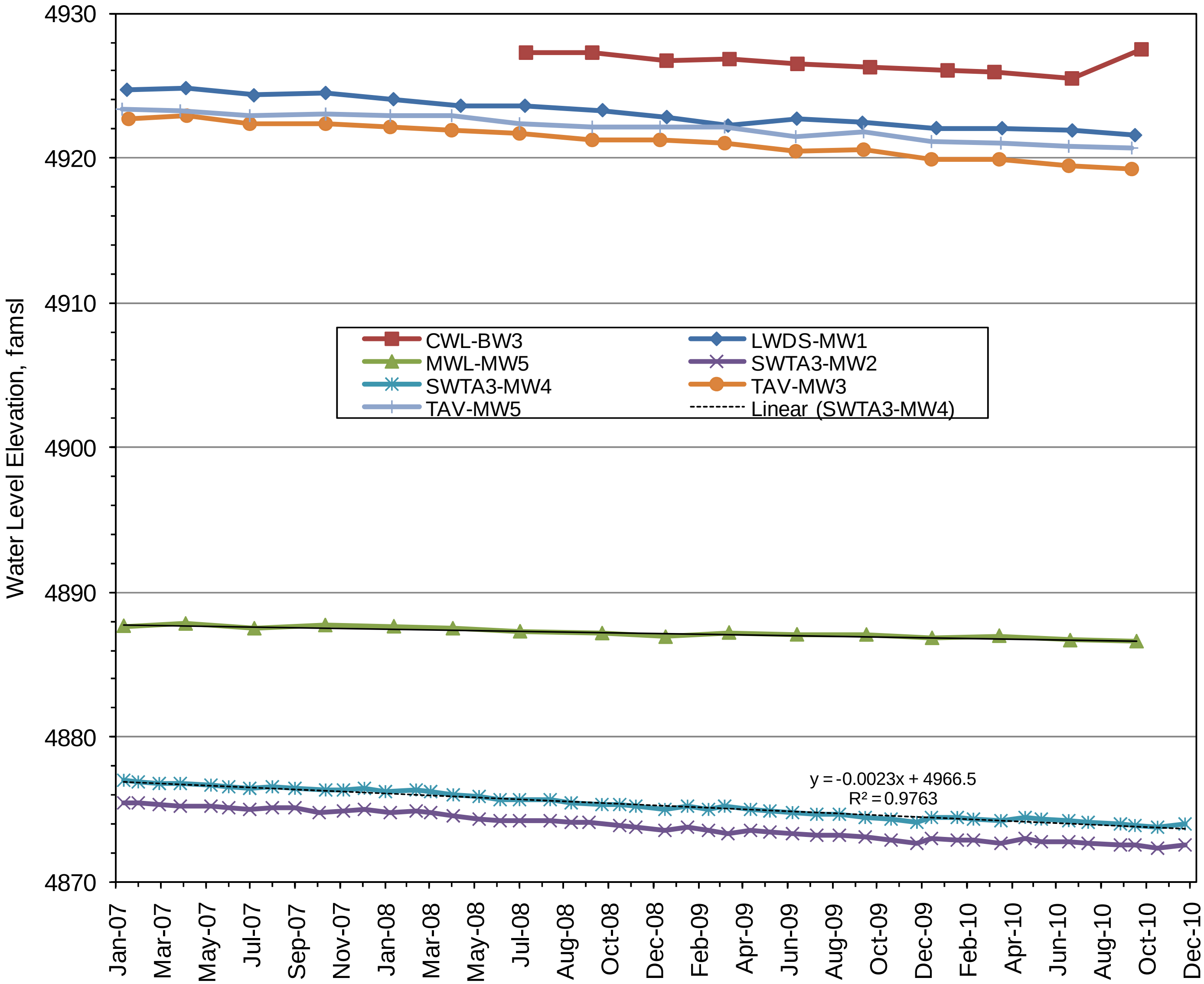

Figure 2C-8. Regional Water Table Hydrographs – Southeast Wells

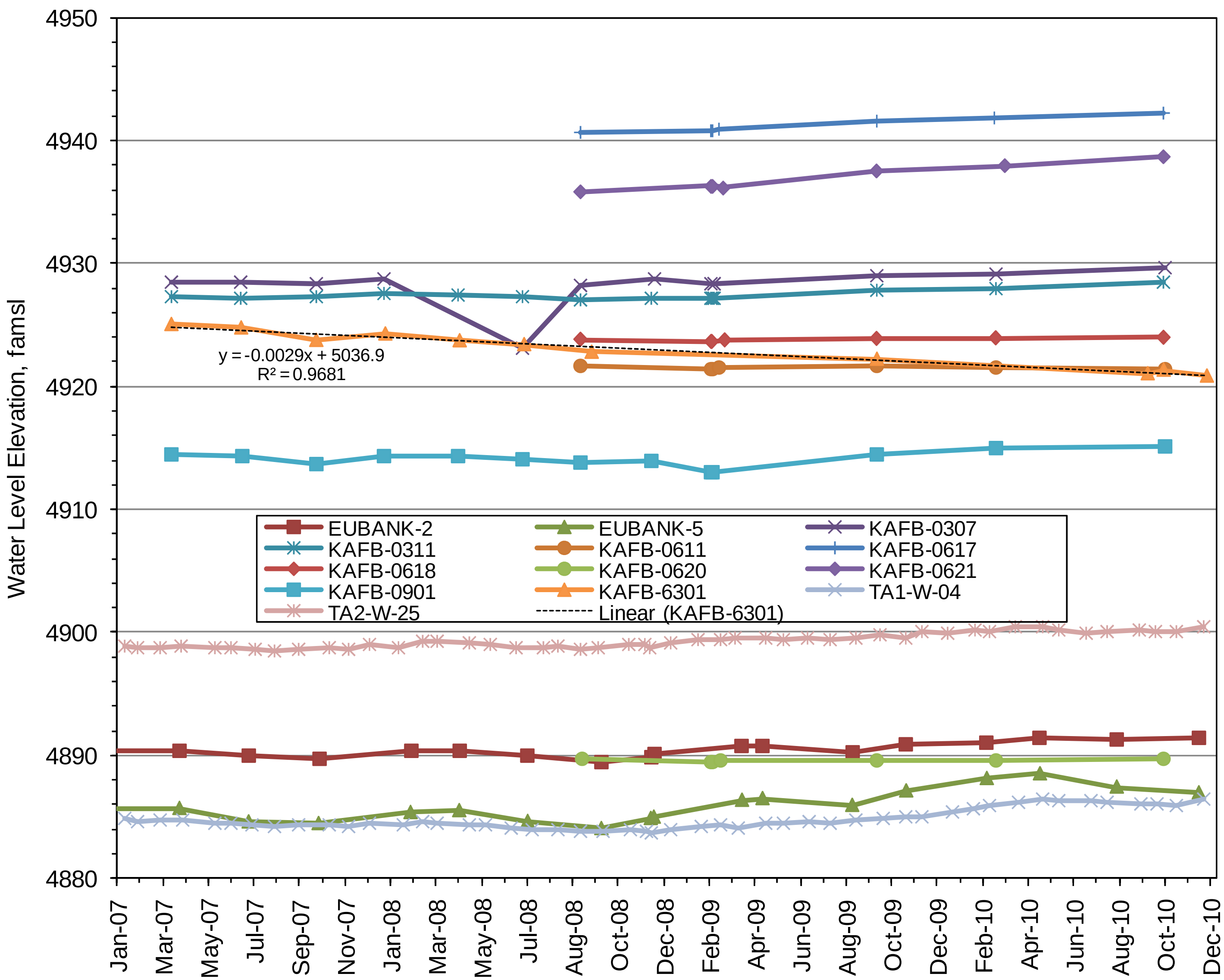

Figure 2C-9. Regional Water Table Hydrographs – Northeast Wells

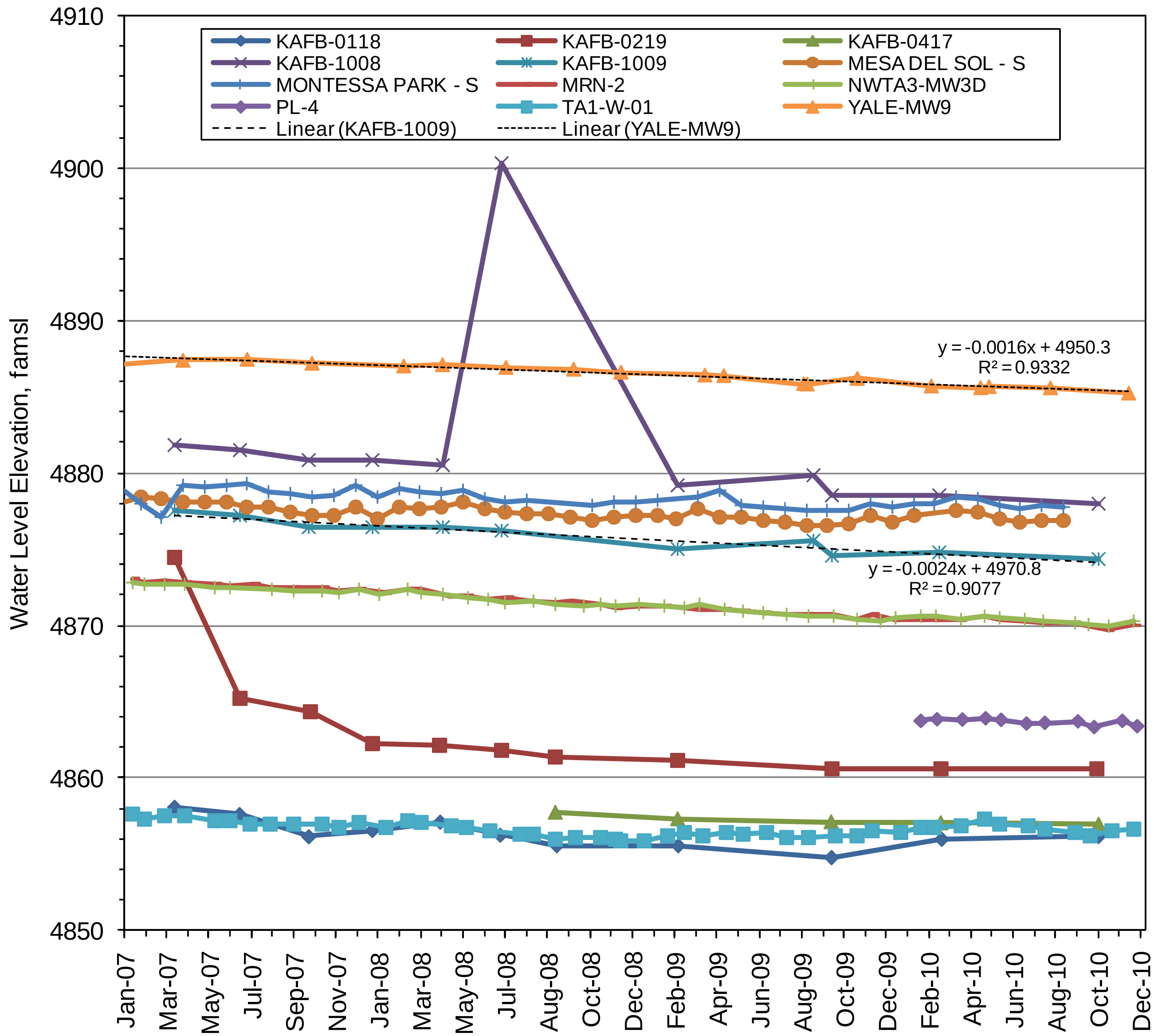

Figure 2C-10. Regional Water Table Hydrographs – West Wells

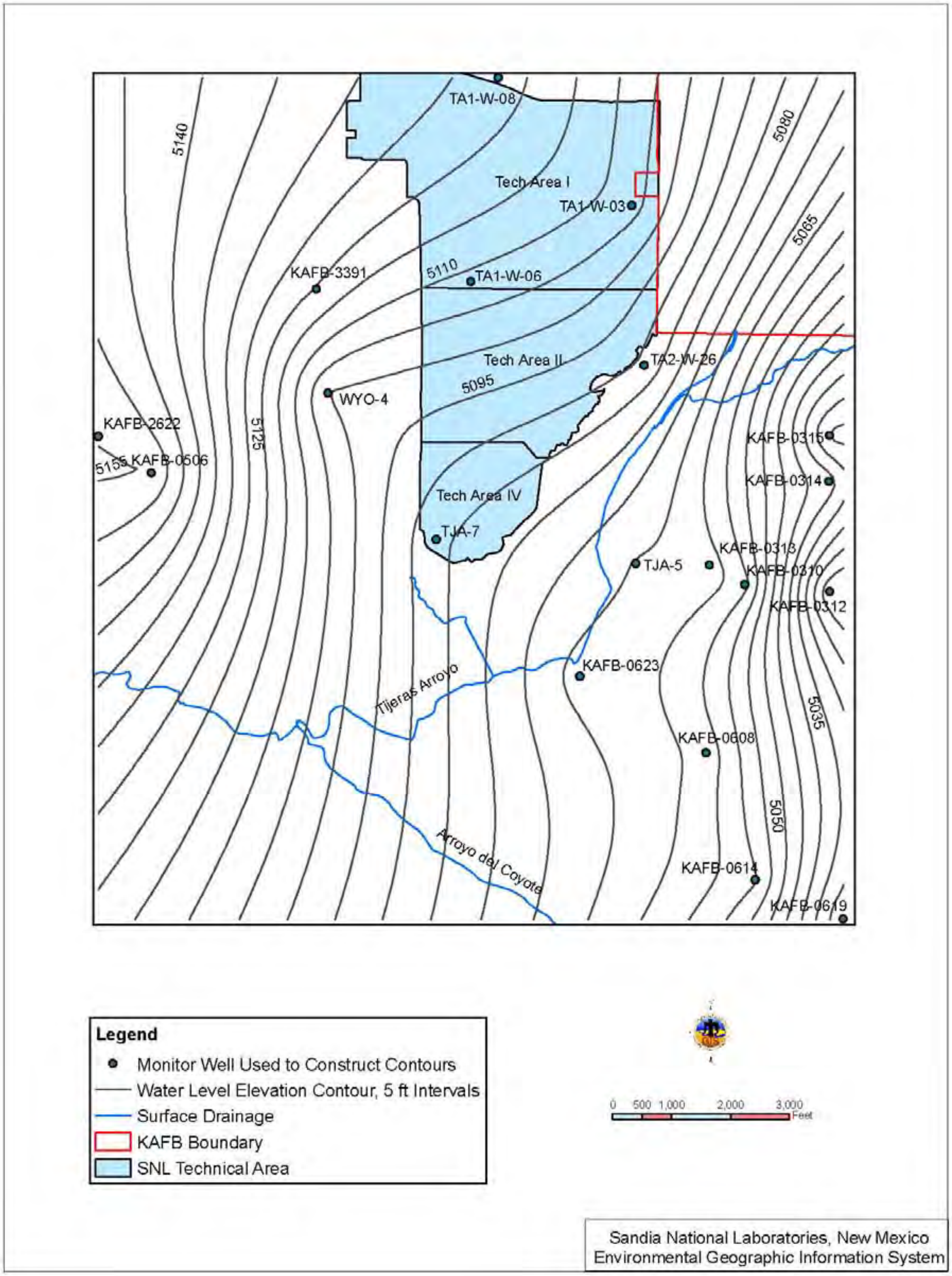

Figure 2C-11. CY10 Perched Groundwater Zone Water Table Elevation

Table 2C-2. Perched Groundwater System Water Table Elevations, CY10

Well Name	X_EASTING	Y_NORTHING	Fall 2009	Fall 2010	CY 2010- CY 2009
KAFB-0310	416967.67	1466775.83	5,062.79	5,062.26	-0.53
KAFB-0312	418411.09	1466654.48	5,009.70	5,010.20	0.50
KAFB-0313	416371.23	1467106.12	5,067.22	5,066.85	-0.37
KAFB-0314	418395.37	1468521.17	5,037.88	5,037.69	-0.19
KAFB-0315	418413.54	1469305.61	5,023.53	5,023.80	0.27
KAFB-0506	406914.23	1468667.94	5,155.40	5,154.95	-0.45
KAFB-0608	416325.83	1463923.85	5,063.30	5,062.80	-0.50
KAFB-0614	417143.96	1461770.43	5,056.17	5,055.83	-0.34
KAFB-0619	418641.29	1461099.95	5,019.30	5,020.04	0.74
KAFB-0623	414174.38	1465223.89	5,067.79	5,067.77	-0.02
KAFB-2622	406006.59	1469291.34	5,154.79	5,154.62	-0.17
KAFB-3391	409710.21	1471788.31	5,120.13	5,119.66	-0.47
TA1-W-03	415058.11	1473207.18	5,109.53	5,107.13	-2.40
TA1-W-06	412331.38	1471918.6	5,109.24	5,108.56	-0.68
TA1-W-08	412787.13	1475374.24	5,123.48	5,122.75	-0.73
TA2-W-26	415265.37	1470489.1	5,089.76	5,088.88	-0.88
TJA-5	415129.026	1467136.269	5,070.29	5,069.57	-0.72
TJA-7	411737.38	1467543.6	5,087.22	5,086.23	-0.99
WYO-4	409912.58	1470025.17	5,101.16	5,099.76	-1.40

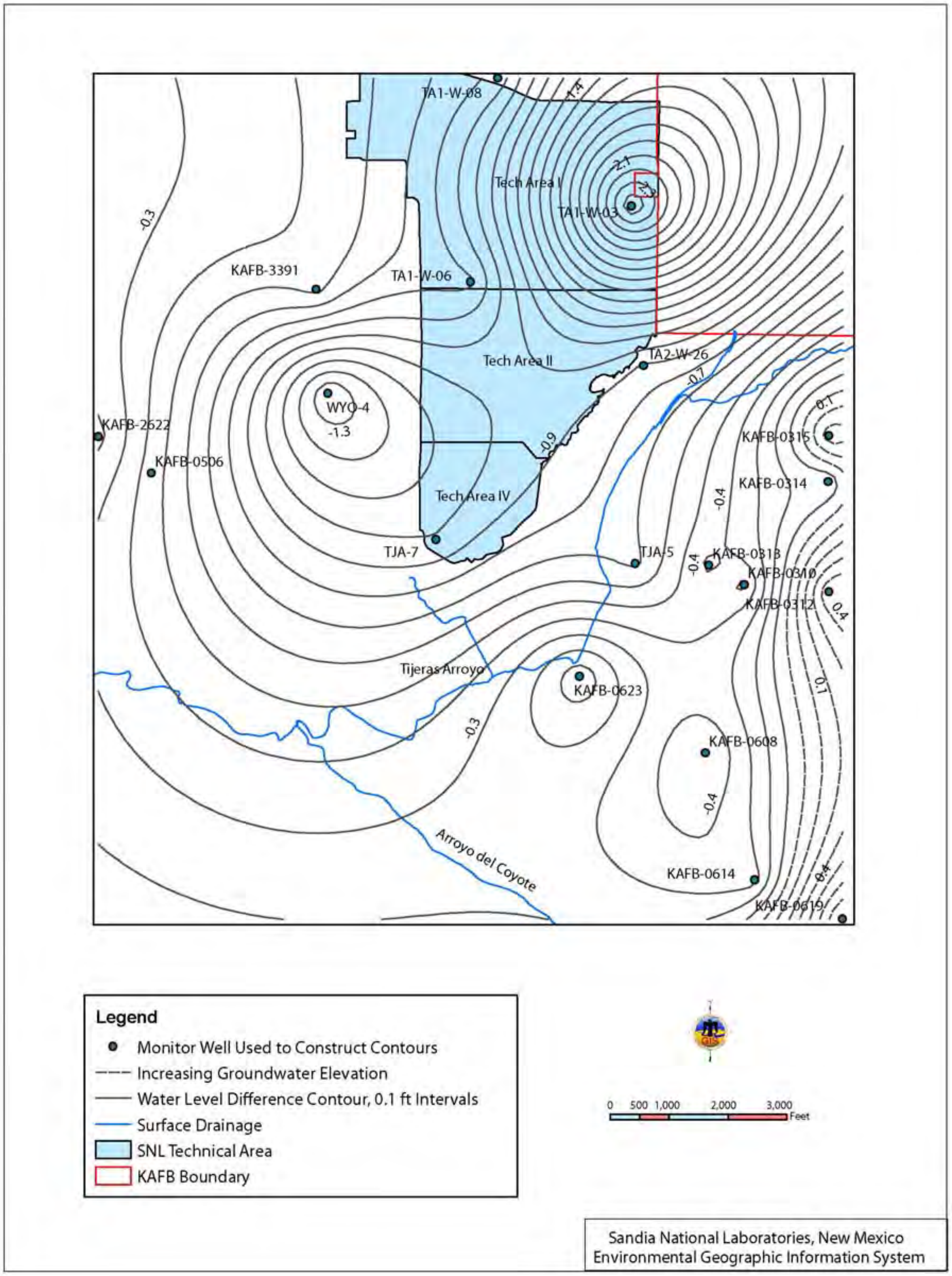

Figure 2C-12. Perched Groundwater Zone Water Table Elevation Difference, CY10-CY09

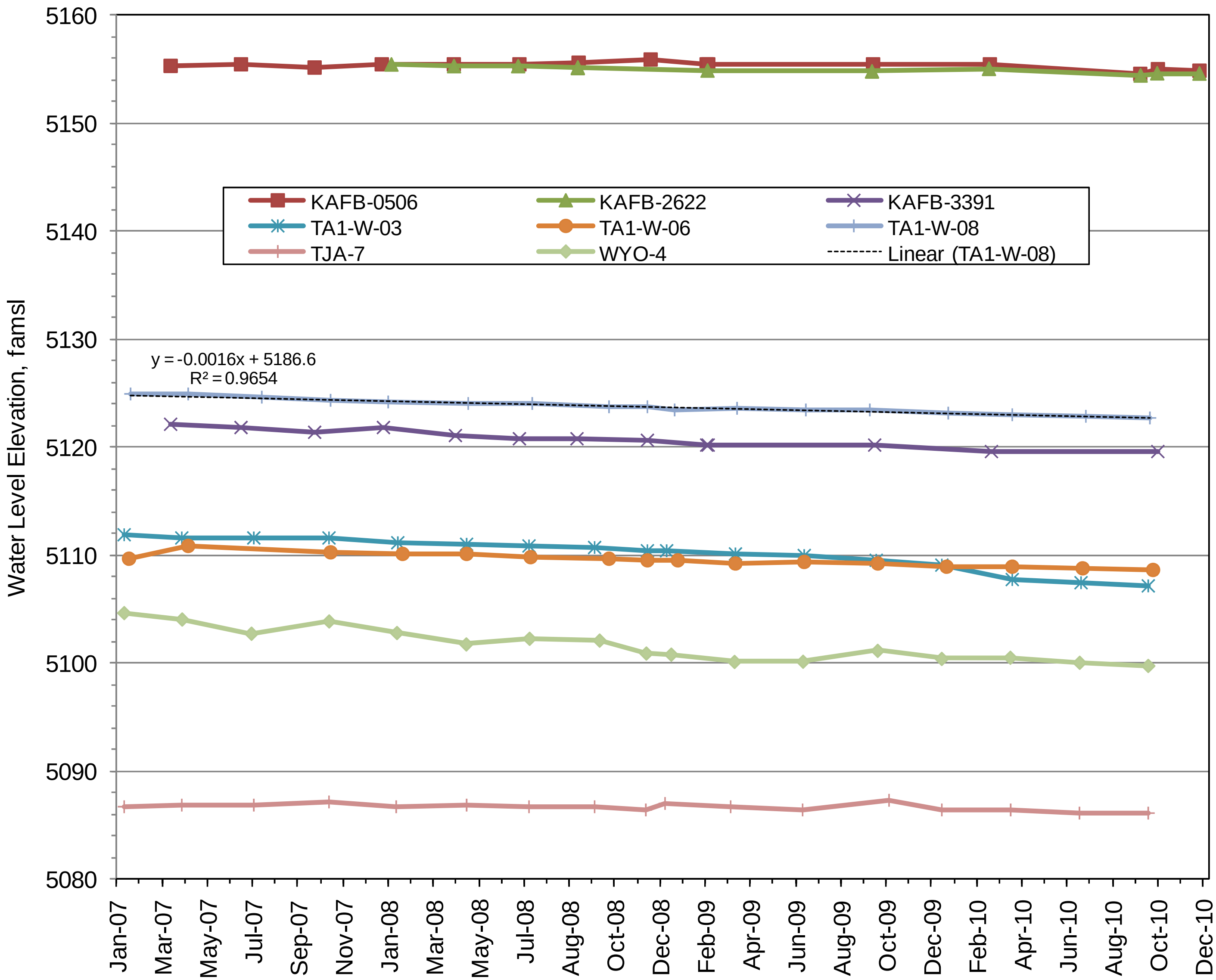

Figure 2C-13. Perched Groundwater Water Table Hydrographs – Northwest Wells

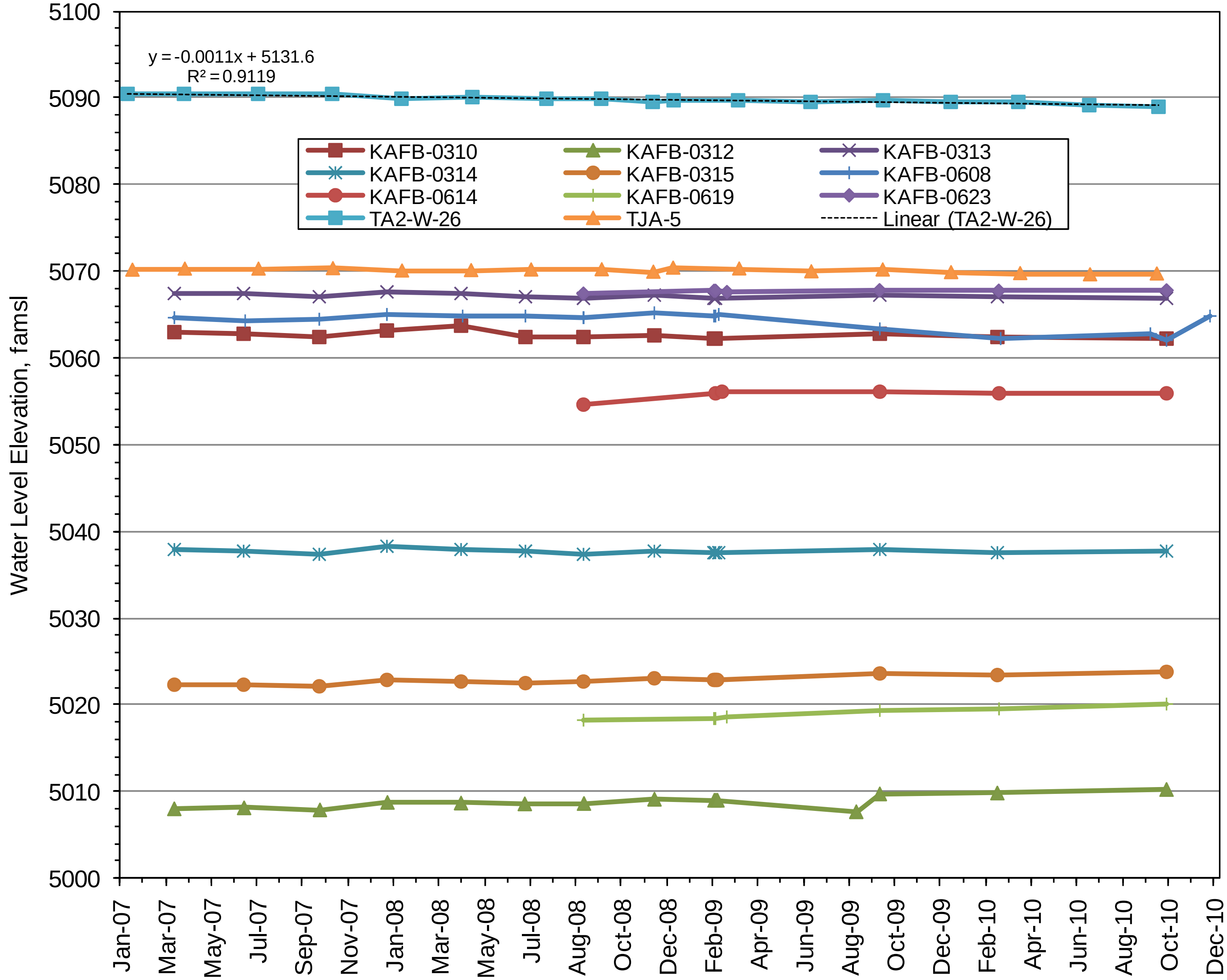

Figure 2C-14. Perched Groundwater Water Table Hydrographs – Southeast Wells

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 CWL Closure Plan (SNL December 1992). The SNL/NM Environmental Restoration (ER) Project implemented two voluntary corrective measures (VCMs), the Vapor Extraction (VE) and Landfill Excavation (LE) VCMs. As part of the VE 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 LE VCM, the CWL was excavated from September 1998 through February 2002. More than 52,000 cubic yards of contaminated soil and debris were removed from the former disposal area.

In April 2004, the U.S. Department of Energy (DOE) and Sandia Corporation (Sandia) requested approval to install an at-grade vegetative soil cover as an interim measure (Wagner April 2004) while New Mexico Environment Department (NMED) comments on the April 2003 CWL Corrective Measure 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 vegetative soil cover began in March 2005 and was completed in September 2005.

On May 21, 2007, the NMED issued the CWL CMS Report (SNL December 2004), Draft Post-Closure Care Permit (NMED 2007) and a Closure Plan amendment for a 60-day public comment period that was completed on August 20, 2007. The DOE and Sandia submitted comments to the NMED (Wagner July 2007) and requested a public hearing. Several citizens also provided comments and requested a public hearing. Informal negotiations were initiated by the NMED in August 2008 with all parties requesting a public hearing. The negotiations were completed on October 15, 2009, and documented in the settlement agreement and *Final Order In the Matter of Application for a Post-Closure Care Hazardous Waste Permit for the Chemical Waste Landfill, Sandia National Laboratories No. NM5890110518* (Final Order), which also included the final CWL Post-Closure Care Permit (NMED October 2009a). On October 16, 2009, the NMED issued a *Notice of Approval, Final Remedy and Closure Plan Amendment, Chemical Waste Landfill* (NMED October 2009b). The NMED-approved CWL Closure Plan amendment addressed changes to both Chapter 12 (closure process) and Appendix G (Groundwater Sampling and Analysis Plan [SAP]). Appendix G changes were established during the 2008 through 2009 informal negotiations and included the replacement of four groundwater monitoring wells and a reduction in the number of wells required for semiannual sampling.

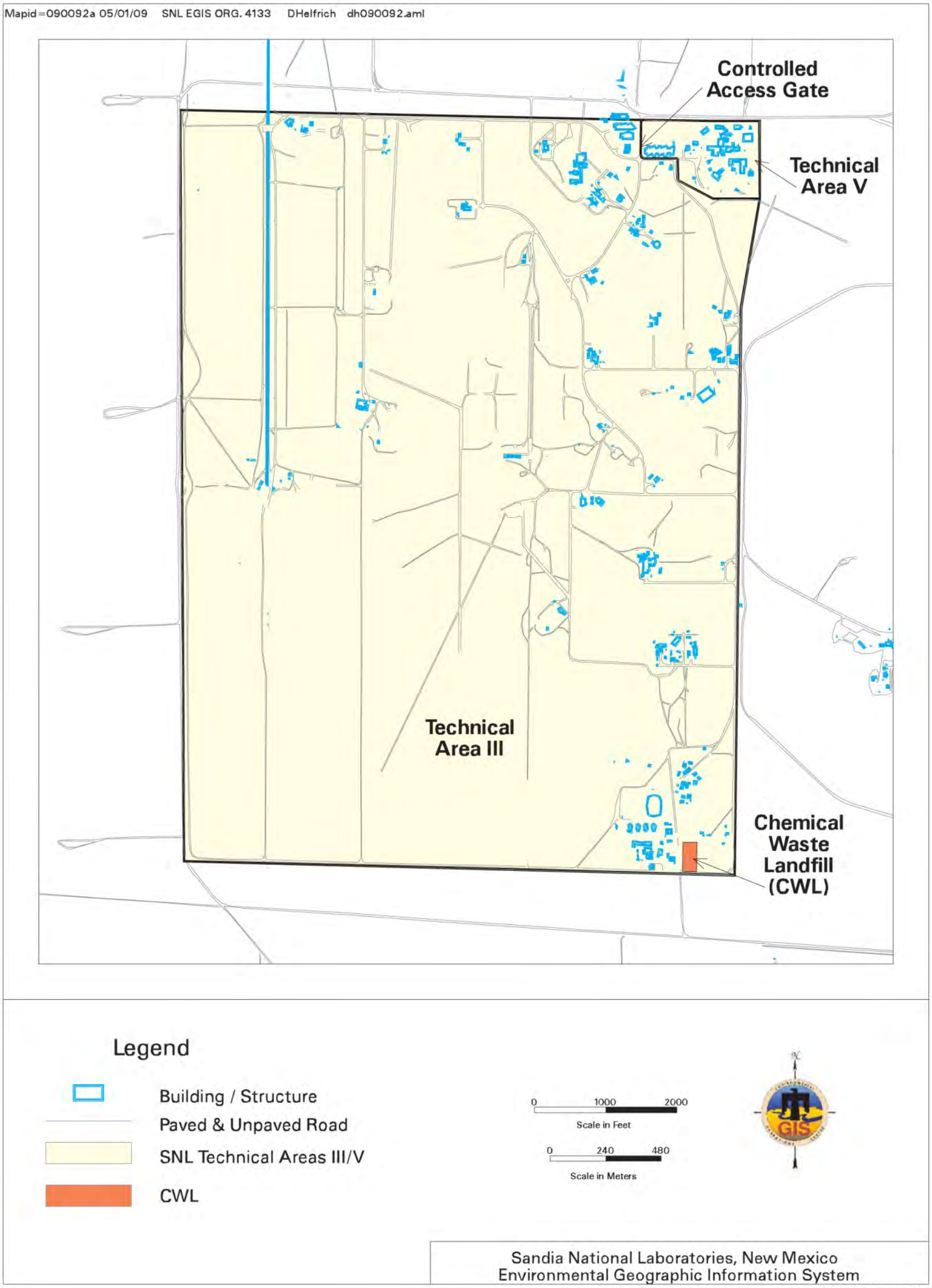

Figure 3-1. Location of the Chemical Waste Landfill within Technical Area III

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. As documented in the Closure Plan amendment (NMED October 2009b), once the new monitoring wells were installed they became the exclusive groundwater monitoring network for the CWL. 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 2010a). The Well Installation and Decommissioning Report was submitted as an appendix to the CWL Final RCRA Closure Report. Approval of CWL closure will make the CWL Post-Closure Care Permit effective, superseding the CWL Closure Plan as the enforceable regulatory document.

3.1.1 Monitoring History

In 1985, groundwater monitoring began 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. In 1988, four additional monitoring wells were installed. In 1990, an additional downgradient well was installed. In 1994, seven more monitoring wells were installed. In response to a Notice of Violation from the NMED with regard to the inadequate design and construction of the 1985 wells, four of these wells were plugged and abandoned in 1997. To complete the ongoing chromium assessment, the NMED requested the installation of two additional deep monitoring wells to be monitored for eight quarters. These wells were installed in March and April 2003 with NMED direction regarding location, construction, and well screen placement in the regional aquifer. The results of the eight sampling events and completion of the chromium investigation were documented in the August 2005 CWL Quarterly Closure Progress Report (SNL August 2005). Monitoring well CWL-MW2A was plugged and abandoned in June 2004 due to well integrity issues (SNL July 2004). As discussed in the previous section, from April through August 2010 new monitoring wells CWL-MW9, CWL-MW10, CWL-MW11, and CWL-BW5 were installed and monitoring wells CWL-MW4, CWL-MW5L, CWL-MW5U, CWL-MW6L, CWL-MW6U, and CWL-BW4A were decommissioned based on agreements reached during Post-Closure Care Permit negotiations with NMED. Two of the decommissioned wells, CWL-MW5U/L and CWL-MW6U/L, were nested well pairs consisting of two wells installed in the same borehole.

Until 1990, all groundwater sampling at the CWL was conducted on a quarterly basis in accordance with 40 CFR 265.92(c)(1). In 1990, the NMED granted a reduction in the sampling frequency from quarterly to semiannually for groundwater contamination indicator parameters and annually for groundwater quality parameters, as allowed by 40 CFR 265.92(d)(2), as no contaminants had been detected above U.S. Environmental Protection Agency (EPA) drinking water standards in samples from any well. During the following sampling quarter in March 1990, TCE was detected above the drinking water standard of 5 µg/L in the sample from CWL-MW2A. Additionally, two indicator parameters (specific conductance [SC] and pH) also exceeded state guidelines. Two months later, resampling for VOCs confirmed the presence of TCE. The NMED reinstated the quarterly sampling requirement and, thereafter, all indicator parameters have been sampled in accordance with 40 CFR 265.93(c)(2).

In 1995, Appendix G of the CWL Closure Plan (SNL December 1992) was revised and updated as part of a Closure Plan Amendment Request submitted to the NMED on June 30, 1995. In May 2000, the NMED approved the following changes to Appendix G of the CWL Closure Plan (Bearzi May 2000):

- Biannual frequency (every other year) for agreed upon Appendix IX constituents including VOCs, semivolatile organic compounds, chlorinated herbicides, polychlorinated biphenyls, total cyanide, sulfides, dissolved chromium, and total metals plus iron.

- Semiannual frequency (twice a year) for Appendix IX VOCs and metals.

As part of its review of the CWL Corrective Measures Study (CMS) Report, the NMED presented general groundwater characterization requirements in December 2003 (Kieling December 2003). In March 2004, these requirements were further discussed, and it was agreed that seven sampling events using the conventional sampling method for all CWL monitoring wells with a large enough diameter to accommodate the conventional method equipment would be sufficient for the revised CMS Report. The original NMED comments and the negotiated agreements regarding the required number of events are documented in the CWL CMS Comment Response Document (SNL October 2004) and in the revised CWL CMS Report (SNL December 2004).

A comprehensive summary of the CWL disposal history is presented in the NMED-approved CWL Closure Plan (SNL December 1992) and the LE VCM Final Report (SNL April 2003). Groundwater and other site investigation results from 1992 through 1995 are documented in both the *Chemical Waste Landfill Unsaturated Zone Contaminant Characterization Report* (SNL November 1993) and the *CWL Groundwater Assessment Report* (SNL October 1995). A comprehensive investigation history of the CWL is presented and summarized in the CWL CMS Report (SNL December 2004), including pre-VCM, VCM, and post-VE VCM soil, soil-gas, and groundwater monitoring results that establish current conditions.

3.1.2 Monitoring Network

The groundwater monitoring network transitioned in Calendar Year (CY) 2010 from the older network comprised of 13 wells to the new network comprised of 11 wells. Of the remaining 11 wells, semiannual sampling is only required for the four new wells installed in 2010. All wells that were part of the CWL monitoring network in CY 2010 are shown in Figure 3-2 and listed in Table 3-1. During CY 2010, six wells were sampled in April (older monitoring network), and four wells were sampled in November-December (new monitoring network).

3.1.3 Summary of Activities

CWL semiannual groundwater monitoring activities were performed during April and in November and December 2010. Groundwater samples were collected from six monitoring wells in April and from the four new wells in November and December. The samples were analyzed for 40 CFR 264 (Appendix IX) VOCs and Appendix IX total metals plus iron. Additional samples for total aluminum, calcium, magnesium, manganese, potassium, and sodium were collected from three CWL wells during the April sampling event. The SNL/NM ER Project quarterly progress reports (SNL September 2010b and March 2011) provide a complete summary of each sampling event. Attachment 3A presents tables showing the analytical results for CWL monitoring wells sampled during CY 2010.

Table 3-1. Monitoring Wells at the CWL

Well[1]	Installation Year	WQ	WL	Comments
Older Monitoring Well Network – April 2010 Sampling Event				
CWL-MW1A	1988			Dry well (filled with sediment during VE VCM)
CWL-MW3A	1988			Dry well (filled with sediment during VE VCM)
CWL-BW3	1988		✓	Insufficient volume for representative sampling
CWL-MW4[2]	1990	✓	✓	Water table well
CWL-MW2BU	1994		✓	Insufficient volume for representative sampling
CWL-MW2BL	1994	✓	✓	Lower section of nested well
CWL-MW5U[2]	1994	✓	✓	Upper section of nested well
CWL-MW5L[2]	1994	✓	✓	Lower section of nested well (2-inch-diameter well)
CWL-MW6U[2]	1994	✓	✓	Upper section of nested well
CWL-MW6L[2]	1994	✓	✓	Lower section of nested well (2-inch-diameter well)
CWL-BW4A[2]	1994			Insufficient volume for representative sampling
CWL-MW7	2003		✓	Deep monitoring well
CWL-MW8	2003		✓	Deep monitoring well
New Monitoring Well Network – November-December 2010 Sampling Event				
CWL-BW5	2010	✓	✓	Upgradient well – replaces CWL-BW4A
CWL-MW9	2010	✓	✓	Downgradient well – new well
CWL-MW10	2010	✓	✓	Downgradient well – new well
CWL-MW11	2010	✓	✓	Downgradient well – new well

NOTES:

(1) Refer to page xviii of this report for well descriptions.

(2) Well decommissioned after April 2010 sampling event.

Check marks in the WQ and WL columns indicate WQ sampling and WL measurements during the period from January to December 2010.

CWL = Chemical Waste Landfill.
VCM = Voluntary Corrective Measure.
VE = Vapor Extraction.
WL = Water level.
WQ = Water quality.

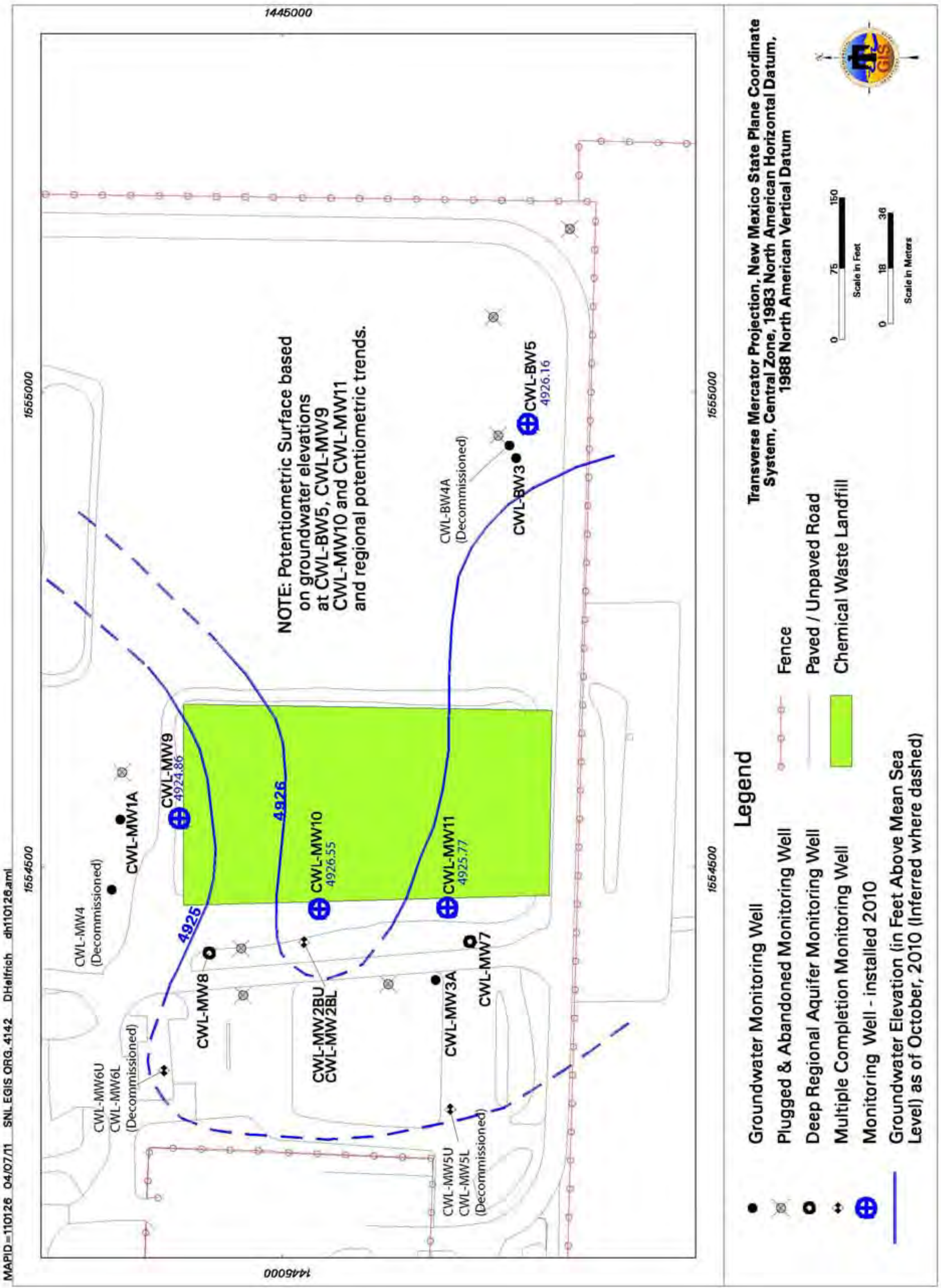

Figure 3-2. Chemical Waste Landfill Monitoring Well Locations and Potentiometric Surface Map

Figure 3-2. Chemical Waste Landfill Monitoring Well Locations

3.1.4 Summary of Future Activities

The NMED-approved CWL Post-Closure Care Permit (NMED October 2009a) supersedes the CWL Closure Plan (SNL December 1992) upon NMED approval of the Final CWL RCRA Closure Report. All future groundwater monitoring will be performed in accordance with the requirements in the Permit. Under the CWL Post-Closure Care Permit, groundwater sampling requirements for the four new monitoring wells (CWL-BW5, CWL-MW9, CWL-MW10, and CWL-MW11) changed. These changes include a reduction in the groundwater monitoring analyte reporting list and an annual report that is due on March 31 of each CY. The first annual report under the Permit will be submitted to NMED by March 31, 2012, and will cover monitoring conducted from June through December 2011. As required by 20.4.1.500 NMAC, incorporating 40 CFR 264.117(a)(1), the post-closure care period is 30 years. The NMED may shorten or extend this period under 20.4.1.500 NMAC, incorporating 40 CFR 264.117(a)(2).

3.1.5 Conceptual Site Model

As documented in the NMED-approved CWL Post-Closure Care Permit, TCE, chromium, and nickel are identified as the constituents of concern at the CWL (NMED October 2009a). A detailed conceptual site model is provided in Annex E of the CWL CMS Report (SNL December 2004).

The regional aquifer in the area of the CWL is located within the Santa Fe Group alluvial sediments at a depth of approximately 485 to 500 feet below ground surface. Regional groundwater beneath KAFB flows generally westward toward the Rio Grande, but local perturbations in the water table occur due to pumping wells and geologic (i.e., lithologic and structural) controls. Pumping by the City of Albuquerque and KAFB have profoundly modified the natural groundwater flow regime (Reeder et al. 1967 and Kues 1987) creating a trough in the water table in the western and northeastern portions of KAFB. Water levels at the CWL have been declining since October 2004 at an approximate average rate of 0.76 feet per year. Detailed hydrographs of specific CWL wells are presented in Attachment 3B (Figures 3B-1 and 3B-2) and in the CWL-MW2A Class 2 Closure Plan Amendment Request (SNL July 2004).

Historically, water levels have been measured quarterly at all CWL wells, with some exceptions. In CY 2010 water levels were measured in all wells on a quarterly basis. The potentiometric surface map of the CWL using October 2010 water level measurements (Figure 3-2) is consistent with the hydrogeologic conceptual model for the Kirtland Air Force Base (KAFB) area, which shows the local groundwater flow direction is generally to the west-northwest due to the regional gradient and influence of groundwater withdrawals by the City of Albuquerque and KAFB. As reflected in Figure 3-2, site-specific changes in the water table surface occur as a result of geologic controls (i.e., vertical and lateral lithologic changes in the saturated Santa Fe Group sediments). The trough in the regional aquifer described above is located to the west of the CWL. Groundwater travel times from the CWL to these KAFB and municipal water supply wells are on the order of hundreds to thousands of years (SNL February 2001).

3.2 Regulatory Criteria

The CWL is an interim status landfill that has undergone closure in accordance with 20.4.1.600 NMAC, incorporating 40 CFR 265 Subpart G, and the CWL Closure Plan (SNL December 1992, as amended). Monitoring details, such as specific analytes and sampling frequencies, are defined in Appendix G of the Closure Plan and subsequent amendments and revisions. When the NMED approves the CWL closure and the CWL Final RCRA Closure Report, all future monitoring will be conducted following the requirements stipulated in the CWL Post-Closure Care Permit (NMED October 2009a).

3.3 Scope of Activities

Groundwater monitoring performed during CY 2010 at the CWL is summarized in Section 3.1.3. The NMED DOE Oversight Bureau (OB) participated in both the April and November-December 2010 sampling events and received split samples from three CWL monitoring wells (CWL-MW2BL, CWL-MW4, and CWL-MW5U) in April, and from three monitoring wells (CWL-MW9, CWL-MW10, and CWL-MW11) in November and December. The split samples for both sampling events were submitted to a different laboratory for analysis of Appendix IX VOCs and metals. Additional samples for total aluminum, calcium, magnesium, manganese, potassium, and sodium were requested by the NMED DOE OB. To ensure a consistent level of quality assurance for these analyses, SNL/NM personnel also collected samples for total aluminum, calcium, magnesium, manganese, potassium, and sodium at the three CWL monitoring wells during the April sampling event. These additional analyses are not required by Appendix G of the CWL Closure Plan (SNL December 1992). The NMED DOE OB split sampling results are presented in a separate document and not included in this report. Table 3-2 lists the parameters and CWL monitoring wells sampled.

Table 3-2. Analytical Parameters at CWL Monitoring Wells for Each Sampling Period

Parameter	April 2010	November-December 2010
Appendix IX VOCs	CWL-MW2BL, CWL-MW4, CWL-MW5L, CWL-MW5U, CWL-MW5U (dup), CWL-MW6L, CWL-MW6U, CWL-MW6U (dup)	CWL-BW5, CWL-MW9, CWL-MW9 (dup), CWL-MW10, CWL-MW11
Appendix IX Total Metals plus Iron	CWL-MW2BL, CWL-MW4, CWL-MW5L, CWL-MW5U, CWL-MW5U (dup), CWL-MW6L, CWL-MW6U, CWL-MW6U (dup)	CWL-BW5, CWL-MW9, CWL-MW9 (dup), CWL-MW10, CWL-MW11

NOTES:
"U" and "L" denote upper and lower completions for nested wells in the same borehole.
CWL = Chemical Waste Landfill.
dup = Duplicate.
VOC = Volatile organic compound.

Groundwater samples collected for chemical analyses were submitted to GEL Laboratories, Inc. (GEL) in Charleston, South Carolina. All chemical analytical results are compared with EPA maximum contaminant levels (MCLs) for drinking water supplies. The analytical results are summarized in Attachment 3A, Tables 3A-1 through 3A-3.

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. Field QC samples included environmental duplicate, equipment blank, field blank (FB), and trip blank (TB) samples. Laboratory QC analyses performed included method blank, laboratory control sample (LCS), matrix spike, matrix spike duplicate, and surrogate spike analyses.

Water quality parameters for groundwater temperature, SC, and pH were measured using a YSI™ Model 620 Water Quality Meter. Turbidity was measured with a Hach™ Model 2100P portable turbidity meter. Field water quality measurements are presented in Attachment 3A, Table 3A-4.

3.4 Field Methods and Measurements

Groundwater sampling was conducted in conformance with procedures outlined in the *Sampling and Analysis Plan for Groundwater Assessment Monitoring at the Chemical Waste Landfill*, Appendix G, Revision 4 of the CWL Closure Plan (SNL December 1992). Groundwater elevation and water quality field measurements were obtained during groundwater sampling activities. Field water quality parameters are presented in Table 3A-4 (Attachment 3A). Depth-to-groundwater measurements were obtained using a Solinst™ depth-to-water well sounder prior to purging activities. Depth-to-groundwater measurements were performed in accordance with the Field Operating Procedure (FOP), *Long-Term Environmental Stewardship Groundwater Monitoring Well Sampling and Field Analytical Measurements*, FOP 05-01 (SNL August 2007). Groundwater elevation measurements at the CWL monitoring wells from CY 2007 through CY 2010 are presented in Attachment 3B, Figures 3B-1 and 3B-2.

A Bennett™ groundwater sampling system was used to collect groundwater samples from all wells, except small-diameter wells (2 inches or less). Wells CWL-MW5L and CWL-MW6L are small-diameter wells, and dedicated sampling systems manufactured by QED™ Environmental Systems, Inc. were used to collect samples from these wells. Prior to sample collection, each monitoring well was purged to remove stagnant well casing water. More than one day was required to complete purging and sampling at CWL-MW5U and CWL-MW6U in April, and at CWL-MW10 and CWL-MW11 in November and December, due to the slow recharge rate of the monitoring wells. Monitoring wells purged to dryness were allowed to recover before sampling to ensure the most representative groundwater sample possible given the low yield of these wells. Wells CWL-MW2BL and CWL-MW4 in April, and CWL-BW5 and CWL-MW9 in November-December, were purged a minimum of three well-bore volumes prior to sampling. Wells CWL-MW5L and CWL-MW6L in April were purged a minimum of two tubing water volumes prior to sampling.

Groundwater temperature, SC, and pH were measured using a YSI™ Model 620 water quality meter. Turbidity was measured with a Hach™ Model 2100P portable turbidity meter. Groundwater stability is considered acceptable when measurements are within 5 nephelometric turbidity units, 0.2 pH units, and 0.2 degrees Celsius (°C), and SC is within 1 percent or 10 microhms per centimeter (whichever is greater). During the purging of CWL-MW2BL and CWL-MW6L in April, the last two temperature measurements for both wells were within the 0.2°C range, but the previous measurement was slightly lower (approximately 0.4°C for CWL-MW6L and 0.25°C for CWL-MW2BL). Additional purging was not performed prior to sample collection.

Groundwater samples collected after the purging process were submitted to off-site laboratories (GEL) following analysis request/chain-of-custody protocol.

3.5 Analytical Methods

The analytical laboratory analyzed samples using EPA-approved analytical methods and specified performance criteria in accordance with the *SNL/NM Statement of Work for Analytical Laboratories* (SNL May 2009). The analytical laboratory provided appropriate sample containers prepared with the required sample preservative. Table 3-3 summarizes analytical requirements and EPA Methods (EPA 1986) applicable to groundwater sampling at the CWL during CY 2010.

3.6 Summary of Analytical Results

The analytical results and water quality parameters are presented in Attachment 3A, Tables 3A-1 through 3A-4. Analyses for aluminum, calcium, magnesium, manganese, potassium, and sodium were also conducted for three of the well samples collected in April. All results are compared with established EPA MCLs, where applicable; no constituents were detected above established MCLs during CY 2010. Data qualifiers from the data validation process are presented with the associated results in the Attachment 3A tables. Data validation and QC sample results associated with each sampling event are discussed in Section 3.7.

Table 3-3. CWL Analyses, Methods, Sample Containers, Preservatives, and Holding Times

Analysis	Method[a]	Container Type/ Volume/Preservative	Holding Time
Appendix IX Volatile Organic Compounds	SW846-8260B	Glass; 3 x 40 mL; HCl; 4°C	14 days
Appendix IX Total metals + iron[b]	SW846-6020/7470A	Polyethylene; 500 mL; HNO_3; 4°C	28 days/180 days[c]

NOTES:

[a]U.S. Environmental Protection Agency, November 1986. *Test Methods for Evaluating Solid, Physical/Chemical Methods,* 3rd ed., (and updates), SW-846, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

[b]For April 2010 samples collected from CWL-MW2BL, CWL-MW4, and CWL-MW5U, analyses for aluminum, calcium, magnesium, manganese, potassium, and sodium were also performed.

[c]Holding time for mercury is 28 days; all other metals are 180 days.

°C = Degree(s) Celsius.
CWL = Chemical Waste Landfill.
HCl = Hydrochloric acid.
HNO_3 = Nitric acid.
mL = Milliliter(s).

3.6.1 Volatile Organic Compounds

Detected VOCs are presented in Attachment 3A, Table 3A-1. No VOCs were detected above established MCLs during CY 2010. No VOCs were detected in any sample except for toluene, chloromethane, and TCE. Toluene and chloromethane were detected below the laboratory practical quantitation limits (PQLs). Toluene was detected below the MCL of 1,000 μg/L in one sample at a concentration of 0.330 μg/L. TCE was detected below the MCL of 5.0 μg/L at concentrations ranging from 0.450 to 2.75 μg/L; three of the five results were below the laboratory PQL of 1.00 μg/L. Associated laboratory method detection limits (MDLs) are presented in Attachment 3A, Table 3A-2.

3.6.2 Total Metals

As required by the NMED Hazardous Waste Bureau, all metal samples were analyzed for total metals. Metal results are presented in Attachment 3A, Table 3A-3. No total metal parameters were detected above established regulatory limits in any groundwater sample. Chromium was detected below the MCL of 0.10 milligrams per liter (mg/L) at concentrations ranging from 0.00253 to 0.00263 mg/L. Nickel was detected above the laboratory MDL in all environmental groundwater samples, except at CWL-MW5L. Detected nickel concentrations range from 0.00253 to 0.252 mg/L. No MCL is established for nickel. Additional samples were collected for total aluminum, calcium, magnesium, manganese, potassium, and sodium from CWL-MW2BL, CWL-MW4, and CWL-MW5U during the April sampling event to duplicate the analyses performed by the NMED DOE OB. No MCLs are established for these metals. Aluminum was not detected above the laboratory MDL. Reported concentrations for calcium ranged from 91.8 to 117 mg/L, magnesium from 25.3 to 36.5 mg/L, manganese at 0.0368 mg/L in the sample from CWL-MW4 only, potassium from 5.95 to 9.08 mg/L, and sodium from 74.0 to 83.0 mg/L.

3.6.3 Water Quality Parameters

Attachment 3A, Table 3A-4 summarizes field water quality measurements prior to sampling and includes temperature, SC, 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 AOP [Administrative Operating Procedure] 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL July 2007). 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 environmental duplicate, FB, and TB samples. TB samples are submitted whenever samples are collected for VOC analysis to assess whether contamination of the samples occurred during shipment and storage. FB samples provide a check for potential ambient sources of sample contamination during the sampling process and/or sampling error. EB samples are collected to verify the effectiveness of the sampling equipment decontamination process, and duplicate samples are collected immediately after the environmental sample to provide information about sampling variability and overall reproducibility. The field QC samples were submitted for analysis along with the groundwater samples in accordance with QC procedures specified in the SAP provided in Appendix G of the CWL Closure Plan (SNL December 1992). The following sections discuss the analytical results for each QC sample type.

3.7.1.1 Duplicate Environmental Samples

Duplicate environmental samples were collected at CWL-MW5U, CWL-MW6U, and CWL-MW9 and analyzed for all detected parameters. Relative percent difference (RPD) calculations between duplicate samples were performed for all analytes. The results show that sampling and analysis precision was in conformance with the SAP (Appendix G of the CWL Closure Plan) requirements for all measured parameters, except selenium in the April sample from CWL-MW5U. The selenium RPD was calculated at 22 and is considered an estimated value because the sampling results reported were less than the laboratory PQL.

3.7.1.2 Field Blank Samples

A total of seven FB samples were collected for VOCs to assess whether contamination of the samples resulted from ambient field conditions. During the April sampling event, an FB sample was collected at each monitoring well (six locations) because monitoring well drilling activities were being performed at the CWL during this sampling event. The FB samples were prepared by pouring deionized water into sample containers at the sample collection point to simulate the transfer of environmental samples from the sampling system into the sample container. VOCs detected above laboratory MDLs included bromodichloromethane, bromoform, chloroform, chloromethane, and dibromochloromethane. No corrective action was necessary for bromodichloromethane, bromoform, or dibromochloromethane as these compounds were not detected in the associated environmental samples. During data validation, the results for chloroform were qualified as not detected in samples from CWL-MW2BL and CWL-MW5L, and for chloromethane in the sample from CWL-MW5U because these compounds were detected at concentrations less than five times the blank concentration.

3.7.1.3 Trip Blank Samples

TB samples consist of laboratory reagent-grade water with hydrochloric acid preservative contained in 40-milliliter volatile organic analysis vials prepared by the analytical laboratory, which accompany the empty sample containers supplied by the laboratory. The TBs were brought to the field and accompanied each sample shipment. A total of 13 TBs were submitted with the CY 2010 samples. No VOCs were detected above laboratory MDLs in any TB sample.

3.7.2 Laboratory Quality Control Samples

Internal laboratory QC samples, including method blanks and duplicate LCSs, were analyzed concurrently with the groundwater samples. Additionally, batch matrix spike, matrix spike duplicate, and surrogate spike samples were analyzed. All laboratory data were reviewed and qualified in accordance with AOP [Administrative Operating Procedure] 00-03, Revision 2, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL July 2007).

Although some analytical results were qualified as not detected or as estimated values during the data validation process, no significant data quality problems were noted for any CWL groundwater sample, except aluminum and vanadium. Aluminum results for CWL-MW2BL and CWL-MW5U and vanadium results for CWL-MW2BL, CWL-MW5L, CWL-MW5U, and CWL-MW6L were qualified as unusable during data validation as the matrix spike percent recoveries did not meet acceptance criteria. SNL/NM requested that GEL reanalyze these metals in the samples. Results of the reanalysis (Sample 088581-R09) are reported in Table 3A-3 (Attachment 3A), and QC measures for the reanalysis are acceptable. Chromium in CWL-MW10 was qualified as not detected during data validation because chromium was detected at a concentration less than five times the detected laboratory method blank value. Data validation reports and findings associated with CWL groundwater monitoring are filed in the SNL/NM Customer Funded Records Center.

3.8 Variances and Nonconformances

Variances and nonconformances from requirements in the CWL SAP (SNL December 1992) are identified as follows:

- CWL-MW1A and CWL-MW3A are no longer sampled. Since 1998 these wells have contained no water. During the VE VCM, the wells partially filled with sediment and have not recovered. However, SNL/NM personnel lowered a water level meter to verify that these wells remain dry.

- No samples were collected from CWL-BW3, CWL-BW4A, or CWL-MW2BU. SNL/NM personnel notified the NMED that these wells did not produce sufficient water to collect a representative sample during the CY 2009 sampling events.

- There was a minor variance relative to the stability target range for temperature at monitoring wells CWL-MW2BL and CWL-MW6L during the purging process in April. The last two temperature measurements for both wells were within the stability target range of 0.2°C, but the previous measurements were slightly lower (approximately 0.4°C for CWL-MW6L and 0.25°C for CWL-MW2BL). After review of the field data and recognition of the variance, corrective action was not deemed necessary as the maximum temperature variation between the final three measurements for both wells was minimal, the last two readings met the stabilization requirement, and all other purging requirements had been met. The field sampling team was reminded of the CWL stability target range for temperature and in the future will continue purging until stability is achieved.

3.9 Summary and Conclusions

During CY 2010, samples were collected from 10 CWL monitoring wells (CWL-MW2BL, CWL-MW4, CWL-MW5L, CWL-MW5U, CWL-MW6L, and CWL-MW6U in April, and CWL-BW5, CWL-MW9, CWL-MW10, and CWL-MW11 in November and December) and analyzed for 40 CFR 264 (Appendix IX) VOCs and total metals plus iron. Analyses for aluminum, calcium, magnesium, manganese, potassium, and sodium were also performed on three of the well samples collected in April. No analytes were detected at concentrations exceeding the associated EPA MCLs in any CWL groundwater samples collected during CY 2010.

3.10 References

Bearzi May 2000 Bearzi, J.P. (New Mexico Environment Department), May 2000. Letter to M.J. Zamorski (U.S. Department of Energy) and R.J. Eagan (Sandia Corporation), *Class 1 Permit Modification Approval and Notice of Administrative Completeness: Request for Chemical Waste Landfill Ground-Water Monitoring Schedule Change,* Sandia National Laboratories, NM58901210518, Task HWB-SNL-02-008, May 5, 2000.

EPA 1986 U.S. Environmental Protection Agency (EPA), 1986. *Test Methods for Evaluating Solid Waste,* 3rd ed., and all updates, SW-846, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C., November.

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), *Approval, Closure of Chemical Waste Landfill and Post-Closure Care Permit in Effect, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-10-013*, June 2, 2011.

Kieling September 2004 Kieling, J.E. (New Mexico Environment Department), September 2004. Letter to P. Wagner (U.S. Department of Energy) and P.B. Davies (Sandia Corporation), *Approval with Conditions of the Landfill Cover Interim Measure at the Chemical Waste Landfill, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-04-027*, September 22, 2004.

Kieling December 2003 Kieling, J.E. (New Mexico Environment Department), December 2003. Letter to K.L. Boardman (U.S. Department of Energy) and P.B. Davies (Sandia Corporation), *Chemical Waste Landfill, Corrective Measures Study, May 2003, Sandia National Laboratories NM5890110518, HWB SNL-03-013*, December 12, 2003.

Kues 1987 Kues, G.E., 1987. *Groundwater Level Data for Albuquerque-Belen Basin, New Mexico, through Water Level Year 1985*, USGS Open File Report 87-1 16, U.S. Geological Survey, Albuquerque, New Mexico.

NMED October 2009a New Mexico Environment Department (NMED), October 2009. *Final Permit Decision and Response to Comments, Post-Closure Care Permit for the Chemical Waste Landfill, Sandia National Laboratories, EPA ID# NM5890110518, SNL-06-002*, New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico, October 15, 2009.

NMED October 2009b New Mexico Environment Department (NMED), October 2009. *Notice of Approval, Final Remedy and Closure Plan Amendment, Chemical Waste Landfill, Sandia National Laboratories, EPA ID No. NM5890110518, NMED-HWB-05-016*, New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico, October 16, 2009.

NMED 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.

Reeder et al. 1967 Reeder, H.O., L.J. Bjorklund, and G.A. Dinwiddie, 1967. *Quantitative Analysis of Water Resources in the Albuquerque Area, New Mexico: Computed Effects on the Rio Grande of Pumpage of Groundwater, 1960-2000,* New Mexico State Engineer Report 33, Santa Fe, New Mexico.

SNL March 2011 Sandia National Laboratories/New Mexico (SNL/NM), March 2011. *Environmental Restoration Project Consolidated Quarterly Report, November 2010 through January 2011*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL September 2010a 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 September 2010b Sandia National Laboratories/New Mexico (SNL/NM), September 2010. *Environmental Restoration Project Consolidated Quarterly Report, May 2010 through July 2010*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL May 2009 Sandia National Laboratories/New Mexico (SNL/NM), May 2009. *SNL/NM Statement of Work for Analytical Laboratories, Revision 4*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL August 2007 Sandia National Laboratories/New Mexico (SNL/NM), August 2007. *Long-Term Environmental Stewardship Groundwater Monitoring Well Sampling and Field Analytical Measurements*, FOP 05-01, Revision 00, Sandia National Laboratories, Albuquerque, New Mexico.

SNL July 2007 Sandia National Laboratories/New Mexico (SNL/NM), July 2007. *Data Validation Procedure for Chemical and Radiochemical Data*, AOP 00-03, Revision 2, Sandia National Laboratories, Albuquerque, New Mexico.

SNL August 2005 Sandia National Laboratories/New Mexico (SNL/NM), August 2005. *Chemical Waste Landfill Quarterly Closure Progress Report*, Sandia National Laboratories, Albuquerque, New Mexico, August 22, 2005.

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 October 2004 Sandia National Laboratories/New Mexico (SNL/NM), October 2004. *Responses to NMED Comments on the CWL CMS Report*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL July 2004 Sandia National Laboratories/New Mexico (SNL/NM), July 2004. *Class 2 Amendment to the Chemical Waste Landfill Closure Plan – Rationale for Decommissioning Monitoring Well CWL-MW2A and Plug and Abandonment Plan,* Revision 1, 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. *CWL Groundwater Assessment Report*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL November 1993 Sandia National Laboratories/New Mexico (SNL/NM), November 1993. *The Chemical Waste Landfill Unsaturated Zone Contaminant Characterization 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 July 2007 Wagner, P. (U.S. Department of Energy), July 2007. Letter to J.E. Kieling (New Mexico Environment Department), *Comments on the New Mexico Environment Department Intent to Approve a Closure Plan Amendment, Select a Final Remedy, and Issue a Post-Closure Care Permit under the New Mexico Hazardous Waste Act for the Sandia National Laboratories Chemical Waste Landfill*, July 19, 2007.

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.

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Attachment 3A
Chemical Waste Landfill
Analytical Results Tables

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Attachment 3A Tables

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Table 3A-1
Summary of Detected Volatile Organic Compounds, Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

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-MW2BL 12-Apr-10	Chloroform	0.640	0.250	1.00	NE	J	1.0U	088581-001	SW846 8260
CWL-MW5L	Chloroform	0.480	0.250	1.00	NE	J	1.0U	088578-001	SW846 8260
13-Apr-10	Trichloroethene	0.570	0.250	1.00	5.00	J		088578-001	SW846 8260
CWL-MW5U	Chloromethane	0.310	0.300	1.00	NE	J	1.0U	088571-001	SW846 8260
09-Apr-10	Trichloroethene	2.74	0.250	1.00	5.00			088571-001	SW846 8260
CWL-MW5U (Duplicate) 09-Apr-10	Trichloroethene	2.75	0.250	1.00	5.00			088572-001	SW846 8260
CWL-MW6L 12-Apr-10	Trichloroethene	0.450	0.250	1.00	5.00	J		088575-001	SW846 8260
CWL-MW6U	Chloromethane	0.400	0.300	1.00	NE	J		088565-001	SW846 8260
07-Apr-10	Toluene	0.330	0.250	1.00	1,000	J		088565-001	SW846 8260
CWL-MW6U (Duplicate) 07-Apr-10	Chloromethane	0.480	0.300	1.00	NE	J		088566-001	SW846 8260
CWL-MW10 06-Dec-10	Trichloroethene	1.11	0.250	1.00	5.00			089885-001	SW846 8260

Refer to footnotes on page 3A-21.

Table 3A-2
Method Detection Limits for Appendix IX Volatile Organic Compounds, Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

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	Chloroform	0.250	SW846 8260
1,1,1-Trichloroethane	0.325	SW846 8260	Chloromethane	0.300	SW846 8260
1,1,2,2-Tetrachloroethane	0.250	SW846 8260	Chloroprene	0.300	SW846 8260
1,1,2-Trichloroethane	0.250	SW846 8260	Dibromochloromethane	0.300	SW846 8260
1,1-Dichloroethane	0.300	SW846 8260	Dibromomethane	0.300	SW846 8260
1,1-Dichloroethene	0.300	SW846 8260	Dichlorodifluoromethane	0.300	SW846 8260
1,2,3-Trichloropropane	0.300	SW846 8260	Ethyl benzene	0.250	SW846 8260
1,2,4-Trichlorobenzene	0.300	SW846 8260	Ethyl cyanide	1.50	SW846 8260
1,2-Dibromo-3-chloropropane	0.300	SW846 8260	Ethyl methacrylate	1.00	SW846 8260
1,2-Dibromoethane	0.250	SW846 8260	Iodomethane	1.25	SW846 8260
1,2-Dichloroethane	0.250	SW846 8260	Isobutanol	12.5	SW846 8260
1,2-Dichloropropane	0.250	SW846 8260	Methacrylonitrile	1.00	SW846 8260
2-Butanone	1.25	SW846 8260	Methyl methacrylate	1.00	SW846 8260
2-Hexanone	1.25	SW846 8260	Methylene chloride	3.00	SW846 8260
4-methyl-, 2-Pentanone	1.25	SW846 8260	Pentachloroethane	1.00	SW846 8260
Acetone	3.50	SW846 8260	Styrene	0.250	SW846 8260
Acetonitrile	6.25	SW846 8260	Tetrachloroethene	0.300	SW846 8260
Acrolein	1.25	SW846 8260	Toluene	0.250	SW846 8260
Acrylonitrile	1.00	SW846 8260	Trichloroethene	0.250	SW846 8260
Allyl chloride	1.50	SW846 8260	Trichlorofluoromethane	0.300	SW846 8260
Benzene	0.300	SW846 8260	Vinyl acetate	1.50	SW846 8260
Bromodichloromethane	0.250	SW846 8260	Vinyl chloride	0.500	SW846 8260
Bromoform	0.250	SW846 8260	Xylene	0.300	SW846 8260
Bromomethane	0.300	SW846 8260	bis-Chloroisopropyl ether	1.50	SW846 8260
Carbon disulfide	1.25	SW846 8260	cis-1,3-Dichloropropene	0.250	SW846 8260
Carbon tetrachloride	0.300	SW846 8260	trans-1,2-Dichloroethene	0.300	SW846 8260
Chlorobenzene	0.250	SW846 8260	trans-1,3-Dichloropropene	0.250	SW846 8260
Chloroethane	0.300	SW846 8260	trans-1,4-Dichloro-2-butene	1.00	SW846 8260

Refer to footnotes on page 3A-21.

Table 3A-3
Summary of Total Metal Results,
Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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-MW2BL	Aluminum	ND	0.050	0.150	NE	U	R	088581-009	SW846 6020
14-Apr-10	Aluminum	ND	0.010	0.030	NE	U		088581-R09	SW846 6020
	Antimony	ND	0.0005	0.003	0.006	U		088581-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		088581-009	SW846 6020
	Barium	0.0579	0.0005	0.002	2.00			088581-009	SW846 6020
	Beryllium	ND	0.0005	0.0025	0.004	U		088581-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088581-009	SW846 6020
	Calcium	117	0.100	1.00	NE			088581-009	SW846 6020
	Chromium	ND	0.0125	0.050	0.100	U		088581-009	SW846 6020
	Cobalt	ND	0.0005	0.005	NE	U		088581-009	SW846 6020
	Copper	ND	0.0015	0.005	NE	U		088581-009	SW846 6020
	Iron	0.160	0.050	0.500	NE	J		088581-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088581-009	SW846 6020
	Magnesium	36.5	0.025	0.075	NE			088581-009	SW846 6020
	Manganese	ND	0.005	0.025	NE	U		088581-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088581-009	SW846 6020
	Nickel	0.00273	0.0025	0.010	NE	J		088581-009	SW846 6020
	Potassium	5.95	0.400	1.50	NE			088581-009	SW846 6020
	Selenium	0.00155	0.001	0.005	0.050	J		088581-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088581-009	SW846 6020
	Sodium	83.0	0.400	1.25	NE			088581-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088581-009	SW846 6020
	Tin	ND	0.001	0.005	NE	U		088581-009	SW846 6020
	Vanadium	ND	0.015	0.050	NE	U	R	088581-009	SW846 6020
	Vanadium	ND	0.015	0.050	NE	U	UJ	088581-R09	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		088581-009	SW846 6020

Refer to footnotes on page 3A-21.

Table 3A-3 *(Continued)*
Summary of Total Metal Results,
Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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-MW4	Aluminum	ND	0.010	0.030	NE	U		088560-009	SW846 6020
05-Apr-10	Antimony	ND	0.0005	0.003	0.006	U		088560-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		088560-009	SW846 6020
	Barium	0.0597	0.0025	0.010	2.00			088560-009	SW846 6020
	Beryllium	ND	0.0005	0.0025	0.004	U		088560-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088560-009	SW846 6020
	Calcium	95.1	0.100	1.00	NE			088560-009	SW846 6020
	Chromium	0.0263	0.0125	0.050	0.100	J		088560-009	SW846 6020
	Cobalt	0.00331	0.0005	0.005	NE	J		088560-009	SW846 6020
	Copper	0.00261	0.0015	0.005	NE	B, J	J+	088560-009	SW846 6020
	Iron	0.771	0.050	0.500	NE			088560-009	SW846 6020
	Lead	ND	0.0025	0.010	NE	U		088560-009	SW846 6020
	Magnesium	25.3	0.005	0.015	NE			088560-009	SW846 6020
	Manganese	0.0368	0.005	0.025	NE			088560-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088560-009	SW846 6020
	Nickel	0.252	0.0025	0.010	NE			088560-009	SW846 6020
	Potassium	8.74	0.080	0.300	NE			088560-009	SW846 6020
	Selenium	0.00164	0.001	0.005	0.050	J		088560-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088560-009	SW846 6020
	Sodium	74.0	0.400	1.25	NE			088560-009	SW846 6020
	Thallium	ND	0.0015	0.005	0.002	U		088560-009	SW846 6020
	Tin	ND	0.001	0.005	NE	U		088560-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		088560-009	SW846 6020
	Zinc	0.00413	0.0026	0.010	NE	J		088560-009	SW846 6020

Refer to footnotes on page 3A-21.

Table 3A-3 *(Continued)*
Summary of Total Metal Results,
Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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-MW5L	Antimony	ND	0.0005	0.003	0.006	U		088578-009	SW846 6020
13-Apr-10	Arsenic	ND	0.0015	0.005	0.010	U		088578-009	SW846 6020
	Barium	0.057	0.0005	0.002	2.00			088578-009	SW846 6020
	Beryllium	ND	0.0005	0.0025	0.004	U		088578-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088578-009	SW846 6020
	Chromium	ND	0.0125	0.050	0.100	U		088578-009	SW846 6020
	Cobalt	ND	0.0005	0.005	NE	U		088578-009	SW846 6020
	Copper	ND	0.0015	0.005	NE	U		088578-009	SW846 6020
	Iron	0.173	0.050	0.500	NE	J		088578-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088578-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088578-009	SW846 7470
	Nickel	ND	0.0025	0.010	NE	U		088578-009	SW846 6020
	Selenium	0.00132	0.001	0.005	0.050	J		088578-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088578-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088578-009	SW846 6020
	Tin	ND	0.001	0.005	NE	U		088578-009	SW846 6020
	Vanadium	ND	0.015	0.050	NE	U	R	088578-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		088578-R09	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		088578-009	SW846 6020

Refer to footnotes on page 3A-21.

Table 3A-3 *(Continued)*
Summary of Total Metal Results,
Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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-MW5U	Aluminum	ND	0.050	0.150	NE	U	R	088571-009	SW846 6020
09-Apr-10	Aluminum	ND	0.010	0.030	NE	U		088571-R09	SW846 6020
	Antimony	ND	0.0005	0.003	0.006	U		088571-009	SW846 6020
	Arsenic	0.00253	0.0015	0.005	0.010	J		088571-009	SW846 6020
	Barium	0.0666	0.0005	0.002	2.00			088571-009	SW846 6020
	Beryllium	ND	0.0005	0.0025	0.004	U		088571-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088571-009	SW846 6020
	Calcium	91.8	0.100	1.00	NE			088571-009	SW846 6020
	Chromium	ND	0.0125	0.050	0.100	U		088571-009	SW846 6020
	Cobalt	ND	0.0005	0.005	NE	U		088571-009	SW846 6020
	Copper	ND	0.0015	0.005	NE	U		088571-009	SW846 6020
	Iron	0.133	0.050	0.500	NE	J		088571-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088571-009	SW846 6020
	Magnesium	26.0	0.025	0.075	NE			088571-009	SW846 6020
	Manganese	ND	0.005	0.025	NE	U		088571-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088571-009	SW846 6020
	Nickel	ND	0.0025	0.010	NE	U		088571-009	SW846 6020
	Potassium	9.08	0.400	1.50	NE			088571-009	SW846 6020
	Selenium	0.0017	0.001	0.005	0.050	J		088571-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088571-009	SW846 6020
	Sodium	75.3	0.400	1.25	NE			088571-009	SW846 6020
	Thallium	0.000686	0.0003	0.001	0.002	J	0.0043U	088571-009	SW846 6020
	Tin	ND	0.001	0.005	NE	U		088571-009	SW846 6020
	Vanadium	ND	0.015	0.050	NE	U	R	088571-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U	UJ	088571-R09	SW846 6020
	Zinc	0.0309	0.0026	0.010	NE			088571-009	SW846 6020

Refer to footnotes on page 3A-21.

Table 3A-3 *(Continued)*
Summary of Total Metal Results,
Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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-MW5U (Duplicate) 09-Apr-10	Aluminum	ND	0.050	0.150	NE	U	R	088572-009	SW846 6020
	Aluminum	ND	0.010	0.030	NE	U		088572-R09	SW846 6020
	Antimony	ND	0.0005	0.003	0.006	U		088572-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		088572-009	SW846 6020
	Barium	0.0671	0.0005	0.002	2.00			088572-009	SW846 6020
	Beryllium	ND	0.0005	0.0025	0.004	U		088572-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088572-009	SW846 6020
	Calcium	94.9	0.100	1.00	NE			088572-009	SW846 6020
	Chromium	ND	0.0125	0.050	0.100	U		088572-009	SW846 6020
	Cobalt	ND	0.0005	0.005	NE	U		088572-009	SW846 6020
	Copper	ND	0.0015	0.005	NE	U		088572-009	SW846 6020
	Iron	0.162	0.050	0.500	NE	J		088572-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088572-009	SW846 6020
	Magnesium	27.5	0.025	0.075	NE			088572-009	SW846 6020
	Manganese	ND	0.005	0.025	NE	U		088572-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088572-009	SW846 6020
	Nickel	0.00259	0.0025	0.010	NE	J		088572-009	SW846 6020
	Potassium	9.08	0.400	1.50	NE			088572-009	SW846 6020
	Selenium	0.00136	0.001	0.005	0.050	J		088572-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088572-009	SW846 6020
	Sodium	77.7	0.400	1.25	NE			088572-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088572-009	SW846 6020
	Tin	ND	0.001	0.005	NE	U		088572-009	SW846 6020
	Vanadium	ND	0.015	0.050	NE	U	R	088572-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U	UJ	088572-R09	SW846 6020
	Zinc	0.0311	0.0026	0.010	NE			088572-009	SW846 6020

Refer to footnotes on page 3A-21.

Table 3A-3 *(Continued)*
Summary of Total Metal Results,
Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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-MW6L	Antimony	ND	0.0005	0.003	0.006	U		088575-009	SW846 6020
12-Apr-10	Arsenic	ND	0.0015	0.005	0.010	U		088575-009	SW846 6020
	Barium	0.0559	0.0005	0.002	2.00			088575-009	SW846 6020
	Beryllium	ND	0.0005	0.0025	0.004	U		088575-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088575-009	SW846 6020
	Chromium	ND	0.0125	0.050	0.100	U		088575-009	SW846 6020
	Cobalt	ND	0.0005	0.005	NE	U		088575-009	SW846 6020
	Copper	ND	0.0015	0.005	NE	U		088575-009	SW846 6020
	Iron	0.185	0.050	0.500	NE	J		088575-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088575-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088575-009	SW846 7470
	Nickel	0.00253	0.0025	0.010	NE	J		088575-009	SW846 6020
	Selenium	0.00137	0.001	0.005	0.050	J		088575-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088575-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088575-009	SW846 6020
	Tin	ND	0.001	0.005	NE	U		088575-009	SW846 6020
	Vanadium	ND	0.015	0.050	NE	U	R	088575-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		088575-R09	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		088575-009	SW846 6020

Refer to footnotes on page 3A-21.

Table 3A-3 *(Continued)*
Summary of Total Metal Results, Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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-MW6U	Antimony	ND	0.0025	0.015	0.006	U		088565-009	SW846 6020
07-Apr-10	Arsenic	ND	0.0015	0.005	0.010	U		088565-009	SW846 6020
	Barium	0.073	0.0025	0.010	2.00			088565-009	SW846 6020
	Beryllium	ND	0.0005	0.0025	0.004	U		088565-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088565-009	SW846 6020
	Chromium	ND	0.0125	0.050	0.100	U		088565-009	SW846 6020
	Cobalt	ND	0.0005	0.005	NE	U		088565-009	SW846 6020
	Copper	ND	0.0015	0.005	NE	U	UJ	088565-009	SW846 6020
	Iron	0.321	0.050	0.500	NE	J		088565-009	SW846 6020
	Lead	ND	0.0025	0.010	NE	U		088565-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088565-009	SW846 7470
	Nickel	0.00271	0.0025	0.010	NE	J		088565-009	SW846 6020
	Selenium	0.00152	0.001	0.005	0.050	J		088565-009	SW846 6020
	Silver	ND	0.001	0.005	NE	U		088565-009	SW846 6020
	Thallium	ND	0.0015	0.005	0.002	U		088565-009	SW846 6020
	Tin	ND	0.005	0.025	NE	U		088565-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		088565-009	SW846 6020
	Zinc	0.00623	0.0026	0.010	NE	J		088565-009	SW846 6020

Refer to footnotes on page 3A-21.

Table 3A-3 *(Continued)*
Summary of Total Metal Results,
Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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-MW6U (Duplicate) 07-Apr-10	Antimony	ND	0.0025	0.015	0.006	U		088566-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		088566-009	SW846 6020
	Barium	0.0697	0.0025	0.010	2.00			088566-009	SW846 6020
	Beryllium	ND	0.0005	0.0025	0.004	U		088566-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088566-009	SW846 6020
	Chromium	ND	0.0125	0.050	0.100	U		088566-009	SW846 6020
	Cobalt	ND	0.0005	0.005	NE	U		088566-009	SW846 6020
	Copper	ND	0.0015	0.005	NE	U	UJ	088566-009	SW846 6020
	Iron	0.301	0.050	0.500	NE	J		088566-009	SW846 6020
	Lead	ND	0.0025	0.010	NE	U		088566-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088566-009	SW846 7470
	Nickel	0.00255	0.0025	0.010	NE	J		088566-009	SW846 6020
	Selenium	0.00129	0.001	0.005	0.050	J		088566-009	SW846 6020
	Silver	ND	0.001	0.005	NE	U		088566-009	SW846 6020
	Thallium	ND	0.0015	0.005	0.002	U		088566-009	SW846 6020
	Tin	ND	0.005	0.025	NE	U		088566-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		088566-009	SW846 6020
	Zinc	0.00677	0.0026	0.010	NE	J		088566-009	SW846 6020

Refer to footnotes on page 3A-21.

Table 3A-3 *(Continued)*
Summary of Total Metal Results,
Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	Antimony	ND	0.0005	0.003	0.006	U		089878-009	SW846 6020
29-Nov-10	Arsenic	ND	0.0015	0.005	0.010	U		089878-009	SW846 6020
	Barium	0.063	0.0005	0.002	2.00			089878-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089878-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089878-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089878-009	SW846 6020
	Cobalt	0.00027	0.0001	0.001	NE	J	J+	089878-009	SW846 6020
	Copper	0.00091	0.0003	0.001	NE	J	J+	089878-009	SW846 6020
	Iron	0.470	0.010	0.100	NE	B		089878-009	SW846 6020
	Lead	0.00052	0.0005	0.002	NE	J		089878-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089878-009	SW846 7470
	Nickel	0.003	0.0005	0.002	NE		J+	089878-009	SW846 6020
	Selenium	0.00127	0.001	0.005	0.050	J	J-	089878-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089878-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089878-009	SW846 6020
	Tin	ND	0.001	0.005	NE	U		089878-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089878-009	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		089878-009	SW846 6020

Refer to footnotes on page 3A-21.

Table 3A-3 *(Continued)*
Summary of Total Metal Results,
Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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-MW9	Antimony	ND	0.0005	0.003	0.006	U		089882-009	SW846 6020
01-Dec-10	Arsenic	ND	0.0015	0.005	0.010	U		089882-009	SW846 6020
	Barium	0.148	0.0025	0.010	2.00			089882-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089882-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089882-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089882-009	SW846 6020
	Cobalt	0.00118	0.0001	0.001	NE		J+	089882-009	SW846 6020
	Copper	0.000893	0.0003	0.001	NE	J	0.0034U	089882-009	SW846 6020
	Iron	1.06	0.010	0.100	NE	B		089882-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089882-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089882-009	SW846 7470
	Nickel	0.00329	0.0005	0.002	NE		J+	089882-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U	UJ	089882-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089882-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089882-009	SW846 6020
	Tin	ND	0.001	0.005	NE	U		089882-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089882-009	SW846 6020
	Zinc	0.023	0.0026	0.010	NE		J+	089882-009	SW846 6020

Refer to footnotes on page 3A-21.

Table 3A-3 *(Continued)*
Summary of Total Metal Results,
Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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-MW9 (Duplicate) 01-Dec-10	Antimony	ND	0.0005	0.003	0.006	U		089883-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089883-009	SW846 6020
	Barium	0.141	0.0025	0.010	2.00			089883-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089883-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089883-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089883-009	SW846 6020
	Cobalt	0.00119	0.0001	0.001	NE		J+	089883-009	SW846 6020
	Copper	0.000968	0.0003	0.001	NE	J	0.0034U	089883-009	SW846 6020
	Iron	1.11	0.010	0.100	NE	B		089883-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089883-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089883-009	SW846 7470
	Nickel	0.00348	0.0005	0.002	NE		J+	089883-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U	UJ	089883-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089883-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089883-009	SW846 6020
	Tin	ND	0.001	0.005	NE	U		089883-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089883-009	SW846 6020
	Zinc	0.0228	0.0026	0.010	NE		J+	089883-009	SW846 6020

Refer to footnotes on page 3A-21.

Table 3A-3 *(Continued)*
Summary of Total Metal Results,
Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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-MW10	Antimony	ND	0.0005	0.003	0.006	U		089885-009	SW846 6020
06-Dec-10	Arsenic	ND	0.0015	0.005	0.010	U		089885-009	SW846 6020
	Barium	0.311	0.0025	0.010	2.00	B		089885-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089885-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089885-009	SW846 6020
	Chromium	0.00325	0.0025	0.010	0.100	B, J	0.014U	089885-009	SW846 6020
	Cobalt	0.00185	0.0001	0.001	NE		J+	089885-009	SW846 6020
	Copper	0.00201	0.0003	0.001	NE		J+	089885-009	SW846 6020
	Iron	1.07	0.010	0.100	NE	B		089885-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089885-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	089885-009	SW846 7470
	Nickel	0.00707	0.0005	0.002	NE	B	J+	089885-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		089885-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089885-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089885-009	SW846 6020
	Tin	ND	0.001	0.005	NE	U		089885-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089885-009	SW846 6020
	Zinc	0.0682	0.0026	0.010	NE		J+	089885-009	SW846 6020

Refer to footnotes on page 3A-21.

Table 3A-3 *(Concluded)*
Summary of Total Metal Results,
Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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-MW11	Antimony	0.000659	0.0005	0.003	0.006	B, J	0.0075U	089888-009	SW846 6020
14-Dec-10	Arsenic	ND	0.0015	0.005	0.010	U		089888-009	SW846 6020
	Barium	0.0818	0.0005	0.002	2.00			089888-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089888-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089888-009	SW846 6020
	Chromium	0.00253	0.0025	0.010	0.100	J	J+	089888-009	SW846 6020
	Cobalt	0.000489	0.0001	0.001	NE	J	J+	089888-009	SW846 6020
	Copper	0.00129	0.0003	0.001	NE			089888-009	SW846 6020
	Iron	0.531	0.010	0.100	NE	B		089888-009	SW846 6020
	Lead	0.000578	0.0005	0.002	NE	J		089888-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089888-009	SW846 7470
	Nickel	0.00449	0.0005	0.002	NE		J+	089888-009	SW846 6020
	Selenium	0.00257	0.001	0.005	0.050	J		089888-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089888-009	SW846 6020
	Thallium	0.000424	0.0003	0.001	0.002	J	0.0019U	089888-009	SW846 6020
	Tin	ND	0.001	0.005	NE	U		089888-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089888-009	SW846 6020
	Zinc	0.0222	0.0026	0.010	NE		J+	089888-009	SW846 6020

Refer to footnotes on page 3A-21.

Table 3A-4
Summary of Field Water Quality Measurements[h],
Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Sample Date	Temperature (^{0}C)	Specific Conductivity (μmho/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
CWL-MW2BL	14-Apr-10	22.10	1107	204.5	6.70	0.12	80.1	7.09
CWL-MW4	05-Apr-10	18.14	960	59.9	6.86	4.45	63.9	6.03
CWL-MW5L	13-Apr-10	18.22	1083	177.8	6.74	0.20	83.8	7.99
CWL-MW5U	09-Apr-10	17.48	919	179.0	6.93	0.23	63.7	6.08
CWL-MW6L	12-Apr-10	20.59	1042	173.4	6.79	2.77	78.8	7.21
CWL-MW6U	07-Apr-10	16.33	914	189.6	6.93	0.43	59.7	5.82
CWL-BW5	29-Nov-10	18.79	1050	202.0	6.97	1.59	70.9	6.60
CWL-MW9	01-Dec-10	19.62	924	-6.7	7.11	0.94	22.4	2.05
CWL-MW10	06-Dec-10	18.25	880	375.2	7.24	8.45	20.3	1.90
CWL-MW11	14-Dec-10	19.05	982	395.2	7.05	4.09	57.2	5.29

Refer to footnotes on page 3A-21.

Footnotes for Chemical Waste Landfill Groundwater Monitoring Tables

[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

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

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

- Maximum contaminant level. Established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11[b]), National Primary Drinking Water Standards, EPA, May 2009.
- NE = not established.

[e]Laboratory Qualifier

B = Analyte is detected in associated laboratory method blank.
J = Amount detected is below the practical quantitation limit (PQL).
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.
J+ = The associated numerical value is an estimated quantity with 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.
R = The data are unusable. Re-sampling and re-analysis are necessary for verification.

[g]Analytical Method

- EPA, 1979, "Methods for Chemical Analysis of Water and Wastes," EPA-600/4-79-020, U.S. Environmental Protection Agency, Cincinnati, Ohio.
- EPA, 1986, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed., Rev. 1, U.S. Environmental Protection Agency, Washington, D.C.
- U.S. Environmental Protection Agency, Washington, D.C.

[h]Field Water Quality Measurements

- Field measurements collected prior to sampling.

°C = degrees Celsius.
% Sat = present saturation.
µmho/cm = micromhos per centimeter.
mg/L = milligrams per liter.
mV = millivolts.
NTU = nephelometric turbidity units.
pH = potential of hydrogen (negative logarithm of the hydrogen ion concentration).

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Attachment 3B
Chemical Waste Landfill
Hydrographs

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Attachment 3B Hydrographs

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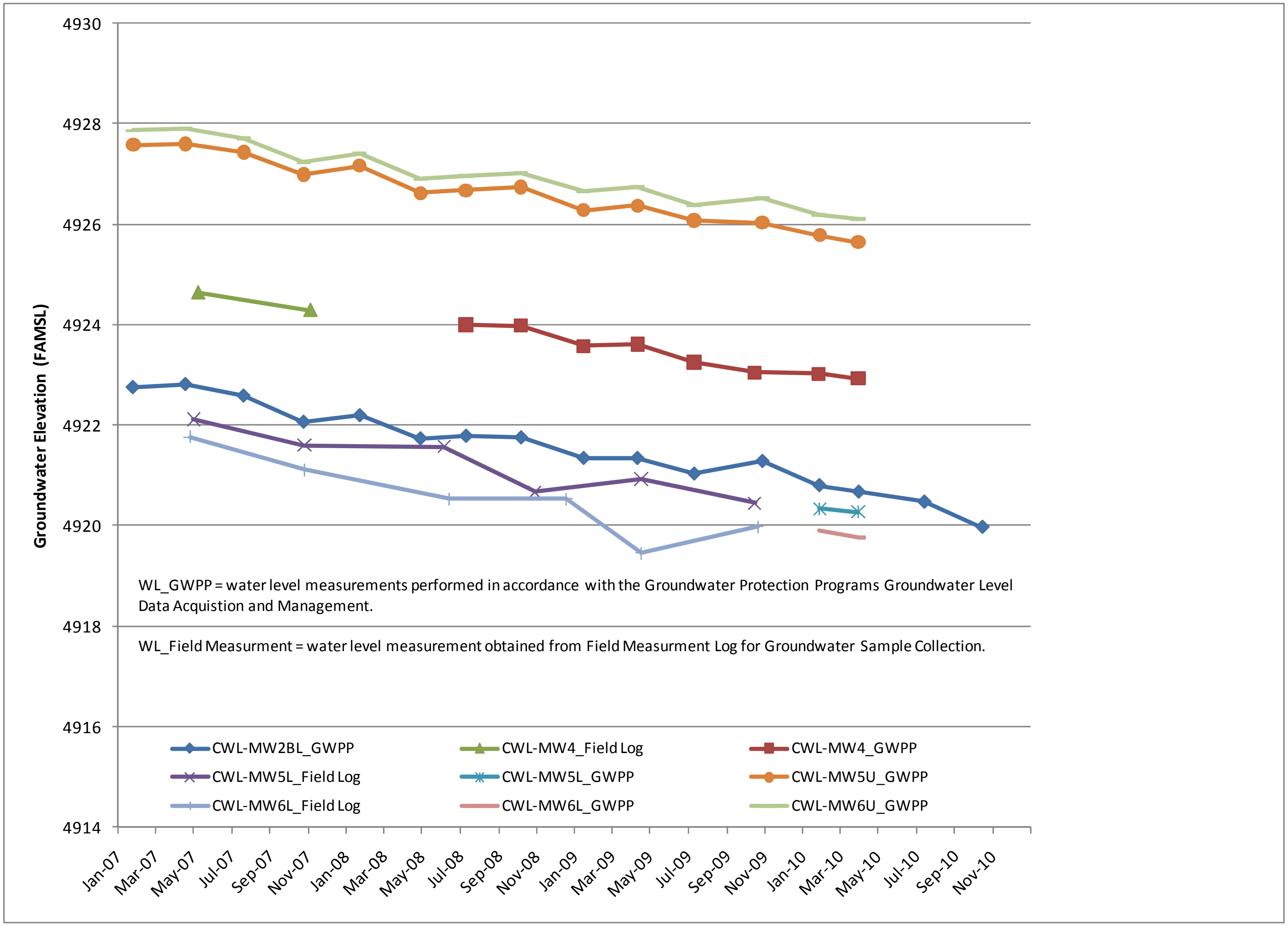

Figure 3B-1. CWL Water Table Hydrographs for the April 2010 Monitoring Wells

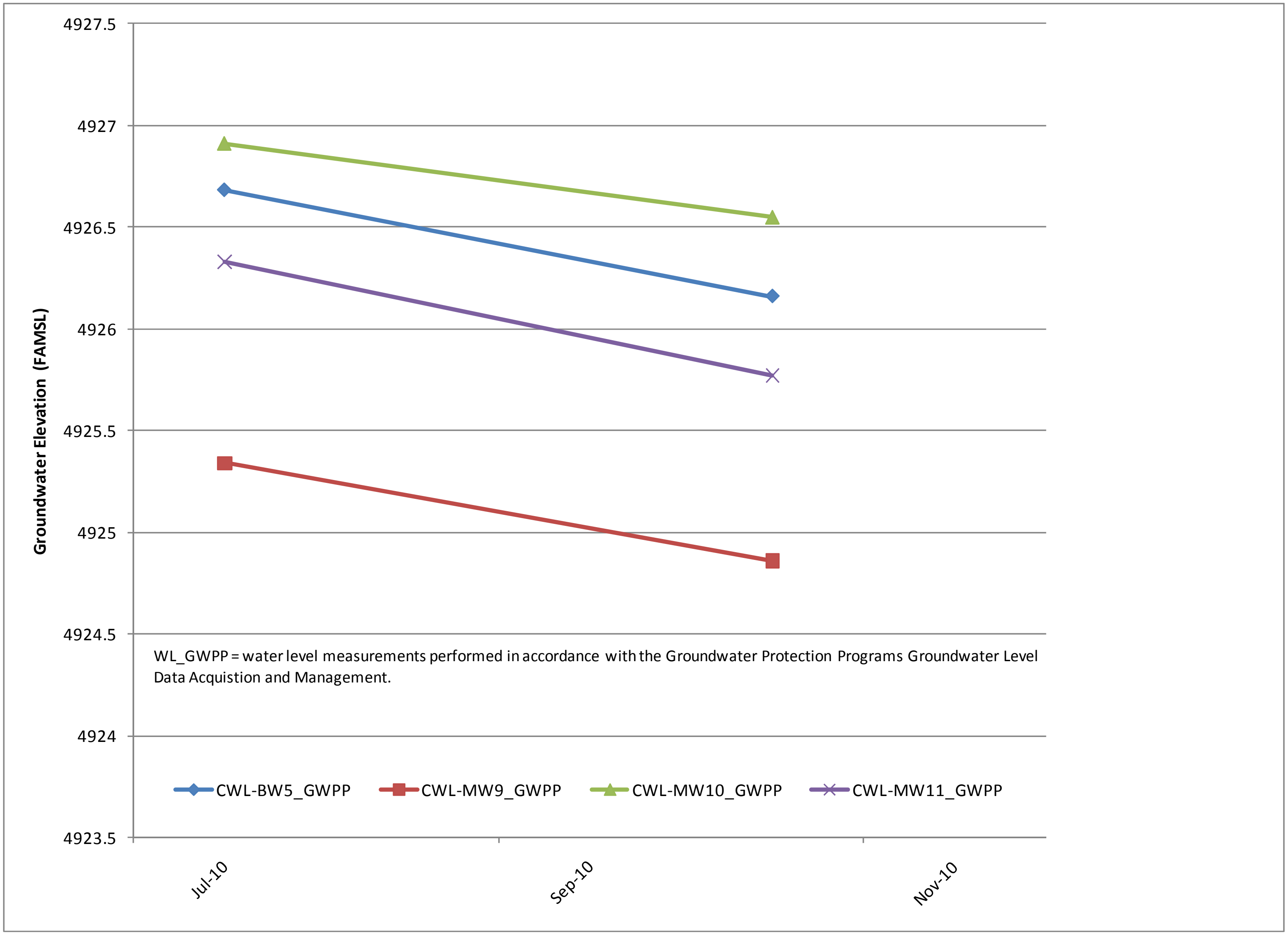

Figure 3B-2. CWL Water Table Hydrographs for the November-December 2010 Monitoring Wells

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 (at the time of disposal) of activity 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 to determine whether a release of RCRA contaminants had occurred at the MWL (SNL September 1990). The Phase 1 RFI indicated that tritium had been released to the environment. A Phase 2 RFI was conducted from 1992 to 1995 to determine the contaminant source, define the nature and extent of contamination, identify potential contaminant transport pathways, evaluate potential risks, and provide remedial action alternatives for the MWL (Peace et al. 2002).

The Phase 2 RFI confirmed tritium as the constituent of concern (COC) in soil at the MWL. Tritium occurs in surface and near-surface soil in and around the classified area. Tritium levels range from 1,100 picocuries per gram (pCi/g) in surface soil to 206 pCi/g in subsurface soil. The highest tritium levels have been found within 30 feet (ft) below ground surface (bgs) in soil adjacent to and directly below classified area disposal pits. At depths greater than 30 ft bgs, tritium levels decrease rapidly. At approximately 100 ft bgs, the highest tritium level detected has been 0.074 pCi/g, and at 120 to 140 ft bgs, maximum tritium levels have been 0.029 pCi/g.

On October 11, 2001, the New Mexico Environment Department (NMED) directed the U.S. Department of Energy (DOE) and Sandia Corporation (Sandia) to conduct a Corrective Measures Study (CMS) for the MWL (SNL December 2001a). The MWL CMS Report (SNL/NM May 2003) was submitted to the NMED on May 21, 2003, for technical review and comment and recommended that an alternative vegetative soil cover (i.e., evapotranspirative [ET] cover) be deployed as the preferred corrective measure for the MWL. The NMED held a public comment period on the MWL CMS from August 11 to December 9, 2004, and a public hearing was held from December 2 to December 3 and December 8 to December 9, 2004. On May 26, 2005, the Secretary of the NMED selected a vegetative ET cover with a biointrusion barrier as the final remedy for the MWL. The selection was documented in the NMED *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* (NMED May 2005), which also required a Corrective Measures Implementation Plan (CMIP). The MWL CMIP (SNL/NM November 2005) was submitted to the NMED in November 2005. The NMED conditionally approved the CMIP in December 2008 after resolution of two Notices of Disapproval (NODs) (Bearzi December 2008). The MWL ET cover construction was completed from May through September 2009.

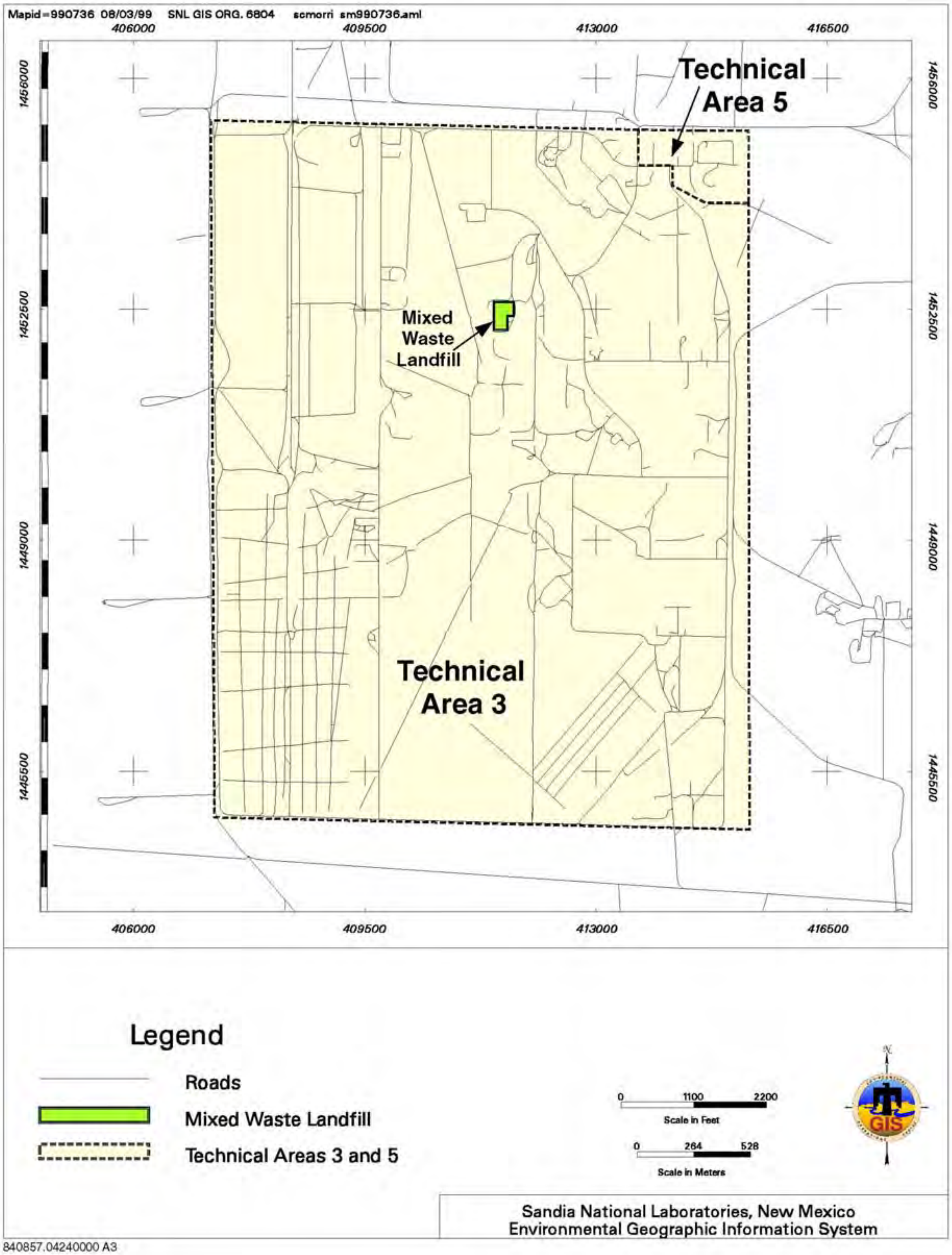

Figure 4-1. Location of the Mixed Waste Landfill within Technical Area III

4.1.1 Monitoring History

The original groundwater monitoring well network at the MWL (MWL-BW1, MWL-MW1, MWL-MW2, and MWL-MW3) was installed in 1989. In 1993 MWL-MW4 was completed at an angle of 6 degrees from vertical and was screened at two discrete intervals 20 ft apart to evaluate vertical potentiometric gradients and changes in aquifer parameters with depth. An inflatable packer separates the screened intervals, and pressure is maintained in the packer to prevent combining water from the two screened sections of the aquifer. Monitoring wells MWL-MW5 and MWL-MW6 were installed in 2000 at a distance of approximately 200 and 500 ft west of the landfill, respectively, with their screened intervals placed below the top of the regional water table in the coarse-grained Ancestral Rio Grande (ARG) deposits.

The MWL groundwater monitoring network was modified in 2008 (SNL May 2009a). Due to the declining water table and stainless screen corrosion, four monitoring wells were plugged and abandoned (MWL-BW1, MWL-MW1, MWL-MW2, and MWL-MW3) and four new monitoring wells were installed (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) (SNL April 2008 and September 2008). The four wells installed in 2008 comprise the MWL groundwater monitoring network for the uppermost part of the regional aquifer and were approved by the NMED (Bearzi October 2008 and January 2009).

Wells MWL-MW7, MWL-MW8, MWL-MW9, and MWL-BW2 were considered new wells and, as required by the Compliance Order on Consent (the Order) (NMED 2004), were sampled a minimum of eight consecutive quarters for a defined suite of parameters in addition to sampling for perchlorate for at least four consecutive quarters. The four consecutive quarters of perchlorate sampling were completed in Calendar Year (CY) 2009 with no detections at or above the screening level of 4 micrograms per liter (µg/L); therefore, these wells have been removed from the perchlorate monitoring network. The required eight quarterly sampling events were completed in CY 2010. Wells MWL-MW4, MWL-MW5, and MWL-MW6 are preexisting wells and are sampled on an annual basis. All MWL wells are now being sampled annually as required by the Order.

Figure 4-2 shows the current groundwater monitoring network consisting of seven wells completed within the interfingering, fine-grained, alluvial fan deposits (MWL-BW2, MWL-MW4 uppermost screened interval, MWL-MW7, MWL-MW8, and MWL-MW9) and coarse-grained ARG alluvial deposits (MWL-MW4 lower screened interval, MWL-MW5, and MWL-MW6). All seven MWL wells are constructed of 5-inch, Schedule 80 polyvinyl chloride (PVC) casing and have screens composed of slotted Schedule 80 PVC.

During construction of the ET cover on May 27, 2009, the packer at MWL-MW4 was removed to allow the well casing to be extended. The packer was serviced and reinstalled on March 4, 2010. References in this report to groundwater samples and water levels from 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.

In April 2010 the DOE and Sandia received a letter from the NMED entitled *Toluene Detections in Groundwater*, which required further investigation to determine the source of very low toluene concentrations in some groundwater samples collected from the MWL in 2008 through early 2010, including conducting a purging/sampling study of the groundwater along with any other studies necessary to determine the source (Bearzi April 2010). DOE/Sandia submitted the *MWL Toluene Investigation Report* in August 2010 and received an NOD with two comments from the NMED in September 2010 (Bearzi September 2010). The DOE/Sandia NOD response (Wagner October 2010) that included a revised version of the report (SNL/NM October 2010) was submitted to the NMED in October 2010 and was approved in January 2011 (Bearzi January 2011).

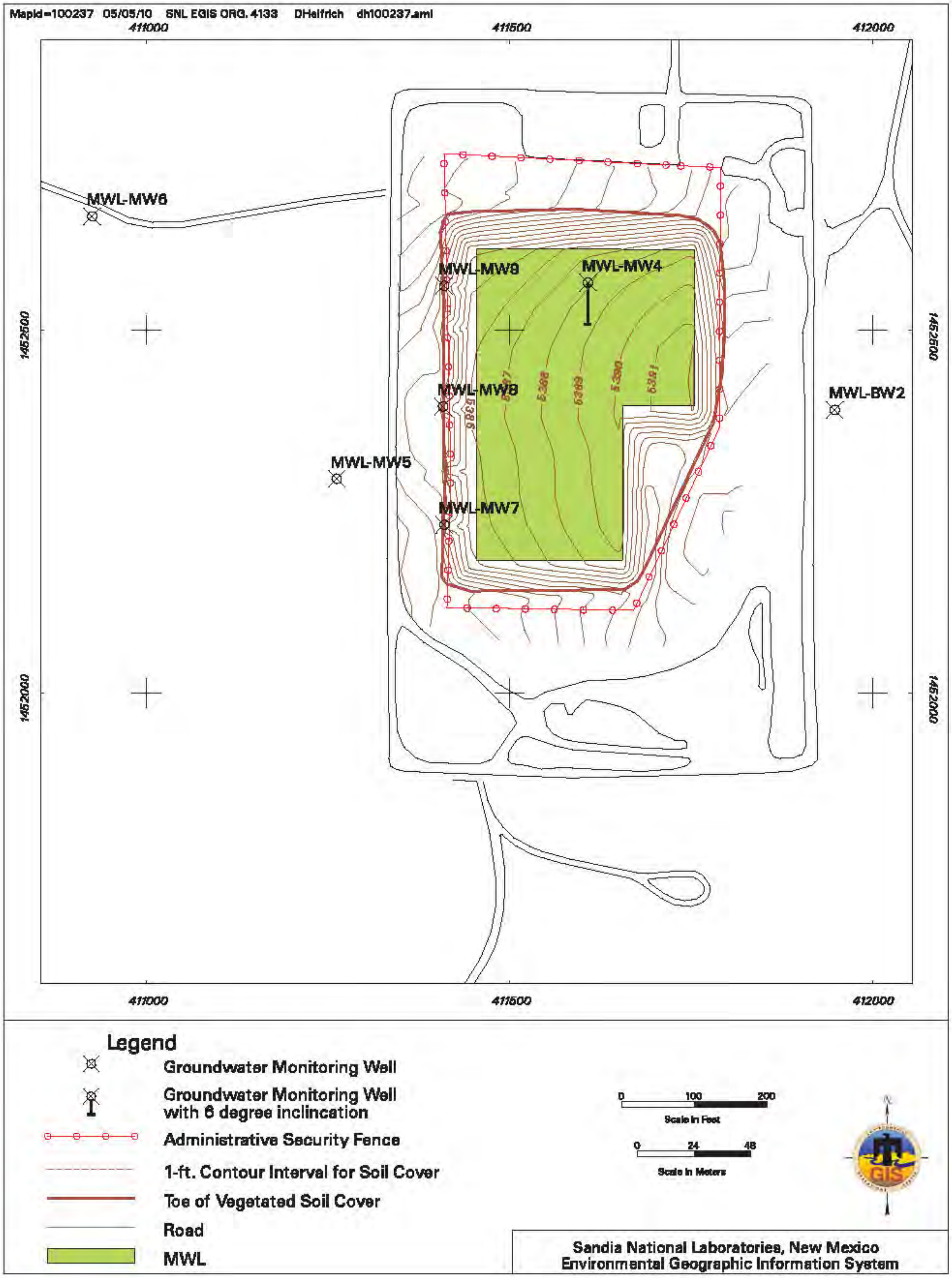

Figure 4-2. Location of Groundwater Monitoring Wells at the Mixed Waste Landfill

Groundwater at the MWL has been extensively characterized since 1990 for major ion chemistry, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), nitrate, metals, radionuclides, and perchlorate. Twenty years of data indicate that groundwater has not been contaminated by releases from the MWL (Goering et al. 2002; SNL December 2001b, January 2002, July 2002, October 2002, June 2003, September 2003, July 2004; Lyon and Goering January 2006; SNL November 2006, January 2008, May 2009a, June 2010, and October 2010).

4.1.2 Monitoring Network

The current groundwater monitoring network at the MWL consists of seven wells, as shown in Figure 4-2 and listed in Table 4-1. The upper interval of monitoring well MWL-MW4 was sampled in 2010, as this interval represents the uppermost portion of the regional aquifer beneath the MWL. Table 4-1 shows the quarterly and annual monitoring events conducted during CY 2010 for each of the MWL wells.

Table 4-1. Calendar Year 2010 Groundwater Sampling Events, Mixed Waste Landfill

Well ID	Installation Year	WQ	WL	January 2010	April 2010	July 2010
MWL-BW2	2008	✓	✓	8th quarter sampling	9th quarter sampling	10th quarter sampling
MWL-MW4	1993	✓	✓	–	Annual sampling	–
MWL-MW5	2000	✓	✓	–	Annual sampling	–
MWL-MW6	2000	✓	✓	–	Annual sampling	–
MWL-MW7	2008	✓	✓	7th quarter sampling	8th quarter sampling	9th quarter sampling
MWL-MW8	2008	✓	✓	7th quarter sampling	8th quarter sampling	9th quarter sampling
MWL-MW9	2008	✓	✓	7th quarter sampling	8th quarter sampling	9th quarter sampling

NOTES: [(1)] Refer to page xviii of this report for well descriptions. Check marks in the WQ and WL columns indicate WQ sampling and WL measurements during the period from January to December 2010.

MWL = Mixed Waste Landfill.
ID = Identification.
WL = Water level.
WQ = Water quality.

4.1.3 Summary of Activities

Quarterly and annual groundwater sampling were conducted during CY 2010 at the MWL in January, April, and July as summarized in Table 4-1. Groundwater samples were collected from seven monitoring wells and analyzed for VOCs, Target Analyte List (TAL) metals plus uranium, anions (as bromide, chloride, fluoride, and sulfate), total alkalinity, nitrate plus nitrite (NPN), gamma spectroscopy, gross alpha, gross beta, and tritium. Additional samples were collected and analyzed for SVOCs (January and April), low-level tritium (April), and isotopic uranium and radon-222 (July). Attachment 4A provides summary tables for the CY 2010 analytical results. The July sampling event was the last quarterly event for the wells installed in 2008 (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9). This report and the Environmental Restoration MWL Annual Groundwater Monitoring Report for CY 2010 (SNL July 2011, in preparation) provide a complete summary of the CY 2010 sampling events.

4.1.4 Summary of Future Activities

The MWL Corrective Measures Implementation (CMI) Report (SNL January 2010a) documents the construction of the MWL ET cover and was submitted to the NMED on January 26, 2010. The topography of the ET cover and side slopes is shown in Figure 4-2. After NMED approval of the CMI Report, DOE and Sandia will revise the 2007 MWL Long-Term Monitoring and Maintenance Plan and submit the revised plan to the NMED for review and approval. The plan will define the long-term monitoring, maintenance, inspection, and repair requirements for the MWL.

4.1.5 Conceptual Site Model

Tritium and VOCs are identified as the COCs at the MWL based upon the Phase 2 RFI, CMIP, and more than 20 years of groundwater monitoring. A detailed conceptual site model is provided in the

MWL Phase 2 RFI Report (Peace et al. 2002) and the *MWL Groundwater Report, 1990 through 2001* (Goering et. al. 2002).

SNL/NM is located within Kirtland Air Force Base (KAFB) in the eastern portion of the Albuquerque Basin. Groundwater at the MWL is present at approximately 500 ft bgs in unconsolidated Santa Fe Group deposits (i.e., fine-grained alluvial deposits). Groundwater recharge occurs by infiltration of precipitation from the mountains to the east. Recharge from infiltration of precipitation at the MWL is negligible due to high evapotranspiration, low precipitation, and dry Santa Fe Group deposits. At KAFB, regional groundwater flows generally westward toward the Rio Grande, but local perturbations in the water table occur due to pumping wells and geologic (i.e., lithologic and structural) controls. Pumping by the City of Albuquerque and KAFB have profoundly modified the natural groundwater flow regime (Reeder et al. 1967 and Kues 1987) creating a trough in the water table in the western and northeastern portions of KAFB. MWL groundwater monitoring records indicate that groundwater is declining an average of approximately 0.8 ft/year (Goering et. al. 2002). Hydrographs for the MWL groundwater monitoring wells are provided in Attachment 4B.

A generalized conceptual model integrating new information from the installation and monitoring of the four wells installed in 2008 is presented in the MWL Annual Groundwater Monitoring Report for CY 2009 (SNL June 2010). In summary, the geology of the upper portion of the regional groundwater system, which is in general a stratified system, varies with depth from a low hydraulic conductivity layer (in which MWL-MW2 and MWL-MW3 are screened) to a medium conductivity layer (in which the lower parts of the screens of MWL-MW7, MWL-MW8, and MWL-MW9 reside) to a high conductivity layer corresponding to the ARG sediments (in which at least part of the screen intervals of MWL-MW4 [lower screen], MWL-MW5, and MWL-MW6 are located). The uppermost surface of the regional aquifer continues to decline as a result of historic and ongoing large-scale removal of water by the City of Albuquerque and KAFB. The overall effect at the MWL is that groundwater flow is predominantly vertically downward in the lower and medium conductivity layers in response to this regional drawdown from pumping (i.e., a draining system). Figure 4-3 shows the October 2010 potentiometric surface of the regional aquifer beneath the MWL and the groundwater flow direction to the west-northwest. The trough in the regional aquifer described above is located to the west of the MWL.

4.2 Regulatory Criteria

Historically, the NMED Hazardous Waste Bureau (HWB) has provided regulatory oversight of the MWL as Solid Waste Management Unit (SWMU) 76 under the Hazardous and Solid Waste Amendments module of the facility RCRA permit. The NMED confirmed that the MWL is properly designated as a SWMU (Dinwiddie June 1998) and, as such, must comply with the corrective action program defined in Title 20, New Mexico Administrative Code, Section 4.1.50, incorporating Title 40, Code of Federal Regulations (CFR), Section 264.101. The requirements for corrective action at the MWL, including those for groundwater monitoring, are established through the corrective measures process.

The NMED issued the Order in April 2004, which transferred the regulatory authority for groundwater sampling at the MWL to the Order (NMED 2004). This report has been formatted to address the content criteria set forth in the Order for Periodic Monitoring Reports.

Although radionuclides are being monitored and screened at the MWL, the information related to radionuclides is provided voluntarily by the DOE and Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements imposed by the NMED, as specified in Section III.A of the Order (NMED 2004).

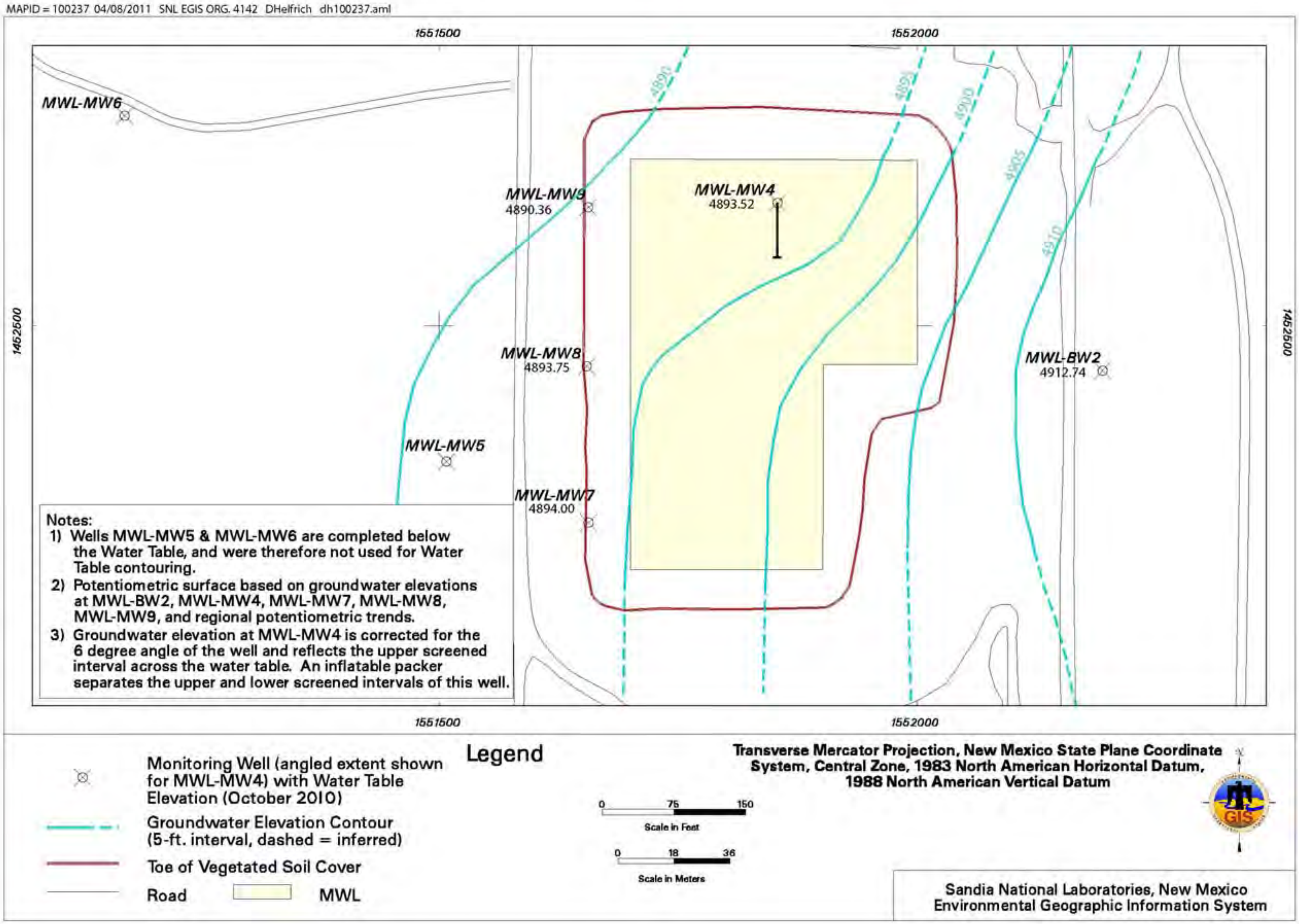

Figure 4-3. Localized Potentiometric Surface of the Basin Fill Aquifer at the Mixed Waste Landfill

4.3 Scope of Activities

Quarterly and annual groundwater sampling are summarized in Section 4.1.3 for CY 2010. As part of the toluene investigation discussed in Section 4.1.1, additional VOC samples were collected during the purging process at each well in April. The April VOC purging/sampling study results are presented in the *MWL Toluene Investigation Report* (SNL October 2010).

The NMED DOE Oversight Bureau (OB) participated in all sampling events and received split samples that were submitted to a different laboratory for analysis. During April, the NMED DOE OB requested additional samples for low-level tritium analysis at each location except MWL-BW2. To ensure a consistent level of quality assurance for these analyses, SNL/NM personnel also collected samples for low-level tritium at these MWL monitoring wells. The NMED DOE OB split sampling results are presented in a separate report and not included in this report. Table 4-2 lists the analytical parameters and MWL wells sampled.

The MWL groundwater samples were submitted for analysis to GEL Laboratories, Inc. (GEL) in Charleston, South Carolina, except for the low-level tritium samples that were sent to GEL in Richland, Washington. All groundwater sampling results are compared with U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) for drinking water supplies (EPA 2001 and 2009). The analytical results are summarized in Attachment 4A, Tables 4A-1 through 4A-7.

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. Field QC samples included environmental duplicate, 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 for groundwater temperature, specific conductance (SC), and pH were measured using a YSI™ Model 620 Water Quality Meter during the purging process. Turbidity was measured with a Hach™ Model 2100P portable turbidity meter.

4.4 Field Methods and Measurements

Groundwater elevation and water quality field measurements were obtained during groundwater sampling activities. Field water quality parameters are presented in Table 4A-8 (Attachment 4A). Depth-to-groundwater measurements were obtained using a Solinst™ depth-to-water well sounder prior to purging activities. Depth-to-groundwater measurements were performed in accordance with the Field Operating Procedure (FOP), *Long-Term Environmental Stewardship Groundwater Monitoring Well Sampling and Field Analytical Measurements,* FOP 05-01 (SNL August 2007). Groundwater elevation measurements at the MWL monitoring wells from CY 2007 through CY 2010 are presented in Attachment 4B, Figure 4B-1. The October 2010 potentiometric surface for the regional aquifer beneath the MWL is shown in Figure 4-3.

Table 4-2. Analytical Parameters at MWL Monitoring Wells for Each Sampling Period

<table>
<tr><th>Analytical Parameter</th><th>January</th><th>April</th><th>July</th></tr>
<tr><td>Total Metals
TAL and Uranium</td><td rowspan="7">MWL–BW2,
MWL–MW7,
MWL–MW7 (dup),
MWL–MW8, and
MWL–MW9</td><td rowspan="2">MWL–BW2, MWL–BW2 (dup), MWL–MW4, MWL–MW5, MWL–MW5 (dup), MWL–MW6, MWL–MW7, MWL–MW8, and MWL–MW9</td><td rowspan="2">MWL–BW2, MWL–MW7, MWL–MW7 (dup), MWL–MW8, and MWL–MW9</td></tr>
<tr><td>Volatile Organic Compounds</td></tr>
<tr><td>Semivolatile Organic Compounds</td><td>MWL–MW7, MWL–MW8, and MWL–MW9</td><td>NA</td></tr>
<tr><td>Nitrate plus Nitrite (as nitrogen)</td><td rowspan="4">MWL–BW2, MWL–BW2 (dup), MWL–MW4, MWL–MW5, MWL–MW5 (dup), MWL–MW6, MWL–MW7, MWL–MW8, and MWL–MW9</td><td rowspan="6">MWL–BW2, MWL–MW7, MWL–MW7 (dup), MWL–MW8, and MWL–MW9</td></tr>
<tr><td>Major Anions
Bromide, Fluoride, Chloride, and Sulfate</td></tr>
<tr><td>Total Alkalinity as Calcium Carbonate</td></tr>
<tr><td>Radionuclides
Gamma-Emitting Radionuclides
Gross Alpha Activity
Gross Beta Activity
Tritium</td></tr>
<tr><td>Isotopic Uranium</td><td>NA</td><td>NA</td></tr>
<tr><td>Radon-222</td><td>NA</td><td>NA</td></tr>
<tr><td>Low-Level Tritium</td><td>NA</td><td>All wells except MWL–BW2</td><td>NA</td></tr>
</table>

NOTES:
dup = Duplicate.
MWL = Mixed Waste Landfill.
NA = Not analyzed.
TAL = Target Analyte List.

A Bennett™ sampling system was used to collect the groundwater samples from all MWL monitoring wells. The pump intake was set near or at the bottom of the screened interval. The minimum flow rate, given limitations of equipment and well characteristics, was used for all purging and sampling activities. Minimum purge requirements for wells that do not produce one saturated casing volume of water before going dry are different; these monitoring wells were purged to dryness, allowed to recover, and then sampled to collect the most representative groundwater sample possible given the low yield of the wells. During CY 2010, monitoring wells MWL-MW4, MWL-MW8 and MWL-MW9 were purged to dryness prior to removing one saturated casing volume and obtaining one set of four stable water quality measurements. The wells were allowed to recover and then sampled in accordance with the Mini-Sampling and Analysis Plans (SAPs) (SNL January 2010b, April 2010, and July 2010).

In accordance with procedures described in SNL/NM FOP 05-01 (SNL August 2007), all other wells were purged a minimum of one saturated casing volume (the volume of one length of the saturated screen plus the borehole annulus around the saturated screen interval). Purging continued until four stable water quality measurements for turbidity, pH, temperature, and SC were obtained from the well prior to the collection of groundwater samples. Groundwater stability is considered acceptable when measurements are equal to or within 10 percent of 5 nephelometric turbidity units, pH is within 0.1 units, temperature is within 1.0 degree Celsius, and SC is within 5 percent.

Groundwater samples collected after the purging process were submitted to off-site laboratories (GEL) following analysis request/chain of custody protocol.

4.5 Analytical Methods

The analytical laboratory analyzed samples using EPA-approved analytical methods (EPA 1979 and 1986) and specified performance criteria in accordance with the *SNL/NM Statement of Work for Analytical Laboratories* (SNL May 2009b). Prior to each sampling event, the analytical laboratory provided appropriate sample containers prepared with the required sample preservative. Table 4-3 summarizes analytical parameters, EPA Methods (EPA 1986), container types, and holding times applicable to groundwater sampling at the MWL during CY 2010.

Table 4-3. MWL Analyses, Methods, Sample Containers, Preservatives, and Holding Times

Analysis	Method[a]	Container Type/ Volume/Preservative	Holding Time
Total Metals (TAL and Uranium)	SW846-6020/7470A	Polyethylene; 500 mL; HNO_3; 4°C	28 days/180 days[b]
Volatile Organic Compounds	SW846-8260B	Glass; 3 x 40 mL; HCl; 4°C	14 days
Semivolatile Organic Compounds	SW846-8270	Amber Glass, 3 x 1 L; None; 4°C	7 days
Nitrate plus Nitrite (as nitrogen)	EPA 353.2	Polyethylene; 250 mL; H_2SO_4; 4°C	28 days
Major Anions Total Alkalinity	EPA 353.2 SM2320B	Polyethylene; 500 mL; None; 4°C	28 days Anions 14 days Alkalinity
Gamma-Emitting Radionuclides	EPA 901.1	Polyethylene; 1 L; HNO_3	180 days
Gross Alpha/Beta	EPA 900.0	Polyethylene; 1 L; HNO_3	180 days
Tritium	EPA 906.0	Amber Glass; 250 mL; None	180 days
Isotopic Uranium	HASL-300	Polyethylene; 1 L; None	180 days
Radon-222	SM 7500-RnB	Glass; 2 x 40 mL; None	4 days
Low-Level Tritium	Liquid Scintillation Method	Glass; 2 x 1 L; None	365 days

NOTES:

[a]U.S. Environmental Protection Agency, 1979, *Methods for Chemical Analysis of Water and Wastes*, EPA-600/4-79-020, U.S. Environmental Protection Agency, Cincinnati, Ohio.

U.S. Environmental Protection Agency, 1980, *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*, EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio

U.S. Environmental Protection Agency, November 1986, *Test Methods for Evaluating Solid, Physical/Chemical Methods,* 3rd ed., (and updates), SW-846, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.; or Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B.

U.S. Department of Energy, Environmental Measurements Laboratory, 1990, *EML Procedures Manual*, 27th ed., Vol. 1, Rev. 1992, HASL-300.

Beckman, 1998, *Standard Methods for the Examination of Water and Wastewater*, *7500-Rn B Method*, 20th ed., Beckman LS5000TD Liquid Scintillation System Operation Manual, May 1988.

[b]Holding time for mercury is 28 days; all other metals are 180 days.

°C = Degree(s) Celsius.
EPA = U.S. Environmental Protection Agency.
H_2SO_4 = Sulfuric acid.
HCl = Hydrochloric acid.
HNO_3 = Nitric acid.
L = Liter(s).
mL = Milliliter(s).
MWL = Mixed Waste Landfill.
SM = Standard Method.
TAL = Target Analyte List.

4.6 Summary of Analytical Results

The results for chemical, general chemistry, and radiological constituent analyses are presented in Attachment 4A, Tables 4A-1 through 4A-7. Field water quality measurements are presented in Attachment 4A, Table 4A-8. All results are compared with established EPA MCLs where applicable; no constituents were detected above established MCLs during CY 2010. Data qualifiers from 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.

4.6.1 Volatile and Semivolatile Organic Compounds

Detected VOCs and SVOCs are presented in Attachment 4A, Table 4A-1. No VOCs or SVOCs were detected in any sample except for the VOCs toluene, chloromethane, and acetone. Toluene was detected in five January samples (one of which was a duplicate sample) including the sample from the background well MWL-BW2. Toluene concentrations ranged from 0.285 to 1.45 μg/L. All detections were very low concentrations and, of the five sample results, three were below the practical quantitation limit (PQL) of 1.00 μg/L. No toluene detections were reported for the April and July samples, including the April purging/sampling study samples (34 samples and 14 field QC samples; SNL October 2010). Chloromethane was detected in two samples below the PQL of 1.00 μg/L, and acetone was detected below the PQL of 10.0 μg/L. Neither constituent has an established MCL.

During the April groundwater sampling event, two detections of methylene chloride (MWL-MW5 primary and duplicate samples) and one detection of toluene were qualified as not detected during data validation due to associated laboratory method blank contamination (Section 4.7). Laboratory method detection limits (MDLs) for all VOCs and SVOCs are presented in Attachment 4A, Table 4A-2.

4.6.2 General Chemistry Parameters

The general chemistry analytical results are presented in Attachment 4A, Tables 4A-3 and 4A-4. No general chemistry parameters exceed established MCLs in the groundwater samples. The only two parameters that have established MCLs are NPN (as nitrogen) and fluoride (10 and 4 milligrams per liter [mg/L], respectively). Concentrations of NPN (as nitrogen) ranged from 0.900 mg/L in the July MWL-MW8 sample to 3.59 mg/L in the April MWL-MW7 sample. Fluoride was detected at concentrations ranging from 0.642 mg/L in the January MWL-BW2 sample to 1.05 mg/L in the April MWL-MW9 sample.

4.6.3 Metals

Metal analysis includes two sets of analyses and results, filtered and unfiltered. Groundwater samples obtained for total metal analyses are collected without filtering. Dissolved metal samples are collected by filtering the sample prior to analysis (SNL August 2007). The difference in concentrations between the total and dissolved fraction may be attributed to the original metallic ion content of the particles and any sorption of ions to the suspended particles.

Table 4A-5 (Attachment 4A) summarizes the metal results, including total uranium, from all unfiltered groundwater samples collected during the CY 2010 groundwater monitoring events at the MWL. Samples were analyzed for TAL metals according to EPA Method 6020 (EPA 1986). No metals were detected in the unfiltered samples at concentrations that exceeded the established MCLs, and the results are consistent with those for previous sampling events at the MWL.

Table 4A-6 (Attachment 4A) summarizes the metal results, including total uranium, for the filtered samples collected during the CY 2010 groundwater monitoring events. No detections of any metals in the filtered samples exceeded the respective MCLs, and the results are consistent with those for previous sampling events at the MWL.

4.6.4 Radiological Parameters

Groundwater samples from the MWL monitoring wells were screened for gamma-emitting radionuclides, gross alpha/beta activity, and tritium. The results for tritium, gross alpha/beta, gamma spectroscopy, and low-level tritium (April only) analyses are presented in Table 4A-7 (Attachment 4A) and are compared with the established EPA MCLs (no MCL has been established for tritium).

Gamma spectroscopy activity levels for short-list radionuclides are less than the associated minimum detectable activity (MDA). Potassium-40 in the January MWL-MW7 environmental sample was qualified as unusable during data validation as the laboratory rejected the result due to the peak not meeting identification criteria. The potassium-40 activity in the MWL-MW7 duplicate sample was less than the associated MDA.

Radioisotopic analyses included gross alpha/beta activity and tritium analyses (all sampling events) and isotopic uranium and radon-222 (July). The gross alpha measurements were corrected for naturally occurring uranium activity according to 40 CFR Parts 9, 141, and 142, Table I-4. No gross alpha results exceeded the MCL of 15 picocuries per liter (pCi/L), and gross beta activity screening results did not exceed established limits. Isotopic uranium activities were below NMED HWB background concentrations. Radon-222 was reported below the NMED HWB background of 300 pCi/L in all groundwater samples, except the July sample from MWL-BW2 that had an activity of 494 ± 132 pCi/L. Tritium activity levels were below laboratory MDAs in all groundwater samples (i.e., tritium was not detected). However, as it is a COC at the MWL, the results are presented in Table 4A-7.

All April low-level tritium results were reported as nondetections except for the MWL-MW6 sample result (1.22 pCi/L). This result was slightly higher than the PQL of 1.18 pCi/L, but was qualified as estimated during data validation.

4.6.5 Water Quality Parameters

The field water quality parameters represent readings measured immediately before sampling. The CY 2010 results for MWL wells are presented in Attachment 4A, Table 4A-8.

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 AOP [Administrative Operating Procedure] 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL July 2007). 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 EB, TB, FB, and field duplicate samples. TB samples are submitted whenever samples are collected for VOC analysis to assess whether contamination of the samples occurred during shipment and storage. FB samples provide a check for potential ambient sources of sample contamination during the sampling process and/or sampling error. EB samples are collected to verify the effectiveness of the sampling equipment decontamination process, and duplicate samples are collected immediately after the environmental sample to provide information about sampling variability. The field QC samples were submitted for analysis along with the groundwater samples in accordance with the MWL Mini-SAPs (SNL January 2010b, April 2010, and July 2010). The following sections discuss the analytical results for each QC sample type.

4.7.1.1 Duplicate Environmental Samples

Duplicate groundwater samples were collected at MWL-MW7 (January and July) and MWL-BW2 and MWL-MW5 (April). Relative percent difference (RPD) calculations were performed for all detected chemical analytes for duplicate samples to measure sample variability.

The MWL Mini-SAPs (SNL January 2010b, April 2010, and July 2010) do not specify QC acceptance criteria for duplicate sample data; however, duplicate sampling results show good correlation (low RPD values less than or equal to 20) for all calculated parameters, except aluminum, nickel, vanadium, and zinc. The RPD values for aluminum and vanadium were calculated at 58 and 90, respectively, for the unfiltered MWL-BW2 sample in April; the RPD for zinc was calculated at 44 in the filtered MWL-MW5 sample in April; and the RPD values for nickel and vanadium were calculated at 97 and 23, respectively, for the filtered MWL-MW7 sample in July. The RPD values for these metal parameters are considered estimated values, as reported concentrations are below associated PQLs.

4.7.1.2 Equipment Blank Samples

A total of seven EB samples were collected during the CY 2010 sampling events at the MWL to verify the equipment decontamination process. The EB sampling results are summarized in this section by sampling event.

In January four EB samples were collected prior to sampling each monitoring well. The EB collected prior to sampling MWL-MW7 was submitted for all analytical parameters. EB samples associated with MWL-BW2, MWL-MW8, and MWL-MW9 were submitted for a limited set of parameters including VOCs, SVOCs, and metals. Various organic and inorganic parameters were detected in EB samples. No corrective action was required except for metals. Detected metals included aluminum, arsenic, barium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, and zinc. Metals in associated environmental samples detected at concentrations less than five times the EB result were qualified as not detected during data validation. The number of metals detected in the EB samples may be attributed to new stainless steel water lines installed inside the sampling truck prior to this sampling event as part of the toluene investigation (Section 4.1.1), deionized water quality, sampling equipment, and/or the analytical laboratory.

In April two EB samples were collected prior to sampling monitoring wells MWL-BW2 and MWL-MW5 and submitted for all analyses. Various VOCs, chloride, alkalinity, calcium, chromium, cobalt, copper, iron, magnesium, manganese, sodium, and vanadium were detected in the EB samples. No corrective action was required for detected organic compounds as these compounds were not detected in associated environmental samples. No corrective action was required for chloride, alkalinity, calcium, chromium, iron, magnesium, manganese, or sodium because these parameters either were not detected in the associated environmental samples or were detected in the environmental sample at concentrations greater than five times the blank result. Filtered fractions of cobalt, copper, and vanadium, and unfiltered fractions of copper in associated environmental samples were detected at concentrations less than five times the EB result and were qualified as not detected during data validation.

In July one EB sample was collected prior to sampling monitoring well MWL-MW7 and submitted for all analyses. Bromodichloromethane, chloroform, cadmium, calcium, cobalt, copper, iron, magnesium, zinc, and gross alpha were detected in the EB sample. No corrective action was required for bromodichloromethane, chloroform, cadmium, or zinc as these analytes were not detected in the associated environmental sample. No corrective action was required for calcium, cobalt, or magnesium because these parameters were detected in the environmental sample at concentrations greater than five times the blank result. The environmental sample results for copper, iron, and gross alpha were qualified as not detected during data validation as the results were less than five times the EB result.

4.7.1.3 Field Blank Samples

FB samples were collected at the various sampling locations, stored with the associated environmental samples throughout the sampling process, and returned to the laboratory for VOC analyses with the associated environmental samples to assess whether contamination of the samples resulted from ambient field conditions. The FB samples are prepared by pouring deionized water into sample containers at the sampling point (i.e., in the sampling truck at the well location) to simulate the transfer of environmental samples from the sampling system to the sample container. Based on a recommendation presented in the *MWL Toluene Investigation Report* (SNL October 2010), an FB sample was collected for each MWL sampling location starting with the July sampling event.

In January and April an FB sample was collected at MWL-MW9, and in July four FB samples were collected (MWL-BW2, MWL-MW7, MWL-MW8 and MWL-MW9). Bromodichloromethane, chloroform, and dibromochloromethane were detected in the FB samples. No corrective action was required as these compounds were not detected in the associated environmental samples.

4.7.1.4 Trip Blank Samples

TB samples consist of laboratory reagent grade water with hydrochloric acid preservative contained in 40-milliliter volatile organic analysis vials prepared by the analytical laboratory. These samples accompany the empty sample containers supplied by the laboratory and are brought to the field and accompany each VOC sample shipment. TB sample results are summarized in this section by sampling event.

A total of seven TB samples were submitted with the January samples. No VOCs were detected above associated laboratory MDLs, except chloromethane. Chloromethane was detected in TB samples associated with three EB samples and the MWL-BW2 environmental sample. No corrective action was required as chloromethane was not detected in associated EB samples or the MWL-BW2 environmental sample.

A total of 10 TB samples were submitted with the April samples. No VOCs were detected above associated laboratory MDLs. During data validation, methylene chloride and toluene results were qualified as not detected in TB samples associated with MWL-MW5, MWL-MW8, and both EB samples due to associated laboratory method blank contamination.

A total of five TB samples were submitted with the July 2010 samples. No VOCs were detected above associated laboratory MDLs.

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 July 2007).

Although some analytical results were qualified as not detected or as estimated values during the data validation process, no significant data quality problems were noted for any CY 2010 MWL groundwater monitoring samples. The most significant issue involved the potassium-40 isotope result for the January MWL-MW7 environmental sample, which was qualified as unusable during data validation because the peak did not meet identification criteria. Corrective action was not initiated as potassium-40 is not a primary COC at the MWL, and the result for the corresponding duplicate sample was nondetect. Data validation reports and findings associated with MWL groundwater monitoring are filed in the SNL/NM Customer Funded Records Center.

4.8 Variances and Nonconformances

All analytical and field methods were performed according to the requirements specified in the MWL groundwater monitoring Mini-SAPs for Fiscal Year 2010 (SNL January 2010b, April 2010, and July 2010), and there were no variances from the plans.

As addressed in Section 4.7, various parameters have been detected in field QC samples since SNL/NM changed suppliers for deionized water. In particular, various metals and the VOCs bromodichloromethane, chloroform, and dibromochloromethane continue to be detected in the FB samples. DOE and Sandia continue to test and investigate the quality of deionized water currently in use and will make adjustments as necessary.

4.9 Summary and Conclusions

Groundwater sampling and analysis were conducted at the MWL during three quarters in 2010 according to the Mini-SAPs generated for each sampling event (SNL January 2010b, April 2010, and July 2010). No organic, inorganic, general chemistry, or radiological constituents were detected at concentrations/activities that exceed the respective established MCLs (where applicable) in the groundwater samples. The groundwater monitoring results for the CY 2010 sampling events are consistent with data from previous sampling events, within the range of historical MWL groundwater data, and indicate the MWL has not impacted groundwater beneath the site. The field and laboratory QC sample and data validation results indicate that the CY 2010 groundwater monitoring data are defensible and representative.

Toluene was detected at very low concentrations in all the groundwater samples in January, but was not detected in any of the samples collected in April and July. The only toluene concentrations detected in the April groundwater and field QC samples, including some of the samples associated with the toluene investigation purging/sampling study, were related to contamination introduced into the samples during the analytical process at the off-site laboratory.

4.10 References

Bearzi January 2011 Bearzi, J.P. (New Mexico Environment Department), January 2011. Letter to P. Wagner (U.S. Department of Energy) and J. Hruby (Sandia Corporation), *Notice of Approval, Mixed Waste Landfill Toluene Investigation Report, Revised October 2010, Sandia National Laboratories, EPA ID No. NM5890110518, HWB-SNL-10-011,* New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico, January 13, 2011.

Bearzi September 2010 Bearzi, J.P. (New Mexico Environment Department), September 2010. Letter to P. Wagner (U.S. Department of Energy) and M. Walck (Sandia Corporation), *Notice of Disapproval, Mixed Waste Landfill Toluene Investigation Report, August 2010*, New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico, September 30, 2010.

Bearzi April 2010 Bearzi, J.P. (New Mexico Environment Department), April 2010. Letter to P. Wagner (U.S. Department of Energy) and M. Walck (Sandia Corporation), *Toluene Detections in Groundwater, Sandia National Laboratories Mixed Waste Landfill,* New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico, April 30, 2010.

Bearzi January 2009 Bearzi, J.P. (New Mexico Environment Department), January 2009. Letter to K. Davis (U.S. Department of Energy) and F. Nimick (Sandia Corporation), *Notice of Approval: Summary Report for the Mixed Waste Landfill Monitoring Well Plug and Abandonment and Installation – Decommissioning of Groundwater Monitoring Wells MWL-MW1, MWL-MW2, and MWL-MW3, Installation of Groundwater Monitoring Wells MWL-MW7, MWL-MW8, and MWL-MW9, September, 2008, Sandia National Laboratories EPA ID#NM5890110518, HWB-SNL-08-020*, January 15, 2009.

Bearzi December 2008 Bearzi, J.P. (New Mexico Environment Department), December 2008. Letter to K. Davis (U.S. Department of Energy) and F. Nimick (Sandia Corporation), *Conditional Approval, Mixed Waste Landfill Corrective Measures Implementation Plan, November 2005, Sandia National Laboratories NM5890110518, SNL-05-025,* December 22, 2008.

Bearzi October 2008 Bearzi, J.P. (New Mexico Environment Department), October 2008. Letter to P. Wagner (U.S. Department of Energy) and F. Nimick (Sandia Corporation), *Notice of Approval: Summary Report for the Mixed Waste Landfill Monitoring Well Plug and Abandonment and Installation – Decommissioning of Groundwater Monitoring Well MWL-BW-1, Installation of Groundwater Monitoring Well MWL-BW2, April, 2008, Sandia National Laboratories EPA ID#NM5890110518, HWB-SNL-08-015*, October 31, 2008.

Dinwiddie June 1998 Dinwiddie, R.S. (New Mexico Environment Department), June 1998. Letter to M.J. Zamorski (U.S. Department of Energy), *Mixed Waste Landfill: Regulatory Status, SNL/KAFB,* June 11, 1998.

EPA 2009 U.S. Environmental Protection Agency (EPA), 2009. *National Primary Drinking Water Regulations*, EPA 816-F 09-004, U.S. Environmental Protection Agency, Washington, D.C.

EPA 2001 U.S. Environmental Protection Agency (EPA), 2001. *National Primary Drinking Water Regulations,* Title 40, Code of Federal Regulations, Part 141, Subpart B, Office of Water, U.S. Environmental Protection Agency, Washington, D.C.

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.

EPA 1979 U.S. Environmental Protection Agency (EPA), 1979. *Methods for Chemical Analysis of Water and Wastes,* EPA-600/4-79-020, U.S. Environmental Protection Agency, Cincinnati, Ohio.

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.

Kues 1987 Kues, G.E., 1987, *Groundwater Level Data for Albuquerque-Belen Basin, New Mexico, through Water Level Year 1985*, USGS Open File Report 87-1 16, U.S. Geological Survey, Albuquerque, New Mexico.

Lyon and Goering 2006 Lyon, M.L., and T.J. Goering, January 2006. *Mixed Waste Landfill Annual Groundwater Monitoring Report, April 2005*, SAND2006-0391, Sandia National Laboratories, Albuquerque, New Mexico.

NMED May 2005 New Mexico Environment Department (NMED), May 2005. *Final Order, State of New Mexico Before the Secretary of the Environment in the Matter of Request for a Class 3 Permit Modification for Corrective Measures for the Mixed Waste Landfill, Sandia National Laboratories, Bernalillo County, New Mexico, EPA ID #5890110518*, New Mexico Environment Department, Santa Fe, New Mexico, May 26, 2005.

NMED 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.

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.

Reeder et al. 1967 Reeder, H.O., L.J. Bjorklund, and G.A. Dinwiddie, 1967, *Quantitative Analysis of Water Resources in the Albuquerque Area, New Mexico: Computed Effects on the Rio Grande of Pumpage of Groundwater, 1960-2000*, New Mexico State Engineer Report 33, Santa Fe, New Mexico.

SNL July 2011 Sandia National Laboratories, New Mexico (SNL/NM), July 2011. *Mixed Waste Landfill Annual Groundwater Monitoring Report, Calendar Year 2010*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, in preparation.

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 July 2010 Sandia National Laboratories, New Mexico (SNL/NM), July 2010. *Mixed Waste Landfill Groundwater Monitoring, Mini-SAP for FY10, 4th Quarter Sampling, July 2010*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2010 Sandia National Laboratories, New Mexico (SNL/NM), June 2009. *Mixed Waste Landfill Annual Groundwater Monitoring Report, Calendar Year 2009*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL April 2010 Sandia National Laboratories, New Mexico (SNL/NM), April 2010. *Mixed Waste Landfill Groundwater Monitoring, Mini-SAP for FY10 3rd Quarter Sampling, April 2010,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL January 2010a Sandia National Laboratories, New Mexico (SNL/NM), January 2010. *Mixed Waste Landfill Corrective Measures Implementation Report,* Environmental Restoration Project, Sandia National Laboratories, New Mexico.

SNL January 2010b Sandia National Laboratories, New Mexico (SNL/NM), January 2010. *Mixed Waste Landfill Groundwater Monitoring Mini-SAP for FY10, 2nd Quarter Sampling*, *January 2010*, Sandia National Laboratories, New Mexico Environmental Restoration Project.

SNL May 2009a 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 May 2009b Sandia National Laboratories/New Mexico (SNL/NM), May 2009. *SNL/NM Statement of Work for Analytical Laboratories, Revision 4,* 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 August 2007 Sandia National Laboratories/New Mexico (SNL/NM), August 2007. *Long-Term Environmental Stewardship (LTES) Groundwater Monitoring Well Sampling and Field Analytical Measurements*, FOP 05-01, Revision 00, Sandia National Laboratories, Albuquerque, New Mexico.

SNL July 2007 Sandia National Laboratories, New Mexico (SNL/NM), July 2007. *Data Validation Procedure for Chemical and Radiochemical Data*, AOP 00-03, Revision 2, Sample Management Office, Sandia National Laboratories, Albuquerque, New Mexico, July 16, 2007.

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 2001a 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 December 2001b Sandia National Laboratories/New Mexico (SNL/NM), December 2001. *Mixed Waste Landfill Quarterly Groundwater Monitoring Report for Monitoring Wells MWL-MW5 and MWL-MW6, July 2001, Sandia National Laboratories/New Mexico,* prepared by IT Corporation for 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.

Wagner October 2010 Wagner, P. (U.S. Department of Energy), October 2010. Letter to J.P. Bearzi (New Mexico Environment Department), *Response to September 28, 2010 New Mexico Environment Department Comments on the Mixed Waste Landfill (MWL) Toluene Investigation Report*, Sandia National Laboratories, Albuquerque, New Mexico, October 14, 2010.

Attachment 4A
Mixed Waste Landfill
Analytical Results Tables

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Attachment 4A Tables

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Table 4A-1
Summary of Detected Volatile and Semivolatile Organic Compounds, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-BW2 04-Jan-10	Toluene	0.438	0.250	1.00	1000	J		087998-001	SW846-8260B
MWL-MW7 05-Jan-10	Toluene	0.320	0.250	1.00	1000	J		088002-001	SW846-8260B
MWL-MW7 (Duplicate) 05-Jan-10	Toluene	0.285	0.250	1.00	1000	J		088003-001	SW846-8260B
MWL-MW8	Chloromethane	0.338	0.300	1.00	NE	J		088007-001	SW846-8260B
06-Jan-10	Toluene	1.45	0.250	1.00	1000			088007-001	SW846-8260B
MWL-MW9 07-Jan-10	Toluene	1.10	0.250	1.00	1000			088011-001	SW846-8260B
MWL-MW5 20-Apr-10	Methylene Chloride	3.95	3.00	10.0	5.00	B, J	10.0U	088918-001	SW846-8260B
MWL-MW5 (Duplicate) 20-Apr-10	Methylene Chloride	3.95	3.00	10.0	5.00	B, J	10.0U	088919-001	SW846-8260B
MWL-MW6 19-Apr-10	Acetone	7.91	3.50	10.0	NE	J		088909-001	SW846-8260B
MWL-MW8 26-Apr-10	Toluene	0.260	0.250	1.00	1000	B, J	1.0U	088934-001	SW846-8260B
MWL-MW8 12-Jul-10	Chloromethane	0.370	0.300	1.00	NE	J		089411-001	SW846-8260B

Refer to footnotes on page 4A-57.

Table 4A-2
Method Detection Limits for Volatile and Semivolatile Organic Compounds, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Analyte	MDL[b] (µg/L)	Analytical Method[g]	Analyte	MDL[b] (µg/L)	Analytical Method[g]	Analyte	MDL[b] (µg/L)	Analytical Method[g]
1,1,1-Trichloroethane	0.325	8260	1,2,4-Trichlorobenzene	2.00 - 2.38	8270	Di-n-butyl phthalate	2.00 - 2.38	8270
1,1,2,2-Tetrachloroethane	0.250	8260	1,2-Dichlorobenzene	2.00 - 2.38	8270	Di-n-octyl phthalate	3.00 - 3.57	8270
1,1,2-Trichloroethane	0.250	8260	1,3-Dichlorobenzene	2.00 - 2.38	8270	Dibenz[a,h]anthracene	0.200 - 0.238	8270
1,1-Dichloroethane	0.300	8260	1,4-Dichlorobenzene	2.00 - 2.38	8270	Dibenzofuran	2.00 - 2.38	8270
1,1-Dichloroethene	0.300	8260	2,4,5-Trichlorophenol	2.00 - 2.38	8270	Diethylphthalate	2.00 - 2.38	8270
1,2-Dichloroethane	0.250	8260	2,4,6-Trichlorophenol	2.00 - 2.38	8270	Dimethylphthalate	2.00 - 2.38	8270
1,2-Dichloropropane	0.250	8260	2,4-Dichlorophenol	2.00 - 2.38	8270	Dinitro-o-cresol	3.00 - 3.57	8270
2-Butanone	1.25	8260	2,4-Dimethylphenol	2.00 - 2.38	8270	Diphenyl amine	3.00 - 3.57	8270
2-Hexanone	1.25	8260	2,4-Dinitrophenol	5.00 - 5.95	8270	Fluoranthene	0.200 - 0.238	8270
4-methyl-, 2-Pentanone	1.25	8260	2,4-Dinitrotoluene	2.00 - 2.38	8270	Fluorene	0.200 - 0.238	8270
Acetone	3.50	8260	2,6-Dinitrotoluene	2.00 - 2.38	8270	Hexachlorobenzene	2.00 - 2.38	8270
Benzene	0.300	8260	2-Chloronaphthalene	0.300 - 0.357	8270	Hexachlorobutadiene	2.00 - 2.38	8270
Bromodichloromethane	0.250	8260	2-Chlorophenol	2.00 - 2.38	8270	Hexachlorocyclopentadiene	3.00 - 3.57	8270
Bromoform	0.250	8260	2-Methylnaphthalene	0.300 - 0.357	8270	Hexachloroethane	2.00 - 2.38	8270
Bromomethane	0.300	8260	2-Nitroaniline	2.00 - 2.38	8270	Indeno(1,2,3-c,d)pyrene	0.200 - 0.238	8270
Carbon disulfide	1.25	8260	2-Nitrophenol	2.00 - 2.38	8270	Isophorone	3.00 - 3.57	8270
Carbon tetrachloride	0.300	8260	3,3'-Dichlorobenzidine	2.00 - 2.38	8270	Naphthalene	0.300 - 0.357	8270
Chlorobenzene	0.250	8260	3-Nitroaniline	2.00 - 2.38	8270	Nitro-benzene	3.00 - 3.57	8270
Chloroethane	0.300	8260	4-Bromophenyl phenyl ether	2.00 - 2.38	8270	Pentachlorophenol	2.00 - 2.38	8270
Chloroform	0.250	8260	4-Chloro-3-methylphenol	2.00 - 2.38	8270	Phenanthrene	0.200 - 0.238	8270
Chloromethane	0.300	8260	4-Chlorobenzenamine	2.00 - 2.38	8270	Phenol	1.00 - 1.19	8270
Dibromochloromethane	0.300	8260	4-Chlorophenyl phenyl ether	2.00 - 2.38	8270	Pyrene	0.300 - 0.357	8270
Ethyl benzene	0.250	8260	4-Nitroaniline	3.00 - 3.57	8270	bis(2-Chloroethoxy)methane	3.00 - 3.57	8270
Methylene chloride	3.00	8260	4-Nitrophenol	2.00 - 2.38	8270	bis(2-Chloroethyl)ether	2.00 - 2.38	8270
Styrene	0.250	8260	Acenaphthene	0.310 - 0.369	8270	bis(2-Ethylhexyl)phthalate	2.00 - 2.38	8270
Tetrachloroethene	0.300	8260	Acenaphthylene	0.200 - 0.238	8270	bis-Chloroisopropyl ether	2.00 - 2.38	8270
Toluene	0.250	8260	Anthracene	0.200 - 0.238	8270	m,p-Cresol	3.00 - 3.57	8270
Trichloroethene	0.250	8260	Benzo(a)anthracene	0.200 - 0.238	8270	n-Nitrosodipropylamine	2.00 - 2.38	8270
Vinyl acetate	1.50	8260	Benzo(a)pyrene	0.200 - 0.238	8270	o-Cresol	2.00 - 2.38	8270
Vinyl chloride	0.500	8260	Benzo(b)fluoranthene	0.200 - 0.238	8270			
Xylene	0.300	8260	Benzo(ghi)perylene	0.200 - 0.238	8270			
cis-1,2-Dichloroethene	0.300	8260	Benzo(k)fluoranthene	0.200 - 0.238	8270			
cis-1,3-Dichloropropene	0.250	8260	Butylbenzyl phthalate	2.00 - 2.38	8270			
trans-1,2-Dichloroethene	0.300	8260	Carbazole	0.200 - 0.238	8270			
trans-1,3-Dichloropropene	0.250	8260	Chrysene	0.200 - 0.238	8270			

Refer to footnotes on page 4A-57.

Table 4A-3
Summary of Nitrate plus Nitrite Results,
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-BW2 04-Jan-10	Nitrate plus nitrite as N	2.20	0.100	0.500	10.0			087998-018	EPA 353.2
MWL-MW7 05-Jan-10	Nitrate plus nitrite as N	3.41	0.100	0.500	10.0			088002-018	EPA 353.2
MWL-MW7 (Duplicate) 05-Jan-10	Nitrate plus nitrite as N	3.29	0.100	0.500	10.0			088003-018	EPA 353.2
MWL-MW8 06-Jan-10	Nitrate plus nitrite as N	1.07	0.050	0.250	10.0			088007-018	EPA 353.2
MWL-MW9 07-Jan-10	Nitrate plus nitrite as N	2.12	0.100	0.500	10.0			088011-018	EPA 353.2
MWL-BW2 27-Apr-10	Nitrate plus nitrite as N	2.38	0.100	0.500	10.0	B		088942-018	EPA 353.2
MWL-BW2 (Duplicate) 27-Apr-10	Nitrate plus nitrite as N	2.30	0.050	0.250	10.0	B		088943-018	EPA 353.2
MWL-MW4 29-Apr-10	Nitrate plus nitrite as N	2.43	0.100	0.500	10.0	B		088949-018	EPA 353.2
MWL-MW5 20-Apr-10	Nitrate plus nitrite as N	1.45	0.050	0.250	10.0	B		088918-018	EPA 353.2
MWL-MW5 (Duplicate) 20-Apr-10	Nitrate plus nitrite as N	1.55	0.050	0.250	10.0	B		088919-018	EPA 353.2
MWL-MW6 19-Apr-10	Nitrate plus nitrite as N	1.89	0.100	0.500	10.0	B		088909-018	EPA 353.2
MWL-MW7 22-Apr-10	Nitrate plus nitrite as N	3.59	0.100	0.500	10.0	B		088929-018	EPA 353.2
MWL-MW8 26-Apr-10	Nitrate plus nitrite as N	1.32	0.050	0.250	10.0	B		088934-018	EPA 353.2
MWL-MW9 21-Apr-10	Nitrate plus nitrite as N	2.33	0.100	0.500	10.0	B		088924-018	EPA 353.2
MWL-BW2 06-Jul-10	Nitrate plus nitrite as N	2.03	0.100	0.500	10.0			089402-018	EPA 353.2
MWL-MW7 07-Jul-10	Nitrate plus nitrite as N	3.11	0.100	0.500	10.0			089407-018	EPA 353.2
MWL-MW7 (Duplicate) 07-Jul-10	Nitrate plus nitrite as N	3.11	0.050	0.250	10.0			089408-018	EPA 353.2

Refer to footnotes on page 4A-57.

Table 4A-3 *(Concluded)*
Summary of Nitrate plus Nitrite Results,
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW8 12-Jul-10	Nitrate plus nitrite as N	0.900	0.050	0.250	10.0	B		089411-018	EPA 353.2
MWL-MW9 13-Jul-10	Nitrate plus nitrite as N	2.41	0.100	0.500	10.0	B		089414-018	EPA 353.2

Refer to footnotes on page 4A-57.

Table 4A-4
Summary of Alkalinity and Anion Results,
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-BW2 04-Jan-10	Alkalinity, total as CaCO3	236	0.725	1.00	NE			087998-016	SM 2320B
	Bromide	0.361	0.066	0.200	NE			087998-016	SW846 9056
	Chloride	67.3	0.660	2.00	NE			087998-016	SW846 9056
	Fluoride	0.642	0.033	0.100	4.0			087998-016	SW846 9056
	Sulfate	46.5	1.00	4.00	NE			087998-016	SW846 9056
MWL-MW7 05-Jan-10	Alkalinity, total as CaCO3	207	0.725	1.00	NE			088002-016	SM 2320B
	Bromide	0.294	0.066	0.200	NE			088002-016	SW846 9056
	Chloride	40.2	0.660	2.00	NE			088002-016	SW846 9056
	Fluoride	0.903	0.033	0.100	4.0			088002-016	SW846 9056
	Sulfate	36.8	0.100	0.400	NE			088002-016	SW846 9056
MWL-MW7 (Duplicate) 05-Jan-10	Alkalinity, total as CaCO3	206	0.725	1.00	NE			088003-016	SM 2320B
	Bromide	0.278	0.066	0.200	NE			088003-016	SW846 9056
	Chloride	40.4	0.660	2.00	NE			088003-016	SW846 9056
	Fluoride	0.971	0.033	0.100	4.0			088003-016	SW846 9056
	Sulfate	36.8	0.100	0.400	NE			088003-016	SW846 9056
MWL-MW8 06-Jan-10	Alkalinity, total as CaCO3	217	0.725	1.00	NE			088007-016	SM 2320B
	Bromide	0.325	0.066	0.200	NE			088007-016	SW846 9056
	Chloride	48.7	0.660	2.00	NE			088007-016	SW846 9056
	Fluoride	0.970	0.033	0.100	4.0			088007-016	SW846 9056
	Sulfate	36.0	0.100	0.400	NE			088007-016	SW846 9056
MWL-MW9 07-Jan-10	Alkalinity, total as CaCO3	209	0.725	1.00	NE	B		088011-016	SM 2320B
	Bromide	0.279	0.066	0.200	NE			088011-016	SW846 9056
	Chloride	38.9	0.660	2.00	NE			088011-016	SW846 9056
	Fluoride	1.02	0.033	0.100	4.0			088011-016	SW846 9056
	Sulfate	38.0	0.100	0.400	NE			088011-016	SW846 9056
MWL-BW2 27-Apr-10	Alkalinity, total as CaCO3	238	0.725	1.00	NE	B		088942-016	SM 2320B
	Bromide	0.399	0.066	0.200	NE			088942-016	SW846 9056
	Chloride	58.4	0.660	2.00	NE			088942-016	SW846 9056
	Fluoride	0.667	0.033	0.100	4.0			088942-016	SW846 9056
	Sulfate	43.7	1.00	4.00	NE			088942-016	SW846 9056
MWL-BW2 (Duplicate) 27-Apr-10	Alkalinity, total as CaCO3	235	0.725	1.00	NE	B		088943-016	SM 2320B
	Bromide	0.399	0.066	0.200	NE			088943-016	SW846 9056
	Chloride	59.3	0.660	2.00	NE			088943-016	SW846 9056
	Fluoride	0.675	0.033	0.100	4.0			088943-016	SW846 9056
	Sulfate	44.6	1.00	4.00	NE			088943-016	SW846 9056

Refer to footnotes on page 4A-57.

Table 4A-4 *(Continued)*
Summary of Alkalinity and Anion Results,
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW4	Alkalinity, total as CaCO3	208	0.725	1.00	NE	B		088949-016	SM 2320B
29-Apr-10	Bromide	0.375	0.066	0.200	NE			088949-016	SW846 9056
	Chloride	47.6	0.660	2.00	NE			088949-016	SW846 9056
	Fluoride	0.982	0.033	0.100	4.0			088949-016	SW846 9056
	Sulfate	38.0	0.100	0.400	NE			088949-016	SW846 9056
MWL-MW5	Alkalinity, total as CaCO3	307	0.725	1.00	NE	B		088918-016	SM 2320B
20-Apr-10	Bromide	0.464	0.066	0.200	NE			088918-016	SW846 9056
	Chloride	84.5	0.660	2.00	NE			088918-016	SW846 9056
	Fluoride	0.861	0.033	0.100	4.0			088918-016	SW846 9056
	Sulfate	53.6	1.00	4.00	NE			088918-016	SW846 9056
MWL-MW5 (Duplicate)	Alkalinity, total as CaCO3	310	0.725	1.00	NE	B		088919-016	SM 2320B
20-Apr-10	Bromide	0.467	0.066	0.200	NE			088919-016	SW846 9056
	Chloride	84.7	0.660	2.00	NE			088919-016	SW846 9056
	Fluoride	0.885	0.033	0.100	4.0			088919-016	SW846 9056
	Sulfate	53.9	1.00	4.00	NE			088919-016	SW846 9056
MWL-MW6	Alkalinity, total as CaCO3	289	0.725	1.00	NE	B		088909-016	SM 2320B
19-Apr-10	Bromide	0.530	0.066	0.200	NE			088909-016	SW846 9056
	Chloride	74.4	0.660	2.00	NE			088909-016	SW846 9056
	Fluoride	0.734	0.033	0.100	4.0			088909-016	SW846 9056
	Sulfate	50.2	1.00	4.00	NE			088909-016	SW846 9056
MWL-MW7	Alkalinity, total as CaCO3	209	0.725	1.00	NE	B		088929-016	SM 2320B
22-Apr-10	Bromide	0.298	0.066	0.200	NE			088929-016	SW846 9056
	Chloride	40.4	0.660	2.00	NE			088929-016	SW846 9056
	Fluoride	1.02	0.033	0.100	4.0			088929-016	SW846 9056
	Sulfate	37.1	0.100	0.400	NE			088929-016	SW846 9056
MWL-MW8	Alkalinity, total as CaCO3	220	0.725	1.00	NE	B		088934-016	SM 2320B
26-Apr-10	Bromide	0.349	0.066	0.200	NE			088934-016	SW846 9056
	Chloride	44.8	0.660	2.00	NE			088934-016	SW846 9056
	Fluoride	0.947	0.033	0.100	4.0			088934-016	SW846 9056
	Sulfate	37.1	0.100	0.400	NE			088934-016	SW846 9056
MWL-MW9	Alkalinity, total as CaCO3	316	0.725	1.00	NE	B		088924-016	SM 2320B
21-Apr-10	Bromide	0.298	0.066	0.200	NE			088924-016	SW846 9056
	Chloride	39.9	0.660	2.00	NE			088924-016	SW846 9056
	Fluoride	1.05	0.033	0.100	4.0			088924-016	SW846 9056
	Sulfate	38.5	0.100	0.400	NE			088924-016	SW846 9056

Refer to footnotes on page 4A-57.

Table 4A-4 *(Concluded)*
Summary of Alkalinity and Anion Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-BW2	Alkalinity, total as CaCO3	250	0.725	1.00	NE	B		089402-016	SM 2320B
06-Jul-10	Bromide	0.388	0.066	0.200	NE			089402-016	SW846 9056
	Chloride	60.1	0.660	2.00	NE	B		089402-016	SW846 9056
	Fluoride	0.690	0.033	0.100	4.0			089402-016	SW846 9056
	Sulfate	45.0	1.00	4.00	NE			089402-016	SW846 9056
MWL-MW7	Alkalinity, total as CaCO3	217	0.725	1.00	NE	B		089407-016	SM 2320B
07-Jul-10	Bromide	0.328	0.066	0.200	NE			089407-016	SW846 9056
	Chloride	37.9	0.660	2.00	NE	B		089407-016	SW846 9056
	Fluoride	0.919	0.033	0.100	4.0			089407-016	SW846 9056
	Sulfate	37.6	0.100	0.400	NE			089407-016	SW846 9056
MWL-MW7 (Duplicate)	Alkalinity, total as CaCO3	219	0.725	1.00	NE	B		089408-016	SM 2320B
07-Jul-10	Bromide	0.317	0.066	0.200	NE			089408-016	SW846 9056
	Chloride	39.0	0.660	2.00	NE	B		089408-016	SW846 9056
	Fluoride	0.948	0.033	0.100	4.0			089408-016	SW846 9056
	Sulfate	37.5	0.100	0.400	NE			089408-016	SW846 9056
MWL-MW8	Alkalinity, total as CaCO3	231	0.725	1.00	NE	B		089411-016	SM 2320B
12-Jul-10	Bromide	0.361	0.066	0.200	NE			089411-016	SW846 9056
	Chloride	50.5	0.660	2.00	NE			089411-016	SW846 9056
	Fluoride	1.01	0.033	0.100	4.0			089411-016	SW846 9056
	Sulfate	35.5	0.100	0.400	NE			089411-016	SW846 9056
MWL-MW9	Alkalinity, total as CaCO3	227	0.725	1.00	NE	B		089414-016	SM 2320B
13-Jul-10	Bromide	0.333	0.066	0.200	NE			089414-016	SW846 9056
	Chloride	39.3	0.660	2.00	NE			089414-016	SW846 9056
	Fluoride	1.04	0.033	0.100	4.0			089414-016	SW846 9056
	Sulfate	38.2	0.100	0.400	NE			089414-016	SW846 9056

Refer to footnotes on page 4A-57.

Table 4A-5
Summary of Total Metal Results (Unfiltered),
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-BW2	Aluminum	ND	0.010	0.030	NE	U		087998-009	SW846 6020
04-Jan-10	Antimony	ND	0.0005	0.003	0.006	U		087998-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		087998-009	SW846 6020
	Barium	0.0909	0.0005	0.002	2.00			087998-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		087998-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		087998-009	SW846 6020
	Calcium	72.3	0.100	1.00	NE			087998-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		087998-009	SW846 6020
	Cobalt	0.000132	0.0001	0.001	NE	J		087998-009	SW846 6020
	Copper	0.000569	0.0003	0.001	NE	J	0.0039U	087998-009	SW846 6020
	Iron	0.192	0.010	0.100	NE			087998-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		087998-009	SW846 6020
	Magnesium	23.0	0.005	0.015	NE			087998-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		087998-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		087998-009	SW846 7470
	Nickel	0.00277	0.0005	0.002	NE			087998-009	SW846 6020
	Potassium	3.86	0.080	0.300	NE			087998-009	SW846 6020
	Selenium	0.00172	0.001	0.005	0.050	J		087998-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		087998-009	SW846 6020
	Sodium	60.6	0.400	1.25	NE			087998-009	SW846 6020
	Thallium	0.000375	0.0003	0.001	0.002	J	0.0017U	087998-009	SW846 6020
	Uranium	**0.00686**	0.00005	0.0002	0.030			087998-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		087998-009	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		087998-009	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-5 *(Continued)*
Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW7	Aluminum	ND	0.010	0.030	NE	U		088002-009	SW846 6020
05-Jan-10	Antimony	ND	0.0005	0.003	0.006	U		088002-009	SW846 6020
	Arsenic	0.00184	0.0015	0.005	0.010	B, J	0.012U	088002-009	SW846 6020
	Barium	0.0974	0.0005	0.002	2.00			088002-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088002-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088002-009	SW846 6020
	Calcium	58.6	0.100	1.00	NE			088002-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088002-009	SW846 6020
	Cobalt	0.000105	0.0001	0.001	NE	J		088002-009	SW846 6020
	Copper	0.000757	0.0003	0.001	NE	J	0.0045U	088002-009	SW846 6020
	Iron	0.168	0.010	0.100	NE			088002-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088002-009	SW846 6020
	Magnesium	20.3	0.005	0.015	NE			088002-009	SW846 6020
	Manganese	0.00139	0.001	0.005	NE	J		088002-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088002-009	SW846 7470
	Nickel	0.00226	0.0005	0.002	NE			088002-009	SW846 6020
	Potassium	5.10	0.080	0.300	NE			088002-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		088002-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088002-009	SW846 6020
	Sodium	50.8	0.400	1.25	NE			088002-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088002-009	SW846 6020
	Uranium	**0.00781**	0.00005	0.0002	0.030			088002-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		088002-009	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		088002-009	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-5 *(Continued)*
Summary of Total Metal Results (Unfiltered),
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW7 (Duplicate) 05-Jan-10	Aluminum	ND	0.010	0.030	NE	U		088003-009	SW846 6020
	Antimony	ND	0.0005	0.003	0.006	U		088003-009	SW846 6020
	Arsenic	0.0019	0.0015	0.005	0.010	B, J	0.012U	088003-009	SW846 6020
	Barium	0.104	0.0005	0.002	2.00			088003-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088003-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088003-009	SW846 6020
	Calcium	61.0	0.100	1.00	NE			088003-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088003-009	SW846 6020
	Cobalt	0.000113	0.0001	0.001	NE	J		088003-009	SW846 6020
	Copper	0.000695	0.0003	0.001	NE	J	0.0045U	088003-009	SW846 6020
	Iron	0.187	0.010	0.100	NE			088003-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088003-009	SW846 6020
	Magnesium	22.1	0.005	0.015	NE			088003-009	SW846 6020
	Manganese	0.00137	0.001	0.005	NE	J		088003-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088003-009	SW846 7470
	Nickel	0.00244	0.0005	0.002	NE			088003-009	SW846 6020
	Potassium	5.37	0.080	0.300	NE			088003-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		088003-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088003-009	SW846 6020
	Sodium	53.2	0.400	1.25	NE			088003-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088003-009	SW846 6020
	Uranium	**0.00833**	0.00005	0.0002	0.030			088003-009	SW846 6020
	Vanadium	0.0041	0.003	0.010	NE	J	0.024U	088003-009	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		088003-009	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-5 *(Continued)*
Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW8	Aluminum	0.077	0.010	0.030	NE		0.18U	088007-009	SW846 6020
06-Jan-10	Antimony	ND	0.0005	0.003	0.006	U		088007-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		088007-009	SW846 6020
	Barium	**0.143**	0.0005	0.002	2.00			088007-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088007-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088007-009	SW846 6020
	Calcium	60.9	0.100	1.00	NE			088007-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088007-009	SW846 6020
	Cobalt	0.000161	0.0001	0.001	NE	J		088007-009	SW846 6020
	Copper	0.000838	0.0003	0.001	NE	J	0.0043U	088007-009	SW846 6020
	Iron	0.275	0.010	0.100	NE			088007-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088007-009	SW846 6020
	Magnesium	22.1	0.005	0.015	NE			088007-009	SW846 6020
	Manganese	0.227	0.001	0.005	NE			088007-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088007-009	SW846 7470
	Nickel	0.00279	0.0005	0.002	NE			088007-009	SW846 6020
	Potassium	5.61	0.080	0.300	NE			088007-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		088007-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088007-009	SW846 6020
	Sodium	51.0	0.400	1.25	NE			088007-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088007-009	SW846 6020
	Uranium	**0.00789**	0.00005	0.0002	0.030			088007-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		088007-009	SW846 6020
	Zinc	0.00496	0.0026	0.010	NE	J		088007-009	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-5 *(Continued)*
Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW9	Aluminum	0.0371	0.010	0.030	NE			088011-009	SW846 6020
07-Jan-10	Antimony	ND	0.0005	0.003	0.006	U		088011-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		088011-009	SW846 6020
	Barium	0.095	0.0005	0.002	2.00			088011-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088011-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088011-009	SW846 6020
	Calcium	57.4	0.100	1.00	NE	B		088011-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088011-009	SW846 6020
	Cobalt	0.000256	0.0001	0.001	NE	J		088011-009	SW846 6020
	Copper	0.00104	0.0003	0.001	NE		0.0048U	088011-009	SW846 6020
	Iron	0.233	0.010	0.100	NE			088011-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088011-009	SW846 6020
	Magnesium	19.9	0.005	0.015	NE			088011-009	SW846 6020
	Manganese	0.0195	0.001	0.005	NE			088011-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088011-009	SW846 7470
	Nickel	0.00186	0.0005	0.002	NE	J		088011-009	SW846 6020
	Potassium	4.96	0.080	0.300	NE			088011-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		088011-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088011-009	SW846 6020
	Sodium	45.2	0.080	0.250	NE			088011-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088011-009	SW846 6020
	Uranium	**0.00942**	0.00005	0.0002	0.030			088011-009	SW846 6020
	Vanadium	0.00317	0.003	0.010	NE	J		088011-009	SW846 6020
	Zinc	0.00317	0.0026	0.010	NE	J		088011-009	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-5 *(Continued)*
Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-BW2	Aluminum	0.0109	0.010	0.030	NE	J		088942-009	SW846 6020
27-Apr-10	Antimony	ND	0.0005	0.003	0.006	U		088942-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		088942-009	SW846 6020
	Barium	0.0938	0.0005	0.002	2.00			088942-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088942-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088942-009	SW846 6020
	Calcium	67.2	0.200	2.00	NE	B		088942-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088942-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		088942-009	SW846 6020
	Copper	0.000382	0.0003	0.001	NE	J	0.019UJ	088942-009	SW846 6020
	Iron	0.0703	0.010	0.100	NE	J		088942-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088942-009	SW846 6020
	Magnesium	20.9	0.005	0.015	NE			088942-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		088942-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088942-009	SW846 7470
	Nickel	0.00103	0.0005	0.002	NE	J		088942-009	SW846 6020
	Potassium	4.14	0.080	0.300	NE			088942-009	SW846 6020
	Selenium	0.00241	0.001	0.005	0.050	J		088942-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088942-009	SW846 6020
	Sodium	50.2	0.800	2.50	NE			088942-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088942-009	SW846 6020
	Uranium	**0.00652**	0.00005	0.0002	0.030			088942-009	SW846 6020
	Vanadium	0.010	0.003	0.010	NE			088942-009	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		088942-009	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-5 *(Continued)*
Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-BW2 (Duplicate) 27-Apr-10	Aluminum	0.0197	0.010	0.030	NE	J		088943-009	SW846 6020
	Antimony	ND	0.0005	0.003	0.006	U		088943-009	SW846 6020
	Arsenic	0.00517	0.0015	0.005	0.010	B	0.014U	088943-009	SW846 6020
	Barium	0.0943	0.0005	0.002	2.00			088943-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088943-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088943-009	SW846 6020
	Calcium	67.8	0.200	2.00	NE	B		088943-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088943-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		088943-009	SW846 6020
	Copper	0.000393	0.0003	0.001	NE	J	0.019UJ	088943-009	SW846 6020
	Iron	0.070	0.010	0.100	NE	J		088943-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088943-009	SW846 6020
	Magnesium	20.5	0.005	0.015	NE			088943-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		088943-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088943-009	SW846 7470
	Nickel	0.00104	0.0005	0.002	NE	J		088943-009	SW846 6020
	Potassium	4.02	0.080	0.300	NE			088943-009	SW846 6020
	Selenium	0.00214	0.001	0.005	0.050	J		088943-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088943-009	SW846 6020
	Sodium	49.8	0.800	2.50	NE			088943-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088943-009	SW846 6020
	Uranium	**0.00636**	0.00005	0.0002	0.030			088943-009	SW846 6020
	Vanadium	0.00378	0.003	0.010	NE	J		088943-009	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		088943-009	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-5 *(Continued)*
Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW4	Aluminum	0.0106	0.010	0.030	NE	J		088949-009	SW846 6020
29-Apr-10	Antimony	0.00372	0.0005	0.003	0.006			088949-009	SW846 6020
	Arsenic	0.00913	0.0015	0.005	0.010	B	0.014U	088949-009	SW846 6020
	Barium	0.0974	0.0005	0.002	2.00			088949-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088949-009	SW846 6020
	Cadmium	0.000233	0.00011	0.001	0.005	J		088949-009	SW846 6020
	Calcium	61.0	0.200	2.00	NE	B		088949-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088949-009	SW846 6020
	Cobalt	0.000166	0.0001	0.001	NE	J		088949-009	SW846 6020
	Copper	0.00305	0.0003	0.001	NE			088949-009	SW846 6020
	Iron	0.0607	0.010	0.100	NE	J		088949-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088949-009	SW846 6020
	Magnesium	18.5	0.005	0.015	NE			088949-009	SW846 6020
	Manganese	0.00925	0.001	0.005	NE			088949-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088949-009	SW846 7470
	Nickel	0.0106	0.0005	0.002	NE			088949-009	SW846 6020
	Potassium	5.29	0.080	0.300	NE			088949-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		088949-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088949-009	SW846 6020
	Sodium	44.5	0.800	2.50	NE			088949-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088949-009	SW846 6020
	Uranium	**0.00573**	0.00005	0.0002	0.030			088949-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		088949-009	SW846 6020
	Zinc	0.117	0.0026	0.010	NE			088949-009	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-5 *(Continued)*
Summary of Total Metal Results (Unfiltered),
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW5	Aluminum	ND	0.010	0.030	NE	U		088918-009	SW846 6020
20-Apr-10	Antimony	ND	0.0005	0.003	0.006	U		088918-009	SW846 6020
	Arsenic	0.00326	0.0015	0.005	0.010	B, J	0.012U	088918-009	SW846 6020
	Barium	**0.126**	0.0005	0.002	2.00			088918-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088918-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088918-009	SW846 6020
	Calcium	94.5	0.100	1.00	NE	B		088918-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088918-009	SW846 6020
	Cobalt	0.000141	0.0001	0.001	NE	J		088918-009	SW846 6020
	Copper	0.000877	0.0003	0.001	NE	J	0.0092U	088918-009	SW846 6020
	Iron	0.197	0.010	0.100	NE	B		088918-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088918-009	SW846 6020
	Magnesium	31.1	0.005	0.015	NE			088918-009	SW846 6020
	Manganese	0.00759	0.001	0.005	NE			088918-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	088918-009	SW846 7470
	Nickel	0.00177	0.0005	0.002	NE	J		088918-009	SW846 6020
	Potassium	6.39	0.400	1.50	NE			088918-009	SW846 6020
	Selenium	0.00123	0.001	0.005	0.050	J	NJ-	088918-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088918-009	SW846 6020
	Sodium	68.6	0.400	1.25	NE			088918-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088918-009	SW846 6020
	Uranium	**0.00994**	0.00005	0.0002	0.030			088918-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U	UJ	088918-009	SW846 6020
	Zinc	0.00307	0.0026	0.010	NE			088918-009	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-5 *(Continued)*
Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW5 (Duplicate) 20-Apr-10	Aluminum	ND	0.010	0.030	NE	U		088919-009	SW846 6020
	Antimony	ND	0.0005	0.003	0.006	U		088919-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		088919-009	SW846 6020
	Barium	**0.127**	0.0005	0.002	2.00			088919-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088919-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088919-009	SW846 6020
	Calcium	90.7	0.100	1.00	NE	B		088919-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088919-009	SW846 6020
	Cobalt	0.000122	0.0001	0.001	NE	J		088919-009	SW846 6020
	Copper	0.000822	0.0003	0.001	NE	J	0.0092U	088919-009	SW846 6020
	Iron	0.236	0.010	0.100	NE	B		088919-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088919-009	SW846 6020
	Magnesium	30.9	0.005	0.015	NE			088919-009	SW846 6020
	Manganese	0.0081	0.001	0.005	NE			088919-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	088919-009	SW846 7470
	Nickel	0.00178	0.0005	0.002	NE	J		088919-009	SW846 6020
	Potassium	6.43	0.400	1.50	NE			088919-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U	UJ	088919-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088919-009	SW846 6020
	Sodium	60.9	0.400	1.25	NE			088919-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088919-009	SW846 6020
	Uranium	**0.0099**	0.00005	0.0002	0.030			088919-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U	UJ	088919-009	SW846 6020
	Zinc	0.00293	0.0026	0.010	NE	J		088919-009	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-5 *(Continued)*
Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW6	Aluminum	ND	0.010	0.030	NE	U		088909-009	SW846 6020
19-Apr-10	Antimony	ND	0.0005	0.003	0.006	U		088909-009	SW846 6020
	Arsenic	0.00288	0.0015	0.005	0.010	B, J	0.012U	088909-009	SW846 6020
	Barium	0.110	0.0005	0.002	2.00			088909-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088909-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088909-009	SW846 6020
	Calcium	90.0	0.100	1.00	NE	B		088909-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088909-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		088909-009	SW846 6020
	Copper	0.000556	0.0003	0.001	NE	J		088909-009	SW846 6020
	Iron	0.0705	0.010	0.100	NE	B, J		088909-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088909-009	SW846 6020
	Magnesium	28.7	0.005	0.015	NE			088909-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		088909-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	088909-009	SW846 7470
	Nickel	0.0012	0.0005	0.002	NE	J		088909-009	SW846 6020
	Potassium	6.08	0.400	1.50	NE			088909-009	SW846 6020
	Selenium	0.0016	0.001	0.005	0.050	J	NJ-	088909-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088909-009	SW846 6020
	Sodium	63.7	0.400	1.25	NE			088909-009	SW846 6020
	Thallium	0.000771	0.0003	0.001	0.002	J		088909-009	SW846 6020
	Uranium	**0.00947**	0.00005	0.0002	0.030		J+	088909-009	SW846 6020
	Vanadium	0.00674	0.003	0.010	NE	B, J	0.022U	088909-009	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		088909-009	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-5 *(Continued)*
Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW7	Aluminum	ND	0.010	0.030	NE	U		088929-009	SW846 6020
22-Apr-10	Antimony	ND	0.0005	0.003	0.006	U		088929-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		088929-009	SW846 6020
	Barium	0.0995	0.0005	0.002	2.00			088929-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088929-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088929-009	SW846 6020
	Calcium	54.5	0.100	1.00	NE	B		088929-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088929-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		088929-009	SW846 6020
	Copper	0.000703	0.0003	0.001	NE	J		088929-009	SW846 6020
	Iron	0.128	0.010	0.100	NE	B		088929-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088929-009	SW846 6020
	Magnesium	19.1	0.005	0.015	NE			088929-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		088929-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	088929-009	SW846 7470
	Nickel	0.00123	0.0005	0.002	NE	J		088929-009	SW846 6020
	Potassium	4.84	0.400	1.50	NE			088929-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U	UJ	088929-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088929-009	SW846 6020
	Sodium	43.9	0.400	1.25	NE			088929-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088929-009	SW846 6020
	Uranium	**0.00819**	0.00005	0.0002	0.030			088929-009	SW846 6020
	Vanadium	0.00648	0.003	0.010	NE	B, J	0.022UJ	088929-009	SW846 6020
	Zinc	0.00342	0.0026	0.010	NE	J		088929-009	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-5 *(Continued)*
Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW8	Aluminum	0.0355	0.010	0.030	NE			088934-009	SW846 6020
26-Apr-10	Antimony	ND	0.0005	0.003	0.006	U		088934-009	SW846 6020
	Arsenic	0.00304	0.0015	0.005	0.010	B, J	0.014U	088934-009	SW846 6020
	Barium	**0.141**	0.0005	0.002	2.00			088934-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088934-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088934-009	SW846 6020
	Calcium	57.2	0.200	2.00	NE	B		088934-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088934-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		088934-009	SW846 6020
	Copper	0.000671	0.0003	0.001	NE	J		088934-009	SW846 6020
	Iron	0.149	0.010	0.100	NE			088934-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088934-009	SW846 6020
	Magnesium	20.3	0.005	0.015	NE			088934-009	SW846 6020
	Manganese	0.00703	0.001	0.005	NE			088934-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088934-009	SW846 7470
	Nickel	0.00109	0.0005	0.002	NE	J		088934-009	SW846 6020
	Potassium	5.29	0.080	0.300	NE			088934-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		088934-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088934-009	SW846 6020
	Sodium	42.5	0.080	0.250	NE			088934-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088934-009	SW846 6020
	Uranium	**0.00694**	0.00005	0.0002	0.030			088934-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		088934-009	SW846 6020
	Zinc	0.00359	0.0026	0.010	NE	J		088934-009	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-5 *(Continued)*
Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW9	Aluminum	0.0386	0.010	0.030	NE			088924-009	SW846 6020
21-Apr-10	Antimony	ND	0.0005	0.003	0.006	U		088924-009	SW846 6020
	Arsenic	0.00344	0.0015	0.005	0.010	B, J	0.012U	088924-009	SW846 6020
	Barium	0.102	0.0005	0.002	2.00			088924-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088924-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088924-009	SW846 6020
	Calcium	58.3	0.100	1.00	NE	B		088924-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088924-009	SW846 6020
	Cobalt	0.000139	0.0001	0.001	NE	J		088924-009	SW846 6020
	Copper	0.000816	0.0003	0.001	NE	J		088924-009	SW846 6020
	Iron	0.144	0.010	0.100	NE	B		088924-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088924-009	SW846 6020
	Magnesium	19.7	0.005	0.015	NE			088924-009	SW846 6020
	Manganese	0.00676	0.001	0.005	NE			088924-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	088924-009	SW846 7470
	Nickel	0.00122	0.0005	0.002	NE	J		088924-009	SW846 6020
	Potassium	4.90	0.400	1.50	NE			088924-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U	UJ	088924-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088924-009	SW846 6020
	Sodium	44.8	0.400	1.25	NE			088924-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088924-009	SW846 6020
	Uranium	**0.00982**	0.00005	0.0002	0.030			088924-009	SW846 6020
	Vanadium	0.0149	0.003	0.010	NE	B	0.022UJ	088924-009	SW846 6020
	Zinc	0.00441	0.0026	0.010	NE	J		088924-009	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-5 *(Continued)*
Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-BW2	Aluminum	ND	0.010	0.030	NE	U		089402-009	SW846 6020
06-Jul-10	Antimony	ND	0.0005	0.003	0.006	U		089402-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089402-009	SW846 6020
	Barium	0.0961	0.0005	0.002	2.00			089402-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089402-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089402-009	SW846 6020
	Calcium	69.2	0.100	1.00	NE	B		089402-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089402-009	SW846 6020
	Cobalt	0.0001	0.0001	0.001	NE	J		089402-009	SW846 6020
	Copper	0.000576	0.0003	0.001	NE	J		089402-009	SW846 6020
	Iron	0.224	0.010	0.100	NE			089402-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089402-009	SW846 6020
	Magnesium	25.2	0.005	0.015	NE			089402-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089402-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089402-009	SW846 7470
	Nickel	0.00173	0.0005	0.002	NE	J		089402-009	SW846 6020
	Potassium	3.93	0.080	0.300	NE			089402-009	SW846 6020
	Selenium	0.00226	0.001	0.005	0.050	J		089402-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089402-009	SW846 6020
	Sodium	51.8	0.400	1.25	NE			089402-009	SW846 6020
	Thallium	0.000504	0.0003	0.001	0.002	J	0.0029U	089402-009	SW846 6020
	Uranium	**0.00729**	0.00005	0.0002	0.030			089402-009	SW846 6020
	Vanadium	0.0057	0.003	0.010	NE	J		089402-009	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		089402-009	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-5 *(Continued)*
Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW7	Aluminum	ND	0.010	0.030	NE	U		089407-009	SW846 6020
07-Jul-10	Antimony	ND	0.0005	0.003	0.006	U		089407-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089407-009	SW846 6020
	Barium	0.0977	0.0005	0.002	2.00			089407-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089407-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089407-009	SW846 6020
	Calcium	55.8	0.100	1.00	NE	B		089407-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089407-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		089407-009	SW846 6020
	Copper	0.000736	0.0003	0.001	NE	J	0.013UJ	089407-009	SW846 6020
	Iron	0.183	0.010	0.100	NE			089407-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089407-009	SW846 6020
	Magnesium	18.0	0.005	0.015	NE			089407-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089407-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089407-009	SW846 7470
	Nickel	0.00157	0.0005	0.002	NE	J		089407-009	SW846 6020
	Potassium	4.86	0.080	0.300	NE			089407-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		089407-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089407-009	SW846 6020
	Sodium	44.8	0.080	0.250	NE			089407-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089407-009	SW846 6020
	Uranium	**0.00798**	0.00005	0.0002	0.030			089407-009	SW846 6020
	Vanadium	0.00783	0.003	0.010	NE	J		089407-009	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		089407-009	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-5 *(Continued)*
Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW7 (Duplicate) 07-Jul-10	Aluminum	ND	0.010	0.030	NE	U		089408-009	SW846 6020
	Antimony	ND	0.0005	0.003	0.006	U		089408-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089408-009	SW846 6020
	Barium	0.0947	0.0005	0.002	2.00			089408-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089408-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089408-009	SW846 6020
	Calcium	54.9	0.100	1.00	NE	B		089408-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089408-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		089408-009	SW846 6020
	Copper	0.000721	0.0003	0.001	NE	J	0.013UJ	089408-009	SW846 6020
	Iron	0.181	0.010	0.100	NE			089408-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089408-009	SW846 6020
	Magnesium	17.2	0.005	0.015	NE			089408-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089408-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089408-009	SW846 7470
	Nickel	0.00139	0.0005	0.002	NE	J		089408-009	SW846 6020
	Potassium	4.52	0.080	0.300	NE			089408-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		089408-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089408-009	SW846 6020
	Sodium	45.9	0.080	0.250	NE			089408-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089408-009	SW846 6020
	Uranium	**0.00796**	0.00005	0.0002	0.030			089408-009	SW846 6020
	Vanadium	0.00828	0.003	0.010	NE	J		089408-009	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		089408-009	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-5 *(Continued)*
Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW8	Aluminum	0.079	0.010	0.030	NE			089411-009	SW846 6020
12-Jul-10	Antimony	ND	0.0005	0.003	0.006	U		089411-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089411-009	SW846 6020
	Barium	**0.145**	0.0005	0.002	2.00			089411-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089411-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089411-009	SW846 6020
	Calcium	61.2	0.100	1.00	NE			089411-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089411-009	SW846 6020
	Cobalt	0.000101	0.0001	0.001	NE	J		089411-009	SW846 6020
	Copper	0.000687	0.0003	0.001	NE	J		089411-009	SW846 6020
	Iron	0.237	0.010	0.100	NE			089411-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089411-009	SW846 6020
	Magnesium	21.4	0.005	0.015	NE			089411-009	SW846 6020
	Manganese	0.0111	0.001	0.005	NE			089411-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089411-009	SW846 7470
	Nickel	0.0013	0.0005	0.002	NE	J		089411-009	SW846 6020
	Potassium	5.34	0.080	0.300	NE			089411-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		089411-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089411-009	SW846 6020
	Sodium	46.5	0.080	0.250	NE			089411-009	SW846 6020
	Thallium	0.000508	0.0003	0.001	0.002	J		089411-009	SW846 6020
	Uranium	**0.00745**	0.00005	0.0002	0.030	B		089411-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089411-009	SW846 6020
	Zinc	0.0034	0.0026	0.010	NE	J		089411-009	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-5 *(Concluded)*
Summary of Total Metal Results (Unfiltered),
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW9	Aluminum	0.0124	0.010	0.030	NE	J		089414-009	SW846 6020
13-Jul-10	Antimony	ND	0.0005	0.003	0.006	U		089414-009	SW846 6020
	Arsenic	0.00316	0.0015	0.005	0.010	J		089414-009	SW846 6020
	Barium	0.0959	0.0005	0.002	2.00			089414-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089414-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089414-009	SW846 6020
	Calcium	58.4	0.100	1.00	NE			089414-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089414-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		089414-009	SW846 6020
	Copper	0.00102	0.0003	0.001	NE			089414-009	SW846 6020
	Iron	0.165	0.010	0.100	NE			089414-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089414-009	SW846 6020
	Magnesium	21.5	0.005	0.015	NE			089414-009	SW846 6020
	Manganese	0.00364	0.001	0.005	NE	J		089414-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089414-009	SW846 7470
	Nickel	0.00134	0.0005	0.002	NE	J		089414-009	SW846 6020
	Potassium	4.81	0.080	0.300	NE			089414-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		089414-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089414-009	SW846 6020
	Sodium	42.4	0.080	0.250	NE			089414-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089414-009	SW846 6020
	Uranium	**0.00881**	0.00005	0.0002	0.030	B		089414-009	SW846 6020
	Vanadium	0.00697	0.003	0.010	NE	J		089414-009	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		089414-009	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-6
Summary of Total Metal Results (Filtered),
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-BW2	Aluminum	ND	0.010	0.030	NE	U		087998-010	SW846 6020
04-Jan-10	Antimony	ND	0.0005	0.003	0.006	U		087998-010	SW846 6020
	Arsenic	0.0024	0.0015	0.005	0.010	B, J	0.012U	087998-010	SW846 6020
	Barium	0.0949	0.0005	0.002	2.00			087998-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		087998-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		087998-010	SW846 6020
	Calcium	75.6	0.100	1.00	NE			087998-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		087998-010	SW846 6020
	Cobalt	0.000154	0.0001	0.001	NE	J	0.00087U	087998-010	SW846 6020
	Copper	0.000552	0.0003	0.001	NE	J	0.011U	087998-010	SW846 6020
	Iron	0.203	0.010	0.100	NE			087998-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		087998-010	SW846 6020
	Magnesium	25.2	0.005	0.015	NE			087998-010	SW846 6020
	Manganese	0.00101	0.001	0.005	NE	J	0.063U	087998-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		087998-010	SW846 7470
	Nickel	0.00279	0.0005	0.002	NE		0.038U	087998-010	SW846 6020
	Potassium	4.27	0.080	0.300	NE			087998-010	SW846 6020
	Selenium	0.00165	0.001	0.005	0.050	J		087998-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		087998-010	SW846 6020
	Sodium	66.3	0.400	1.25	NE			087998-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		087998-010	SW846 6020
	Uranium	**0.00706**	0.00005	0.0002	0.030			087998-010	SW846 6020
	Vanadium	0.00455	0.003	0.010	NE	J	0.024U	087998-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		087998-010	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-6 *(Continued)*
Summary of Total Metal Results (Filtered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW7	Aluminum	ND	0.010	0.030	NE	U		088002-010	SW846 6020
05-Jan-10	Antimony	ND	0.0005	0.003	0.006	U		088002-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		088002-010	SW846 6020
	Barium	0.0938	0.0005	0.002	2.00			088002-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088002-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088002-010	SW846 6020
	Calcium	59.5	0.100	1.00	NE			088002-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088002-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		088002-010	SW846 6020
	Copper	0.000825	0.0003	0.001	NE	J	0.012U	088002-010	SW846 6020
	Iron	0.155	0.010	0.100	NE			088002-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088002-010	SW846 6020
	Magnesium	21.3	0.005	0.015	NE			088002-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		088002-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088002-010	SW846 7470
	Nickel	0.00218	0.0005	0.002	NE			088002-010	SW846 6020
	Potassium	5.15	0.080	0.300	NE			088002-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		088002-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088002-010	SW846 6020
	Sodium	49.3	0.400	1.25	NE			088002-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088002-010	SW846 6020
	Uranium	**0.00774**	0.00005	0.0002	0.030			088002-010	SW846 6020
	Vanadium	0.00528	0.003	0.010	NE	J	0.024U	088002-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		088002-010	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-6 *(Continued)*
Summary of Total Metal Results (Filtered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW7 (Duplicate) 05-Jan-10	Aluminum	ND	0.010	0.030	NE	U		088003-010	SW846 6020
	Antimony	ND	0.0005	0.003	0.006	U		088003-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		088003-010	SW846 6020
	Barium	0.0961	0.0005	0.002	2.00			088003-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088003-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088003-010	SW846 6020
	Calcium	60.7	0.100	1.00	NE			088003-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088003-010	SW846 6020
	Cobalt	0.000105	0.0001	0.001	NE	J		088003-010	SW846 6020
	Copper	0.000672	0.0003	0.001	NE	J	0.012U	088003-010	SW846 6020
	Iron	0.161	0.010	0.100	NE			088003-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088003-010	SW846 6020
	Magnesium	22.7	0.005	0.015	NE			088003-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		088003-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088003-010	SW846 7470
	Nickel	0.0023	0.0005	0.002	NE			088003-010	SW846 6020
	Potassium	5.71	0.080	0.300	NE			088003-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		088003-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088003-010	SW846 6020
	Sodium	53.1	0.400	1.25	NE			088003-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088003-010	SW846 6020
	Uranium	**0.00792**	0.00005	0.0002	0.030			088003-010	SW846 6020
	Vanadium	0.00403	0.003	0.010	NE	J	0.024U	088003-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		088003-010	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-6 *(Continued)*
Summary of Total Metal Results (Filtered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW8	Aluminum	ND	0.010	0.030	NE	U		088007-010	SW846 6020
06-Jan-10	Antimony	ND	0.0005	0.003	0.006	U		088007-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		088007-010	SW846 6020
	Barium	**0.142**	0.0005	0.002	2.00			088007-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088007-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088007-010	SW846 6020
	Calcium	62.3	0.100	1.00	NE			088007-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088007-010	SW846 6020
	Cobalt	0.000119	0.0001	0.001	NE	J		088007-010	SW846 6020
	Copper	0.000651	0.0003	0.001	NE	J	0.0021U	088007-010	SW846 6020
	Iron	0.179	0.010	0.100	NE			088007-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088007-010	SW846 6020
	Magnesium	22.2	0.005	0.015	NE			088007-010	SW846 6020
	Manganese	0.224	0.001	0.005	NE			088007-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088007-010	SW846 7470
	Nickel	0.00269	0.0005	0.002	NE			088007-010	SW846 6020
	Potassium	5.84	0.080	0.300	NE			088007-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		088007-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088007-010	SW846 6020
	Sodium	53.7	0.400	1.25	NE			088007-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088007-010	SW846 6020
	Uranium	**0.00779**	0.00005	0.0002	0.030			088007-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		088007-010	SW846 6020
	Zinc	0.00492	0.0026	0.010	NE	J		088007-010	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-6 *(Continued)*
Summary of Total Metal Results (Filtered),
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW9	Aluminum	ND	0.010	0.030	NE	U		088011-010	SW846 6020
07-Jan-10	Antimony	0.000782	0.0005	0.003	0.006	J		088011-010	SW846 6020
	Arsenic	0.00175	0.0015	0.005	0.010	J		088011-010	SW846 6020
	Barium	0.0945	0.0005	0.002	2.00			088011-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088011-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088011-010	SW846 6020
	Calcium	60.3	0.100	1.00	NE	B		088011-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088011-010	SW846 6020
	Cobalt	0.000181	0.0001	0.001	NE	J		088011-010	SW846 6020
	Copper	0.00081	0.0003	0.001	NE	J	0.0025U	088011-010	SW846 6020
	Iron	0.180	0.010	0.100	NE			088011-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088011-010	SW846 6020
	Magnesium	20.3	0.005	0.015	NE			088011-010	SW846 6020
	Manganese	0.00407	0.001	0.005	NE	J		088011-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088011-010	SW846 7470
	Nickel	0.00164	0.0005	0.002	NE	J		088011-010	SW846 6020
	Potassium	4.95	0.080	0.300	NE			088011-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		088011-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088011-010	SW846 6020
	Sodium	47.8	0.080	0.250	NE			088011-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088011-010	SW846 6020
	Uranium	**0.00971**	0.00005	0.0002	0.030			088011-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		088011-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		088011-010	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-6 *(Continued)*
Summary of Total Metal Results (Filtered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-BW2	Aluminum	0.0118	0.010	0.030	NE	J		088942-010	SW846 6020
27-Apr-10	Antimony	ND	0.0005	0.003	0.006	U		088942-010	SW846 6020
	Arsenic	0.00331	0.0015	0.005	0.010	B, J	0.014U	088942-010	SW846 6020
	Barium	0.0935	0.0005	0.002	2.00			088942-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088942-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088942-010	SW846 6020
	Calcium	64.1	0.200	2.00	NE	B		088942-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088942-010	SW846 6020
	Cobalt	0.000305	0.0001	0.001	NE	J	0.0034U	088942-010	SW846 6020
	Copper	0.00044	0.0003	0.001	NE	J	0.0036U	088942-010	SW846 6020
	Iron	0.0625	0.010	0.100	NE	J		088942-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088942-010	SW846 6020
	Magnesium	20.1	0.005	0.015	NE			088942-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		088942-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088942-010	SW846 7470
	Nickel	0.00108	0.0005	0.002	NE	J		088942-010	SW846 6020
	Potassium	3.95	0.080	0.300	NE			088942-010	SW846 6020
	Selenium	0.002	0.001	0.005	0.050	J		088942-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088942-010	SW846 6020
	Sodium	48.0	0.800	2.50	NE			088942-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088942-010	SW846 6020
	Uranium	**0.00638**	0.00005	0.0002	0.030			088942-010	SW846 6020
	Vanadium	0.00856	0.003	0.010	NE	J	0.074UJ	088942-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		088942-010	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-6 *(Continued)*
Summary of Total Metal Results (Filtered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-BW2 (Duplicate) 27-Apr-10	Aluminum	ND	0.010	0.030	NE	U		088943-010	SW846 6020
	Antimony	ND	0.0005	0.003	0.006	U		088943-010	SW846 6020
	Arsenic	0.00518	0.0015	0.005	0.010	B	0.014U	088943-010	SW846 6020
	Barium	0.095	0.0005	0.002	2.00			088943-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088943-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088943-010	SW846 6020
	Calcium	71.7	0.200	2.00	NE	B		088943-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088943-010	SW846 6020
	Cobalt	0.000139	0.0001	0.001	NE	J	0.0034U	088943-010	SW846 6020
	Copper	0.00043	0.0003	0.001	NE	J	0.0036U	088943-010	SW846 6020
	Iron	0.0648	0.010	0.100	NE	J		088943-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088943-010	SW846 6020
	Magnesium	21.9	0.005	0.015	NE			088943-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		088943-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088943-010	SW846 7470
	Nickel	0.00113	0.0005	0.002	NE	J		088943-010	SW846 6020
	Potassium	4.20	0.080	0.300	NE			088943-010	SW846 6020
	Selenium	0.00206	0.001	0.005	0.050	J		088943-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088943-010	SW846 6020
	Sodium	53.1	0.800	2.50	NE			088943-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088943-010	SW846 6020
	Uranium	**0.00642**	0.00005	0.0002	0.030			088943-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U	0.074UJ	088943-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		088943-010	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-6 *(Continued)*
Summary of Total Metal Results (Filtered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW4	Aluminum	0.0172	0.010	0.030	NE	J		088949-010	SW846 6020
29-Apr-10	Antimony	0.00288	0.0005	0.003	0.006	J		088949-010	SW846 6020
	Arsenic	0.007	0.0015	0.005	0.010	B	0.014U	088949-010	SW846 6020
	Barium	0.0969	0.0005	0.002	2.00			088949-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088949-010	SW846 6020
	Cadmium	0.000237	0.00011	0.001	0.005	J		088949-010	SW846 6020
	Calcium	59.5	0.200	2.00	NE	B		088949-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088949-010	SW846 6020
	Cobalt	0.000137	0.0001	0.001	NE	J		088949-010	SW846 6020
	Copper	0.00163	0.0003	0.001	NE			088949-010	SW846 6020
	Iron	0.045	0.010	0.100	NE	J	NJ-	088949-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088949-010	SW846 6020
	Magnesium	18.6	0.005	0.015	NE			088949-010	SW846 6020
	Manganese	0.004	0.001	0.005	NE	J		088949-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088949-010	SW846 7470
	Nickel	0.00976	0.0005	0.002	NE			088949-010	SW846 6020
	Potassium	5.11	0.080	0.300	NE			088949-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		088949-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088949-010	SW846 6020
	Sodium	44.5	0.800	2.50	NE			088949-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088949-010	SW846 6020
	Uranium	**0.0058**	0.00005	0.0002	0.030			088949-010	SW846 6020
	Vanadium	0.0111	0.003	0.010	NE			088949-010	SW846 6020
	Zinc	0.106	0.0026	0.010	NE			088949-010	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-6 *(Continued)*
Summary of Total Metal Results (Filtered),
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW5	Aluminum	ND	0.010	0.030	NE	U		088918-010	SW846 6020
20-Apr-10	Antimony	ND	0.0005	0.003	0.006	U		088918-010	SW846 6020
	Arsenic	0.004	0.0015	0.005	0.010	B, J	0.012U	088918-010	SW846 6020
	Barium	**0.129**	0.0005	0.002	2.00			088918-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088918-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088918-010	SW846 6020
	Calcium	88.8	0.100	1.00	NE	B		088918-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088918-010	SW846 6020
	Cobalt	0.000134	0.0001	0.001	NE	J	0.00086U	088918-010	SW846 6020
	Copper	0.000791	0.0003	0.001	NE	J	0.0081U	088918-010	SW846 6020
	Iron	0.165	0.010	0.100	NE	B		088918-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088918-010	SW846 6020
	Magnesium	28.7	0.005	0.015	NE			088918-010	SW846 6020
	Manganese	0.00296	0.001	0.005	NE	J		088918-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	088918-010	SW846 7470
	Nickel	0.00203	0.0005	0.002	NE			088918-010	SW846 6020
	Potassium	5.62	0.400	1.50	NE			088918-010	SW846 6020
	Selenium	0.00135	0.001	0.005	0.050	J	NJ-	088918-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088918-010	SW846 6020
	Sodium	60.6	0.400	1.25	NE			088918-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088918-010	SW846 6020
	Uranium	**0.0102**	0.00005	0.0002	0.030			088918-010	SW846 6020
	Vanadium	0.00933	0.003	0.010	NE	B, J	0.022UJ	088918-010	SW846 6020
	Zinc	0.00443	0.0026	0.010	NE	J		088918-010	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-6 *(Continued)*
Summary of Total Metal Results (Filtered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW5 (Duplicate) 20-Apr-10	Aluminum	ND	0.010	0.030	NE	U		088919-010	SW846 6020
	Antimony	ND	0.0005	0.003	0.006	U		088919-010	SW846 6020
	Arsenic	0.00234	0.0015	0.005	0.010	B, J	0.012U	088919-010	SW846 6020
	Barium	**0.138**	0.0005	0.002	2.00			088919-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088919-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088919-010	SW846 6020
	Calcium	95.5	0.100	1.00	NE	B		088919-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088919-010	SW846 6020
	Cobalt	0.000126	0.0001	0.001	NE	J	0.00086U	088919-010	SW846 6020
	Copper	0.000843	0.0003	0.001	NE	J	0.0081U	088919-010	SW846 6020
	Iron	0.198	0.010	0.100	NE	B		088919-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088919-010	SW846 6020
	Magnesium	31.2	0.005	0.015	NE			088919-010	SW846 6020
	Manganese	0.00323	0.001	0.005	NE	J		088919-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	088919-010	SW846 7470
	Nickel	0.00169	0.0005	0.002	NE	J		088919-010	SW846 6020
	Potassium	5.92	0.400	1.50	NE			088919-010	SW846 6020
	Selenium	0.00155	0.001	0.005	0.050	J	NJ-	088919-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088919-010	SW846 6020
	Sodium	65.5	0.400	1.25	NE			088919-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088919-010	SW846 6020
	Uranium	**0.0102**	0.00005	0.0002	0.030			088919-010	SW846 6020
	Vanadium	0.00358	0.003	0.010	NE	B, J	0.022UJ	088919-010	SW846 6020
	Zinc	0.00282	0.0026	0.010	NE	J		088919-010	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-6 *(Continued)*
Summary of Total Metal Results (Filtered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW6	Aluminum	ND	0.010	0.030	NE	U		088909-010	SW846 6020
19-Apr-10	Antimony	ND	0.0005	0.003	0.006	U		088909-010	SW846 6020
	Arsenic	0.00474	0.0015	0.005	0.010	B, J	0.012U	088909-010	SW846 6020
	Barium	0.109	0.0005	0.002	2.00			088909-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088909-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088909-010	SW846 6020
	Calcium	86.6	0.100	1.00	NE	B		088909-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088909-010	SW846 6020
	Cobalt	0.000196	0.0001	0.001	NE	J		088909-010	SW846 6020
	Copper	0.00102	0.0003	0.001	NE			088909-010	SW846 6020
	Iron	0.184	0.010	0.100	NE	B		088909-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088909-010	SW846 6020
	Magnesium	28.1	0.005	0.015	NE			088909-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		088909-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	088909-010	SW846 7470
	Nickel	0.00156	0.0005	0.002	NE	J		088909-010	SW846 6020
	Potassium	5.94	0.400	1.50	NE			088909-010	SW846 6020
	Selenium	0.00158	0.001	0.005	0.050	J	NJ-	088909-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088909-010	SW846 6020
	Sodium	62.8	0.400	1.25	NE			088909-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088909-010	SW846 6020
	Uranium	**0.00989**	0.00005	0.0002	0.030			088909-010	SW846 6020
	Vanadium	0.00826	0.003	0.010	NE	B, J	0.022UJ	088909-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		088909-010	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-6 *(Continued)*
Summary of Total Metal Results (Filtered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW7	Aluminum	ND	0.010	0.030	NE	U		088929-010	SW846 6020
22-Apr-10	Antimony	ND	0.0005	0.003	0.006	U		088929-010	SW846 6020
	Arsenic	0.00242	0.0015	0.005	0.010	B, J	0.012U	088929-010	SW846 6020
	Barium	0.108	0.0005	0.002	2.00			088929-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088929-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088929-010	SW846 6020
	Calcium	58.5	0.100	1.00	NE	B		088929-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088929-010	SW846 6020
	Cobalt	0.000128	0.0001	0.001	NE	J		088929-010	SW846 6020
	Copper	0.000799	0.0003	0.001	NE	J		088929-010	SW846 6020
	Iron	0.159	0.010	0.100	NE	B		088929-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088929-010	SW846 6020
	Magnesium	19.2	0.005	0.015	NE			088929-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		088929-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	088929-010	SW846 7470
	Nickel	0.00127	0.0005	0.002	NE	J		088929-010	SW846 6020
	Potassium	5.45	0.400	1.50	NE			088929-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U	UJ	088929-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088929-010	SW846 6020
	Sodium	49.8	0.400	1.25	NE			088929-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088929-010	SW846 6020
	Uranium	**0.00842**	0.00005	0.0002	0.030			088929-010	SW846 6020
	Vanadium	0.00828	0.003	0.010	NE	B, J	0.022UJ	088929-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		088929-010	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-6 *(Continued)*
Summary of Total Metal Results (Filtered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW8	Aluminum	ND	0.010	0.030	NE	U		088934-010	SW846 6020
26-Apr-10	Antimony	ND	0.0005	0.003	0.006	U		088934-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		088934-010	SW846 6020
	Barium	**0.142**	0.0005	0.002	2.00			088934-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088934-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088934-010	SW846 6020
	Calcium	56.6	0.200	2.00	NE	B		088934-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088934-010	SW846 6020
	Cobalt	0.000266	0.0001	0.001	NE	J		088934-010	SW846 6020
	Copper	0.000555	0.0003	0.001	NE	J		088934-010	SW846 6020
	Iron	0.087	0.010	0.100	NE	J		088934-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088934-010	SW846 6020
	Magnesium	19.2	0.005	0.015	NE			088934-010	SW846 6020
	Manganese	0.00265	0.001	0.005	NE	J		088934-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		088934-010	SW846 7470
	Nickel	0.00104	0.0005	0.002	NE	J		088934-010	SW846 6020
	Potassium	5.25	0.080	0.300	NE			088934-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		088934-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088934-010	SW846 6020
	Sodium	43.0	0.080	0.250	NE			088934-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088934-010	SW846 6020
	Uranium	**0.00679**	0.00005	0.0002	0.030			088934-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		088934-010	SW846 6020
	Zinc	0.0032	0.0026	0.010	NE	J		088934-010	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-6 *(Continued)*
Summary of Total Metal Results (Filtered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW9	Aluminum	ND	0.010	0.030	NE	U		088924-010	SW846 6020
21-Apr-10	Antimony	ND	0.0005	0.003	0.006	U		088924-010	SW846 6020
	Arsenic	0.0044	0.0015	0.005	0.010	B, J	0.012U	088924-010	SW846 6020
	Barium	0.098	0.0005	0.002	2.00			088924-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		088924-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		088924-010	SW846 6020
	Calcium	58.6	0.100	1.00	NE	B		088924-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		088924-010	SW846 6020
	Cobalt	0.000158	0.0001	0.001	NE	J		088924-010	SW846 6020
	Copper	0.000725	0.0003	0.001	NE	J		088924-010	SW846 6020
	Iron	0.127	0.010	0.100	NE	B		088924-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		088924-010	SW846 6020
	Magnesium	18.5	0.005	0.015	NE			088924-010	SW846 6020
	Manganese	0.00168	0.001	0.005	NE	J		088924-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	088924-010	SW846 7470
	Nickel	0.00129	0.0005	0.002	NE	J		088924-010	SW846 6020
	Potassium	5.44	0.400	1.50	NE			088924-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U	UJ	088924-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		088924-010	SW846 6020
	Sodium	49.3	0.400	1.25	NE			088924-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		088924-010	SW846 6020
	Uranium	**0.00959**	0.00005	0.0002	0.030			088924-010	SW846 6020
	Vanadium	0.012	0.003	0.010	NE	B	0.022UJ	088924-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		088924-010	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-6 *(Continued)*
Summary of Total Metal Results (Filtered),
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-BW2	Aluminum	ND	0.010	0.030	NE	U		089402-010	SW846 6020
06-Jul-10	Antimony	ND	0.0005	0.003	0.006	U		089402-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089402-010	SW846 6020
	Barium	0.0948	0.0005	0.002	2.00			089402-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089402-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089402-010	SW846 6020
	Calcium	70.4	0.100	1.00	NE	B		089402-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089402-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		089402-010	SW846 6020
	Copper	0.000786	0.0003	0.001	NE	J		089402-010	SW846 6020
	Iron	0.226	0.010	0.100	NE			089402-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089402-010	SW846 6020
	Magnesium	25.1	0.005	0.015	NE			089402-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089402-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089402-010	SW846 7470
	Nickel	0.00172	0.0005	0.002	NE	J		089402-010	SW846 6020
	Potassium	4.00	0.080	0.300	NE			089402-010	SW846 6020
	Selenium	0.00228	0.001	0.005	0.050	J		089402-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089402-010	SW846 6020
	Sodium	54.4	0.400	1.25	NE			089402-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089402-010	SW846 6020
	Uranium	**0.0074**	0.00005	0.0002	0.030			089402-010	SW846 6020
	Vanadium	0.00687	0.003	0.010	NE	J		089402-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		089402-010	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-6 *(Continued)*
Summary of Total Metal Results (Filtered),
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW7	Aluminum	ND	0.010	0.030	NE	U		089407-010	SW846 6020
07-Jul-10	Antimony	ND	0.0005	0.003	0.006	U		089407-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089407-010	SW846 6020
	Barium	0.0982	0.0005	0.002	2.00			089407-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089407-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089407-010	SW846 6020
	Calcium	55.6	0.100	1.00	NE	B		089407-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089407-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		089407-010	SW846 6020
	Copper	0.00246	0.0003	0.001	NE		0.0032U	089407-010	SW846 6020
	Iron	0.184	0.010	0.100	NE		0.29U	089407-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089407-010	SW846 6020
	Magnesium	17.4	0.005	0.015	NE			089407-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089407-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089407-010	SW846 7470
	Nickel	0.00445	0.0005	0.002	NE			089407-010	SW846 6020
	Potassium	4.91	0.080	0.300	NE			089407-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		089407-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089407-010	SW846 6020
	Sodium	45.3	0.080	0.250	NE			089407-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089407-010	SW846 6020
	Uranium	**0.00816**	0.00005	0.0002	0.030			089407-010	SW846 6020
	Vanadium	0.0081	0.003	0.010	NE	J		089407-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		089407-010	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-6 *(Continued)*
Summary of Total Metal Results (Filtered),
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW7 (Duplicate) 07-Jul-10	Aluminum	ND	0.010	0.030	NE	U		089408-010	SW846 6020
	Antimony	ND	0.0005	0.003	0.006	U		089408-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089408-010	SW846 6020
	Barium	0.0971	0.0005	0.002	2.00			089408-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089408-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089408-010	SW846 6020
	Calcium	54.8	0.100	1.00	NE	B		089408-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089408-010	SW846 6020
	Cobalt	0.000171	0.0001	0.001	NE	J	0.00088U	089408-010	SW846 6020
	Copper	0.000873	0.0003	0.001	NE	J	0.0032U	089408-010	SW846 6020
	Iron	0.198	0.010	0.100	NE		0.29U	089408-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089408-010	SW846 6020
	Magnesium	17.4	0.005	0.015	NE			089408-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089408-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089408-010	SW846 7470
	Nickel	0.00155	0.0005	0.002	NE	J		089408-010	SW846 6020
	Potassium	4.58	0.080	0.300	NE			089408-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		089408-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089408-010	SW846 6020
	Sodium	46.0	0.080	0.250	NE			089408-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089408-010	SW846 6020
	Uranium	**0.008**	0.00005	0.0002	0.030			089408-010	SW846 6020
	Vanadium	0.00646	0.003	0.010	NE	J		089408-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		089408-010	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-6 *(Continued)*
Summary of Total Metal Results (Filtered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW8	Aluminum	ND	0.010	0.030	NE	U		089411-010	SW846 6020
12-Jul-10	Antimony	0.000927	0.0005	0.003	0.006	J		089411-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089411-010	SW846 6020
	Barium	**0.144**	0.0005	0.002	2.00			089411-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089411-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089411-010	SW846 6020
	Calcium	61.7	0.100	1.00	NE			089411-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089411-010	SW846 6020
	Cobalt	0.000251	0.0001	0.001	NE	J		089411-010	SW846 6020
	Copper	0.00058	0.0003	0.001	NE	J		089411-010	SW846 6020
	Iron	0.140	0.010	0.100	NE			089411-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089411-010	SW846 6020
	Magnesium	21.4	0.005	0.015	NE			089411-010	SW846 6020
	Manganese	0.00325	0.001	0.005	NE	J		089411-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089411-010	SW846 7470
	Nickel	0.00133	0.0005	0.002	NE	J		089411-010	SW846 6020
	Potassium	5.06	0.080	0.300	NE			089411-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		089411-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089411-010	SW846 6020
	Sodium	44.4	0.080	0.250	NE			089411-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089411-010	SW846 6020
	Uranium	**0.00739**	0.00005	0.0002	0.030	B		089411-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089411-010	SW846 6020
	Zinc	0.00364	0.0026	0.010	NE	J		089411-010	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-6 *(Concluded)*
Summary of Total Metal Results (Filtered),
Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW9	Aluminum	ND	0.010	0.030	NE	U		089414-010	SW846 6020
13-Jul-10	Antimony	ND	0.0005	0.003	0.006	U		089414-010	SW846 6020
	Arsenic	0.00316	0.0015	0.005	0.010	J		089414-010	SW846 6020
	Barium	0.0971	0.0005	0.002	2.00			089414-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089414-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089414-010	SW846 6020
	Calcium	57.3	0.100	1.00	NE			089414-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089414-010	SW846 6020
	Cobalt	0.00017	0.0001	0.001	NE	J		089414-010	SW846 6020
	Copper	0.000471	0.0003	0.001	NE	J		089414-010	SW846 6020
	Iron	0.138	0.010	0.100	NE			089414-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089414-010	SW846 6020
	Magnesium	20.3	0.005	0.015	NE			089414-010	SW846 6020
	Manganese	0.00153	0.001	0.005	NE	J		089414-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089414-010	SW846 7470
	Nickel	0.0013	0.0005	0.002	NE	J		089414-010	SW846 6020
	Potassium	5.03	0.080	0.300	NE			089414-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		089414-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089414-010	SW846 6020
	Sodium	46.4	0.080	0.250	NE			089414-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089414-010	SW846 6020
	Uranium	**0.00883**	0.00005	0.0002	0.030	B		089414-010	SW846 6020
	Vanadium	0.00767	0.003	0.010	NE	J		089414-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		089414-010	SW846 6020

Refer to footnotes on page 4A-57.

Table 4A-7
Summary of Tritium, Gross Alpha, Gross Beta, Gamma Spectroscopy, Isotopic Uranium, and Radon-222 Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d] (pCi/L)	NMED HWB[e] (pCi/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-BW2	Americium-241	-4.38 ± 18.4	21.9	11.0	NE	NE	U	BD	087998-033	EPA 901.1
04-Jan-10	Cesium-137	-3.32 ± 2.28	3.60	1.80	NE	9.3	U	BD	087998-033	EPA 901.1
	Cobalt-60	0.698 ± 2.22	3.85	1.93	NE	NE	U	BD	087998-033	EPA 901.1
	Potassium-40	11.7 ± 50.3	39.1	19.6	NE	NE	U	BD	087998-033	EPA 901.1
	Gross Alpha	1.97	NA	NA	15	NE	NA	None	087998-034	EPA 900.0
	Gross Beta	4.74 ± 1.23	1.33	0.637	4mrem/yr	NE			087998-034	EPA 900.0
	Tritium	11.4 ± 87.7	151	73.2	NE	NE	U	BD	087998-036	EPA 906.0 M
MWL-MW7	Americium-241	1.95 ± 12.1	21.0	10.5	NE	NE	U	BD	088002-033	EPA 901.1
05-Jan-10	Cesium-137	-3.4 ± 3.87	3.97	1.99	NE	9.3	U	BD	088002-033	EPA 901.1
	Cobalt-60	-5.06 ± 4.14	3.42	1.71	NE	NE	U	BD	088002-033	EPA 901.1
	Potassium-40	73.4 ± 28.7	33.5	16.8	NE	NE	X	R	088002-033	EPA 901.1
	Gross Alpha	7.07	NA	NA	15	NE	NA	None	088002-034	EPA 900.0
	Gross Beta	3.98 ± 1.04	1.07	0.513	4mrem/yr	NE			088002-034	EPA 900.0
	Tritium	43.6 ± 90.1	153	74.0	NE	NE	U	BD	088002-036	EPA 906.0 M
MWL-MW7 (Duplicate)	Americium-241	-18.2 ± 12.6	20.7	10.4	NE	NE	U	BD	088003-033	EPA 901.1
05-Jan-10	Cesium-137	0.400 ± 2.27	3.78	1.89	NE	9.3	U	BD	088003-033	EPA 901.1
	Cobalt-60	0.487 ± 2.25	3.79	1.90	NE	NE	U	BD	088003-033	EPA 901.1
	Potassium-40	-14.6 ± 42.5	46.6	23.3	NE	NE	U	BD	088003-033	EPA 901.1
	Gross Alpha	5.02	NA	NA	15	NE	NA	None	088003-034	EPA 900.0
	Gross Beta	4.94 ± 1.19	1.17	0.564	4mrem/yr	NE			088003-034	EPA 900.0
	Tritium	-34.2 ± 87.1	153	74.1	NE	NE	U	BD	088003-036	EPA 906.0 M
MWL-MW8	Americium-241	-4.21 ± 5.90	9.77	4.89	NE	NE	U	BD	088007-033	EPA 901.1
06-Jan-10	Cesium-137	-2.37 ± 2.65	3.08	1.54	NE	9.3	U	BD	088007-033	EPA 901.1
	Cobalt-60	2.37 ± 1.95	3.55	1.77	NE	NE	U	BD	088007-033	EPA 901.1
	Potassium-40	25.2 ± 46.4	30.7	15.4	NE	NE	U	BD	088007-033	EPA 901.1
	Gross Alpha	4.91	NA	NA	15	NE	NA	None	088007-034	EPA 900.0
	Gross Beta	6.81 ± 1.53	1.41	0.687	4mrem/yr	NE			088007-034	EPA 900.0
	Tritium	-38 ± 87.2	153	74.3	NE	NE	U	BD	088007-036	EPA 906.0 M
MWL-MW9	Americium-241	-1.52 ± 8.81	13.6	6.82	NE	NE	U	BD	088011-033	EPA 901.1
07-Jan-10	Cesium-137	1.92 ± 1.84	3.26	1.63	NE	9.3	U	BD	088011-033	EPA 901.1
	Cobalt-60	0.306 ± 1.84	3.11	1.56	NE	NE	U	BD	088011-033	EPA 901.1
	Potassium-40	16.8 ± 41.2	31.1	15.6	NE	NE	U	BD	088011-033	EPA 901.1
	Gross Alpha	9.89	NA	NA	15	NE	NA	None	088011-034	EPA 900.0
	Gross Beta	10.4 ± 2.11	1.67	0.813	4mrem/yr	NE			088011-034	EPA 900.0
	Tritium	27.9 ± 91.3	157	75.6	NE	NE	U	BD	088011-036	EPA 906.0 M

Refer to footnotes on page 4A-57.

Table 4A-7 *(Continued)*
Summary of Tritium, Gross Alpha, Gross Beta, Gamma Spectroscopy, Isotopic Uranium, and Radon-222 Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d] (pCi/L)	NMED HWB[e] (pCi/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-BW2	Americium-241	-0.0373 ± 5.88	9.55	4.78	NE	NE	U	BD	088942-033	EPA 901.1
27-Apr-10	Cesium-137	0.751 ± 1.60	2.72	1.36	NE	9.3	U	BD	088942-033	EPA 901.1
	Cobalt-60	-1.43 ± 2.86	2.87	1.44	NE	NE	U	BD	088942-033	EPA 901.1
	Potassium-40	17.2 ± 31.1	40.6	20.3	NE	NE	U	BD	088942-033	EPA 901.1
	Gross Alpha	7.73	NA	NA	15	NE	NA	None	088942-034	EPA 900.0
	Gross Beta	3.63 ± 1.09	1.20	0.572	4mrem/yr	NE		BD	088942-034	EPA 900.0
	Tritium	34.7 ± 101	183	80.9	NE	NE	U	BD	088942-036	EPA 906.0 M
MWL-BW2 (Duplicate)	Americium-241	-1.16 ± 7.62	12.8	6.42	NE	NE	U	BD	088943-033	EPA 901.1
27-Apr-10	Cesium-137	-0.495 ± 2.82	3.30	1.65	NE	9.3	U	BD	088943-033	EPA 901.1
	Cobalt-60	0.546 ± 1.86	3.18	1.59	NE	NE	U	BD	088943-033	EPA 901.1
	Potassium-40	-1.01 ± 35.8	42.4	21.2	NE	NE	U	BD	088943-033	EPA 901.1
	Gross Alpha	6.24	NA	NA	15	NE	NA	None	088943-034	EPA 900.0
	Gross Beta	3.19 ± 1.06	1.23	0.586	4mrem/yr	NE		J	088943-034	EPA 900.0
	Tritium	34.5 ± 101	182	80.4	NE	NE	U	BD	088943-036	EPA 906.0 M
MWL-MW4	Americium-241	-0.689 ± 7.49	11.9	5.94	NE	NE	U	BD	088949-033	EPA 901.1
29-Apr-10	Cesium-137	1.87 ± 1.65	2.87	1.44	NE	9.3	U	BD	088949-033	EPA 901.1
	Cobalt-60	-0.705 ± 1.69	2.69	1.35	NE	NE	U	BD	088949-033	EPA 901.1
	Potassium-40	-9.08 ± 34.3	43.3	21.7	NE	NE	U	BD	088949-033	EPA 901.1
	Gross Alpha	6.56	NA	NA	15	NE	NA	None	088949-034	EPA 900.0
	Gross Beta	4.68 ± 1.21	1.20	0.569	4mrem/yr	NE			088949-034	EPA 900.0
	Tritium	-36.9 ± 89.2	180	79.4	NE	NE	U	BD	088949-036	EPA 906.0 M
MWL-MW5	Americium-241	-36.5 ± 11.6	17.5	8.77	NE	NE	U	BD	088918-033	EPA 901.1
20-Apr-10	Cesium-137	0.0424 ± 1.92	3.28	1.64	NE	9.3	U	BD	088918-033	EPA 901.1
	Cobalt-60	-1.93 ± 2.83	3.20	1.60	NE	NE	U	BD	088918-033	EPA 901.1
	Potassium-40	5.62 ± 42.1	45.2	22.6	NE	NE	U	BD	088918-033	EPA 901.1
	Gross Alpha	6.74	NA	NA	15	NE	NA	None	088918-034	EPA 900.0
	Gross Beta	4.55 ± 1.46	1.86	0.894	4mrem/yr	NE		J	088918-034	EPA 900.0
	Tritium	-21 ± 90.0	157	76.1	NE	NE	U	BD	088918-036	EPA 906.0 M
MWL-MW5 (Duplicate)	Americium-241	-26.5 ± 11.6	18.7	9.33	NE	NE	U	BD	088919-033	EPA 901.1
20-Apr-10	Cesium-137	-0.343 ± 1.91	3.21	1.61	NE	9.3	U	BD	088919-033	EPA 901.1
	Cobalt-60	1.07 ± 1.93	3.35	1.68	NE	NE	U	BD	088919-033	EPA 901.1
	Potassium-40	4.85 ± 53.3	52.6	26.3	NE	NE	U	BD	088919-033	EPA 901.1
	Gross Alpha	8.57	NA	NA	15	NE	NA	None	088919-034	EPA 900.0
	Gross Beta	5.50 ± 1.39	1.33	0.633	4mrem/yr	NE			088919-034	EPA 900.0
	Tritium	-24.8 ± 89.7	157	76.0	NE	NE	U	BD	088919-036	EPA 906.0 M

Refer to footnotes on page 4A-57.

Table 4A-7 *(Continued)*
Summary of Tritium, Gross Alpha, Gross Beta, Gamma Spectroscopy, Isotopic Uranium, and Radon-222 Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d] (pCi/L)	NMED HWB[e] (pCi/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW6	Americium-241	-18 ± 12.1	19.1	9.57	NE	NE	U	BD	088909-033	EPA 901.1
19-Apr-10	Cesium-137	-0.304 ± 1.79	2.97	1.49	NE	9.3	U	BD	088909-033	EPA 901.1
	Cobalt-60	0.169 ± 1.88	3.17	1.58	NE	NE	U	BD	088909-033	EPA 901.1
	Potassium-40	-19.9 ± 37.2	45.3	22.6	NE	NE	U	BD	088909-033	EPA 901.1
	Gross Alpha	5.26	NA	NA	15	NE	NA	None	088909-034	EPA 900.0
	Gross Beta	3.20 ± 1.08	1.32	0.627	4mrem/yr	NE		J	088909-034	EPA 900.0
	Tritium	41.7 ± 91.6	156	75.4	NE	NE	U	BD	088909-036	EPA 906.0 M
	Low Level Tritium	1.22 ± 0.744	1.18	0.554	NE	NE		J	088909-037	HASL 300
MWL-MW7	Americium-241	1.28 ± 5.88	9.61	4.81	NE	NE	U	BD	088929-033	EPA 901.1
22-Apr-10	Cesium-137	0.658 ± 1.66	2.81	1.41	NE	9.3	U	BD	088929-033	EPA 901.1
	Cobalt-60	1.77 ± 1.71	3.04	1.52	NE	NE	U	BD	088929-033	EPA 901.1
	Potassium-40	-5.69 ± 36.1	36.5	18.2	NE	NE	U	BD	088929-033	EPA 901.1
	Gross Alpha	3.52	NA	NA	15	NE	NA	None	088929-034	EPA 900.0
	Gross Beta	5.63 ± 1.24	0.969	0.459	4mrem/yr	NE			088929-034	EPA 900.0
	Tritium	-21 ± 89.8	157	76.0	NE	NE	U	BD	088929-036	EPA 906.0 M
MWL-MW8	Americium-241	-8.24 ± 5.47	8.80	4.40	NE	NE	U	BD	088934-033	EPA 901.1
26-Apr-10	Cesium-137	1.65 ± 1.77	3.12	1.56	NE	9.3	U	BD	088934-033	EPA 901.1
	Cobalt-60	-2.01 ± 2.70	3.21	1.61	NE	NE	U	BD	088934-033	EPA 901.1
	Potassium-40	49.5 ± 43.8	29.3	14.7	NE	NE	X	BD	088934-033	EPA 901.1
	Gross Alpha	3.52	NA	NA	15	NE	NA	None	088934-034	EPA 900.0
	Gross Beta	4.29 ± 1.12	1.12	0.529	4mrem/yr	NE			088934-034	EPA 900.0
	Tritium	108 ± 112	181	79.8	NE	NE	U	BD	088934-036	EPA 906.0 M
MWL-MW9	Americium-241	-2.93 ± 13.3	22.5	11.3	NE	NE	U	BD	088924-033	EPA 901.1
21-Apr-10	Cesium-137	0.313 ± 1.86	3.19	1.60	NE	9.3	U	BD	088924-033	EPA 901.1
	Cobalt-60	0.497 ± 1.94	3.35	1.67	NE	NE	U	BD	088924-033	EPA 901.1
	Potassium-40	-36.3 ± 44.5	49.3	24.7	NE	NE	U	BD	088924-033	EPA 901.1
	Gross Alpha	1.63	NA	NA	15	NE	NA	None	088924-034	EPA 900.0
	Gross Beta	5.65 ± 1.37	1.31	0.632	4mrem/yr	NE			088924-034	EPA 900.0
	Tritium	-115 ± 86.7	157	76.1	NE	NE	U	BD	088924-036	EPA 906.0 M

Refer to footnotes on page 4A-57.

Table 4A-7 *(Continued)*
Summary of Tritium, Gross Alpha, Gross Beta, Gamma Spectroscopy, Isotopic Uranium, and Radon-222 Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d] (pCi/L)	NMED HWB[e] (pCi/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-BW2	Americium-241	2.09 ± 7.82	11.7	5.84	NE	NE	U	BD	089402-033	EPA 901.1
06-Jul-10	Cesium-137	0.0535 ± 1.91	3.17	1.59	NE	9.3	U	BD	089402-033	EPA 901.1
	Cobalt-60	1.65 ± 2.02	3.57	1.79	NE	NE	U	BD	089402-033	EPA 901.1
	Potassium-40	-44.9 ± 38.0	42.0	21.0	NE	NE	U	BD	089402-033	EPA 901.1
	Gross Alpha	1.31	NA	NA	15	NE	NA	None	089402-034	EPA 900.0
	Gross Beta	5.56 ± 1.61	1.94	0.935	4mrem/yr	NE		J	089402-034	EPA 900.0
	Uranium-233/234	6.13 ± 0.909	0.122	0.0544	NE	7.0			089402-035	HASL-300
	Uranium-235/236	0.199 ± 0.0724	0.0735	0.0288	NE	0.41		J	089402-035	HASL-300
	Uranium-238	2.12 ± 0.353	0.0845	0.0358	NE	3.0			089402-035	HASL-300
	Tritium	37.6 ± 91.4	156	75.3	NE	NE	U	BD	089402-036	EPA 906.0 M
	Radon-222	**494 ± 132**	92.4	43.9	NE	300			089402-038	SM 7500 Rn B
MWL-MW7	Americium-241	0.165 ± 3.95	5.01	2.51	NE	NE	U	BD	089407-033	EPA 901.1
07-Jul-10	Cesium-137	0.155 ± 3.51	3.96	1.98	NE	9.3	U	BD	089407-033	EPA 901.1
	Cobalt-60	-2.63 ± 3.37	4.03	2.02	NE	NE	U	BD	089407-033	EPA 901.1
	Potassium-40	58.5 ± 25.5	58.5	24.7	NE	NE	U	BD	089407-033	EPA 901.1
	Gross Alpha	-2.23	NA	NA	15	NE	NA	None	089407-034	EPA 900.0
	Gross Beta	5.39 ± 1.57	1.95	0.948	4mrem/yr	NE		J	089407-034	EPA 900.0
	Uranium-233/234	5.38 ± 0.818	0.132	0.059	NE	7.0			089407-035	HASL-300
	Uranium-235/236	0.286 ± 0.0926	0.0797	0.0312	NE	0.41			089407-035	HASL-300
	Uranium-238	2.38 ± 0.396	0.0916	0.0388	NE	3.0			089407-035	HASL-300
	Tritium	61.8 ± 93.4	157	75.9	NE	NE	U	BD	089407-036	EPA 906.0 M
	Radon-222	289 ± 85.8	77.9	37.0	NE	300			089407-038	SM 7500 Rn B
MWL-MW7 (Duplicate)	Americium-241	-40.3 ± 11.7	17.4	8.68	NE	NE	U	BD	089408-033	EPA 901.1
07-Jul-10	Cesium-137	-0.51 ± 1.86	3.14	1.57	NE	9.3	U	BD	089408-033	EPA 901.1
	Cobalt-60	2.81 ± 2.08	3.77	1.89	NE	NE	U	BD	089408-033	EPA 901.1
	Potassium-40	6.90 ± 35.9	46.5	23.3	NE	NE	U	BD	089408-033	EPA 901.1
	Gross Alpha	-2.41	NA	NA	15	NE	NA	None	089408-034	EPA 900.0
	Gross Beta	4.28 ± 1.13	1.23	0.592	4mrem/yr	NE			089408-034	EPA 900.0
	Uranium-233/234	5.27 ± 0.794	0.125	0.0559	NE	7.0			089408-035	HASL-300
	Uranium-235/236	0.187 ± 0.0707	0.0756	0.0296	NE	0.41		J	089408-035	HASL-300
	Uranium-238	2.71 ± 0.438	0.0868	0.0368	NE	3.0			089408-035	HASL-300
	Tritium	41.5 ± 91.5	156	75.3	NE	NE	U	BD	089408-036	EPA 906.0 M
	Radon-222	231 ± 75.3	78.1	37.1	NE	300		J	089408-038	SM 7500 Rn B

Refer to footnotes on page 4A-57.

Table 4A-7 *(Concluded)*
Summary of Tritium, Gross Alpha, Gross Beta, Gamma Spectroscopy, Isotopic Uranium, and Radon-222 Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d] (pCi/L)	NMED HWB[e] (pCi/L)	Laboratory Qualifier[f]	Validation Qualifier[g]	Sample No.	Analytical Method[h]
MWL-MW8	Americium-241	1.48 ± 4.05	6.68	3.34	NE	NE	U	BD	089411-033	EPA 901.1
12-Jul-10	Cesium-137	-9.95 ± 5.84	8.40	4.20	NE	9.3	U	BD	089411-033	EPA 901.1
	Cobalt-60	-0.248 ± 3.33	5.58	2.79	NE	NE	U	BD	089411-033	EPA 901.1
	Potassium-40	-0.685 ± 59.6	76.8	38.4	NE	NE	U	BD	089411-033	EPA 901.1
	Gross Alpha	-4.99	NA	NA	15	NE	NA	None	089411-034	EPA 900.0
	Gross Beta	9.90 ± 2.90	3.51	1.69	4mrem/yr	NE		J	089411-034	EPA 900.0
	Uranium-233/234	5.24 ± 0.813	0.149	0.0667	NE	7.0			089411-035	HASL-300
	Uranium-235/236	0.223 ± 0.0844	0.0901	0.0353	NE	0.41		J	089411-035	HASL-300
	Uranium-238	2.33 ± 0.400	0.103	0.0439	NE	3.0			089411-035	HASL-300
	Tritium	59.4 ± 92.5	156	75.3	NE	NE	U	BD	089411-036	EPA 906.0 M
	Radon-222	183 ± 61.4	67.0	31.9	NE	300		J	089411-038	SM 7500 Rn B
MWL-MW9	Americium-241	5.51 ± 8.50	13.2	6.59	NE	NE	U	BD	089414-033	EPA 901.1
13-Jul-10	Cesium-137	2.66 ± 1.79	3.21	1.61	NE	9.3	U	BD	089414-033	EPA 901.1
	Cobalt-60	0.205 ± 1.83	3.08	1.54	NE	NE	U	BD	089414-033	EPA 901.1
	Potassium-40	-10.1 ± 39.7	42.5	21.2	NE	NE	U	BD	089414-033	EPA 901.1
	Gross Alpha	-0.42	NA	NA	15	NE	NA	None	089414-034	EPA 900.0
	Gross Beta	6.44 ± 2.04	2.44	1.16	4mrem/yr	NE		J	089414-034	EPA 900.0
	Uranium-233/234	5.43 ± 0.832	0.140	0.0624	NE	7.0			089414-035	HASL-300
	Uranium-235/236	0.148 ± 0.0652	0.0843	0.0331	NE	0.41		J	089414-035	HASL-300
	Uranium-238	2.78 ± 0.458	0.0969	0.0411	NE	3.0			089414-035	HASL-300
	Tritium	-21.9 ± 89.5	157	75.8	NE	NE	U	BD	089414-036	EPA 906.0 M
	Radon-222	294 ± 83.4	70.5	33.6	NE	300			089414-038	SM 7500 Rn B

Refer to footnotes on page 4A-57.

Table 4A-8
Summary of Field Water Quality Measurements[i], Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Sample Date	Temperature (^{0}C)	Specific Conductivity (μmho/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
MWL-BW2	04-Jan-10	18.14	704	100.3	7.07	0.18	6.7	0.63
MWL-MW7	05-Jan-10	16.74	579	196.9	7.24	0.62	41.7	4.04
MWL-MW8	06-Jan-10	17.54	594	194.9	7.23	0.65	22.0	2.08
MWL-MW9	07-Jan-10	12.97	569	219.2	7.29	1.87	59.1	6.12
MWL-BW2	27-Apr-10	20.02	688	152.4	7.12	0.25	8.0	0.72
MWL-MW4	29-Apr-10	19.80	592	257.4	7.33	0.26	27.6	2.51
MWL-MW5	20-Apr-10	21.00	863	166.5	7.03	0.24	28.9	2.56
MWL-MW6	19-Apr-10	20.72	822	175.0	7.16	0.11	33.3	2.98
MWL-MW7	22-Apr-10	16.67	565	242.3	7.30	0.42	44.2	4.29
MWL-MW8	26-Apr-10	22.14	586	153.3	7.21	0.53	30.1	2.62
MWL-MW9	21-Apr-10	21.44	571	134.5	7.20	1.50	30.8	2.71
MWL-BW2	06-Jul-10	21.70	683	143.6	7.32	0.58	12.8	1.11
MWL-MW7	07-Jul-10	23.69	568	243.1	7.55	0.28	52.6	4.44
MWL-MW8	12-Jul-10	25.54	595	167.5	7.45	0.83	27.9	2.28
MWL-MW9	13-Jul-10	25.66	577	223.5	7.47	1.65	47.9	3.90

Refer to footnotes on page 4A-57.

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Footnotes for Mixed Waste Landfill Groundwater Monitoring Tables

[a]Result

- Values in bold exceed the established MCL and/or NMED HWB-approved background level.
- ND = not detected (at method detection limit).
- 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)
- μg/L = micrograms per liter
- mg/L = milligrams per liter
- pCi/L = picocuries per liter

[b]MDL or MDA

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.

The minimum detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.

NA = not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

[c]PQL or Critical Level

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.

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.

[d]MCL

- Maximum contaminant level. Established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11[b]), National Primary Drinking Water Standards, EPA, May 2009.
- NE = not established.
- 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).

[e]NMED HWB

- The New Mexico Environment Department Hazardous Waste Bureau-approved maximum background concentrations, NMED Letter to M. Zamorski and J.B. Woodard, dated November 25, 1998.
- NE = not established.

[f]Laboratory Qualifier

B = Analyte is detected in associated laboratory method blank.
J = Estimated value, the analyte concentration is below the practical quantitation limit (PQL).
NA = Not applicable for gross alpha activities.
U = Analyte is absent or below the method detection limit.
X = Data rejected due to peak not meeting identification criteria.

Footnotes for Mixed Waste Landfill Groundwater Monitoring Tables (Concluded)

[g]**Validation Qualifier** (Continued)

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.
NJ-	=	Presumptive evidence of the presence of the material at an estimated quantity with a suspected negative bias.
None	=	No data validation for corrected gross alpha activity.
U	=	The analyte was analyzed for but 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. Re-sampling and re-analysis are necessary for verification.

[h]**Analytical Method**

- EPA, 1979, “Methods for Chemical Analysis of Water and Wastes,” EPA-600/4-79-020, U.S. Environmental Protection Agency, Cincinnati, Ohio..
- 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, “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,” SW-846, 3rd ed., Rev. 1, U.S. Environmental Protection Agency, Washington, D.C.
- U.S. Environmental Protection Agency, Washington, D.C.; or Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B.
- U.S. Department of Energy, Environmental Measurements Laboratory, 1990, *EML Procedures Manual*, 27th ed., Vol. 1, Rev. 1992, HASL-300.
- Beckman, 1998, *Standard Methods for the Examination of Water and Wastewater, 7500-Rn B Method*, 20th ed., Beckman LS5000TD Liquid Scintillation System Operation Manual, May 1988.

[i]**Field Water Quality Measurements**

- Field measurements collected prior to sampling.

°C	=	degrees Celsius.
% Sat	=	present saturation.
μmho/cm	=	micromhos per centimeter.
mg/L	=	milligrams per liter.
mV	=	millivolts.
NTU	=	nephelometric turbidity units.
pH	=	potential of hydrogen (negative logarithm of the hydrogen ion concentration).

Attachment 4B
Mixed Waste Landfill
Hydrographs

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Attachment 4B Hydrographs

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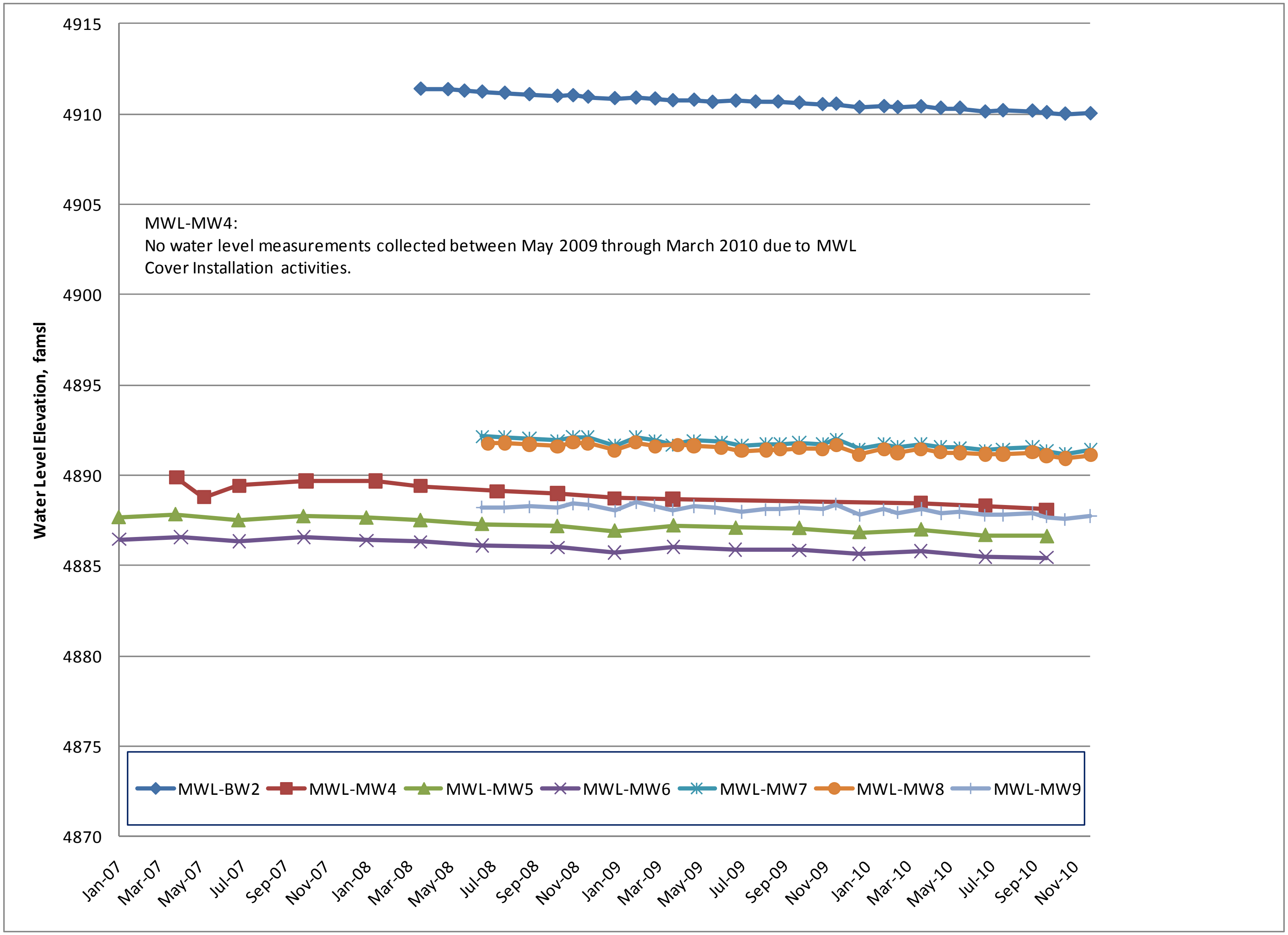

Figure 4B-1. Mixed Waste Landfill Groundwater Wells

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5.0 Technical Area V Groundwater

5.1 Introduction

Trichloroethene (TCE) and nitrate have been identified as constituents of concern (COCs) in groundwater at the Technical Area (TA)-V Groundwater Investigation Study Area (TA-V study area) based on detections above the U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) in samples collected from monitoring wells. Since 1993, the maximum concentrations detected in the study area have been 26 micrograms per liter (µg/L) of TCE and 19 milligrams per liter (mg/L) of nitrate. The EPA and State of New Mexico drinking water standards (MCLs) for TCE and nitrate are 5 µg/L and 10 mg/L (as nitrogen), respectively. Unique features of the TA-V study area include low concentrations of TCE and nitrate in a deep alluvial aquifer.

5.1.1 Location

TA-V occupies approximately 35 acres in the northeastern corner of TA-III (Figure 5-1) at Sandia National Laboratories, New Mexico (SNL/NM). TA-V is located in the north-central portion of Kirtland Air Force Base (KAFB), south of the City of Albuquerque (COA) (Figure 5-1). The SNL/NM facility is a government-owned, contractor-operated, multi-program laboratory overseen by the U.S. Department of Energy (DOE), National Nuclear Security Administration through the Sandia Site Office in Albuquerque, New Mexico. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM under Contract DE-AC04-94AL85000.

TA-V is situated within the Albuquerque Basin, and the vadose zone at TA-V is approximately 500 feet (ft) in thickness and consists of heterogeneous, lenticular, coarse- to fine-grained deposits. The underlying aquifer at TA-V consists of unconsolidated fine-grained, clay-rich, alluvial-fan sediments. Groundwater in the vicinity of TA-V flows generally from east to west. To the west of TA-V, groundwater flow paths turn to the north in response to pumping from municipal well fields located north of KAFB and from water supply wells located in the northern portion of KAFB.

5.1.2 Site History

TA-V facilities are designed to test radiation effects on components and include two research reactors, the Gamma Irradiation Facility and Hot Cell Facility. Historically, wastewater containing contaminants derived from these facilities was disposed of to drain fields, seepage pits, and unlined ponds. SNL/NM Environmental Restoration (ER) Operations (formerly ER Project) personnel have conducted numerous groundwater investigations in the TA-V study area since 1992 (Table 5-1). Many of these investigations were site-specific and conducted in support of various Solid Waste Management Unit (SWMU) assessments. Other investigations in the TA-V study area were more regional studies conducted by the SNL/NM Site-Wide Hydrogeologic Characterization Project (SNL February 1998).

5.1.3 Monitoring History

Investigations of groundwater quality in the TA-V study area have been conducted by Sandia over the past 18 years (Table 5-1). Groundwater monitoring at TA-V began in October 1992. TCE was first detected in monitoring well LWDS-MW1 in October 1993 and was later detected in TAV-MW1 in September 1995. Since then, low concentrations of TCE have been consistently detected during quarterly sampling events. Potential sources for TCE in groundwater include the Liquid Waste Disposal System (LWDS) drain field and surface impoundments and the TA-V seepage pits (Section 5.1.7).

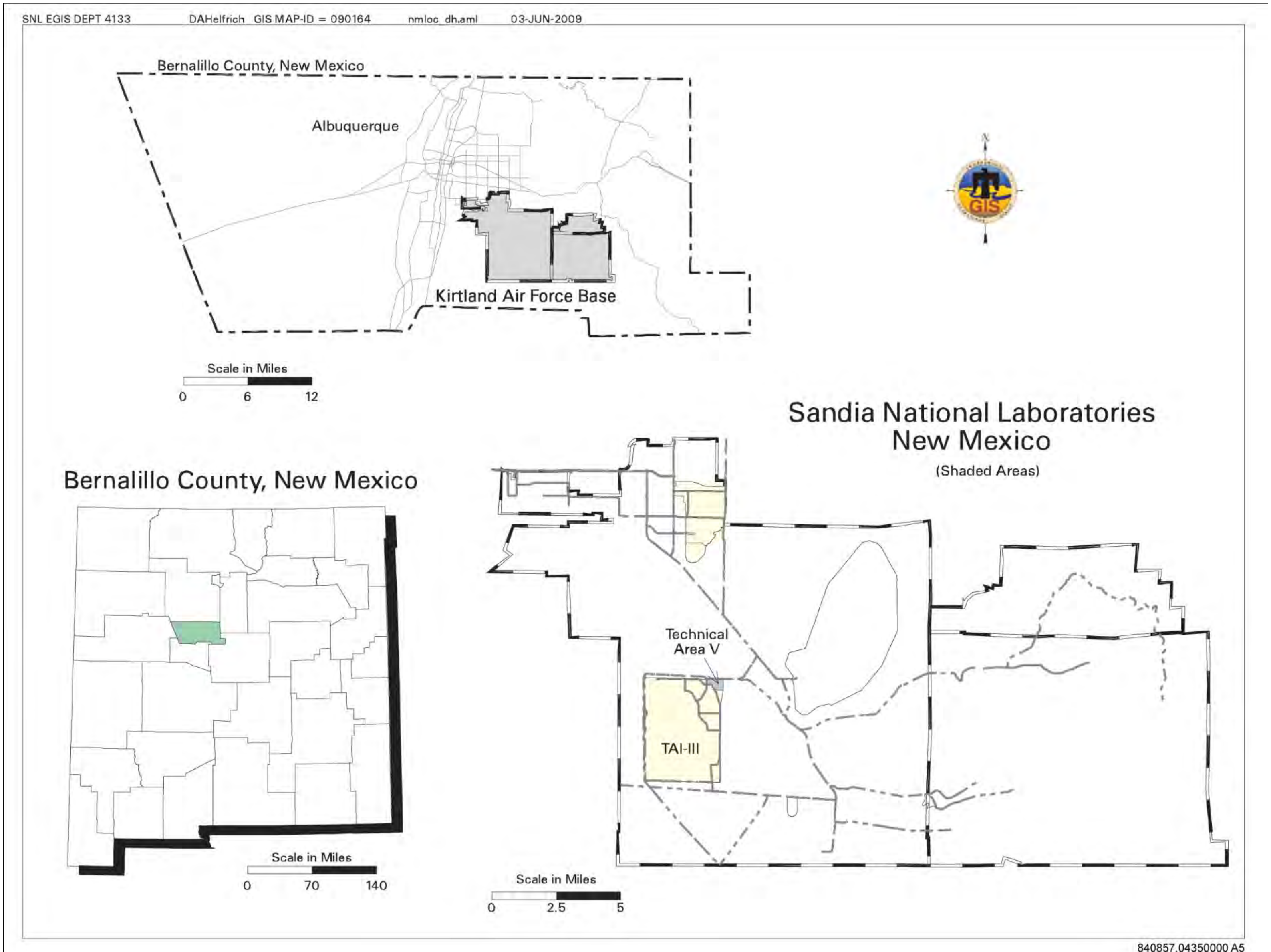

Figure 5-1. Location of the TA-V Study Area

Table 5-1. Historical Timeline of the TA-V Study Area

Month	Year	Event	Reference
May	1959	KAFB water supply well KAFB-10 is installed west of TA-V and north of TA-III. Water from the well was used as auxiliary water for fire protection.	NMSEO May 1959
April	1992	The LWDS RFI Work Plan is submitted. The investigation will examine SWMUs 4, 5, and 52.	SNL March 1993
	1992–1993	Two groundwater monitoring wells are installed as part of the LWDS investigation. LWDS-MW2 installed October 1992, and LWDS-MW1 installed May 1993.	SNL September 1995
November	1993	LWDS-MW1 and LWDS-MW2 are sampled. The first sampling event of LWDS-MW1 in November 1993 reveals TCE near the method detection limit, and the detection is confirmed during a later sampling event at values exceeding the MCL of 5 μg/L.	SNL March 1995
June	1994	Notification letter from DOE to EPA regarding TCE detection in LWDS-MW1.	DOE June 1994
March	1995	Groundwater sample analytical results for TA-V wells LWDS-MW1 and LWDS-MW2 reported in the Calendar Year 1994 SNL/NM Annual Groundwater Monitoring Report.	SNL March 1995
June	1995	Report submitted discussing water quality issues reported in the Calendar Year 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 Calendar Year 1995 SNL/NM Annual Groundwater Monitoring Report	SNL March 1996
March	1996	DOE submits a letter to the NMED with notification of a single elevated nitrate detection for groundwater monitoring well LWDS-MW1. The result is 10.1 mg/L, exceeding the MCL of 10 mg/L.	DOE March 1996
April	1996	KAFB-10 is plugged and abandoned as there is a potential for the ungrouted borehole for this production well to act as a conduit for contaminant transport into the groundwater.	SNL April 1996
March	1997	Groundwater sampling analytical results for TA-V wells reported in the Calendar Year 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	DOE/Sandia provides responses to the NMED September 1997 RSI.	SNL January 1998
March	1998	Groundwater sampling analytical results for TA-V wells reported in the Calendar Year 1997 SNL/NM Annual Groundwater Monitoring Report	SNL March 1998

Table 5-1. Historical Timeline of the TA-V Study Area *(Continued)*

Month	Year	Event	Reference
October	1998	DOE/Sandia provides cross sections to NMED for the LWDS as required in the September 1997 RSI from NMED.	DOE October 1998
March	1999	Groundwater sampling analytical results for TA-V wells reported in the Fiscal Year 1998 SNL/NM Annual Groundwater Monitoring Report.	SNL March 1999b
March	1999	SNL/NM submits 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 Fiscal Year 1999 SNL/NM Annual Groundwater Monitoring Report	SNL March 2000
April	2001	Groundwater sampling analytical results for TA-V wells reported in the Fiscal Year 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 Fiscal Years 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 Fiscal Year 2001 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2002
March	2003	Groundwater sampling analytical results for TA-V wells reported in the Fiscal Year 2002 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2003a
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 Fiscal Year 2003 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2004
April	2004	The NMED issues the Compliance Order on Consent (the Consent Order) to the DOE/Sandia, which identified TA-V as an area with groundwater contamination requiring a CME.	NMED April 2004
May	2004	DOE/Sandia 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	DOE/Sandia 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

Table 5-1. Historical Timeline of the TA-V Study Area *(Continued)*

Month	Year	Event	Reference
December	2004	DOE/Sandia submit responses to the NMED request 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	DOE/Sandia 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	DOE/Sandia 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 Fiscal Year 2004 SNL/NM Annual Groundwater Monitoring Report.	SNL October 2005
March	2006	DOE/Sandia 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 Fiscal Year 2005 SNL/NM Annual Groundwater Monitoring Report.	SNL November 2006
March	2007	Groundwater sampling analytical results for TA-V wells reported in the Fiscal Year 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 Fiscal Year 2007 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2008
July	2008	NMED issues an NOD on the July 2005 CME Report for TA-V Groundwater.	NMED July 2008
September	2008	The 13 TA-V monitoring wells are resurveyed to establish new northing and easting coordinates and elevations for each well.	SNL October 2008
December	2008	SNL/NM, DOE, and NMED personnel attend an MNA seminar presented by Savannah River National Laboratory personnel and also discuss technical issues and the need for additional characterization work at TA-V.	SRNL December 2008
April	2009	NMED requires characterization of perchlorate in groundwater in one well in the TA-V study area.	NMED April 2009
April	2009	DOE/Sandia submit a response to the NOD on the July 2005 CME Report for TA-V Groundwater.	SNL April 2009
June	2009	Groundwater sampling analytical results for TA-V wells reported in the Calendar Year 2008 SNL/NM Annual Groundwater Monitoring Report.	SNL June 2009
August	2009	NMED issues a second NOD on the July 2005 CME Report for TA-V Groundwater.	NMED August 2009

Table 5-1. Historical Timeline of the TA-V Study Area *(Concluded)*

Month	Year	Event	Reference
November	2009	DOE/Sandia submit a response to the second NOD on the July 2005 CME Report for TA-V Groundwater.	SNL November 2009
December	2009	NMED issues a third NOD on the July 2005 CME Report for TA-V Groundwater.	NMED December 2009
February	2010	DOE/Sandia submit a response to the third NOD on the July 2005 CME Report for TA-V Groundwater.	SNL February 2010
May	2010	NMED issues a notice of conditional approval for the TA-V Groundwater Investigation Work Plan associated with July 2005 TA-V Groundwater CME Report.	NMED May 2010
October	2010	DOE/Sandia began installation of groundwater monitoring wells TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14.	SNL February 2010
November	2010	DOE/Sandia 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

NOTES:

CME = Corrective Measures Evaluation.
DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
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.
NMSEO = New Mexico State Engineer Office.
NOD = Notice of Disapproval.
OU = Operable Unit.
RCRA = Resource Conservation and Recovery Act.
RFI = RCRA Facility Investigation.
RSI = Request for Supplemental Information.
Sandia = Sandia Corporation.
SNL = Sandia National Laboratories.
SNL/NM = Sandia National Laboratories/New Mexico.
SRNL = Savannah River National Laboratory.
SWMU = Solid Waste Management Unit.
TA = Technical Area.
TCE = Trichloroethene.

In April 2004, the Compliance Order on Consent (the Order) between the New Mexico Environment Department (NMED), DOE, and Sandia specified that TA-V was an area of groundwater contamination (NMED April 2004). Since the initial discoveries of TCE and nitrate at the TA-V study area, numerous characterization activities have been conducted (Table 5-1), which are summarized in the *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Technical Area-V* (SNL April 2004a). In response to the Order, this document was submitted to the NMED along with the *Corrective Measures Evaluation (CME) Work Plan, TA-V Groundwater* (SNL April 2004b) by Sandia in April 2004. The Current Conceptual Model provides a comprehensive list of groundwater monitoring data sources used to support the summary of investigations. After fulfilling the requirements of the CME Work Plan, Sandia submitted the CME Report to the NMED in July 2005 (SNL July 2005).

5.1.4 Current Monitoring Network

In Calendar Year (CY) 2010, 12 wells in the TA-V study area were being monitored for water quality and water levels (Figure 5-2; Table 5-2). Table XI-1 of the Order (NMED April 2004) specifies that the sampling frequency for groundwater monitoring at TA-V is quarterly.

5.1.5 Summary of Calendar Year Activities

The following activities took place for the TA-V study area during CY 2010:

- Obtained monthly or quarterly water level measurements for all TA-V wells.
- Conducted quarterly groundwater sampling events at 12 wells (Table 5-2) in February 2010, June 2010, August/September 2010, and October 2010 (SNL January 2010, May 2010, August 2010, and September 2010).
- Performed quarterly perchlorate screening groundwater sampling and reporting for LWDS-MW1 in February 2010 (NMED April 2009).
- Submitted a response to the NMED's third Notice of Disapproval (NMED December 2009) for the CME Report for TA-V Groundwater (SNL February 2010).
- NMED issued a *Notice of Conditional Approval for the TA-V Groundwater Investigation Work Plan* associated with the July 2005 TA-V CME Report (NMED May 2010).
- Installed groundwater monitoring wells TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14 (SNL February 2010).
- Submitted a report on the geophysical log and slug test results for the new TA-V wells (SNL November 2010).
- Discussed changes in soil-vapor well installation and received approval from the NMED (NMED December 2010).
- Prepared tables of analytical results (Attachment 5A), concentration versus time plots (Attachment 5B), and hydrographs (Attachment 5C) in support of this report.

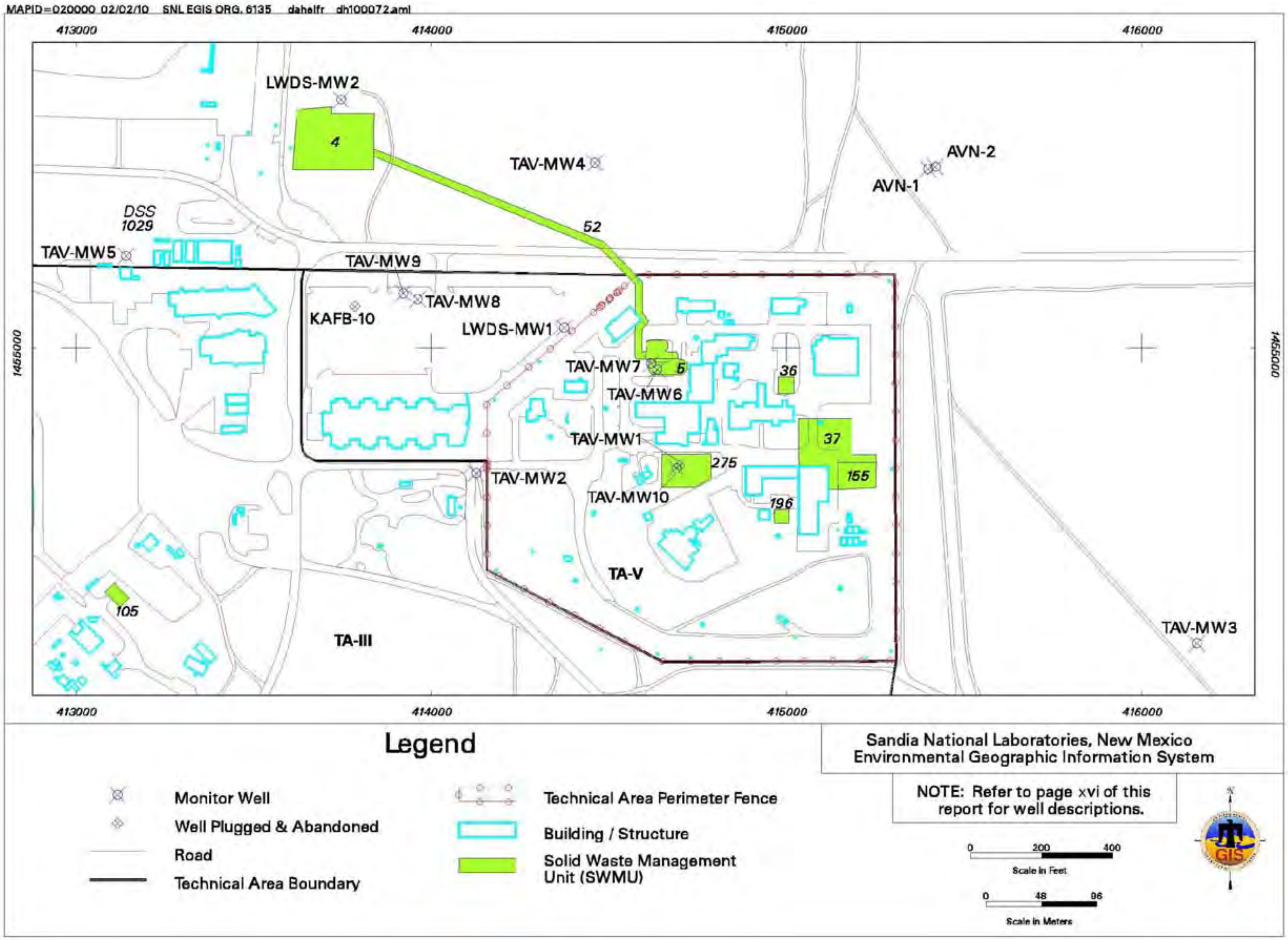

Figure 5-2. TA-V Monitoring Well Locations (12 Active Wells)

Table 5-2. Groundwater Monitoring Wells at the TA-V Study Area

Well	Installation Year	WQ	WL	Comments
LWDS-MW1	1993	√	√	Regional aquifer
LWDS-MW2	1992	√	√	Regional aquifer
AVN-1	1995	√	√	Regional aquifer
AVN-2	1995			Regional aquifer; currently dry
TAV-MW1	1995			Regional aquifer, plugged and abandoned February 2008
TAV-MW2	1995	√	√	Regional aquifer
TAV-MW3	1997	√	√	Regional aquifer
TAV-MW4	1997	√	√	Regional aquifer
TAV-MW5	1997	√	√	Regional aquifer
TAV-MW6	2001	√	√	Regional aquifer, water table completion
TAV-MW7	2001	√	√	Regional aquifer, deep completion (597–617 feet)
TAV-MW8	2001	√	√	Regional aquifer, water table completion
TAV-MW9	2001	√	√	Regional aquifer, deep completion (582–602 feet)
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 feet)
TAV-MW14	2010			Regional aquifer, water table completion

NOTE: Check marks in the WQ and WL columns indicate WQ sampling and WL measurements were obtained during this reporting period.
LWDS = Liquid Waste Disposal System.
TA-V = Technical Area V.
WL = Water level.
WQ = Water quality.

5.1.6 Summary of Future Activities

The following activities are anticipated for the TA-V study area during CY 2011:

- Obtain periodic water level measurements for all TA-V wells.
- Conduct quarterly or semi-annual groundwater sampling at 16 TA-V wells.
- Install three soil-vapor monitoring wells.
- Obtain location surveys for the new groundwater and soil-vapor monitoring wells.
- Conduct quarterly soil-vapor sampling at three TA-V wells.
- Submit a report on the TA-V field activities.

5.1.7 Current Conceptual Model

The conceptual site model of contaminant transport at TA-V includes release from the source term, migration through the vadose zone, and movement in groundwater.

TCE and other organic chemicals were present in water that was discharged to the LWDS drain field from 1962 to 1967 and to the TA-V seepage pits from the 1960s until the early 1980s when disposal practices were modified to protect the environment. Wastewater discharged to the seepage pits from the early 1980s until 1992 contained no TCE.

Water containing dissolved concentrations of TCE and other organic chemicals moved rapidly through the alluvial fan lithofacies into the aquifer. Upon cessation of disposal, vertical pathways to the aquifer drained rapidly. Continued flushing of the vadose zone beneath the seepage pits until 1992 likely removed significant sources of secondary contaminants.

Low concentrations of TCE present in the aquifer today are a result of these initial releases. The slow rate of groundwater flow (4 to 20 ft per year [ft/yr]) is responsible for the present distribution of TCE in the aquifer.

Nitrate concentrations in groundwater at TA-V are primarily derived from unknown upgradient sources. These concentrations have exceeded MCLs in the two upgradient AVN wells, LWDS-MW1, and TAV-MW10.

5.1.7.1 Regional Hydrogeologic Conditions

SNL/NM TA-V is located within the Albuquerque Basin of the Rio Grande Rift in north-central New Mexico. The Rio Grande Rift is marked by a series of sediment-filled structural basins and adjoining uplifted mountain ranges. One of these basins, the Albuquerque Basin (also known as the Middle Rio Grande Basin), covers about 3,060 square miles in central New Mexico and extends from Cochiti Reservoir on the north to San Acacia, New Mexico, on the south. The Albuquerque Basin includes KAFB and TA-V.

The sedimentary deposits of the Santa Fe Group and overlying alluvium that fill the Albuquerque Basin contain the Santa Fe Group aquifer system. This aquifer system provides the primary source of municipal, domestic, and industrial water in the Albuquerque area. The structure of the aquifer system within the Middle Rio Grande Basin today is complex (Bartolino and Cole 2002). The major hydrostratigraphic units in the aquifer are tabular and wedge-shaped bodies that are truncated and displaced by numerous faults. Few of the major units are present continuously throughout all three subbasins, and most “pinch out” against the subsurface basement blocks that separate the subbasins. These major units are hundreds to thousands of feet thick, extend over tens of square miles, and primarily consist of unconsolidated and partially cemented deposits that interfinger in complex arrangements.

Prior to development of water resources in the Albuquerque area, groundwater flow direction in the Albuquerque Basin generally was from the north to the south, with a westward component of flow from recharge areas along mountain-front boundaries to the east (Bartolino and Cole 2002). As the Santa Fe Group aquifer has been developed as a source for municipal and industrial water supplies, groundwater flow directions have been altered toward pumping centers to the north of TA-V. Regional discharge occurs as groundwater moves out of the Albuquerque Basin into downgradient basins on the Rio Grande Rift as underflow or through discharge to the Rio Grande.

Contaminant transport at TA-V is constrained by geologic features. The stratigraphic units of hydrologic significance consist of the alluvial fan lithofacies and Ancestral Rio Grande (ARG) lithofacies. TA-V is largely underlain by a thick section of alluvial fan deposits. These deposits consist of the alluvial fan lithofacies of the Santa Fe Group overlain by post-Santa Fe Group alluvial fan deposits. The deepest monitoring well in the study area (AVN-1) penetrated 650 ft of these deposits. The total thickness of deposits at TA-V is not known.

The alluvial fan lithofacies is further subdivided into lower and upper sections. The lower section consists of a fine-grained, clay-rich unit. This unit has been identified as low-energy piedmont deposits derived from upland soil that developed during a preglacial humid climate. The upper section consists of relatively coarse-grained sediments deposited in a higher-energy environment. The water table of the Santa Fe Group aquifer at TA-V is located in the fine-grained lower unit of alluvial fan deposits.

The post-Santa Fe Group alluvial fan deposits blanket the area around TA-V and compose the upper few tens of feet of the vadose zone. These deposits were derived primarily from alluvial fans that developed from Coyote Canyon to the east.

The ARG deposits interfinger with alluvial fan deposits west of TA-V. These deposits consist predominantly of uniformly coarse sand and gravel that were deposited with the integration of the Rio Grande drainage system.

5.1.7.2 Hydrologic Conditions at the TA-V Study Area

Areal precipitation may provide one possible source of local recharge. The average annual precipitation at TA-V is 8.7 inches (SNL April 2004a). Much of this precipitation is derived from summer thunderstorms that occur between July and October. Because the rate of evapotranspiration in the Albuquerque area greatly exceeds precipitation, this source of recharge is considered to be minimal as a mechanism for transporting contaminants through the thick vadose zone at TA-V. Estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL February 1998).

The Tijeras and Coyote arroyos to the north and Hells Canyon arroyo to the south of TA-V channel sporadic, short, ephemeral flows from mountainous drainages to the east. Part of the recharge derived from infiltration of these flows is returned to the atmosphere through processes of evapotranspiration. Some water that infiltrates arroyo channels may move past the root zone and provide some local recharge. The distance between these ephemeral stream channels and TA-V precludes a significant effect on local flow and contaminant transport.

The vadose zone at TA-V, consisting of approximately 500 ft of unconsolidated to semiconsolidated alluvial sediments, forms the potential pathway for contaminant transport from contaminant sources to the aquifer. Upper sections of the alluvial-fan sediments are relatively coarse-grained, becoming fine-grained and clay-rich with depth.

The unsaturated and saturated hydraulic properties of the vadose zone at TA-V have not been fully characterized. However, they are highly variable and anisotropic because of the heterogeneous textures, lenticularity, layering, and changes in cementation. Disposal of wastewater from the LWDS drain field, the LWDS surface impoundments, and the TA-V seepage pits resulted in the development of preferential pathways of saturated or nearly saturated flow through the thick vadose zone to the aquifer. Rapid vertical flow through the discontinuous, layered, lenticular sediments in the vadose zone may have been somewhat attenuated or diverted at horizons of contrasting hydraulic properties. Discharge of wastewater to the drain field was discontinued in 1967. Discharge to the seepage pits was discontinued in the early 1990s.

No evidence of perching has been observed at TA-V. Based on moisture content measurements in vadose-zone sediment samples, drainage of residual water from the vadose zone to the aquifer was rapid after discharge ceased; minimal moisture from wastewater discharge at TA-V probably remains in the vadose zone.

A wide range of hydraulic conductivity estimates were derived from aquifer tests at TA-V that is attributed to the textural heterogeneities associated with the alluvial fan lithofacies. The average horizontal hydraulic conductivity for these sediments is estimated to be about 1.24×10^{-4} ft per minute (SNL March 1999a). Vertical hydraulic conductivity is estimated to be one-tenth to one-hundredth the horizontal hydraulic conductivity.

5.1.7.3 Local Direction of Flow

Water levels measured in nine wells were used to construct a map of the potentiometric surface at TA-V (Figure 5-3). Groundwater elevations presented in this potentiometric surface map reflect new survey coordinates. Until recently, ER Operations survey coordinates were based on the New Mexico State Plane Coordinate System, Central Zone, North American Datum of 1927 and Northern Geographic Vertical Datum of 1929 for elevations. In order to be consistent with current SNL/NM Facilities and KAFB survey practices, ER Operations survey data now are based on New Mexico State Plane Coordinate System, Central Zone, North American Datum of 1983 (NAD83) and North American Vertical Datum of 1988 (NAVD88). Location information for wells surveyed before August 2010 has been mathematically converted to the new NAD83/NAVD88 coordinates using National Geodetic Survey-approved software.

The potentiometric surface indicates that the regional groundwater flow beneath TA-V is generally to the northwest. Localized flow paths are to the west and southwest. The October 2010 horizontal gradient ranged from approximately 0.0007 to 0.002 feet per foot. Calculated groundwater flow velocities based on aquifer testing range from 4 to 10 ft/yr (SNL March 1999a). Water-table contours for October 2010 suggest that a subtle groundwater mound is present at TA-V. This apparent groundwater mound is considered to be an artifact of regional water level declines within a heterogeneous aquifer and does not represent residual mounding from wastewater disposal that was discontinued in the early 1990s (SNL March 1999a).

Water-level data indicate that groundwater flow to the west of TA-V turns sharply to the north, moving toward COA pumping centers located north of KAFB and KAFB water-supply wells. The sharp change in flow direction coincides with the location of coarse, uniformly sorted ARG sediments. These sediments are much more permeable than the fine-grained sediments of the alluvial fan facies at TA-V and permit more rapid flow.

Vertical flow gradients in the regional aquifer within the TA-V study area are strongly downward. Historically, water levels in the regional aquifer have been declining at a rate approaching 1.3 ft/yr (Attachment 5C, Figures 5C-1 and 5C-2).

5.1.7.4 Contaminant Sources

Contaminant migration in the subsurface at TA-V is controlled by local recharge to the Santa Fe Group aquifer and by the permeability of the sedimentary units in the vadose zone and aquifer. Possible sources of recharge include infiltration of wastewater disposed of at TA-V, areal precipitation, and ephemeral flows in nearby arroyos.

SWMUs 4, 5, and 275 are responsible for the majority of wastewater discharged at TA-V. Table 5-3 identifies the dates of disposal and estimated disposal volumes. After 1992, wastewater was disposed of to the COA sanitary sewer system.

Sampling and analysis have been conducted in the vadose zone in order to characterize the presence of COCs. Locations of investigations are based on possible source terms (Table 5-3). Overall, the presence of COCs in the vadose zone is minimal. Movement of water and contaminant transport through the vadose zone occurred rapidly, and vadose zone drainage occurred soon after cessation of wastewater disposal.

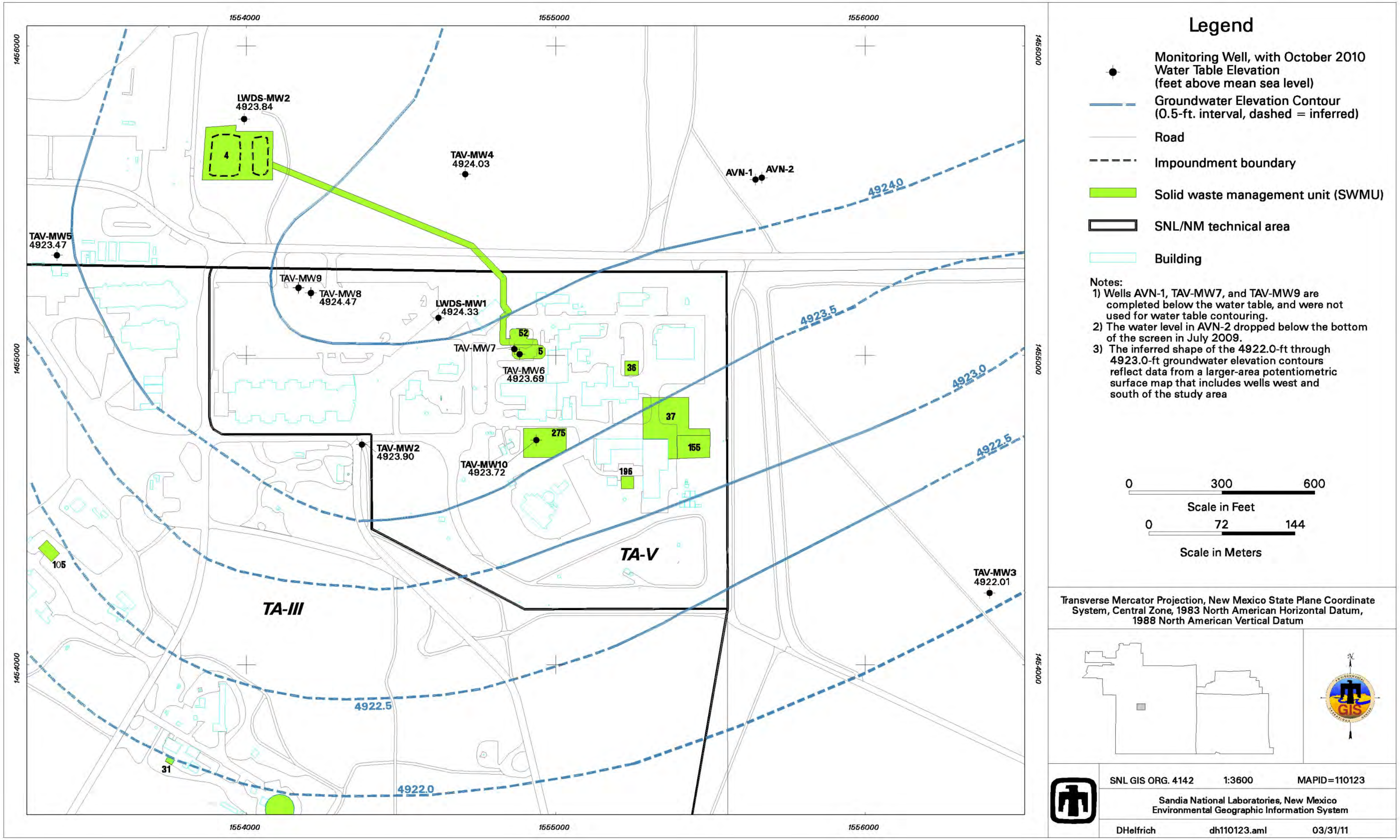

Figure 5-3. TA-V Study Area Potentiometric Surface Map (October 2010)

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Table 5-3. Wastewater Disposal History at TA-V

Disposal Site	Dates	Estimated Volume of Wastewater (gal.)
SWMU 275 – TA-V Seepage Pits	1960s–1992	30 to 50 million
SWMU 5 – LWDS Drain Field	1962–1967	6.5 million
SWMU 4 – LWDS Surface Impoundments	1967–1972	12 million

NOTES:
gal. = Gallon(s).
LWDS = Liquid Waste Disposal System.
SWMU = Solid Waste Management Unit.
TA-V = Technical Area V.

Within the LWDS drain field, trace quantities of TCE, tetrachloroethene (PCE), and benzene were detected in shallow borehole soil-vapor samples collected during 1994 (SNL March 1999a). The possibility of vadose zone contamination was further investigated with the installation of wells TAV-MW6, TAV-MW7, TAV-MW8, and TAV-MW9 in March and April 2001. The results for soil and soil-vapor samples show no significant residual soil contamination in the vadose zone. Also, no results have shown evidence of excessive moisture in the vadose zone sediments; therefore, no significant residual contaminated water is present in the vadose zone beneath the LWDS drain field (SNL October 2001).

In the vicinity of the TA-V seepage pits, trace quantities of TCE, PCE, benzene, toluene, and total xylene were detected in shallow and deep vadose-zone borehole soil-vapor samples collected during passive, surficial characterization studies conducted during 1994 and 1995. Vapor-phase TCE was detected at 44 parts per billion (by volume) at a depth of 80 ft below ground surface in TAV-BH-01 (SNL March 1999a). Solvent disposals to the seepage pits were most likely reduced in the early 1980s (SNL March 1999a), but wastewater disposal continued. This likely flushed any residual contaminants that may have been present in the vapor and aqueous phase in the vadose zone into the aquifer.

Other surface contamination sites have been investigated at TA-V. Investigations have included surficial and subsurficial passive and active vapor-phase sampling for COCs. Sampling results have shown that these other sites probably have not contributed to groundwater contamination. For example, only trace quantities of TCE, methylene chloride, trichloroethane, benzene, and toluene were detected in shallow soil samples collected at SWMU 196 (Building 6597 cistern).

Because TCE is volatile and the vapors are denser than ambient air, the physical properties of TCE are conducive to vapor transport; therefore, vapor transport in the vadose zone is a possible mechanism for the presence of TCE in the aquifer. Some TCE will typically be retained in the vadose zone due to absorption onto fine-grained materials and capillary forces.

Three physical processes, occurring in the vadose zone, affect the migration of TCE into the aquifer as follows:

- Vaporization from the source
- Transport to the capillary fringe
- Adsorption into the water table

Nitrate is present primarily in the aqueous phase in both the vadose zone and aquifer. It is nonsorptive and, for the most part, does not exchange on sediment surfaces in the vadose zone or groundwater.

Therefore, any locally derived nitrate most likely was transported through the vadose zone with the initial discharges of wastewater.

5.1.7.5 Contaminant Distribution and Transport in Groundwater

Distribution and transport of COCs and aquifer parameters are discussed in this section. TCE is present in low concentrations in the Santa Fe Group aquifer beneath TA-V. The highest TCE concentrations are not directly under the drain field source; rather, the highest concentrations have migrated in the localized direction of groundwater flow. The TCE distribution depicted in Figure 5-4 shows that the center of the TCE mass is located about 200 ft northwest of the SWMU 5 drain field and about 300 ft northwest of the SWMU 275 seepage pits.

Maximum historical TCE concentrations reported at TA-V were 23 to 26 µg/L for LWDS-MW1 on November 13, 2000. TCE has consistently exceeded the MCL at LWDS-MW1 since 1993, and concentrations at TAV-MW6 and TAV-MW10 have exceeded the MCL in recent sampling events (Section 5.6). TCE has been found only in water-table completion wells and has not been detected 100 ft below the water table based on data collected from deep wells TAV-MW7 and TAV-MW9.

Nitrate is present in groundwater in all wells at TA-V, generally at concentrations ranging from less than 5 to more than 10 mg/L. Nitrate concentrations have exceeded MCLs in samples from AVN-1, AVN-2, LWDS-MW1, TAV-MW5, and TAV-MW10, although concentrations do not appear to be increasing over time. The highest reported concentrations for TA-V wells include the following:

- 13 mg/L for AVN-1 on May 14, 2001
- 16 mg/L for AVN-2 on October 27, 1999
- 13 mg/L for TAV-MW5 on August 18, 1999
- 14 mg/L for TAV-MW10 on October 20, 2010
- 19 mg/L for LWDS-MW1 on November 13, 2000, and February 16, 2001

Upgradient wells AVN-1 and AVN-2 were completed at different depths and show relatively consistent nitrate concentrations with depth and over time.

The source of nitrate in water from TA-V wells is unknown. Some nitrate may have been disposed of to the subsurface in TA-V sanitary wastes; however, nitrate concentrations exceeding the MCL in the AVN wells suggests that the source of nitrate is regionally upgradient and to the northeast of TA-V. The background nitrate concentration is 4 mg/L.

5.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM ER Operations as well as implements and enforces federal regulations mandated by the Resource Conservation and Recovery Act (RCRA). All ER SWMUs and Areas of Concern (AOCs) are listed in Module IV of the SNL/NM RCRA Part B Operating Permit, *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA for Sandia National Laboratories* (NMED 1993).

All investigations and corrective action requirements pertaining to SWMUs and AOCs are contained in the Order (NMED April 2004). Groundwater characterization for TA-V was initiated to satisfy the requirements of the SNL/NM HSWA permit for characterization of SWMUs. The groundwater monitoring activities for the TA-V study area are not associated with a single SWMU but are more regional in nature and have historically been voluntarily conducted by SNL/NM ER Operations.

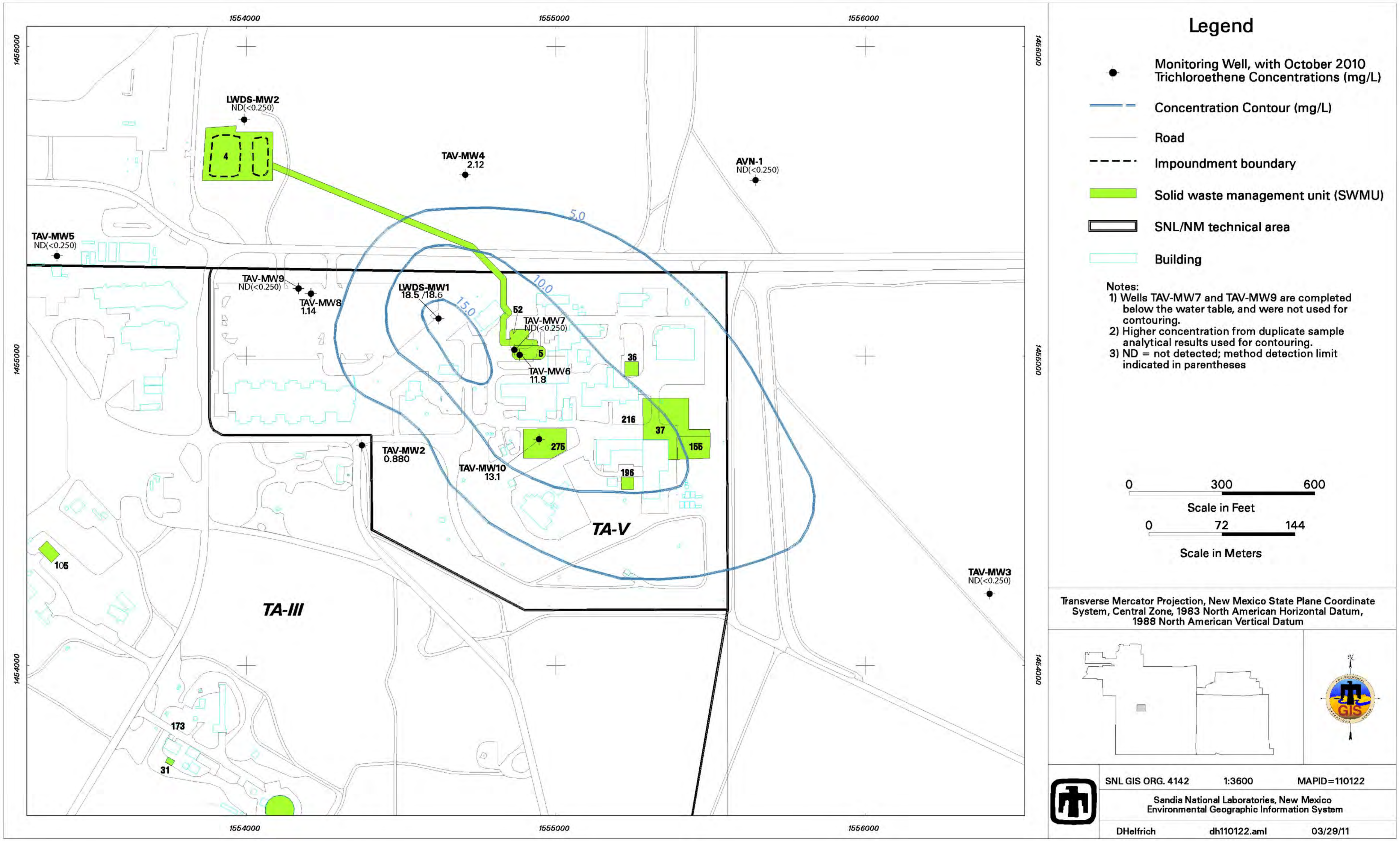

Figure 5-4. Distribution of TCE in Groundwater at SNL/NM TA-V, October 2010

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The Order, which became effective in April 2004, transferred regulatory authority for corrective action requirements from the HSWA module to the Order (NMED April 2004). The TA-V investigations must comply with requirements set forth in the Order for site characterization and development of a CME. The Order also contains schedules that define dates for the delivery of plans and reports related to TA-V.

Although the Order requires that the DOE and Sandia evaluate the nature and extent of contamination in the TA-V study area, no specific reporting requirements are prescribed in the Order. Sandia continues to present TA-V data with the data from other groundwater sites in the Groundwater Protection Program (GWPP) Annual Groundwater Monitoring Report. The outline of this report is based on the required elements of a "Periodic Monitoring Report" described in Section X.D. of the Order (NMED April 2004).

In this report, TA-V 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/Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Order. Additional information on radionuclides and the scope of the Order is available in Section III.A of the Order (NMED April 2004).

5.3 Scope of Activities

The activities for the TA-V investigation for CY 2010, including plans and reports, are listed in Section 5.1.5. The field activities completed in the study area include monitoring well installation and groundwater monitoring. The CY 2010 sampling events (four quarterly events) are summarized in Table 5-4, and the analytical parameters for each well for each sampling event are listed in Table 5-5.

Table 5-4. Groundwater Monitoring Well Network and Sampling Dates for the TA-V Study Area, Calendar Year 2010

Date of Sampling Event	Wells Sampled[1]	SAP
February 2010	AVN-1, LWDS-MW1, LWDS-MW2, TAV-MW2, TAV-MW3, TAV-MW4, TAV-MW5, TAV-MW6, TAV-MW7, TAV-MW8, TAV-MW9, and TAV-MW10	*TA-V Groundwater Monitoring Mini-SAP for Second Quarter, Fiscal Year 2010* (SNL January 2010)
June 2010	AVN-1, LWDS-MW1, LWDS-MW2, TAV-MW2, TAV-MW3, TAV-MW4, TAV-MW5, TAV-MW6, TAV-MW7, TAV-MW8, TAV-MW9, and TAV-MW10	*TA-V Groundwater Monitoring Mini-SAP for Third Quarter, Fiscal Year 2010* (SNL May 2010)
August/ September 2010	AVN-1, LWDS-MW1, LWDS-MW2, TAV-MW2, TAV-MW3, TAV-MW4, TAV-MW5, TAV-MW6, TAV-MW7, TAV-MW8, TAV-MW9, and TAV-MW10	*TA-V Groundwater Monitoring Mini-SAP for Fourth Quarter, Fiscal Year 2010* (SNL August 2010)
October 2010	AVN-1, LWDS-MW1, LWDS-MW2, TAV-MW2, TAV-MW3, TAV-MW4, TAV-MW5, TAV-MW6, TAV-MW7, TAV-MW8, TAV-MW9, and TAV-MW10	*TA-V Groundwater Monitoring Mini-SAP for First Quarter, Fiscal Year 2011* (SNL September 2010)

NOTE: [1] Refer to page xviii of this report for well descriptions.
SAP = Sampling and Analysis Plan.
TA-V = Technical Area V.

Table 5-5. Parameters Sampled at TA-V Wells[1] for Each Sampling Event, Calendar Year 2010

Parameter	February 2010	Parameter	June 2010
NPN VOCs	AVN-1 LWDS-MW1 LWDS-MW2 TAV-MW2 TAV-MW3 TAV-MW3 (dup) TAV-MW4 TAV-MW5 TAV-MW6 TAV-MW7 TAV-MW8 TAV-MW9 TAV-MW10 TAV-MW10 (dup)	NPN VOCs	AVN-1 LWDS-MW1 LWDS-MW2 TAV-MW2 TAV-MW3 TAV-MW4 TAV-MW5 TAV-MW5 (dup) TAV-MW6 TAV-MW7 TAV-MW8 TAV-MW8 (dup) TAV-MW9 TAV-MW10 TAV-MW10 (dup)
Perchlorate	LWDS-MW1		
Parameter	**August/September 2010**	**Parameter**	**October 2010**
Anions Gamma Spec* Gross Alpha Gross Beta NPN TAL Metals, plus Total Uranium Tritium VOCs	AVN-1 LWDS-MW1 LWDS-MW2 TAV-MW2 TAV-MW2 (dup) TAV-MW3 TAV-MW4 TAV-MW5 TAV-MW6 TAV-MW7 TAV-MW8 TAV-MW9 TAV-MW9 (dup) TAV-MW10	NPN VOCs	AVN-1 LWDS-MW1 LWDS-MW1 (dup) LWDS-MW2 TAV-MW2 TAV-MW3 TAV-MW4 TAV-MW5 TAV-MW5 (dup) TAV-MW6 TAV-MW7 TAV-MW8 TAV-MW9 TAV-MW10

NOTE: [1] Refer to page xviii of this report for well descriptions.
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).
TAL = Target Analyte List.
TA-V = Technical Area V.
VOC = Volatile organic compound.

Quality control (QC) samples are collected in the field at the time of environmental sample collection. Field QC samples include duplicate samples, split samples, equipment blank (EB), and trip blank (TB) samples. Field QC samples are used to monitor the sampling process. Duplicate 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. TB samples are used to determine whether volatile organic compounds (VOCs) contaminated the sample during preparation, transportation, or handling prior to receipt by the analytical laboratory.

5.4 Field Methods and Measurements

The monitoring procedures, as conducted by ER Operations personnel, are consistent with procedures identified in the EPA technical enforcement guidance document (EPA 1986). The following sections provide an overview of the sampling and data collection procedures.

5.4.1 Groundwater Elevation

Throughout CY 2010, water level measurements were obtained to determine groundwater flow directions, hydraulic gradients, and changes in water table elevations. Water levels are periodically measured in TA-V groundwater monitoring wells according to the instructions and requirements of SNL/NM Field Operating Procedure (FOP) 03-02, *Groundwater Level Data Acquisition and Management,* Rev. 02 (SNL November 2007). The water level information was used to develop the potentiometric surface map presented in Figure 5-3 and the hydrographs presented in Figures 5C-1 and 5C-2 (Attachment 5C).

5.4.2 Well Purging and Water Quality Measurements

A Bennett™ groundwater sampling system (a nitrogen gas-powered portable piston pump) was used to collect the groundwater samples from TA-V wells. The wells are purged a minimum of one saturated screen volume. Field water quality measurements for turbidity, pH, temperature, specific conductance (SC), oxidation-reduction potential (ORP), and dissolved oxygen (DO) were recorded for each well prior to the collection of groundwater samples, according to SNL/NM FOP 05-01 (SNL August 2007a). Groundwater temperature, SC, ORP, DO, and pH were measured using a YSI™ Model 620 water quality meter. Turbidity was measured with a HACH™ Model 2100P portable turbidity meter.

The amount of water required to achieve stability of field parameters is fairly consistent. However, the ability of the aquifer to produce water varies greatly from well to well. In accordance with the Mini-Sampling and Analysis Plans (SAPs) (Table 5-4), purging continues until four stable measurements for temperature, SC, pH, and turbidity are obtained.

Groundwater stability is considered acceptable when measurements are equal to or within 10 percent of 5 nephelometric turbidity units, pH is within 0.1 units, temperature is within 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 Records Center.

5.4.3 Pump Decontamination

The Bennett™ sampling pump and tubing bundle were decontaminated prior to installation into monitoring wells according to procedures described in *Long-Term Environmental Stewardship (LTES) Groundwater Sampling Equipment Decontamination,* SNL/NM FOP 05-03 (SNL August 2007b). An EB or rinsate sample was collected to verify the effectiveness of the equipment decontamination process.

5.4.4 Sample Collection Sampling Procedures

Groundwater samples are collected using the Bennett™ pump in accordance with SNL/NM FOP 05-01 (SNL August 2007a). Sample bottles are filled directly from the pump discharge line, with the VOC samples collected at the lowest achievable discharge rate.

5.4.5 Sample Handling and Shipment

The SNL/NM Sample Management Office (SMO) processes environmental samples collected by ER Operations personnel. The SMO reviews the Mini-SAPs, orders sample containers, issues sample control and tracking numbers, tracks the chain-of-custody, and reviews analytical results returned from the laboratories for laboratory contract compliance (SNL March 2003b and April 2007). All groundwater samples are analyzed by off-site laboratories using EPA-specified protocols.

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 (LCS), matrix spike, matrix spike duplicate, and surrogate spike samples. Reported laboratory analytical and QC data are reviewed against quality assurance requirements specified in the *Procedure for Completing the Contract Verification Review, SMO-05-03, Issue 03*, (SNL April 2007) and Administrative Operating Procedure (AOP) 00-03, *Data Validation Procedure for Chemical and Radiochemical Data*, (SNL July 2007).

5.4.6 Waste Management

Purge and decontamination water generated from sampling activities were placed into 55-gallon containers and stored at the ER Operations Field Office waste accumulation area. All waste was managed in accordance with SNL/NM FOP 05-04 (SNL August 2007c) as nonregulated waste, based on historical sampling results and process knowledge of the monitoring well location. Associated environmental sampling results provide supplemental data for approval to discharge water to the sanitary sewer. All data were compared with COA discharge limits.

5.5 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using EPA-specified protocols. Groundwater samples were submitted to GEL Laboratories, Inc. for analysis. Samples were analyzed in accordance with applicable EPA analytical methods (Tables 5-6 and 5-7), including:

- *The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0* (EPA 1983)
- *Perchlorate in Drinking Water Using Ion Chromatography* (EPA, 1999)
- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Rev. 1* (EPA 1996)
- *Prescribed Procedures for Measurement of Radioactivity in Drinking Water* (EPA 1980)

Table 5-6. TA-V Study Area Chemical Analytical Methods

Analyte	Analytical Method[a,b,c]
Anions	SW846-9056
NPN	EPA 353.2
Perchlorate	EPA 314.0
TAL Metals, plus Uranium	SW846-6020/7470
VOCs	SW846-8260

NOTES: [a]U.S. Environmental Protection Agency, 1996, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed., Rev. 1 (and all updates), U.S. Environmental Protection Agency, Washington, D.C.
[b]U.S. Environmental Protection Agency, 1983, *The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0*, EPA-600/4-84-017.
[c]U.S. Environmental Protection Agency (EPA), 1999, *Perchlorate in Drinking Water Using Ion Chromatography*, EPA 815/R-00-014.
EPA = U.S. Environmental Protection Agency.
NPN = Nitrate plus nitrite (reported as nitrogen).
SW = Solid Waste.
TAL = Target analyte list.
TA-V = Technical Area V.
VOC = Volatile organic compound.

Table 5-7. TA-V Study Area Radiochemical Analytical Methods

Analyte	Analytical Method[a]
Gamma Spectroscopy (short list)	EPA 901.0
Gross Alpha/Beta Activity	EPA 900.0
Tritium	EPA 906.0

NOTES: [a]U.S. Environmental Protection Agency, 1980, *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*, EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.
EPA = U.S. Environmental Protection Agency.
TA-V = Technical Area V.

5.6 Summary of Analytical Results

This section discusses monitoring results, exceedances of standards, and pertinent trends in concentrations for COCs in the TA-V study area that exceed standards. The analytical results and field measurements for all TA-V sampling events are presented in Attachment 5A, Tables 5A-1 through 5A-8; concentration trend plots for COCs that exceed the MCLs are presented in Attachment 5B, Figures 5B-1 through 5B-5. 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 low concentrations in groundwater samples from TA-V study area monitoring wells include the following:

- Chloroform
- cis-1,2-Dichloroethene
- TCE

Three VOCs were detected during CY 2010. Two of these VOCs have promulgated MCLs. Only TCE exceeds its corresponding MCL, which is 5 µg/L (Table 5A-1). TCE was detected in samples from three wells: LWDS-MW1, TAV-MW6, and TAV-MW10. The maximum concentration of TCE detected during this reporting period was 18.6 µg/L in the sample from LWDS-MW1 collected in October 2010. Figures 5B-1, 5B-2, and 5B-3 (Attachment 5B) show that the TCE concentrations are decreasing over time in LWDS-MW1 and increasing over time in TAV-MW6 and TAV-MW10.

The analytical results for 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 LWDS-MW1 and TAV-MW10. The maximum concentration of NPN detected during this reporting period is 13.7 mg/L in the sample collected from TAV-MW10 in October 2010. Figure 5B-4 (Attachment 5B) shows that the NPN concentrations in LWDS-MW1 have typically exceeded the MCL, with concentrations being stable to slightly decreasing over time. In contrast, Figure 5B-5 (Attachment 5B) shows that NPN concentrations in TAV-MW10 (and its predecessor, TAV-MW1) only occasionally exceed the MCL with the trend increasing over time.

The analytical results for anions (bromide, chloride, fluoride, and sulfate) are presented in Table 5A-4 (Attachment 5A). Secondary MCLs have been promulgated for three of the anions; none of the results exceed the corresponding secondary MCLs.

The analytical result for perchlorate are presented in Table 5A-5; perchlorate was not detected in the one groundwater sample analyzed in CY 2010.

Total metal results are presented in Table 5A-6; no metal results exceed established primary or secondary MCLs.

Tritium, gross alpha/beta activity, and gamma spectroscopy results are presented in Table 5A-7; all radionuclide results are below established MCLs.

Field water quality parameters were measured during purging of each well prior to sampling and included temperature, SC, ORP, pH, turbidity, and DO. The parameter measurements obtained immediately before sample collection are presented in Table 5A-8.

5.7 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 chemical data were reviewed and qualified in accordance with AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL July 2007). Although some analytical results were qualified during the data validation process, no significant data quality problems were noted for TA-V COCs during CY 2010 sampling events. Data validation qualifiers are presented with the analytical results in Tables 5A-1 through 5A-7 (Attachment 5A). The data validation report associated with each sampling event has been submitted to the SNL/NM Customer Funded Records Center. The results for each QC sample and the impact on data quality for the TA-V quarterly sampling events are discussed in the following sections.

5.7.1 Field Quality Control Samples

Field QC samples included environmental duplicate, EB, and TB samples. The field QC samples were submitted for analysis along with the groundwater samples in accordance with QC procedures specified in the Mini-SAPs (SNL January 2010, May 2010, August 2010, and September 2010).

5.7.1.1 Duplicate Environmental Samples

Duplicate environmental samples were analyzed in order to estimate the overall reproducibility of the sampling and analytical process. A duplicate sample is collected immediately after the original environmental sample in order to reduce variability caused by time and/or sampling mechanics. The results for duplicate sample analyses (detected parameters only) are used to calculate relative percent difference (RPD) values. Duplicate sampling results for all wells and all sampling periods show good correlation (RPD values of less than 20) for all calculated parameters.

5.7.1.2 Equipment Blank Samples

The Bennett™ pump and tubing bundle were decontaminated prior to installation into monitoring wells according to procedures described in SNL/NM FOP 05-03 (SNL August 2007b). An EB or rinsate sample was collected to verify the effectiveness of the equipment decontamination process. The results for the EB analyses are as follows:

- **February 2010 Sampling Event—**EB samples were collected prior to sampling at TAV-MW3 and TAV-MW10 and submitted for all analyses. Bromodichloromethane, bromoform, chloroform, and dibromochloromethane were detected above the laboratory MDLs. No corrective action was necessary as these compounds were not detected in associated environmental samples.

- **June 2010 Sampling Event—**EB samples were collected prior to sampling at TAV-MW5 and TAV-MW8 and submitted for all analyses. Bromodichloromethane, chloroform, and dibromochloromethane were detected above the laboratory MDLs. No corrective action was necessary as these compounds were not detected in associated environmental samples.

- **August/September 2010 Sampling Event—**EB samples were collected prior to sampling at TAV-MW2 and TAV-MW9 and submitted for VOC, total metal, anion, NPN, gamma spectroscopy, gross alpha, gross beta, and tritium analyses. The analytical parameters barium, bromodichloromethane, calcium, chloride, chloroform, chromium, copper, dibromochloromethane, iron, manganese, and zinc were detected in the EB samples. Chromium, copper, iron, manganese, and zinc were qualified as not detected during data validation when environmental samples reported these metals at concentrations less than five times the associated EB result. No corrective action was required for barium, bromodichloromethane, calcium, chloride, chloroform, and dibromochloromethane. These parameters either were not detected in environmental samples or were detected at concentrations greater than five times the blank result.

- **October 2010 2008 Sampling Event—**EB samples were collected prior to sampling at LWDS-MW1 and TAV-MW5 and submitted for VOC and NPN analyses. The organic compounds bromodichloromethane, bromoform, chloroform, dibromochloromethane, and TCE were detected in the EB samples. No corrective action was required as these compounds either were not detected in environmental samples or were detected at concentrations greater than five times the blank result.

5.7.1.3 Trip Blank Samples

TB samples are submitted whenever samples are collected for VOC analysis to assess whether contamination of the samples has occurred during shipment and storage. TB samples consist of laboratory reagent grade water with hydrochloric acid preservative contained in 40-milliliter volatile organic analysis vials prepared by the analytical laboratory, which accompany the empty sample containers supplied by the laboratory. TBs were brought to the field and accompanied each sample shipment. TB qualifiers are provided with the analytical results in Table 5A-1 (Attachment 5A).

5.7.2 Laboratory Quality Control Samples

Internal laboratory QC samples, including method blanks and duplicate LCSs were analyzed concurrently with all groundwater samples. All chemical data were reviewed and qualified in accordance with AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL July 2007). Laboratory data qualifiers are provided with the analytical results in Tables 5A-1 through 5A-7 (Attachment 5A).

5.8 Variances and Nonconformances

No variances or nonconformances from requirements specified in the TA-V Mini-SAPs were identified during CY 2010 sampling activities. However, a project-specific issue associated with these sampling events was noted during all sampling events. Monitoring well LWDS-MW1 was purged dry prior to minimum volume and stability requirements. This well was allowed to recover and then sampled to collect a representative groundwater sample given the low yield of this well.

5.9 Summary and Conclusions

The conceptual site model of contaminant transport at TA-V includes release from the two primary sources, migration through the vadose zone, and movement into and along with groundwater. TCE and other organic chemicals were present in wastewater that was discharged to the underground LWDS drain field during the period from 1962 to 1967, and to the TA-V seepage pits from the 1960s until the early 1980s when disposal practices were modified to protect the environment. Wastewater discharged to the seepage pits from the early 1980s until 1992 contained no TCE.

Wastewater containing dissolved concentrations of TCE and other organic chemicals moved rapidly through the alluvial fan lithofacies into the aquifer. Upon cessation of disposal, vertical pathways to the aquifer drained rapidly. Continued flushing of the vadose zone beneath the seepage pits that occurred until 1992 removed a significant portion of residual COCs present in the vadose zone. Rapid drainage and continued flushing removed significant secondary contaminant sources. Low concentrations of TCE present in the aquifer today represent these initial wastewater releases. The combined effect of low groundwater velocities, dispersion, and dilution are responsible for the current distribution of TCE in the regional aquifer.

Nitrate concentrations in groundwater at TA-V are primarily derived from unknown upgradient sources. These concentrations have exceeded MCLs in samples from the two upgradient AVN wells (AVN-1 and AVN-2), LWDS-MW1, and TAV-MW5.

The analytical results for this reporting period are consistent with historical concentrations. The following conclusions are based on a comprehensive review of available information for current groundwater contamination conditions in the TA-V study area:

- The primary COCs for the TA-V study area are TCE and nitrate.

- Based on the historical use and disposal of chlorinated solvents, the extent of TCE in groundwater is associated with multiple TA-V wastewater releases containing VOCs and the subsequent vapor-phase transport of these VOCs through the vadose zone to the water table.

- The distribution of low concentrations of TCE in the regional aquifer is principally attributed to the combined effect of low groundwater velocities, dispersion, and dilution.

- The distribution of nitrate above the background level is laterally widespread in the study area, but the lateral extent of nitrate above the MCL is limited.

- The primary sources of TCE and possibly nitrate in the TA-V study area consist of two wastewater disposal systems (SWMUs 5 and 275). An upgradient source of nitrate may be present.

- The current conceptual site model described in Section 5.1.7 does not require modification based on the analytical results for this reporting period.

DOE/Sandia recommend the following approach as part of the ongoing environmental studies of the TA-V study area:

- Continue collecting groundwater samples at the 16 TA-V groundwater and 3 soil-vapor monitoring wells on a quarterly basis. At a minimum, the analytes for groundwater sampling will consist of VOCs and NPN.

- Continue obtaining periodic measurements of groundwater elevations in all TA-V monitoring wells.

- Continue reporting future TA-V investigation results in the SNL/NM GWPP Annual Groundwater Monitoring Report.

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/.

DOE March 2006 U.S. Department of Energy (DOE), March 2006. Letter to NMED 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, 2005.

DOE October 2005 U.S. Department of Energy (DOE), October 2005. Letter to NMED requesting change of sampling frequency from 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.

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 1996 U.S. Environmental Protection Agency (EPA), 1996. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed., Rev. 1 (and updates), U.S. Environmental Protection Agency, Washington, D.C., December.

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.

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, 1980. *Prescribed Procedures for Measurement of Radioactivity in Drinking Water,* EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.

IT June 1995 IT Corporation (IT), June 1995. *1994 Water Quality Study for Technical Area V, Sandia National Laboratories/New Mexico*, prepared by IT Corporation, Albuquerque, New Mexico.

NMED December 2010 New Mexico Environment Department (NMED), December 2010. *Modification of Soil-Vapor Monitoring Well Design, TA-V Groundwater Investigation Work Plan, February 2010, Sandia National Laboratories EPA ID# NM5890110518, HWB-SNL-05-027*, New Mexico Environment Department, Santa Fe, New Mexico, December 23, 2010.

NMED May 2010 New Mexico Environment Department (NMED), May 2010. *Notice of Conditional Approval, SNL Responses to NMED December 2009 NOD issued for TA-V Groundwater Investigation Work Plan Associated with TA-V Groundwater CME Report, July 2005, Sandia National Laboratories EPA ID# NM5890110518, HWB-SNL-05-027*, New Mexico Environment Department, Santa Fe, New Mexico, December 22, 2009.

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.

NMSEO May 1959 New Mexico State Engineer Office (NMSEO), May 1959. State Engineer Office Well Record for Well KAFB-10, Drilled for the U.S. Atomic Energy Commission at Sandia National Laboratories/New Mexico, Albuquerque, New Mexico.

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 Project, Sandia National Laboratories, Albuquerque, New Mexico, November 24, 2010.

SNL September 2010 Sandia National Laboratories/New Mexico (SNL/NM), September 2010. *TA-V Groundwater Monitoring Mini-SAP for First Quarter, Fiscal Year 2011*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico, September 14, 2010.

SNL August 2010 Sandia National Laboratories/New Mexico (SNL/NM), August 2010. *TA-V Groundwater Monitoring Mini-SAP for Fourth Quarter, Fiscal Year 2010*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico, August 4, 2010.

SNL May 2010 Sandia National Laboratories/New Mexico (SNL/NM), May 2010. *TA-V Groundwater Monitoring Mini-SAP for Third Quarter, Fiscal Year 2010*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico, May 19, 2010.

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 Project, Sandia National Laboratories, Albuquerque, New Mexico, February 22, 2009.

SNL January 2010 Sandia National Laboratories/New Mexico (SNL/NM), January 2010. *TA-V Groundwater Monitoring Mini-SAP for Second Quarter, Fiscal Year 2010*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico, January 4, 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 Project, 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 November 2007 Sandia National Laboratories/New Mexico (SNL/NM), November 2007. *Groundwater Level Data Acquisition and Management*, FOP 03-02, Rev. 02, Sandia National Laboratories, Albuquerque, New Mexico. November 26, 2007.

SNL August 2007a Sandia National Laboratories/New Mexico (SNL/NM), August 2007a. *Long-Term Environmental Stewardship (LTES) Groundwater Monitoring Well Sampling and Field Analytical Measurements,* FOP 05-01, Revision 00, Sandia National Laboratories, Albuquerque, New Mexico.

SNL August 2007b Sandia National Laboratories/New Mexico (SNL/NM), August 2007b. *Long-Term Environmental Stewardship (LTES) Groundwater Sampling Equipment Decontamination,* FOP 05-03, Revision 02, Sandia National Laboratories, Albuquerque, New Mexico.

SNL August 2007c Sandia National Laboratories/New Mexico (SNL/NM), August 2007c. *Long-Term Environmental Stewardship (LTES) Groundwater Monitoring Waste Management,* FOP 05-04, Revision 02, Sandia National Laboratories, Albuquerque, New Mexico.

SNL July 2007 Sandia National Laboratories/New Mexico (SNL/NM), July 2007. *Data Validation Procedure for Chemical and Radiochemical Data,* AOP 00-03, Revision 2, Sandia National Laboratories, Albuquerque, New Mexico, July 16, 2007.

SNL April 2007 Sandia National Laboratories/New Mexico (SNL/NM). April 2007. *Procedure for Completing the Contract Verification Review, SMO-05-03, Issue 03,* Sandia National Laboratories, Albuquerque, New Mexico, April 30, 2007.

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 2003a Sandia National Laboratories/New Mexico (SNL/NM), March 2003a. *Annual Groundwater Monitoring Report, Fiscal Year 2002*, Groundwater Protection Program, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 2003b Sandia National Laboratories/New Mexico (SNL/NM), March 2003b. *SNL/NM Statement of Work for Analytical Laboratories, Revision 2,* 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 1999a. *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 1999b. *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

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Attachment 5A Tables

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Table 5A-1
Summary of Detected Volatile Organic Compounds, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

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	**16.9**	0.250	1.00	5.00			088141-001	SW846-8260B
17-Feb-10	cis-1,2-Dichloroethene	2.95	0.300	1.00	70.0			088141-001	SW846-8260B
TAV-MW2 10-Feb-10	Trichloroethene	1.06	0.250	1.00	5.00			088129-001	SW846-8260B
TAV-MW4	Chloroform	0.490	0.250	1.00	NE	J		088131-001	SW846-8260B
11-Feb-10	Trichloroethene	1.80	0.250	1.00	5.00			088131-001	SW846-8260B
TAV-MW6	Trichloroethene	**12.6**	0.250	1.00	5.00			088133-001	SW846-8260B
12-Feb-10	cis-1,2-Dichloroethene	2.03	0.300	1.00	70.0			088133-001	SW846-8260B
TAV-MW8 09-Feb-10	Trichloroethene	1.41	0.250	1.00	5.00			088127-001	SW846-8260B
TAV-MW10	Trichloroethene	**14.8**	0.250	1.00	5.00			088138-001	SW846-8260B
15-Feb-10	cis-1,2-Dichloroethene	2.33	0.300	1.00	70.0			088138-001	SW846-8260B
TAV-MW10 (Duplicate)	Trichloroethene	**14.7**	0.250	1.00	5.00			088139-001	SW846-8260B
15-Feb-10	cis-1,2-Dichloroethene	2.28	0.300	1.00	70.0			088139-001	SW846-8260B
LWDS-MW1	Trichloroethene	**14.4**	0.250	1.00	5.00			089212-001	SW846-8260B
25-Jun-10	cis-1,2-Dichloroethene	2.55	0.300	1.00	70.0			089212-001	SW846-8260B
TAV-MW2 21-Jun-10	Trichloroethene	1.02	0.250	1.00	5.00		1.0U	089205-001	SW846-8260B
TAV-MW4	Chloroform	0.650	0.250	1.00	NE	J		089207-001	SW846-8260B
22-Jun-10	Trichloroethene	2.15	0.250	1.00	5.00			089207-001	SW846-8260B
TAV-MW6	Trichloroethene	**11.9**	0.250	1.00	5.00			089209-001	SW846-8260B
23-Jun-10	cis-1,2-Dichloroethene	2.12	0.300	1.00	70.0			089209-001	SW846-8260B
TAV-MW8 16-Jun-10	Trichloroethene	1.27	0.250	1.00	5.00			089202-001	SW846-8260B
TAV-MW8 (Duplicate) 16-Jun-10	Trichloroethene	1.17	0.250	1.00	5.00			089203-001	SW846-8260B
TAV-MW10	Trichloroethene	**14.7**	0.250	1.00	5.00			089181-001	SW846-8260B
07-Jun-10	cis-1,2-Dichloroethene	2.32	0.300	1.00	70.0			089181-001	SW846-8260B
TAV-MW10 (Duplicate)	Trichloroethene	**14.7**	0.250	1.00	5.00			089182-001	SW846-8260B
07-Jun-10	cis-1,2-Dichloroethene	2.36	0.300	1.00	70.0			089182-001	SW846-8260B
LWDS-MW1	Trichloroethene	**12.6**	0.250	1.00	5.00			089563-001	SW846-8260B
13-Sep-10	cis-1,2-Dichloroethene	2.98	0.300	1.00	70.0			089563-001	SW846-8260B
TAV-MW2 31-Aug-10	Trichloroethene	1.04	0.250	1.00	5.00			089551-001	SW846-8260B

Refer to footnotes on page 5A-35.

Table 5A-1 *(Concluded)*
Summary of Detected Volatile Organic Compounds, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

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-MW2 (Duplicate) 31-Aug-10	Trichloroethene	1.01	0.250	1.00	5.00			089552-001	SW846-8260B
TAV-MW4	Chloroform	0.630	0.250	1.00	NE	J		089561-001	SW846-8260B
09-Sep-10	Trichloroethene	2.39	0.250	1.00	5.00			089561-001	SW846-8260B
TAV-MW6	Trichloroethene	**12.0**	0.250	1.00	5.00			089554-001	SW846-8260B
01-Sep-10	cis-1,2-Dichloroethene	1.91	0.300	1.00	70.0			089554-001	SW846-8260B
TAV-MW8 30-Aug-10	Trichloroethene	1.35	0.250	1.00	5.00			089546-001	SW846-8260B
TAV-MW10	Trichloroethene	**14.9**	0.250	1.00	5.00			089556-001	SW846-8260B
02-Sep-10	cis-1,2-Dichloroethene	2.19	0.300	1.00	70.0			089556-001	SW846-8260B
LWDS-MW1	Trichloroethene	**18.5**	0.250	1.00	5.00			089728-001	SW846-8260B
25-Oct-10	cis-1,2-Dichloroethene	3.52	0.300	1.00	70.0			089728-001	SW846-8260B
LWDS-MW1 (Duplicate)	Trichloroethene	**18.6**	0.250	1.00	5.00			089729-001	SW846-8260B
25-Oct-10	cis-1,2-Dichloroethene	3.63	0.300	1.00	70.0			089729-001	SW846-8260B
TAV-MW2 14-Oct-10	Trichloroethene	0.880	0.250	1.00	5.00	J		089717-001	SW846-8260B
TAV-MW4	Chloroform	0.530	0.250	1.00	NE	J		089719-001	SW846-8260B
18-Oct-10	Trichloroethene	2.12	0.250	1.00	5.00			089719-001	SW846-8260B
TAV-MW6	Trichloroethene	**11.8**	0.250	1.00	5.00			089721-001	SW846-8260B
19-Oct-10	cis-1,2-Dichloroethene	2.27	0.300	1.00	70.0			089721-001	SW846-8260B
TAV-MW8 13-Oct-10	Trichloroethene	1.14	0.250	1.00	5.00			089715-001	SW846-8260B
TAV-MW10	Trichloroethene	**13.1**	0.250	1.00	5.00			089723-001	SW846-8260B
20-Oct-10	cis-1,2-Dichloroethene	2.39	0.300	1.00	70.0			089723-001	SW846-8260B

Refer to footnotes on page 5A-35.

Table 5A-2
Method Detection Limits for Volatile Organic Compounds (Method[g] SW846-8260), Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Analyte	MDL[b] (µg/L)
1,1,1-Trichloroethane	0.325
1,1,2,2-Tetrachloroethane	0.250
1,1,2-Trichloroethane	0.250
1,1-Dichloroethane	0.300
1,1-Dichloroethene	0.300
1,2-Dichloroethane	0.250
1,2-Dichloropropane	0.250
2-Butanone	1.25
2-Hexanone	1.25
4-methyl-, 2-Pentanone	1.25
Acetone	3.50
Benzene	0.300
Bromodichloromethane	0.250
Bromoform	0.250
Bromomethane	0.300
Carbon disulfide	1.25
Carbon tetrachloride	0.300
Chlorobenzene	0.250
Chloroethane	0.300
Chloroform	0.250
Chloromethane	0.300
Dibromochloromethane	0.300
Ethyl benzene	0.250
Methylene chloride	3.00
Styrene	0.250
Tetrachloroethene	0.300
Toluene	0.250
Trichloroethene	0.250
Vinyl acetate	1.50
Vinyl chloride	0.500
Xylene	0.300
cis-1,2-Dichloroethene	0.300
cis-1,3-Dichloropropene	0.250
trans-1,2-Dichloroethene	0.300
trans-1,3-Dichloropropene	0.250

Refer to footnotes on page 5A-35.

Table 5A-3
Summary of Nitrate plus Nitrite Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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 08-Feb-10	Nitrate plus nitrite as N	8.80	0.250	1.25	10.0			088125-018	EPA 353.2
LWDS-MW1 17-Feb-10	Nitrate plus nitrite as N	**10.9**	0.250	1.25	10.0			088141-018	EPA 353.2
LWDS-MW2 05-Feb-10	Nitrate plus nitrite as N	7.55	0.250	1.25	10.0			088123-018	EPA 353.2
TAV-MW2 10-Feb-10	Nitrate plus nitrite as N	3.12	0.100	0.500	10.0			088129-018	EPA 353.2
TAV-MW3 02-Feb-10	Nitrate plus nitrite as N	4.38	0.250	1.25	10.0			088115-018	EPA 353.2
TAV-MW3 (Duplicate) 02-Feb-10	Nitrate plus nitrite as N	4.55	0.250	1.25	10.0			088116-018	EPA 353.2
TAV-MW4 11-Feb-10	Nitrate plus nitrite as N	5.88	0.250	1.25	10.0			088131-018	EPA 353.2
TAV-MW5 04-Feb-10	Nitrate plus nitrite as N	6.58	0.250	1.25	10.0			088121-018	EPA 353.2
TAV-MW6 12-Feb-10	Nitrate plus nitrite as N	8.70	0.250	1.25	10.0			088133-018	EPA 353.2
TAV-MW7 03-Feb-10	Nitrate plus nitrite as N	3.53	0.100	0.500	10.0			088118-018	EPA 353.2
TAV-MW8 09-Feb-10	Nitrate plus nitrite as N	5.54	0.100	0.500	10.0			088127-018	EPA 353.2
TAV-MW9 01-Feb-10	Nitrate plus nitrite as N	3.20	0.250	1.25	10.0			088111-018	EPA 353.2
TAV-MW10 15-Feb-10	Nitrate plus nitrite as N	**10.1**	0.250	1.25	10.0			088138-018	EPA 353.2
TAV-MW10 (Duplicate) 15-Feb-10	Nitrate plus nitrite as N	9.95	0.250	1.25	10.0			088139-018	EPA 353.2
AVN-1 15-Jun-10	Nitrate plus nitrite as N	8.58	0.250	1.25	10.0			089198-018	EPA 353.2
LWDS-MW1 25-Jun-10	Nitrate plus nitrite as N	**11.0**	0.250	1.25	10.0			089212-018	EPA 353.2
LWDS-MW2 11-Jun-10	Nitrate plus nitrite as N	7.40	0.500	2.50	10.0			089191-018	EPA 353.2
TAV-MW2 21-Jun-10	Nitrate plus nitrite as N	3.18	0.250	1.25	10.0			089205-018	EPA 353.2

Refer to footnotes on page 5A-35.

Table 5A-3 *(Continued)*
Summary of Nitrate plus Nitrite Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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 09-Jun-10	Nitrate plus nitrite as N	4.95	0.250	1.25	10.0			089186-018	EPA 353.2
TAV-MW4 22-Jun-10	Nitrate plus nitrite as N	5.83	0.100	0.500	10.0			089207-018	EPA 353.2
TAV-MW5 14-Jun-10	Nitrate plus nitrite as N	7.05	0.500	2.50	10.0			089195-018	EPA 353.2
TAV-MW5 (Duplicate) 14-Jun-10	Nitrate plus nitrite as N	7.05	0.500	2.50	10.0			089196-018	EPA 353.2
TAV-MW6 23-Jun-10	Nitrate plus nitrite as N	8.43	0.250	1.25	10.0			089209-018	EPA 353.2
TAV-MW7 10-Jun-10	Nitrate plus nitrite as N	3.93	0.250	1.25	10.0			089188-018	EPA 353.2
TAV-MW8 16-Jun-10	Nitrate plus nitrite as N	5.55	0.500	2.50	10.0			089202-018	EPA 353.2
TAV-MW8 (Duplicate) 16-Jun-10	Nitrate plus nitrite as N	5.55	0.500	2.50	10.0			089203-018	EPA 353.2
TAV-MW9 08-Jun-10	Nitrate plus nitrite as N	3.55	0.250	1.25	10.0			089184-018	EPA 353.2
TAV-MW10 07-Jun-10	Nitrate plus nitrite as N	**10.5**	0.500	2.50	10.0			089181-018	EPA 353.2
TAV-MW10 (Duplicate) 07-Jun-10	Nitrate plus nitrite as N	**10.8**	0.500	2.50	10.0			089182-018	EPA 353.2
AVN-1 26-Aug-10	Nitrate plus nitrite as N	9.05	0.500	2.50	10.0	B		089542-018	EPA 353.2
LWDS-MW1 13-Sep-10	Nitrate plus nitrite as N	**11.0**	0.250	1.25	10.0			089563-018	EPA 353.2
LWDS-MW2 07-Sep-10	Nitrate plus nitrite as N	7.50	0.250	1.25	10.0	B		089559-018	EPA 353.2
TAV-MW2 31-Aug-10	Nitrate plus nitrite as N	3.00	0.100	0.500	10.0	B		089551-018	EPA 353.2
TAV-MW2 (Duplicate) 31-Aug-10	Nitrate plus nitrite as N	3.00	0.100	0.500	10.0	B		089552-018	EPA 353.2
TAV-MW3 23-Aug-10	Nitrate plus nitrite as N	5.50	0.250	1.25	10.0	B		089533-018	EPA 353.2
TAV-MW4 09-Sep-10	Nitrate plus nitrite as N	5.80	0.250	1.25	10.0			089561-018	EPA 353.2

Refer to footnotes on page 5A-35.

Table 5A-3 *(Continued)*
Summary of Nitrate plus Nitrite Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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 27-Aug-10	Nitrate plus nitrite as N	6.83	0.250	1.25	10.0	B		089544-018	EPA 353.2
TAV-MW6 01-Sep-10	Nitrate plus nitrite as N	8.63	0.250	1.25	10.0	B		089554-018	EPA 353.2
TAV-MW7 25-Aug-10	Nitrate plus nitrite as N	4.00	0.100	0.500	10.0	B		089540-018	EPA 353.2
TAV-MW8 30-Aug-10	Nitrate plus nitrite as N	5.58	0.250	1.25	10.0	B		089546-018	EPA 353.2
TAV-MW9 24-Aug-10	Nitrate plus nitrite as N	3.80	0.250	1.25	10.0	B		089537-018	EPA 353.2
TAV-MW9 (Duplicate) 24-Aug-10	Nitrate plus nitrite as N	3.85	0.250	1.25	10.0	B		089538-018	EPA 353.2
TAV-MW10 02-Sep-10	Nitrate plus nitrite as N	**10.4**	0.250	1.25	10.0	B		089556-018	EPA 353.2
AVN-1 12-Oct-10	Nitrate plus nitrite as N	9.18	0.250	1.25	10.0	B		089713-018	EPA 353.2
LWDS-MW1 25-Oct-10	Nitrate plus nitrite as N	**12.0**	0.250	1.25	10.0	B		089728-018	EPA 353.2
LWDS-MW1 (Duplicate) 25-Oct-10	Nitrate plus nitrite as N	**12.1**	0.500	2.50	10.0	B		089729-018	EPA 353.2
LWDS-MW2 11-Oct-10	Nitrate plus nitrite as N	7.63	0.250	1.25	10.0	B		089710-018	EPA 353.2
TAV-MW2 14-Oct-10	Nitrate plus nitrite as N	3.18	0.100	0.500	10.0	B		089717-018	EPA 353.2
TAV-MW3 04-Oct-10	Nitrate plus nitrite as N	4.53	0.250	1.25	10.0			089701-018	EPA 353.2
TAV-MW4 18-Oct-10	Nitrate plus nitrite as N	5.95	0.250	1.25	10.0	B		089719-018	EPA 353.2
TAV-MW5 07-Oct-10	Nitrate plus nitrite as N	6.33	0.250	1.25	10.0			089707-018	EPA 353.2
TAV-MW5 (Duplicate) 07-Oct-10	Nitrate plus nitrite as N	6.73	0.250	1.25	10.0			089708-018	EPA 353.2
TAV-MW6 19-Oct-10	Nitrate plus nitrite as N	8.95	0.250	1.25	10.0	B		089721-018	EPA 353.2

Refer to footnotes on page 5A-35.

Table 5A-3 *(Concluded)*
Summary of Nitrate plus Nitrite Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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-Oct-10	Nitrate plus nitrite as N	3.40	0.250	1.25	10.0			089703-018	EPA 353.2
TAV-MW8 13-Oct-10	Nitrate plus nitrite as N	5.88	0.250	1.25	10.0	B		089715-018	EPA 353.2
TAV-MW9 05-Oct-10	Nitrate plus nitrite as N	3.15	0.250	1.25	10.0			089699-018	EPA 353.2
TAV-MW10 20-Oct-10	Nitrate plus nitrite as N	**13.7**	0.250	1.25	10.0	B		089723-018	EPA 353.2

Refer to footnotes on page 5A-35.

Table 5A-4
Summary of Anion Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.066	0.200	NE	J		089542-016	SW846 9056
26-Aug-10	Chloride	9.51	0.066	0.200	NE			089542-016	SW846 9056
	Fluoride	1.25	0.033	0.100	4.0			089542-016	SW846 9056
	Sulfate	32.2	0.100	0.400	NE			089542-016	SW846 9056
LWDS-MW1	Bromide	0.824	0.066	0.200	NE			089563-016	SW846 9056
13-Sep-10	Chloride	72.6	0.660	2.00	NE			089563-016	SW846 9056
	Fluoride	0.690	0.033	0.100	4.0			089563-016	SW846 9056
	Sulfate	38.7	1.00	4.00	NE			089563-016	SW846 9056
LWDS-MW2	Bromide	0.190	0.066	0.200	NE	J		089559-016	SW846 9056
07-Sep-10	Chloride	13.4	0.066	0.200	NE			089559-016	SW846 9056
	Fluoride	1.26	0.033	0.100	4.0			089559-016	SW846 9056
	Sulfate	37.4	0.200	0.800	NE			089559-016	SW846 9056
TAV-MW2	Bromide	0.378	0.066	0.200	NE			089551-016	SW846 9056
31-Aug-10	Chloride	55.0	0.660	2.00	NE			089551-016	SW846 9056
	Fluoride	0.985	0.033	0.100	4.0			089551-016	SW846 9056
	Sulfate	53.3	1.00	4.00	NE			089551-016	SW846 9056
TAV-MW2 (Duplicate)	Bromide	0.389	0.066	0.200	NE			089552-016	SW846 9056
31-Aug-10	Chloride	55.2	0.660	2.00	NE			089552-016	SW846 9056
	Fluoride	0.945	0.033	0.100	4.0			089552-016	SW846 9056
	Sulfate	53.5	1.00	4.00	NE			089552-016	SW846 9056
TAV-MW3	Bromide	0.222	0.066	0.200	NE			089533-016	SW846 9056
23-Aug-10	Chloride	20.5	0.660	2.00	NE			089533-016	SW846 9056
	Fluoride	1.57	0.033	0.100	4.0			089533-016	SW846 9056
	Sulfate	61.8	1.00	4.00	NE			089533-016	SW846 9056
TAV-MW4	Bromide	0.396	0.066	0.200	NE			089561-016	SW846 9056
09-Sep-10	Chloride	31.9	0.660	2.00	NE			089561-016	SW846 9056
	Fluoride	1.19	0.033	0.100	4.0			089561-016	SW846 9056
	Sulfate	37.0	0.100	0.400	NE			089561-016	SW846 9056
TAV-MW5	Bromide	0.189	0.066	0.200	NE	J		089544-016	SW846 9056
27-Aug-10	Chloride	17.2	0.066	0.200	NE			089544-016	SW846 9056
	Fluoride	1.28	0.033	0.100	4.0			089544-016	SW846 9056
	Sulfate	39.5	0.200	0.800	NE			089544-016	SW846 9056

Refer to footnotes on page 5A-35.

Table 5A-4 *(Concluded)*
Summary of Anion Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	Bromide	0.778	0.066	0.200	NE			089554-016	SW846 9056
01-Sep-10	Chloride	64.4	0.330	1.00	NE			089554-016	SW846 9056
	Fluoride	1.11	0.033	0.100	4.0			089554-016	SW846 9056
	Sulfate	42.5	0.500	2.00	NE			089554-016	SW846 9056
TAV-MW7	Bromide	0.249	0.066	0.200	NE			089540-016	SW846 9056
25-Aug-10	Chloride	26.7	0.660	2.00	NE			089540-016	SW846 9056
	Fluoride	1.14	0.033	0.100	4.0			089540-016	SW846 9056
	Sulfate	64.0	1.00	4.00	NE			089540-016	SW846 9056
TAV-MW8	Bromide	0.325	0.066	0.200	NE			089546-016	SW846 9056
30-Aug-10	Chloride	34.9	0.330	1.00	NE			089546-016	SW846 9056
	Fluoride	1.43	0.033	0.100	4.0			089546-016	SW846 9056
	Sulfate	51.1	0.500	2.00	NE			089546-016	SW846 9056
TAV-MW9	Bromide	0.265	0.066	0.200	NE			089537-016	SW846 9056
24-Aug-10	Chloride	31.8	0.660	2.00	NE			089537-016	SW846 9056
	Fluoride	0.932	0.033	0.100	4.0			089537-016	SW846 9056
	Sulfate	57.3	1.00	4.00	NE			089537-016	SW846 9056
TAV-MW9 (Duplicate)	Bromide	0.249	0.066	0.200	NE			089538-016	SW846 9056
24-Aug-10	Chloride	31.3	0.660	2.00	NE			089538-016	SW846 9056
	Fluoride	0.931	0.033	0.100	4.0			089538-016	SW846 9056
	Sulfate	56.9	1.00	4.00	NE			089538-016	SW846 9056
TAV-MW10	Bromide	0.387	0.066	0.200	NE			089556-016	SW846 9056
02-Sep-10	Chloride	47.4	0.330	1.00	NE			089556-016	SW846 9056
	Fluoride	1.35	0.033	0.100	4.0			089556-016	SW846 9056
	Sulfate	42.9	0.500	2.00	NE			089556-016	SW846 9056

Refer to footnotes on page 5A-35.

Table 5A-5
Summary of Perchlorate Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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 17-Feb-10	Perchlorate	ND	4.0	12	NE	U		088141-020	EPA 314.0

Refer to footnotes on page 5A-35.

Table 5A-6
Summary of Total Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.0649	0.010	0.030	NE			089542-010	SW846 6020
26-Aug-10	Antimony	ND	0.0005	0.003	0.006	U		089542-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089542-010	SW846 6020
	Barium	0.0729	0.0005	0.002	2.00			089542-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089542-010	SW846 6020
	Cadmium	0.000319	0.00011	0.001	0.005	J		089542-010	SW846 6020
	Calcium	37.3	0.020	0.200	NE	B		089542-010	SW846 6020
	Chromium	0.00527	0.0025	0.010	0.100	J		089542-010	SW846 6020
	Cobalt	0.000135	0.0001	0.001	NE	J		089542-010	SW846 6020
	Copper	0.00172	0.0003	0.001	NE			089542-010	SW846 6020
	Iron	0.195	0.010	0.100	NE	B		089542-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089542-010	SW846 6020
	Magnesium	8.44	0.005	0.015	NE			089542-010	SW846 6020
	Manganese	0.00215	0.001	0.005	NE	J		089542-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089542-010	SW846 7470
	Nickel	0.00101	0.0005	0.002	NE	J		089542-010	SW846 6020
	Potassium	3.19	0.080	0.300	NE			089542-010	SW846 6020
	Selenium	0.00145	0.001	0.005	0.050	J		089542-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089542-010	SW846 6020
	Sodium	34.3	0.080	0.250	NE			089542-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089542-010	SW846 6020
	Uranium	0.00225	0.00005	0.0002	0.030	B		089542-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089542-010	SW846 6020
	Zinc	0.00791	0.0026	0.010	NE	J		089542-010	SW846 6020

Refer to footnotes on page 5A-35.

Table 5A-6 *(Continued)*
Summary of Total Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.010	0.030	NE	U		089563-010	SW846 6020
13-Sep-10	Antimony	ND	0.0005	0.003	0.006	U		089563-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089563-010	SW846 6020
	Barium	0.0793	0.0005	0.002	2.00			089563-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089563-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089563-010	SW846 6020
	Calcium	63.2	0.200	2.00	NE	B		089563-010	SW846 6020
	Chromium	0.00394	0.0025	0.010	0.100	J		089563-010	SW846 6020
	Cobalt	0.000231	0.0001	0.001	NE	J		089563-010	SW846 6020
	Copper	0.000877	0.0003	0.001	NE	J		089563-010	SW846 6020
	Iron	0.280	0.010	0.100	NE			089563-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089563-010	SW846 6020
	Magnesium	20.2	0.005	0.015	NE			089563-010	SW846 6020
	Manganese	0.0012	0.001	0.005	NE	J		089563-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089563-010	SW846 7470
	Nickel	0.00173	0.0005	0.002	NE	J		089563-010	SW846 6020
	Potassium	3.11	0.080	0.300	NE			089563-010	SW846 6020
	Selenium	0.00521	0.001	0.005	0.050			089563-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089563-010	SW846 6020
	Sodium	58.3	0.800	2.50	NE			089563-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089563-010	SW846 6020
	Uranium	0.0043	0.00005	0.0002	0.030	B		089563-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089563-010	SW846 6020
	Zinc	0.00432	0.0026	0.010	NE	J		089563-010	SW846 6020

Refer to footnotes on page 5A-35.

Table 5A-6 *(Continued)*
Summary of Total Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.010	0.030	NE	U		089559-010	SW846 6020
07-Sep-10	Antimony	ND	0.0005	0.003	0.006	U		089559-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089559-010	SW846 6020
	Barium	0.068	0.0005	0.002	2.00			089559-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089559-010	SW846 6020
	Cadmium	0.000417	0.00011	0.001	0.005	J		089559-010	SW846 6020
	Calcium	46.3	0.020	0.200	NE	B		089559-010	SW846 6020
	Chromium	0.00531	0.0025	0.010	0.100	J		089559-010	SW846 6020
	Cobalt	0.00016	0.0001	0.001	NE	J		089559-010	SW846 6020
	Copper	0.00116	0.0003	0.001	NE			089559-010	SW846 6020
	Iron	0.194	0.010	0.100	NE			089559-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089559-010	SW846 6020
	Magnesium	13.0	0.005	0.015	NE			089559-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089559-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089559-010	SW846 7470
	Nickel	0.00116	0.0005	0.002	NE	J		089559-010	SW846 6020
	Potassium	2.79	0.080	0.300	NE			089559-010	SW846 6020
	Selenium	0.00248	0.001	0.005	0.050	J		089559-010	SW846 6020
	Silver	0.00193	0.0002	0.001	NE			089559-010	SW846 6020
	Sodium	45.6	0.080	0.250	NE			089559-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089559-010	SW846 6020
	Uranium	0.00345	0.00005	0.0002	0.030			089559-010	SW846 6020
	Vanadium	0.00449	0.003	0.010	NE	J		089559-010	SW846 6020
	Zinc	0.00372	0.0026	0.010	NE	J		089559-010	SW846 6020

Refer to footnotes on page 5A-35.

Table 5A-6 *(Continued)*
Summary of Total Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.0115	0.010	0.030	NE	J		089551-010	SW846 6020
31-Aug-10	Antimony	ND	0.0005	0.003	0.006	U		089551-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089551-010	SW846 6020
	Barium	0.0591	0.0005	0.002	2.00			089551-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089551-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089551-010	SW846 6020
	Calcium	67.1	0.100	1.00	NE			089551-010	SW846 6020
	Chromium	0.0042	0.0025	0.010	0.100	J		089551-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		089551-010	SW846 6020
	Copper	ND	0.0003	0.001	NE	U	0.0052UJ	089551-010	SW846 6020
	Iron	0.108	0.010	0.100	NE			089551-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089551-010	SW846 6020
	Magnesium	21.9	0.005	0.015	NE			089551-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089551-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089551-010	SW846 7470
	Nickel	0.0014	0.0005	0.002	NE	J		089551-010	SW846 6020
	Potassium	3.52	0.080	0.300	NE			089551-010	SW846 6020
	Selenium	0.00249	0.001	0.005	0.050	J		089551-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089551-010	SW846 6020
	Sodium	64.1	0.400	1.25	NE	B		089551-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089551-010	SW846 6020
	Uranium	0.00695	0.00005	0.0002	0.030	B		089551-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089551-010	SW846 6020
	Zinc	0.0028	0.0026	0.010	NE	J	0.014U	089551-010	SW846 6020

Refer to footnotes on page 5A-35.

Table 5A-6 *(Continued)*
Summary of Total Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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 (Duplicate)	Aluminum	ND	0.010	0.030	NE	U		089552-010	SW846 6020
31-Aug-10	Antimony	ND	0.0005	0.003	0.006	U		089552-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089552-010	SW846 6020
	Barium	0.0604	0.0005	0.002	2.00			089552-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089552-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089552-010	SW846 6020
	Calcium	67.2	0.100	1.00	NE			089552-010	SW846 6020
	Chromium	0.00363	0.0025	0.010	0.100	J		089552-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		089552-010	SW846 6020
	Copper	ND	0.0003	0.001	NE	U	0.0052UJ	089552-010	SW846 6020
	Iron	0.123	0.010	0.100	NE			089552-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089552-010	SW846 6020
	Magnesium	23.0	0.005	0.015	NE			089552-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089552-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089552-010	SW846 7470
	Nickel	0.00133	0.0005	0.002	NE	J		089552-010	SW846 6020
	Potassium	3.49	0.080	0.300	NE			089552-010	SW846 6020
	Selenium	0.00265	0.001	0.005	0.050	J		089552-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089552-010	SW846 6020
	Sodium	69.4	0.400	1.25	NE	B		089552-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089552-010	SW846 6020
	Uranium	0.0071	0.00005	0.0002	0.030	B		089552-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089552-010	SW846 6020
	Zinc	0.00297	0.0026	0.010	NE	J	0.014U	089552-010	SW846 6020

Refer to footnotes on page 5A-35.

Table 5A-6 *(Continued)*
Summary of Total Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

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Well ID	Analyte	Result[a] (mg/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	0.010	0.030	NE	U		089533-010	SW846 6020
23-Aug-10	Antimony	ND	0.0005	0.003	0.006	U		089533-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089533-010	SW846 6020
	Barium	0.0411	0.0005	0.002	2.00			089533-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089533-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089533-010	SW846 6020
	Calcium	46.8	0.020	0.200	NE	B		089533-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089533-010	SW846 6020
	Cobalt	0.000118	0.0001	0.001	NE	J		089533-010	SW846 6020
	Copper	0.000516	0.0003	0.001	NE	J		089533-010	SW846 6020
	Iron	0.163	0.010	0.100	NE	B		089533-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089533-010	SW846 6020
	Magnesium	12.4	0.005	0.015	NE			089533-010	SW846 6020
	Manganese	0.00152	0.001	0.005	NE	J		089533-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089533-010	SW846 7470
	Nickel	0.000889	0.0005	0.002	NE	J		089533-010	SW846 6020
	Potassium	4.28	0.080	0.300	NE			089533-010	SW846 6020
	Selenium	0.00177	0.001	0.005	0.050	J		089533-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089533-010	SW846 6020
	Sodium	45.9	0.080	0.250	NE			089533-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089533-010	SW846 6020
	Uranium	0.00358	0.00005	0.0002	0.030	B		089533-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089533-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		089533-010	SW846 6020

Refer to footnotes on page 5A-35.

Table 5A-6 *(Continued)*
Summary of Total Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

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Well ID	Analyte	Result[a] (mg/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	0.010	0.030	NE	U		089561-010	SW846 6020
09-Sep-10	Antimony	ND	0.0005	0.003	0.006	U		089561-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089561-010	SW846 6020
	Barium	0.0814	0.0005	0.002	2.00			089561-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089561-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089561-010	SW846 6020
	Calcium	46.3	0.020	0.200	NE	B		089561-010	SW846 6020
	Chromium	0.0234	0.0025	0.010	0.100			089561-010	SW846 6020
	Cobalt	0.000152	0.0001	0.001	NE	J		089561-010	SW846 6020
	Copper	0.00062	0.0003	0.001	NE	J		089561-010	SW846 6020
	Iron	0.201	0.010	0.100	NE			089561-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089561-010	SW846 6020
	Magnesium	14.2	0.005	0.015	NE			089561-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089561-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089561-010	SW846 7470
	Nickel	0.0011	0.0005	0.002	NE	J		089561-010	SW846 6020
	Potassium	2.92	0.080	0.300	NE			089561-010	SW846 6020
	Selenium	0.00364	0.001	0.005	0.050	J		089561-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089561-010	SW846 6020
	Sodium	43.3	0.080	0.250	NE			089561-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089561-010	SW846 6020
	Uranium	0.0039	0.00005	0.0002	0.030			089561-010	SW846 6020
	Vanadium	0.00427	0.003	0.010	NE	J		089561-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		089561-010	SW846 6020

Refer to footnotes on page 5A-35.

Table 5A-6 *(Continued)*
Summary of Total Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

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Well ID	Analyte	Result[a] (mg/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	0.010	0.030	NE	U		089544-010	SW846 6020
27-Aug-10	Antimony	ND	0.0005	0.003	0.006	U		089544-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089544-010	SW846 6020
	Barium	0.0592	0.0005	0.002	2.00			089544-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089544-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089544-010	SW846 6020
	Calcium	43.6	0.020	0.200	NE			089544-010	SW846 6020
	Chromium	0.00415	0.0025	0.010	0.100	J		089544-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		089544-010	SW846 6020
	Copper	ND	0.0003	0.001	NE	U		089544-010	SW846 6020
	Iron	0.0799	0.010	0.100	NE	J		089544-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089544-010	SW846 6020
	Magnesium	13.9	0.005	0.015	NE			089544-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089544-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089544-010	SW846 7470
	Nickel	0.000734	0.0005	0.002	NE	J		089544-010	SW846 6020
	Potassium	2.90	0.080	0.300	NE			089544-010	SW846 6020
	Selenium	0.00221	0.001	0.005	0.050	J		089544-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089544-010	SW846 6020
	Sodium	46.9	0.080	0.250	NE	B		089544-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089544-010	SW846 6020
	Uranium	0.00367	0.00005	0.0002	0.030	B		089544-010	SW846 6020
	Vanadium	0.00392	0.003	0.010	NE	J		089544-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		089544-010	SW846 6020

Refer to footnotes on page 5A-35.

Table 5A-6 *(Continued)*
Summary of Total Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.0118	0.010	0.030	NE	J		089554-010	SW846 6020
01-Sep-10	Antimony	ND	0.0005	0.003	0.006	U		089554-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089554-010	SW846 6020
	Barium	0.0623	0.0005	0.002	2.00			089554-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089554-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089554-010	SW846 6020
	Calcium	60.6	0.100	1.00	NE			089554-010	SW846 6020
	Chromium	0.00489	0.0025	0.010	0.100	J		089554-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		089554-010	SW846 6020
	Copper	ND	0.0003	0.001	NE	U		089554-010	SW846 6020
	Iron	0.106	0.010	0.100	NE			089554-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089554-010	SW846 6020
	Magnesium	19.2	0.005	0.015	NE			089554-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089554-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089554-010	SW846 7470
	Nickel	0.00125	0.0005	0.002	NE	J		089554-010	SW846 6020
	Potassium	3.76	0.080	0.300	NE			089554-010	SW846 6020
	Selenium	0.00342	0.001	0.005	0.050	J		089554-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089554-010	SW846 6020
	Sodium	65.9	0.400	1.25	NE	B		089554-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089554-010	SW846 6020
	Uranium	0.00462	0.00005	0.0002	0.030	B		089554-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089554-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		089554-010	SW846 6020

Refer to footnotes on page 5A-35.

Table 5A-6 *(Continued)*
Summary of Total Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.010	0.030	NE	U		089540-010	SW846 6020
25-Aug-10	Antimony	ND	0.0005	0.003	0.006	U		089540-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089540-010	SW846 6020
	Barium	0.0488	0.0005	0.002	2.00			089540-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089540-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089540-010	SW846 6020
	Calcium	58.7	0.200	2.00	NE	B		089540-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089540-010	SW846 6020
	Cobalt	0.000138	0.0001	0.001	NE	J		089540-010	SW846 6020
	Copper	0.000653	0.0003	0.001	NE	J		089540-010	SW846 6020
	Iron	0.171	0.010	0.100	NE	B		089540-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089540-010	SW846 6020
	Magnesium	16.0	0.005	0.015	NE			089540-010	SW846 6020
	Manganese	0.00259	0.001	0.005	NE	J		089540-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089540-010	SW846 7470
	Nickel	0.000918	0.0005	0.002	NE	J		089540-010	SW846 6020
	Potassium	3.85	0.080	0.300	NE			089540-010	SW846 6020
	Selenium	0.0016	0.001	0.005	0.050	J		089540-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089540-010	SW846 6020
	Sodium	49.0	0.080	0.250	NE			089540-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089540-010	SW846 6020
	Uranium	0.00509	0.00005	0.0002	0.030	B		089540-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089540-010	SW846 6020
	Zinc	0.0029	0.0026	0.010	NE	J		089540-010	SW846 6020

Refer to footnotes on page 5A-35.

Table 5A-6 *(Continued)*
Summary of Total Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.0243	0.010	0.030	NE	J		089546-010	SW846 6020
30-Aug-10	Antimony	ND	0.0005	0.003	0.006	U		089546-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089546-010	SW846 6020
	Barium	0.0502	0.0005	0.002	2.00			089546-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089546-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089546-010	SW846 6020
	Calcium	53.5	0.100	1.00	NE			089546-010	SW846 6020
	Chromium	0.00461	0.0025	0.010	0.100	J		089546-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		089546-010	SW846 6020
	Copper	ND	0.0003	0.001	NE	U		089546-010	SW846 6020
	Iron	0.0985	0.010	0.100	NE	J		089546-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089546-010	SW846 6020
	Magnesium	16.1	0.005	0.015	NE			089546-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089546-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089546-010	SW846 7470
	Nickel	0.00103	0.0005	0.002	NE	J		089546-010	SW846 6020
	Potassium	3.81	0.080	0.300	NE			089546-010	SW846 6020
	Selenium	0.0026	0.001	0.005	0.050	J		089546-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089546-010	SW846 6020
	Sodium	56.7	0.400	1.25	NE	B		089546-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089546-010	SW846 6020
	Uranium	0.00385	0.00005	0.0002	0.030	B		089546-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089546-010	SW846 6020
	Zinc	0.00283	0.0026	0.010	NE	J		089546-010	SW846 6020

Refer to footnotes on page 5A-35.

Table 5A-6 *(Continued)*
Summary of Total Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.0158	0.010	0.030	NE	J		089537-010	SW846 6020
24-Aug-10	Antimony	ND	0.0005	0.003	0.006	U		089537-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089537-010	SW846 6020
	Barium	0.0565	0.0005	0.002	2.00			089537-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089537-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089537-010	SW846 6020
	Calcium	59.4	0.200	2.00	NE	B		089537-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089537-010	SW846 6020
	Cobalt	0.000168	0.0001	0.001	NE	J		089537-010	SW846 6020
	Copper	0.000999	0.0003	0.001	NE	J	0.0044U	089537-010	SW846 6020
	Iron	0.196	0.010	0.100	NE	B	0.67UJ	089537-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089537-010	SW846 6020
	Magnesium	17.8	0.005	0.015	NE			089537-010	SW846 6020
	Manganese	0.00495	0.001	0.005	NE	J	0.0052U	089537-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089537-010	SW846 7470
	Nickel	0.00124	0.0005	0.002	NE	J		089537-010	SW846 6020
	Potassium	3.83	0.080	0.300	NE			089537-010	SW846 6020
	Selenium	0.00145	0.001	0.005	0.050	J		089537-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089537-010	SW846 6020
	Sodium	48.6	0.080	0.250	NE			089537-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089537-010	SW846 6020
	Uranium	0.00561	0.00005	0.0002	0.030	B		089537-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089537-010	SW846 6020
	Zinc	0.00842	0.0026	0.010	NE	J	0.014U	089537-010	SW846 6020

Refer to footnotes on page 5A-35.

Table 5A-6 *(Continued)*
Summary of Total Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW9 (Duplicate)	Aluminum	0.016	0.010	0.030	NE	J		089538-010	SW846 6020
24-Aug-10	Antimony	ND	0.0005	0.003	0.006	U		089538-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089538-010	SW846 6020
	Barium	0.0563	0.0005	0.002	2.00			089538-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089538-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089538-010	SW846 6020
	Calcium	60.1	0.200	2.00	NE	B		089538-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089538-010	SW846 6020
	Cobalt	0.000169	0.0001	0.001	NE	J		089538-010	SW846 6020
	Copper	0.00184	0.0003	0.001	NE		0.0044U	089538-010	SW846 6020
	Iron	0.235	0.010	0.100	NE	B	0.67UJ	089538-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089538-010	SW846 6020
	Magnesium	16.9	0.005	0.015	NE			089538-010	SW846 6020
	Manganese	0.00528	0.001	0.005	NE			089538-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089538-010	SW846 7470
	Nickel	0.00125	0.0005	0.002	NE	J		089538-010	SW846 6020
	Potassium	3.69	0.080	0.300	NE			089538-010	SW846 6020
	Selenium	0.00141	0.001	0.005	0.050	J		089538-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089538-010	SW846 6020
	Sodium	49.3	0.080	0.250	NE			089538-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089538-010	SW846 6020
	Uranium	0.00556	0.00005	0.0002	0.030	B		089538-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089538-010	SW846 6020
	Zinc	0.0122	0.0026	0.010	NE		0.014U	089538-010	SW846 6020

Refer to footnotes on page 5A-35.

Table 5A-6 *(Concluded)*
Summary of Total Metal Results,
Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.010	0.030	NE	U		089556-010	SW846 6020
02-Sep-10	Antimony	ND	0.0005	0.003	0.006	U		089556-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089556-010	SW846 6020
	Barium	0.0612	0.0005	0.002	2.00			089556-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089556-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089556-010	SW846 6020
	Calcium	61.9	0.100	1.00	NE			089556-010	SW846 6020
	Chromium	0.0052	0.0025	0.010	0.100	J		089556-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		089556-010	SW846 6020
	Copper	ND	0.0003	0.001	NE	U		089556-010	SW846 6020
	Iron	0.106	0.010	0.100	NE			089556-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089556-010	SW846 6020
	Magnesium	19.2	0.005	0.015	NE			089556-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089556-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089556-010	SW846 7470
	Nickel	0.00127	0.0005	0.002	NE	J		089556-010	SW846 6020
	Potassium	4.20	0.080	0.300	NE			089556-010	SW846 6020
	Selenium	0.0028	0.001	0.005	0.050	J		089556-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089556-010	SW846 6020
	Sodium	63.7	0.400	1.25	NE	B		089556-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089556-010	SW846 6020
	Uranium	0.0043	0.00005	0.0002	0.030	B		089556-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089556-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		089556-010	SW846 6020

Refer to footnotes on page 5A-35.

Table 5A-7
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[b] (pCi/L)	MCL[d] (pCi/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
AVN-1	Americium-241	2.43 ± 4.63	7.87	3.94	NE	U	BD	089542-033	EPA 901.1
26-Aug-10	Cesium-137	0.180 ± 1.59	2.73	1.37	NE	U	BD	089542-033	EPA 901.1
	Cobalt-60	-0.566 ± 1.69	2.81	1.41	NE	U	BD	089542-033	EPA 901.1
	Potassium-40	-12.7 ± 30.7	40.6	20.3	NE	U	BD	089542-033	EPA 901.1
	Gross Alpha	1.77	NA	NA	15	NA	None	089542-034	EPA 900.0
	Gross Beta	3.28 ± 1.16	1.57	0.760	4mrem/yr		J	089542-034	EPA 900.0
	Tritium	60.3 ± 67.2	111	50.6	NE	U	BD	089542-036	EPA 906.0 M
LWDS-MW1	Americium-241	1.97 ± 5.66	9.31	4.66	NE	U	BD	089563-033	EPA 901.1
13-Sep-10	Cesium-137	0.711 ± 1.51	2.57	1.29	NE	U	BD	089563-033	EPA 901.1
	Cobalt-60	0.970 ± 1.67	2.89	1.45	NE	U	BD	089563-033	EPA 901.1
	Potassium-40	-1.5 ± 38.0	38.7	19.4	NE	U	BD	089563-033	EPA 901.1
	Gross Alpha	1.96	NA	NA	15	NA	None	089563-034	EPA 900.0
	Gross Beta	12.9 ± 2.50	1.55	0.746	4mrem/yr			089563-034	EPA 900.0
	Tritium	-38.5 ± 60.0	115	53.3	NE	U	BD	089563-036	EPA 906.0 M
LWDS-MW2	Americium-241	-21.3 ± 11.9	18.6	9.30	NE	U	BD	089559-033	EPA 901.1
07-Sep-10	Cesium-137	-2.15 ± 1.90	3.00	1.50	NE	U	BD	089559-033	EPA 901.1
	Cobalt-60	1.13 ± 1.99	3.46	1.73	NE	U	BD	089559-033	EPA 901.1
	Potassium-40	-35.6 ± 41.0	42.4	21.2	NE	U	BD	089559-033	EPA 901.1
	Gross Alpha	3.13	NA	NA	15	NA	None	089559-034	EPA 900.0
	Gross Beta	4.11 ± 1.40	1.92	0.936	4mrem/yr		J	089559-034	EPA 900.0
	Tritium	75.2 ± 59.2	91.8	41.5	NE	U	BD	089559-036	EPA 906.0 M
TAV-MW2	Americium-241	7.11 ± 10.3	18.3	9.18	NE	U	BD	089551-033	EPA 901.1
31-Aug-10	Cesium-137	-0.751 ± 2.01	3.34	1.67	NE	U	BD	089551-033	EPA 901.1
	Cobalt-60	0.376 ± 2.15	3.61	1.81	NE	U	BD	089551-033	EPA 901.1
	Potassium-40	6.97 ± 44.8	52.2	26.1	NE	U	BD	089551-033	EPA 901.1
	Gross Alpha	4.53	NA	NA	15	NA	None	089551-034	EPA 900.0
	Gross Beta	5.47 ± 1.61	1.90	0.917	4mrem/yr		J	089551-034	EPA 900.0
	Tritium	40.0 ± 62.8	107	49.0	NE	U	BD	089551-036	EPA 906.0 M
TAV-MW2 (Duplicate)	Americium-241	-8.44 ± 11.5	19.1	9.57	NE	U	BD	089552-033	EPA 901.1
31-Aug-10	Cesium-137	0.302 ± 3.66	4.13	2.07	NE	U	BD	089552-033	EPA 901.1
	Cobalt-60	0.370 ± 1.89	3.26	1.63	NE	U	BD	089552-033	EPA 901.1
	Potassium-40	3.25 ± 41.7	44.2	22.1	NE	U	BD	089552-033	EPA 901.1
	Gross Alpha	4.55	NA	NA	15	NA	None	089552-034	EPA 900.0
	Gross Beta	3.03 ± 1.34	1.97	0.955	4mrem/yr		J	089552-034	EPA 900.0
	Tritium	25.5 ± 63.3	111	50.9	NE	U	BD	089552-036	EPA 906.0 M

Refer to footnotes on page 5A-35.

Table 5A-7 *(Continued)*
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[b] (pCi/L)	MCL[d] (pCi/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW3	Americium-241	-8.71 ± 10.2	17.4	8.72	NE	U	BD	089533-033	EPA 901.1
23-Aug-10	Cesium-137	1.03 ± 2.09	3.60	1.80	NE	U	BD	089533-033	EPA 901.1
	Cobalt-60	1.29 ± 2.17	3.76	1.88	NE	U	BD	089533-033	EPA 901.1
	Potassium-40	27.1 ± 43.6	56.8	28.4	NE	U	BD	089533-033	EPA 901.1
	Gross Alpha	2.42	NA	NA	15	NA	None	089533-034	EPA 900.0
	Gross Beta	6.31 ± 1.59	1.71	0.828	4mrem/yr			089533-034	EPA 900.0
	Tritium	21.5 ± 60.7	107	49.0	NE	U	BD	089533-036	EPA 906.0 M
TAV-MW4	Americium-241	-0.716 ± 5.21	8.82	4.41	NE	U	BD	089561-033	EPA 901.1
09-Sep-10	Cesium-137	0.363 ± 1.75	2.99	1.50	NE	U	BD	089561-033	EPA 901.1
	Cobalt-60	0.242 ± 1.88	3.18	1.59	NE	U	BD	089561-033	EPA 901.1
	Potassium-40	3.55 ± 43.9	46.7	23.4	NE	U	BD	089561-033	EPA 901.1
	Gross Alpha	1.11	NA	NA	15	NA	None	089561-034	EPA 900.0
	Gross Beta	3.10 ± 0.891	1.01	0.480	4mrem/yr			089561-034	EPA 900.0
	Tritium	40.8 ± 55.6	93.9	42.4	NE	U	BD	089561-036	EPA 906.0 M
TAV-MW5	Americium-241	-2.31 ± 5.36	7.92	3.96	NE	U	BD	089544-033	EPA 901.1
27-Aug-10	Cesium-137	0.444 ± 1.56	2.71	1.35	NE	U	BD	089544-033	EPA 901.1
	Cobalt-60	1.20 ± 1.63	2.91	1.46	NE	U	BD	089544-033	EPA 901.1
	Potassium-40	-17.6 ± 34.5	39.6	19.8	NE	U	BD	089544-033	EPA 901.1
	Gross Alpha	1.44	NA	NA	15	NA	None	089544-034	EPA 900.0
	Gross Beta	2.16 ± 0.840	1.15	0.548	4mrem/yr		J	089544-034	EPA 900.0
	Tritium	12.4 ± 60.4	108	49.6	NE	U	BD	089544-036	EPA 906.0 M
TAV-MW6	Americium-241	-7.94 ± 10.7	17.6	8.83	NE	U	BD	089554-033	EPA 901.1
01-Sep-10	Cesium-137	0.456 ± 1.87	3.19	1.60	NE	U	BD	089554-033	EPA 901.1
	Cobalt-60	0.549 ± 2.16	3.68	1.84	NE	U	BD	089554-033	EPA 901.1
	Potassium-40	40.2 ± 24.8	45.1	22.6	NE	U	BD	089554-033	EPA 901.1
	Gross Alpha	1.09	NA	NA	15	NA	None	089554-034	EPA 900.0
	Gross Beta	4.60 ± 1.23	1.42	0.685	4mrem/yr			089554-034	EPA 900.0
	Tritium	6.33 ± 60.7	110	50.4	NE	U	BD	089554-036	EPA 906.0 M
TAV-MW7	Americium-241	-16.2 ± 7.80	12.6	6.29	NE	U	BD	089540-033	EPA 901.1
25-Aug-10	Cesium-137	0.341 ± 1.77	3.00	1.50	NE	U	BD	089540-033	EPA 901.1
	Cobalt-60	2.18 ± 1.91	3.46	1.73	NE	U	BD	089540-033	EPA 901.1
	Potassium-40	13.7 ± 35.1	43.6	21.8	NE	U	BD	089540-033	EPA 901.1
	Gross Alpha	3.35	NA	NA	15	NA	None	089540-034	EPA 900.0
	Gross Beta	5.62 ± 1.46	1.63	0.788	4mrem/yr			089540-034	EPA 900.0
	Tritium	6.12 ± 58.7	107	48.8	NE	U	BD	089540-036	EPA 906.0 M

Refer to footnotes on page 5A-35.

Table 5A-7 *(Concluded)*
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[b] (pCi/L)	MCL[d] (pCi/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW8	Americium-241	0.470 ± 2.42	3.95	1.98	NE	U	BD	089546-033	EPA 901.1
30-Aug-10	Cesium-137	-0.888 ± 4.39	5.39	2.70	NE	U	BD	089546-033	EPA 901.1
	Cobalt-60	-0.419 ± 2.07	3.45	1.73	NE	U	BD	089546-033	EPA 901.1
	Potassium-40	36.6 ± 23.5	42.9	21.5	NE	U	BD	089546-033	EPA 901.1
	Gross Alpha	0.80	NA	NA	15	NA	None	089546-034	EPA 900.0
	Gross Beta	2.92 ± 0.895	1.07	0.509	4mrem/yr		J	089546-034	EPA 900.0
	Tritium	45.6 ± 62.9	106	48.5	NE	U	BD	089546-036	EPA 906.0 M
TAV-MW9	Americium-241	5.81 ± 13.2	22.6	11.3	NE	U	BD	089537-033	EPA 901.1
24-Aug-10	Cesium-137	-1.29 ± 1.96	3.18	1.59	NE	U	BD	089537-033	EPA 901.1
	Cobalt-60	-0.709 ± 1.91	3.09	1.54	NE	U	BD	089537-033	EPA 901.1
	Potassium-40	-17.9 ± 37.6	51.4	25.7	NE	U	BD	089537-033	EPA 901.1
	Gross Alpha	2.00	NA	NA	15	NA	None	089537-034	EPA 900.0
	Gross Beta	5.98 ± 1.62	1.89	0.922	4mrem/yr			089537-034	EPA 900.0
	Tritium	6.33 ± 60.8	110	50.5	NE	U	BD	089537-036	EPA 906.0 M
TAV-MW9 (Duplicate)	Americium-241	-28.4 ± 11.4	17.8	8.92	NE	U	BD	089538-033	EPA 901.1
24-Aug-10	Cesium-137	-0.292 ± 1.92	3.26	1.63	NE	U	BD	089538-033	EPA 901.1
	Cobalt-60	0.351 ± 1.95	3.36	1.68	NE	U	BD	089538-033	EPA 901.1
	Potassium-40	-19.2 ± 43.5	46.1	23.1	NE	U	BD	089538-033	EPA 901.1
	Gross Alpha	2.09	NA	NA	15	NA	None	089538-034	EPA 900.0
	Gross Beta	4.81 ± 1.37	1.66	0.807	4mrem/yr		J	089538-034	EPA 900.0
	Tritium	39.5 ± 62.1	106	48.5	NE	U	BD	089538-036	EPA 906.0 M
TAV-MW10	Americium-241	-0.111 ± 5.02	8.51	4.26	NE	U	BD	089556-033	EPA 901.1
02-Sep-10	Cesium-137	-0.071 ± 1.79	3.02	1.51	NE	U	BD	089556-033	EPA 901.1
	Cobalt-60	-1.56 ± 2.05	3.24	1.62	NE	U	BD	089556-033	EPA 901.1
	Potassium-40	-4.81 ± 46.1	44.2	22.1	NE	U	BD	089556-033	EPA 901.1
	Gross Alpha	2.32	NA	NA	15	NA	None	089556-034	EPA 900.0
	Gross Beta	4.00 ± 1.02	0.995	0.470	4mrem/yr			089556-034	EPA 900.0
	Tritium	-33.0 ± 56.3	110	50.1	NE	U	BD	089556-036	EPA 906.0 M

Refer to footnotes on page 5A-35.

Table 5A-8
Summary of Field Water Quality Measurements[h], Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Sample Date	Temperature (⁰C)	Specific Conductivity (μmho/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
AVN-1	08-Feb-10	17.12	411	154.1	7.53	1.20	40.8	3.93
LWDS-MW1	17-Feb-10	17.59	729	234.7	7.19	0.69	75.6	7.31
LWDS-MW2	05-Feb-10	18.05	468	203.3	7.41	0.42	49.4	4.66
TAV-MW2	10-Feb-10	17.00	715	183.1	7.18	0.45	58.2	5.61
TAV-MW3	02-Feb-10	17.97	541	220.4	7.32	0.61	70.4	6.66
TAV-MW4	11-Feb-10	16.02	514	236.4	7.39	0.64	70.1	6.99
TAV-MW5	04-Feb-10	17.23	485	206.1	7.38	0.16	47.7	4.58
TAV-MW6	12-Feb-10	16.41	679	211.2	7.25	0.63	74.5	7.31
TAV-MW7	03-Feb-10	17.47	600	136.1	7.25	1.39	2.7	0.26
TAV-MW8	09-Feb-10	18.12	575	200.5	7.34	0.68	66.0	6.22
TAV-MW9	01-Feb-10	18.61	591	170.1	7.11	1.65	16.1	1.50
TAV-MW10	15-Feb-10	16.31	655	235.1	7.22	0.21	85.3	8.34
AVN-1	15-Jun-10	21.42	405	66.3	7.83	2.47	43.2	3.81
LWDS-MW1	25-Jun-10	23.06	700	183.9	7.41	0.24	84.5	7.22
LWDS-MW2	11-Jun-10	21.82	459	72.3	7.69	0.53	50.0	4.34
TAV-MW2	21-Jun-10	22.53	687	52.8	7.53	2.17	60.3	5.18
TAV-MW3	09-Jun-10	23.78	525	116.0	7.50	0.54	74.8	6.20
TAV-MW4	22-Jun-10	21.68	500	288.6	7.51	0.89	71.6	6.28
TAV-MW5	14-Jun-10	22.34	476	67.0	7.71	0.14	52.6	4.56
TAV-MW6	23-Jun-10	21.34	663	213.9	7.40	1.59	78.7	6.98
TAV-MW7	10-Jun-10	22.23	591	2.7	7.52	0.64	3.7	0.32
TAV-MW8	16-Jun-10	22.91	565	63.8	7.68	0.46	70.9	6.04
TAV-MW9	08-Jun-10	21.67	628	92.5	8.46	1.08	16.4	1.44
TAV-MW10	07-Jun-10	21.99	644	159.6	8.47	0.25	83.1	7.26
AVN-1	26-Aug-10	22.74	393	154.1	7.56	1.67	36.6	3.28
LWDS-MW1	13-Sep-10	20.12	691	112.3	7.34	0.22	81.8	7.40
LWDS-MW2	07-Sep-10	22.54	454	173.3	7.45	0.09	50.9	4.41
TAV-MW2	31-Aug-10	22.47	679	186.8	7.19	0.42	66.5	5.76
TAV-MW3	23-Aug-10	22.61	516	144.6	7.39	0.73	74.8	6.45
TAV-MW4	09-Sep-10	21.78	495	177.9	7.47	0.45	75.4	6.63
TAV-MW5	27-Aug-10	22.92	464	163.8	7.42	0.16	54.1	4.65
TAV-MW6	01-Sep-10	21.87	645	193.5	7.29	0.39	80.5	7.11

Refer to footnotes on page 5A-35.

Table 5A-8 *(Concluded)*
Summary of Field Water Quality Measurements[h], Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Sample Date	Temperature (^{0}C)	Specific Conductivity (μmho/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
TAV-MW7	25-Aug-10	21.00	572	107.9	7.26	0.30	3.5	0.31
TAV-MW8	30-Aug-10	21.27	547	190.9	7.37	0.98	79.1	7.10
TAV-MW9	24-Aug-10	21.84	568	125.6	7.17	1.73	18.4	1.61
TAV-MW10	02-Sep-10	23.11	631	171.5	7.27	0.12	84.4	7.20
AVN-1	12-Oct-10	21.00	400	195.7	7.68	0.95	43.2	3.84
LWDS-MW1	25-Oct-10	16.38	690	249.9	7.47	0.22	76.3	7.46
LWDS-MW2	11-Oct-10	20.80	452	232.2	7.59	0.21	49.7	4.43
TAV-MW2	14-Oct-10	20.37	688	277.6	7.31	0.58	58.4	5.26
TAV-MW3	04-Oct-10	21.45	528	154.5	7.46	0.20	75.0	6.64
TAV-MW4	18-Oct-10	20.43	497	215.4	7.56	0.41	71.8	6.48
TAV-MW5	07-Oct-10	21.27	471	228.3	7.53	0.11	50.9	4.49
TAV-MW6	19-Oct-10	19.17	652	214.7	7.40	0.61	74.3	6.85
TAV-MW7	06-Oct-10	20.79	582	214.9	7.37	0.27	3.4	0.30
TAV-MW8	13-Oct-10	19.99	555	225.1	7.50	0.90	69.1	6.26
TAV-MW9	05-Oct-10	22.46	605	144.9	7.27	1.47	17.3	1.50
TAV-MW10	20-Oct-10	20.58	629	206.8	7.42	0.08	76.9	7.00

Refer to footnotes on page 5A-35.

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Footnotes for Technical Area V Groundwater Monitoring Tables

[a]Result

- Values in bold exceed the established MCL.
- ND = not detected (at method detection limit).
- Activities of zero or less are considered to be not detected.
- Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 1-4)
- μg/L = micrograms per liter
- mg/L = milligrams per liter
- pCi/L = picocuries per liter

[b]MDL or MDA

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.

The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.

NA = not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

[c]PQL or Critical Level

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.

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.

[d]MCL

- Maximum contaminant level. Established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11[b]), National Primary Drinking Water Standards, EPA, July 2002.
- NE = not established.
- 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).

[e]Laboratory Qualifier

B = Analyte is detected in associated laboratory method blank.
J = Amount detected is below the practical quantitation limit (PQL).
NA = Not applicable for gross alpha activities.
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 = The associate value is an estimated quantity.
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.

Footnotes for Technical Area V Groundwater Monitoring Tables (Concluded)

[g]Analytical Method

- EPA, 1979, *Methods for Chemical Analysis of Water and Wastes*, EPA-600/4-79-020, U.S. Environmental Protection Agency, Cincinnati, Ohio.
- EPA, 1980, *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*, EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio
- EPA, 1996, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed., Rev. 1, U.S. Environmental Protection Agency, Washington, D.C.
- EPA, 1999, *Perchlorate in Drinking Water Using Ion Chromatography*, EPA 815/R-00-014, U.S. Environmental Protection Agency, Washington, D.C.

[h]Field Water Quality Measurements

- Field measurements collected prior to sampling.

°C	=	degrees Celsius.
% sat	=	present saturation.
µmho/cm	=	micromhos per centimeter.
mg/L	=	milligrams per liter.
mV	=	millivolts.
NTU	=	nephelometric turbidity units.
pH	=	potential of hydrogen (negative logarithm of the hydrogen ion concentration).

Attachment 5B
Technical Area V
Plots

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Attachment 5B Plots

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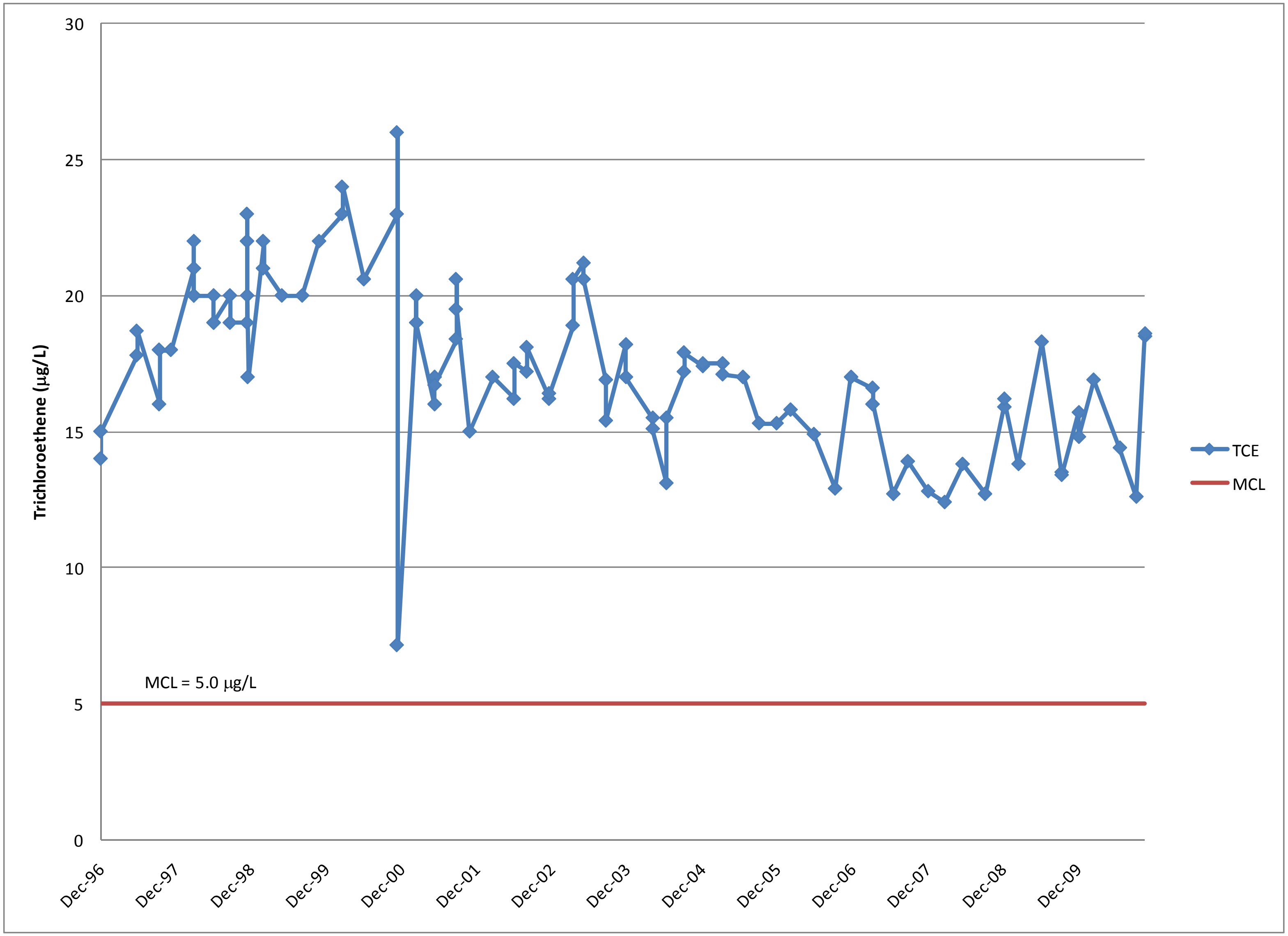

Figure 5B-1. Trichloroethene Concentrations, LWDS-MW1

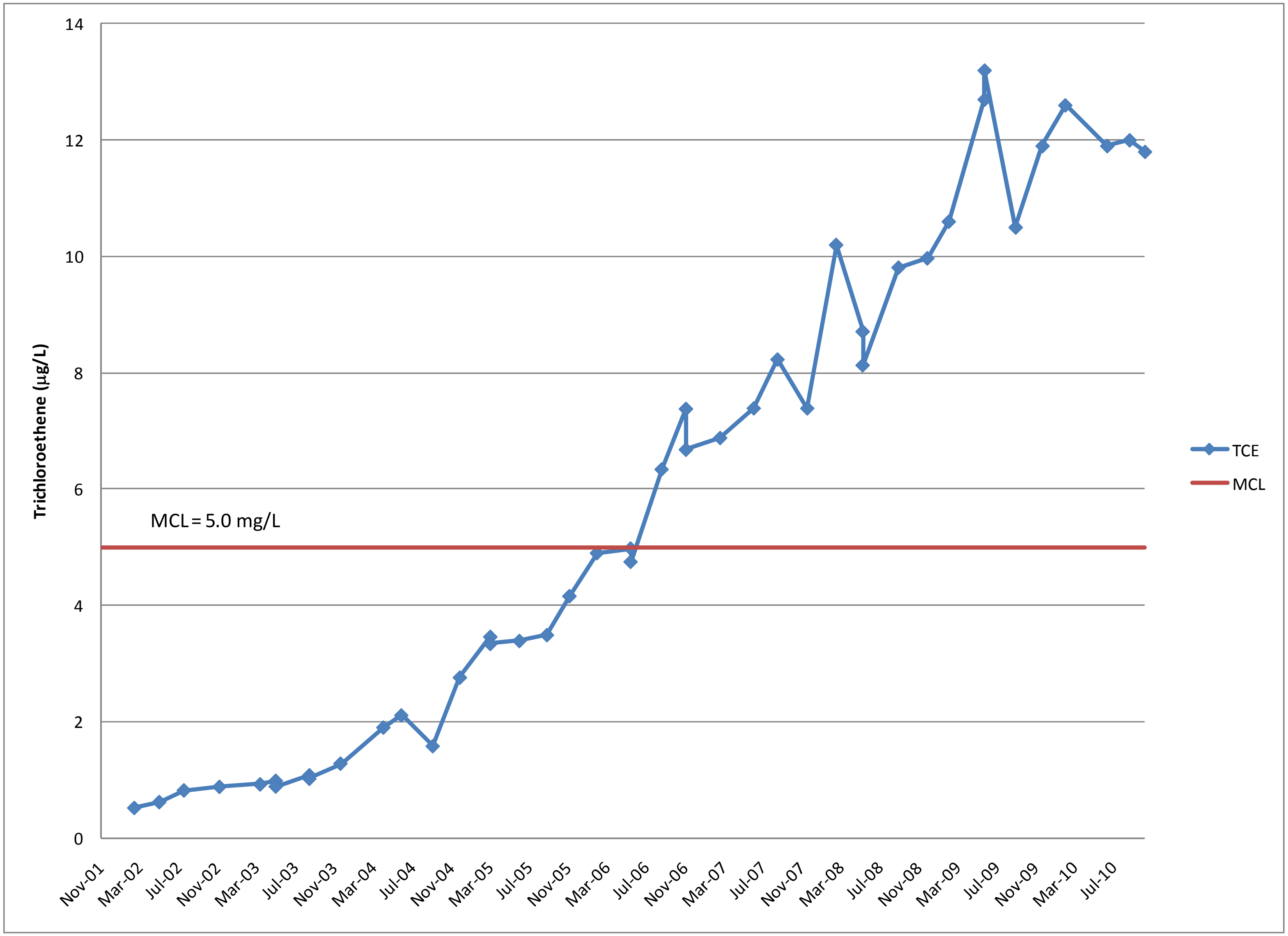

Figure 5B-2. Trichloroethene Concentrations, TAV-MW6

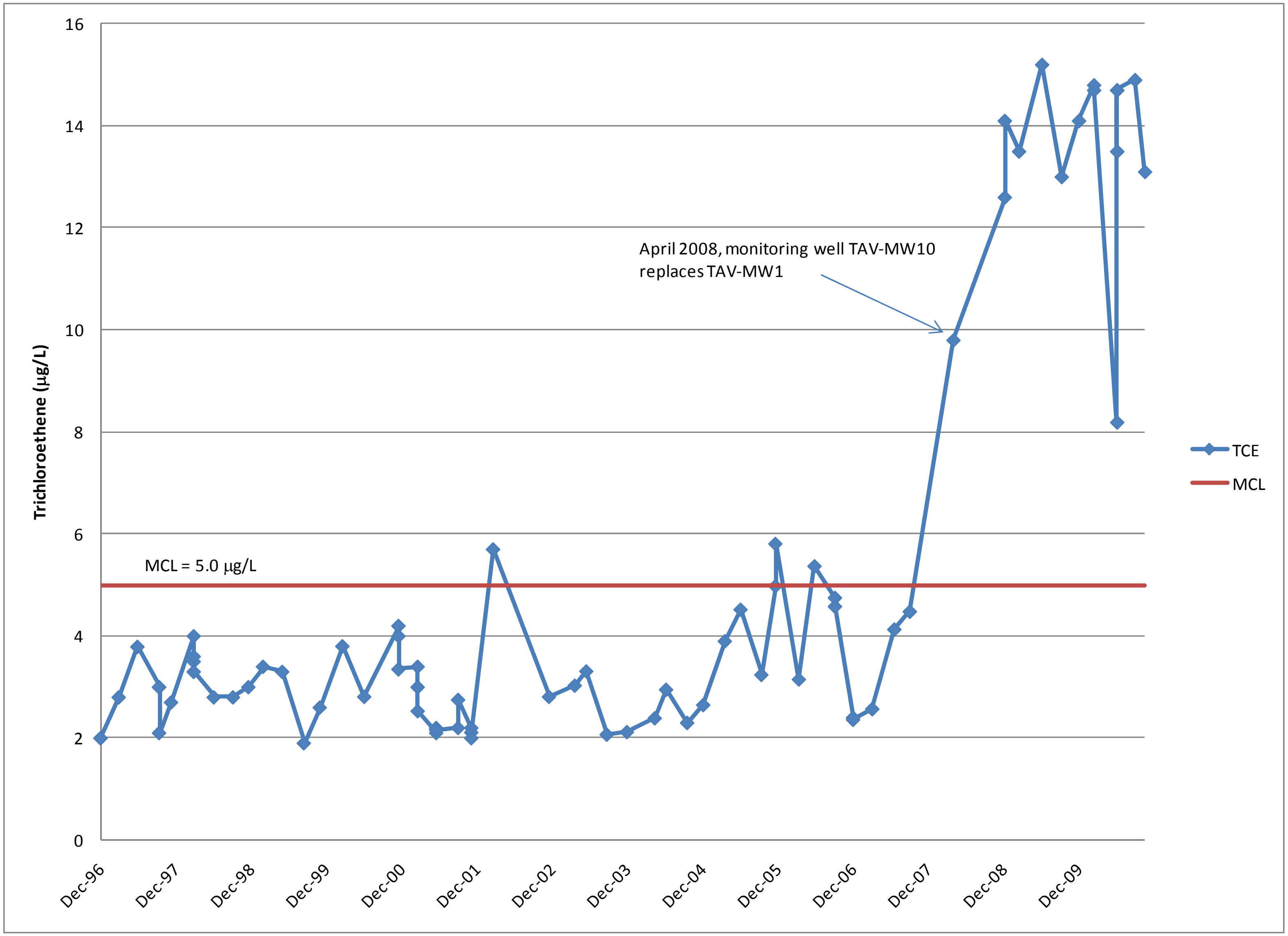

Figure 5B-3. Trichloroethene Concentrations, TAV-MW10

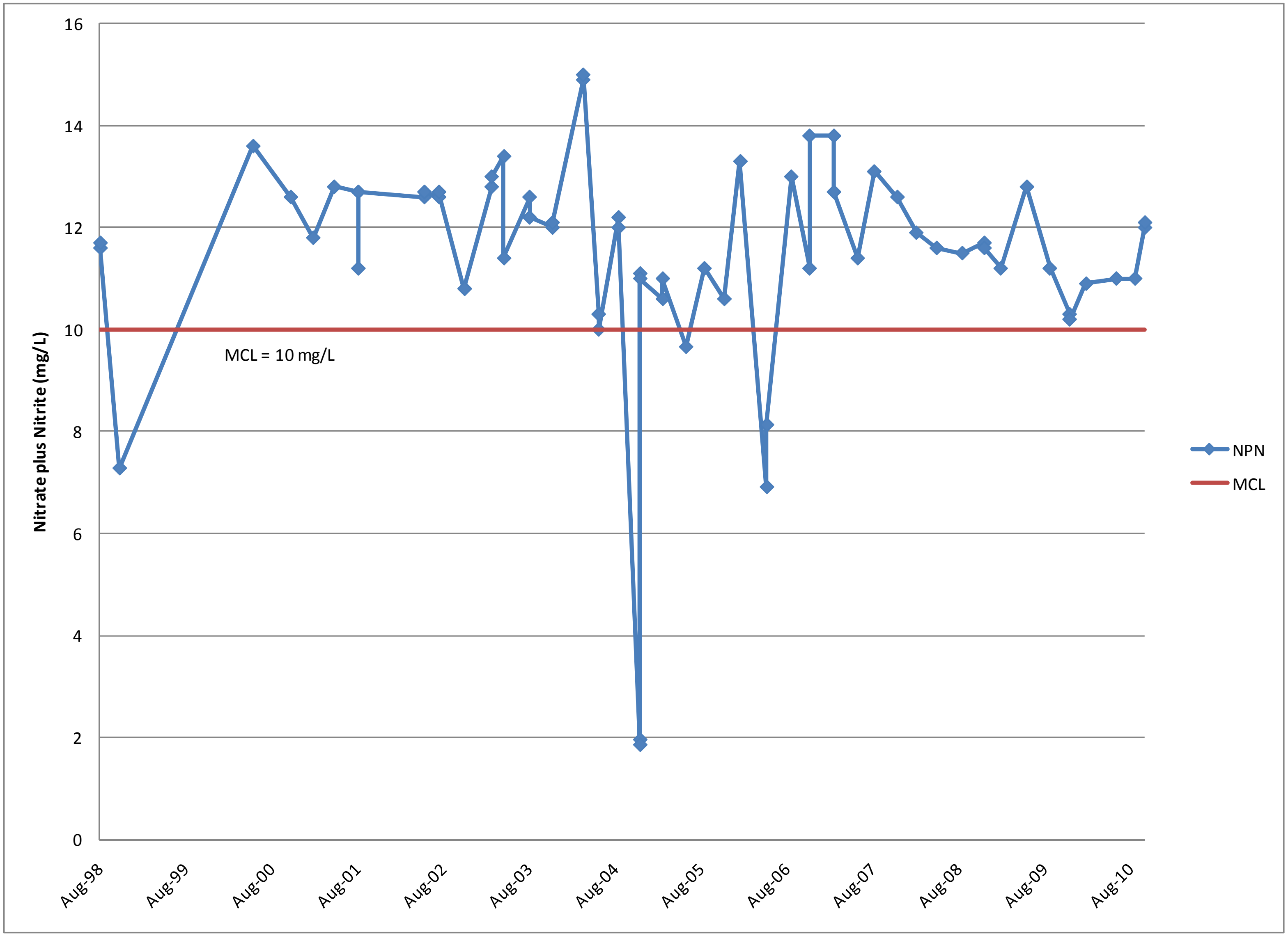

Figure 5B-4. Nitrate plus Nitrite Concentrations, LWDS-MW1

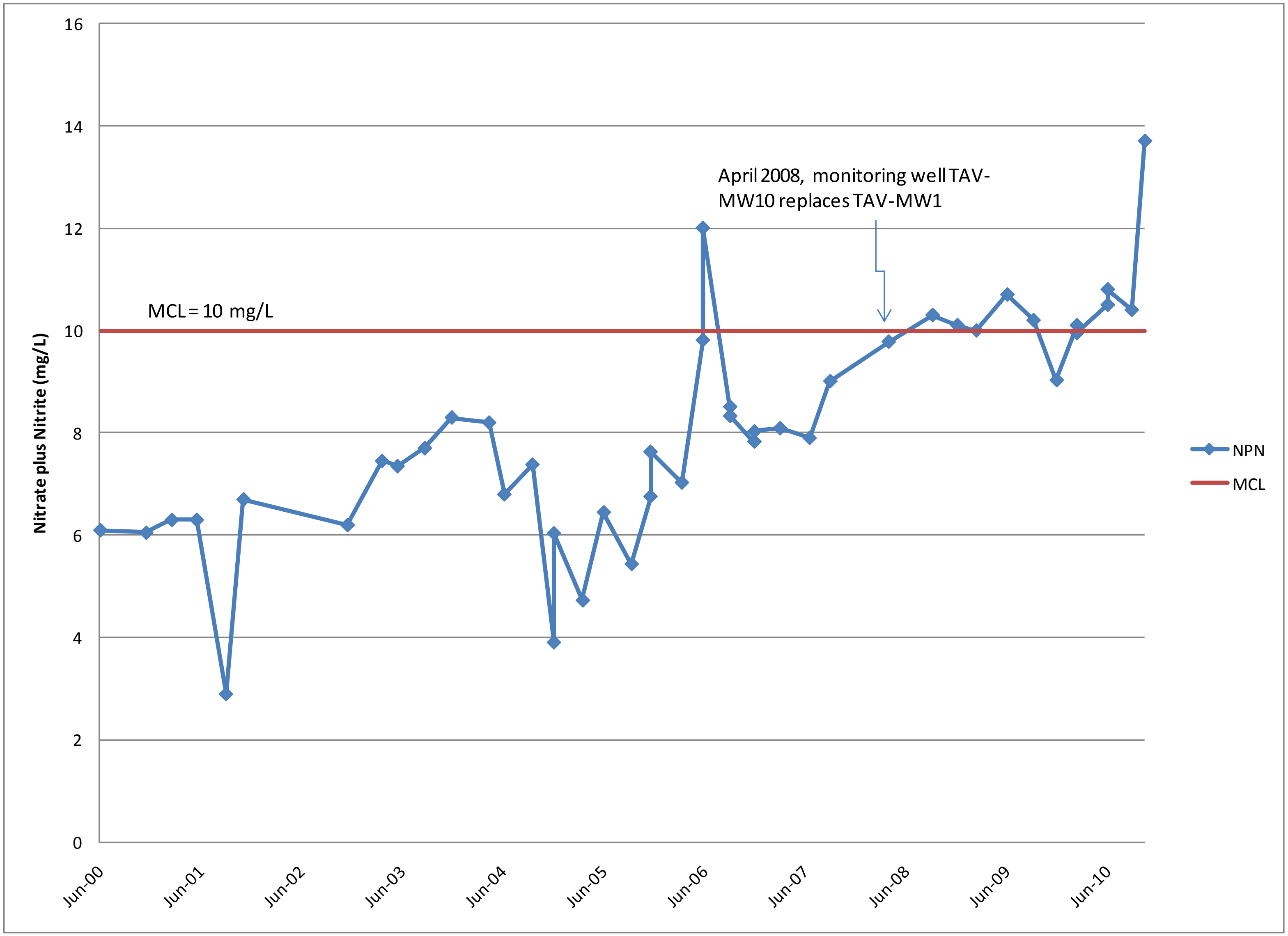

Figure 5B-5. Nitrate plus Nitrite Concentrations, TAV-MW10

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Attachment 5C
Technical Area V
Hydrographs

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Attachment 5C Hydrographs

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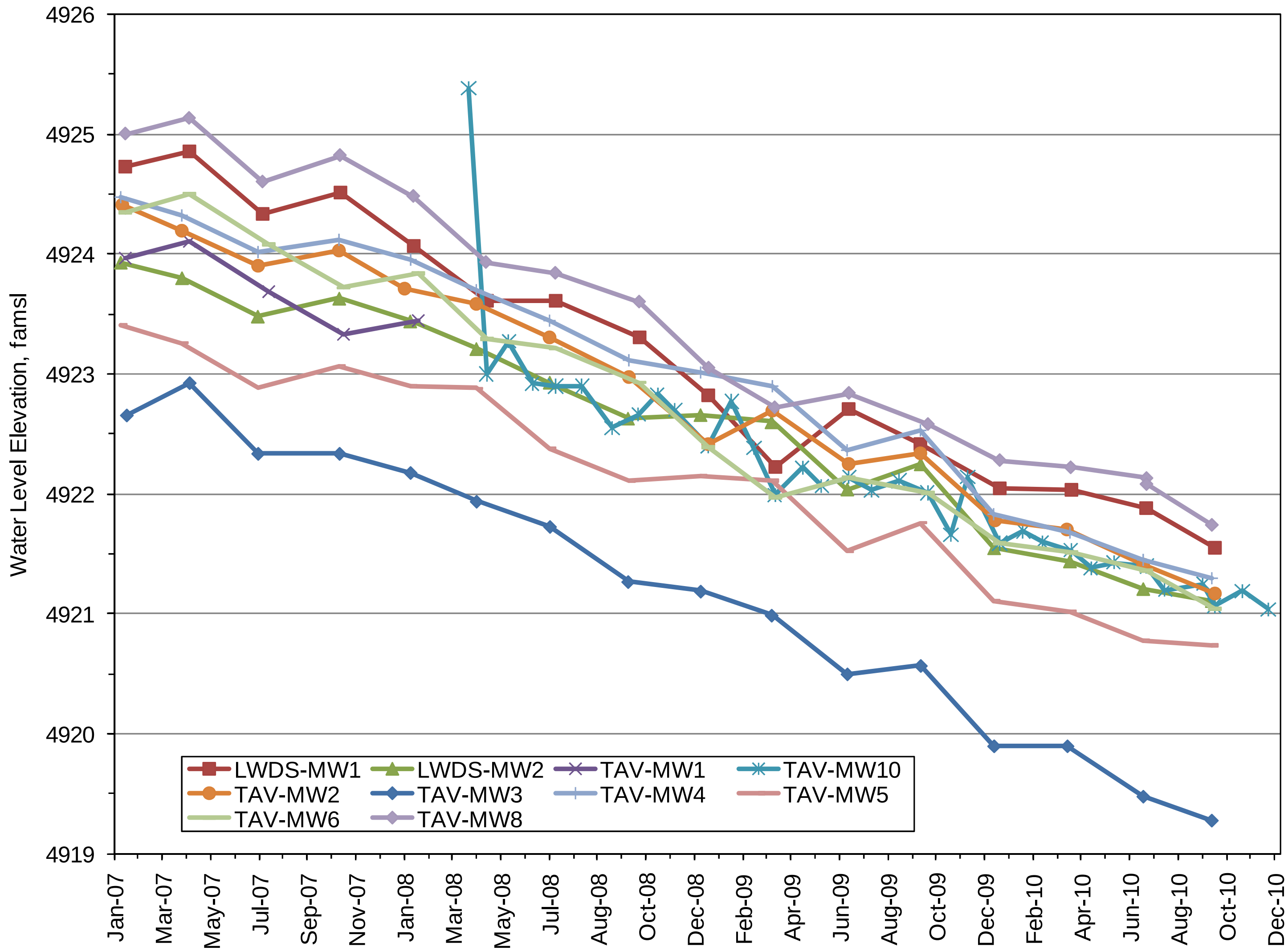

Figure 5C-1. TA-V Study Area Water Table Completion Wells

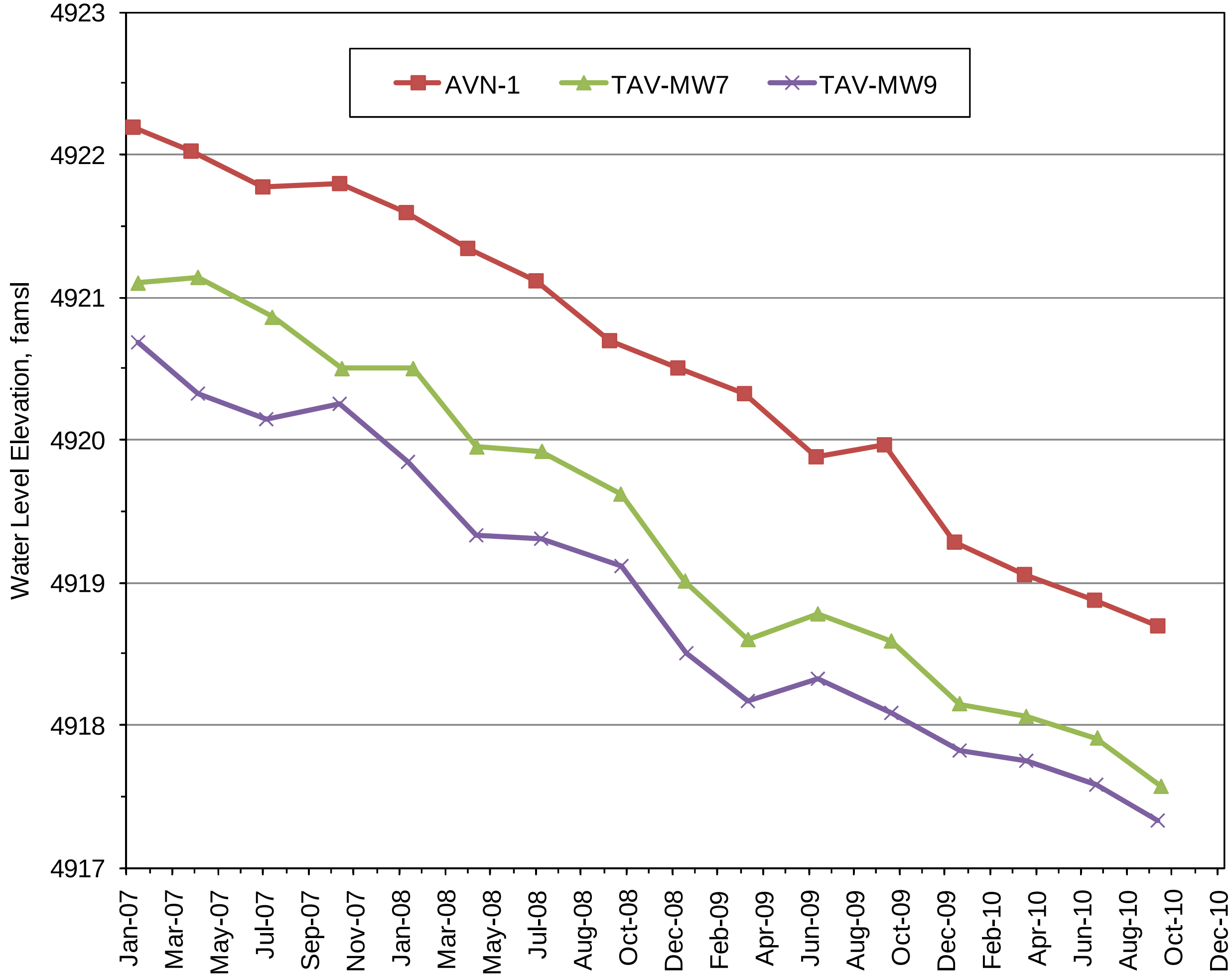

Figure 5C-2. TA-V Study Area Deep Completion Wells

6.0 Tijeras Arroyo Groundwater Study Area

6.1 Introduction

Trichloroethene (TCE) and nitrate have been identified as constituents of concern (COCs) in groundwater at the Tijeras Arroyo Groundwater (TAG) study area based on historical groundwater monitoring results. Detections of these COCs exceed the U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) in samples collected from the TAG study area monitoring wells. Since August 1996, the historical maximum TCE concentration detected at the site has been 9.6 micrograms per liter (μg/L), and the maximum nitrate detection has been 49 milligrams per liter (mg/L). The EPA and State of New Mexico drinking water standards (MCLs) for TCE and nitrate are 5 μg/L and 10 mg/L (as nitrogen), respectively.

Unique features of the TAG study area include low concentrations of TCE at scattered locations in the perched groundwater system (PGWS), and low concentrations of nitrate at scattered locations in the PGWS and regional aquifer.

6.1.1 Location

The TAG study area encompasses approximately 40 square miles (sq mi) in the north-central portion of Kirtland Air Force Base (KAFB) (Figure 6-1). Three of the five Technical Areas (TAs) managed by Sandia National Laboratories, New Mexico (SNL/NM) are located in the TAG study area. Together, the three TAs (TA-I, TA-II, and TA-IV) encompass approximately 641 acres. The SNL/NM facility is a government-owned, contractor-operated, multi-program laboratory overseen by the U.S. Department of Energy (DOE), National Nuclear Security Administration through the Sandia Site Office in Albuquerque, New Mexico. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM under Contract DE-AC04-94AL85000.

The three parties identified as potentially responsible for groundwater contamination within the TAG area include Sandia, KAFB, 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 brig, a diesel-fuel tank farm, an electromagnetic research facility, and inactive sewage lagoons. Bordering the southern and southeastern edges of the three TAs are undeveloped open spaces, active landfills, closed landfills, emergency-response training areas, and the Tijeras Arroyo Golf Course. The COA residential areas are located along most of the northern boundary of KAFB.

6.1.2 Site History

In early 1928, the first airport in Albuquerque was constructed where TA-I and TA-II are currently located. In the spring of 1946, during a dismantling operation, 2,250 military aircraft were dismantled adjacent to the taxiways. In July 1945, the “Z Division” of the Manhattan Engineers District, an extension of the original Los Alamos Laboratory, was established as the forerunner of SNL/NM. At that time, the primary mission of the Z Division was to provide engineering, production, stockpiling, and testing support for nuclear weapon components and systems. In the summer of 1949, the major weapons production was transferred to other manufacturing facilities and the early work of SNL/NM concentrated on prototype research and manufacturing of experimental devices. 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 and TA-II can be

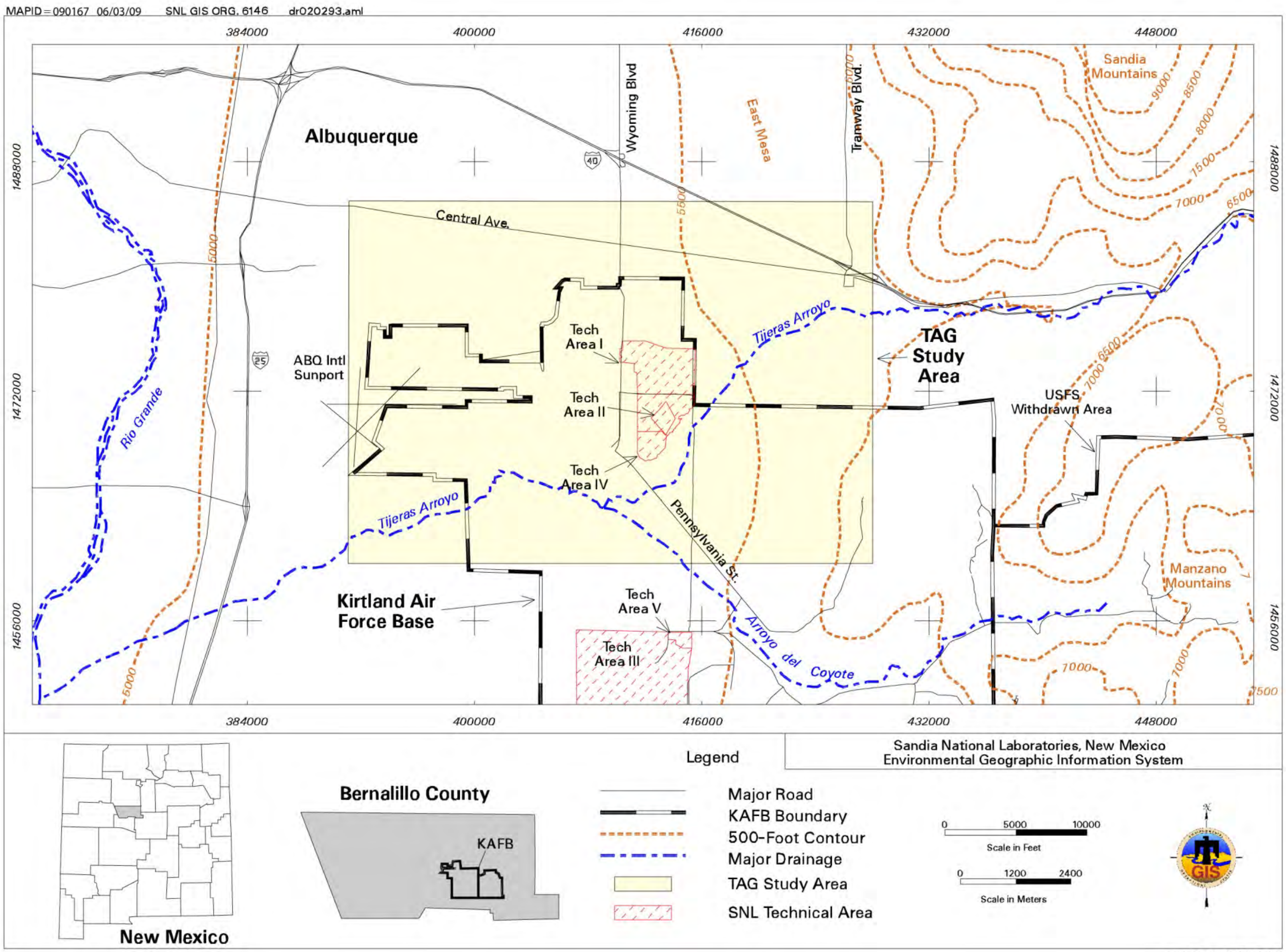

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Figure 6-1. Location of the TAG Study Area

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 of most SNL/NM operations has resulted in an inventory of numerous chemicals, which are generally stored and used indoors in small quantities.

SNL/NM Environmental Restoration (ER) Operations (formerly ER Project) has conducted numerous groundwater investigations in the TAG study area since 1992 (SNL November 2005) (Table 6-1). Many of these investigations were site-specific and conducted in support of various Solid Waste Management Unit (SWMU) assessments. Other investigations in the TAG study area were more regional studies conducted by the SNL/NM Site-Wide Hydrogeologic Characterization Project (SNL February 1998). Both KAFB and COA have also completed numerous groundwater investigations in the TAG study area, the results of which are presented in the *TAG Investigation Report* (SNL November 2005).

6.1.3 Monitoring History

Investigations of groundwater quality in the TAG study area have been conducted by Sandia over the past 18 years (Table 6-1). In 1992, Sandia began to investigate groundwater quality as part of the overall TA-II investigation 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 caused Sandia to further investigate groundwater contamination in the study area.

Beginning in October 2000, meetings of the TAG High Performing Team (HPT) served as a forum for discussing TAG issues. During these meetings, members of the HPT 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 Sandia until an alternative sampling method could be implemented. In June 2003, SNL/NM submitted the *TAG Investigation Work Plan* (SNL June 2003) to the New Mexico Environment Department (NMED). This work plan presented a comprehensive scope of work for groundwater investigations that are being jointly conducted by SNL/NM, KAFB, and COA. Based on the requirements of the work plan, Sandia 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 the initial discoveries of TCE and nitrate at the TAG study area, numerous characterization activities have been conducted (Table 6-1). The 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, a Compliance Order on Consent (the Order) became effective between the DOE, Sandia and the NMED, specified that TAG was an area of groundwater contamination (NMED April 2004). In response to the Order, 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, Sandia submitted the CME Report to the NMED (SNL/NM August 2005).

Table 6-1. Historical Timeline of the TAG Study Area

Month	Year	Event	Reference
November–July	1992–1993	SNL/NM began investigation of TA-II groundwater. PGWS discovered as first wells were installed (TA2-SW1-320, TA2-NW1-325, and TA2-NW1-595).	SNL March 1995a
March	1994	Groundwater sampling analytical results for TA-II wells reported in the Calendar Year 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 from groundwater sampling first detected TCE.	SNL March 1996a
March	1995	Groundwater sampling analytical results for TA-II wells reported in the Calendar Year 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 from 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 Calendar Year 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 Calendar Year 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 Calendar Year 1997 SNL/NM Annual Groundwater Monitoring Report.	SNL March 1998b
March	1998	Fiscal Year 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 Fiscal Year 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 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 Fiscal Year 1999 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2000
June	2000	Fiscal Year 1998 Sandia North Groundwater Investigation Annual Report submitted to the NMED.	SNL June 2000

Table 6-1. Historical Timeline of the TAG Study Area *(Continued)*

Month	Year	Event	Reference
October	2000	TAG High Performing Team convened for the first time.	SNL June 2003
December	2000	Project name changed from the Sandia North to the Tijeras Arroyo Groundwater Investigation.	Collins 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 Fiscal Year 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 Fiscal Year 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 Fiscal Year 2002 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2003a
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	ER Project conducts slug (hydraulic conductivity) tests at groundwater monitoring wells.	Collins 2004
March	2004	Groundwater sampling analytical results for TAG wells reported in the Fiscal Year 2003 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2004
April	2004	NMED issues the Compliance Order on Consent (the Consent Order), which 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	Monitoring wells TAG-SV-01 through TAG-SV-05 were 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 Fiscal Year 2004 SNL/NM Annual Groundwater Monitoring Report.	SNL October 2005
November	2005	SNL/NM submits TAG Investigation Report to the NMED.	SNL November 2005
November	2006	Groundwater sampling analytical results for TAG wells reported in the Fiscal Year 2005 SNL/NM Annual Groundwater Monitoring Report.	SNL November 2006
March	2007	Groundwater sampling analytical results for TAG wells reported in the Fiscal Year 2006 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2007
March	2008	Groundwater sampling analytical results for TAG wells reported in the Fiscal Year 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	SNL/NM submits Response to NMED's August 2008 Notice of Disapproval on November 2005 TAG Investigation Report.	SNL February 2009

Table 6-1. Historical Timeline of the TAG Study Area *(Concluded)*

Month	Year	Event	Reference
June	2009	Groundwater sampling analytical results for TAG wells reported in the Calendar Year 2008 SNL/NM Annual Groundwater Monitoring Report.	SNL June 2009
April	2009	NMED requires characterization of perchlorate in groundwater in five wells in the TAG study area.	NMED April 2009
August	2009	NMED issues Second Notice of Disapproval on November 2005 TAG Investigation Report.	NMED August 2009
January	2010	SNL/NM submits 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 Calendar Year 2009 SNL/NM Annual Groundwater Monitoring Report.	SNL October 2010a

NOTES:

BGW = Balleau Groundwater, Inc.
CME = Corrective Measures Evaluation
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
IT = IT Corporation.
KAFB = Kirtland Air Force Base.
MCL = Maximum Contaminant Level.
μg/L = Microgram(s) per liter.
NMED = New Mexico Environment Department.
PGWS = Perched Groundwater System.
Sandia = Sandia Corporation.
SNL = Sandia National Laboratories.
SNL/NM = Sandia National Laboratories/New Mexico.
TA = Technical Area.
TAG = Tijeras Arroyo Groundwater.
TCE = Trichloroethene.
USGS = U.S. Geological Survey.

Table XI-1 of the Order (NMED April 2004) specifies the minimum sampling frequency for the groundwater monitoring and sampling schedule for TAG as: "Six events – after the TAG HPT Characterization Plans approved by the Department and starting no later than first quarter of Calendar Year 2004 . . . ." The six quarterly sampling events required by the work plan were completed at the end of Fiscal Year 2005. Having fulfilled those requirements, Sandia has continued groundwater monitoring on a voluntary basis, and TAG wells have been sampled quarterly, semiannually, or annually. All sampling continues to follow the procedures outlined in the NMED-approved work plan (SNL June 2003).

6.1.4 Current Monitoring Network

Currently, 21 wells in the TAG study area are being monitored for water quality, and 27 wells are monitored for water levels (Figure 6-2; Table 6-2). Two groundwater systems are present in the TAG study area: the PGWS at approximately 220 to 330 ft bgs, and the regional aquifer groundwater system at approximately 440 to 570 ft bgs. Groundwater monitoring wells are completed either in the PGWS or regional aquifer (Table 6-2).

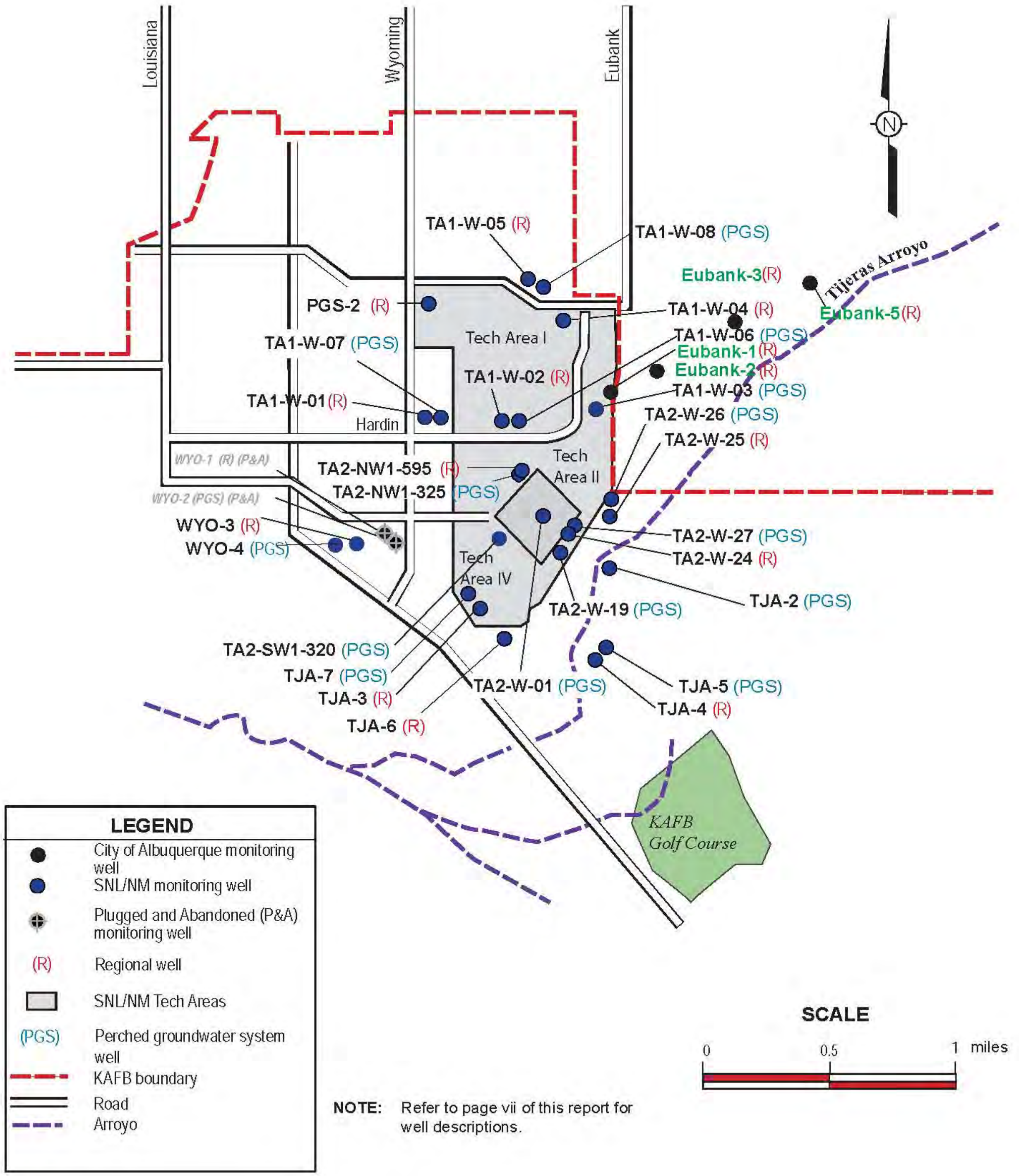

Figure 6-2. Tijeras Arroyo Groundwater (TAG) Investigation Monitoring Well Locations

Table 6-2. Groundwater Monitoring Wells in the TAG Study Area

Well	Installation Year	WQ	WL	Comments
Eubank-1	1988		✓	Regional aquifer (COA well)
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-08	2001	✓	✓	PGWS
TA2-NW1-595	1993	✓	✓	Regional aquifer
TA2-SW1-320	1992	✓	✓	PGWS
TA2-W-01	1994	✓	✓	PGWS
TA2-W-19	1995	✓	✓	PGWS
TA2-W-25	1997		✓	Regional aquifer
TA2-W-26	1998	✓	✓	PGWS
TA2-W-27	1998	✓	✓	PGWS
TJA-2	1994	✓	✓	PGWS
TJA-3	1998	✓	✓	Regional aquifer
TJA-4	1998	✓	✓	Regional aquifer
TJA-5	1998		✓	PGWS
TJA-6	2001	✓	✓	Regional aquifer
TJA-7	2001	✓	✓	PGWS
WYO-3	2001	✓	✓	Regional aquifer
WYO-4	2001	✓	✓	PGWS

NOTE: 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 Jake Daugherty, Environmental Service Division of the City of Albuquerque Environmental Health Department.

COA = City of Albuquerque.
PGWS = Perched Groundwater System.
TAG = Tijeras Arroyo Groundwater.
WL = Water level.
WQ = Water quality.

6.1.5 Summary of Calendar Year 2010 Activities

The following activities took place for the TAG investigation during Calendar Year (CY) 2010:

- Monthly or quarterly water level measurements were obtained from TAG wells.
- Quarterly groundwater sampling events were conducted at seven wells (TA2-SW1-320, TA2-W-19, TA2-W-26, TJA-2, TJA-4, TJA-7, and WYO-4) in January/February 2010, May 2010, July/August 2010, and October/November 2010 (SNL December 2009, April 2010, June 2010, and October 2010b).

- Semiannual groundwater sampling was conducted at four wells (TA2-W-01, TA2-W-27, TJA-3, and TJA-6) in January/February 2010 and July/August 2010 (SNL December 2009 and June 2010).

- Annual groundwater sampling was conducted at nine wells (PGS-2, TA1-W-01, TA1-W-02, TA1-W-04, TA1-W-05, TA1-W-06, TA1-W-08, TA2-NW1-595, and WYO-3) in July/August 2010 (SNL June 2010).

- Quarterly perchlorate screening groundwater sampling was conducted at up to five wells (TA1-W-03, TA1-W-06, TA1-W-08, TA2-W-01, and TA2-W-27) in January/February 2010, May 2010, July/August 2010, and October/November 2010 (SNL December 2009, April 2010, June 2010, and October 2010b).

- Responses to the NMED's second *Notice of Disapproval of November 2005 TAG Investigation Report* were submitted to the NMED (SNL January 2010).

- The *Approval of the November 2005 TAG Investigation Report* (NMED February 2010) was received from the NMED.

- Quarterly reporting of perchlorate analyses for TA1-W-03, TA1-W-06, TA1-W-08, TA2-W-01, and TA2-W-27 was conducted.

- 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 2011):

- Monthly or quarterly water level measurements from TAG wells.

- Quarterly groundwater sampling at seven wells: TA2-SW1-320, TA2-W-19, TA2-W-26, TJA-2, TJA-4, TJA-7, and WYO-4.

- Semiannual groundwater sampling at four wells: TA2-W-01, TA2-W-27, TJA-3, and TJA-6.

- Annual groundwater sampling 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.

6.1.7 Current Conceptual Model

Two groundwater systems are present in the TAG study area: the PGWS at approximately 220 to 330 ft bgs, and the regional aquifer groundwater system at approximately 440 to 570 ft bgs. The uppermost saturated interval of the PGWS is between 10 and 30 ft in thickness. Water in the PGWS moves to the southeast and is assumed to merge with the underlying regional aquifer southeast of Tijeras Arroyo. Figure 6-3 presents a diagram of the TAG conceptual model.

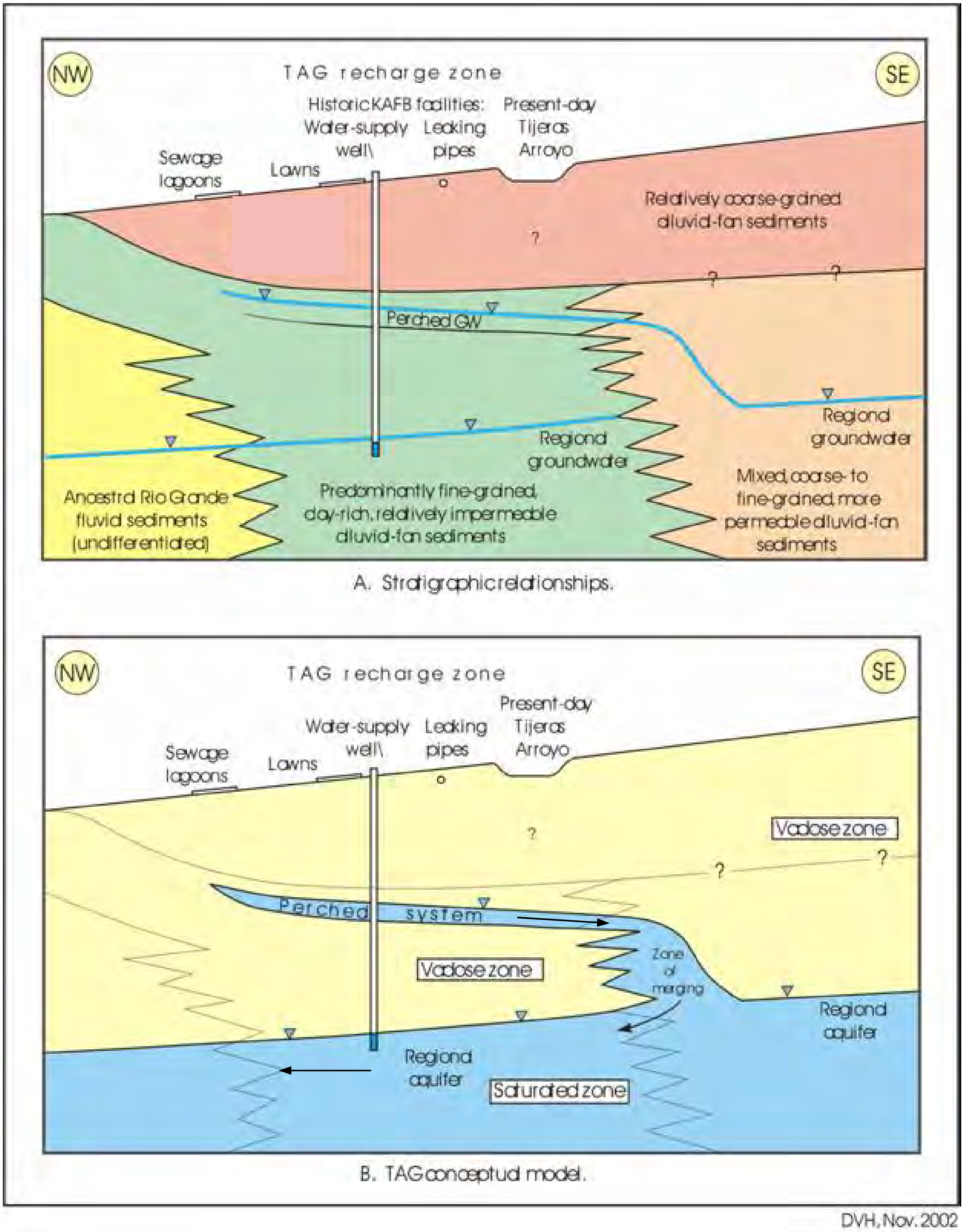

Figure 6-3. TAG Conceptual Model Illustration

Data pertaining to the hydrogeologic setting have been synthesized into the TAG conceptual model. The hydrogeologic setting for the TAG study area is well understood based on a significant number of monitoring wells. Groundwater occurs in both the PGWS and regional aquifer. However, the PGWS has a limited lateral extent that encompasses approximately 3.8 sq mi of north-central KAFB. The PGWS may extend northward across the KAFB boundary. In the TAG study area, the depth to groundwater for the PGWS ranges from 220 to 330 ft bgs. The uppermost saturated zone in the PGWS varies from approximately 10 to 30 ft in thickness, depending on the well location. Borehole geophysical surveys indicate that a few relatively damp intervals are present below the uppermost saturated zone, but borehole-yield testing has revealed that most of these deeper intervals are too thin to yield volumes of water sufficient for the construction of monitoring wells. The PGWS is not used as a 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 0.008 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 the former sewage lagoons) and natural sources (Tijeras Arroyo and possibly ancestral Tijeras Creek). Principal hydrogeologic controls on the PGWS include: (1) eastward bedding-plane dip attributed to the western limb of an inferred syncline; (2) stratigraphic variations (such as braided paleochannels); and (3) multiple recharge locations in the northwestern portion of the TAG study area.

Multiple overlapping lenses of low conductivity, mostly unsaturated sediments, serve as a perching horizon beneath the PGWS. Beneath the central TAG study area, a layer of approximately 180 to 280 ft of these unsaturated sediments separates the PGWS from the regional aquifer. Groundwater in the PGWS merges with the regional aquifer southeast of Tijeras Arroyo where the alluvial fan sediments are slightly more permeable.

The regional aquifer is more laterally extensive than the PGWS, underlying the entire TAG study area as well as the Albuquerque Basin. Across the TAG study area, the depth to the regional aquifer ranges from approximately 440 to 570 ft bgs. The regional aquifer is composed of both the Ancestral Rio Grande (ARG) fluvial facies and alluvial fan facies. 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 0.009 ft/ft across the TAG study area, but is steeper near the KAFB, COA, and Veterans Administration (VA) water supply wells. 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. Groundwater elevations are generally decreasing in the northwestern portion of the study area but are increasing in the southeastern area. Seasonal pumping variations cause sporadic water-level fluctuations 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, COA, and VA water supply wells.

The aqueous geochemical signatures of the PGWS and the regional aquifer are distinctive. The geochemical signatures of the PGWS vary between well locations but tend 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 to eventually drain into the Rio Grande, approximately 6 miles west of KAFB. Surface water flows in the arroyo several times per year as a result of storm events. The average annual precipitation for the area, as measured at the Albuquerque International Sunport, is 8.2 inches (SNL February 2001). During most rainfall events, rainfall quickly infiltrates into the soil in the study area. However, virtually all of the moisture subsequently undergoes evapotranspiration. Estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL February 1998).

The TAG study area overlies the eastern margin of the Albuquerque Basin where the basin-bounding faults mostly trend parallel to the Sandia-Manzanita-Manzano mountain front. The stratigraphic unit of greatest interest is the Upper Santa Fe Group, which is primarily composed of two interfingering lithofacies: an alluvial-fan lithofacies and a fluvial lithofacies. Both lithofacies are less than 5 million years old 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 fluvial lithofacies is derived from the ARG to the north and is typically well sorted and medium- to coarse-grained.

6.1.7.2 Hydrologic Conditions at the TAG Study Area

The thickness of the vadose zone is reduced in the central portion of the TAG study area where the PGWS is present. Discontinuous, yet overlapping multiple lenses of unsaturated alluvial-fan sediments serve as a perching horizon beneath the PGWS in that area. The PGWS is present at approximately 220 to 330 ft bgs, and the regional aquifer system is present at approximately 440 to 570 ft bgs. Groundwater in the PGWS most likely merges with the regional aquifer southeast of Tijeras Arroyo where the alluvial-fan sediments are slightly more permeable.

A comparison of aquifer characteristics for the PGWS and the regional aquifer in the TAG study area is provided in Table 6-3. The PGWS is presently understood to cover 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 a horizontal gradient that varies from approximately 0.02 to 0.004 ft/ft. The vertical gradient is approximately 0.95 ft/ft over most of the PGWS, and continuous vertical flow is suggested by the merging of the two groundwater systems to the southeast.

6.1.7.3 Local Direction of Flow

Figure 6-4 presents the current potentiometric surface for the PGWS (October 2010). Groundwater elevations presented in this potentiometric surface map reflect new survey coordinates. Until recently, ER Operations provided survey coordinates that were based on the New Mexico State Plane Coordinate System, Central Zone, North American Datum of 1927 and Northern Geographic Vertical Datum of 1929 for elevations. In order to be consistent with current SNL/NM Facilities and KAFB survey practices, ER Operations survey data now are based on New Mexico State Plane Coordinate System, Central Zone, North American Datum of 1983 (NAD83) and North American Vertical Datum of 1988 (NAVD88). Location information for wells surveyed before August 2010 has been mathematically converted to the new NAD83/NAVD88 coordinates using National Geodetic Survey-approved software.

The direction of groundwater flow in the PGWS is towards the southeast. The horizontal gradient of the PGWS varies from approximately 0.02 to 0.004 ft/ft. Historically, water levels in the PGWS have fluctuated across the study area (SNL November 2005). In the vicinity of the former sewage lagoons, water levels have been declining since 1987, apparently in response to the lagoons being removed from service. Conversely, water levels have increased southeast of Tijeras Arroyo (Attachment 6C, Figures 6C-1 through 6C-11).

Table 6-3. Comparison of the Perched Groundwater System and the Regional Aquifer in the Tijeras Arroyo Groundwater Study Area (SNL November 2005)

Characteristic	PGWS	Regional Aquifer
Pressure Head	Unconfined (water table) conditions	Unconfined to semiconfined 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 0.009 ft/ft, but steeper near water supply wells
Flow velocities	4 to 10 ft/yr	4 to 10 ft/yr
Usage	Not used for water supply purposes	Utilized for water supply by KAFB, COA, 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 thick across much of the study area
Geochemical Variability	Geochemical signatures variable between monitoring wells	Geochemical signatures consistent between monitoring wells
Geochemical	High chloride, nitrate, and sulfate concentrations	Low calcium concentrations but high bicarbonate/alkalinity concentrations
Water levels	Steadily declining water levels in the northwest, but increasing in the southeast part of the TAG study area	Steadily declining water levels in the northwest, but increasing in the southeast part of the TAG study area
Recharge	Recharged by both anthropogenic (leaking water supply/sewer lines, irrigated lawns, Tijeras Arroyo Golf Course), and natural sources such as Tijeras Arroyo	Recharged by natural sources including mountain front flow, the perched system, 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, COA, and VA water supply wells

NOTES:

ARG = Ancestral Rio Grande (facies).
COA = City of Albuquerque.
ft = Foot (feet).
ft/ft = Feet/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.

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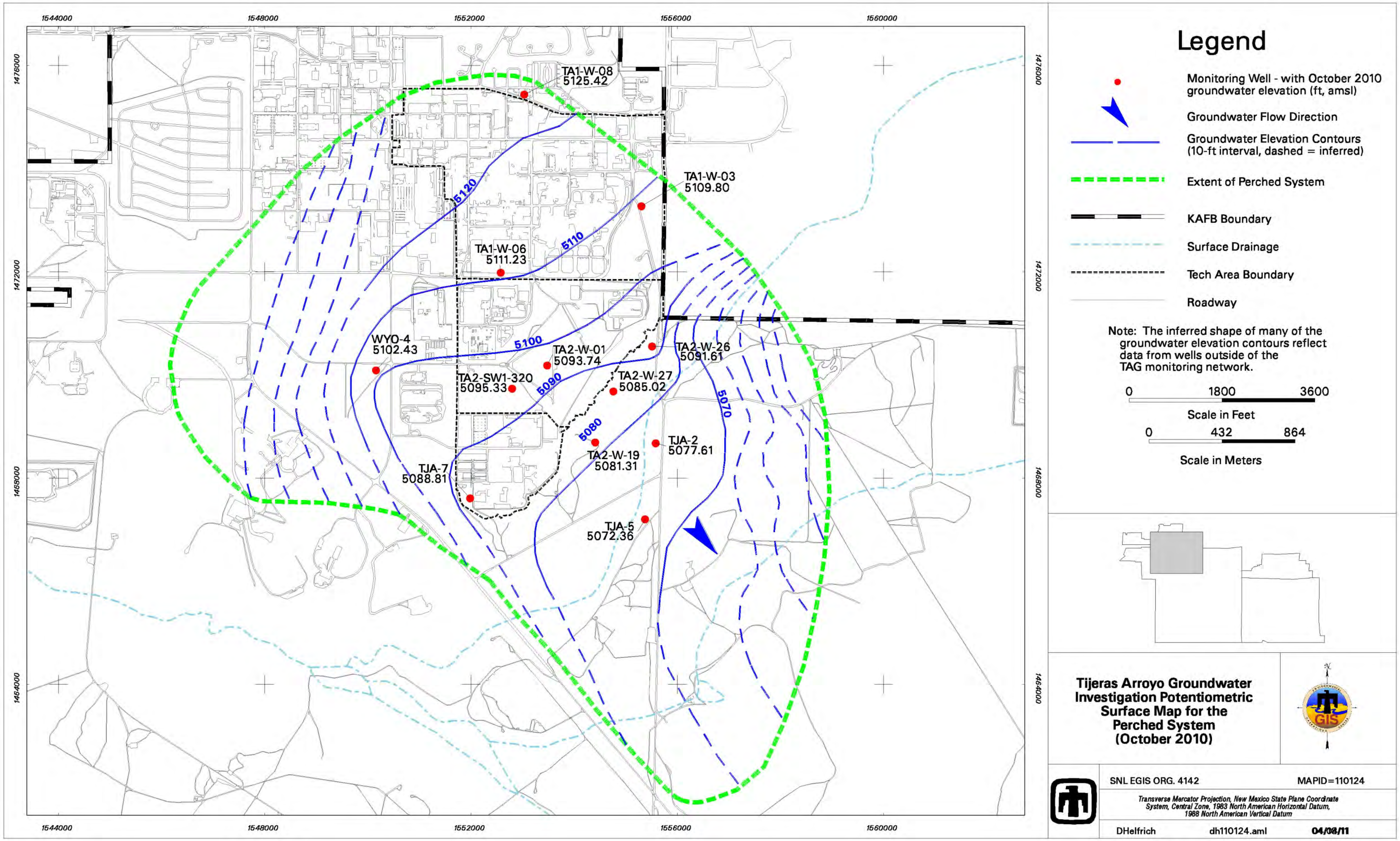

Figure 6-4. Tijeras Arroyo Groundwater Investigation Potentiometric Surface Map for the Perched Groundwater System (October 2010)

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Figure 6-5 presents the current potentiometric surface for the regional aquifer (October 2010). The direction of groundwater flow in the regional aquifer is to the northwest towards the KAFB, COA, and VA water supply wells. The horizontal gradient of the regional aquifer across the central portion of the study area is approximately 0.01 ft/ft. Vertical flow gradients within the TAG study area have not been measured but are inferred to be downward, consistent with TA-V groundwater studies.

Historically, water levels in the regional aquifer have fluctuated across the study area (SNL November 2005). A line of demarcation between increasing and declining water levels is evident along the eastern extent of the ARG-fluvial lithofacies. Declining water levels approaching 1.5 feet/year (ft/yr) are apparently associated with the KAFB, COA, and VA water supply wells. Increases in groundwater elevations of up to 1.8 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 (Attachment 6C, Figures 6C-1 through 6C-11).

6.1.7.4 Contaminant Sources

Sandia, the KAFB Installation Restoration Program (IRP), 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 report, two potential TCE and three potential nitrate sources are believed to be the responsibility of Sandia. A brief description of each potential release site is provided as follows.

SWMU 46 (Old Acid Waste Line Outfall)—TCE and Nitrate: An estimated 1.3 billion gallons of wastewater from six TA-I research/office buildings (839, 840, 841, 860, 863, and 892) discharged into the three outfall ditches at the south end of SWMU 226. Possible TCE and nitrate were present in the wastewater. Septic water from possible cross-connects between the SWMU 226 waste line and sewer lines may have discharged at SWMU 46. In 2000, two soil-vapor monitoring wells were installed at SWMU 46, and soil-vapor sampling was conducted quarterly. Well 46-VW-01 is located near the waste-line outfall, and 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 115 ft bgs. Well 46-VW-02, located 900 ft farther southeast, has 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 96 ft bgs.

SWMU 165 (Building 901 Septic System)—TCE and Nitrate: The septic system leach field is connected to a personnel shower/laundry facility (Building 901) and small research/machine shop (Building 902). Possible TCE and high explosives 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 are possibly leaking and 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 vapor monitoring network have indicated evidence of vapor-phase contaminants. 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 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.

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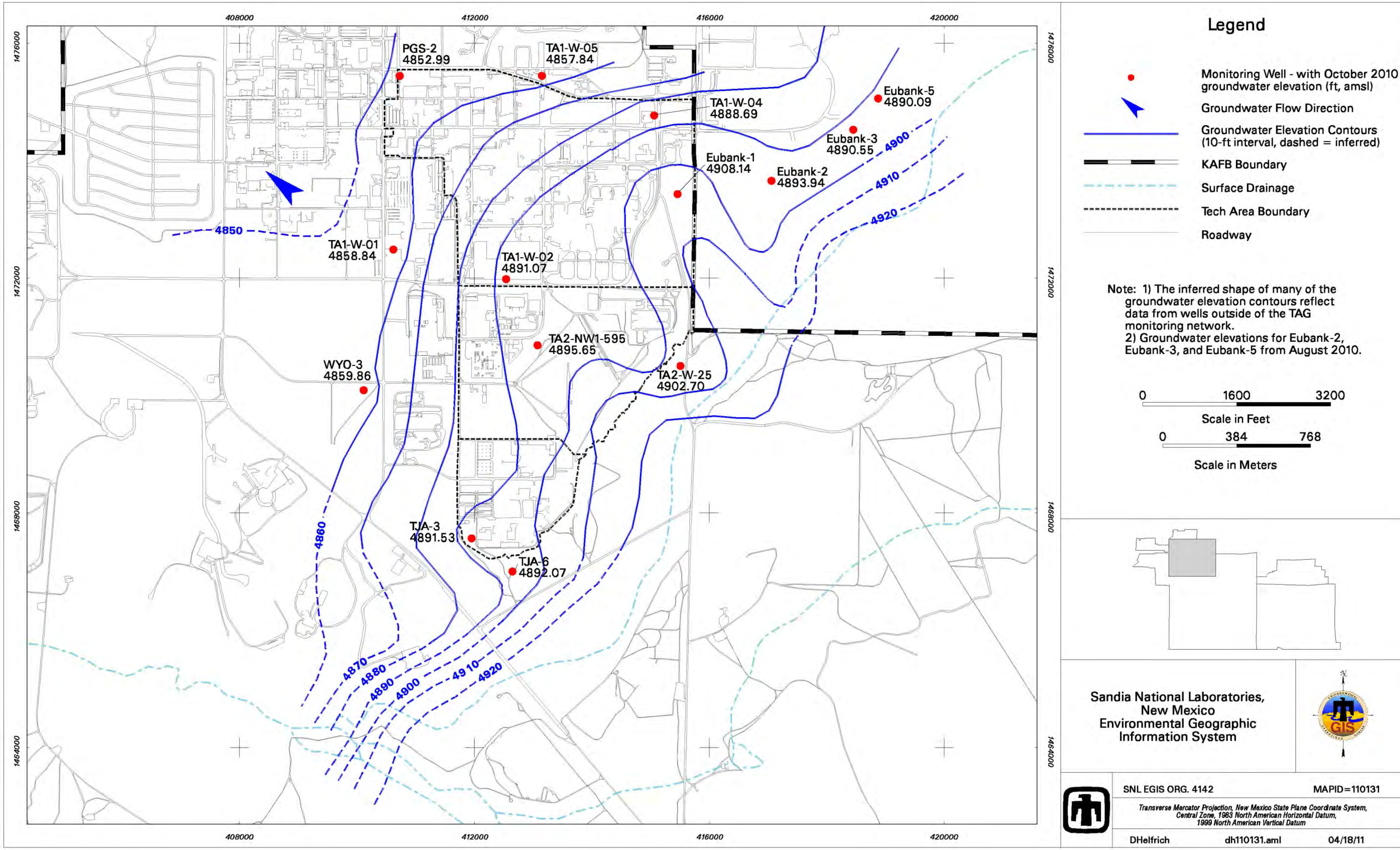

Figure 6-5. Tijeras Arroyo Groundwater Investigation Potentiometric Surface Map for the Regional Aquifer (October 2010)

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Based on soil-vapor data (SNL November 2005), the mass of TCE that the vapor phase is contributing to the aquifer is minimal. In addition, the consistency of soil-vapor concentration measurements over time indicates that this TCE 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 of 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 ever 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 *Resource Conservation and Recovery Act (RCRA) Corrective Action Plan* (EPA May 1994).

Nitrate was present in sewage wastewater discharged to 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 the sites. Because nitrate is extremely soluble and cannot exist as a separate phase (i.e., vapor or nonaqueous phase liquid), and because no water-saturated core samples have been encountered in any of the soil samples collected from boreholes, a secondary source of anthropogenic nitrate contamination in the vadose zone does not exist.

6.1.7.5 Contaminant Distribution and Transport in Groundwater

Perched Groundwater System

The distribution of TCE is discontinuous across the PGWS and does not indicate a single release site. Based on the historic use of chlorinated solvents across SNL/NM and KAFB, the known extent of TCE in the PGWS is associated with multiple releases of aqueous-phase solvents and subsequent transport through the vadose zone.

The maximum historical concentration of TCE in the PGWS is 9.6 µg/L for well TA2-W-26; samples from only three TAG study area wells have exceeded the MCL for TCE (5 µg/L) (TA2-W-19, TA2-W-26, and WYO-4).

The maximum historical concentration of nitrate in the PGWS within the TAG study area is 44 mg/L for well TA2-SW1-320. Concentrations of nitrate in the PGWS exceeding the MCL for nitrate (10 mg/L) are scattered across the TAG study area. Historically, two plumes have been identified in the PGWS, consisting of Plume 3 beneath SNL/NM TA-II and Plume 4 beneath the Tijeras Arroyo Golf Course (MWH Americas, Inc. July 2003). However, the subsequent installation and sampling of several monitoring wells failed to identify a boundary between Plumes 3 and 4. Therefore, the perched aquifer 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 underneath 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 samples with detectable TCE concentrations except for low-level detections in samples from TJA-3. No samples from the SNL/NM TAG study area regional aquifer wells exceed the MCL of 5 µg/L for TCE.

In the regional aquifer, samples from nine SNL/NM TAG study area wells have exceeded the MCL for nitrate during at least one sampling event. The maximum historical concentration of nitrate for wells completed in the regional aquifer system 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 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 (CH2M HILL, Inc. June 2009).

Potential downgradient receptors for the TAG nitrate and TCE plumes are the COA and KAFB well fields to the north and northwest. 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 nitrate and TCE concentrations are decreasing in groundwater to below levels of concern through dispersion and dilution as the plume moves into the more hydraulically conductive deposits at the COA and KAFB well fields.

6.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM ER Operations as well as implements and enforces federal regulations mandated by RCRA. All ER SWMUs and Areas of Concern (AOCs) are listed in Module IV of the SNL/NM RCRA Part B Operating Permit, *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA for Sandia National Laboratories* (NMED 1993).

All investigations and corrective action requirements pertaining to SWMUs and AOCs are contained in the Order (NMED April 2004). The groundwater monitoring activities for the TAG investigation are not associated with a single SWMU but are more regional in nature. Groundwater characterization activities for TAG were originally conducted voluntarily as proposed in the Groundwater Investigation Plan (SNL March 1996b). More recently TAG activities have been conducted as required by the NMED-approved *TAG Investigation Work Plan* (SNL June 2003).

The Order, effective in April 2004, transferred regulatory authority for corrective action requirements from the HSWA module to the Order. The TAG investigation must comply with requirements set forth in the Order for site characterization and the development of a CME. The Order also contains schedules that define dates for the delivery of plans and reports related to TAG. The NMED is the regulatory agency responsible for enforcing the requirements identified in the Order for the CME.

Although the Order requires that the DOE and Sandia evaluate the nature and extent of contamination in the TAG study area, no specific reporting requirements are prescribed in the Order. However, the *TAG Investigation Report* (SNL November 2005) specifies that data would continue to be presented in annual reports such as this Groundwater Protection Program (GWPP) Annual Groundwater Monitoring Report. The outline of this report is based on the required elements of a “Periodic Monitoring Report” described in Section X.D. of the Order (NMED April 2004).

In this report, TAG 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/Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Order. Additional information on radionuclides and the scope of the Order is available in Section III.A of the Order (NMED April 2004).

6.3 Scope of Activities

The CY 2010 activities for the TAG investigation, including plans and reports, are listed in Section 6.1.5. However, the only field activity completed in the study area was groundwater monitoring. The four groundwater sampling events are summarized in Table 6-4, and the analytical parameters for each well and each sampling event are listed in Table 6-5.

Quality control (QC) samples are collected in the field at the time of environmental sample collection. Field QC samples include equipment blank (EB) samples, duplicate samples, split samples, and trip blank (TB) samples. Field QC samples are used to monitor the sampling process. EB samples are used to verify the effectiveness of sampling equipment decontamination procedures. Duplicate samples are used to measure the precision of the sampling process. Split samples are used to verify the performance of the analytical laboratory. 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.

6.4 Field Methods and Measurements

The monitoring procedures, as conducted by ER Operations personnel, are consistent with procedures identified in the EPA technical enforcement guidance document (EPA 1986). The following sections provide an overview of the sampling and data collection procedures.

6.4.1 Groundwater Elevation

Throughout CY 2010, water level measurements were obtained to determine groundwater flow directions, hydraulic gradients, and changes in water table elevations. Water levels are periodically measured in TAG monitoring wells according to the instructions and requirements specified in SNL/NM Field Operating Procedure (FOP) 03-02, *Groundwater Level Data Acquisition and Management*, Rev. 02 (SNL November 2007). 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.

6.4.2 Well Purging and Water Quality Measurements

A portable Bennett™ groundwater sampling system was used to collect the groundwater samples from TAG wells. The wells are purged a minimum of one saturated screen volume. Field water quality measurements for turbidity, pH, temperature, specific conductance (SC), oxidation-reduction potential (ORP), and dissolved oxygen (DO) were recorded from the well prior to collecting groundwater samples, according to SNL/NM FOP 05-01 (SNL August 2007a). Groundwater temperature, SC, ORP, DO, and pH were measured using a YSI™ Model 620 water quality meter. Turbidity was measured with a HACH™ Model 2100P portable turbidity meter.

The amount of water required to achieve stability of field parameters is fairly consistent. However, the ability of the aquifer to produce water varies greatly from well to well. In accordance with the Mini-Sampling and Analysis Plans (SAPs) (Table 6-4), purging continued until four stable measurements for temperature, SC, pH, and turbidity were obtained. Groundwater stability is considered acceptable when measurements range within 10 percent or 5 nephelometric turbidity units, 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 Records Center.

Table 6-4. Groundwater Monitoring Well Network and Sampling Dates for the TAG Study Area, Calendar Year 2010

Date of Sampling Event	Wells Sampled[1]		SAP
January/February 2010	TA1-W-03 TA1-W-06 TA1-W-08 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 FY10, 2nd Quarter Sampling, January 2010* (SNL December 2009)
May 2010	TA1-W-03 TA1-W-06 TA1-W-08 TA2-W-01 TA2-SW1-320 TA2-W-19	TA2-W-26 TJA-2 TJA-4 TJA-7 WYO-4	*Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY10, 3rd Quarter Sampling, May 2010* (SNL April 2010)
July/August 2010	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 FY10, 4th Quarter Sampling, July/August 2010* (SNL June 2010)
October/ November 2010	TA1-W-03 TA2-SW1-320 TA2-W-19 TA2-W-26 TJA-2	TJA-4 TJA-7 WYO-4	*Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY11, 1st Quarter Sampling, November 2010* (SNL October 2010b)

NOTE: [1] Refer to page xviii of this report for well descriptions.
FY = Fiscal Year.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories.
TAG = Tijeras Arroyo Groundwater.

Table 6-5. Parameters Sampled at TAG Wells[1] for Each Sampling Event, Calendar Year 2010

Parameter	January/February 2010		
NPN VOCs	TA2-SW1-320 (QED™) TA2-W-01 TA2-W-19 TA2-W-26 TA2-W-27	TA2-W-27 (dup) TJA-2 TJA-3 TJA-4 TJA-4 (dup)	TJA-6 TJA-7 WYO-4
Perchlorate	TA1-W-06 TA1-W-08	TA2-W-01 TA2-W-27	TA2-W-27 (dup)
Parameter	**May 2010**		
NPN VOCs	TA2-SW1-320 (QED™) TA2-W-19 TA2-W-26 TJA-2	TJA-4 TJA-4 (dup) TJA-7 WYO-4	
Perchlorate	TA1-W-03 TA1-W-06 TA1-W-08	TA1-W-08 (dup) TA2-W-01 TA2-W-27	
Parameter	**July/August 2010**		
Alkalinity Anions Gamma Spec* Gross alpha/beta NPN TAL Metals, plus Total Uranium Tritium VOCs	PGS-2 (QED™) TA1-W-01 TA1-W-02 TA1-W-03 TA1-W-03 (dup) TA1-W-04 TA1-W-05 TA1-W-06 TA1-W-08	TA1-W-03 (dup) TA2-NW1-595 TA2-SW1-320 (QED) TA2-W-01 TA2-W-19 TA2-W-19 (dup) TA2-W-26 TA2-W-27 TJA-2	TJA-3 TJA-3 (dup) TJA-4 TJA-6 TJA-7 WYO-3 WYO-4
Perchlorate	TA1-W-03 TA1-W-03 (dup)		
Parameter	**November 2010**		
NPN VOCs	TA2-SW1-320 (QED™) TA2-W-19 TA2-W-26 TJA-2	TJA-4 TJA-7 TJA-7 (dup) WYO-4	
Perchlorate	TA1-W-03		

NOTE: [1] Refer to page xviii of this report for well descriptions.

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).
QED™ = MicroPurge®, low-flow sampling method.
TAG = Tijeras Arroyo Groundwater.
TAL = Target Analyte List.
VOC = Volatile organic compound.

6.4.3 Pump Decontamination

A portable Bennett™ groundwater sampling system was used to collect groundwater samples from all wells. The sampling pump and tubing bundle were decontaminated prior to installation into monitoring wells according to procedures described in *Long-Term Environmental Stewardship Groundwater Sampling Equipment Decontamination*, SNL/NM FOP 05-03 (SNL August 2007b). An EB or rinsate sample was collected to verify the equipment decontamination process.

6.4.4 Sample Collection Sampling Procedures

Groundwater samples are collected using a nitrogen gas-powered portable piston pump (Bennett™) and/or a nitrogen gas-powered bladder pump (QED™) in accordance with SNL/NM FOP 05-01 (SNL August 2007a). Sample bottles are filled directly from the pump discharge line, with the VOC samples collected at the lowest achievable discharge rate.

6.4.5 Sample Handling and Shipment

The SNL/NM Sample Management Office (SMO) processes environmental samples collected by ER Operations personnel. The SMO reviews the Mini-SAPs, orders sample containers, issues sample control and tracking numbers, tracks the chain-of-custody, and reviews analytical results returned from the laboratories for laboratory contract compliance (SNL March 2003b and April 2007). All groundwater samples are analyzed by off-site laboratories using EPA-specified protocols.

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 duplicates, and surrogate spike samples. Reported laboratory analytical and QC data are reviewed against quality assurance requirements specified in the *Procedure for Completing the Contract Verification Review, SMO-05-03, Issue 03* (SNL April 2007) and Administrative Operating Procedure (AOP) 00-03, *Data Validation Procedure for Chemical and Radiochemical Data*, (SNL July 2007).

6.4.6 Waste Management

Purge and decontamination water generated from sampling activities were placed into 55-gallon containers and stored at the ER Operations Field Office waste accumulation area. All waste was managed in accordance with SNL/NM FOP 05-04 (SNL August 2007c) as nonregulated waste, based on historical sampling results and process knowledge of the monitoring well location. Results for associated environmental samples provide supplemental data for approval to discharge water to the sanitary sewer. All data were compared with COA discharge limits.

6.5 Analytical Methods

All groundwater samples are analyzed by off-site laboratories using EPA-specified protocols. Groundwater samples were submitted to GEL Laboratories, Inc. for analysis. Samples were analyzed in accordance with applicable EPA methods (Tables-6-6 and 6-7), including the following:

- *The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0* (EPA 1983)
- *Perchlorate in Drinking Water Using Ion Chromatography* (EPA, 1999)
- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (EPA 1996).
- *Prescribed Procedures for Measurement of Radioactivity in Drinking Water* (EPA 1980).

6.6 Summary of Analytical Results

This section discusses monitoring results, exceedances of standards, and pertinent trends in concentrations for COCs in the TAG study area that exceed standards. The analytical results and field measurements for all TAG sampling events are presented in Attachment 6A, Tables 6A-1 through 6A-8; 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 are presented in Table 6A-1. The method detection limits (MDLs) for all analyzed VOCs are listed in Table 6A-2.

Table 6-6. TAG Study Area Chemical Analytical Methods

Analyte	Analytical Method[a,b,c]
Anions	SW846-9056
NPN	EPA 353.2
Perchlorate	EPA 314.0
TAL Metals, plus Total Uranium	SW846-6020/7470
VOCs	SW846-8260

NOTES: [a]U.S. Environmental Protection Agency, 1996, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed., Rev. 1 (and all updates), U.S. Environmental Protection Agency, Washington, D.C.
[b]U.S. Environmental Protection Agency, 1983, *The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0*, EPA-600/4-84-017.
[c]U.S. Environmental Protection Agency, 1999, *Perchlorate in Drinking Water Using Ion Chromatography,* EPA 815/R-00-014.
EPA = U.S. Environmental Protection Agency.
NPN = Nitrate plus nitrite (reported as nitrogen).
SW = Solid waste.
TAG = Tijeras Arroyo Groundwater.
TAL = Target Analyte List.
VOC = Volatile organic compound.

Table 6-7. TAG Study Area Radiochemical Analytical Methods

Analyte	Analytical Method[a]
Gamma Spectroscopy (short list)	EPA 901.0
Gross Alpha/Beta Activity	EPA 900.0
Tritium	EPA 906.0

NOTES: [a]U.S. Environmental Protection Agency, 1980. *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*, EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.
EPA = U.S. Environmental Protection Agency.
TAG = Tijeras Arroyo Groundwater.

The VOCs detected at low concentrations in groundwater samples from TAG study area monitoring wells include the following:

- 1,1-Dichloroethane
- Carbon Disulfide
- Chloroform
- Chloromethane
- *cis*-1,2-Dichloroethene
- Tetrachloroethene (PCE)
- Toluene
- TCE

Nine VOCs were detected during CY 2010. Four of these VOCs have promulgated MCLs. Only TCE exceeded its MCL of 5 µg/L (Table 6A-1). TCE was detected in the sample from one PGWS well, WYO-4. The maximum concentration of TCE reported for WYO-4 during this reporting period is 8.94 µg/L in the sample collected during the October/November 2010 sampling event. Figure 6B-1 (Attachment 6B) shows that the TCE concentrations in samples from WYO-4 have slightly exceeded the MCL, and the trend is level to slightly increasing over time.

The analytical results for nitrate plus nitrite (NPN) (reported as nitrogen) are presented in Table 6A-3 (Attachment 6A). The NPN results exceed the MCL of 10 mg/L in samples from TA2-SW1-320, TA2-W-19, TJA-2, TJA-4, and TJA-7. The maximum concentration of NPN detected during this reporting period is 33.3 mg/L in the sample from TJA-7 collected during the October/November 2010 sampling event. Figures 6B-2 through 6B-6 (Attachment 6B) show that the NPN concentrations in wells TA2-SW1-320, TJA-4, and TJA-7 have generally exceeded the MCL for the life of the wells, and trends are slightly increasing to slightly decreasing over time. In contrast, NPN concentrations in TA2-W-19 and TJA-2 only occasionally exceed the MCL, and trends are slightly increasing over time.

Analytical results for anions and alkalinity are presented in Table 6A-4; no anion concentrations exceed established MCLs. Analytical results for perchlorate are presented in Table 6A-5; no perchlorate was detected above the MDL. Total metal analytical results are presented in Table 6A-6; no metal results exceed established MCLs. Groundwater samples were analyzed for tritium, gross alpha/beta activity, and gamma spectroscopy. The results are presented in Table 6A-7. 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, SC, ORP, pH, turbidity, and DO. The parameter measurements obtained immediately before collecting the samples are presented in Table 6A-8.

6.7 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 chemical data were reviewed and qualified in accordance with AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL July 2007). Although some analytical results were qualified during the data validation process, no significant data quality problems were noted for TAG study area COCs. Data validation qualifiers are provided with the analytical results in Tables 6A-1 through 6A-7 (Attachment 6A). The data validation report associated with each sampling event has been submitted to the SNL/NM Customer Funded Records Center. The following sections discuss the results for each QC sample and the impact on data quality for the TAG quarterly sampling events.

6.7.1 Field Quality Control Samples

Field QC samples included environmental duplicate, EB, and TB samples. The field QC samples were submitted for analysis along with the groundwater samples in accordance with QC procedures specified in the Mini-SAPs (SNL December 2009, April 2010, June 2010, and October 2010b).

6.7.1.1 Duplicate Environmental Samples

Duplicate environmental samples were analyzed in order to estimate the overall reproducibility of the sampling and analytical process. A duplicate sample is collected immediately after the original environmental sample, in order to reduce variability caused by time and/or sampling mechanics. The results for duplicate sample analyses (detected parameters only) are used to calculate relative percent difference (RPD) values. Duplicate sample results for all wells and all sampling periods show good correlation (RPD values less than 20) for all calculated parameters, with the following exceptions:

- **January/February 2010 Sampling Event—**The RPD for PCE in the TA2-W-27 sample was calculated at 21. Although analytical results were not duplicated, the reported concentrations for PCE are comparable to historical values.

- **July/August 2010 Sampling Event—**The RPD for *cis*-1, 2-dichloroethene in the sample from TA2-W-19 was calculated at 27. This RPD value is considered estimated, as reported concentrations were below associated practical quantitation limits (PQLs).

- **November 2010 Sampling Event—**The RPD for TCE in the TJA-7 sample was calculated at 27. This RPD value is considered estimated, as reported concentrations were below associated PQLs.

6.7.1.2 Equipment Blank Samples

A portable Bennett™ groundwater sampling system was used to collect groundwater samples from all wells except TA2-SW1-320, which is fitted with a dedicated pumping system. 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 August 2007b). An EB or rinsate sample was collected to verify the effectiveness of the equipment decontamination process. The results for the EB analyses are as follows:

- **January/February 2010 Sampling Event—**The EB sample was collected prior to sampling wells TA2-W-27 and TJA-4. Bromodichloromethane, chloroform, chloromethane, and dibromochloromethane were detected in the EB samples. No corrective action was required for bromodichloromethane, chloromethane, or dibromochloromethane as these compounds were not detected in the associated environmental samples. The result for chloroform was qualified as not detected in the TA2-W-27 EB sample during data validation because the result for the environmental sample was reported at a concentration less than the EB result.

- **May 2010 Sampling Event—**An EB sample was collected prior to sampling wells TA1-W-08 and TJA-4. Bromodichloromethane, bromoform, chloroform, dibromochloromethane, and NPN were detected in the EB sample associated with TJA-4. No corrective action was required for bromodichloromethane, bromoform, chloroform, or dibromochloromethane as these compounds were not detected in the associated environmental samples. No corrective action was required for NPN because NPN was reported in the associated environmental samples at concentrations greater than 10 times the EB result.

- **July/August 2010 Sampling Event—**EB samples were collected prior to sampling wells TA1-W-03, TA2-W-19, and TJA-3 and submitted for analysis of VOCs, total metals, anions, NPN, gamma spectroscopy, gross alpha, gross beta, and tritium. The analytical parameters bromodichloromethane, chloroform, dibromochloromethane, alkalinity, calcium, copper, iron, magnesium, nickel, NPN, sodium, and zinc were detected in EB samples. The result for chloroform was qualified as not detected during data validation in the TA1-W-03 environmental and duplicate samples, as the blank contamination was within five times the environmental sample concentration. The results for copper, nickel, and zinc were qualified as not detected during data validation because the results for these metals in the environmental samples were at concentrations less than five times the associated EB result. No corrective action was required for bromodichloromethane, dibromochloromethane, alkalinity, calcium, iron, magnesium, NPN, or sodium. These parameters either were not detected in environmental samples or detected at concentrations greater than five times the EB result.

- **November 2010 Sampling Event—**One EB sample was collected prior to sampling monitoring well TJA-7 and submitted for analysis of VOCs and NPN. The organic compounds bromodichloromethane, bromoform, chloroform, and dibromochloromethane were detected in the EB sample. No corrective action was required as these compounds were not detected in the associated environmental sample. The result for NPN was qualified as not detected during data validation due to associated laboratory method blank and calibration blank contamination.

6.7.1.3 Trip Blank Samples

TB samples are submitted whenever samples are collected for VOC analysis to assess whether contamination of the samples has occurred during shipment and storage. The TB samples consist of laboratory reagent grade water with hydrochloric acid preservative contained in 40-milliliter volatile organic analysis vials prepared by the analytical laboratory, which accompany the empty sample containers supplied by the laboratory. TBs were brought to the field and accompanied each sample shipment. TB qualifiers are provided with the analytical results in Table 6A-1 (Attachment 6A).

6.7.2 Laboratory Quality Control Samples

Internal laboratory QC samples, including method blanks and duplicate laboratory control samples were analyzed concurrently with all groundwater samples. All chemical data were reviewed and qualified in accordance with AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL July 2007). Laboratory data qualifiers are provided with the analytical results in Tables 6A-1 through 6A-7 (Attachment 6A).

6.8 Variances and Nonconformances

No variances or nonconformances from field or sampling requirements specified in the TAG Investigation Mini-SAPs (SNL December 2009, April 2010, June 2010, and October 2010b) were noted during sampling activities. However, project-specific issues associated with these sampling events are noted as follows:

- **All sampling events—**(1) WYO-4 was purged dry prior to sampling. This well was allowed to recover to a minimum of 80 percent of the original water level and then samples were collected. (2) A MicroPurge®, low-flow (QED™) sampling system was used to collect a groundwater sample from TA2-SW1-320. Conventional sampling equipment cannot be lowered to the proper sampling depth due to well construction issues. The pump intake was set at 279 ft bgs in TA2-W-19 due to sediment at the bottom of the well. (3) The field team was unable to set the pump in monitoring well TA2-W-01 at the selected depth of 334 ft below the top of the well casing due to sediment within the well screen interval. The portable system was removed from the well, the pump was cleaned of fine-grained sand and silt, and the pump was then lowered back into the well to a depth of 332.5 to 333 ft below the top of the well casing.

- **January/February 2010 Sampling Event—**On February 26, 2010, a perchlorate sample was collected from monitoring well TA1-W-03, as required by the letter from the NMED Hazardous Waste Bureau, dated April 30, 2009 (NMED April 2009). Prior sampling has been unsuccessful due to unstable turbidity readings, and in early February 2010, monitoring well TA1-W-03 was redeveloped to remove sediment from the well.

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 current conceptual model, and plans for studies to be completed during CY 2011 at the TAG study area.

The TAG study area encompasses an area of approximately 40 sq mi in the north-central portion of KAFB. Groundwater investigations were initiated in 1992, and the current monitoring network consists of 21 monitoring wells for water quality analysis and 27 wells for water level measurements. For this reporting period, wells were sampled in January/February 2010, May 2010, July/August 2010, and October/November 2010. The samples were analyzed for VOCs, NPN, anions, alkalinity, perchlorate, Target Analyte List metals (plus uranium), gross alpha/beta activity, tritium, and radionuclides by gamma spectroscopy. Depending on their locations and historical concentrations of COCs, wells were sampled quarterly, semiannually, or annually during this reporting period.

Only NPN and TCE were detected above MCLs in samples from TAG study area wells. NPN concentrations exceeded the MCL of 10 mg/L in samples from TA2-SW1-320, TJA-2, TJA-4, and TJA-7 during all sampling events, with a maximum concentration of 33.3 mg/L in the sample from TJA-7 collected during the November 2010 sampling event. NPN concentrations occasionally exceeded the MCL in samples from TA2-W-19.

TCE exceeded the MCL of 5 μg/L in samples from well WYO-4, completed in the PGWS. The maximum concentration of TCE detected during this reporting period was 8.94 μg/L detected in the sample from WYO-4 collected during the November 2010 sampling event. TCE concentrations in WYO-4 have barely exceeded the MCL for the life of the well, and the trend is level to slightly increasing over time.

The analytical results for this reporting period are consistent with historical concentrations. The following conclusions are based on a comprehensive review of available information for current groundwater contamination conditions in the TAG study area:

- The distribution of TCE in the PGWS is sporadic across the study area and reflects multiple release sites and the effect of subsurface heterogeneity.
- Based on the historical use and disposal of chlorinated solvents, the extent of TCE in groundwater is probably associated with multiple aqueous releases of solvents and subsequent vapor-phase transport through the vadose zone.
- The distribution of nitrate above the background level is laterally widespread in the PGWS.
- In the regional aquifer, concentrations of nitrate above the MCL occur in the western and southeastern portions of the TAG study area.
- The potential sources of TCE and/or nitrate in the TAG study area include sewage lagoons, wastewater outfalls, septic systems, landfills, sewer lines, and the golf course.
- The current conceptual model described in Section 6.1.7 does not require modification based on the analytical results for this reporting period.

DOE/Sandia recommend the following approach as part of the ongoing environmental studies of the TAG study area:

- Continue collection of groundwater samples at the 21 TAG groundwater monitoring wells on a quarterly, semiannual, and 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 IRP personnel with respect to the results of TCE and nitrate abatement studies.

- As available, obtain groundwater results from both KAFB 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 SNL/NM GWPP 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 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 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 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 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 1996 U.S. Environmental Protection Agency (EPA), 1996. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed., Rev. 1 (and all updates), U.S. Environmental Protection Agency, Washington, D.C.

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.

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.

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, 1980. *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*, EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.

Fritts and Van Hart 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. *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.

SNL October 2010a 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 October 2010b Sandia National Laboratories/New Mexico (SNL/NM), October 2010. *Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY11, 1st Quarter Sampling, November 2010*, Environmental Restoration Program, Sandia National Laboratories, Albuquerque, New Mexico, October 12, 2010.

SNL June 2010 Sandia National Laboratories/New Mexico (SNL/NM), June 2010. *Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY10, 4th Quarter Sampling, July/August 2010*, Environmental Restoration Program, Sandia National Laboratories, Albuquerque, New Mexico, June 14, 2010.

SNL April 2010 Sandia National Laboratories/New Mexico (SNL/NM), April 2010. *Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY10, 3rd Quarter Sampling, May 2010,* Environmental Restoration Program, Sandia National Laboratories, Albuquerque, New Mexico, April 19, 2010.

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 Program, Sandia National Laboratories, Albuquerque, New Mexico, January 19, 2010.

SNL December 2009 Sandia National Laboratories/New Mexico (SNL/NM), December 2009. *Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY10, 2nd Quarter Sampling, January 2010*, Environmental Restoration Program, Sandia National Laboratories, Albuquerque, New Mexico, December 14, 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 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 Program, 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 November 2007 Sandia National Laboratories/New Mexico (SNL/NM), November 2007. *Groundwater Level Data Acquisition and Management*, FOP 03-02, Rev. 02, Sandia National Laboratories, Albuquerque, New Mexico.

SNL August 2007a Sandia National Laboratories/New Mexico (SNL/NM), August 2007a. *Long-Term Environmental Stewardship (LTES) Groundwater Monitoring Well Sampling and Field Analytical Measurements,* FOP 05-01, Revision 00, Sandia National Laboratories, Albuquerque, New Mexico.

SNL August 2007b Sandia National Laboratories/New Mexico (SNL/NM), August 2007b. *LTES Groundwater Sampling Equipment Decontamination,* FOP 05-03, Revision 02, Sandia National Laboratories, Albuquerque, New Mexico.

SNL August 2007c Sandia National Laboratories/New Mexico (SNL/NM), August 2007c. *LTES Groundwater Monitoring Waste Management,* FOP 05-04, Revision 02, Sandia National Laboratories, Albuquerque, New Mexico.

SNL July 2007 Sandia National Laboratories, New Mexico (SNL/NM) July 2007. *Data Validation Procedure for Chemical and Radiochemical Data*, AOP 00-03, Revision 2, Sample Management Office, Sandia National Laboratories, New Mexico, July 16, 2007.

SNL April 2007 Sandia National Laboratories/New Mexico (SNL/NM), April 2007. *Procedure for Completing the Contract Verification Review*, *SMO-05-03, Issue 03,* Sandia National Laboratories, Albuquerque, New Mexico, April 30, 2007.

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 2003a 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 2003b Sandia National Laboratories/New Mexico (SNL/NM), March 2003. *SNL/NM Statement of Work for Analytical Laboratories, Revision 2*, 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 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.

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.

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

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Attachment 6A Tables

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Table 6A-1
Summary of Detected Volatile Organic Compounds, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-W-01	Tetrachloroethene	0.392	0.300	1.00	5.00	J		088016-001	SW846-8260B
13-Jan-10	Trichloroethene	1.41	0.250	1.00	5.00			088016-001	SW846-8260B
TA2-W-19	1,1-Dichloroethane	0.510	0.300	1.00	NE	J		088032-001	SW846-8260B
21-Jan-10	Trichloroethene	4.49	0.250	1.00	5.00			088032-001	SW846-8260B
	cis-1,2-Dichloroethene	0.590	0.300	1.00	70.0	J		088032-001	SW846-8260B
TA2-W-26	Chloroform	0.250	0.250	1.00	NE	J		088030-001	SW846-8260B
20-Jan-10	Tetrachloroethene	0.790	0.300	1.00	5.00	J		088030-001	SW846-8260B
	Trichloroethene	0.940	0.250	1.00	5.00	J		088030-001	SW846-8260B
TA2-W-27	Tetrachloroethene	1.23	0.300	1.00	5.00			088020-001	SW846-8260B
14-Jan-10	Trichloroethene	0.733	0.250	1.00	5.00	J		088020-001	SW846-8260B
TA2-W-27 (Duplicate)	Chloroform	0.266	0.250	1.00	NE	J	1.0U	088021-001	SW846-8260B
14-Jan-10	Tetrachloroethene	0.992	0.300	1.00	5.00	J		088021-001	SW846-8260B
	Trichloroethene	0.783	0.250	1.00	5.00	J		088021-001	SW846-8260B
TJA-2	Carbon Disulfide	2.00	1.25	5.00	NE	J		088041-001	SW846-8260B
28-Jan-10	Trichloroethene	3.58	0.250	1.00	5.00			088041-001	SW846-8260B
	cis-1,2-Dichloroethene	0.490	0.300	1.00	70.0	J		088041-001	SW846-8260B
TJA-4 (Duplicate) 27-Jan-10	Chloromethane	0.300	0.300	1.00	NE	J	1.0UJ	088039-001	SW846-8260B
TJA-7 29-Jan-10	Trichloroethene	0.353	0.250	1.00	5.00	J		088043-001	SW846-8260B
WYO-4	1,1-Dichloroethane	0.980	0.300	1.00	NE	J		088034-001	SW846-8260B
26-Jan-10	Trichloroethene	**8.34**	0.250	1.00	5.00			088034-001	SW846-8260B
	cis-1,2-Dichloroethene	1.77	0.300	1.00	70.0			088034-001	SW846-8260B
TA2-W-19	1,1-Dichloroethane	0.520	0.300	1.00	NE	J		088987-001	SW846-8260B
14-May-10	Toluene	0.250	0.250	1.00	1000	J		088987-001	SW846-8260B
	Trichloroethene	4.09	0.250	1.00	5.00			088987-001	SW846-8260B
	cis-1,2-Dichloroethene	0.540	0.300	1.00	70.0	J		088987-001	SW846-8260B
TA2-W-26	Chloroform	0.280	0.250	1.00	NE	J		088985-001	SW846-8260B
13-May-10	Tetrachloroethene	0.760	0.300	1.00	5.00	J		088985-001	SW846-8260B
	Trichloroethene	0.920	0.250	1.00	5.00	J		088985-001	SW846-8260B
TJA-2	1,1-Dichloroethane	0.420	0.300	1.00	NE	J		088996-001	SW846-8260B
20-May-10	Trichloroethene	3.17	0.250	1.00	5.00			088996-001	SW846-8260B
	cis-1,2-Dichloroethene	0.500	0.300	1.00	70.0	J		088996-001	SW846-8260B
TJA-4 (Duplicate) 19-May-10	Chloromethane	31.8	0.300	1.00	NE			088994-001	SW846-8260B

Refer to footnotes on page 6A-49.

Table 6A-1 *(Continued)*
Summary of Detected Volatile Organic Compounds, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-7 24-May-10	Trichloroethene	0.440	0.250	1.00	5.00	J		088998-001	SW846-8260B
WYO-4	1,1-Dichloroethane	0.740	0.300	1.00	NE	J		088989-001	SW846-8260B
18-May-10	Chloromethane	0.400	0.300	1.00	NE	J		088989-001	SW846-8260B
	Trichloroethene	**6.47**	0.250	1.00	5.00			088989-001	SW846-8260B
	cis-1,2-Dichloroethene	1.51	0.300	1.00	70.0			088989-001	SW846-8260B
TA1-W-03 22-Jul-10	Chloroform	0.360	0.250	1.00	NE	J	1.0U	089435-001	SW846-8260B
TA1-W-03 (Duplicate) 22-Jul-10	Chloroform	0.430	0.250	1.00	NE	J	1.0U	089436-001	SW846-8260B
TA1-W-06 27-Jul-10	1,1-Dichloroethene	0.640	0.300	1.00	7.00	J		089442-001	SW846-8260B
TA2-W-01	Tetrachloroethene	0.320	0.300	1.00	5.00	J		089460-001	SW846-8260B
09-Aug-10	Trichloroethene	1.47	0.250	1.00	5.00			089460-001	SW846-8260B
TA2-W-19	1,1-Dichloroethane	0.550	0.300	1.00	NE	J		089466-001	SW846-8260B
11-Aug-10	Trichloroethene	3.53	0.250	1.00	5.00			089466-001	SW846-8260B
	cis-1,2-Dichloroethene	0.420	0.300	1.00	70.0	J		089466-001	SW846-8260B
TA2-W-19 (Duplicate)	Trichloroethene	3.93	0.250	1.00	5.00			089467-001	SW846-8260B
11-Aug-10	cis-1,2-Dichloroethene	0.550	0.300	1.00	70.0	J		089467-001	SW846-8260B
TA2-W-26	Chloroform	0.260	0.250	1.00	5.00	J		089462-001	SW846-8260B
10-Aug-10	Tetrachloroethene	0.850	0.300	1.00	5.00	J		089462-001	SW846-8260B
	Trichloroethene	0.830	0.250	1.00	5.00	J		089462-001	SW846-8260B
	cis-1,2-Dichloroethene	0.310	0.300	1.00	70.0	J		089462-001	SW846-8260B
TA2-W-27	Tetrachloroethene	0.990	0.300	1.00	5.00	J		089456-001	SW846-8260B
04-Aug-10	Trichloroethene	0.750	0.250	1.00	5.00	J		089456-001	SW846-8260B
TJA-2	1,1-Dichloroethane	0.400	0.300	1.00	NE	J		089469-001	SW846-8260B
12-Aug-10	Trichloroethene	2.97	0.250	1.00	5.00			089469-001	SW846-8260B
	cis-1,2-Dichloroethene	0.490	0.300	1.00	70.0	J		089469-001	SW846-8260B
TJA-3 29-Jul-10	Trichloroethene	0.870	0.250	1.00	5.00	J		089448-001	SW846-8260B
TJA-3 (Duplicate) 29-Jul-10	Trichloroethene	0.980	0.250	1.00	5.00	J		089449-001	SW846-8260B
TJA-7 18-Aug-10	Trichloroethene	0.400	0.250	1.00	5.00	J		089475-001	SW846-8260B

Refer to footnotes on page 6A-49.

Table 6A-1 *(Concluded)*
Summary of Detected Volatile Organic Compounds, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

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]
WYO-3 02-Aug-10	Toluene	0.290	0.250	1.00	1000	J	1.0U	089451-001	SW846-8260B
WYO-4 16-Aug-10	1,1-Dichloroethane	1.04	0.300	1.00	NE			089471-001	SW846-8260B
	Trichloroethene	**8.80**	0.250	1.00	5.00			089471-001	SW846-8260B
	cis-1,2-Dichloroethene	1.90	0.300	1.00	70.0			089471-001	SW846-8260B
TA2-W-19 11-Nov-10	1,1-Dichloroethane	0.390	0.300	1.00	NE	J		089842-001	SW846-8260B
	Trichloroethene	3.09	0.250	1.00	5.00			089842-001	SW846-8260B
	cis-1,2-Dichloroethene	0.410	0.300	1.00	70.0	J		089842-001	SW846-8260B
TA2-W-26 10-Nov-10	Chloroform	0.370	0.250	1.00	NE	J		089840-001	SW846-8260B
	Tetrachloroethene	0.910	0.300	1.00	5.00	J		089840-001	SW846-8260B
	Trichloroethene	1.07	0.250	1.00	5.00			089840-001	SW846-8260B
TJA-2 15-Nov-10	1,1-Dichloroethane	0.620	0.300	1.00	NE	J	J	089847-001	SW846-8260B
	Trichloroethene	3.97	0.250	1.00	5.00		J	089847-001	SW846-8260B
	cis-1,2-Dichloroethene	0.630	0.300	1.00	70.0	J	J	089847-001	SW846-8260B
TJA-7 16-Nov-10	Trichloroethene	0.590	0.250	1.00	5.00	J	J	089851-001	SW846-8260B
TJA-7 (Duplicate) 16-Nov-10	Trichloroethene	0.450	0.250	1.00	5.00	J	J	089852-001	SW846-8260B
WYO-4 18-Nov-10	1,1-Dichloroethane	1.17	0.300	1.00	NE		J	089854-001	SW846-8260B
	Chloromethane	0.350	0.300	1.00	NE	J	J	089854-001	SW846-8260B
	Toluene	0.250	0.250	1.00	1000	J	1.0U	089854-001	SW846-8260B
	Trichloroethene	**8.94**	0.250	1.00	5.00		J	089854-001	SW846-8260B
	cis-1,2-Dichloroethene	2.09	0.300	1.00	70.0		J	089854-001	SW846-8260B

Refer to footnotes on page 6A-49.

Table 6A-2
Method Detection Limits for Volatile Organic Compounds (EPA Method[g] 8260), Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Analyte	MDL[b] (μg/L)
1,1,1-Trichloroethane	0.325
1,1,2,2-Tetrachloroethane	0.250
1,1,2-Trichloroethane	0.250
1,1-Dichloroethane	0.300
1,1-Dichloroethene	0.300
1,2-Dichloroethane	0.250
1,2-Dichloropropane	0.250
2-Butanone	1.25
2-Hexanone	1.25
4-methyl-, 2-Pentanone	1.25
Acetone	3.50
Benzene	0.300
Bromodichloromethane	0.250
Bromoform	0.250
Bromomethane	0.300
Carbon disulfide	1.25
Carbon tetrachloride	0.300
Chlorobenzene	0.250
Chloroethane	0.300
Chloroform	0.250
Chloromethane	0.300
Dibromochloromethane	0.300
Ethyl benzene	0.250
Methylene chloride	3.00
Styrene	0.250
Tetrachloroethene	0.300
Toluene	0.250
Trichloroethene	0.250
Vinyl acetate	1.50
Vinyl chloride	0.500
Xylene	0.300
cis-1,2-Dichloroethene	0.300
cis-1,3-Dichloropropene	0.250
trans-1,2-Dichloroethene	0.300
trans-1,3-Dichloropropene	0.250

Refer to footnotes on page 6A-49.

Table 6A-3
Summary of Nitrate plus Nitrite Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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 19-Jan-10	Nitrate plus nitrite as N	**21.6**	0.250	1.25	10			088028-018	EPA 353.2
TA2-W-01 13-Jan-10	Nitrate plus nitrite as N	5.09	0.100	0.500	10	B		088016-018	EPA 353.2
TA2-W-19 21-Jan-10	Nitrate plus nitrite as N	9.80	0.250	1.25	10			088032-018	EPA 353.2
TA2-W-26 20-Jan-10	Nitrate plus nitrite as N	4.78	0.250	1.25	10			088030-018	EPA 353.2
TA2-W-27 14-Jan-10	Nitrate plus nitrite as N	4.10	0.100	0.500	10	B		088020-018	EPA 353.2
TA2-W-27 (Duplicate) 14-Jan-10	Nitrate plus nitrite as N	4.44	0.100	0.500	10	B		088021-018	EPA 353.2
TJA-2 28-Jan-10	Nitrate plus nitrite as N	**10.5**	0.250	1.25	10			088041-018	EPA 353.2
TJA-3 15-Jan-10	Nitrate plus nitrite as N	2.42	0.100	0.500	10			088023-018	EPA 353.2
TJA-4 27-Jan-10	Nitrate plus nitrite as N	**29.5**	0.500	2.50	10			088038-018	EPA 353.2
TJA-4 (Duplicate) 27-Jan-10	Nitrate plus nitrite as N	**29.2**	0.500	2.50	10			088039-018	EPA 353.2
TJA-6 18-Jan-10	Nitrate plus nitrite as N	2.48	0.100	0.500	10			088026-018	EPA 353.2
TJA-7 29-Jan-10	Nitrate plus nitrite as N	**21.0**	0.250	1.25	10			088043-018	EPA 353.2
WYO-4 26-Jan-10	Nitrate plus nitrite as N	3.00	0.100	0.500	10			088034-018	EPA 353.2
TA2-SW1-320 12-May-10	Nitrate plus nitrite as N	**23.0**	0.250	1.25	10	B		088983-018	EPA 353.2
TA2-W-19 14-May-10	Nitrate plus nitrite as N	**10.1**	0.250	1.25	10			088987-018	EPA 353.2
TA2-W-26 13-May-10	Nitrate plus nitrite as N	5.06	0.100	0.500	10	B		088985-018	EPA 353.2
TJA-2 20-May-10	Nitrate plus nitrite as N	**10.4**	0.250	1.25	10			088996-018	EPA 353.2

Refer to footnotes on page 6A-49.

Table 6A-3 *(Continued)*
Summary of Nitrate plus Nitrite Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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 19-May-10	Nitrate plus nitrite as N	**28.0**	1.00	5.00	10			088993-018	EPA 353.2
TJA-4 (Duplicate) 19-May-10	Nitrate plus nitrite as N	**28.4**	0.500	2.50	10			088994-018	EPA 353.2
TJA-7 24-May-10	Nitrate plus nitrite as N	**23.7**	0.500	2.50	10			088998-018	EPA 353.2
WYO-4 18-May-10	Nitrate plus nitrite as N	2.96	0.100	0.500	10			088989-018	EPA 353.2
PGS-2 16-Jul-10	Nitrate plus nitrite as N	0.900	0.050	0.250	10			089426-018	EPA 353.2
TA1-W-01 06-Aug-10	Nitrate plus nitrite as N	2.73	0.100	0.500	10			089429-018	EPA 353.2
TA1-W-02 21-Jul-10	Nitrate plus nitrite as N	1.02	0.050	0.250	10			089431-018	EPA 353.2
TA1-W-03 22-Jul-10	Nitrate plus nitrite as N	6.40	0.250	1.25	10			089435-018	EPA 353.2
TA1-W-03 (Duplicate) 22-Jul-10	Nitrate plus nitrite as N	6.40	0.250	1.25	10			089436-018	EPA 353.2
TA1-W-04 23-Jul-10	Nitrate plus nitrite as N	1.68	0.100	0.500	10			089438-018	EPA 353.2
TA1-W-05 26-Jul-10	Nitrate plus nitrite as N	1.31	0.050	0.250	10			089440-018	EPA 353.2
TA1-W-06 27-Jul-10	Nitrate plus nitrite as N	3.42	0.100	0.500	10			089442-018	EPA 353.2
TA1-W-08 28-Jul-10	Nitrate plus nitrite as N	7.00	0.250	1.25	10			089444-018	EPA 353.2
TA2-NW1-595 03-Aug-10	Nitrate plus nitrite as N	4.05	0.250	1.25	10			089453-018	EPA 353.2
TA2-SW1-320 15-Jul-10	Nitrate plus nitrite as N	**21.4**	0.500	2.50	10	B	J	089424-018	EPA 353.2
TA2-W-01 09-Aug-10	Nitrate plus nitrite as N	4.65	0.100	0.500	10			089460-018	EPA 353.2

Refer to footnotes on page 6A-49.

Table 6A-3 *(Continued)*
Summary of Nitrate plus Nitrite Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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 11-Aug-10	Nitrate plus nitrite as N	**10.5**	0.250	1.25	10			089466-018	EPA 353.2
TA2-W-19 (Duplicate) 11-Aug-10	Nitrate plus nitrite as N	**10.6**	0.250	1.25	10			089467-018	EPA 353.2
TA2-W-26 10-Aug-10	Nitrate plus nitrite as N	4.83	0.100	0.500	10			089462-018	EPA 353.2
TA2-W-27 04-Aug-10	Nitrate plus nitrite as N	4.23	0.250	1.25	10			089456-018	EPA 353.2
TJA-2 12-Aug-10	Nitrate plus nitrite as N	**10.8**	0.250	1.25	10			089469-018	EPA 353.2
TJA-3 29-Jul-10	Nitrate plus nitrite as N	2.57	0.100	0.500	10			089448-018	EPA 353.2
TJA-3 (Duplicate) 29-Jul-10	Nitrate plus nitrite as N	2.61	0.100	0.500	10			089449-018	EPA 353.2
TJA-4 17-Aug-10	Nitrate plus nitrite as N	**27.7**	1.00	5.00	10		J	089473-018	EPA 353.2
TJA-6 05-Aug-10	Nitrate plus nitrite as N	2.60	0.250	1.25	10			089458-018	EPA 353.2
TJA-7 18-Aug-10	Nitrate plus nitrite as N	**22.9**	1.00	5.00	10		J	089475-018	EPA 353.2
WYO-3 02-Aug-10	Nitrate plus nitrite as N	2.27	0.100	0.500	10			089451-018	EPA 353.2
WYO-4 16-Aug-10	Nitrate plus nitrite as N	2.87	0.100	0.500	10			089471-018	EPA 353.2
TA2-SW1-320 09-Nov-10	Nitrate plus nitrite as N	**22.4**	0.500	2.50	10			089838-018	EPA 353.2
TA2-W-19 11-Nov-10	Nitrate plus nitrite as N	**10.1**	0.250	1.25	10			089842-018	EPA 353.2
TA2-W-26 10-Nov-10	Nitrate plus nitrite as N	4.93	0.100	0.500	10			089840-018	EPA 353.2
TJA-2 15-Nov-10	Nitrate plus nitrite as N	**14.1**	2.50	12.5	10	B	30U	089847-018	EPA 353.2

Refer to footnotes on page 6A-49.

Table 6A-3 *(Concluded)*
Summary of Nitrate plus Nitrite Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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 12-Nov-10	Nitrate plus nitrite as N	**30.0**	2.50	12.5	10	B	30U	089845-018	EPA 353.2
TJA-7 16-Nov-10	Nitrate plus nitrite as N	**27.3**	2.50	12.5	10	B	30U	089851-018	EPA 353.2
TJA-7 (Duplicate) 16-Nov-10	Nitrate plus nitrite as N	**33.3**	2.50	12.5	10	B		089852-018	EPA 353.2
WYO-4 18-Nov-10	Nitrate plus nitrite as N	0.730	0.050	0.250	10	B	J	089854-018	EPA 353.2

Refer to footnotes on page 6A-49.

Table 6A-4
Summary of Anion and Alkalinity Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.170	0.066	0.200	NE	J		089426-016	SW846 9056
16-Jul-10	Chloride	14.6	0.066	0.200	NE			089426-016	SW846 9056
	Fluoride	0.227	0.033	0.100	4.0			089426-016	SW846 9056
	Sulfate	63.6	0.500	2.00	NE			089426-016	SW846 9056
	Alkalinity, Total	161	0.725	1.00	NE	B		089426-016	SM 2320B
TA1-W-01	Bromide	0.206	0.066	0.200	NE			089429-016	SW846 9056
06-Aug-10	Chloride	16.3	0.066	0.200	NE			089429-016	SW846 9056
	Fluoride	0.498	0.033	0.100	4.0			089429-016	SW846 9056
	Sulfate	76.8	1.00	4.00	NE			089429-016	SW846 9056
	Alkalinity, Total	168	0.725	1.00	NE	B		089429-016	SM 2320B
TA1-W-02	Bromide	0.180	0.066	0.200	NE	J		089431-016	SW846 9056
21-Jul-10	Chloride	15.1	0.066	0.200	NE			089431-016	SW846 9056
	Fluoride	0.478	0.033	0.100	4.0			089431-016	SW846 9056
	Sulfate	76.7	0.500	2.00	NE			089431-016	SW846 9056
	Alkalinity, Total	176	0.725	1.00	NE	B		089431-016	SM 2320B
TA1-W-03	Bromide	3.29	0.066	0.200	NE			089435-016	SW846 9056
22-Jul-10	Chloride	264	1.65	5.00	NE			089435-016	SW846 9056
	Fluoride	0.263	0.033	0.100	4.0			089435-016	SW846 9056
	Sulfate	503	2.50	10.0	NE			089435-016	SW846 9056
	Alkalinity, Total	71.1	0.725	1.00	NE	B		089435-016	SM 2320B
TA1-W-03 (Duplicate)	Bromide	3.32	0.066	0.200	NE			089436-016	SW846 9056
22-Jul-10	Chloride	260	1.65	5.00	NE			089436-016	SW846 9056
	Fluoride	0.262	0.033	0.100	4.0			089436-016	SW846 9056
	Sulfate	497	2.50	10.0	NE			089436-016	SW846 9056
	Alkalinity, Total	72.1	0.725	1.00	NE	B		089436-016	SM 2320B
TA1-W-04	Bromide	0.191	0.066	0.200	NE	J		089438-016	SW846 9056
23-Jul-10	Chloride	15.3	0.066	0.200	NE			089438-016	SW846 9056
	Fluoride	0.476	0.033	0.100	4.0			089438-016	SW846 9056
	Sulfate	65.4	0.200	0.800	NE			089438-016	SW846 9056
	Alkalinity, Total	174	0.725	1.00	NE	B		089438-016	SM 2320B
TA1-W-05	Bromide	0.167	0.066	0.200	NE	J		089440-016	SW846 9056
26-Jul-10	Chloride	11.2	0.066	0.200	NE			089440-016	SW846 9056
	Fluoride	0.359	0.033	0.100	4.0			089440-016	SW846 9056
	Sulfate	98.1	0.500	2.00	NE			089440-016	SW846 9056
	Alkalinity, Total	212	0.725	1.00	NE	B		089440-016	SM 2320B

Refer to footnotes on page 6A-49.

Table 6A-4 *(Continued)*
Summary of Anion and Alkalinity Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	Bromide	1.27	0.066	0.200	NE			089442-016	SW846 9056
27-Jul-10	Chloride	102	0.660	2.00	NE			089442-016	SW846 9056
	Fluoride	0.350	0.033	0.100	4.0			089442-016	SW846 9056
	Sulfate	206	1.00	4.00	NE			089442-016	SW846 9056
	Alkalinity, Total	87.8	0.725	1.00	NE	B		089442-016	SM 2320B
TA1-W-08	Bromide	2.53	0.066	0.200	NE			089444-016	SW846 9056
28-Jul-10	Chloride	199	3.30	10.0	NE		J	089444-016	SW846 9056
	Fluoride	0.269	0.033	0.100	4.0			089444-016	SW846 9056
	Sulfate	731	5.00	20.0	NE		J	089444-016	SW846 9056
	Alkalinity, Total	85.7	0.725	1.00	NE	B		089444-016	SM 2320B
TA2-NW1-595	Bromide	1.33	0.066	0.200	NE			089453-016	SW846 9056
03-Aug-10	Chloride	97.2	0.660	2.00	NE			089453-016	SW846 9056
	Fluoride	0.378	0.033	0.100	4.0			089453-016	SW846 9056
	Sulfate	107	1.00	4.00	NE			089453-016	SW846 9056
	Alkalinity, Total	133	0.725	1.00	NE	B		089453-016	SM 2320B
TA2-SW1-320	Bromide	0.547	0.066	0.200	NE			089424-016	SW846 9056
15-Jul-10	Chloride	30.0	0.660	2.00	NE			089424-016	SW846 9056
	Fluoride	0.471	0.033	0.100	4.0			089424-016	SW846 9056
	Sulfate	13.8	0.100	0.400	NE			089424-016	SW846 9056
	Alkalinity, Total	124	0.725	1.00	NE	B		089424-016	SM 2320B
TA2-W-01	Bromide	1.48	0.066	0.200	NE			089460-016	SW846 9056
09-Aug-10	Chloride	99.7	0.660	2.00	NE			089460-016	SW846 9056
	Fluoride	0.414	0.033	0.100	4.0			089460-016	SW846 9056
	Sulfate	51.5	1.00	4.00	NE			089460-016	SW846 9056
	Alkalinity, Total	96.0	0.725	1.00	NE	B		089460-016	SM 2320B
TA2-W-19	Bromide	0.927	0.066	0.200	NE			089466-016	SW846 9056
11-Aug-10	Chloride	64.7	0.660	2.00	NE			089466-016	SW846 9056
	Fluoride	0.409	0.033	0.100	4.0			089466-016	SW846 9056
	Sulfate	54.0	1.00	4.00	NE			089466-016	SW846 9056
	Alkalinity, Total	105	0.725	1.00	NE	B		089466-016	SM 2320B
TA2-W-19 (Duplicate)	Bromide	0.913	0.066	0.200	NE			089467-016	SW846 9056
11-Aug-10	Chloride	65.2	0.660	2.00	NE			089467-016	SW846 9056
	Fluoride	0.409	0.033	0.100	4.0			089467-016	SW846 9056
	Sulfate	54.2	1.00	4.00	NE			089467-016	SW846 9056
	Alkalinity, Total	104	0.725	1.00	NE	B		089467-016	SM 2320B

Refer to footnotes on page 6A-49.

Table 6A-4 *(Continued)*
Summary of Anion and Alkalinity Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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 10-Aug-10	Bromide	2.20	0.066	0.200	NE			089462-016	SW846 9056
	Chloride	165	1.65	5.00	NE			089462-016	SW846 9056
	Fluoride	0.313	0.033	0.100	4.0			089462-016	SW846 9056
	Sulfate	334	2.50	10.0	NE			089462-016	SW846 9056
	Alkalinity, Total	82.0	0.725	1.00	NE	B		089462-016	SM 2320B
TA2-W-27 04-Aug-10	Bromide	1.58	0.066	0.200	NE			089456-016	SW846 9056
	Chloride	114	0.660	2.00	NE			089456-016	SW846 9056
	Fluoride	0.403	0.033	0.100	4.0			089456-016	SW846 9056
	Sulfate	179	1.00	4.00	NE			089456-016	SW846 9056
	Alkalinity, Total	69.0	0.725	1.00	NE	B		089456-016	SM 2320B
TJA-2 12-Aug-10	Bromide	0.906	0.066	0.200	NE			089469-016	SW846 9056
	Chloride	63.0	0.660	2.00	NE			089469-016	SW846 9056
	Fluoride	0.403	0.033	0.100	4.0			089469-016	SW846 9056
	Sulfate	51.8	1.00	4.00	NE			089469-016	SW846 9056
	Alkalinity, Total	104	0.725	1.00	NE	B		089469-016	SM 2320B
TJA-3 29-Jul-10	Bromide	0.182	0.066	0.200	NE	J		089448-016	SW846 9056
	Chloride	13.3	0.066	0.200	NE			089448-016	SW846 9056
	Fluoride	0.422	0.033	0.100	4.0			089448-016	SW846 9056
	Sulfate	77.6	0.500	2.00	NE			089448-016	SW846 9056
	Alkalinity, Total	168	0.725	1.00	NE	B		089448-016	SM 2320B
TJA-3 (Duplicate) 23-Jul-10	Bromide	0.183	0.066	0.200	NE	J		089449-016	SW846 9056
	Chloride	13.3	0.066	0.200	NE			089449-016	SW846 9056
	Fluoride	0.421	0.033	0.100	4.0			089449-016	SW846 9056
	Sulfate	77.4	0.500	2.00	NE			089449-016	SW846 9056
	Alkalinity, Total	169	0.725	1.00	NE	B		089449-016	SM 2320B
TJA-4 17-Aug-10	Bromide	0.365	0.066	0.200	NE			089473-016	SW846 9056
	Chloride	20.2	0.330	1.00	NE			089473-016	SW846 9056
	Fluoride	0.450	0.033	0.100	4.0			089473-016	SW846 9056
	Sulfate	17.8	0.100	0.400	NE			089473-016	SW846 9056
	Alkalinity, Total	138	0.725	1.00	NE	B		089473-016	SM 2320B
TJA-6 05-Aug-10	Bromide	0.199	0.066	0.200	NE	J		089458-016	SW846 9056
	Chloride	15.3	0.066	0.200	NE			089458-016	SW846 9056
	Fluoride	0.500	0.033	0.100	4.0			089458-016	SW846 9056
	Sulfate	62.9	1.00	4.00	NE			089458-016	SW846 9056
	Alkalinity, Total	158	0.725	1.00	NE	B		089458-016	SM 2320B

Refer to footnotes on page 6A-49.

Table 6A-4 *(Concluded)*
Summary of Anion and Alkalinity Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	Bromide	0.434	0.066	0.200	NE			089475-016	SW846 9056
18-Aug-10	Chloride	23.2	0.330	1.00	NE			089475-016	SW846 9056
	Fluoride	0.447	0.033	0.100	4.0			089475-016	SW846 9056
	Sulfate	20.8	0.100	0.400	NE			089475-016	SW846 9056
	Alkalinity, Total	128	0.725	1.00	NE	B		089475-016	SM 2320B
WYO-3	Bromide	0.214	0.066	0.200	NE			089451-016	SW846 9056
02-Aug-10	Chloride	17.2	0.066	0.200	NE			089451-016	SW846 9056
	Fluoride	0.521	0.033	0.100	4.0			089451-016	SW846 9056
	Sulfate	79.0	1.00	4.00	NE			089451-016	SW846 9056
	Alkalinity, Total	161	0.725	1.00	NE	B		089451-016	SM 2320B
WYO-4	Bromide	1.31	0.066	0.200	NE			089471-016	SW846 9056
16-Aug-10	Chloride	107	0.660	2.00	NE			089471-016	SW846 9056
	Fluoride	0.412	0.033	0.100	4.0			089471-016	SW846 9056
	Sulfate	49.5	1.00	4.00	NE			089471-016	SW846 9056
	Alkalinity, Total	99.5	0.725	1.00	NE	B		089471-016	SM 2320B

Refer to footnotes on page 6A-49.

Table 6A-5
Summary of Perchlorate Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

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-03 26-Feb-10	Perchlorate	ND	4.0	12	NE	U		088220-020	EPA 314.0
TA1-W-06 11-Jan-10	Perchlorate	ND	4.0	12	NE	U		088014-020	EPA 314.0
TA1-W-08 12-Jan-10	Perchlorate	ND	4.0	12	NE	U		088015-020	EPA 314.0
TA2-W-01 13-Jan-10	Perchlorate	ND	4.0	12	NE	U		088016-020	EPA 314.0
TA2-W-27 14-Jan-10	Perchlorate	ND	4.0	12	NE	U		088020-020	EPA 314.0
TA2-W-27 (Duplicate) 14-Jan-10	Perchlorate	ND	4.0	12	NE	U		088021-020	EPA 314.0
TA1-W-03 03-May-10	Perchlorate	ND	4.0	12	NE	U		088976-020	EPA 314.0
TA1-W-06 04-May-10	Perchlorate	ND	4.0	12	NE	U		088977-020	EPA 314.0
TA1-W-08 05-May-10	Perchlorate	ND	4.0	12	NE	U		088979-020	EPA 314.0
TA1-W-08 (Duplicate) 05-May-10	Perchlorate	ND	4.0	12	NE	U		088980-020	EPA 314.0
TA2-W-01 06-May-10	Perchlorate	ND	4.0	12	NE	U		088981-020	EPA 314.0
TA2-W-27 11-May-10	Perchlorate	ND	4.0	12	NE	U		088982-020	EPA 314.0
TA1-W-03 22-Jul-10	Perchlorate	ND	4.0	12	NE	U		089435-020	EPA 314.0
TA1-W-03 (Duplicate) 22-Jul-10	Perchlorate	ND	4.0	12	NE	U		089436-020	EPA 314.0
TA1-W-03 08-Nov-10	Perchlorate	ND	4.0	12	NE	U		089837-020	EPA 314.0

Refer to footnotes on page 6A-49.

Table 6A-6
Summary of Total Metal Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.0103	0.010	0.030	NE	J		089426-010	SW846 6020
16-Jul-10	Antimony	ND	0.0005	0.003	0.006	U		089426-010	SW846 6020
	Arsenic	0.00218	0.0015	0.005	0.010	J		089426-010	SW846 6020
	Barium	0.0602	0.0005	0.002	2.00			089426-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089426-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089426-010	SW846 6020
	Calcium	64.1	0.200	2.00	NE	B		089426-010	SW846 6020
	Chromium	0.00501	0.0025	0.010	0.100	J		089426-010	SW846 6020
	Cobalt	0.000189	0.0001	0.001	NE	J		089426-010	SW846 6020
	Copper	0.00136	0.0003	0.001	NE			089426-010	SW846 6020
	Iron	0.172	0.010	0.100	NE			089426-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089426-010	SW846 6020
	Magnesium	11.7	0.005	0.015	NE			089426-010	SW846 6020
	Manganese	0.00318	0.001	0.005	NE	J		089426-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	089426-010	SW846 7470
	Nickel	0.00857	0.0005	0.002	NE			089426-010	SW846 6020
	Potassium	2.60	0.080	0.300	NE			089426-010	SW846 6020
	Selenium	0.00225	0.001	0.005	0.050	B, J	0.0062U	089426-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089426-010	SW846 6020
	Sodium	30.9	0.080	0.250	NE			089426-010	SW846 6020
	Thallium	0.000395	0.0003	0.001	0.002	J	0.0018U	089426-010	SW846 6020
	Uranium	0.00111	0.00005	0.0002	0.030			089426-010	SW846 6020
	Vanadium	0.00674	0.003	0.010	NE	J		089426-010	SW846 6020
	Zinc	0.00481	0.0026	0.010	NE	J		089426-010	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-6 *(Continued)*
Summary of Total Metal Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-01	Aluminum	ND	0.010	0.030	NE	U		089429-010	SW846 6020
06-Aug-10	Antimony	ND	0.0005	0.003	0.006	U		089429-010	SW846 6020
	Arsenic	0.00241	0.0015	0.005	0.010	B, J	0.012U	089429-010	SW846 6020
	Barium	0.0488	0.0005	0.002	2.00			089429-010	SW846 6020
	Beryllium	0.000104	0.0001	0.0005	0.004	B, J	0.00093U	089429-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089429-010	SW846 6020
	Calcium	69.9	0.100	1.00	NE	B		089429-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089429-010	SW846 6020
	Cobalt	0.000146	0.0001	0.001	NE	B, J	0.00072U	089429-010	SW846 6020
	Copper	0.000636	0.0003	0.001	NE	J		089429-010	SW846 6020
	Iron	0.149	0.010	0.100	NE	B	J	089429-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089429-010	SW846 6020
	Magnesium	14.2	0.005	0.015	NE			089429-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089429-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089429-010	SW846 7470
	Nickel	0.0013	0.0005	0.002	NE	J		089429-010	SW846 6020
	Potassium	2.08	0.080	0.300	NE			089429-010	SW846 6020
	Selenium	0.00134	0.001	0.005	0.050	J		089429-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089429-010	SW846 6020
	Sodium	26.9	0.080	0.250	NE			089429-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089429-010	SW846 6020
	Uranium	0.0034	0.00005	0.0002	0.030			089429-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089429-010	SW846 6020
	Zinc	0.00317	0.0026	0.010	NE	J		089429-010	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-6 *(Continued)*
Summary of Total Metal Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	ND	0.010	0.030	NE	U		089431-010	SW846 6020
21-Jul-10	Antimony	ND	0.0005	0.003	0.006	U		089431-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089431-010	SW846 6020
	Barium	0.0478	0.0005	0.002	2.00			089431-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089431-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089431-010	SW846 6020
	Calcium	77.3	0.200	2.00	NE	B		089431-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089431-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		089431-010	SW846 6020
	Copper	0.000576	0.0003	0.001	NE	J		089431-010	SW846 6020
	Iron	0.119	0.010	0.100	NE			089431-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089431-010	SW846 6020
	Magnesium	13.6	0.005	0.015	NE			089431-010	SW846 6020
	Manganese	0.00116	0.001	0.005	NE	J		089431-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	089431-010	SW846 7470
	Nickel	0.00105	0.0005	0.002	NE	J		089431-010	SW846 6020
	Potassium	2.28	0.080	0.300	NE			089431-010	SW846 6020
	Selenium	0.00136	0.001	0.005	0.050	B, J	0.0062U	089431-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089431-010	SW846 6020
	Sodium	24.4	0.080	0.250	NE			089431-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089431-010	SW846 6020
	Uranium	0.00337	0.00005	0.0002	0.030			089431-010	SW846 6020
	Vanadium	0.00336	0.003	0.010	NE	J		089431-010	SW846 6020
	Zinc	0.00377	0.0026	0.010	NE	J		089431-010	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-6 *(Continued)*
Summary of Total Metal Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.0175	0.010	0.030	NE	J		089435-010	SW846 6020
22-Jul-10	Antimony	ND	0.0005	0.003	0.006	U		089435-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089435-010	SW846 6020
	Barium	0.027	0.0005	0.002	2.00			089435-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089435-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089435-010	SW846 6020
	Calcium	306	0.200	2.00	NE	B		089435-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089435-010	SW846 6020
	Cobalt	0.000175	0.0001	0.001	NE	J		089435-010	SW846 6020
	Copper	0.00164	0.0003	0.001	NE		0.011U	089435-010	SW846 6020
	Iron	0.458	0.010	0.100	NE			089435-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089435-010	SW846 6020
	Magnesium	33.4	0.005	0.015	NE			089435-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089435-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	089435-010	SW846 7470
	Nickel	0.00298	0.0005	0.002	NE		0.0069U	089435-010	SW846 6020
	Potassium	2.74	0.080	0.300	NE			089435-010	SW846 6020
	Selenium	0.0304	0.001	0.005	0.050	B		089435-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089435-010	SW846 6020
	Sodium	50.0	0.080	0.250	NE			089435-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089435-010	SW846 6020
	Uranium	0.00122	0.00005	0.0002	0.030			089435-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089435-010	SW846 6020
	Zinc	0.00372	0.0026	0.010	NE	J	0.016U	089435-010	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-6 *(Continued)*
Summary of Total Metal Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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) 22-Jul-10	Aluminum	ND	0.010	0.030	NE	U		089436-010	SW846 6020
	Antimony	ND	0.0005	0.003	0.006	U		089436-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089436-010	SW846 6020
	Barium	0.0267	0.0005	0.002	2.00			089436-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089436-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089436-010	SW846 6020
	Calcium	281	0.200	2.00	NE	B		089436-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089436-010	SW846 6020
	Cobalt	0.000154	0.0001	0.001	NE	J		089436-010	SW846 6020
	Copper	0.00148	0.0003	0.001	NE		0.011U	089436-010	SW846 6020
	Iron	0.455	0.010	0.100	NE			089436-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089436-010	SW846 6020
	Magnesium	34.4	0.005	0.015	NE			089436-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089436-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	089436-010	SW846 7470
	Nickel	0.00293	0.0005	0.002	NE		0.0069U	089436-010	SW846 6020
	Potassium	2.82	0.080	0.300	NE			089436-010	SW846 6020
	Selenium	0.0302	0.001	0.005	0.050	B		089436-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089436-010	SW846 6020
	Sodium	49.0	0.080	0.250	NE			089436-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089436-010	SW846 6020
	Uranium	0.00123	0.00005	0.0002	0.030			089436-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089436-010	SW846 6020
	Zinc	0.00312	0.0026	0.010	NE	J	0.016U	089436-010	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-6 *(Continued)*
Summary of Total Metal Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.010	0.030	NE	U		089438-010	SW846 6020
23-Jul-10	Antimony	ND	0.0005	0.003	0.006	U		089438-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089438-010	SW846 6020
	Barium	0.0505	0.0005	0.002	2.00			089438-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089438-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089438-010	SW846 6020
	Calcium	65.2	0.100	1.00	NE	B		089438-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089438-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		089438-010	SW846 6020
	Copper	0.000737	0.0003	0.001	NE	J		089438-010	SW846 6020
	Iron	0.243	0.010	0.100	NE			089438-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089438-010	SW846 6020
	Magnesium	10.6	0.005	0.015	NE			089438-010	SW846 6020
	Manganese	0.00104	0.001	0.005	NE	J		089438-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089438-010	SW846 7470
	Nickel	0.00116	0.0005	0.002	NE	J		089438-010	SW846 6020
	Potassium	2.01	0.080	0.300	NE			089438-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U	UJ	089438-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089438-010	SW846 6020
	Sodium	22.2	0.080	0.250	NE			089438-010	SW846 6020
	Thallium	0.000512	0.0003	0.001	0.002	J	0.0034U	089438-010	SW846 6020
	Uranium	0.00322	0.00005	0.0002	0.030			089438-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089438-010	SW846 6020
	Zinc	0.00323	0.0026	0.010	NE	J		089438-010	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-6 *(Continued)*
Summary of Total Metal Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.010	0.030	NE	U		089440-010	SW846 6020
26-Jul-10	Antimony	ND	0.0005	0.003	0.006	U		089440-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089440-010	SW846 6020
	Barium	0.0371	0.0005	0.002	2.00			089440-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089440-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089440-010	SW846 6020
	Calcium	83.9	0.100	1.00	NE	B		089440-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089440-010	SW846 6020
	Cobalt	0.000116	0.0001	0.001	NE	J		089440-010	SW846 6020
	Copper	0.00091	0.0003	0.001	NE	J		089440-010	SW846 6020
	Iron	0.310	0.010	0.100	NE			089440-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089440-010	SW846 6020
	Magnesium	12.1	0.005	0.015	NE			089440-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089440-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089440-010	SW846 7470
	Nickel	0.00142	0.0005	0.002	NE	J		089440-010	SW846 6020
	Potassium	2.25	0.080	0.300	NE			089440-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U	UJ	089440-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089440-010	SW846 6020
	Sodium	29.4	0.080	0.250	NE			089440-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089440-010	SW846 6020
	Uranium	0.00401	0.00005	0.0002	0.030			089440-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089440-010	SW846 6020
	Zinc	0.0057	0.0026	0.010	NE	J		089440-010	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-6 *(Continued)*
Summary of Total Metal Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	ND	0.010	0.030	NE	U		089442-010	SW846 6020
27-Jul-10	Antimony	ND	0.0005	0.003	0.006	U		089442-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089442-010	SW846 6020
	Barium	0.0266	0.0005	0.002	2.00			089442-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089442-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089442-010	SW846 6020
	Calcium	128	0.100	1.00	NE	B		089442-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089442-010	SW846 6020
	Cobalt	0.00019	0.0001	0.001	NE	J	J+	089442-010	SW846 6020
	Copper	0.00133	0.0003	0.001	NE			089442-010	SW846 6020
	Iron	0.470	0.010	0.100	NE			089442-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089442-010	SW846 6020
	Magnesium	16.8	0.005	0.015	NE			089442-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089442-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089442-010	SW846 7470
	Nickel	0.00216	0.0005	0.002	NE		J+	089442-010	SW846 6020
	Potassium	2.24	0.080	0.300	NE			089442-010	SW846 6020
	Selenium	0.00777	0.001	0.005	0.050		J-	089442-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089442-010	SW846 6020
	Sodium	32.3	0.080	0.250	NE			089442-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089442-010	SW846 6020
	Uranium	0.00137	0.00005	0.0002	0.030			089442-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089442-010	SW846 6020
	Zinc	0.00292	0.0026	0.010	NE	J	J+	089442-010	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-6 *(Continued)*
Summary of Total Metal Results,
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Well ID	Analyte	Result[a] (mg/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	0.010	0.030	NE	U		089444-010	SW846 6020
28-Jul-10	Antimony	ND	0.0005	0.003	0.006	U		089444-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089444-010	SW846 6020
	Barium	0.0196	0.0005	0.002	2.00			089444-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089444-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089444-010	SW846 6020
	Calcium	334	0.200	2.00	NE	B		089444-010	SW846 6020
	Chromium	0.00346	0.0025	0.010	0.100	J		089444-010	SW846 6020
	Cobalt	0.000588	0.0001	0.001	NE	J	J+	089444-010	SW846 6020
	Copper	0.00405	0.0003	0.001	NE			089444-010	SW846 6020
	Iron	1.41	0.010	0.100	NE			089444-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089444-010	SW846 6020
	Magnesium	40.1	0.005	0.015	NE			089444-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089444-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089444-010	SW846 7470
	Nickel	0.00717	0.0005	0.002	NE		J+	089444-010	SW846 6020
	Potassium	2.97	0.080	0.300	NE			089444-010	SW846 6020
	Selenium	0.0275	0.001	0.005	0.050		J-	089444-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089444-010	SW846 6020
	Sodium	83.1	0.800	2.50	NE			089444-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089444-010	SW846 6020
	Uranium	0.00215	0.00005	0.0002	0.030			089444-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089444-010	SW846 6020
	Zinc	0.00533	0.0026	0.010	NE	J	J+	089444-010	SW846 6020

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Table 6A-6 *(Continued)*
Summary of Total Metal Results,
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Well ID	Analyte	Result[a] (mg/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	0.010	0.030	NE	U		089453-010	SW846 6020
03-Aug-10	Antimony	0.000638	0.0005	0.003	0.006	J		089453-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089453-010	SW846 6020
	Barium	0.0424	0.0005	0.002	2.00			089453-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089453-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089453-010	SW846 6020
	Calcium	104	0.200	2.00	NE			089453-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089453-010	SW846 6020
	Cobalt	0.000116	0.0001	0.001	NE	J	J+	089453-010	SW846 6020
	Copper	0.000636	0.0003	0.001	NE	J	J+	089453-010	SW846 6020
	Iron	0.215	0.010	0.100	NE			089453-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089453-010	SW846 6020
	Magnesium	18.9	0.005	0.015	NE			089453-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089453-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089453-010	SW846 7470
	Nickel	0.00296	0.0005	0.002	NE		J+	089453-010	SW846 6020
	Potassium	2.37	0.080	0.300	NE			089453-010	SW846 6020
	Selenium	0.00863	0.001	0.005	0.050			089453-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089453-010	SW846 6020
	Sodium	28.8	0.080	0.250	NE			089453-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089453-010	SW846 6020
	Uranium	0.0022	0.00005	0.0002	0.030			089453-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089453-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		089453-010	SW846 6020

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Table 6A-6 *(Continued)*
Summary of Total Metal Results,
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Well ID	Analyte	Result[a] (mg/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	0.196	0.010	0.030	NE		J	089424-010	SW846 6020
15-Jul-10	Antimony	ND	0.0005	0.003	0.006	U		089424-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089424-010	SW846 6020
	Barium	0.212	0.0005	0.002	2.00			089424-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089424-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089424-010	SW846 6020
	Calcium	64.8	0.400	4.00	NE		J	089424-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089424-010	SW846 6020
	Cobalt	0.000187	0.0001	0.001	NE	J		089424-010	SW846 6020
	Copper	0.000638	0.0003	0.001	NE	J		089424-010	SW846 6020
	Iron	0.294	0.010	0.100	NE			089424-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089424-010	SW846 6020
	Magnesium	11.2	0.005	0.015	NE			089424-010	SW846 6020
	Manganese	0.00731	0.001	0.005	NE			089424-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089424-010	SW846 7470
	Nickel	0.00145	0.0005	0.002	NE	J		089424-010	SW846 6020
	Potassium	1.88	0.080	0.300	NE			089424-010	SW846 6020
	Selenium	0.00326	0.001	0.005	0.050	J		089424-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089424-010	SW846 6020
	Sodium	18.2	0.080	0.250	NE			089424-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089424-010	SW846 6020
	Uranium	0.00138	0.00005	0.0002	0.030			089424-010	SW846 6020
	Vanadium	0.00403	0.003	0.010	NE	J		089424-010	SW846 6020
	Zinc	0.0049	0.0026	0.010	NE	J		089424-010	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-6 *(Continued)*
Summary of Total Metal Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

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Well ID	Analyte	Result[a] (mg/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	0.505	0.010	0.030	NE			089460-010	SW846 6020
09-Aug-10	Antimony	ND	0.0005	0.003	0.006	U		089460-010	SW846 6020
	Arsenic	0.0041	0.0015	0.005	0.010	B, J	0.012U	089460-010	SW846 6020
	Barium	0.123	0.0005	0.002	2.00			089460-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089460-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089460-010	SW846 6020
	Calcium	86.0	0.100	1.00	NE	B		089460-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089460-010	SW846 6020
	Cobalt	0.00025	0.0001	0.001	NE	B, J	0.00072U	089460-010	SW846 6020
	Copper	0.00115	0.0003	0.001	NE			089460-010	SW846 6020
	Iron	0.819	0.010	0.100	NE	B	J	089460-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089460-010	SW846 6020
	Magnesium	12.8	0.005	0.015	NE			089460-010	SW846 6020
	Manganese	0.0127	0.001	0.005	NE			089460-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089460-010	SW846 7470
	Nickel	0.00206	0.0005	0.002	NE			089460-010	SW846 6020
	Potassium	1.89	0.080	0.300	NE			089460-010	SW846 6020
	Selenium	0.00653	0.001	0.005	0.050			089460-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089460-010	SW846 6020
	Sodium	20.3	0.080	0.250	NE			089460-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089460-010	SW846 6020
	Uranium	0.000942	0.00005	0.0002	0.030			089460-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089460-010	SW846 6020
	Zinc	0.00389	0.0026	0.010	NE	J		089460-010	SW846 6020

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Table 6A-6 *(Continued)*
Summary of Total Metal Results,
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Well ID	Analyte	Result[a] (mg/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	0.010	0.030	NE	U		089466-010	SW846 6020
11-Aug-10	Antimony	ND	0.0005	0.003	0.006	U		089466-010	SW846 6020
	Arsenic	0.00369	0.0015	0.005	0.010	B, J	0.012U	089466-010	SW846 6020
	Barium	0.0428	0.0005	0.002	2.00			089466-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089466-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089466-010	SW846 6020
	Calcium	78.2	0.100	1.00	NE	B		089466-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089466-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		089466-010	SW846 6020
	Copper	0.00057	0.0003	0.001	NE	J	0.0057UJ	089466-010	SW846 6020
	Iron	0.162	0.010	0.100	NE	B	J	089466-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089466-010	SW846 6020
	Magnesium	13.8	0.005	0.015	NE			089466-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089466-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089466-010	SW846 7470
	Nickel	0.00143	0.0005	0.002	NE	J		089466-010	SW846 6020
	Potassium	1.56	0.080	0.300	NE			089466-010	SW846 6020
	Selenium	0.00445	0.001	0.005	0.050	J		089466-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089466-010	SW846 6020
	Sodium	21.0	0.080	0.250	NE			089466-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089466-010	SW846 6020
	Uranium	0.00101	0.00005	0.0002	0.030			089466-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089466-010	SW846 6020
	Zinc	0.00508	0.0026	0.010	NE	J	0.016U	089466-010	SW846 6020

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Table 6A-6 *(Continued)*
Summary of Total Metal Results,
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Well ID	Analyte	Result[a] (mg/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 (Duplicate) 11-Aug-10	Aluminum	ND	0.010	0.030	NE	U		089467-010	SW846 6020
	Antimony	ND	0.0005	0.003	0.006	U		089467-010	SW846 6020
	Arsenic	0.0042	0.0015	0.005	0.010	B, J	0.012U	089467-010	SW846 6020
	Barium	0.0438	0.0005	0.002	2.00			089467-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089467-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089467-010	SW846 6020
	Calcium	78.5	0.100	1.00	NE	B		089467-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089467-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		089467-010	SW846 6020
	Copper	0.000528	0.0003	0.001	NE	J	0.0057UJ	089467-010	SW846 6020
	Iron	0.152	0.010	0.100	NE	B	J	089467-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089467-010	SW846 6020
	Magnesium	13.0	0.005	0.015	NE			089467-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089467-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089467-010	SW846 7470
	Nickel	0.00139	0.0005	0.002	NE	J		089467-010	SW846 6020
	Potassium	1.62	0.080	0.300	NE			089467-010	SW846 6020
	Selenium	0.00413	0.001	0.005	0.050	J		089467-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089467-010	SW846 6020
	Sodium	20.5	0.080	0.250	NE			089467-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089467-010	SW846 6020
	Uranium	0.00105	0.00005	0.0002	0.030			089467-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089467-010	SW846 6020
	Zinc	0.00372	0.0026	0.010	NE	J	0.016U	089467-010	SW846 6020

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Table 6A-6 *(Continued)*
Summary of Total Metal Results,
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Well ID	Analyte	Result[a] (mg/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	0.0109	0.010	0.030	NE	J		089462-010	SW846 6020
10-Aug-10	Antimony	ND	0.0005	0.003	0.006	U		089462-010	SW846 6020
	Arsenic	0.00345	0.0015	0.005	0.010	B, J	0.012U	089462-010	SW846 6020
	Barium	0.0653	0.0005	0.002	2.00			089462-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089462-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U	UJ	089462-010	SW846 6020
	Calcium	198	0.100	1.00	NE	B		089462-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089462-010	SW846 6020
	Cobalt	0.00021	0.0001	0.001	NE	B, J	0.00072U	089462-010	SW846 6020
	Copper	0.00241	0.0003	0.001	NE		J+	089462-010	SW846 6020
	Iron	0.394	0.010	0.100	NE	B	J	089462-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089462-010	SW846 6020
	Magnesium	28.2	0.005	0.015	NE			089462-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089462-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089462-010	SW846 7470
	Nickel	0.00299	0.0005	0.002	NE		J+	089462-010	SW846 6020
	Potassium	2.30	0.080	0.300	NE			089462-010	SW846 6020
	Selenium	0.0156	0.001	0.005	0.050			089462-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089462-010	SW846 6020
	Sodium	34.1	0.080	0.250	NE			089462-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089462-010	SW846 6020
	Uranium	0.0011	0.00005	0.0002	0.030			089462-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089462-010	SW846 6020
	Zinc	0.00301	0.0026	0.010	NE	J	J+	089462-010	SW846 6020

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Table 6A-6 *(Continued)*
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Well ID	Analyte	Result[a] (mg/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	ND	0.010	0.030	NE	U		089456-010	SW846 6020
04-Aug-10	Antimony	ND	0.0005	0.003	0.006	U		089456-010	SW846 6020
	Arsenic	0.00151	0.0015	0.005	0.010	J		089456-010	SW846 6020
	Barium	0.0579	0.0005	0.002	2.00			089456-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089456-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089456-010	SW846 6020
	Calcium	119	0.200	2.00	NE			089456-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089456-010	SW846 6020
	Cobalt	0.00013	0.0001	0.001	NE	J	J+	089456-010	SW846 6020
	Copper	0.000847	0.0003	0.001	NE	J	J+	089456-010	SW846 6020
	Iron	0.256	0.010	0.100	NE			089456-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089456-010	SW846 6020
	Magnesium	19.4	0.005	0.015	NE			089456-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089456-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089456-010	SW846 7470
	Nickel	0.00349	0.0005	0.002	NE		J+	089456-010	SW846 6020
	Potassium	2.07	0.080	0.300	NE			089456-010	SW846 6020
	Selenium	0.010	0.001	0.005	0.050			089456-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089456-010	SW846 6020
	Sodium	29.2	0.080	0.250	NE			089456-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089456-010	SW846 6020
	Uranium	0.00113	0.00005	0.0002	0.030			089456-010	SW846 6020
	Vanadium	0.00306	0.003	0.010	NE	J		089456-010	SW846 6020
	Zinc	0.00292	0.0026	0.010	NE	J	J+	089456-010	SW846 6020

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Table 6A-6 *(Continued)*
Summary of Total Metal Results,
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Well ID	Analyte	Result[a] (mg/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	0.010	0.030	NE	U		089469-010	SW846 6020
12-Aug-10	Antimony	ND	0.0005	0.003	0.006	U		089469-010	SW846 6020
	Arsenic	0.00375	0.0015	0.005	0.010	B, J	0.012U	089469-010	SW846 6020
	Barium	0.0415	0.0005	0.002	2.00			089469-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089469-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089469-010	SW846 6020
	Calcium	145	0.100	1.00	NE	B		089469-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089469-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		089469-010	SW846 6020
	Copper	0.000524	0.0003	0.001	NE	J		089469-010	SW846 6020
	Iron	0.153	0.010	0.100	NE	B	J	089469-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089469-010	SW846 6020
	Magnesium	13.3	0.005	0.015	NE			089469-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089469-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089469-010	SW846 7470
	Nickel	0.00133	0.0005	0.002	NE	J		089469-010	SW846 6020
	Potassium	1.70	0.080	0.300	NE			089469-010	SW846 6020
	Selenium	0.00383	0.001	0.005	0.050	J		089469-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089469-010	SW846 6020
	Sodium	21.0	0.080	0.250	NE			089469-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089469-010	SW846 6020
	Uranium	0.00125	0.00005	0.0002	0.030			089469-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089469-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		089469-010	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-6 *(Continued)*
Summary of Total Metal Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.010	0.030	NE	U		089448-010	SW846 6020
29-Jul-10	Antimony	ND	0.0005	0.003	0.006	U		089448-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089448-010	SW846 6020
	Barium	0.0441	0.0005	0.002	2.00			089448-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089448-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089448-010	SW846 6020
	Calcium	73.3	0.100	1.00	NE	B		089448-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089448-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		089448-010	SW846 6020
	Copper	0.00152	0.0003	0.001	NE		0.0067UJ	089448-010	SW846 6020
	Iron	0.248	0.010	0.100	NE			089448-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089448-010	SW846 6020
	Magnesium	12.4	0.025	0.075	NE			089448-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089448-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089448-010	SW846 7470
	Nickel	0.00133	0.0005	0.002	NE	J		089448-010	SW846 6020
	Potassium	1.84	0.080	0.300	NE			089448-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U	UJ	089448-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089448-010	SW846 6020
	Sodium	24.6	0.400	1.25	NE			089448-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089448-010	SW846 6020
	Uranium	0.00288	0.00005	0.0002	0.030			089448-010	SW846 6020
	Vanadium	0.00304	0.003	0.010	NE	J		089448-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		089448-010	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-6 *(Continued)*
Summary of Total Metal Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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 (Duplicate) 23-Jul-10	Aluminum	ND	0.010	0.030	NE	U		089449-010	SW846 6020
	Antimony	ND	0.0005	0.003	0.006	U		089449-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089449-010	SW846 6020
	Barium	0.0387	0.0005	0.002	2.00			089449-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089449-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089449-010	SW846 6020
	Calcium	68.5	0.100	1.00	NE	B		089449-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089449-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		089449-010	SW846 6020
	Copper	0.000861	0.0003	0.001	NE	J	0.0067UJ	089449-010	SW846 6020
	Iron	0.241	0.010	0.100	NE			089449-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089449-010	SW846 6020
	Magnesium	11.3	0.025	0.075	NE			089449-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089449-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089449-010	SW846 7470
	Nickel	0.00129	0.0005	0.002	NE	J		089449-010	SW846 6020
	Potassium	1.72	0.080	0.300	NE			089449-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U	UJ	089449-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089449-010	SW846 6020
	Sodium	23.8	0.400	1.25	NE			089449-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089449-010	SW846 6020
	Uranium	0.0028	0.00005	0.0002	0.030			089449-010	SW846 6020
	Vanadium	0.00328	0.003	0.010	NE	J		089449-010	SW846 6020
	Zinc	0.00295	0.0026	0.010	NE	J		089449-010	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-6 *(Continued)*
Summary of Total Metal Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.010	0.030	NE	U		089473-010	SW846 6020
17-Aug-10	Antimony	ND	0.0005	0.003	0.006	U		089473-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089473-010	SW846 6020
	Barium	0.187	0.0025	0.010	2.00			089473-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089473-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089473-010	SW846 6020
	Calcium	70.1	0.200	2.00	NE	B		089473-010	SW846 6020
	Chromium	0.00302	0.0025	0.010	0.100	J		089473-010	SW846 6020
	Cobalt	0.000149	0.0001	0.001	NE	J	0.00062U	089473-010	SW846 6020
	Copper	0.000874	0.0003	0.001	NE	J		089473-010	SW846 6020
	Iron	0.200	0.010	0.100	NE			089473-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089473-010	SW846 6020
	Magnesium	14.2	0.005	0.015	NE			089473-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089473-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089473-010	SW846 7470
	Nickel	0.00216	0.0005	0.002	NE			089473-010	SW846 6020
	Potassium	3.34	0.080	0.300	NE			089473-010	SW846 6020
	Selenium	0.00342	0.001	0.005	0.050	J		089473-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089473-010	SW846 6020
	Sodium	25.9	0.080	0.250	NE			089473-010	SW846 6020
	Thallium	0.00055	0.0003	0.001	0.002	J	0.0039U	089473-010	SW846 6020
	Uranium	0.00298	0.00005	0.0002	0.030			089473-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089473-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		089473-010	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-6 *(Continued)*
Summary of Total Metal Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.0284	0.010	0.030	NE	J		089458-010	SW846 6020
05-Aug-10	Antimony	ND	0.0005	0.003	0.006	U		089458-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089458-010	SW846 6020
	Barium	0.0634	0.0005	0.002	2.00			089458-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089458-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089458-010	SW846 6020
	Calcium	64.8	0.100	1.00	NE			089458-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089458-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		089458-010	SW846 6020
	Copper	0.000555	0.0003	0.001	NE	J		089458-010	SW846 6020
	Iron	0.165	0.010	0.100	NE			089458-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089458-010	SW846 6020
	Magnesium	13.6	0.005	0.015	NE			089458-010	SW846 6020
	Manganese	0.00108	0.001	0.005	NE	J		089458-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089458-010	SW846 7470
	Nickel	0.00191	0.0005	0.002	NE	J		089458-010	SW846 6020
	Potassium	2.33	0.080	0.300	NE			089458-010	SW846 6020
	Selenium	0.00106	0.001	0.005	0.050	J		089458-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089458-010	SW846 6020
	Sodium	23.0	0.080	0.250	NE			089458-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089458-010	SW846 6020
	Uranium	0.00305	0.00005	0.0002	0.030			089458-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089458-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		089458-010	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-6 *(Continued)*
Summary of Total Metal Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.115	0.010	0.030	NE			089475-010	SW846 6020
18-Aug-10	Antimony	ND	0.0005	0.003	0.006	U		089475-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089475-010	SW846 6020
	Barium	0.232	0.0025	0.010	2.00			089475-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089475-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089475-010	SW846 6020
	Calcium	73.4	0.200	2.00	NE	B		089475-010	SW846 6020
	Chromium	0.00306	0.0025	0.010	0.100	J		089475-010	SW846 6020
	Cobalt	0.000686	0.0001	0.001	NE	J		089475-010	SW846 6020
	Copper	0.000593	0.0003	0.001	NE	J		089475-010	SW846 6020
	Iron	0.267	0.010	0.100	NE			089475-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089475-010	SW846 6020
	Magnesium	13.1	0.005	0.015	NE			089475-010	SW846 6020
	Manganese	0.00198	0.001	0.005	NE	J		089475-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089475-010	SW846 7470
	Nickel	0.00217	0.0005	0.002	NE			089475-010	SW846 6020
	Potassium	2.16	0.080	0.300	NE			089475-010	SW846 6020
	Selenium	0.00555	0.001	0.005	0.050			089475-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089475-010	SW846 6020
	Sodium	19.5	0.080	0.250	NE			089475-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089475-010	SW846 6020
	Uranium	0.00176	0.00005	0.0002	0.030			089475-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089475-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		089475-010	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-6 *(Continued)*
Summary of Total Metal Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
WYO-3	Aluminum	0.0232	0.010	0.030	NE	J		089451-010	SW846 6020
02-Aug-10	Antimony	ND	0.0005	0.003	0.006	U		089451-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089451-010	SW846 6020
	Barium	0.0476	0.0005	0.002	2.00			089451-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089451-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089451-010	SW846 6020
	Calcium	64.9	0.100	1.00	NE			089451-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089451-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		089451-010	SW846 6020
	Copper	0.000766	0.0003	0.001	NE	J		089451-010	SW846 6020
	Iron	0.160	0.010	0.100	NE			089451-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089451-010	SW846 6020
	Magnesium	14.5	0.005	0.015	NE			089451-010	SW846 6020
	Manganese	0.00147	0.001	0.005	NE	J		089451-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089451-010	SW846 7470
	Nickel	0.00203	0.0005	0.002	NE			089451-010	SW846 6020
	Potassium	2.46	0.080	0.300	NE			089451-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		089451-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089451-010	SW846 6020
	Sodium	24.2	0.080	0.250	NE			089451-010	SW846 6020
	Thallium	0.000316	0.0003	0.001	0.002	J	0.002U	089451-010	SW846 6020
	Uranium	0.00361	0.00005	0.0002	0.030			089451-010	SW846 6020
	Vanadium	0.00401	0.003	0.010	NE	J		089451-010	SW846 6020
	Zinc	0.00437	0.0026	0.010	NE	J		089451-010	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-6 *(Concluded)*
Summary of Total Metal Results,
Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
WYO-4	Aluminum	0.0129	0.010	0.030	NE	J		089471-010	SW846 6020
16-Aug-10	Antimony	ND	0.0005	0.003	0.006	U		089471-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089471-010	SW846 6020
	Barium	0.182	0.0025	0.010	2.00			089471-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089471-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089471-010	SW846 6020
	Calcium	90.2	0.200	2.00	NE	B		089471-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089471-010	SW846 6020
	Cobalt	0.00019	0.0001	0.001	NE	J	0.00062U	089471-010	SW846 6020
	Copper	0.00195	0.0003	0.001	NE			089471-010	SW846 6020
	Iron	0.251	0.010	0.100	NE			089471-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089471-010	SW846 6020
	Magnesium	15.7	0.005	0.015	NE			089471-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089471-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089471-010	SW846 7470
	Nickel	0.00291	0.0005	0.002	NE			089471-010	SW846 6020
	Potassium	2.19	0.080	0.300	NE			089471-010	SW846 6020
	Selenium	0.00637	0.001	0.005	0.050			089471-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089471-010	SW846 6020
	Sodium	22.2	0.080	0.250	NE			089471-010	SW846 6020
	Thallium	0.000669	0.0003	0.001	0.002	J	0.0039U	089471-010	SW846 6020
	Uranium	0.0013	0.00005	0.0002	0.030			089471-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089471-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		089471-010	SW846 6020

Refer to footnotes on page 6A-49.

Table 6A-7
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

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	-0.283 ± 12.2	20.2	10.1	NE	U	BD	089426-033	EPA 901.1
16-Jul-10	Cesium-137	1.86 ± 2.31	4.07	2.04	NE	U	BD	089426-033	EPA 901.1
	Cobalt-60	-0.854 ± 2.25	3.70	1.85	NE	U	BD	089426-033	EPA 901.1
	Potassium-40	28.8 ± 41.4	59.0	29.5	NE	U	BD	089426-033	EPA 901.1
	Gross Alpha	1.33	NA	NA	15	NA	None	089426-034	EPA 900.0
	Gross Beta	2.91 ± 0.885	1.10	0.530	4mrem/yr		J	089426-034	EPA 900.0
	Tritium	61.4 ± 92.6	156	75.3	NE	U	BD	089426-036	EPA 906.0 M
TA1-W-01	Americium-241	-2.35 ± 5.00	8.30	4.15	NE	U	BD	089429-033	EPA 901.1
06-Aug-10	Cesium-137	0.892 ± 1.57	2.76	1.38	NE	U	BD	089429-033	EPA 901.1
	Cobalt-60	-0.262 ± 1.61	2.71	1.36	NE	U	BD	089429-033	EPA 901.1
	Potassium-40	-28.2 ± 36.1	40.9	20.5	NE	U	BD	089429-033	EPA 901.1
	Gross Alpha	1.90	NA	NA	15	NA	None	089429-034	EPA 900.0
	Gross Beta	1.99 ± 1.07	1.61	0.775	4mrem/yr		J	089429-034	EPA 900.0
	Tritium	-18.6 ± 63.7	119	54.9	NE	U	BD	089429-036	EPA 906.0 M
TA1-W-02	Americium-241	-0.735 ± 12.2	20.9	10.4	NE	U	BD	089431-033	EPA 901.1
21-Jul-10	Cesium-137	0.221 ± 3.66	4.48	2.24	NE	U	BD	089431-033	EPA 901.1
	Cobalt-60	-1.75 ± 2.07	3.23	1.61	NE	U	BD	089431-033	EPA 901.1
	Potassium-40	-34.4 ± 46.9	46.6	23.3	NE	U	BD	089431-033	EPA 901.1
	Gross Alpha	2.06	NA	NA	15	NA	None	089431-034	EPA 900.0
	Gross Beta	4.09 ± 1.03	1.06	0.508	4mrem/yr			089431-034	EPA 900.0
	Tritium	81.4 ± 94.2	156	75.6	NE	U	BD	089431-036	EPA 906.0 M
TA1-W-03	Americium-241	-0.797 ± 5.08	8.59	4.30	NE	U	BD	089435-033	EPA 901.1
22-Jul-10	Cesium-137	0.530 ± 1.72	2.95	1.48	NE	U	BD	089435-033	EPA 901.1
	Cobalt-60	-1.23 ± 1.98	3.16	1.58	NE	U	BD	089435-033	EPA 901.1
	Potassium-40	6.21 ± 41.3	45.0	22.5	NE	U	BD	089435-033	EPA 901.1
	Gross Alpha	0.27	NA	NA	15	NA	None	089435-034	EPA 900.0
	Gross Beta	0.824 ± 2.26	3.85	1.87	4mrem/yr	U	BD	089435-034	EPA 900.0
	Tritium	53.2 ± 91.8	155	75.0	NE	U	BD	089435-036	EPA 906.0 M
TA1-W-03 (Duplicate)	Americium-241	-1.89 ± 12.6	18.6	9.31	NE	U	BD	089436-033	EPA 901.1
22-Jul-10	Cesium-137	-0.0267 ± 1.88	3.16	1.58	NE	U	BD	089436-033	EPA 901.1
	Cobalt-60	-0.396 ± 2.10	3.46	1.73	NE	U	BD	089436-033	EPA 901.1
	Potassium-40	-0.752 ± 40.2	45.6	22.8	NE	U	BD	089436-033	EPA 901.1
	Gross Alpha	-1.01	NA	NA	15	NA	None	089436-034	EPA 900.0
	Gross Beta	7.35 ± 2.47	3.25	1.56	4mrem/yr		J	089436-034	EPA 900.0
	Tritium	27.7 ± 90.9	156	75.3	NE	U	BD	089436-036	EPA 906.0 M

Refer to footnotes on page 6A-49.

Table 6A-7 *(Continued)*
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

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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-04	Americium-241	-0.726 ± 13.1	22.9	11.5	NE	U	BD	089438-033	EPA 901.1
23-Jul-10	Cesium-137	-0.392 ± 2.80	4.70	2.35	NE	U	BD	089438-033	EPA 901.1
	Cobalt-60	-0.379 ± 2.81	4.61	2.31	NE	U	BD	089438-033	EPA 901.1
	Potassium-40	31.7 ± 52.0	71.7	35.9	NE	U	BD	089438-033	EPA 901.1
	Gross Alpha	0.86	NA	NA	15	NA	None	089438-034	EPA 900.0
	Gross Beta	2.11 ± 0.957	1.40	0.672	4mrem/yr		J	089438-034	EPA 900.0
	Tritium	20.4 ± 111	191	92.3	NE	U	BD	089438-036	EPA 906.0 M
TA1-W-05	Americium-241	3.74 ± 14.3	22.0	11.0	NE	U	BD	089440-033	EPA 901.1
26-Jul-10	Cesium-137	-1.82 ± 1.84	2.96	1.48	NE	U	BD	089440-033	EPA 901.1
	Cobalt-60	0.365 ± 2.09	3.58	1.79	NE	U	BD	089440-033	EPA 901.1
	Potassium-40	-2.90 ± 40.4	49.2	24.6	NE	U	BD	089440-033	EPA 901.1
	Gross Alpha	4.27	NA	NA	15	NA	None	089440-034	EPA 900.0
	Gross Beta	11.5 ± 2.38	1.94	0.940	4mrem/yr			089440-034	EPA 900.0
	Tritium	5.16 ± 111	193	93.3	NE	U	BD	089440-036	EPA 906.0 M
TA1-W-06	Americium-241	-2.80 ± 6.51	9.56	4.78	NE	U	BD	089442-033	EPA 901.1
27-Jul-10	Cesium-137	-2.61 ± 2.77	2.75	1.38	NE	U	BD	089442-033	EPA 901.1
	Cobalt-60	0.431 ± 1.69	2.84	1.42	NE	U	BD	089442-033	EPA 901.1
	Potassium-40	6.57 ± 31.4	40.1	20.1	NE	U	BD	089442-033	EPA 901.1
	Gross Alpha	-0.56	NA	NA	15	NA	None	089442-034	EPA 900.0
	Gross Beta	0.0388 ± 1.44	2.48	1.20	4mrem/yr	U	BD	089442-034	EPA 900.0
	Tritium	63.2 ± 112	189	91.5	NE	U	BD	089442-036	EPA 906.0 M
TA1-W-08	Americium-241	-2.04 ± 8.57	12.9	6.44	NE	U	BD	089444-033	EPA 901.1
28-Jul-10	Cesium-137	0.659 ± 1.86	3.19	1.60	NE	U	BD	089444-033	EPA 901.1
	Cobalt-60	0.940 ± 1.82	3.16	1.58	NE	U	BD	089444-033	EPA 901.1
	Potassium-40	-12.4 ± 41.9	44.2	22.1	NE	U	BD	089444-033	EPA 901.1
	Gross Alpha	-5.82	NA	NA	15	NA	None	089444-034	EPA 900.0
	Gross Beta	1.16 ± 3.06	5.20	2.52	4mrem/yr	U	BD	089444-034	EPA 900.0
	Tritium	2.55 ± 110	191	92.2	NE	U	BD	089444-036	EPA 906.0 M
TA2-NW1-595	Americium-241	-3.06 ± 5.19	8.58	4.29	NE	U	BD	089453-033	EPA 901.1
03-Aug-10	Cesium-137	-0.152 ± 1.50	2.55	1.28	NE	U	BD	089453-033	EPA 901.1
	Cobalt-60	-0.686 ± 1.61	2.66	1.33	NE	U	BD	089453-033	EPA 901.1
	Potassium-40	-8.24 ± 30.5	38.5	19.3	NE	U	BD	089453-033	EPA 901.1
	Gross Alpha	0.62	NA	NA	15	NA	None	089453-034	EPA 900.0
	Gross Beta	4.26 ± 1.68	2.41	1.17	4mrem/yr		J	089453-034	EPA 900.0
	Tritium	-19.3 ± 66.0	123	56.8	NE	U	BD	089453-036	EPA 906.0 M

Refer to footnotes on page 6A-49.

Table 6A-7 *(Continued)*
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

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-SW1-320	Americium-241	-0.797 ± 7.28	11.6	5.78	NE	U	BD	089424-033	EPA 901.1
15-Jul-10	Cesium-137	1.95 ± 1.67	2.91	1.46	NE	U	BD	089424-033	EPA 901.1
	Cobalt-60	0.0393 ± 1.65	2.73	1.36	NE	U	BD	089424-033	EPA 901.1
	Potassium-40	-32.5 ± 37.8	39.4	19.7	NE	U	BD	089424-033	EPA 901.1
	Gross Alpha	1.64	NA	NA	15	NA	None	089424-034	EPA 900.0
	Gross Beta	4.21 ± 1.03	0.982	0.466	4mrem/yr			089424-034	EPA 900.0
	Tritium	37.5 ± 91.1	155	75.1	NE	U	BD	089424-036	EPA 906.0 M
TA2-W-01	Americium-241	-20.7 ± 7.95	12.5	6.28	NE	U	BD	089460-033	EPA 901.1
09-Aug-10	Cesium-137	-0.578 ± 1.80	2.97	1.48	NE	U	BD	089460-033	EPA 901.1
	Cobalt-60	1.09 ± 1.95	3.40	1.70	NE	U	BD	089460-033	EPA 901.1
	Potassium-40	-9.92 ± 32.7	41.7	20.9	NE	U	BD	089460-033	EPA 901.1
	Gross Alpha	1.29	NA	NA	15	NA	None	089460-034	EPA 900.0
	Gross Beta	0.779 ± 0.839	1.38	0.658	4mrem/yr	U	BD	089460-034	EPA 900.0
	Tritium	6.29 ± 67.0	121	55.7	NE	U	BD	089460-036	EPA 906.0 M
TA2-W-19	Americium-241	-16.5 ± 11.9	18.9	9.46	NE	U	BD	089466-033	EPA 901.1
11-Aug-10	Cesium-137	1.19 ± 2.00	3.50	1.75	NE	U	BD	089466-033	EPA 901.1
	Cobalt-60	-0.80 ± 2.26	3.73	1.87	NE	U	BD	089466-033	EPA 901.1
	Potassium-40	14.6 ± 51.6	51.1	25.6	NE	U	BD	089466-033	EPA 901.1
	Gross Alpha	0.91	NA	NA	15	NA	None	089466-034	EPA 900.0
	Gross Beta	1.38 ± 0.901	1.41	0.672	4mrem/yr	U	BD	089466-034	EPA 900.0
	Tritium	21.6 ± 67.3	119	54.8	NE	U	BD	089466-036	EPA 906.0 M
TA2-W-19 (Duplicate)	Americium-241	2.85 ± 10.1	17.7	8.86	NE	U	BD	089467-033	EPA 901.1
11-Aug-10	Cesium-137	0.410 ± 2.04	3.48	1.74	NE	U	BD	089467-033	EPA 901.1
	Cobalt-60	0.608 ± 2.21	3.74	1.87	NE	U	BD	089467-033	EPA 901.1
	Potassium-40	7.17 ± 46.1	54.2	27.1	NE	U	BD	089467-033	EPA 901.1
	Gross Alpha	1.52	NA	NA	15	NA	None	089467-034	EPA 900.0
	Gross Beta	1.32 ± 0.924	1.46	0.699	4mrem/yr	U	BD	089467-034	EPA 900.0
	Tritium	21.6 ± 67.3	119	54.7	NE	U	BD	089467-036	EPA 906.0 M
TA2-W-26	Americium-241	6.22 ± 11.9	17.8	8.93	NE	U	BD	089462-033	EPA 901.1
10-Aug-10	Cesium-137	-0.55 ± 1.94	3.27	1.64	NE	U	BD	089462-033	EPA 901.1
	Cobalt-60	1.80 ± 1.99	3.54	1.77	NE	U	BD	089462-033	EPA 901.1
	Potassium-40	12.4 ± 33.7	46.7	23.3	NE	U	BD	089462-033	EPA 901.1
	Gross Alpha	1.45	NA	NA	15	NA	None	089462-034	EPA 900.0
	Gross Beta	2.32 ± 1.60	2.53	1.21	4mrem/yr	U	BD	089462-034	EPA 900.0
	Tritium	15.8 ± 68.2	121	56.0	NE	U	BD	089462-036	EPA 906.0 M

Refer to footnotes on page 6A-49.

Table 6A-7 *(Continued)*
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

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-27 04-Aug-10	Americium-241	1.18 ± 5.33	9.00	4.50	NE	U	BD	089456-033	EPA 901.1
	Cesium-137	-0.525 ± 1.60	2.70	1.35	NE	U	BD	089456-033	EPA 901.1
	Cobalt-60	-0.0257 ± 1.54	2.62	1.31	NE	U	BD	089456-033	EPA 901.1
	Potassium-40	3.33 ± 31.3	38.6	19.3	NE	U	BD	089456-033	EPA 901.1
	Gross Alpha	-0.68	NA	NA	15	NA	None	089456-034	EPA 900.0
	Gross Beta	2.71 ± 1.51	2.35	1.14	4mrem/yr		J	089456-034	EPA 900.0
	Tritium	6.37 ± 67.8	122	56.4	NE	U	ND	089456-036	EPA 906.0 M
TJA-2 12-Aug-10	Americium-241	1.05 ± 5.19	8.86	4.43	NE	U	BD	089469-033	EPA 901.1
	Cesium-137	1.33 ± 1.65	2.90	1.45	NE	U	BD	089469-033	EPA 901.1
	Cobalt-60	0.169 ± 2.03	3.41	1.71	NE	U	BD	089469-033	EPA 901.1
	Potassium-40	-2.27 ± 35.7	46.0	23.0	NE	U	BD	089469-033	EPA 901.1
	Gross Alpha	1.32	NA	NA	15	NA	None	089469-034	EPA 900.0
	Gross Beta	0.650 ± 0.920	1.54	0.739	4mrem/yr	U	BD	089469-034	EPA 900.0
	Tritium	-28.2 ± 63.5	120	55.5	NE	U	BD	089469-036	EPA 906.0 M
TJA-3 29-Jul-10	Americium-241	0.583 ± 2.61	4.26	2.13	NE	U	BD	089448-033	EPA 901.1
	Cesium-137	-5.30 ± 4.86	5.75	2.88	NE	U	BD	089448-033	EPA 901.1
	Cobalt-60	0.244 ± 2.14	3.65	1.83	NE	U	BD	089448-033	EPA 901.1
	Potassium-40	3.06 ± 46.6	49.6	24.8	NE	U	BD	089448-033	EPA 901.1
	Gross Alpha	1.19	NA	NA	15	NA	None	089448-034	EPA 900.0
	Gross Beta	1.47 ± 0.776	1.15	0.550	4mrem/yr		J	089448-034	EPA 900.0
	Tritium	69.4 ± 114	192	93.0	NE	U	BD	089448-036	EPA 906.0 M
TJA-3 (Duplicate) 23-Jul-10	Americium-241	-31.7 ± 11.5	17.7	8.86	NE	U	BD	089449-033	EPA 901.1
	Cesium-137	-0.625 ± 1.85	3.12	1.56	NE	U	BD	089449-033	EPA 901.1
	Cobalt-60	0.602 ± 1.88	3.27	1.63	NE	U	BD	089449-033	EPA 901.1
	Potassium-40	-1.34 ± 35.7	46.2	23.1	NE	U	BD	089449-033	EPA 901.1
	Gross Alpha	0.74	NA	NA	15	NA	None	089449-034	EPA 900.0
	Gross Beta	3.11 ± 1.01	1.30	0.626	4mrem/yr		J	089449-034	EPA 900.0
	Tritium	-51.2 ± 108	191	92.5	NE	U	BD	089449-036	EPA 906.0 M
TJA-4 17-Aug-10	Americium-241	-2.61 ± 13.5	22.8	11.4	NE	U	BD	089473-033	EPA 901.1
	Cesium-137	0.374 ± 1.82	3.14	1.57	NE	U	BD	089473-033	EPA 901.1
	Cobalt-60	0.442 ± 1.96	3.36	1.68	NE	U	BD	089473-033	EPA 901.1
	Potassium-40	-6.72 ± 40.0	52.4	26.2	NE	U	BD	089473-033	EPA 901.1
	Gross Alpha	0.53	NA	NA	15	NA	None	089473-034	EPA 900.0
	Gross Beta	1.76 ± 0.746	1.05	0.499	4mrem/yr		J	089473-034	EPA 900.0
	Tritium	-29.9 ± 56.7	110	50.2	NE	U	BD	089473-036	EPA 906.0 M

Refer to footnotes on page 6A-49.

Table 6A-7 *(Concluded)*
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

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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-6 05-Aug-10	Americium-241	-18.6 ± 7.70	12.0	6.01	NE	U	BD	089458-033	EPA 901.1
	Cesium-137	0.798 ± 1.90	3.22	1.61	NE	U	BD	089458-033	EPA 901.1
	Cobalt-60	0.969 ± 2.12	3.67	1.84	NE	U	BD	089458-033	EPA 901.1
	Potassium-40	3.87 ± 33.6	42.6	21.3	NE	U	BD	089458-033	EPA 901.1
	Gross Alpha	1.12	NA	NA	15	NA	None	089458-034	EPA 900.0
	Gross Beta	3.52 ± 1.15	1.52	0.738	4mrem/yr		J	089458-034	EPA 900.0
	Tritium	16.0 ± 69.0	123	56.6	NE	U	BD	089458-036	EPA 906.0 M
TJA-7 18-Aug-10	Americium-241	1.10 ± 5.95	9.72	4.86	NE	U	BD	089475-033	EPA 901.1
	Cesium-137	1.36 ± 1.57	2.72	1.36	NE	U	BD	089475-033	EPA 901.1
	Cobalt-60	-1.65 ± 1.72	2.59	1.30	NE	U	BD	089475-033	EPA 901.1
	Potassium-40	55.9 ± 20.3	55.9	19.3	NE	U	BD	089475-033	EPA 901.1
	Gross Alpha	3.05	NA	NA	15	NA	None	089475-034	EPA 900.0
	Gross Beta	1.08 ± 0.711	1.11	0.530	4mrem/yr	U	BD	089475-034	EPA 900.0
	Tritium	-3.1 ± 58.6	108	49.4	NE	U	BD	089475-036	EPA 906.0 M
WYO-3 02-Aug-10	Americium-241	-19.4 ± 7.72	12.0	5.99	NE	U	BD	089451-033	EPA 901.1
	Cesium-137	0.172 ± 1.89	3.15	1.58	NE	U	BD	089451-033	EPA 901.1
	Cobalt-60	-0.219 ± 2.04	3.40	1.70	NE	U	BD	089451-033	EPA 901.1
	Potassium-40	14.3 ± 34.3	45.1	22.6	NE	U	BD	089451-033	EPA 901.1
	Gross Alpha	3.15	NA	NA	15	NA	None	089451-034	EPA 900.0
	Gross Beta	4.11± 1.47	2.06	1.00	4mrem/yr		J	089451-034	EPA 900.0
	Tritium	18.5 ± 67.0	119	54.7	NE	U	BD	089451-036	EPA 906.0 M
WYO-4 16-Aug-10	Americium-241	-3.97 ± 11.8	19.6	9.79	NE	U	BD	089471-033	EPA 901.1
	Cesium-137	1.86 ± 1.97	3.44	1.72	NE	U	BD	089471-033	EPA 901.1
	Cobalt-60	1.81 ± 2.01	3.56	1.78	NE	U	BD	089471-033	EPA 901.1
	Potassium-40	-41.0 ± 49.4	44.4	22.2	NE	U	BD	089471-033	EPA 901.1
	Gross Alpha	-0.08	NA	NA	15	NA	None	089471-034	EPA 900.0
	Gross Beta	0.143 ± 0.579	1.00	0.475	4mrem/yr	U	BD	089471-034	EPA 900.0
	Tritium	41.8 ± 65.7	112	51.3	NE	U	BD	089471-036	EPA 906.0 M

Refer to footnotes on page 6A-49.

Table 6A-8
Summary of Field Water Quality Measurements[h], Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

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Well ID	Sample Date	Temperature (^{0}C)	Specific Conductivity (μmho/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
TA1-W-03	26-Feb-10	14.20	1626	209.6	7.50	0.74	77.3	7.89
TA1-W-06	11-Jan-10	17.39	826	215.1	7.36	0.52	86.1	8.20
TA1-W-08	12-Jan-10	17.33	1841	218.9	7.21	0.46	78.6	7.49
TA2-SW1-320	19-Jan-10	13.90	472	274.9	7.52	19.0	83.9	8.65
TA2-W-01	13-Jan-10	16.95	603	244.8	7.40	1.88	83.5	8.07
TA2-W-19	21-Jan-10	15.63	563	239.8	7.47	0.16	83.8	8.32
TA2-W-26	20-Jan-10	14.11	1148	237.6	7.35	0.29	78.7	8.09
TA2-W-27	14-Jan-10	16.00	799	226.5	7.36	0.40	72.6	7.00
TJA-2	28-Jan-10	12.32	562	239.7	7.45	0.26	82.1	8.79
TJA-3	15-Jan-10	18.52	475	210.0	7.25	0.27	76.1	7.12
TJA-4	27-Jan-10	16.79	524	229.8	7.39	0.32	56.0	5.47
TJA-6	18-Jan-10	17.64	446	240.8	7.28	0.64	64.2	6.11
TJA-7	29-Jan-10	13.93	498	252.2	7.44	1.19	79.9	8.23
WYO-4	26-Jan-10	12.78	610	261.4	7.49	0.37	77.3	8.18
TA1-W-03	03-May-10	15.83	1585	300.2	7.35	0.36	82.0	8.08
TA1-W-06	04-May-10	19.79	812	276.3	7.37	1.81	85.7	7.81
TA1-W-08	05-May-10	19.87	1813	264.4	7.26	0.23	81.0	7.34
TA2-SW1-320	12-May-10	16.64	467	258.6	7.50	6.63	80.9	7.88
TA2-W-01	06-May-10	19.71	597	244.9	7.40	2.30	85.8	7.83
TA2-W-19	14-May-10	19.25	556	205.6	7.40	0.17	89.1	8.19
TA2-W-26	13-May-10	18.69	1142	218.4	7.33	0.21	81.7	7.61
TA2-W-27	11-May-10	19.67	784	289.8	7.34	0.22	90.0	8.26
TJA-2	20-May-10	19.31	553	219.9	7.36	0.29	88.1	8.11
TJA-4	19-May-10	19.85	521	170.0	7.31	0.15	56.9	5.20
TJA-7	24-May-10	18.69	491	193.9	7.41	5.19	85.0	7.92
WYO-4	18-May-10	18.30	597	157.3	7.57	0.31	81.9	7.69

Refer to footnotes on page 6A-49.

Table 6A-8 *(Concluded)*
Summary of Field Water Quality Measurements[h], Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Sample Date	Temperature (^{0}C)	Specific Conductivity (μmho/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
PGS-2	16-Jul-10	23.10	429	162.7	8.16	1.18	14.4	1.24
TA1-W-01	06-Aug-10	21.12	487	159.1	7.56	0.27	70.9	6.32
TA1-W-02	21-Jul-10	21.91	472	144.1	7.53	0.89	62.2	5.44
TA1-W-03	22-Jul-10	19.53	1588	180.6	7.58	0.21	88.1	8.04
TA1-W-04	23-Jul-10	20.69	447	157.9	7.55	0.35	64.6	6.18
TA1-W-05	26-Jul-10	19.71	547	226.9	7.40	0.17	79.8	7.38
TA1-W-06	27-Jul-10	19.61	803	158.9	7.66	0.84	81.6	7.50
TA1-W-08	28-Jul-10	20.83	1823	158.9	7.48	0.30	84.2	7.48
TA2-NW1-595	03-Aug-10	20.79	730	143.7	7.49	0.30	87.6	7.82
TA2-SW1-320	15-Jul-10	20.94	472	191.3	7.76	2.67	89.5	8.00
TA2-W-01	09-Aug-10	21.60	595	160.9	7.73	6.23	88.4	7.80
TA2-W-19	11-Aug-10	22.49	557	155.4	7.73	0.14	94.1	8.14
TA2-W-26	10-Aug-10	20.82	1154	144.8	7.59	0.36	81.3	7.25
TA2-W-27	04-Aug-10	22.85	790	149.5	7.64	0.19	94.9	8.14
TJA-2	12-Aug-10	21.42	554	157.7	7.72	0.22	92.4	8.24
TJA-3	29-Jul-10	20.86	470	159.7	7.58	0.07	78.2	6.99
TJA-4	17-Aug-10	20.42	522	135.9	7.67	0.20	62.0	5.58
TJA-6	05-Aug-10	22.04	441	158.3	7.62	1.92	63.8	5.56
TJA-7	18-Aug-10	20.75	489	162.9	7.72	2.20	90.1	8.06
WYO-3	02-Aug-10	21.49	476	134.4	7.70	0.66	76.1	6.71
WYO-4	16-Aug-10	20.07	601	127.4	7.76	0.11	86.4	7.83
TA1-W-03	08-Nov-10	16.72	1569	299.9	7.51	0.19	80.7	7.81
TA2-SW1-320	09-Nov-10	13.84	463	323.1	7.77	14.2	76.9	7.93
TA2-W-19	11-Nov-10	18.00	535	257.4	7.65	0.22	89.8	8.49
TA2-W-26	10-Nov-10	17.67	1149	296.6	7.52	0.25	77.1	7.32
TJA-2	15-Nov-10	15.34	540	236.7	7.67	0.20	84.1	8.41
TJA-4	12-Nov-10	17.33	512	237.6	7.60	0.18	55.0	5.27
TJA-7	16-Nov-10	17.61	478	226.5	7.66	1.86	82.6	7.87
WYO-4	18-Nov-10	15.36	588	245.0	7.74	0.68	78.9	7.89

Refer to footnotes on page 6A-49.

Footnotes for Tijeras Arroyo Groundwater Investigation Tables

[a]Result

- Values in bold exceed the established MCL.
- ND = not detected (at method detection limit).
- Activities of zero or less are considered to be not detected.
- Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 1-4)
- μg/L = micrograms per liter.
- mg/L = milligrams per liter.
- pCi/L = picocuries per liter.

[b]MDL or MDA

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.

The minimum detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.

NA = not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

[c]PQL or Critical Level

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.

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.

[d]MCL

- Maximum contaminant level. Established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11, Subpart B), National Primary Drinking Water Standards, EPA, July 2002.
- NE = not established.
- 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).

[e]Laboratory Qualifier

B = Analyte is detected in associated laboratory method blank.
J = Amount detected is below the practical quantitation limit (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 = The associate value is an estimated quantity.
J+ = The associated numerical value is an estimated quantity with 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.

[f]Validation Qualifier (continued)

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

- EPA, 1980, *Prescribed Procedures for Measurement of Radioactivity in Drinking Water* EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.
- EPA, 1983, *The Determination of Inorganic Anions in Water by Ion Chromatography- Method 300.00,* EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.
- EPA, 1996, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* SW-846, 3rd ed., Rev. 1, U.S. Environmental Protection Agency, Washington, D.C.
- U.S. Environmental Protection Agency, Washington, D.C.; or Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B.
- EPA, 1999, *Perchlorate in Drinking Water Using Ion Chromatography,* EPA 815/R-00-014, U.S. Environmental Protection Agency, Washington, D.C.

[h]Field Water Quality Measurements

- Field measurements collected prior to sampling.

°C	=	degrees Celsius.
% sat	=	present saturation.
μmho/cm	=	micromhos per centimeter.
mg/L	=	milligrams per liter.
mV	=	millivolts.
NTU	=	nephelometric turbidity units.
pH	=	potential of hydrogen (negative logarithm of the hydrogen ion concentration).

Attachment 6B
Tijeras Arroyo Groundwater Plots

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Attachment 6B Plots

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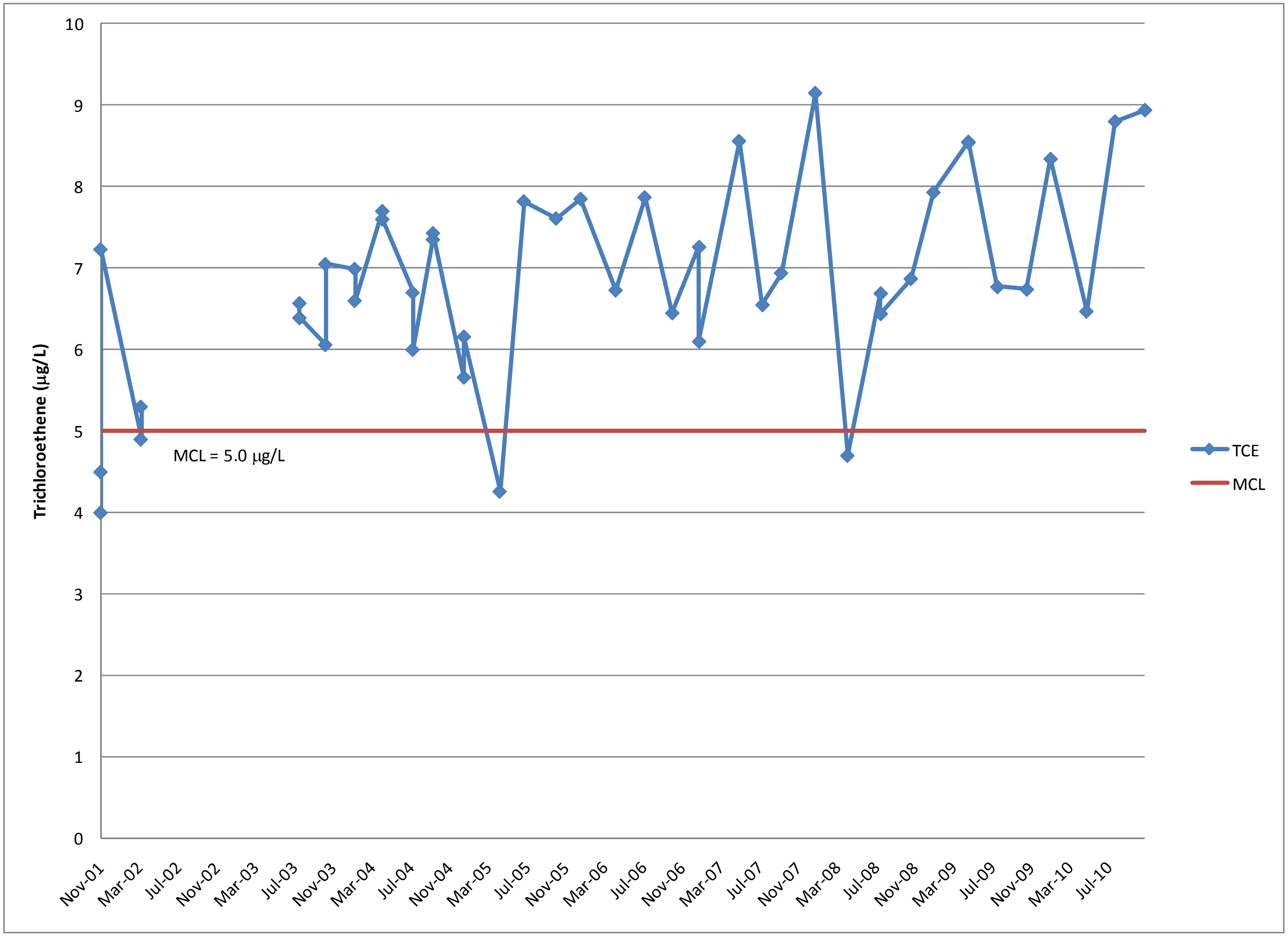

Figure 6B-1. Trichloroethene Concentrations, WYO-4

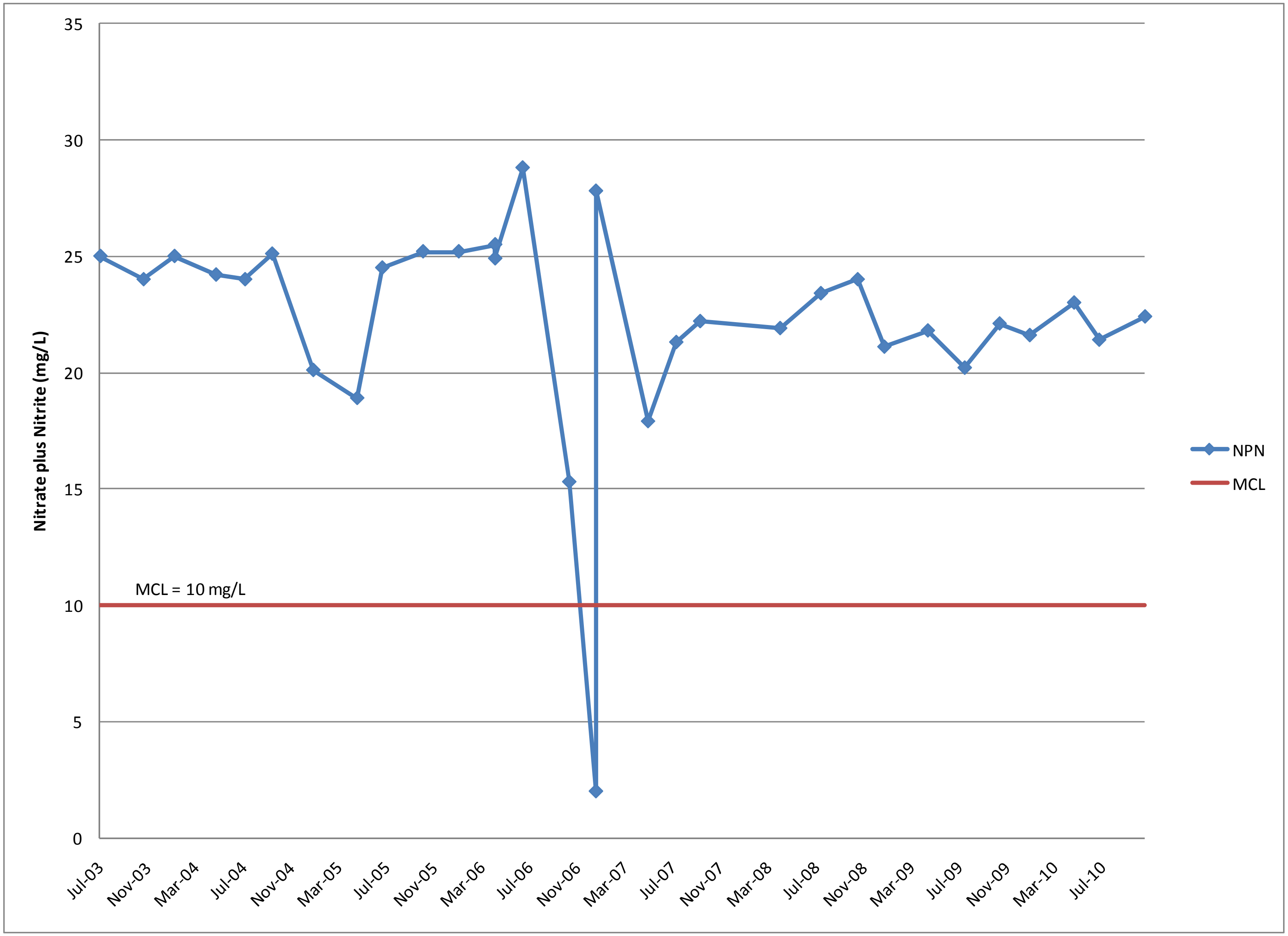

Figure 6B-2. Nitrate plus Nitrite Concentrations, TA2-SW1-320

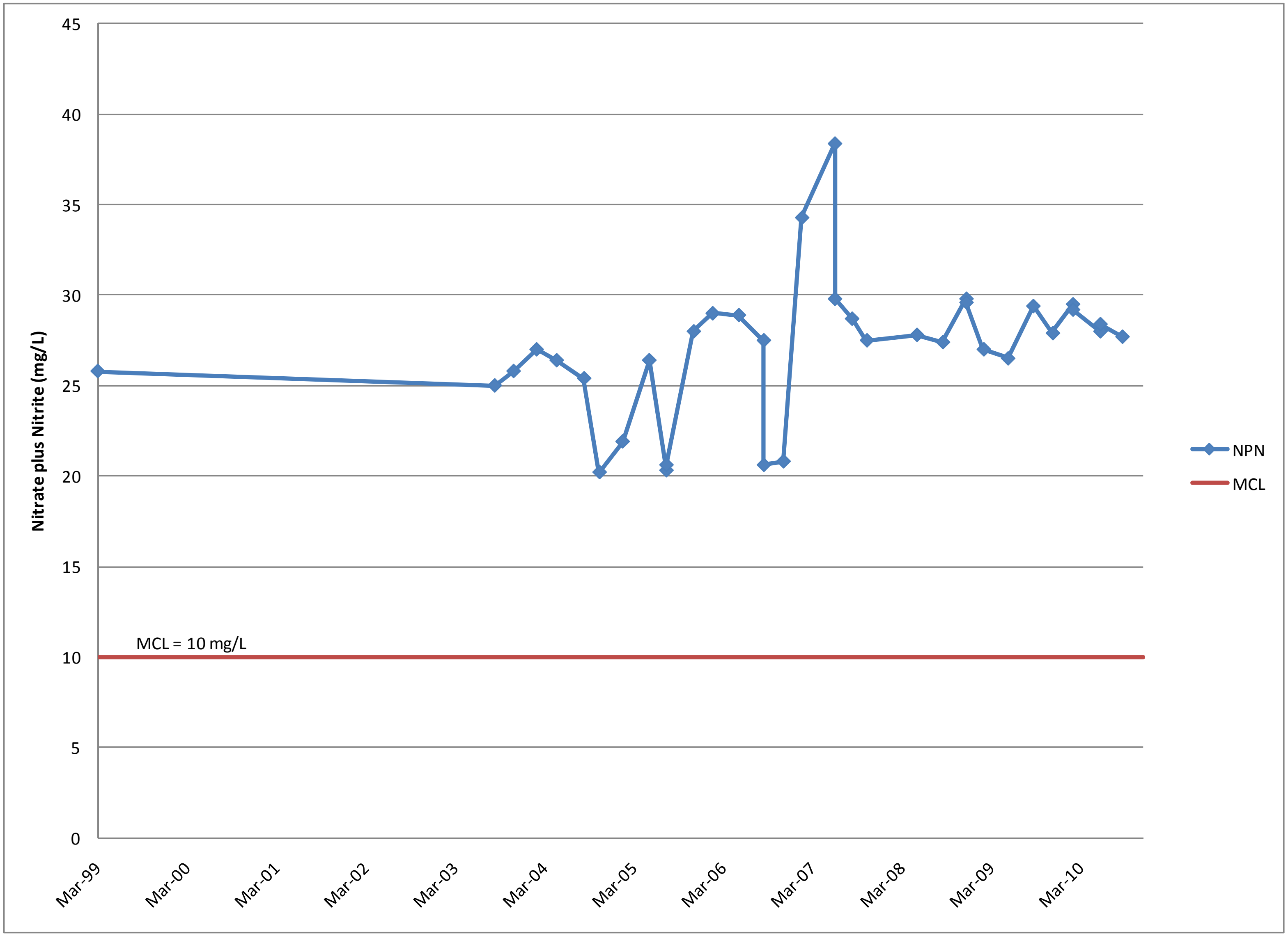

Figure 6B-3. Nitrate plus Nitrite Concentrations, TJA-4

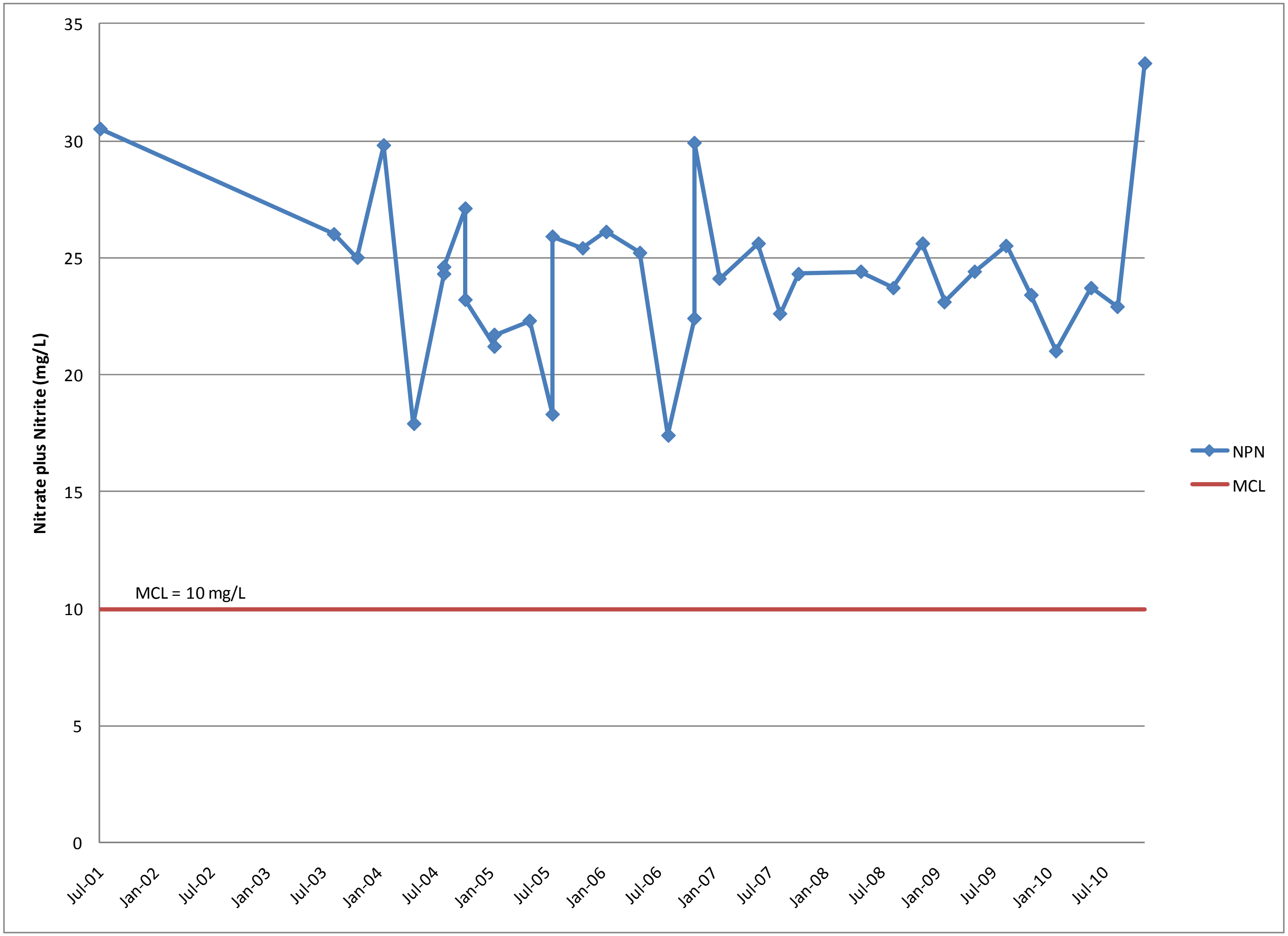

Figure 6B-4. Nitrate plus Nitrite Concentrations, TJA-7

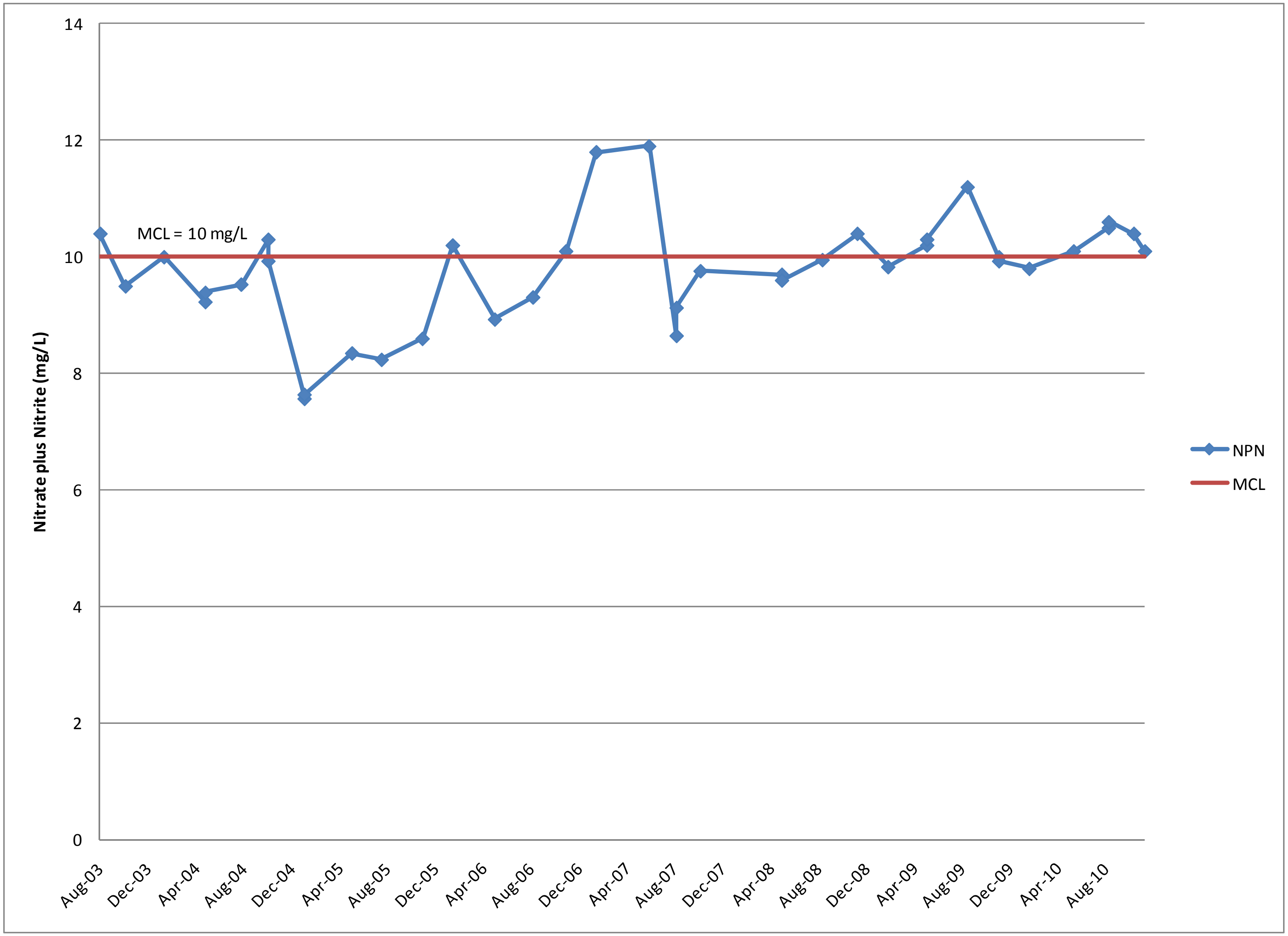

Figure 6B-5. Nitrate plus Nitrite Concentrations, TA2-W-19

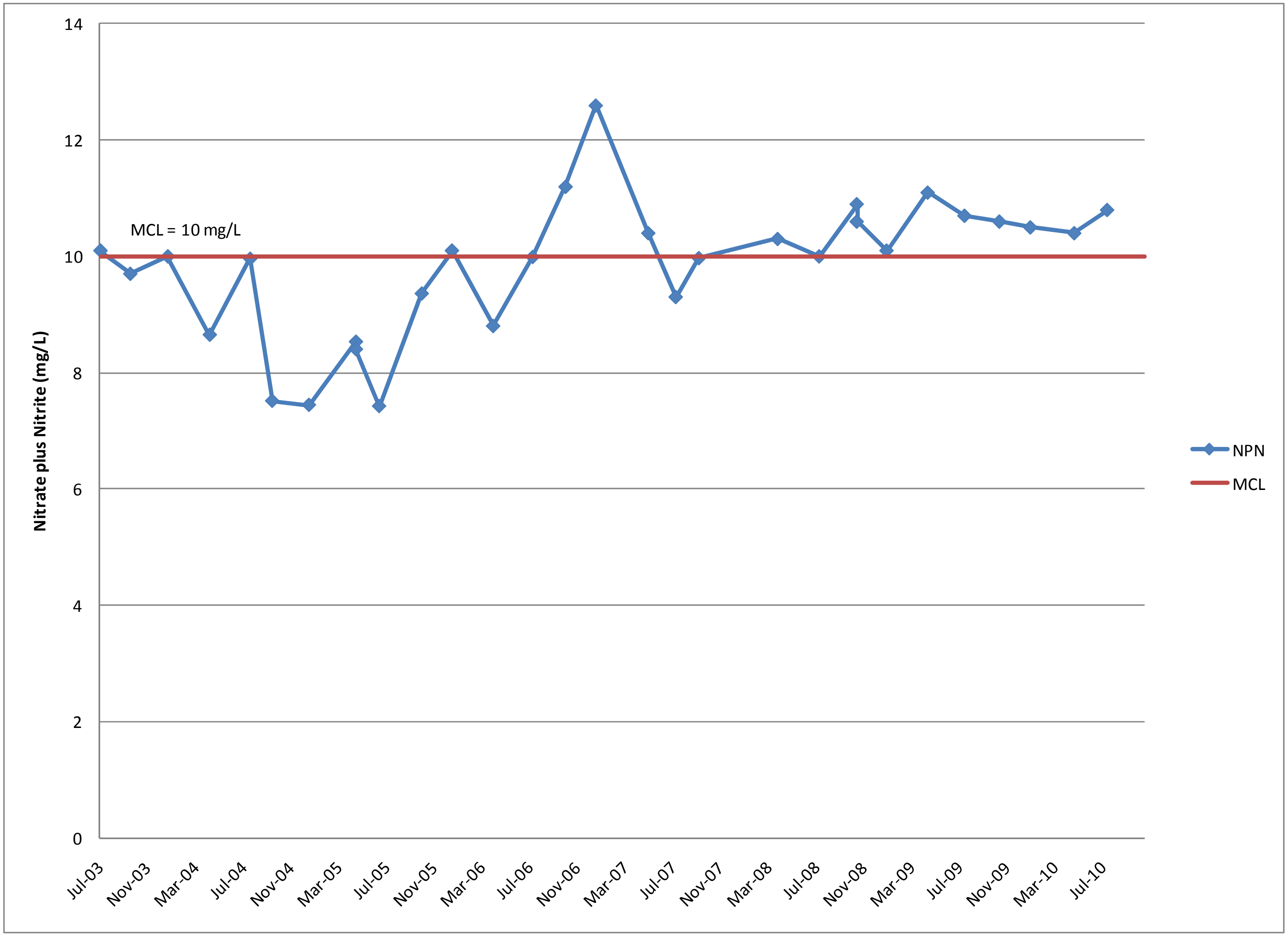

Figure 6B-6. Nitrate plus Nitrite Concentrations, TJA-2

Attachment 6C
Tijeras Arroyo Groundwater Hydrographs

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Attachment 6C Hydrographs

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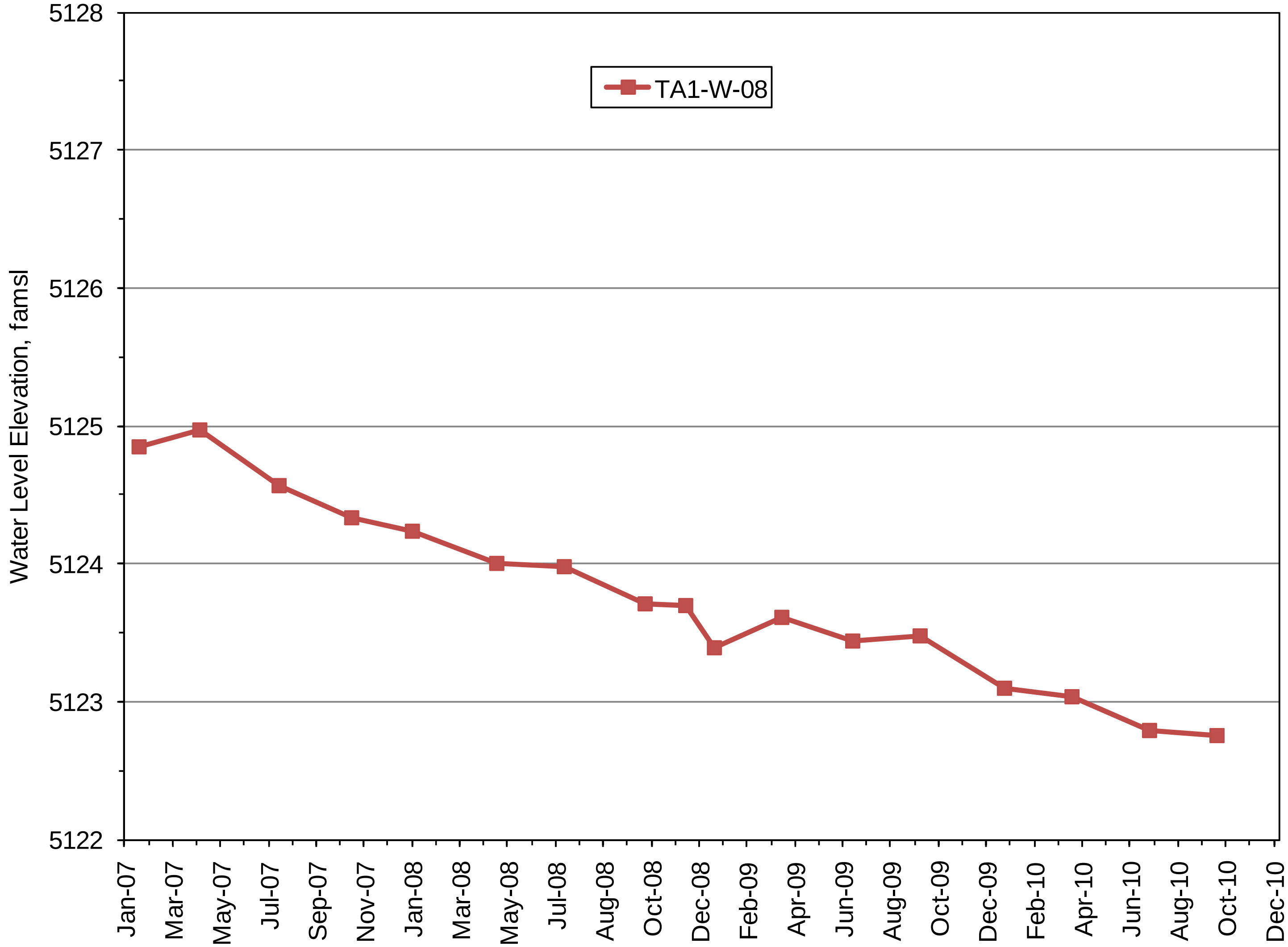

Figure 6C-1. TAG Study Area PGWS Wells (1 of 6)

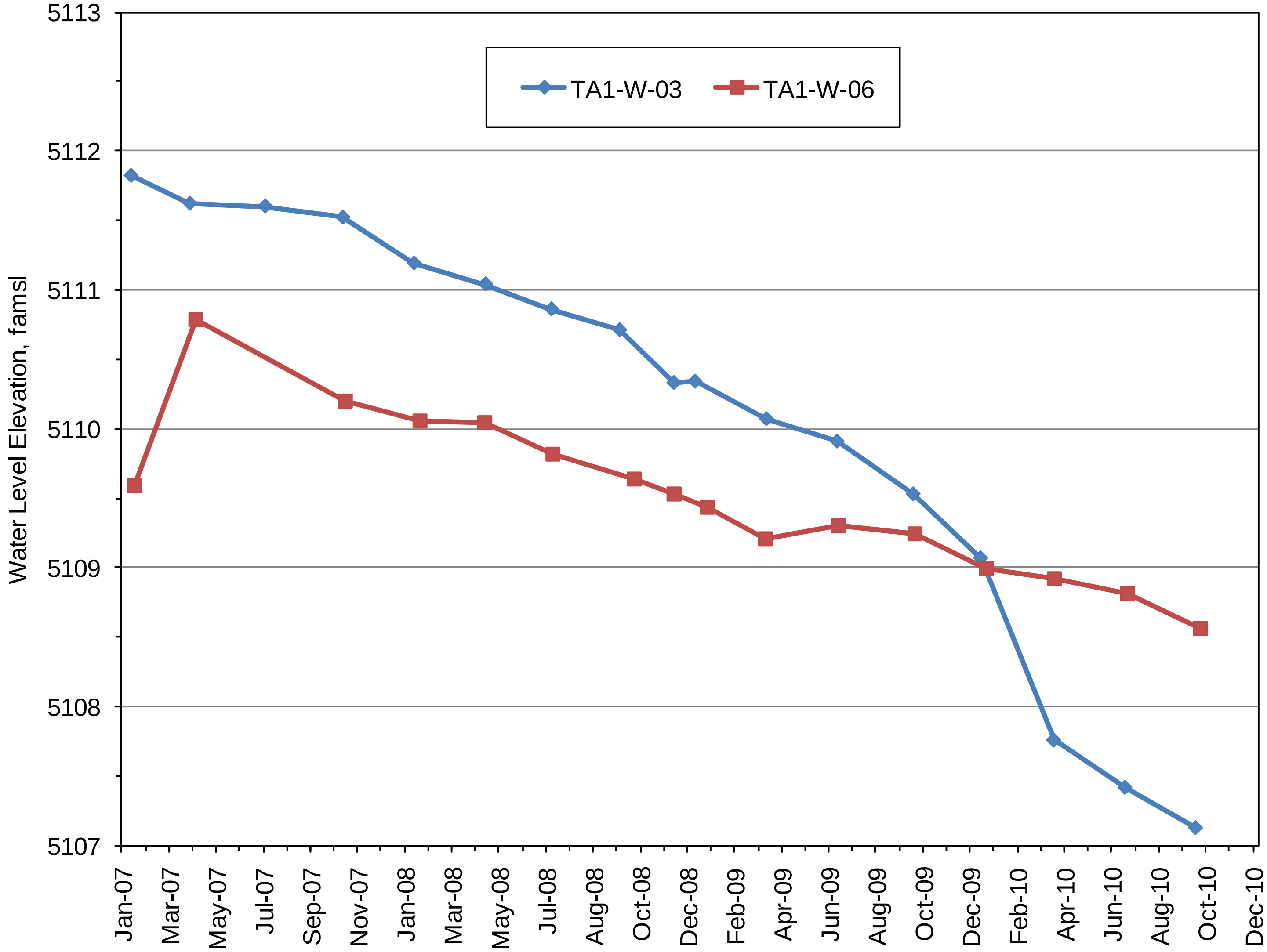

Figure 6C-2. TAG Study Area PGWS Wells (2 of 6)

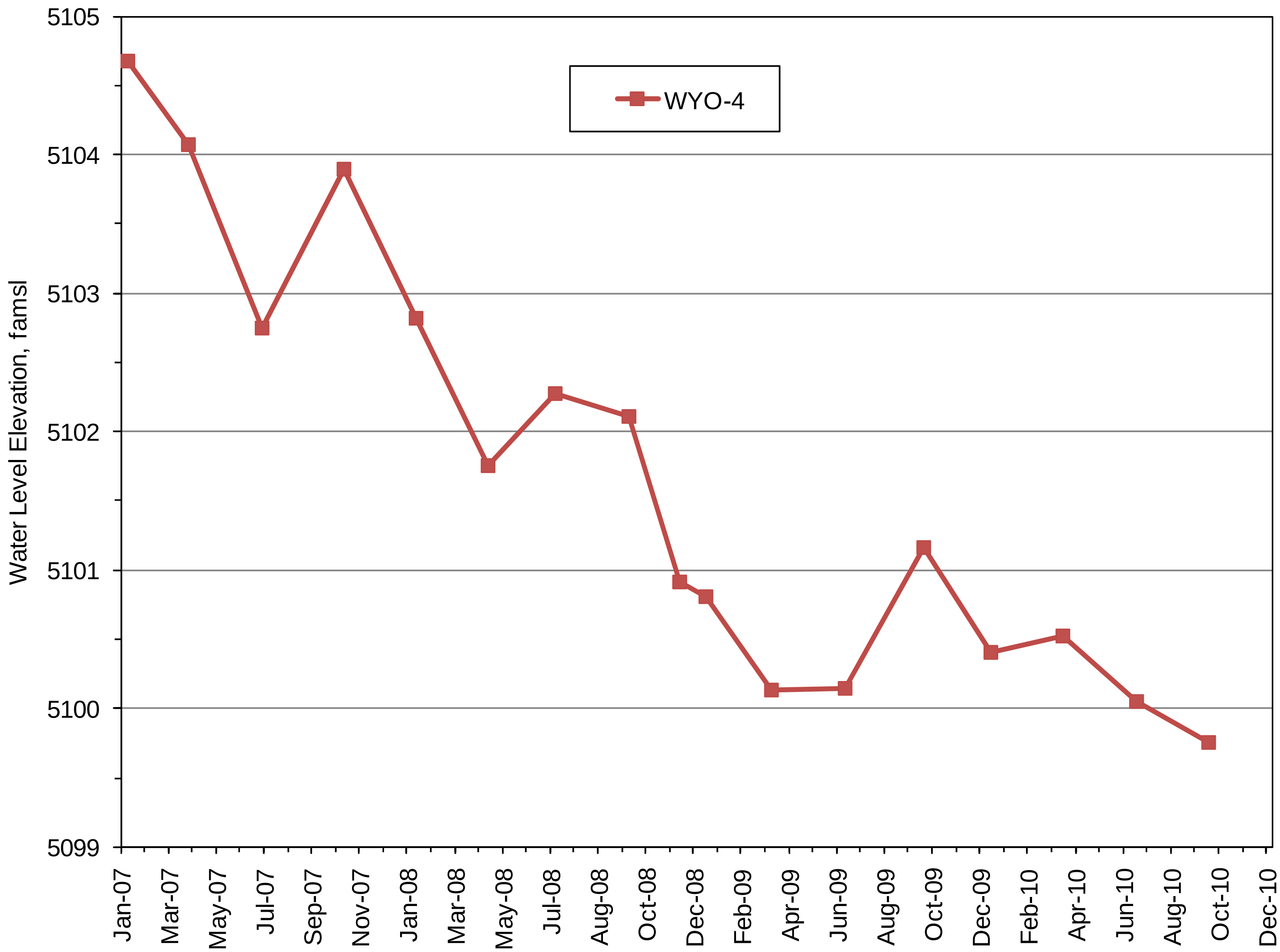

Figure 6C-3. TAG Study Area PGWS Wells (3 of 6)

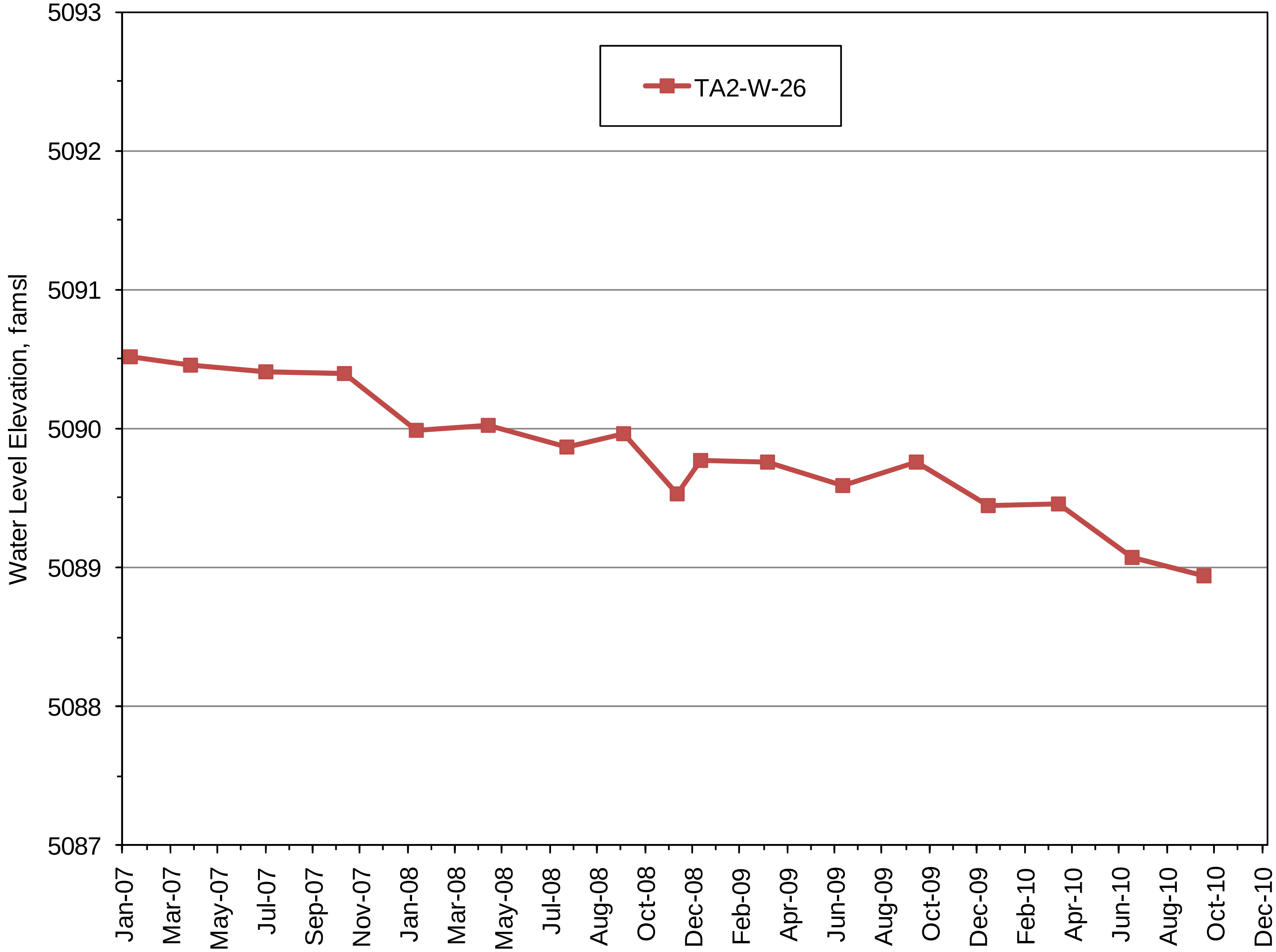

Figure 6C-4. TAG Study Area PGWS Wells (4 of 6)

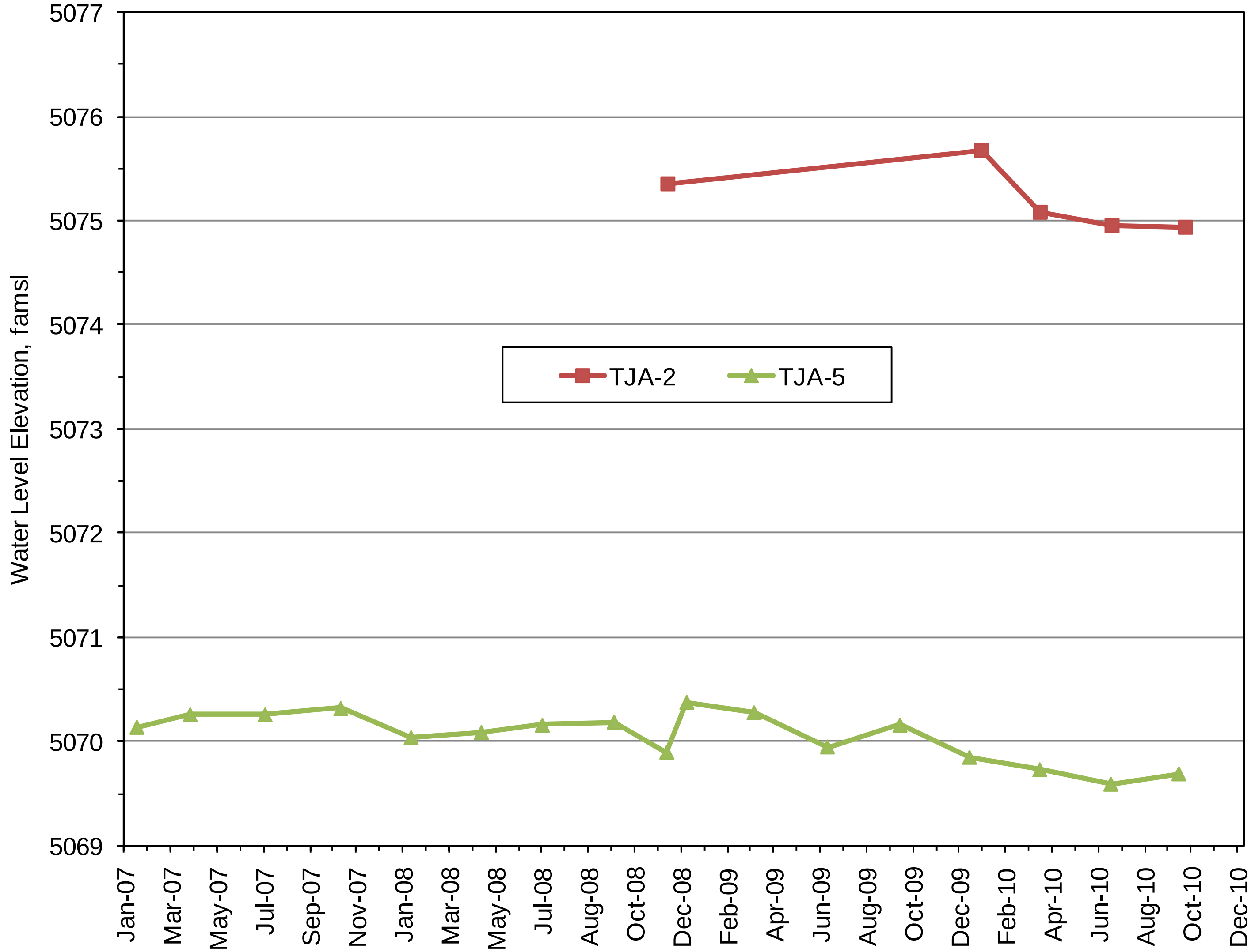

Figure 6C-5. TAG Study Area PGWS Wells (5 of 6)

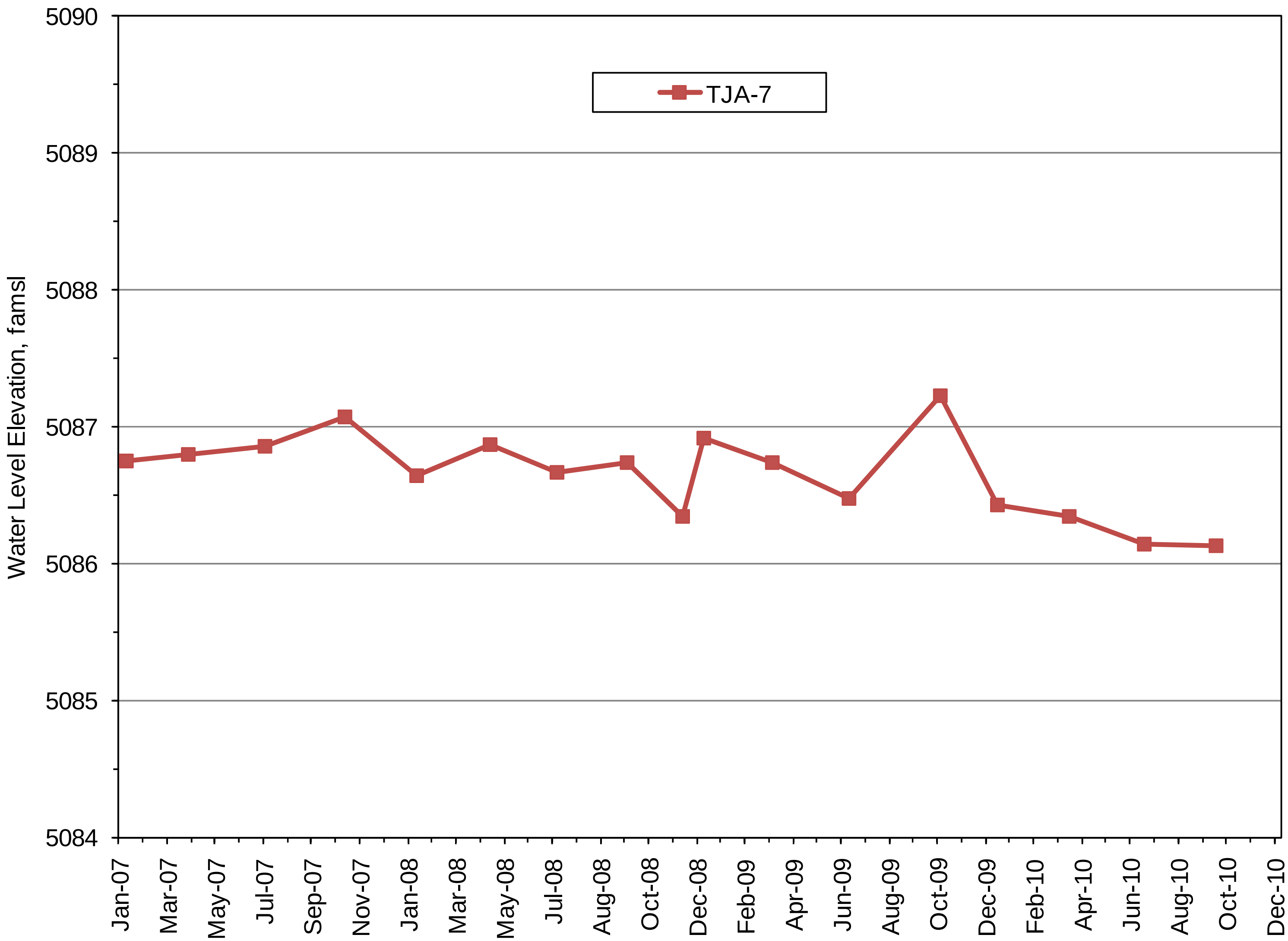

Figure 6C-6. TAG Study Area PGWS Wells (6 of 6)

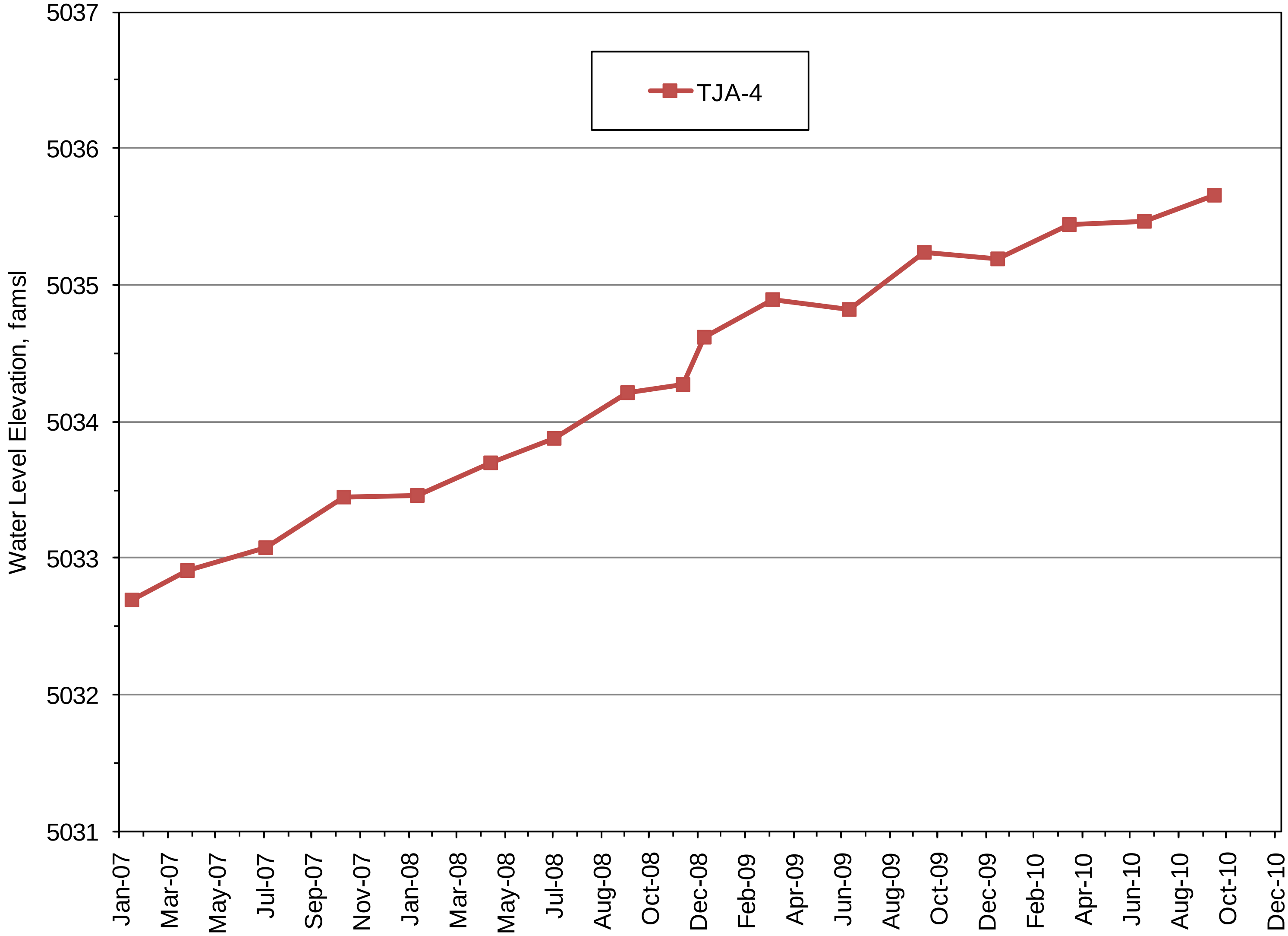

Figure 6C-7. TAG Study Area Regional Aquifer Wells (1 of 5)

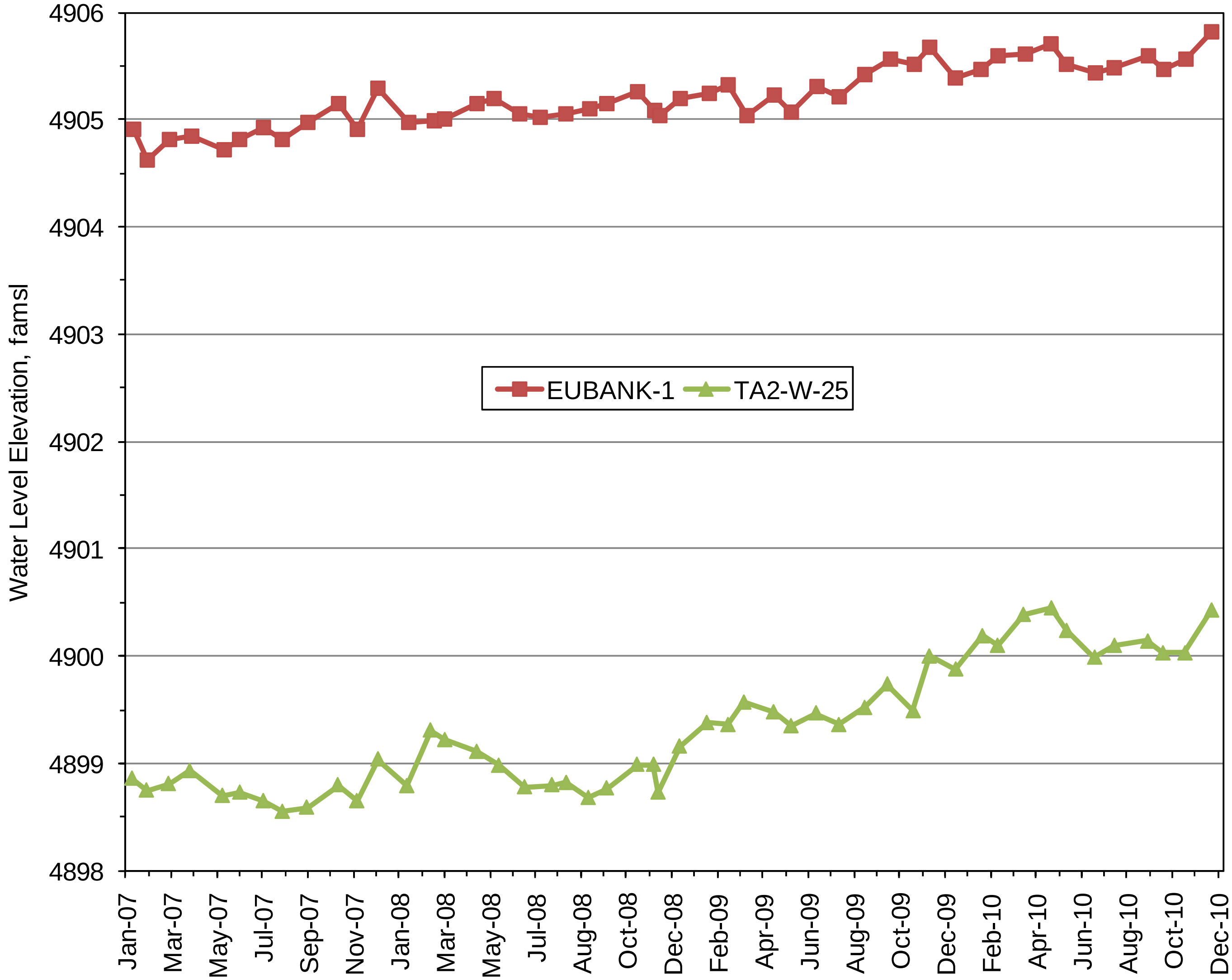

Figure 6C-8. TAG Study Area Regional Aquifer Wells (2 of 5)

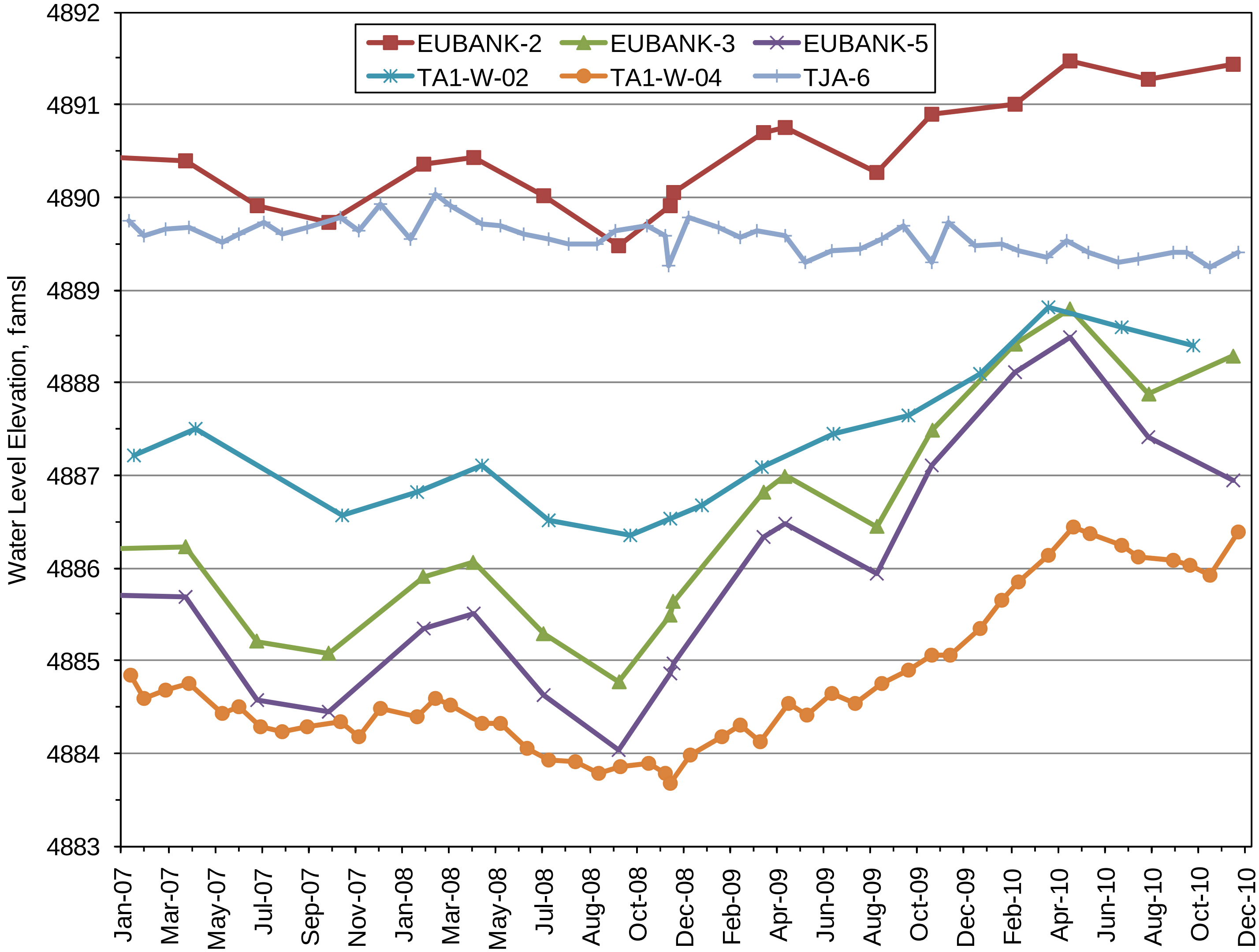

Figure 6C-9. TAG Study Area Regional Aquifer Wells (3 of 5)

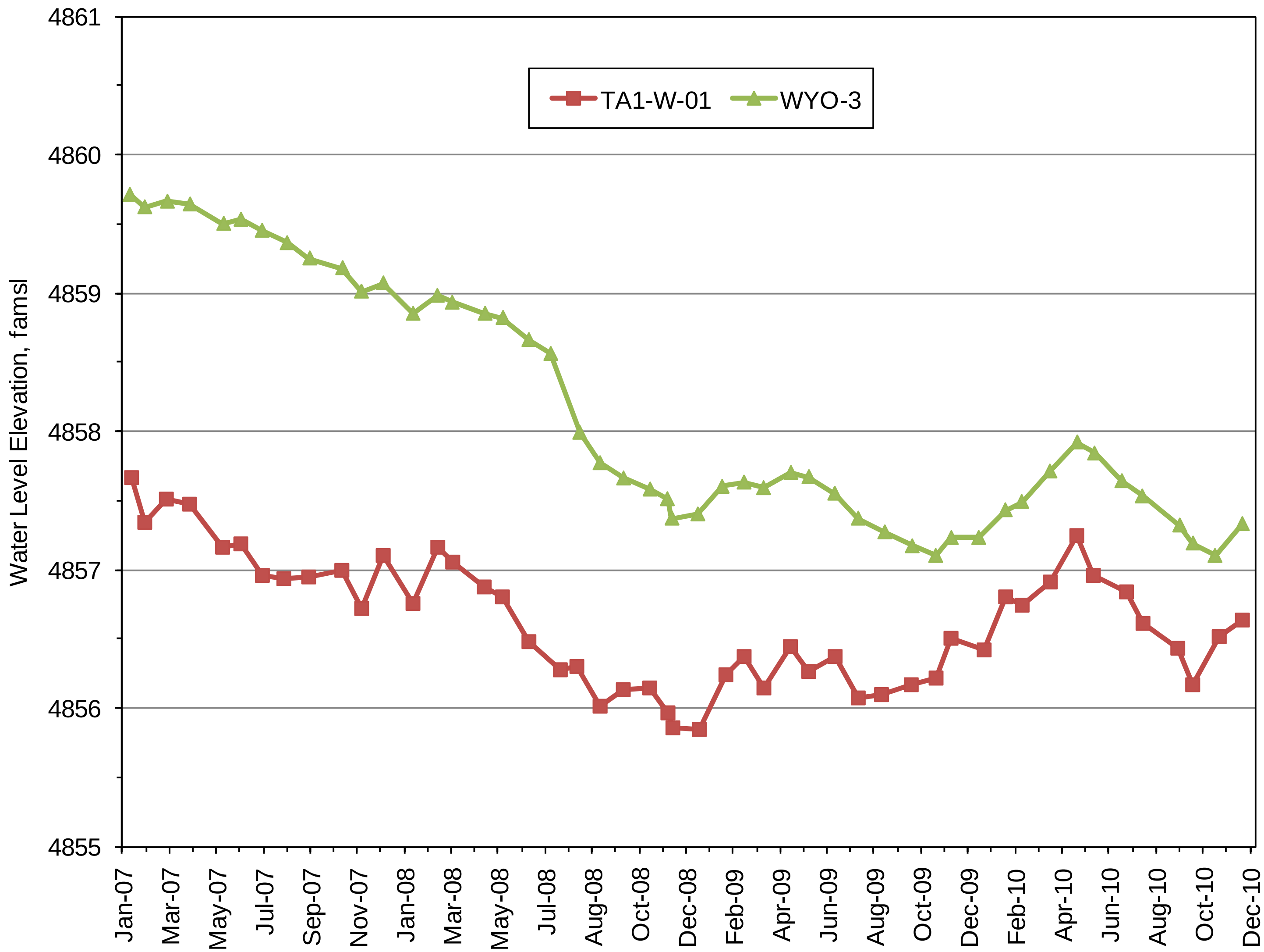

Figure 6C-10. TAG Study Area Regional Aquifer Wells (4 of 5)

Figure 6C-11. TAG Study Area Regional Aquifer Wells (5 of 5)

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7.0 Burn Site Groundwater Study Area

7.1 Introduction

Unique features of the Burn Site Groundwater (BSG) study area, located in the Manzanita Mountains (Figure 7-1), include low concentrations of nitrate and perchlorate 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 29.3 milligrams per liter (mg/L). The EPA and State of New Mexico drinking water standard (MCL) for nitrate is 10 mg/L (as nitrogen).

Perchlorate has also been identified as a COC in groundwater at the BSG study area. Currently there is no EPA MCL or State of New Mexico drinking water standard for perchlorate. However, Section IV.B of the Compliance Order on Consent (the Order), between the New Mexico Environment Department (NMED), the U.S. Department of Energy (DOE), and Sandia Corporation (Sandia) stipulates that a select group of groundwater monitoring wells be sampled for perchlorate using a screening level/method detection limit (MDL) of 4 micrograms per liter (µg/L) (NMED April 2004). Furthermore, the Order requires that for detections equal to or greater than 4 µg/L, the DOE/Sandia will evaluate the nature and extent of perchlorate contamination. Perchlorate has been detected in samples from one well and, since March 2006, the maximum concentration of perchlorate in the study area has been 8.93 µg/L.

7.1.1 Location

Sandia National Laboratories, New Mexico (SNL/NM) manages the Coyote Canyon Test Area in the eastern portion of Kirtland Air Force Base (KAFB). The SNL/NM facility is a government-owned, contractor-operated, multi-program laboratory overseen by the DOE, National Nuclear Security Administration through the Sandia Site Office in Albuquerque, New Mexico. Sandia, a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM under Contract DE-AC04-94AL85000.

The Burn Site is located in Lurance Canyon, one of three canyons that are located on the eastern edge of the Coyote Canyon Test Area and within the Manzanita Mountains. Two other canyons, Madera Canyon and Sol se Mete Canyon, intersect Lurance Canyon to the west of the Burn Site. These three canyons are the headwaters of Arroyo del Coyote. Testing activities at the Lurance Canyon Burn Facility, which includes the Burn Site, began in 1967.

The BSG study area is located along the eastern margin of the Albuquerque Basin, and the terrain is characterized by large topographic relief, exceeding 500 feet (ft). Lurance Canyon, deeply incised into Paleozoic and Precambrian rocks, provides local westward drainage of ephemeral surface-water flows to Arroyo del Coyote.

7.1.2 Site History

The Lurance Canyon Burn Site (Solid Waste Management Unit [SWMU] 94) and the nearby Lurance Canyon Explosive Test Site (SWMU 65) have been used since 1967. Most research has involved testing the fire survivability of transportation containers, weapon components, simulated weapons, and satellite components. Historical operations also include open detonation of high explosives (HE) (Table 7-1) and the open burning of HE materials, liquid propellants, and solid propellants. Most HE testing occurred

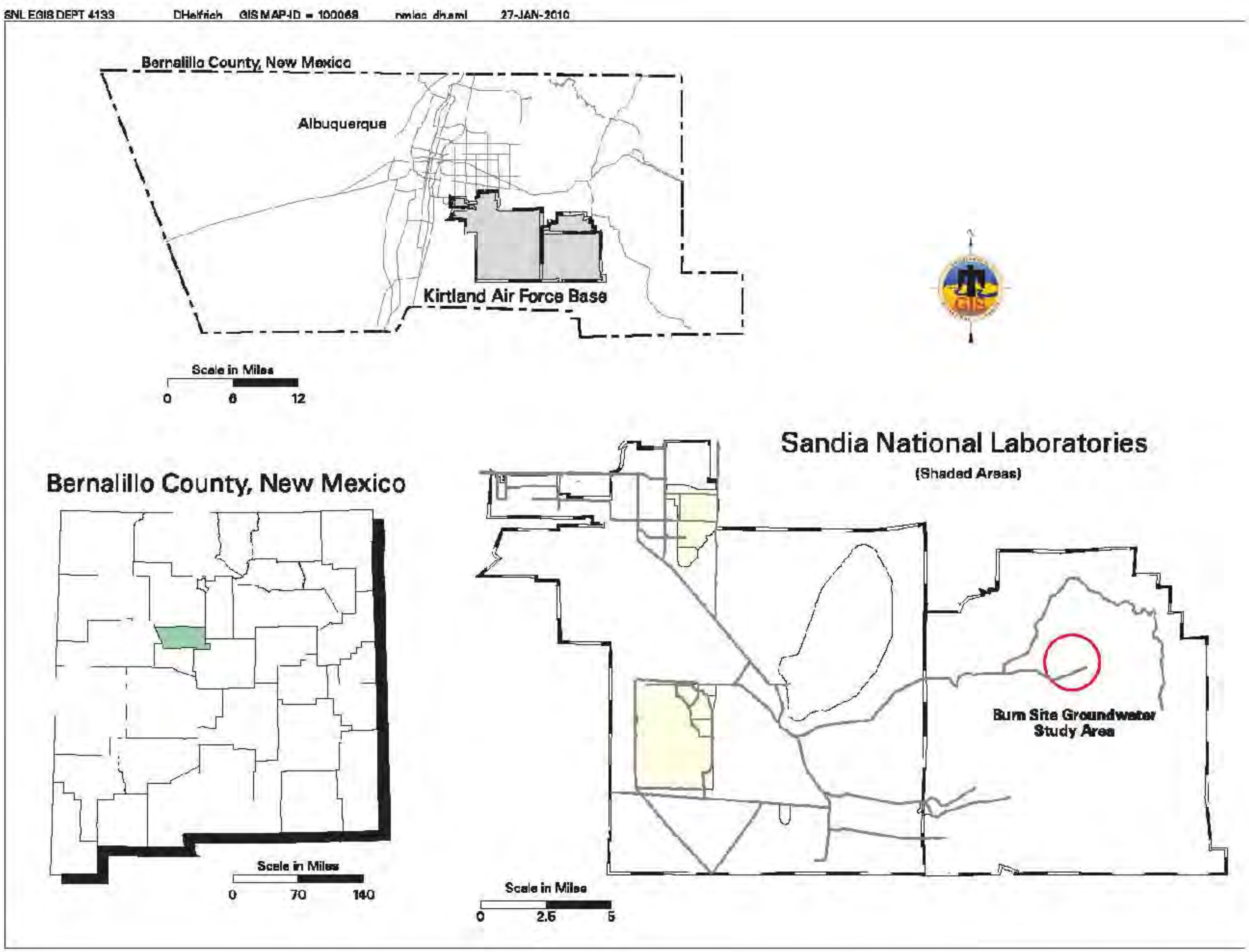

Figure 7-1. Location of the Burn Site Groundwater Study Area

Table 7-1. Historical Timeline of the Burn Site Groundwater Study Area

Month	Year	Event	Reference
	1967-early 1980s	HE testing at 18 SWMUs conducted within the BSG study area until early 1980s. Burn testing began in 1970s using excavation pits and portable burn pans with JP-4. Wastewater discharged into unlined pits. Nitrate and diesel range organics identified as potential COCs.	SNL November 2001
February	1998	Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report containing description of BSG hydrogeology submitted.	SNL February 1998
	1996	Burn Site Well showed elevated nitrate levels (25 mg/L).	SNL January 2005
July	1997	NMED/DOE/OB and SNL/NM agree on installation of deep and shallow monitoring wells and one year of quarterly sampling.	SNL July 1997
November	1997	Monitoring well CYN-MW1D and piezometers CYN-MW2S and 12AUP-01 installed.	SNL June 1998
March	1999	GWPP Fiscal Year 1998 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL March 1999
June	1999	Monitoring wells CYN-MW3 and CYN-MW4 installed.	SNL November 2001
	Various (e.g., 1994)	BSG study area SWMUs 94 and 65 proposed and approved for NFA/CAC.	Numerous references, for example: SNL February 2004
March	2000	GWPP Fiscal Year 1999 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL March 2000
April	2001	GWPP Fiscal Year 2000 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL April 2001
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 2003a
June	2003	Further refinements of the hydrogeologic setting of the BSG study area are presented.	Van Hart June 2003
March	2004	GWPP Fiscal Year 2003 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL March 2004
April	2004	Compliance Order on Consent lists BSG as an Area of Concern that requires a CME.	NMED April 2004
June	2004	A revised conceptual site model of the BSG study area prepared.	SNL June 2004a
June	2004	A CME work plan for the BSG study area prepared.	SNL June 2004b
January	2005	Nitrate source evaluation of deep soil in the BSG study area performed.	SNL January 2005
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 requires supplemental information for the Interim Measures Work Plan.	NMED July 2005
August	2005	SNL/NM submits response for RSI.	SNL August 2005
October	2005	GWPP Fiscal Year 2004 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL October 2005
October	2006	CYN-MW6, CYN-MW7, and CYN-MW8 installed.	SNL October 2006

Table 7-1. Historical Timeline of the Burn Site Groundwater Study Area *(Concluded)*

Month	Year	Event	Reference
March	2007	GWPP Fiscal Year 2006 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL March 2007
April	2008	BSG Current Conceptual Site Model resubmitted.	SNL April 2008a
April	2008	BSG CME Work Plan resubmitted.	SNL April 2008b
March	2008	GWPP Fiscal Year 2007 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL March 2008
April	2009	NMED requires supplemental characterization of soil and groundwater in the BSG study area.	NMED April 2009
November	2009	BSG Characterization Work Plan submitted.	SNL November 2009
June	2009	GWPP Calendar Year 2008 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL June 2009a
February	2010	Received notice of conditional approval for the November 2009 BSG Characterization Work Plan.	NMED February 2010
July	2010	Completed subsurface soil sampling at 10 deep soil boring locations to determine contaminant sources.	SNL November 2009
July	2010	Installed four groundwater monitoring wells to determine extent of groundwater contamination.	SNL November 2009
September	2010	Submitted an extension request for the BSG CME Report.	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 2010a

NOTES:

BSG = Burn Site Groundwater.
CAC = Corrective Action Complete.
CME = Corrective Measures Evaluation.
COC = Constituent of concern.
DOE = U.S. Department of Energy.
GWPP = Groundwater Protection Program.
HE = High explosive(s).
JP-4 = Jet propellant fuel composition 4
mg/L = Milligram(s) per liter.
NFA = No Further Action.
NMED = New Mexico Environment Department.
OB = Oversight Bureau.
RSI = Request for Supplemental Information.
SNL/NM = Sandia National Laboratories/New Mexico.
SWMU = Solid Waste Management Unit.

between 1967 and 1975 and was completely phased out by the 1980s. 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 JP-4 (jet propellant fuel composition 4). The Light Air Transport Accident Resistant Container Unit was constructed in 1980, and other engineered burn units were constructed by 1983. These burn units used jet fuel, gasoline, and diesel for the burn tests.

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 well CYN-MW1D and piezometer CYN-MW2S were installed downgradient of the Burn Site Well (Table 7-2). Samples from well CYN-MW1D contained nitrate concentrations exceeding the MCL. Two more 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 and Piezometers at the Burn Site Groundwater Study Area

Well	Installation Year	WQ	WL	Comments
2AUP-01	1996		√	Underflow piezometer (typically dry)
Burn Site Well	1986			Nonpotable production well
CYN-MW1D	1997	√	√	Bedrock groundwater well
CYN-MW2S	1997		√	Underflow piezometer (typically dry)
CYN-MW3	1999	√	√	Bedrock groundwater well
CYN-MW4	1999	√	√	Bedrock groundwater well
CYN-MW6	2006	√	√	Bedrock groundwater well
CYN-MW7	2006	√	√	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

NOTE: Check marks in the WQ and WL columns indicate WQ sampling and WL measurements were obtained during this reporting period.
WL = Water level.
WQ = Water Quality.

Previous monitoring reports include analytical results for CYN-MW5. Groundwater monitoring well CYN-MW5 was installed in 2001 as part of the investigation of Drain and Septic System (DSS) sites. This well was sampled for eight quarters as part of the DSS investigation and was then incorporated into the BSG study area investigation as a downgradient well. However, in its February 2005 letter, the NMED stated that it "will not consider monitoring well CYN-MW5 as a downgradient well because it is located over two miles away from the Burn Site" (NMED February 2005). Based on the NMED determination, CYN-MW5 has not been sampled since the third quarter of Fiscal Year (FY) 2005.

Since the initial discovery of nitrate at the BSG study area, numerous characterization activities have been conducted (Table 7-1). The results of these characterization activities are summarized in two versions of the *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Burn Site* (SNL June 2004a and April 2008a). These two versions of the BSG conceptual site model provide a comprehensive list of groundwater monitoring data sources used to support the summary of investigations.

In April 2004, a Compliance Order on Consent (the Order) became effective between the DOE, Sandia and the NMED. The Order specified the Burn Site as an area of groundwater contamination (NMED April 2004). In response to the Order, DOE/Sandia submitted the Corrective Measures Evaluation (CME) Work Plan for the BSG study area to the NMED in June 2004 (SNL June 2004b). Based on requirements stipulated by the NMED (discussed in Section 7.2), DOE/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 in 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 wells downgradient of CYN-MW1D (CYN-MW7 and CYN-MW8) were analyzed for nitrate.

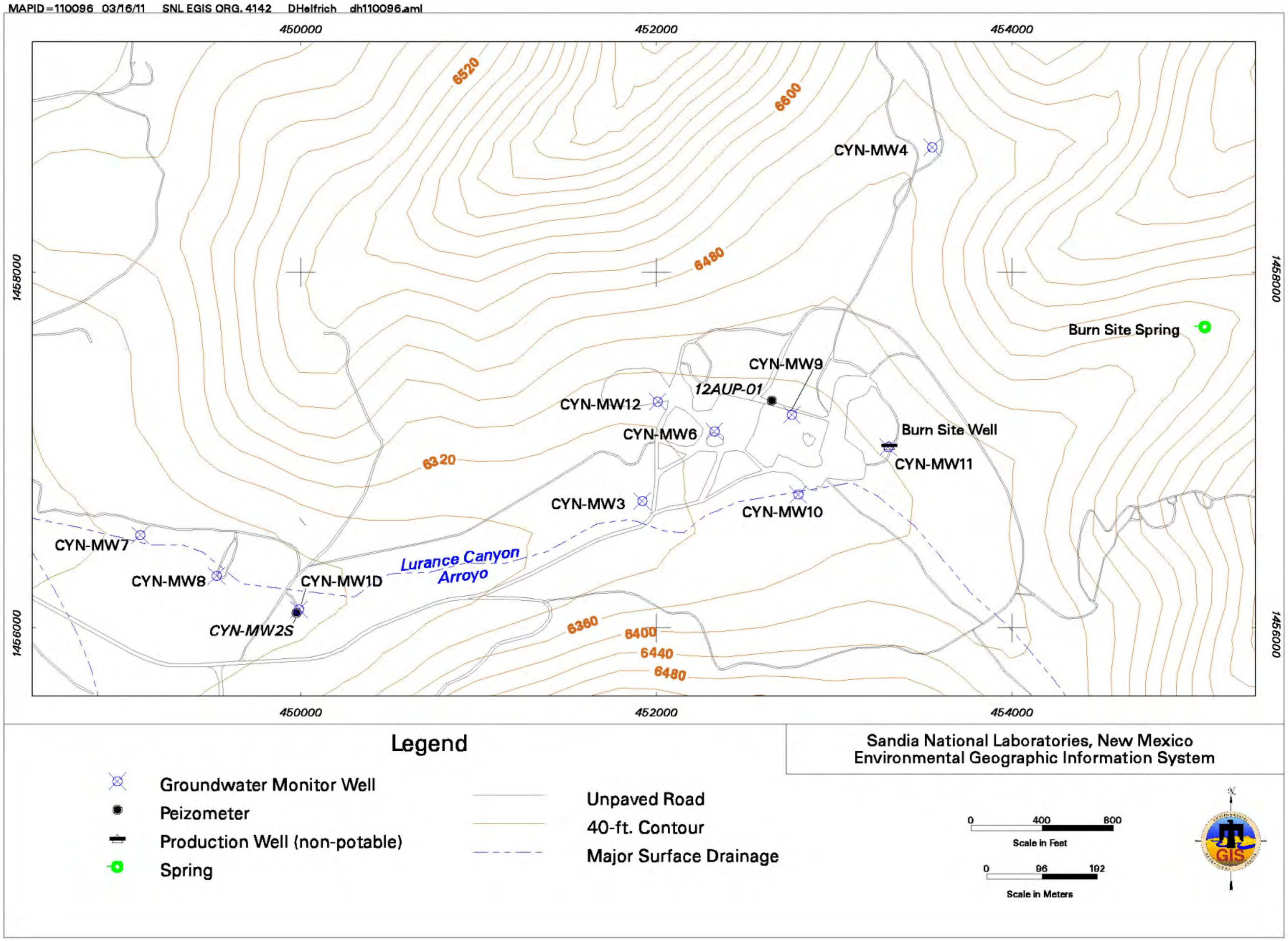

Figure 7-2. Wells and Piezometers in the Burn Site Groundwater Study Area (10 Active Wells)

Samples from the newly installed well adjacent to SWMU 94F (CYN-MW6) were analyzed for nitrate, total petroleum hydrocarbons (TPH) as gasoline range organics (GRO) and 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 (NMED April 2009), DOE/Sandia were required to further characterize the nature and extent of the perchlorate contamination at the BSG study area. DOE/Sandia prepared the BSG Characterization Work Plan (SNL/NM November 2009) that was approved by NMED (NMED February 2010). In July 2010, DOE/Sandia implemented the requirements of the work plan and installed four new groundwater monitoring wells (CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12) to determine the extent of groundwater contamination (Section 7.1.5). These four new wells were sampled for the first time in September 2010.

7.1.4 Current Monitoring Network

Currently 10 wells in the BSG study area are monitored for water quality, including CYN-MW1D, CYN-MW3, CYN-MW4, CYN-MW6, CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12 (Figure 7-2). Two shallow piezometers (12AUP-01 and CYN-MW2S) were installed in 1997 to determine whether any ephemeral flow was occurring at the alluvium-bedrock interface. Both piezometers have been predominately dry since installation.

7.1.5 Summary of Calendar Year Activities

The following activities took place for the BSG study area investigation during Calendar Year (CY) 2010 (January through December 2010):

- Semiannual groundwater sampling was conducted at six wells (CYN-MW1D, CYN-MW3, CYN-MW4, CYN-MW6, CYN-MW7, and CYN-MW8) in February/March 2010, May/June 2010, and September 2010.

- Quarterly groundwater sampling was conducted at four wells (CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12) in September 2010 and October/November 2010.

- The *Burn Site Groundwater Characterization Work Plan, Installation of Groundwater Monitoring Wells CYN-MW9, CYN-MW10, and CYN-MW11, Collection of Subsurface Soil Samples* (SNL November 2009) was conditionally approved by the NMED (February 2010).

- Subsurface soil sampling was completed in July 2010 at 10 deep soil boring locations to determine contaminant sources.

- Four groundwater monitoring wells (CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12) were installed in July 2010 to determine the extent of groundwater contamination.

- Semiannual reporting of perchlorate analyses for CYN-MW6 was conducted.

- Tables of analytical results (Attachment 7A), concentration versus time graphs (Attachment 7B), and hydrographs (Attachment 7C) were prepared in support of this report.

7.1.6 Summary of Future Activities

The following activities are anticipated for the BSG study area investigation during CY 2011:

- Quarterly groundwater sampling will be conducted at four wells (CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12) during CY 2011.
- Semiannual groundwater sampling will be conducted at six wells (CYN-MW1D, CYN-MW3, CYN-MW4, CYN-MW6, CYN-MW7, and CYN-MW8) during the second and fourth quarters of CY 2011.
- A report describing the subsurface soil sampling and well installation field activities will be prepared and submitted to the NMED.
- Semiannual reporting of perchlorate analyses for CYN-MW6 will be performed.

7.1.7 Current Conceptual Model

Groundwater flow in the BSG study area is controlled by the local geologic framework and structural features described in the following sections.

7.1.7.1 Regional Hydrogeologic Conditions

The Manzanita Mountains are composed of a complex sequence of uplifted Precambrian metamorphic and granitic units that were subjected to 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 of the testing facilities at a limestone outcrop. The permeability of the fractured bedrock units is low and well yields are minimal. Groundwater discharges to small ephemeral springs located at the base of the Manzanita Mountains approximately 3 miles west of the Burn Site. Additionally, some groundwater may discharge as underflow to unconsolidated sedimentary deposits of the Albuquerque Basin.

The Precambrian metamorphic rocks typically are fractured as a result of the long and complex history of regional deformation. Drill core data and exposures indicate that the fractures in shallow bedrock are filled with chemical precipitates such as calcium carbonate. The carbonate precipitation likely occurred when the water table was 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 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 well CYN-MW4. Nearby outcrops indicate that the fault displacement is approximately 160 ft.

The canyon floor at the BSG study area consists of unconsolidated alluvial fill deposits 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 borings drilled at the BSG study area.

7.1.7.2 Hydrogeologic Conditions at the BSG Study Area

When the Burn Site Well was drilled in 1986, the depth to groundwater-bearing strata was approximately 222 ft below ground surface. Following completion of the well in fractured bedrock, the water level rose approximately 150 ft due to positive head. The fractured rocks of the Manzanita Mountains are recharged by infiltration of precipitation, largely occurring from summer thundershowers and, to a lesser degree, winter snowfall on the higher elevations. Groundwater recharge is restricted by high evapotranspiration rates (losses to the atmosphere by evaporation and plant transpiration) and low permeability of the fractured bedrock.

Regionally, groundwater in the western Manzanita Mountains flows generally toward the west from a groundwater flow divide located east of the BSG study area (SNL November 2001). Westward groundwater flow across 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 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. Two piezometers (Figure 7-2) were constructed in Lurance Canyon to monitor moisture within the channel deposits at the contact with underlying Precambrian bedrock. No water was detected in either piezometer until September 2, 2004. After a series of rain events, between 1 and 2 inches of water was measured in 12AUP-01. The water level remained fairly constant through September 2004. However, more recent water level measurements show no measurable water in 12AUP-01. It is likely that significant saturation in the vadose zone occurs only after a series of significant rain events. Episodic accumulation of precipitation, as evidenced by the occurrence of water in the piezometer, 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 7-3 presents the current potentiometric surface for the BSG monitoring well network (October 2010). Groundwater elevations presented in this potentiometric surface map reflect new survey coordinates. Until recently, Environmental Restoration (ER) Operations (formerly ER Project) survey coordinates were based on the New Mexico State Plane Coordinate System, Central Zone, North American Datum of 1927 and Northern Geographic Vertical Datum of 1929 for elevations. In order to be consistent with current SNL/NM Facilities and KAFB survey practices, ER Operations survey data now

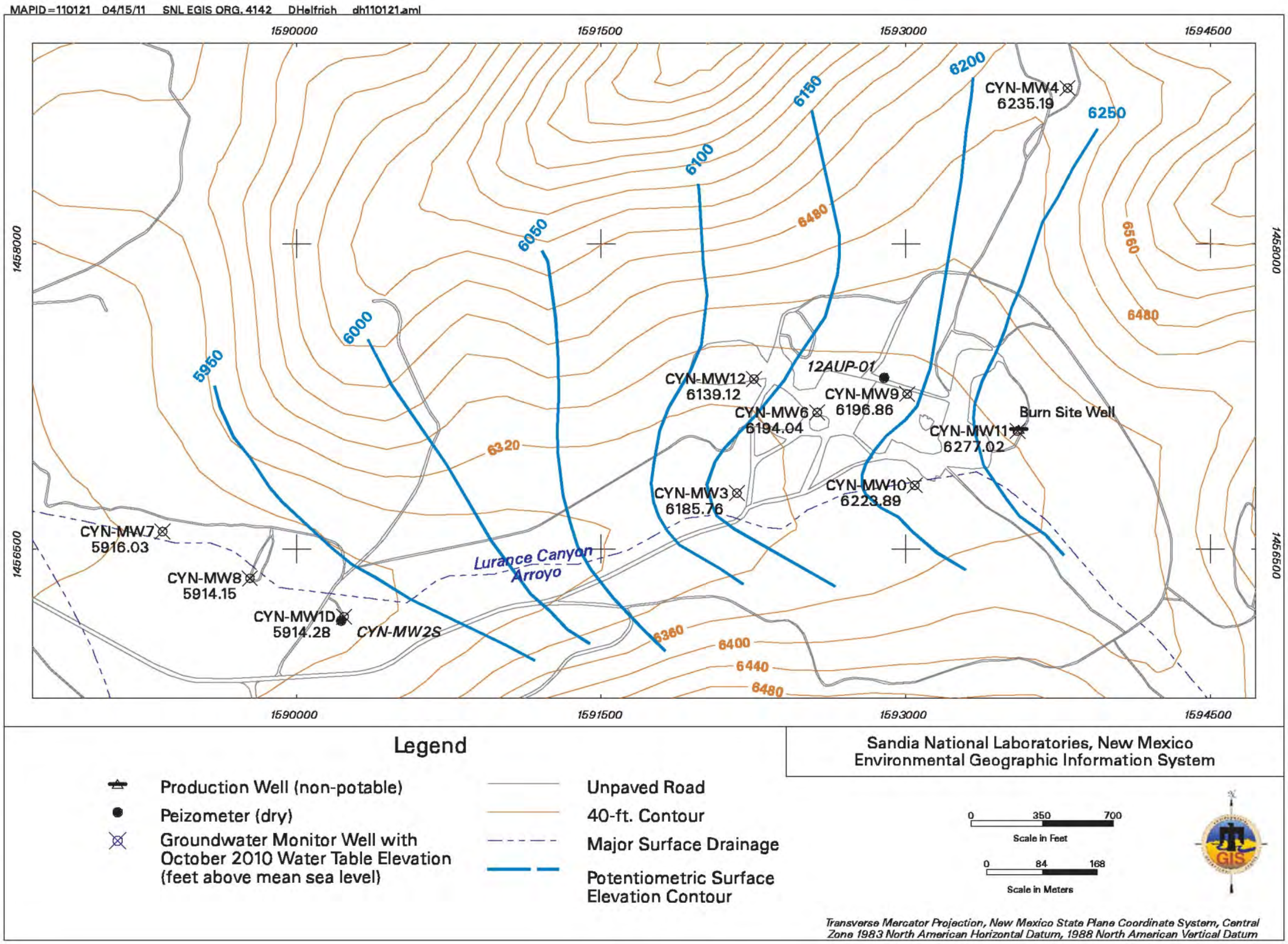

Figure 7-3. Burn Site Groundwater Potentiometric Surface Map (October 2010)

are based on New Mexico State Plane Coordinate System, Central Zone, North American Datum of 1983 (NAD83) and North American Vertical Datum of 1988 (NAVD88) coordinates. Location information for wells surveyed before August 2010 has been mathematically converted to the new NAD83/NAVD88 coordinates using National Geodetic Survey-approved software.

The general direction of groundwater flow beneath the BSG study area is to the west-southwest as indicated by the potentiometric surface. No water supply wells are located near the BSG study area, except for the Burn Site Well that is used only rarely (last pumped in 2003) for nonpotable applications such as fire suppression. Groundwater levels in the Paleozoic rocks near the BSG study area are not influenced by regional water supply well pumping from the basin-fill deposits of the Albuquerque Basin.

The apparent horizontal groundwater gradient based on BSG monitoring wells, piezometers, and springs varies from approximately 0.004 to 0.14 feet per foot (SNL April 2008a). The hydraulic gradient west of the BSG study area flattens substantially.

The wide range of hydraulic gradients in Lurance Canyon indicate that localized groundwater systems associated with brecciated fault zones in the low-permeability fractured bedrock at the BSG study area are poorly connected and are effectively compartmentalized. Limited groundwater flow velocity information is based on COC first-arrival estimates. Based on contaminant releases from SWMU 94F arriving at well CYN-MW1D, the minimum apparent velocity of the COCs is estimated to be approximately 160 ft/year (ft/yr) (SNL April 2008a). No information is available about vertical flow velocity within the fractured rocks at the BSG study area. However, vertical movement of water to the water table within the brecciated fault zones probably occurs as rapid, partially saturated to saturated flow. Filled fractures within the upper portion of metamorphic rock act as a semiconfined unit restricting vertical flow.

Water levels have been routinely monitored in BSG wells since 1999. Figures 7C-1 through 7C-4 (Attachment 7C) show groundwater levels in BSG wells that are completed in bedrock. No substantial seasonal variation in water levels is evident in these wells. The wide range of hydraulic gradients in Lurance Canyon and the lack of correlation between water level fluctuations in these wells support the assessment that the low-permeability fractured groundwater system at the BSG study area is poorly connected. Water level fluctuations may be a result of local heterogeneities in hydraulic properties related to the fractured system. The BSG monitoring wells have shown significant groundwater declines over the past three to four years, with decreases in water levels ranging from 0.7 to 2.8 ft/yr. Declining water levels may be due to reduced amounts of precipitation.

7.1.7.4 Contaminant Sources

Nitrate in the BSG study area may be derived from both natural and anthropogenic sources. The NMED-specified background concentration for nitrate in groundwater is 4 mg/L. Potential natural sources include the weathering of sedimentary rocks and atmospheric deposition. Evaporation and transpiration of rainwater that has infiltrated canyon alluvial sediments can increase nitrate concentrations. Potential anthropogenic nitrate sources include septic systems and the degradation of HE materials.

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.

SWMU 65 is located in the center of the BSG study area and contains open-air detonation areas where nitrate-based explosives were used. The detonations may have dispersed HE materials across the ground surface, and subsequent degradation (weathering) of these HE materials most likely released nitrate. SWMU 94 testing also involved burning HE material and propellants. Nitrate is highly soluble in water, and precipitation can enhance the migration of nitrate to groundwater. In addition to nitrate, petroleum products were detected in soil samples; therefore, the potential for petroleum products in groundwater required further evaluation.

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 wells CYN-MW1D (December 1997), CYN-MW3 (June 1999), CYN-MW6 (February 2006), CYN-MW9, CYN-MW10, and CYN-MW12 (July 2010), nitrate concentrations that exceed the MCL have been consistently detected in samples from these six wells. Nitrate concentrations in samples from CYN-MW11 are near or just above the MCL. Nitrate concentrations in groundwater samples from wells CYN-MW4, CYN-MW7, and CYN-MW8 have not exceeded the MCL.

Nitrate concentrations in groundwater samples from the Burn Site Well decreased from 24.3 mg/L in 1996 to 5.5 mg/L in 2001. Concentrations in groundwater samples from well CYN-MW6, approximately 1,000 ft downgradient of the Burn Site Well, have ranged from 22.9 to 39.9 mg/L since 2006. Concentrations in groundwater samples from well CYN-MW3, located approximately 1,400 ft downgradient of the Burn Site Well, have ranged from less than 5 to 15 mg/L since 1999. Nitrate concentrations have increased from approximately 10 to more than 25 mg/L from 1998 to 2008 in groundwater samples from well CYN-MW1D, located approximately 3,400 ft downgradient of the Burn Site Well.

Potential downgradient receptors for the nitrate plume are Coyote Springs, approximately 3 miles west of the study area, and the City of Albuquerque (COA) and KAFB well fields, approximately 12 miles to the west-northwest of the study area. Numerical simulations suggest nitrate concentrations will be decreasing in groundwater to below the MCL at Coyote Springs and to below MDLs through dispersion and dilution as the plume moves into the more hydraulically conductive Ancestral Rio Grande deposits west of Coyote Springs. Numerical simulations also show that contaminant travel times exceed 600 years from the study area to the COA and KAFB well fields (SNL May 2005).

7.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM ER Operations as well as implements and enforces federal regulations mandated by the Resource Conservation and Recovery Act (RCRA). All ER SWMUs and Areas of Concern (AOCs) are listed in Module IV of the SNL/NM RCRA Part B Operating Permit, *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA for Sandia National Laboratories* (NMED 1993).

All investigations and corrective action requirements pertaining to SWMUs and AOCs are contained in the Order (NMED April 2004). The groundwater monitoring activities for BSG are not associated with a single SWMU but are more regional in nature. Before the effectiveness of the Order in April 2004, groundwater investigations at the BSG study area had been conducted voluntarily by ER Operations.

Initially, groundwater monitoring for the BSG was initiated to satisfy the requirements of the SNL/NM HSWA permit for characterization of SWMUs. The Order transferred regulatory authority for corrective action requirements from the HSWA module to the Order. The BSG investigation must comply with requirements set forth in the Order for site characterization and the development of a CME.

In response to the Order, DOE/Sandia submitted the following two documents to the NMED: (1) *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Burn Site* (SNL June 2004a), and (2) *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 provides a description and justification of which remedial alternatives were considered and the methods and criteria to be used in the evaluation. The CME Work Plan was completed to comply with requirements set forth in the Order and with the guidance of the RCRA Corrective Action Plan (EPA 1994).

On March 1, 2005, the DOE and Sandia received a letter from the NMED (February 2005) that rejected the CME Work Plan and stipulated the following requirements:

- DOE/Sandia must prepare and submit an IMWP within 90 days from the receipt of the letter (by May 30, 2005).

- The NMED requires additional characterization of the nitrate-contaminated groundwater near the BSG study area. Specifically, the downgradient extent of groundwater with nitrate concentrations greater than 10 mg/L shall be determined.

- The NMED does not accept the *Corrective Measures Evaluation Work Plan for Sandia National Laboratories/New Mexico Burn Site* (SNL June 2004b) because it is not satisfied with the existing characterization of nitrate-contaminated groundwater near the BSG study area.

- The NMED also requires the installation of one additional monitoring well "adjacent to SWMU-94F in order to establish groundwater conditions in this petroleum-contamination source area."

The DOE and Sandia submitted an IMWP to the NMED in May 2005 that proposed the installation of additional groundwater monitoring wells to characterize the extent of nitrate contamination in the bedrock aquifer downgradient of 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: (1) provide data to support the CME; (2) monitor the migration of the nitrate plume in order to provide an early warning system to trigger an action if a danger to downgradient ecological receptors (Coyote Springs) becomes apparent; and (3) 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 included the following reports as attachments: (1) Remedial Alternatives Data Gaps Review, (2) Nitrate Source Evaluation, and (3) Evaluation of Contaminant Transport. The Data Gaps Review document included detailed definitions of remedial alternatives and a preliminary evaluation of remedial alternatives with the purpose of identifying data gaps. 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 (SNL May 2005).

Data collected as part of additional characterization required by the IMWP 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 was developed to address the concerns outlined in the letter from the NMED (February 2005) and to comply with requirements of the Order. The work plan provides information and data gathered during interim measures and performance and compliance goals and objectives for the remediation of the BSG.

A letter was received from the NMED by DOE/Sandia on April 30, 2009, entitled, *Perchlorate Contamination in Groundwater, Sandia National Laboratories, EPA ID #NM5890110518* (NMED April 2009). The NMED's 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 states that DOE/Sandia must characterize the nature and extent of the perchlorate contamination at the BSG study area and submit to the NMED a plan for such characterization. DOE/Sandia met with the NMED in June and July 2009 (SNL June 2009b and July 2009) and submitted a letter requesting an extension to November 30, 2009 (DOE July 2009). The results of the discussions at the June and July meetings (SNL June 2009b and July 2009) have been incorporated into the BSG Characterization Work Plan (SNL/NM November 2009).

In February 2010, DOE/Sandia received notice of conditional approval for the November 2009 BSG Characterization Work Plan (NMED February 2010). In July 2010, DOE/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/Sandia submitted an extension request for the BSG CME Report in September 2010 (SNL September 2010), which was approved by the NMED (October 2010).

In this report, BSG monitoring data are being presented for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (gamma spectroscopy, gross/beta activity, and tritium) are provided voluntarily by the DOE/Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Order. Additional information on radionuclides and the scope of the Order is available in Section III.A of the Order (NMED April 2004).

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 activity discussed in this section is groundwater monitoring sampling and analysis, including the February/March through October/November 2010 sampling events (Table 7-3). The analytical parameters for each well and each sampling event are listed in Table 7-4.

Quality control (QC) samples are collected in the field at the time of environmental sample collection. Field QC samples include duplicate samples, split samples, equipment blank (EB), field blank (FB), and trip blank (TB) samples. Duplicate samples are used to measure the precision of the sampling process. Split samples are used to verify the performance of the analytical laboratory. EB samples are used to verify the effectiveness of sampling equipment decontamination procedures. FB samples provide a check for potential ambient sources of sample contamination during the sampling process and/or sampling error. TB samples are used to determine whether volatile organic compounds (VOCs) contaminated the sample during preparation, transportation, and handling prior to receipt by the analytical laboratory.

Table 7-3. Groundwater Monitoring Well Network and Sampling Dates for the Burn Site Groundwater Study Area, Calendar Year 2010

Date of Sampling Event	Wells Sampled[1]		SAP
February and March 2010	CYN-MW1D CYN-MW3 CYN-MW4 CYN-MW6 CYN-MW7 CYN-MW8		*Burn Site Groundwater Monitoring, Mini-SAP for Second Quarter Fiscal Year 2010* (SNL February 2010)
May and June 2010	CYN-MW1D CYN-MW3 CYN-MW4 CYN-MW6 CYN-MW7 CYN-MW8		*Burn Site Groundwater Monitoring, Mini-SAP for Third Quarter Fiscal Year 2010* (SNL May 2010)
September 2010	CYN-MW1D CYN-MW3 CYN-MW4 CYN-MW6 CYN-MW7	CYN-MW8 CYN-MW9 CYN-MW10 CYN-MW11 CYN-MW12	*Burn Site Groundwater Monitoring, Mini-SAP for Fourth Quarter Fiscal Year 2010* (SNL August 2010)
October and November 2010	CYN-MW9 CYN-MW10 CYN-MW11 CYN-MW12		*Burn Site Groundwater Monitoring, Mini-SAP for First Quarter Fiscal Year 2011* (SNL October 2010b)

NOTE: [1] Refer to page xviii of this report for well descriptions.
SAP = Sampling and analysis Plan.
SNL = Sandia National Laboratories.

Table 7-4. Parameters Sampled at Burn Site Groundwater Study Area Wells(1) for Each Sampling Event, Calendar Year 2010

Parameter	February/March 2010
NPN TPH-DRO TPH-GRO	CYN-MW1D CYN-MW3 CYN-MW4 CYN-MW6 CYN-MW7 CYN-MW7 (dup) CYN-MW8
Perchlorate	CYN-MW6
Parameter	**May/June 2010**
TPH-GRO	CYN-MW1D CYN-MW3 CYN-MW4 CYN-MW6 CYN-MW7 CYN-MW7 (dup) CYN-MW8
Parameter	**September 2010**
Anions Bicarbonate/carbonates Cations Gamma Spec* Gross Alpha Gross Beta Isotopic Uranium NPN TAL Metals, plus Total Uranium TPH-DRO TPH-GRO Tritium VOCs	CYN-MW1D CYN-MW3 CYN-MW4 CYN-MW4 (dup) CYN-MW6 CYN-MW7 CYN-MW8 CYN-MW9 CYN-MW9 (dup) CYN-MW10 CYN-MW11 CYN-MW12
SVOCs HE	CYN-MW9 CYN-MW9 (dup) CYN-MW10 CYN-MW11 CYN-MW12
Perchlorate	CYN-MW6 CYN-MW9 CYN-MW9 (dup) CYN-MW10 CYN-MW11 CYN-MW12
Parameter	**October/November 2010**
HE NPN Perchlorate SVOCs TPH-DRO TPH-GRO VOCs	CYN-MW9 CYN-MW10 CYN-MW10 (dup) CYN-MW11 CYN-MW12

NOTE: (1) Refer to page xviii of this report for well descriptions.

DRO = Diesel range organics.
dup = duplicate sample.
Gamma Spec* = Gamma spectroscopy short list (Americium-241, Cesium-137, Cobalt-60, and Potassium-40).
GRO = Gasoline range organics.
HE = High explosives.
NPN = Nitrate plus nitrate (reported as nitrogen).
SVOC = Semivolatile organic compound.
TAL = Target Analyte List.
TPH = Total petroleum hydrocarbons.
VOC = Volatile organic compound.

7.4 Field Methods and Measurements

The monitoring procedures, as conducted by ER Operations personnel, are consistent with procedures identified in the EPA technical enforcement guidance document (EPA 1986). The following sections provide an overview of the sampling and data collection procedures.

7.4.1 Groundwater Elevation

Throughout CY 2010, water level measurements were obtained to determine groundwater flow directions, hydraulic gradients, and changes in water table elevations. Water levels are periodically measured in BSG monitoring wells according to the instructions and requirements specified in SNL/NM Field Operating Procedure (FOP) 03-02, *Groundwater Level Data Acquisition and Management,* Rev. 02 (SNL November 2007). The water level information was used to create the potentiometric surface map presented in Figure 7-3 and the hydrographs presented in Figures 7C-1 through 7C-4 (Attachment 7C).

7.4.2 Well Purging and Water Quality Measurements

A portable Bennett™ groundwater sampling system was used to collect the groundwater samples from BSG wells. The wells are purged a minimum of one saturated screen volume. Field water quality measurements for turbidity, pH, temperature, specific conductance (SC), oxidation-reduction potential (ORP), and dissolved oxygen (DO) were recorded from the well, prior to the collection of groundwater samples according to SNL/NM FOP 05-01 (SNL August 2007a). Groundwater temperature, SC, ORP, DO, and pH were measured using a YSI™ Model 620 water quality meter. Turbidity was measured with a HACH™ Model 2100P portable turbidity meter.

The amount of water required to achieve stability of field parameters is fairly consistent. However, the ability of the bedrock units to produce water varies greatly from well to well. In accordance with the Mini-Sampling and Analysis Plans (SAPs) (Table 7-3), purging continued until four stable measurements for temperature, SC, pH, and turbidity were obtained.

Groundwater stability is considered acceptable when turbidity measurements are within 10 percent of 5 nephelometric turbidity units, pH is within 0.1 units, temperature is within 1.0 degrees 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 Records Center.

7.4.3 Pump Decontamination

A portable Bennett™ sampling pump and tubing bundle were decontaminated prior to installation into monitoring wells according to procedures described in *Long-Term Environmental Stewardship Groundwater Sampling Equipment Decontamination,* SNL/NM FOP 05-03 (SNL August 2007b). An EB or rinsate sample was collected to verify the effectiveness of the equipment decontamination process.

7.4.4 Sample Collection Sampling Procedures

Groundwater samples are collected using the Bennett™ nitrogen gas-powered portable piston pump. Sample bottles are filled directly from the pump discharge line, with the VOC samples collected at the lowest achievable discharge rate. The alluvial piezometers have continued to be dry, and no groundwater samples have ever been collected from these piezometers.

7.4.5 Sample Handling and Shipment

The SNL/NM Sample Management Office (SMO) processes environmental samples collected by ER Operations personnel. The SMO reviews the Mini-SAPs, orders sample containers, issues sample control and tracking numbers, tracks the chain-of-custody, and reviews analytical results returned from the laboratories for laboratory contract compliance (SNL March 2003b and April 2007). All groundwater samples are analyzed by off-site laboratories using EPA-specified protocols.

QC samples are also prepared at the laboratory to determine whether contaminant chemicals are introduced in laboratory processes and procedures. These include method blanks, laboratory control samples, matrix spike, matrix spike duplicate, and surrogate spike samples. Reported laboratory analytical and QC data are reviewed against quality assurance requirements specified in the *Procedure for Completing the Contract Verification Review,* SMO-05-03, Issue 03 (SNL April 2007) and Administrative Operating Procedure (AOP) 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL July 2007).

7.4.6 Waste Management

Purge and decontamination water generated from sampling activities were placed into 55-gallon containers and stored at the ER Operations Field Office waste accumulation area. All waste was managed in accordance with FOP 05-04 (SNL August 2007c) as nonregulated waste, based on historical sampling results and process knowledge of the monitoring well location. Results for associated environmental samples provide supplemental data for approval to discharge water to the sanitary sewer. All data were compared with COA discharge limits.

7.5 Analytical Methods

Groundwater samples were submitted to GEL Laboratories, Inc. (GEL) for analysis. Samples were analyzed in accordance with applicable EPA analytical methods (Tables 7-5 and 7-6), including the following:

- *The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0* (EPA 1983).

- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* SW-846, 3rd ed., Rev. 1 (and updates) (EPA 1996).

- *Perchlorate in Drinking Water Using Ion Chromatography* (EPA 1999).

- *Prescribed Procedures for Measurement of Radioactivity in Drinking Water,* EPA-600/4-80-032 (EPA 1980).

Table 7-5. Burn Site Groundwater Study Area Chemical Analytical Methods

Analyte	Analytical Method[a,b,c]
Anions	SW846-9056
Bicarbonate/carbonates	SM 2320B
Cations	SW846-6020
HE	SW846-8321A Mod
NPN	EPA 353.2
Perchlorate	EPA 314.0
SVOCs	SW846-8270
TAL Metals, plus Total Uranium	SW846-6020/7470
TPH Diesel Range Organics	SW846-8015
TPH Gasoline Range Organics	SW846-8015
VOCs	SW846-8260

NOTES:
[a]U.S. Environmental Protection Agency, 1996, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed., Rev. 1, U.S. Environmental Protection Agency, Washington, D.C.
[b]U.S. Environmental Protection Agency, 1983, *The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0*, EPA-600/4-84-017.
[c]U.S. Environmental Protection Agency, 1999, *Perchlorate in Drinking Water Using Ion Chromatography*, EPA 815/R-00-014.
EPA = U.S. Environmental Protection Agency.
HE = High explosives.
NPN = Nitrate plus nitrite (reported as nitrogen).
SW = Solid waste.
SVOC = Semi volatile organic compound.
TAL = Target Analyte List.
TPH = Total petroleum hydrocarbons.
VOC = Volatile organic compound.

Table 7-6. Burn Site Groundwater Study Area Radiochemical Analytical Methods

Analyte	Analytical Method[a]
Gamma Spectroscopy (short list)	EPA 901.0
Gross Alpha/Beta	EPA 900.0
Isotopic Uranium	ASTM D3972-09M
Tritium	EPA 906.0

NOTES:
[a]U.S. Environmental Protection Agency, 1980. *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*, EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.
EPA = U.S. Environmental Protection Agency.

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 2010 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.

A summary of detected VOC and semivolatile organic compound (SVOC) results is presented in Table 7A-1. The MDLs for all analyzed VOCs and SVOCs are listed in Table 7A-2. The only VOC detected was carbon disulfide (Table 7A-1). Carbon disulfide was reported at concentrations of 1.58 J (where "J" is an estimated value below the laboratory practical quantitation limit) for samples from monitoring well CYN-MW1D. No HE compounds were detected. The MDLs for all analyzed HE compounds are listed in Table 7A-3.

The analytical results for nitrate plus nitrite (NPN) (reported as nitrogen) are presented in Table 7A-4. NPN results exceed the MCL of 10 mg/L in samples from CYN-MW1D, CYN-MW3, CYN-MW6, CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12. NPN concentrations in samples from the other BSG wells are less than the MCL (Table 7A-4). For CY 2010, the NPN concentrations for wells exceeding the MCL are summarized as follows:

- CYN-MW1D had reported concentrations of 13.4 mg/L (February 2010), 12.4 mg/L (February 2010, reanalysis), and 12.2 mg/L (September 2010). The historical range of NPN concentrations for CYN-MW1 is less than 1 to 28 mg/L with highly variable fluctuations in concentrations and a slightly decreasing trend (Figure 7B-1).

- CYN-MW3 had reported concentrations of 10.4 mg/L (March 2010) and 12.0 mg/L (September 2010). The historical range of NPN concentrations for CYN-MW3 is approximately 4 to 15 mg/L with a slightly decreasing trend (Figure 7B-2).

- CYN-MW6 had reported concentrations of 35.8 mg/L (March 2010) and 29.9 mg/L (September 2010). The historical range of NPN concentrations for CYN-MW6 is approximately 23 to 40 mg/L with an overall increasing trend (Figure 7B-3).

- CYN-MW9 had reported concentrations of 30.1 mg/L (September 2010), 30.1 mg/L (September 2010, duplicate), and 36.6 mg/L (October 2010). Two sampling events are insufficient to determine a trend (Figure 7B-4).

- CYN-MW10 had reported concentrations of 11.0 mg/L (September 2010), 11.4 mg/L (November 2010), and 11.4 mg/L (November 2010, duplicate). Two sampling events are insufficient to determine a trend (Figure 7B-5).

- CYN-MW11 had reported concentrations of 10.0 mg/L (September 2010) and 10.6 mg/L (November 2010). Two sampling events are insufficient to determine a trend (Figure 7B-6).

- CYN-MW12 had reported concentrations of 12.2 mg/L (September 2010) and 14.4 mg/L (November 2010). Two sampling events are insufficient to determine a trend (Figure 7B-7).

The results for TPH are listed for TPH-DRO and TPH-GRO in Table 7A-5. No MCLs have been established for TPH-DRO or TPH-GRO. No detections of TPH-DRO were reported for any of the samples collected during the CY 2010 sampling events. Detections of TPH-GRO were reported for the February sampling event, with values ranging from 17.8 to 30.5 µg/L. However, all TPH–GRO results were rejected during data validation, which initiated an additional round of sampling for TPH–GRO in June 2010. All TPH–GRO results for the June and September 2010 sampling events were qualified as not detected during data validation. All TPH-GRO results for the October/November 2010 samples were not detected (Table 7A-5).

The analytical results for anions, cations, and alkalinity are presented in Table 7A-6. None of the analytes exceed MCLs, where established.

Perchlorate was not detected above the MDL of 4 µg/L in any of the samples collected from the new wells CYN-MW9, CYN-MW10, CYN-MW11, or CYN-MW12. Perchlorate was detected above the MDL of 4 µg/L in samples collected from CYN-MW6 (Table 7A-7). Perchlorate concentrations for the samples from CYN-MW6 are estimated values and range from 4.59 J to 6.14 J μg/L. Currently, no MCL is established for perchlorate. However, perchlorate is a COC for the BSG study area because it exceeds the NMED-specified screening level/MDL of 4 μg/L (NMED April 2004). Figure 7B-8 (Attachment 7B) shows that the perchlorate concentration in this well has historically exceeded the screening level/MDL of 4 μg/L, but exhibits a slightly decreasing trend.

Total metal results are presented in Table 7A-8. No metals exceed established MCLs.

Groundwater samples were analyzed for tritium, gross alpha/beta activity, and gamma spectroscopy. The results are presented in Table 7A-9. All radionuclide activities are below MCLs, where established. Gamma spectroscopy analysis detected no isotopes above the associated minimum detectable activity.

Field water quality parameters are measured during sample purging of each well prior to sampling and include temperature, SC, ORP, pH, turbidity, and DO. 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 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 chemical data were reviewed and qualified in accordance with AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL July 2007). Although some analytical results were qualified during the data validation process, no significant data quality problems were noted for BSG COCs. Data validation qualifiers are provided with the analytical results in Tables 7A-1 through 7A-9 (Attachment 7A). The data validation report associated with each sampling event has been submitted to the SNL/NM Customer Funded Records Center. The following sections discuss site-specific QC results for the BSG quarterly sampling events.

7.7.1 Field Quality Control Samples

Field QC samples included environmental duplicate, EB, and TB, and FB samples. The field QC samples were submitted for analysis along with the groundwater samples in accordance with QC procedures specified in the Mini-SAPs (SNL February 2010, May 2010, August 2010, and October 2010b).

7.7.1.1 Duplicate Environmental Samples

Duplicate environmental samples were analyzed in order to estimate the overall reproducibility of the sampling and analytical process. A duplicate sample is collected immediately after the original environmental sample in order to reduce variability caused by time and/or sampling mechanics. The results of duplicate sample analyses (detected parameters only) are used to calculate relative percent difference (RPD) values. Duplicate sample results show good correlation (RPD values less than 20) for all calculated parameters.

7.7.1.2 Equipment Blank Samples

A portable Bennett™ groundwater sampling system was used to collect groundwater samples in all wells. The sampling pump and tubing bundle were decontaminated prior to installation into monitoring wells according to procedures described in SNL/NM FOP 05-03 (SNL August 2007b). An EB or rinsate sample was collected to verify the effectiveness of the equipment decontamination process. The results of the EB sample analyses are as follows:

- **February/March 2010 Sampling Event at CYN-MW7**—An EB sample was collected prior to sampling and analyzed for NPN, TPH-DRO, and TPH-GRO. The results for the February 2010 sample showed detections of NPN and TPH-GRO. NPN was reported at a concentration of 0.0885 mg/L, but this result was qualified as not detected during data validation due to associated laboratory method blank contamination. The result for TPH-GRO was qualified as unusable during data validation.

- **May/June 2010 Sampling Event at CYN-MW7**—The EB sample was collected prior to sampling CYN-MW7 and analyzed for NPN, TPH-DRO, and TPH-GRO. No parameters were detected above the associated laboratory MDLs.

- **September 2010 Sampling Events at CYN-MW4 and CYN-MW9**—The EB samples were collected prior to sampling CYN-MW4 and CYN-MW9 and analyzed for all parameters. Bromodichloromethane, bromoform, carbon disulfide, chloroform, chloromethane, dibromochloromethane, and toluene were detected above the laboratory MDLs. No corrective action was necessary as these compounds were not detected in the associated environmental samples. Inorganic analytes detected in the EB samples included antimony, calcium, copper, chloride, sodium, and zinc. No corrective action was required for antimony, calcium, chloride, and sodium as the associated sampling results were greater than five times the EB result. The results for copper in CYN-MW9 samples and zinc in CYN-MW4 samples were qualified as not detected during data validation as these parameters were detected in the EB samples at concentrations less than five times the environmental sampling results.

- **October/November 2010 Sampling Events at CYN-MW10**—The EB sample was collected prior to sampling CYN-MW10 and analyzed for all parameters. Bromodichloromethane, chloroform, and dibromochloromethane were detected above the laboratory MDLs. No corrective action was necessary as these compounds were not detected in the associated environmental sample.

7.7.1.3 Trip Blank Samples

TB samples are submitted whenever samples are collected for VOC analysis to assess whether contamination of the samples has occurred during shipment and storage. The TB samples consist of laboratory reagent grade water with hydrochloric acid preservative contained in 40-milliliter volatile organic analysis vials prepared by the analytical laboratory, which accompany the empty sample containers supplied by the laboratory. The TBs were brought to the field and accompanied each sample shipment.

- **May/June 2010 Sampling Event**—Due to detections of TPH-GRO in environmental samples, seven TB samples were submitted for TPH-GRO analysis during the May/June 2010 resampling event. TPH-GRO was detected above the MDL in the TB samples associated with CYN-MW4, CYN-MW6, and CYN-MW7. No corrective action was required for the CYN-MW6 TB sample result as TPH-GRO was not detected in the environmental sample. The result for the TB sample associated with CYN-MW4 was qualified as not detected during data validation due to associated laboratory method blank contamination. TPH-GRO was detected in the TB sample associat4ed with CYN-MW7 at a concentration of 30.6 μg/L; however, as this result is greater than the results for the environmental and duplicate samples, the results for both the CYN-MW7 environmental and duplicate samples were qualified as not detected during data validation.

- **September 2010 Sampling Event**—A total of 12 TB samples were submitted with the September 2010 samples. Chloromethane was detected above the MDL in the TB samples associated with CYN-MW4, CYN-MW7, and CYN-MW10. No corrective action was necessary as the compound was not detected in associated environmental samples. TPH-GRO was detected in all TB samples at concentrations ranging from 11.0 to 31.3 μg/L. Therefore, the results for environmental samples with detected TPH-GRO at concentrations less than five times the TB concentration were qualified as not detected during data validation.

- **October/November 2010 Sampling Event**—A total of five VOC and TPH-GRO TB samples were submitted with the October/November 2010 samples. Chloromethane and toluene were detected above the MDL in various TB samples. TPH-GRO was detected in the TB sample associated with CYN-MW12 at a concentration 11.0 μg/L. No corrective action was necessary as these compounds were not detected in associated environmental samples.

7.7.1.4 Field Blank Samples

FB samples were collected to assess whether contamination of the samples resulted from ambient field conditions. The FB samples were prepared by pouring deionized water into sample containers at a sampling point to simulate the transfer of environmental samples from the sampling system to the sample container.

- **May/June 2010 Sampling Event**—An FB sample was collected at the CYN-MW6 sampling point. TPH-DRO was detected above the laboratory MDL, but no corrective action was necessary as TPH-DRO was not detected in the associated CYN-MW6 environmental sample.

- **September 2010 Sampling Event**—An FB sample was collected at the CYN-MW12 sampling point. The VOC compounds bromodichloromethane, chloroform, and dibromochloromethane were detected above laboratory MDLs. No corrective action was necessary as these compounds were not detected in the associated CYN-MW12 environmental sample.

- **October/November 2010 Sampling Event**—An FB sample was collected at the CYN-MW10 sampling point. The VOC compounds bromodichloromethane, chloroform, and dibromochloromethane were detected above laboratory MDLs. No corrective action was necessary as these compounds were not detected in the associated environmental sample.

7.7.2 Laboratory Quality Control Samples

Internal laboratory QC samples, including method blanks and duplicate laboratory control samples were analyzed concurrently with all groundwater samples. All chemical data were reviewed and qualified in accordance with AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL July 2007). Laboratory data qualifiers are provided with the analytical results in Tables 7A-1 through 7A-9 (Attachment 7A).

7.8 Variances and Nonconformances

No variances or nonconformances from field or sampling requirements specified in the BSG monitoring Mini-SAPs (SNL February 2010, May 2010, August 2010, and October 2010b) occurred during sampling activities. The following project-specific issues associated with the CY 2010 sampling events for BSG occurred:

- **February/March 2010 Sampling Event**—Monitoring well CYN-MW6 was purged dry, allowed to recover, and then sampled to collect the most representative groundwater sample possible. TPH-GRO results were qualified as unusable and the following additional tests were performed. SNL/NM personnel collected several field QC samples including FB, TB, and EB samples in May 2010. SNL/NM submitted the samples to GEL with several empty 40-milliliter vials and various laboratory-prepared TB samples for analysis. Siloxane compounds detected in various samples have been attributed to the sample containers and acid preservative.

- **September 2010 Sampling Event—**SNL/NM field team members did not include TB samples specific for TPH-GRO analysis. SNL/NM contacted GEL and requested that TPH-GRO TB analysis be performed using extra volume from the VOC TB samples. The error was not discovered until completion of several analyses, and GEL reanalyzed the samples from CYN-MW4, CYN-MW7, and CYN-MW8 outside holding time requirements. Request for data validation of the CYN-MW3 anion reanalysis was not initially performed by SNL/NM SMO personnel. Data validation for the reanalysis was completed in December 2010.

7.9 Summary and Conclusions

This section provides a brief summary of activities, discussion of COCs that exceed standards, trends of concentrations versus time, the current conceptual site model, and plans for studies to be completed during CY 2011 at the BSG study area.

The BSG study area is located in the vicinity of the active Lurance Canyon Burn Site facility. Groundwater investigations were initiated in 1997 at the request of the NMED after elevated nitrate levels were discovered in the nonpotable Burn Site Well. The study area currently consists of 10 monitoring wells. Wells were sampled during February/March 2010, May/June 2010, September 2010, and October/November 2010. The samples were analyzed for VOCs, SVOCs, HE, TPH-DRO, TPH-GRO, anions, NPN, Target Analyte List metals (plus uranium), anions, bicarbonate/carbonates, cations, gross alpha/beta activity, tritium, and radionuclides by gamma spectroscopy. As required by the NMED, semiannual sampling for perchlorate was conducted at CYN-MW6, and quarterly sampling for perchlorate was conducted at the four new monitoring wells CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12.

Only NPN was detected at concentrations exceeding the MCL of 10 mg/L in samples from the following BSG study area wells: CYN-MW1D, CYN-MW3, CYN-MW6, CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12. The maximum concentration reported was 36.6 mg/L in the sample collected from CYN-MW9 during the October 2010 sampling event. For CY 2010, the NPN concentrations for samples from wells exceeding the MCL are summarized as follows:

- CYN-MW1D had reported concentrations of NPN at 13.4, 12.4, and 12.2 mg/L. The historical range of NPN concentrations for CYN-MW1 is less than 1 to 28 mg/L with highly variable fluctuations in concentrations and a slightly decreasing trend.

- CYN-MW3 had reported concentrations of NPN at 10.4 and 12.0 mg/L. The historical range of NPN concentrations for CYN-MW3 is approximately 4 to 15 mg/L with a slightly decreasing trend.

- CYN-MW6 had reported concentrations of NPN at 35.8 and 29.9 mg/L. The historical range of NPN concentrations for CYN-MW6 is approximately 23 to 40 mg/L with an overall increasing trend.

- CYN-MW9 had reported concentrations of NPN at 30.1, 30.1, and 36.6 mg/L.

- CYN-MW10 had reported concentrations of NPN at 11.0, 11.4, and 11.4 mg/L.

- CYN-MW11 had reported concentrations of NPN at 10.0 and 10.6 mg/L.

- CYN-MW12 had reported concentrations of NPN at 12.2 and 14.4 mg/L.

The analytical results for this reporting period are consistent with historical concentrations. The current conceptual model described in Section 7.1.7 does not require modification based on the analytical results for this reporting period.

During CY 2011, semiannual groundwater sampling will continue at six of the BSG study area wells (CYN-MW1D, CYN-MW3, CYN-MW4, CYN-MW6, CYN-MW7, and CYN-MW8) during the second and fourth quarters of FY 2011. Quarterly groundwater sampling will continue at the four new BSG study area wells (CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12) during CY 2011. In addition, the subsurface soil sampling and well installation field report will be submitted to the NMED.

7.10 References

Brown et al. 1999 Brown, C.L., K.E. Karlstrom, M. Heizler, and D. Unruh, 1999. *Paleoproterozoic deformation, metamorphism, and 40Ar/39Ar thermal history of the 1.65-Ga Manzanita Pluton, Manzanita Mountains, New Mexico,* in New Mexico Geological Society 50th Annual Fall Field Conference, Albuquerque Geology, pp. 255–68.

DOE July 2009 U.S. Department of Energy, 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.

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 1996 U.S. Environmental Protection Agency (EPA), 1996. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* SW-846, 3rd ed., Rev. 1 (and updates), U.S. Environmental Protection Agency, Washington, D.C.

EPA 1994 U.S. Environmental Protection Agency (EPA), 1994. *RCRA Corrective Action 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.

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, Washington, D.C.

EPA 1980 U.S. Environmental Protection Agency, 1980. *Prescribed Procedures for Measurement of Radioactivity in Drinking Water,* EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.

National Weather Service 2002 National Weather Service, 2002. *New Mexico Climate Summaries*. http://www.wrcc.dri.edu/summary/climsmnm.html.

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 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. *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.

SNL October 2010a 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 October 2010b Sandia National Laboratories, New Mexico (SNL/NM), October 2010. *Burn Site Groundwater Monitoring, Mini-Sampling and Analysis Plan (SAP) for First Quarter, Fiscal Year 2011*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico, October 1, 2010.

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 Project, 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 Project, Sandia National Laboratories, Albuquerque, New Mexico, August 23, 2010.

SNL May 2010 Sandia National Laboratories, New Mexico (SNL/NM), May 2010. *Burn Site Groundwater Monitoring, Mini-Sampling and Analysis Plan (SAP) for Third Quarter, Fiscal Year 2010*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico, May 12, 2010.

SNL February 2010 Sandia National Laboratories, New Mexico (SNL/NM), February 2010. *Burn Site Groundwater Monitoring, Mini-Sampling and Analysis Plan (SAP) for Second Quarter, Fiscal Year 2010*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico, February 8, 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 Project, Sandia National Laboratories, Albuquerque, New Mexico, November 23, 2009.

SNL July 2009 Sandia National Laboratories/New Mexico (SNL/NM), July 2009. *Notes of Meeting—July 14, 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, July 23, 2009.

SNL June 2009a Sandia National Laboratories/New Mexico (SNL/NM), June 2009. *Annual Groundwater Monitoring Report, Calendar Year 2008, Groundwater Protection Program,* Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL June 2009b Sandia National Laboratories/New Mexico (SNL/NM), June 2009. *Notes of Meeting—June 15, 2009 Meeting Between NMED, DOE, and SNL/NM to discuss the April 2009 NMED Letter entitled: Perchlorate Contamination in Groundwater, Sandia National Laboratories*, Sandia National Laboratories, Albuquerque, New Mexico, June 23, 2009.

SNL April 2008a Sandia National Laboratories/New Mexico (SNL/NM), April 2008. *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Burn Site,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

SNL April 2008b Sandia National Laboratories/New Mexico (SNL/NM), April 2008. *Corrective Measures Evaluation Work Plan, Burn Site Groundwater,* Environmental Management Department, Sandia National Laboratories, Albuquerque, New Mexico.

SNL March 2008 Sandia National Laboratories/New Mexico (SNL/NM), March 2008. *Annual Groundwater Monitoring Report, Fiscal Year 2007, Groundwater Protection Program,* Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico.

SNL November 2007 Sandia National Laboratories/New Mexico (SNL/NM), November 2007. *Groundwater Level Data Acquisition and Management,* FOP 03-02, Rev. 02, Sandia National Laboratories, Albuquerque, New Mexico.

SNL August 2007a Sandia National Laboratories/New Mexico (SNL/NM), August 2007. *Long-Term Environmental Stewardship (LTES) Groundwater Monitoring Well Sampling and Field Analytical Measurements,* FOP 05-01, Revision 00, Sandia National Laboratories, Albuquerque, New Mexico.

SNL August 2007b Sandia National Laboratories/New Mexico (SNL/NM), August 2007. *LTES Groundwater Sampling Equipment Decontamination,* FOP 05 03, Revision 02, Sandia National Laboratories, Albuquerque, New Mexico.

SNL August 2007c Sandia National Laboratories/New Mexico (SNL/NM), August 2007. *LTES Groundwater Monitoring Waste Management,* FOP 05-04, Revision 02, Sandia National Laboratories, Albuquerque, New Mexico.

SNL July 2007 Sandia National Laboratories, New Mexico (SNL/NM) July 2007. *Data Validation Procedure for Chemical and Radiochemical Data*, AOP 00-03, Revision 2, Sample Management Office, Sandia National Laboratories, Albuquerque, New Mexico, July 16, 2007.

SNL April 2007 Sandia National Laboratories/New Mexico (SNL/NM), April 2007. *Procedure for Completing the Contract Verification Review,* SMO-05-03, Issue 03, Sandia National Laboratories, Albuquerque, New Mexico, April 30, 2007.

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 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 2003a 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 2003b Sandia National Laboratories/New Mexico (SNL/NM), March 2003. *SNL/NM Statement of Work for Analytical Laboratories, Revision 2,* 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.

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Attachment 7A
Burn Site Groundwater
Analytical Results Tables

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Attachment 7A Tables

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Table 7A-1
Summary of Detected Volatile Organic, Semivolatile Organic, and High Explosive Compounds, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

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-MW1D 21-Sep-10	Carbon Disulfide	1.58	1.25	5.00	NE	J		089661-001	SW846-8260B

Refer to footnotes on page 7A-35.

Table 7A-2
Method Detection Limits for Volatile and Semivolatile Organic Compounds, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Analyte	MDL[b] (µg/L)	Analytical Method[g]	Analyte	MDL[b] (µg/L)	Analytical Method[g]	Analyte	MDL[b] (µg/L)	Analytical Method[g]
1,1,1-Trichloroethane	0.325	8260B	1,2,4-Trichlorobenzene	1.89 - 2.41	8270C	Di-n-butyl phthalate	1.89 - 2.41	8270C
1,1,2,2-Tetrachloroethane	0.250	8260B	1,2-Dichlorobenzene	1.89 - 2.41	8270C	Di-n-octyl phthalate	2.83 - 3.61	8270C
1,1,2-Trichloroethane	0.250	8260B	1,3-Dichlorobenzene	1.89 - 2.41	8270C	Dibenz[a,h]anthracene	0.189 - 0.241	8270C
1,1-Dichloroethane	0.300	8260B	1,4-Dichlorobenzene	1.89 - 2.41	8270C	Dibenzofuran	1.89 - 2.41	8270C
1,1-Dichloroethene	0.300	8260B	2,4,5-Trichlorophenol	1.89 - 2.41	8270C	Diethylphthalate	1.89 - 2.41	8270C
1,2-Dichloroethane	0.250	8260B	2,4,6-Trichlorophenol	1.89 - 2.41	8270C	Dimethylphthalate	1.89 - 2.41	8270C
1,2-Dichloropropane	0.250	8260B	2,4-Dichlorophenol	1.89 - 2.41	8270C	Dinitro-o-cresol	2.83 - 3.61	8270C
2-Butanone	1.25	8260B	2,4-Dimethylphenol	1.89 - 2.41	8270C	Diphenyl amine	2.83 - 3.61	8270C
2-Hexanone	1.25	8260B	2,4-Dinitrophenol	4.72 - 6.02	8270C	Fluoranthene	0.189 - 0.241	8270C
4-methyl-, 2-Pentanone	1.25	8260B	2,4-Dinitrotoluene	1.89 - 2.41	8270C	Fluorene	0.189 - 0.241	8270C
Acetone	3.50	8260B	2,6-Dinitrotoluene	1.89 - 2.41	8270C	Hexachlorobenzene	1.89 - 2.41	8270C
Benzene	0.300	8260B	2-Chloronaphthalene	0.283 - 0.361	8270C	Hexachlorobutadiene	1.89 - 2.41	8270C
Bromodichloromethane	0.250	8260B	2-Chlorophenol	1.89 - 2.41	8270C	Hexachlorocyclopentadiene	2.83 - 3.61	8270C
Bromoform	0.250	8260B	2-Methylnaphthalene	0.283 - 0.361	8270C	Hexachloroethane	1.89 - 2.41	8270C
Bromomethane	0.300	8260B	2-Nitroaniline	1.89 - 2.41	8270C	Indeno(1,2,3-c,d)pyrene	0.189 - 0.241	8270C
Carbon disulfide	1.25	8260B	2-Nitrophenol	1.89 - 2.41	8270C	Isophorone	2.83 - 3.61	8270C
Carbon tetrachloride	0.300	8260B	3,3'-Dichlorobenzidine	1.89 - 2.41	8270C	Naphthalene	0.283 - 0.361	8270C
Chlorobenzene	0.250	8260B	3-Nitroaniline	1.89 - 2.41	8270C	Nitro-benzene	2.83 - 3.61	8270C
Chloroethane	0.300	8260B	4-Bromophenyl phenyl ether	1.89 - 2.41	8270C	Pentachlorophenol	1.89 - 2.41	8270C
Chloroform	0.250	8260B	4-Chloro-3-methylphenol	1.89 - 2.41	8270C	Phenanthrene	0.189 - 0.241	8270C
Chloromethane	0.300	8260B	4-Chlorobenzenamine	1.89 - 2.41	8270C	Phenol	0.943 - 1.2	8270C
Dibromochloromethane	0.300	8260B	4-Chlorophenyl phenyl ether	1.89 - 2.41	8270C	Pyrene	0.283 - 0.361	8270C
Ethyl benzene	0.250	8260B	4-Nitroaniline	2.83 - 3.61	8270C	bis(2-Chloroethoxy)methane	2.83 - 3.61	8270C
Methylene chloride	3.00	8260B	4-Nitrophenol	1.89 - 2.41	8270C	bis(2-Chloroethyl)ether	1.89 - 2.41	8270C
Styrene	0.250	8260B	Acenaphthene	0.292 - 0.373	8270C	bis(2-Ethylhexyl)phthalate	1.89 - 2.41	8270C
Tetrachloroethene	0.300	8260B	Acenaphthylene	0.189 - 0.241	8270C	bis-Chloroisopropyl ether	1.89 - 2.41	8270C
Toluene	0.250	8260B	Anthracene	0.189 - 0.241	8270C	m,p-Cresol	2.83 - 3.61	8270C
Trichloroethene	0.250	8260B	Benzo(a)anthracene	0.189 - 0.241	8270C	n-Nitrosodipropylamine	1.89 - 2.41	8270C
Vinyl acetate	1.50	8260B	Benzo(a)pyrene	0.189 - 0.241	8270C	o-Cresol	1.89 - 2.41	8270C
Vinyl chloride	0.500	8260B	Benzo(b)fluoranthene	0.189 - 0.241	8270C			
Xylene	0.300	8260B	Benzo(ghi)perylene	0.189 - 0.241	8270C			
cis-1,2-Dichloroethene	0.300	8260B	Benzo(k)fluoranthene	0.189 - 0.241	8270C			
cis-1,3-Dichloropropene	0.250	8260B	Butylbenzyl phthalate	1.89 - 2.41	8270C			
trans-1,2-Dichloroethene	0.300	8260B	Carbazole	0.189 - 0.241	8270C			
trans-1,3-Dichloropropene	0.250	8260B	Chrysene	0.189 - 0.241	8270C			

Refer to footnotes on page 7A-35.

Table 7A-3
Method Detection Limits for High Explosives Compounds (EPA Method[g] SW846-8321A), Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Analyte	MDL[b] (µg/L)
1,3,5-Trinitrobenzene	0.104
1,3-Dinitrobenzene	0.104
2,4,6-Trinitrotoluene	0.104
2,4-Dinitrotoluene	0.104
2,6-Dinitrotoluene	0.0779
2-Amino-4,6-dinitrotoluene	0.104
2-Nitrotoluene	0.104
3-Nitrotoluene	0.104
4-Amino-2,6-dinitrotoluene	0.104
4-Nitrotoluene	0.104
HMX	0.104
Nitro-benzene	0.104
Pentaerythritol tetranitrate	0.130
RDX	0.104
Tetryl	0.130

Refer to footnotes on page 7A-35.

Table 7A-4
Summary of Nitrate plus Nitrite Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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-MW1D 25-Feb-10	Nitrate plus nitrite as N	**13.4**	0.500	2.50	10.0	B	J	088178-018	EPA 353.2
CYN-MW1D (Reanalysis) 25-Feb-10	Nitrate plus nitrite as N	**12.4**	0.250	1.25	10.0	H		088178-R18	EPA 353.2
CYN-MW3 01-Mar-10	Nitrate plus nitrite as N	**10.4**	0.100	0.500	10.0			088179-018	EPA 353.2
CYN-MW4 22-Feb-10	Nitrate plus nitrite as N	0.171	0.050	0.250	10.0	B, J	0.058U	088173-018	EPA 353.2
CYN-MW6 03-Mar-10	Nitrate plus nitrite as N	**35.8**	0.250	1.25	10.0			088180-018	EPA 353.2
CYN-MW7 24-Feb-10	Nitrate plus nitrite as N	2.04	0.100	0.500	10.0	B		088176-018	EPA 353.2
CYN-MW7 (Duplicate) 24-Feb-10	Nitrate plus nitrite as N	2.19	0.100	0.500	10.0	B		088177-018	EPA 353.2
CYN-MW8 23-Feb-10	Nitrate plus nitrite as N	4.90	0.250	1.25	10.0	B		088174-018	EPA 353.2
CYN-MW1D 21-Sep-10	Nitrate plus nitrite as N	**12.2**	0.250	1.25	10.0	B		089661-018	EPA 353.2
CYN-MW3 22-Sep-10	Nitrate plus nitrite as N	**12.0**	0.250	1.25	10.0	B		089663-018	EPA 353.2
CYN-MW4 16-Sep-10	Nitrate plus nitrite as N	0.149	0.050	0.250	10.0	J		089656-018	EPA 353.2
CYN-MW4 (Duplicate) 16-Sep-10	Nitrate plus nitrite as N	0.150	0.050	0.250	10.0	J		089657-018	EPA 353.2
CYN-MW6 20-Sep-10	Nitrate plus nitrite as N	**29.9**	0.500	2.50	10.0	B		089659-018	EPA 353.2
CYN-MW7 15-Sep-10	Nitrate plus nitrite as N	2.15	0.100	0.500	10.0			089652-018	EPA 353.2
CYN-MW8 14-Sep-10	Nitrate plus nitrite as N	5.08	0.250	1.25	10.0			089650-018	EPA 353.2
CYN-MW9 28-Sep-10	Nitrate plus nitrite as N	**30.1**	0.500	2.50	10.0			089672-018	EPA 353.2
CYN-MW9 (Duplicate) 28-Sep-10	Nitrate plus nitrite as N	**30.1**	0.500	2.50	10.0			089673-018	EPA 353.2

Refer to footnotes on page 7A-35.

Table 7A-4 *(Concluded)*
Summary of Nitrate plus Nitrite Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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 27-Sep-10	Nitrate plus nitrite as N	**11.0**	0.250	1.25	10.0			089668-018	EPA 353.2
CYN-MW11 29-Sep-10	Nitrate plus nitrite as N	10.0	0.250	1.25	10.0			089675-018	EPA 353.2
CYN-MW12 23-Sep-10	Nitrate plus nitrite as N	**12.2**	0.250	1.25	10.0	B		089665-018	EPA 353.2
CYN-MW9 27-Oct-10	Nitrate plus nitrite as N	**36.6**	5.00	25.0	10.0			089759-018	EPA 353.2
CYN-MW10 02-Nov-10	Nitrate plus nitrite as N	**11.4**	0.250	1.25	10.0			089773-018	EPA 353.2
CYN-MW10 (Duplicate) 02-Nov-10	Nitrate plus nitrite as N	**11.4**	0.250	1.25	10.0			089774-018	EPA 353.2
CYN-MW11 01-Nov-10	Nitrate plus nitrite as N	**10.6**	0.250	1.25	10.0			089765-018	EPA 353.2
CYN-MW12 28-Oct-10	Nitrate plus nitrite as N	**14.4**	0.500	2.50	10.0			089762-018	EPA 353.2

Refer to footnotes on page 7A-35.

Table 7A-5
Summary of TPH-Diesel Range Organics and TPH-Gasoline Range Organics Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

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-MW1D	Diesel Range Organics	ND	69.1	213	NE	U		088178-005	SW846 8015A/B
25-Feb-10	Gasoline Range Organics	30.5	10.5	50.0	NE	J	R	088178-006	SW846 8015B
CYN-MW3	Diesel Range Organics	ND	73.9	227	NE	U		088179-005	SW846 8015A/B
01-Mar-10	Gasoline Range Organics	23.0	10.5	50.0	NE	J	R	088179-006	SW846 8015B
CYN-MW4	Diesel Range Organics	ND	67.7	208	NE	U		088173-005	SW846 8015A/B
22-Feb-10	Gasoline Range Organics	17.8	10.5	50.0	NE	J	R	088173-006	SW846 8015B
CYN-MW6	Diesel Range Organics	ND	70.7	217	NE	U		088180-005	SW846 8015A/B
03-Mar-10	Gasoline Range Organics	27.2	10.5	50.0	NE	J	R	088180-006	SW846 8015B
CYN-MW7	Diesel Range Organics	ND	69.1	213	NE	U		088176-005	SW846 8015A/B
24-Feb-10	Gasoline Range Organics	30.1	10.5	50.0	NE	J	R	088176-006	SW846 8015B
CYN-MW7 (Duplicate)	Diesel Range Organics	ND	69.1	213	NE	U		088177-005	SW846 8015A/B
24-Feb-10	Gasoline Range Organics	25.6	10.5	50.0	NE	J	R	088177-006	SW846 8015B
CYN-MW8	Diesel Range Organics	ND	69.1	213	NE	U		088174-005	SW846 8015A/B
23-Feb-10	Gasoline Range Organics	26.3	10.5	50.0	NE	J	R	088174-006	SW846 8015B
CYN-MW1D 01-Jun-10	Gasoline Range Organics	ND	10.5	50.0	NE	U		089140-006	SW846 8015B
CYN-MW3 02-Jun-10	Gasoline Range Organics	ND	10.5	50.0	NE	U		089142-006	SW846 8015B
CYN-MW4 27-May-10	Gasoline Range Organics	14.1	10.5	50.0	NE	B, J	50U	089138-006	SW846 8015B
CYN-MW6 04-Jun-10	Gasoline Range Organics	ND	10.5	50.0	NE	U		089144-006	SW846 8015B
CYN-MW7 26-May-10	Gasoline Range Organics	29.6	10.5	50.0	NE	J	50U	089135-006	SW846 8015B
CYN-MW7 (Duplicate) 26-May-10	Gasoline Range Organics	24.9	10.5	50.0	NE	J	50U	089136-006	SW846 8015B
CYN-MW8 25-May-10	Gasoline Range Organics	ND	10.5	50.0	NE	U		089131-006	SW846 8015B
CYN-MW1D	Diesel Range Organics	ND	69.9	215	NE	U		089661-005	SW846 8015A/B
21-Sep-10	Gasoline Range Organics	19.1	10.5	50.0	NE	J	50U	089661-006	SW846 8015B
CYN-MW3	Diesel Range Organics	ND	67.7	208	NE	U		089663-005	SW846 8015A/B
22-Sep-10	Gasoline Range Organics	ND	10.5	50.0	NE	U		089663-006	SW846 8015B

Refer to footnotes on page 7A-35.

Table 7A-5 *(Continued)*
Summary of TPH-Diesel Range Organics and TPH-Gasoline Range Organics Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

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	70.7	217	NE	U		089656-005	SW846 8015A/B
16-Sep-10	Gasoline Range Organics	10.8	10.5	50.0	NE	J	50U	089656-006	SW846 8015B
CYN-MW4 (Re-analysis) 16-Sep-10	Gasoline Range Organics	14.8	10.5	50.0	NE	H, J	50UJ	089656-R06	SW846 8015B
CYN-MW4 (Duplicate)	Diesel Range Organics	ND	70.7	217	NE	U		089657-005	SW846 8015A/B
16-Sep-10	Gasoline Range Organics	11.4	10.5	50.0	NE	J	50U	089657-006	SW846 8015B
CYN-MW4 (Duplicate re-analysis) 16-Sep-10	Gasoline Range Organics	ND	10.5	50.0	NE	H, U	UJ	089657-R06	SW846 8015B
CYN-MW6	Diesel Range Organics	ND	65.0	200	NE	U		089659-005	SW846 8015A/B
20-Sep-10	Gasoline Range Organics	ND	10.5	50.0	NE	U		089659-006	SW846 8015B
CYN-MW7	Diesel Range Organics	ND	69.1	213	NE	U		089652-005	SW846 8015A/B
15-Sep-10	Gasoline Range Organics	ND	10.5	50.0	NE	U		089652-006	SW846 8015B
CYN-MW7 (Re-analysis) 15-Sep-10	Gasoline Range Organics	ND	10.5	50.0	NE	H, U	UJ	089652-R06	SW846 8015B
CYN-MW8	Diesel Range Organics	ND	74.7	230	NE	U		089650-005	SW846 8015A/B
14-Sep-10	Gasoline Range Organics	ND	10.5	50.0	NE	U		089650-006	SW846 8015B
CYN-MW8 (Re-analysis) 14-Sep-10	Gasoline Range Organics	13.5	10.5	50.0	NE	H, J	50UJ	089650-R06	SW846 8015B
CYN-MW9	Diesel Range Organics	ND	73.0	225	NE	U		089672-005	SW846 8015A/B
28-Sep-10	Gasoline Range Organics	14.8	10.5	50.0	NE	J	50U	089672-006	SW846 8015B
CYN-MW9 (Duplicate)	Diesel Range Organics	ND	71.4	220	NE	U		089673-005	SW846 8015A/B
28-Sep-10	Gasoline Range Organics	13.1	10.5	50.0	NE	J	50U	089673-006	SW846 8015B
CYN-MW10	Diesel Range Organics	ND	72.2	222	NE	U		089668-005	SW846 8015A/B
27-Sep-10	Gasoline Range Organics	13.5	10.5	50.0	NE	J	50U	089668-006	SW846 8015B
CYN-MW11	Diesel Range Organics	ND	68.4	211	NE	U		089675-005	SW846 8015A/B
29-Sep-10	Gasoline Range Organics	12.1	10.5	50.0	NE	J	50U	089675-006	SW846 8015B
CYN-MW12	Diesel Range Organics	ND	71.4	220	NE	U		089665-005	SW846 8015A/B
23-Sep-10	Gasoline Range Organics	14.4	10.5	50.0	NE	J	50U	089665-006	SW846 8015B
CYN-MW9	Diesel Range Organics	ND	65.0	200	NE	U		089759-005	SW846 8015A/B
27-Oct-10	Gasoline Range Organics	ND	10.5	50.0	NE	U		089759-006	SW846 8015B
CYN-MW10	Diesel Range Organics	ND	65.7	202	NE	U		089773-005	SW846 8015A/B
02-Nov-10	Gasoline Range Organics	ND	10.5	50.0	NE	U		089773-006	SW846 8015B
CYN-MW10 (Duplicate)	Diesel Range Organics	ND	66.3	204	NE	U		089774-005	SW846 8015A/B
02-Nov-10	Gasoline Range Organics	ND	10.5	50.0	NE	U		089774-006	SW846 8015B

Refer to footnotes on page 7A-35.

Table 7A-5 *(Concluded)*
Summary of TPH-Diesel Range Organics and TPH-Gasoline Range Organics Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

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	64.4	198	NE	U		089765-005	SW846 8015A/B
01-Nov-10	Gasoline Range Organics	ND	10.5	50.0	NE	U		089765-006	SW846 8015B
CYN-MW12	Diesel Range Organics	ND	71.4	220	NE	U		089762-005	SW846 8015A/B
28-Oct-10	Gasoline Range Organics	ND	10.5	50.0	NE	U		089762-006	SW846 8015B

Refer to footnotes on page 7A-35.

Table 7A-6
Summary of Anion, Cation, and Alkalinity Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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-MW1D 21-Sep-10	Bicarbonate Alkalinity	72.9	0.725	1.00	NE	B		089661-016	SM2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		089661-016	SM2320B
	Bromide	0.429	0.066	0.200	NE			089661-016	SW846 9056
	Chloride	27.2	0.660	2.00	NE			089661-016	SW846 9056
	Fluoride	1.81	0.033	0.100	4.0			089661-016	SW846 9056
	Sulfate	114	1.00	4.00	NE			089661-016	SW846 9056
	Calcium	70.0	0.200	2.00	NE	B		089661-017	SW846-6020
	Magnesium	14.6	0.005	0.015	NE			089661-017	SW846-6020
	Potassium	2.62	0.080	0.300	NE			089661-017	SW846-6020
	Sodium	34.8	0.080	0.250	NE			089661-017	SW846-6020
CYN-MW3 22-Sep-10	Bicarbonate Alkalinity	239	0.725	1.00	NE	B		089663-016	SM2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		089663-016	SM2320B
	Bromide	0.748	0.066	0.200	NE			089663-016	SW846 9056
	Chloride	120	0.660	2.00	NE			089663-016	SW846 9056
	Fluoride	0.639	0.033	0.100	4.0			089663-016	SW846 9056
	Sulfate	365	1.00	4.00	NE			089663-016	SW846 9056
	Calcium	129	0.200	2.00	NE	B		089663-017	SW846-6020
	Magnesium	35.4	0.005	0.015	NE			089663-017	SW846-6020
	Potassium	2.03	0.080	0.300	NE			089663-017	SW846-6020
	Sodium	40.7	0.080	0.250	NE			089663-017	SW846-6020
CYN-MW3 (Re-analysis) 22-Sep-10	Bromide	0.750	0.066	0.200	NE	H	J	089663-R16	SW846 9056
	Chloride	55.3	0.660	2.00	NE	H	J	089663-R16	SW846 9056
	Fluoride	0.675	0.033	0.100	4.0	H	J	089663-R16	SW846 9056
	Sulfate	167	1.00	4.00	NE	H	J	089663-R16	SW846 9056
CYN-MW4 16-Sep-10	Bicarbonate Alkalinity	223	0.725	1.00	NE	B		089656-016	SM2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		089656-016	SM2320B
	Bromide	0.378	0.066	0.200	NE			089656-016	SW846 9056
	Chloride	24.2	0.660	2.00	NE			089656-016	SW846 9056
	Fluoride	0.780	0.033	0.100	4.0			089656-016	SW846 9056
	Sulfate	130	1.00	4.00	NE			089656-016	SW846 9056
	Calcium	69.7	0.200	2.00	NE			089656-017	SW846-6020
	Magnesium	33.9	0.025	0.075	NE			089656-017	SW846-6020
	Potassium	6.27	0.400	1.50	NE			089656-017	SW846-6020
	Sodium	46.6	0.400	1.50	NE			089656-017	SW846-6020

Refer to footnotes on page 7A-35.

Table 7A-6 *(Continued)*
Summary of Anion, Cation, and Alkalinity Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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 (Duplicate) 16-Sep-10	Bicarbonate Alkalinity	223	0.725	1.00	NE	B		089657-016	SM2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		089657-016	SM2320B
	Bromide	0.396	0.066	0.200	NE			089657-016	SW846 9056
	Chloride	24.0	0.660	2.00	NE			089657-016	SW846 9056
	Fluoride	0.784	0.033	0.100	4.0			089657-016	SW846 9056
	Sulfate	128	1.00	4.00	NE			089657-016	SW846 9056
	Calcium	68.4	0.200	2.00	NE			089657-017	SW846-6020
	Magnesium	36.3	0.025	0.075	NE			089657-017	SW846-6020
	Potassium	6.87	0.400	1.50	NE			089657-017	SW846-6020
	Sodium	45.5	0.400	1.25	NE			089657-017	SW846-6020
CYN-MW6 20-Sep-10	Bicarbonate Alkalinity	296	0.725	1.00	NE	B		089659-016	SM2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		089659-016	SM2320B
	Bromide	0.875	0.066	0.200	NE			089659-016	SW846 9056
	Chloride	61.1	0.660	2.00	NE			089659-016	SW846 9056
	Fluoride	0.624	0.033	0.100	4.0			089659-016	SW846 9056
	Sulfate	132	1.00	4.00	NE			089659-016	SW846 9056
	Calcium	162	0.200	2.00	NE	B		089659-017	SW846-6020
	Magnesium	42.3	0.005	0.015	NE			089659-017	SW846-6020
	Potassium	2.33	0.080	0.300	NE			089659-017	SW846-6020
	Sodium	44.4	0.080	0.250	NE			089659-017	SW846-6020
CYN-MW7 15-Sep-10	Bicarbonate Alkalinity	256	0.725	1.00	NE	B		089652-016	SM2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		089652-016	SM2320B
	Bromide	0.626	0.066	0.200	NE			089652-016	SW846 9056
	Chloride	41.3	0.330	1.00	NE			089652-016	SW846 9056
	Fluoride	1.30	0.033	0.100	4.0			089652-016	SW846 9056
	Sulfate	82.8	0.500	2.00	NE			089652-016	SW846 9056
	Calcium	103	0.200	2.00	NE			089652-017	SW846-6020
	Magnesium	20.4	0.025	0.075	NE			089652-017	SW846-6020
	Potassium	2.43	0.400	1.50	NE			089652-017	SW846-6020
	Sodium	44.1	0.400	1.25	NE			089652-017	SW846-6020

Refer to footnotes on page 7A-35.

Table 7A-6 *(Continued)*
Summary of Anion, Cation, and Alkalinity Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	Bicarbonate Alkalinity	237	0.725	1.00	NE	B		089650-016	SM2320B
14-Sep-10	Carbonate Alkalinity	ND	0.725	1.00	NE	U		089650-016	SM2320B
	Bromide	0.752	0.066	0.200	NE			089650-016	SW846 9056
	Chloride	56.9	0.660	2.00	NE			089650-016	SW846 9056
	Fluoride	1.40	0.033	0.100	4.0			089650-016	SW846 9056
	Sulfate	119	1.00	4.00	NE			089650-016	SW846 9056
	Calcium	114	0.200	2.00	NE			089650-017	SW846-6020
	Magnesium	24.3	0.025	0.075	NE			089650-017	SW846-6020
	Potassium	2.32	0.400	1.50	NE			089650-017	SW846-6020
	Sodium	45.9	0.400	1.25	NE			089650-017	SW846-6020
CYN-MW9	Bicarbonate Alkalinity	236	0.725	1.00	NE	B		089672-016	SM2320B
28-Sep-10	Carbonate Alkalinity	ND	0.725	1.00	NE	U		089672-016	SM2320B
	Bromide	1.13	0.066	0.200	NE			089672-016	SW846 9056
	Chloride	79.2	0.660	2.00	NE			089672-016	SW846 9056
	Fluoride	0.609	0.033	0.100	4.0			089672-016	SW846 9056
	Sulfate	173	1.00	4.00	NE			089672-016	SW846 9056
	Calcium	169	0.400	4.00	NE		J	089672-017	SW846-6020
	Magnesium	48.6	0.050	0.150	NE			089672-017	SW846-6020
	Potassium	2.71	0.080	0.300	NE			089672-017	SW846-6020
	Sodium	40.3	0.800	2.50	NE			089672-017	SW846-6020
CYN-MW9 (Duplicate)	Bicarbonate Alkalinity	238	0.725	1.00	NE	B		089673-016	SM2320B
28-Sep-10	Carbonate Alkalinity	ND	0.725	1.00	NE	U		089673-016	SM2320B
	Bromide	1.15	0.066	0.200	NE			089673-016	SW846 9056
	Chloride	80.2	0.660	2.00	NE			089673-016	SW846 9056
	Fluoride	0.600	0.033	0.100	4.0			089673-016	SW846 9056
	Sulfate	175	1.00	4.00	NE			089673-016	SW846 9056
	Calcium	170	0.400	4.00	NE		J	089673-017	SW846-6020
	Magnesium	50.6	0.050	0.150	NE			089673-017	SW846-6020
	Potassium	2.63	0.080	0.300	NE			089673-017	SW846-6020
	Sodium	43.6	0.800	2.50	NE			089673-017	SW846-6020

Refer to footnotes on page 7A-35.

Table 7A-6 *(Concluded)*
Summary of Anion, Cation, and Alkalinity Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	Bicarbonate Alkalinity	236	0.725	1.00	NE	B		089668-016	SM2320B
27-Sep-10	Carbonate Alkalinity	ND	0.725	1.00	NE	U		089668-016	SM2320B
	Bromide	0.789	0.066	0.200	NE			089668-016	SW846 9056
	Chloride	53.2	0.660	2.00	NE			089668-016	SW846 9056
	Fluoride	0.626	0.033	0.100	4.0			089668-016	SW846 9056
	Sulfate	172	1.00	4.00	NE			089668-016	SW846 9056
	Calcium	128	0.500	5.00	NE		J	089668-017	SW846-6020
	Magnesium	36.4	0.025	0.075	NE			089668-017	SW846-6020
	Potassium	1.96	0.080	0.300	NE			089668-017	SW846-6020
	Sodium	37.6	0.400	1.25	NE			089668-017	SW846-6020
CYN-MW11	Bicarbonate Alkalinity	257	0.725	1.00	NE	B		089675-016	SM2320B
29-Sep-10	Carbonate Alkalinity	ND	0.725	1.00	NE	U		089675-016	SM2320B
	Bromide	1.00	0.066	0.200	NE			089675-016	SW846 9056
	Chloride	73.6	0.660	2.00	NE			089675-016	SW846 9056
	Fluoride	0.660	0.033	0.100	4.0			089675-016	SW846 9056
	Sulfate	178	1.00	4.00	NE			089675-016	SW846 9056
	Calcium	142	0.400	4.00	NE		J	089675-017	SW846-6020
	Magnesium	44.0	0.050	0.150	NE			089675-017	SW846-6020
	Potassium	3.33	0.080	0.300	NE			089675-017	SW846-6020
	Sodium	45.5	0.800	2.50	NE			089675-017	SW846-6020
CYN-MW12	Bicarbonate Alkalinity	250	0.725	1.00	NE	B		089665-016	SM2320B
23-Sep-10	Carbonate Alkalinity	ND	0.725	1.00	NE	U		089665-016	SM2320B
	Bromide	0.928	0.066	0.200	NE			089665-016	SW846 9056
	Chloride	88.8	0.330	1.00	NE			089665-016	SW846 9056
	Fluoride	1.04	0.033	0.100	4.0			089665-016	SW846 9056
	Sulfate	208	1.00	4.00	NE			089665-016	SW846 9056
	Calcium	164	0.200	2.00	NE	B		089665-017	SW846-6020
	Magnesium	44.2	0.005	0.015	NE			089665-017	SW846-6020
	Potassium	5.86	0.080	0.300	NE			089665-017	SW846-6020
	Sodium	51.4	0.800	2.50	NE			089665-017	SW846-6020

Refer to footnotes on page 7A-35.

Table 7A-7
Summary of Perchlorate Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Perchlorate 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-MW6 03-Mar-10	4.59	4.0	12	NE	J		088180-020	EPA 314.0
CYN-MW6 20-Sep-10	6.14	4.0	12	NE	J		089659-020	EPA 314.0
CYN-MW9 28-Sep-10	ND	4.0	12	NE	U		089672-020	EPA 314.0
CYN-MW9 (Duplicate) 28-Sep-10	ND	4.0	12	NE	U		089673-020	EPA 314.0
CYN-MW10 27-Sep-10	ND	4.0	12	NE	U		089668-020	EPA 314.0
CYN-MW11 29-Sep-10	ND	4.0	12	NE	U		089675-020	EPA 314.0
CYN-MW12 23-Sep-10	ND	4.0	12	NE	U		089665-020	EPA 314.0
CYN-MW9 27-Oct-10	ND	4.0	12	NE	U		089759-020	EPA 314.0
CYN-MW10 02-Nov-10	ND	4.0	12	NE	U		089773-020	EPA 314.0
CYN-MW10 (Duplicate) 02-Nov-10	ND	4.0	12	NE	U		089774-020	EPA 314.0
CYN-MW11 01-Nov-10	ND	4.0	12	NE	U		089765-020	EPA 314.0
CYN-MW12 28-Oct-10	ND	4.0	12	NE	U		089762-020	EPA 314.0

Refer to footnotes on page 7A-35.

Table 7A-8
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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-MW1D	Aluminum	0.0245	0.010	0.030	NE	J		089661-010	SW846 6020
21-Sep-10	Antimony	ND	0.0005	0.003	0.006	U		089661-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089661-010	SW846 6020
	Barium	0.0467	0.0005	0.002	2.00			089661-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089661-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089661-010	SW846 6020
	Calcium	67.3	0.200	2.00	NE	B		089661-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089661-010	SW846 6020
	Cobalt	0.000325	0.0001	0.001	NE	J		089661-010	SW846 6020
	Copper	0.00245	0.0003	0.001	NE			089661-010	SW846 6020
	Iron	8.36	0.010	0.100	NE			089661-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089661-010	SW846 6020
	Magnesium	14.4	0.005	0.015	NE			089661-010	SW846 6020
	Manganese	0.0675	0.001	0.005	NE			089661-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089661-010	SW846 7470
	Nickel	0.00168	0.0005	0.002	NE	J		089661-010	SW846 6020
	Potassium	2.52	0.080	0.300	NE			089661-010	SW846 6020
	Selenium	0.002	0.001	0.005	0.050	J		089661-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089661-010	SW846 6020
	Sodium	33.4	0.080	0.250	NE			089661-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089661-010	SW846 6020
	Uranium	0.00111	0.00005	0.0002	0.030			089661-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089661-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		089661-010	SW846 6020

Refer to footnotes on page 7A-35.

Table 7A-8 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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-MW3	Aluminum	0.0158	0.010	0.030	NE	J		089663-010	SW846 6020
22-Sep-10	Antimony	ND	0.0005	0.003	0.006	U		089663-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089663-010	SW846 6020
	Barium	0.0502	0.0005	0.002	2.00			089663-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089663-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089663-010	SW846 6020
	Calcium	140	0.200	2.00	NE	B		089663-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089663-010	SW846 6020
	Cobalt	0.000179	0.0001	0.001	NE	J	J+	089663-010	SW846 6020
	Copper	0.00348	0.0003	0.001	NE			089663-010	SW846 6020
	Iron	0.233	0.010	0.100	NE			089663-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089663-010	SW846 6020
	Magnesium	37.0	0.005	0.015	NE			089663-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		089663-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089663-010	SW846 7470
	Nickel	0.00274	0.0005	0.002	NE			089663-010	SW846 6020
	Potassium	2.13	0.080	0.300	NE			089663-010	SW846 6020
	Selenium	0.00811	0.001	0.005	0.050			089663-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089663-010	SW846 6020
	Sodium	41.2	0.080	0.250	NE			089663-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089663-010	SW846 6020
	Uranium	0.00624	0.00005	0.0002	0.030			089663-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089663-010	SW846 6020
	Zinc	0.00283	0.0026	0.010	NE	J		089663-010	SW846 6020

Refer to footnotes on page 7A-35.

Table 7A-8 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.050	0.150	NE	U		089656-010	SW846 6020
16-Sep-10	Antimony	ND	0.0005	0.003	0.006	U		089656-010	SW846 6020
	Arsenic	0.00185	0.0015	0.005	0.010	J		089656-010	SW846 6020
	Barium	0.0471	0.0005	0.002	2.00			089656-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089656-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089656-010	SW846 6020
	Calcium	69.7	0.200	2.00	NE			089656-010	SW846 6020
	Chromium	ND	0.0125	0.050	0.100	U		089656-010	SW846 6020
	Cobalt	ND	0.0005	0.005	NE	U		089656-010	SW846 6020
	Copper	ND	0.0015	0.005	NE	U		089656-010	SW846 6020
	Iron	0.128	0.050	0.500	NE	J		089656-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089656-010	SW846 6020
	Magnesium	34.6	0.025	0.075	NE			089656-010	SW846 6020
	Manganese	ND	0.005	0.025	NE	U		089656-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089656-010	SW846 7470
	Nickel	ND	0.0025	0.010	NE	U		089656-010	SW846 6020
	Potassium	6.34	0.400	1.50	NE			089656-010	SW846 6020
	Selenium	0.0148	0.001	0.005	0.050			089656-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089656-010	SW846 6020
	Sodium	45.7	0.400	1.25	NE			089656-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089656-010	SW846 6020
	Uranium	0.0126	0.00005	0.0002	0.030	B		089656-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089656-010	SW846 6020
	Zinc	0.00672	0.0026	0.010	NE	J	0.041U	089656-010	SW846 6020

Refer to footnotes on page 7A-35.

Table 7A-8 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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 (Duplicate) 16-Sep-10	Aluminum	ND	0.050	0.150	NE	U		089657-010	SW846 6020
	Antimony	ND	0.0005	0.003	0.006	U		089657-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089657-010	SW846 6020
	Barium	0.0464	0.0005	0.002	2.00			089657-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089657-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089657-010	SW846 6020
	Calcium	69.1	0.200	2.00	NE			089657-010	SW846 6020
	Chromium	ND	0.0125	0.050	0.100	U		089657-010	SW846 6020
	Cobalt	ND	0.0005	0.005	NE	U		089657-010	SW846 6020
	Copper	ND	0.0015	0.005	NE	U		089657-010	SW846 6020
	Iron	0.127	0.050	0.500	NE	J		089657-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089657-010	SW846 6020
	Magnesium	35.4	0.025	0.075	NE			089657-010	SW846 6020
	Manganese	ND	0.005	0.025	NE	U		089657-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089657-010	SW846 7470
	Nickel	ND	0.0025	0.010	NE	U		089657-010	SW846 6020
	Potassium	6.41	0.400	1.50	NE			089657-010	SW846 6020
	Selenium	0.0146	0.001	0.005	0.050			089657-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089657-010	SW846 6020
	Sodium	46.3	0.400	1.25	NE			089657-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089657-010	SW846 6020
	Uranium	0.0126	0.00005	0.0002	0.030	B		089657-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089657-010	SW846 6020
	Zinc	0.00651	0.0026	0.010	NE	J	0.041U	089657-010	SW846 6020

Refer to footnotes on page 7A-35.

Table 7A-8 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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-MW6	Aluminum	0.0138	0.010	0.030	NE	J		089659-010	SW846 6020
20-Sep-10	Antimony	ND	0.0005	0.003	0.006	U		089659-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089659-010	SW846 6020
	Barium	0.0664	0.0005	0.002	2.00			089659-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089659-010	SW846 6020
	Cadmium	0.000124	0.00011	0.001	0.005	J	J+	089659-010	SW846 6020
	Calcium	160	0.200	2.00	NE	B		089659-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089659-010	SW846 6020
	Cobalt	0.000299	0.0001	0.001	NE	J	J+	089659-010	SW846 6020
	Copper	0.00628	0.0003	0.001	NE			089659-010	SW846 6020
	Iron	0.253	0.010	0.100	NE			089659-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089659-010	SW846 6020
	Magnesium	46.4	0.005	0.015	NE			089659-010	SW846 6020
	Manganese	0.00148	0.001	0.005	NE	J	J+	089659-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089659-010	SW846 7470
	Nickel	0.00361	0.0005	0.002	NE			089659-010	SW846 6020
	Potassium	2.37	0.080	0.300	NE			089659-010	SW846 6020
	Selenium	0.0101	0.001	0.005	0.050			089659-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089659-010	SW846 6020
	Sodium	45.2	0.080	0.250	NE			089659-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089659-010	SW846 6020
	Uranium	0.0087	0.00005	0.0002	0.030			089659-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089659-010	SW846 6020
	Zinc	0.0197	0.0026	0.010	NE			089659-010	SW846 6020

Refer to footnotes on page 7A-35.

Table 7A-8 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.0562	0.050	0.150	NE	J	J+	089652-010	SW846 6020
15-Sep-10	Antimony	ND	0.0005	0.003	0.006	U		089652-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089652-010	SW846 6020
	Barium	0.106	0.0005	0.002	2.00			089652-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089652-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089652-010	SW846 6020
	Calcium	107	0.200	2.00	NE			089652-010	SW846 6020
	Chromium	ND	0.0125	0.050	0.100	U		089652-010	SW846 6020
	Cobalt	ND	0.0005	0.005	NE	U		089652-010	SW846 6020
	Copper	ND	0.0015	0.005	NE	U		089652-010	SW846 6020
	Iron	0.203	0.050	0.500	NE	J		089652-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089652-010	SW846 6020
	Magnesium	21.2	0.025	0.075	NE			089652-010	SW846 6020
	Manganese	ND	0.005	0.025	NE	U		089652-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089652-010	SW846 7470
	Nickel	0.00322	0.0025	0.010	NE	J		089652-010	SW846 6020
	Potassium	2.52	0.400	1.50	NE			089652-010	SW846 6020
	Selenium	0.00449	0.001	0.005	0.050	J		089652-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089652-010	SW846 6020
	Sodium	39.9	0.400	1.25	NE			089652-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089652-010	SW846 6020
	Uranium	0.00682	0.00005	0.0002	0.030	B		089652-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089652-010	SW846 6020
	Zinc	0.004	0.0026	0.010	NE	J		089652-010	SW846 6020

Refer to footnotes on page 7A-35.

Table 7A-8 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.010	0.030	NE	U		089650-010	SW846 6020
14-Sep-10	Antimony	ND	0.0005	0.003	0.006	U		089650-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089650-010	SW846 6020
	Barium	0.0598	0.0005	0.002	2.00			089650-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089650-010	SW846 6020
	Cadmium	0.000171	0.00011	0.001	0.005	J	J+	089650-010	SW846 6020
	Calcium	116	0.200	2.00	NE			089650-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089650-010	SW846 6020
	Cobalt	0.000309	0.0001	0.001	NE	J	J+	089650-010	SW846 6020
	Copper	0.000956	0.0003	0.001	NE	B, J	0.0019U	089650-010	SW846 6020
	Iron	0.188	0.010	0.100	NE			089650-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089650-010	SW846 6020
	Magnesium	24.4	0.025	0.075	NE			089650-010	SW846 6020
	Manganese	0.00305	0.001	0.005	NE	J	J+	089650-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089650-010	SW846 7470
	Nickel	0.00324	0.0005	0.002	NE		J+	089650-010	SW846 6020
	Potassium	2.62	0.400	1.50	NE			089650-010	SW846 6020
	Selenium	0.00708	0.001	0.005	0.050			089650-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089650-010	SW846 6020
	Sodium	49.2	0.400	1.25	NE			089650-010	SW846 6020
	Thallium	0.000434	0.0003	0.001	0.002	J	0.0023U	089650-010	SW846 6020
	Uranium	0.00797	0.00005	0.0002	0.030	B		089650-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089650-010	SW846 6020
	Zinc	0.00609	0.0026	0.010	NE	J		089650-010	SW846 6020

Refer to footnotes on page 7A-35.

Table 7A-8 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW9	Aluminum	ND	0.010	0.030	NE	U		089672-010	SW846 6020
28-Sep-10	Antimony	ND	0.0005	0.003	0.006	U		089672-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089672-010	SW846 6020
	Barium	0.0738	0.0005	0.002	2.00			089672-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089672-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089672-010	SW846 6020
	Calcium	166	0.400	4.00	NE		J	089672-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089672-010	SW846 6020
	Cobalt	0.000365	0.0001	0.001	NE	J	J+	089672-010	SW846 6020
	Copper	0.0015	0.0003	0.001	NE		0.0098UJ	089672-010	SW846 6020
	Iron	0.368	0.010	0.100	NE			089672-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089672-010	SW846 6020
	Magnesium	48.1	0.050	0.150	NE			089672-010	SW846 6020
	Manganese	0.0658	0.001	0.005	NE		J+	089672-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089672-010	SW846 7470
	Nickel	0.00524	0.0005	0.002	NE		J+	089672-010	SW846 6020
	Potassium	2.68	0.080	0.300	NE			089672-010	SW846 6020
	Selenium	0.00822	0.001	0.005	0.050			089672-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089672-010	SW846 6020
	Sodium	42.0	0.800	2.50	NE			089672-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089672-010	SW846 6020
	Uranium	0.00821	0.00005	0.0002	0.030	B		089672-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089672-010	SW846 6020
	Zinc	0.0359	0.0026	0.010	NE		J+	089672-010	SW846 6020

Refer to footnotes on page 7A-35.

Table 7A-8 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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 (Duplicate) 28-Sep-10	Aluminum	0.012	0.010	0.030	NE	J		089673-010	SW846 6020
	Antimony	ND	0.0005	0.003	0.006	U		089673-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089673-010	SW846 6020
	Barium	0.074	0.0005	0.002	2.00			089673-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089673-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089673-010	SW846 6020
	Calcium	174	0.400	4.00	NE		J	089673-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089673-010	SW846 6020
	Cobalt	0.000378	0.0001	0.001	NE	J	J+	089673-010	SW846 6020
	Copper	0.00152	0.0003	0.001	NE		0.0098UJ	089673-010	SW846 6020
	Iron	0.388	0.010	0.100	NE			089673-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089673-010	SW846 6020
	Magnesium	49.8	0.050	0.150	NE			089673-010	SW846 6020
	Manganese	0.068	0.001	0.005	NE		J+	089673-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089673-010	SW846 7470
	Nickel	0.00547	0.0005	0.002	NE		J+	089673-010	SW846 6020
	Potassium	2.75	0.080	0.300	NE			089673-010	SW846 6020
	Selenium	0.00831	0.001	0.005	0.050			089673-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089673-010	SW846 6020
	Sodium	40.2	0.800	2.50	NE			089673-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089673-010	SW846 6020
	Uranium	0.00827	0.00005	0.0002	0.030	B		089673-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089673-010	SW846 6020
	Zinc	0.0368	0.0026	0.010	NE		J+	089673-010	SW846 6020

Refer to footnotes on page 7A-35.

Table 7A-8 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.010	0.030	NE	U		089668-010	SW846 6020
27-Sep-10	Antimony	ND	0.0005	0.003	0.006	U		089668-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089668-010	SW846 6020
	Barium	0.0644	0.0005	0.002	2.00			089668-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089668-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089668-010	SW846 6020
	Calcium	133	0.100	1.00	NE			089668-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089668-010	SW846 6020
	Cobalt	0.000197	0.0001	0.001	NE	J	J+	089668-010	SW846 6020
	Copper	0.000989	0.0003	0.001	NE	J		089668-010	SW846 6020
	Iron	0.282	0.010	0.100	NE			089668-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089668-010	SW846 6020
	Magnesium	35.2	0.025	0.075	NE			089668-010	SW846 6020
	Manganese	0.00296	0.001	0.005	NE	J	J+	089668-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089668-010	SW846 7470
	Nickel	0.00399	0.0005	0.002	NE		J+	089668-010	SW846 6020
	Potassium	1.99	0.080	0.300	NE			089668-010	SW846 6020
	Selenium	0.00771	0.001	0.005	0.050			089668-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089668-010	SW846 6020
	Sodium	37.2	0.400	1.25	NE			089668-010	SW846 6020
	Thallium	0.000588	0.0003	0.001	0.002	B, J	0.0031U	089668-010	SW846 6020
	Uranium	0.0068	0.00005	0.0002	0.030	B		089668-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089668-010	SW846 6020
	Zinc	0.00305	0.0026	0.010	NE	J	J+	089668-010	SW846 6020

Refer to footnotes on page 7A-35.

Table 7A-8 *(Continued)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.0478	0.010	0.030	NE			089675-010	SW846 6020
29-Sep-10	Antimony	0.000617	0.0005	0.003	0.006	J		089675-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089675-010	SW846 6020
	Barium	0.0868	0.0005	0.002	2.00			089675-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089675-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		089675-010	SW846 6020
	Calcium	128	0.400	4.00	NE		J	089675-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089675-010	SW846 6020
	Cobalt	0.00127	0.0001	0.001	NE		J+	089675-010	SW846 6020
	Copper	0.00153	0.0003	0.001	NE			089675-010	SW846 6020
	Iron	0.394	0.010	0.100	NE			089675-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089675-010	SW846 6020
	Magnesium	44.2	0.050	0.150	NE			089675-010	SW846 6020
	Manganese	0.771	0.001	0.005	NE			089675-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089675-010	SW846 7470
	Nickel	0.00593	0.0005	0.002	NE		J+	089675-010	SW846 6020
	Potassium	3.62	0.080	0.300	NE			089675-010	SW846 6020
	Selenium	0.00548	0.001	0.005	0.050			089675-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089675-010	SW846 6020
	Sodium	51.8	0.800	2.50	NE			089675-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089675-010	SW846 6020
	Uranium	0.00771	0.00005	0.0002	0.030	B		089675-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089675-010	SW846 6020
	Zinc	0.735	0.0026	0.010	NE			089675-010	SW846 6020

Refer to footnotes on page 7A-35.

Table 7A-8 *(Concluded)*
Summary of Total Metal Results,
Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Analyte	Result[a] (mg/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	0.0105	0.010	0.030	NE	J		089665-010	SW846 6020
23-Sep-10	Antimony	ND	0.0005	0.003	0.006	U		089665-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		089665-010	SW846 6020
	Barium	0.0435	0.0005	0.002	2.00			089665-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		089665-010	SW846 6020
	Cadmium	0.00029	0.00011	0.001	0.005	J		089665-010	SW846 6020
	Calcium	157	0.200	2.00	NE	B		089665-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		089665-010	SW846 6020
	Cobalt	0.00126	0.0001	0.001	NE		J+	089665-010	SW846 6020
	Copper	0.0036	0.0003	0.001	NE			089665-010	SW846 6020
	Iron	0.280	0.010	0.100	NE			089665-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		089665-010	SW846 6020
	Magnesium	43.6	0.005	0.015	NE			089665-010	SW846 6020
	Manganese	0.588	0.001	0.005	NE			089665-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		089665-010	SW846 7470
	Nickel	0.00425	0.0005	0.002	NE			089665-010	SW846 6020
	Potassium	5.56	0.080	0.300	NE			089665-010	SW846 6020
	Selenium	0.00668	0.001	0.005	0.050			089665-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		089665-010	SW846 6020
	Sodium	48.2	0.080	0.250	NE			089665-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		089665-010	SW846 6020
	Uranium	0.00877	0.00005	0.0002	0.030			089665-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		089665-010	SW846 6020
	Zinc	0.231	0.013	0.050	NE			089665-010	SW846 6020

Refer to footnotes on page 7A-35.

Table 7A-9
Summary of Tritium, Gross Alpha, Gross Beta, Gamma Spectroscopy, and Isotopic Uranium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

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]
CYN-MW1D	Americium-241	-7.19 ± 13.0	21.5	10.7	NE	U	BD	089661-033	EPA 901.1
21-Sep-10	Cesium-137	0.949 ± 2.02	3.45	1.73	NE	U	BD	089661-033	EPA 901.1
	Cobalt-60	0.0907 ± 2.20	3.66	1.83	NE	U	BD	089661-033	EPA 901.1
	Potassium-40	12.2 ± 46.9	33.1	16.5	NE	U	BD	089661-033	EPA 901.1
	Gross Alpha	0.50	NA	NA	15	NA	None	089661-034	EPA 900.0
	Gross Beta	2.53 ± 1.07	1.56	0.756	4mrem/yr		J	089661-034	EPA 900.0
	Uranium-233/234	2.04 ± 0.320	0.0513	0.0216	NE			089661-035	HASL-300
	Uranium-235/236	0.0413 ± 0.0271	0.0396	0.0147	NE		J	089661-035	HASL-300
	Uranium-238	0.331 ± 0.0771	0.031	0.0114	NE			089661-035	HASL-300
	Tritium	32.4 ± 86.6	147	71.6	NE	U	BD	089661-036	EPA 906.0 M
CYN-MW3	Americium-241	4.37 ± 12.4	18.7	9.36	NE	U	BD	089663-033	EPA 901.1
22-Sep-10	Cesium-137	0.398 ± 1.92	3.26	1.63	NE	U	BD	089663-033	EPA 901.1
	Cobalt-60	0.879 ± 1.94	3.34	1.67	NE	U	BD	089663-033	EPA 901.1
	Potassium-40	21.1 ± 50.1	28.4	14.2	NE	U	BD	089663-033	EPA 901.1
	Gross Alpha	2.00	NA	NA	15	NA	None	089663-034	EPA 900.0
	Gross Beta	5.63 ± 1.86	2.43	1.17	4mrem/yr		J	089663-034	EPA 900.0
	Uranium-233/234	6.16 ± 0.899	0.0559	0.0235	NE			089663-035	HASL-300
	Uranium-235/236	0.213 ± 0.0659	0.0431	0.016	NE		J	089663-035	HASL-300
	Uranium-238	1.93 ± 0.310	0.0338	0.0124	NE			089663-035	HASL-300
	Tritium	56.6 ± 92.7	156	75.8	NE	U	BD	089663-036	EPA 906.0 M
CYN-MW4	Americium-241	7.34 ± 7.95	12.5	6.25	NE	U	BD	089656-033	EPA 901.1
16-Sep-10	Cesium-137	0.416 ± 1.86	3.15	1.57	NE	U	BD	089656-033	EPA 901.1
	Cobalt-60	-1.53 ± 1.89	2.98	1.49	NE	U	BD	089656-033	EPA 901.1
	Potassium-40	-15.4 ± 38.4	41.6	20.8	NE	U	BD	089656-033	EPA 901.1
	Gross Alpha	3.74	NA	NA	15	NA	None	089656-034	EPA 900.0
	Gross Beta	13.3 ± 2.71	1.45	0.691	4mrem/yr			089656-034	EPA 900.0
	Uranium-233/234	32.5 ± 4.76	0.123	0.0548	NE			089656-035	HASL-300
	Uranium-235/236	0.721 ± 0.166	0.0628	0.0232	NE			089656-035	HASL-300
	Uranium-238	4.34 ± 0.690	0.0546	0.0207	NE			089656-035	HASL-300
	Tritium	8.74 ± 63.4	114	52.5	NE	U	BD	089656-036	EPA 906.0 M

Refer to footnotes on page 7A-35.

Table 7A-9 *(Continued)*
Summary of Tritium, Gross Alpha, Gross Beta, Gamma Spectroscopy, and Isotopic Uranium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

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]
CYN-MW4 (Duplicate)	Americium-241	0.182 ± 4.58	7.70	3.85	NE	U	BD	089657-033	EPA 901.1
16-Sep-10	Cesium-137	-0.564 ± 1.55	2.60	1.30	NE	U	BD	089657-033	EPA 901.1
	Cobalt-60	1.65 ± 1.59	2.90	1.45	NE	U	BD	089657-033	EPA 901.1
	Potassium-40	-22.2 ± 34.1	39.2	19.6	NE	U	BD	089657-033	EPA 901.1
	Gross Alpha	-5.15	NA	NA	15	NA	None	089657-034	EPA 900.0
	Gross Beta	4.08 ± 2.00	2.79	1.36	4mrem/yr		J	089657-034	EPA 900.0
	Uranium-233/234	33.9 ± 4.93	0.116	0.0515	NE			089657-035	HASL-300
	Uranium-235/236	0.355 ± 0.103	0.059	0.0218	NE			089657-035	HASL-300
	Uranium-238	4.39 ± 0.689	0.0514	0.0195	NE			089657-035	HASL-300
	Tritium	-5.95 ± 63.3	116	53.6	NE	U	BD	089657-036	EPA 906.0 M
CYN-MW6	Americium-241	-8.49 ± 12.8	21.1	10.6	NE	U	BD	089659-033	EPA 901.1
20-Sep-10	Cesium-137	-0.25 ± 2.03	3.38	1.69	NE	U	BD	089659-033	EPA 901.1
	Cobalt-60	-0.781 ± 2.21	3.55	1.78	NE	U	BD	089659-033	EPA 901.1
	Potassium-40	-46.4 ± 36.7	42.3	21.2	NE	U	BD	089659-033	EPA 901.1
	Gross Alpha	-1.69	NA	NA	15	NA	None	089659-034	EPA 900.0
	Gross Beta	4.25 ± 2.00	2.95	1.43	4mrem/yr		J	089659-034	EPA 900.0
	Uranium-233/234	10.6 ± 1.55	0.0889	0.0373	NE			089659-035	HASL-300
	Uranium-235/236	0.247 ± 0.0895	0.0685	0.0255	NE		J	089659-035	HASL-300
	Uranium-238	2.84 ± 0.463	0.0537	0.0197	NE			089659-035	HASL-300
	Tritium	83.3 ± 93.5	155	75.2	NE	U	BD	089659-036	EPA 906.0 M
CYN-MW7	Americium-241	-2.87 ± 10.6	17.8	8.90	NE	U	BD	089652-033	EPA 901.1
15-Sep-10	Cesium-137	0.889 ± 1.96	3.37	1.68	NE	U	BD	089652-033	EPA 901.1
	Cobalt-60	-0.333 ± 2.09	3.43	1.71	NE	U	BD	089652-033	EPA 901.1
	Potassium-40	40.8 ± 24.8	45.2	22.6	NE	U	BD	089652-033	EPA 901.1
	Gross Alpha	-1.94	NA	NA	15	NA	None	089652-034	EPA 900.0
	Gross Beta	4.99 ± 1.48	1.60	0.761	4mrem/yr			089652-034	EPA 900.0
	Uranium-233/234	19.3 ± 2.80	0.107	0.0479	NE			089652-035	HASL-300
	Uranium-235/236	0.127 ± 0.054	0.0549	0.0203	NE		J	089652-035	HASL-300
	Uranium-238	2.41 ± 0.397	0.0478	0.0181	NE			089652-035	HASL-300
	Tritium	0.00 ± 63.0	115	52.9	NE	U	BD	089652-036	EPA 906.0 M

Refer to footnotes on page 7A-35.

Table 7A-9 *(Continued)*
Summary of Tritium, Gross Alpha, Gross Beta, Gamma Spectroscopy, and Isotopic Uranium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

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]
CYN-MW8 14-Sep-10	Americium-241	-2.01 ± 12.0	20.4	10.2	NE	U	BD	089650-033	EPA 901.1
	Cesium-137	-5.26 ± 3.74	4.14	2.07	NE	U	BD	089650-033	EPA 901.1
	Cobalt-60	-1.19 ± 1.88	3.01	1.50	NE	U	BD	089650-033	EPA 901.1
	Potassium-40	40.3 ± 26.9	31.8	15.9	NE		J	089650-033	EPA 901.1
	Gross Alpha	-5.59	NA	NA	15	NA	None	089650-034	EPA 900.0
	Gross Beta	5.96 ± 1.78	2.08	1.00	4mrem/yr		J	089650-034	EPA 900.0
	Uranium-233/234	24.9 ± 3.62	0.157	0.0702	NE			089650-035	HASL-300
	Uranium-235/236	0.326 ± 0.109	0.0804	0.0297	NE			089650-035	HASL-300
	Uranium-238	2.96 ± 0.499	0.070	0.0265	NE			089650-035	HASL-300
	Tritium	-48.3 ± 58.3	114	52.7	NE	U	BD	089650-036	EPA 906.0 M
CYN-MW9 28-Sep-10	Americium-241	2.16 ± 12.5	18.8	9.41	NE	U	BD	089672-033	EPA 901.1
	Cesium-137	1.92 ± 1.83	3.23	1.62	NE	U	BD	089672-033	EPA 901.1
	Cobalt-60	1.30 ± 1.92	3.37	1.69	NE	U	BD	089672-033	EPA 901.1
	Potassium-40	-6.03 ± 43.5	45.6	22.8	NE	U	BD	089672-033	EPA 901.1
	Gross Alpha	-0.49	NA	NA	15	NA	None	089672-034	EPA 900.0
	Gross Beta	3.93 ± 1.57	2.18	1.05	4mrem/yr		J	089672-034	EPA 900.0
	Uranium-233/234	8.21 ± 1.18	0.0533	0.0224	NE			089672-035	HASL-300
	Uranium-235/236	0.218 ± 0.0646	0.0411	0.0153	NE		J	089672-035	HASL-300
	Uranium-238	2.46 ± 0.381	0.0322	0.0118	NE			089672-035	HASL-300
	Tritium	58.0 ± 67.2	111	50.8	NE	U	BD	089672-036	EPA 906.0 M
CYN-MW9 (Duplicate) 28-Sep-10	Americium-241	-8.95 ± 13.1	21.8	10.9	NE	U	BD	089673-033	EPA 901.1
	Cesium-137	-0.77 ± 1.85	3.04	1.52	NE	U	BD	089673-033	EPA 901.1
	Cobalt-60	0.220 ± 2.04	3.43	1.72	NE	U	BD	089673-033	EPA 901.1
	Potassium-40	3.29 ± 45.0	51.5	25.8	NE	U	BD	089673-033	EPA 901.1
	Gross Alpha	3.00	NA	NA	15	NA	None	089673-034	EPA 900.0
	Gross Beta	4.19 ± 1.84	2.66	1.29	4mrem/yr		J	089673-034	EPA 900.0
	Uranium-233/234	9.03 ± 1.31	0.0585	0.0246	NE			089673-035	HASL-300
	Uranium-235/236	0.158 ± 0.0568	0.0451	0.0167	NE		J	089673-035	HASL-300
	Uranium-238	2.51 ± 0.395	0.0354	0.013	NE			089673-035	HASL-300
	Tritium	76.9 ± 68.0	108	49.5	NE	U	BD	089673-036	EPA 906.0 M

Refer to footnotes on page 7A-35.

Table 7A-9 *(Concluded)*
Summary of Tritium, Gross Alpha, Gross Beta, Gamma Spectroscopy, and Isotopic Uranium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

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]
CYN-MW10	Americium-241	-6.54 ± 11.8	17.2	8.61	NE	U	BD	089668-033	EPA 901.1
27-Sep-10	Cesium-137	0.0486 ± 1.92	3.28	1.64	NE	U	BD	089668-033	EPA 901.1
	Cobalt-60	-0.572 ± 2.04	3.42	1.71	NE	U	BD	089668-033	EPA 901.1
	Potassium-40	-25.4 ± 36.9	45.4	22.7	NE	U	BD	089668-033	EPA 901.1
	Gross Alpha	-0.99	NA	NA	15	NA	None	089668-034	EPA 900.0
	Gross Beta	2.82 ± 1.32	1.91	0.921	4mrem/yr		J	089668-034	EPA 900.0
	Uranium-233/234	6.21 ± 0.916	0.0601	0.0253	NE			089668-035	HASL-300
	Uranium-235/236	0.132 ± 0.0507	0.0463	0.0172	NE		J	089668-035	HASL-300
	Uranium-238	2.19 ± 0.352	0.0363	0.0134	NE			089668-035	HASL-300
	Tritium	31.6 ± 62.9	109	49.9	NE	U	BD	089668-036	EPA 906.0 M
CYN-MW11	Americium-241	11.0 ± 7.72	11.9	5.96	NE	U	BD	089675-033	EPA 901.1
29-Sep-10	Cesium-137	0.980 ± 1.90	3.23	1.61	NE	U	BD	089675-033	EPA 901.1
	Cobalt-60	2.25 ± 2.02	3.63	1.82	NE	U	BD	089675-033	EPA 901.1
	Potassium-40	4.29 ± 40.8	28.4	14.2	NE	U	BD	089675-033	EPA 901.1
	Gross Alpha	0.88	NA	NA	15	NA	None	089675-034	EPA 900.0
	Gross Beta	9.26 ± 3.64	5.19	2.53	4mrem/yr		J	089675-034	EPA 900.0
	Uranium-233/234	6.28 ± 0.911	0.053	0.0223	NE			089675-035	HASL-300
	Uranium-235/236	0.143 ± 0.0525	0.0409	0.0152	NE		J	089675-035	HASL-300
	Uranium-238	2.22 ± 0.348	0.032	0.0118	NE			089675-035	HASL-300
	Tritium	34.3 ± 62.4	108	49.2	NE	U	BD	089675-036	EPA 906.0 M
CYN-MW12	Americium-241	-8.69 ± 13.3	22.1	11.1	NE	U	BD	089665-033	EPA 901.1
23-Sep-10	Cesium-137	0.466 ± 1.90	3.24	1.62	NE	U	BD	089665-033	EPA 901.1
	Cobalt-60	-0.594 ± 2.03	3.31	1.65	NE	U	BD	089665-033	EPA 901.1
	Potassium-40	13.1 ± 47.0	33.7	16.9	NE	U	BD	089665-033	EPA 901.1
	Gross Alpha	0.521	NA	NA	15	NA	None	089665-034	EPA 900.0
	Gross Beta	7.33 ± 2.61	3.59	1.75	4mrem/yr		J	089665-034	EPA 900.0
	Uranium-233/234	11.1 ± 1.60	0.0583	0.0245	NE			089665-035	HASL-300
	Uranium-235/236	0.239 ± 0.0708	0.0449	0.0167	NE		J	089665-035	HASL-300
	Uranium-238	2.84 ± 0.440	0.0352	0.0129	NE			089665-035	HASL-300
	Tritium	61.7 ± 92.8	156	75.7	NE	U	BD	089665-036	EPA 906.0 M

Refer to footnotes on page 7A-35.

Table 7A-10
Summary of Field Water Quality Measurements[h], Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

Calendar Year 2010

Well ID	Sample Date	Temperature (^{0}C)	Specific Conductivity (μmho/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
CYN-MW1D	25-Feb-10	13.89	517	27.5	7.74	132	11.7	1.20
CYN-MW3	01-Mar-10	13.10	927	266.3	7.19	0.33	62.1	6.56
CYN-MW4	22-Feb-10	12.98	702	224.8	7.17	0.26	44.3	4.66
CYN-MW6	03-Mar-10	16.27	1302	231.2	6.92	1.74	18.0	1.76
CYN-MW7	24-Feb-10	15.73	736	229.9	7.03	15.6	33.0	3.24
CYN-MW8	23-Feb-10	14.97	849	223.5	7.06	0.36	29.9	3.08
CYN-MW1D	01-Jun-10	19.71	445	-109.8	8.98	92.0	6.3	0.59
CYN-MW3	02-Jun-10	16.70	912	260.5	8.31	1.39	64.5	6.26
CYN-MW4	27-May-10	19.74	685	96.0	7.84	0.18	37.4	3.42
CYN-MW6	04-Jun-10	18.28	1090	284.4	8.18	0.34	20.4	1.91
CYN-MW7	26-May-10	19.17	719	140.0	7.35	4.90	34.7	3.20
CYN-MW8	25-May-10	18.53	824	149.9	7.14	0.61	40.8	3.81
CYN-MW1D	21-Sep-10	20.31	495	-20.6	7.75	105.0	9.6	0.88
CYN-MW3	22-Sep-10	18.35	900	142.5	7.29	0.33	66.5	6.19
CYN-MW4	16-Sep-10	20.50	672	180.5	7.29	0.12	34.8	3.12
CYN-MW6	20-Sep-10	18.53	1059	103.8	7.04	0.37	20.6	1.92
CYN-MW7	15-Sep-10	21.62	707	166.1	7.09	1.11	39.1	3.44
CYN-MW8	14-Sep-10	21.46	811	158.1	7.13	0.19	48.1	4.24
CYN-MW9	28-Sep-10	18.93	1089	197.3	7.03	0.45	48.6	4.50
CYN-MW10	27-Sep-10	19.86	905	145.5	7.33	0.40	71.3	6.49
CYN-MW11	29-Sep-10	21.51	992	58.9	7.27	3.73	5.5	0.51
CYN-MW12	23-Sep-10	18.47	1045	50.8	7.10	0.90	5.4	0.51
CYN-MW9	27-Oct-10	16.07	1081	210.7	7.08	0.28	48.5	475
CYN-MW10	02-Nov-10	16.40	899	259.3	7.37	0.39	66.8	6.52
CYN-MW11	01-Nov-10	16.98	975	81.3	7.34	0.57	5.4	0.55
CYN-MW12	28-Oct-10	17.59	1035	173.4	7.16	0.26	6.6	0.63

Refer to footnotes on page 7A-35.

Footnotes for Burn Site Groundwater Monitoring Tables

[a]Result

- Values in bold exceed the established MCL.
- ND = not detected (at method detection limit).
- Activities of zero or less are considered to be not detected.
- Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 1-4)
- µg/L = micrograms per liter.
- mg/L = milligrams per liter.
- pCi/L = picocuries per liter.

[b]MDL or MDA

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.

The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.

NA = not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

[c]PQL or Critical Level

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.

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.

[d]MCL

- Maximum contaminant level. Established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11(b)), National Primary Drinking Water Standards, EPA, July 2002.
- NE = not established.
- 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).

[e]Laboratory Qualifier

B = Analyte is detected in associated laboratory method blank.
H = Analytical holding time was exceeded.
J = Amount detected is below the practical quantitation limit (PQL).
NA = Not applicable for gross alpha activities.
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 = The associated value is an estimated quantity.
J+ = The associated numerical value is an estimated quantity with suspected positive bias.

Footnotes for Burn Site Groundwater Monitoring Tables (Concluded)

[f]Validation Qualifier (continued)

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. Resampling and reanalysis are necessary for verification.

[g]Analytical Method

- U.S. Environmental Protection Agency, 1996, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed., Rev. 1
- U.S. Environmental Protection Agency, Washington, D.C.; or Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20^{th} ed., Method 2320B.
- U.S. Environmental Protection Agency, 1983, *The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0*, EPA-600/4-84-017.
- U.S. Environmental Protection Agency, 1980, *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*, EPA-600/4-80-032.
- U.S. Environmental Protection Agency, 1999, *Perchlorate in Drinking Water Using Ion Chromatography*, EPA 815/R-00-014.
- U.S. Department of Energy, Environmental Measurements Laboratory, 1990, *EML Procedures Manual,* 27th ed., Vol. 1, Rev. 1992, HASL-300.

[h]Field Water Quality Measurements

- Field measurements collected prior to sampling.

°C	= degrees Celsius.
% Sat	= present saturation.
µmho/cm	= micromhos per centimeter.
mg/L	= milligrams per liter.
mV	= millivolts.
NTU	= nephelometric turbidity units.
pH	= potential of hydrogen (negative logarithm of the hydrogen ion concentration).

Attachment 7B
Burn Site Groundwater
Plots

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Attachment 7B Plots

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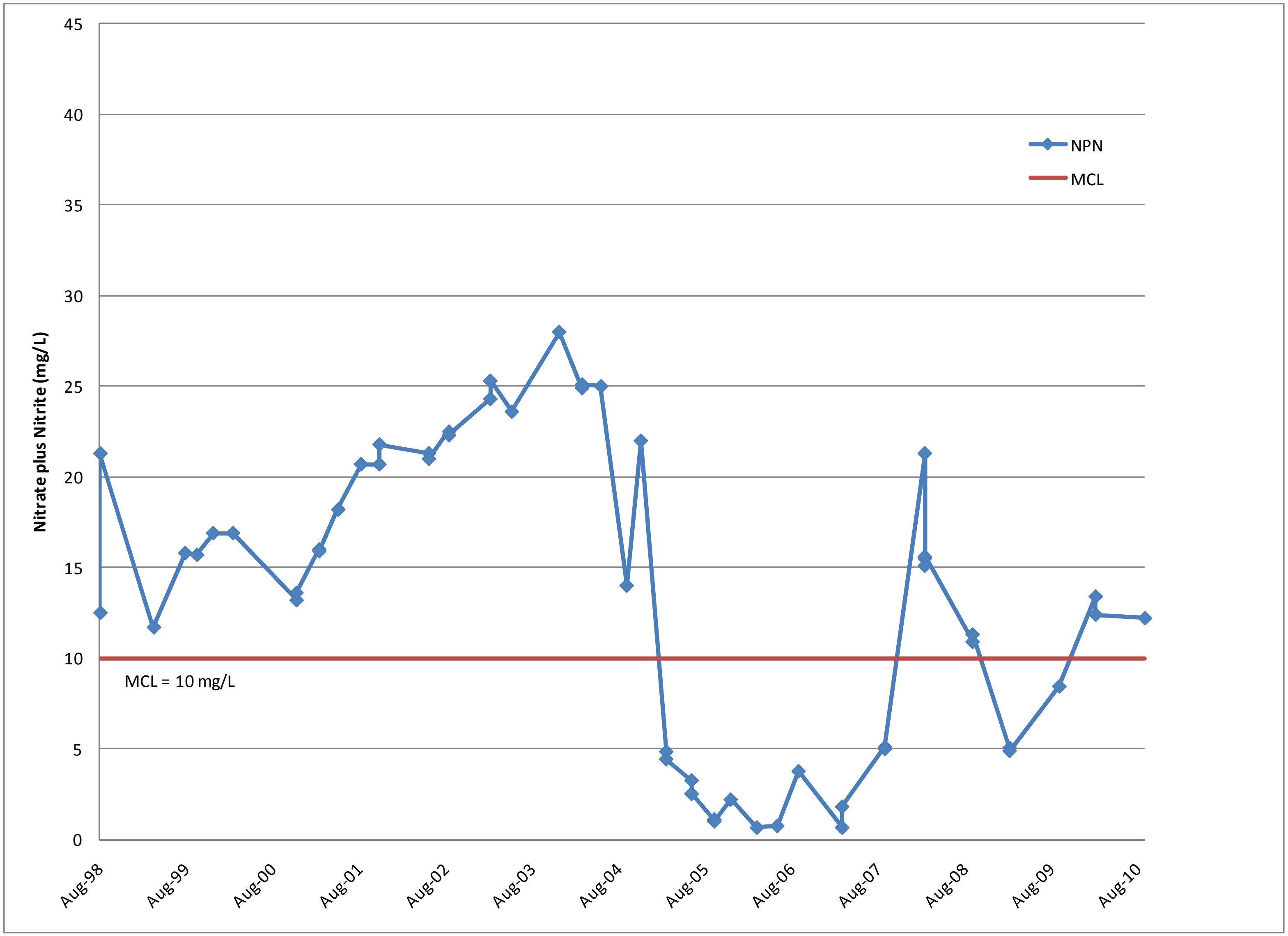

Figure 7B-1. Nitrate plus Nitrite Concentrations, CYN-MW1D

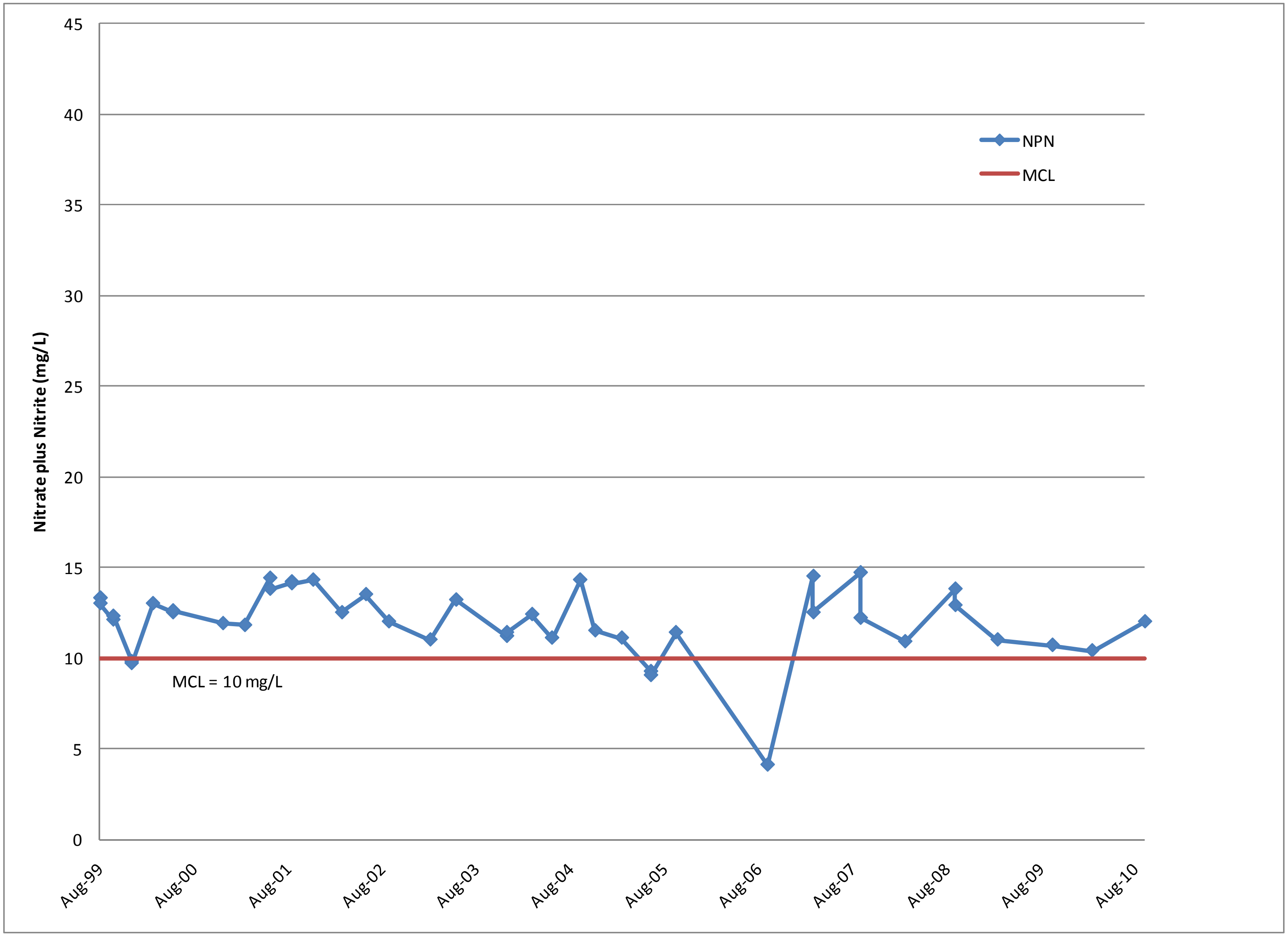

Figure 7B-2. Nitrate plus Nitrite Concentrations, CYN-MW3

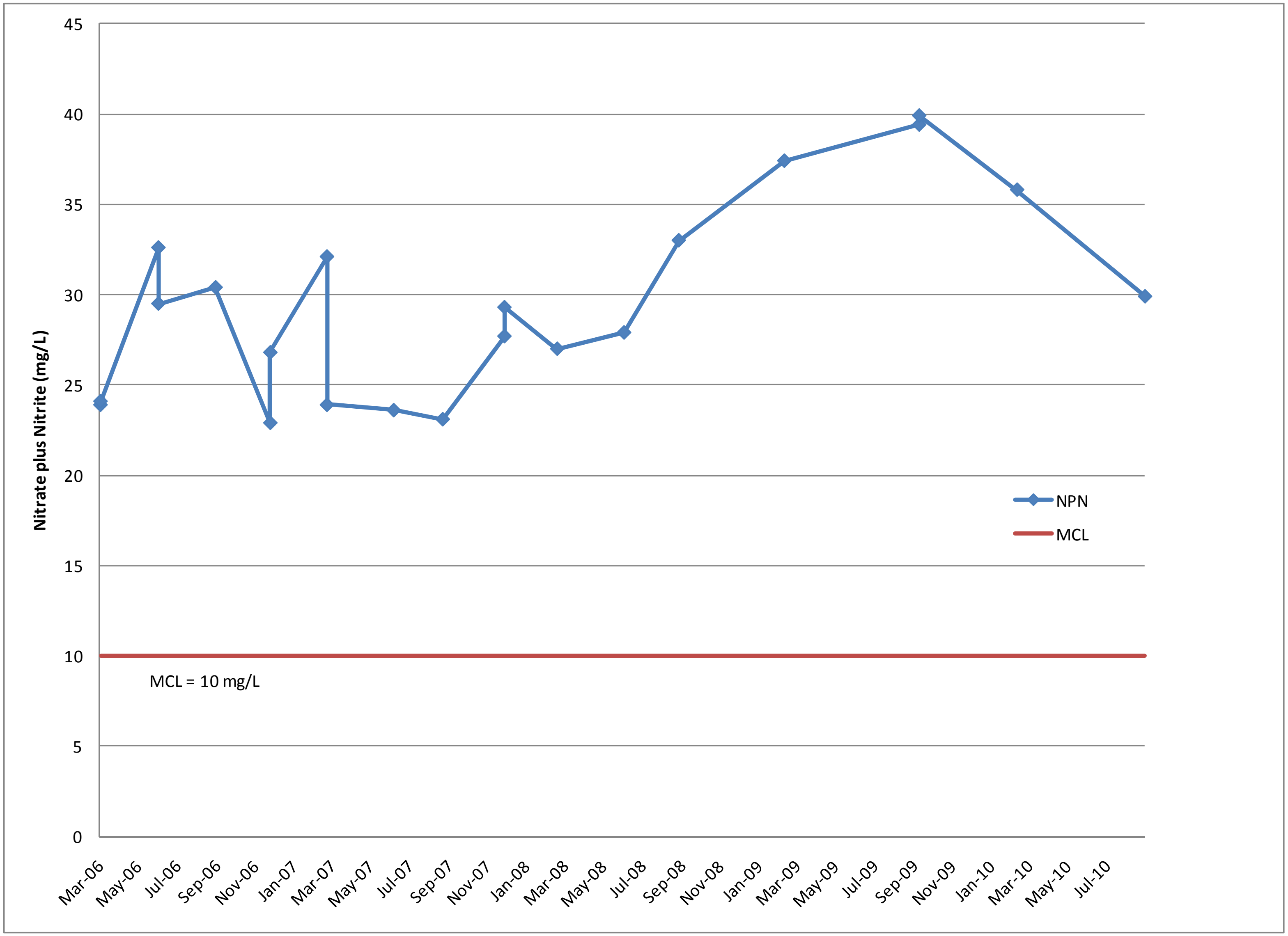

Figure 7B-3. Nitrate plus Nitrite Concentrations, CYN-MW6

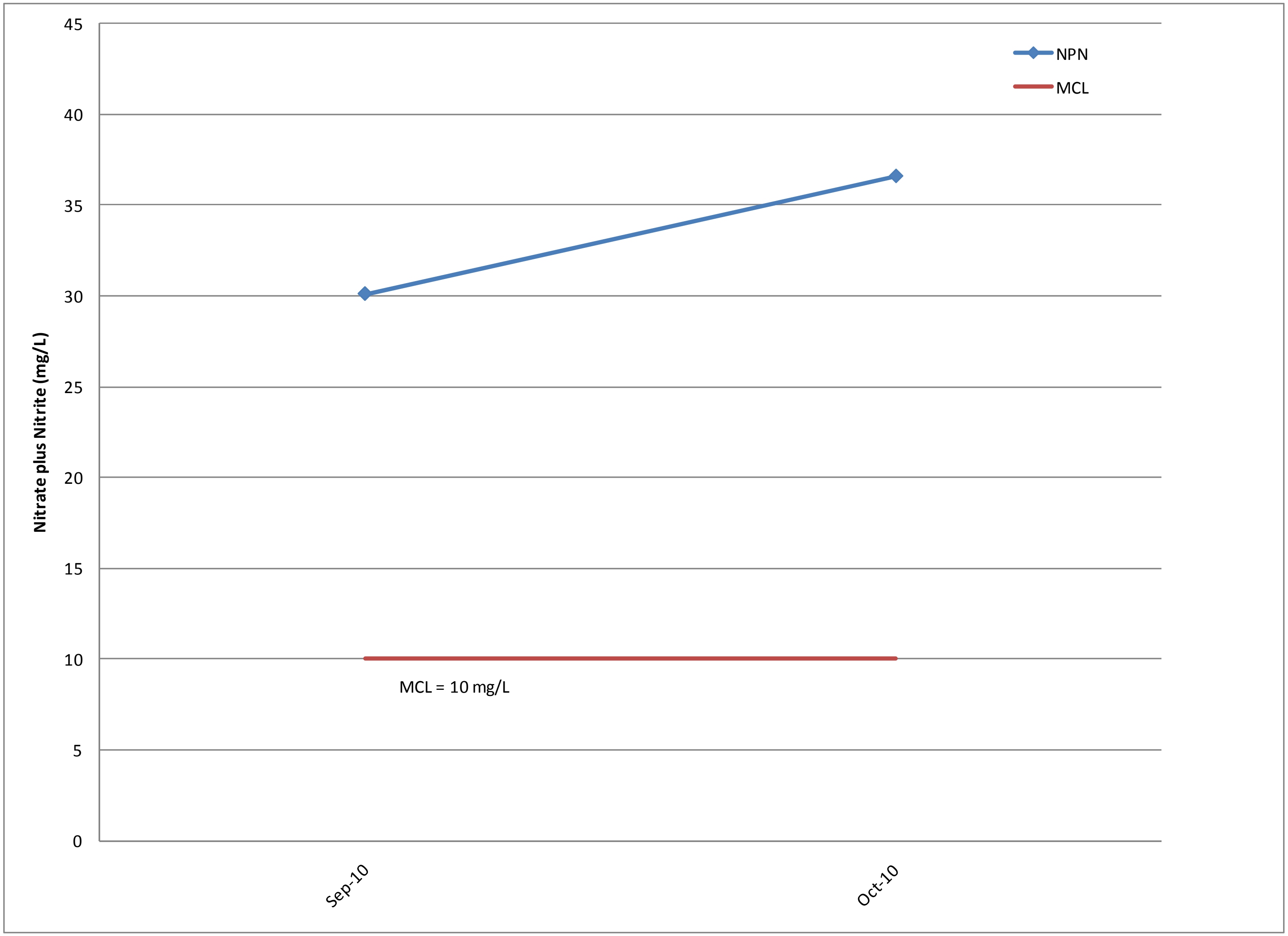

Figure 7B-4. Nitrate plus Nitrite Concentrations, CYN-MW9

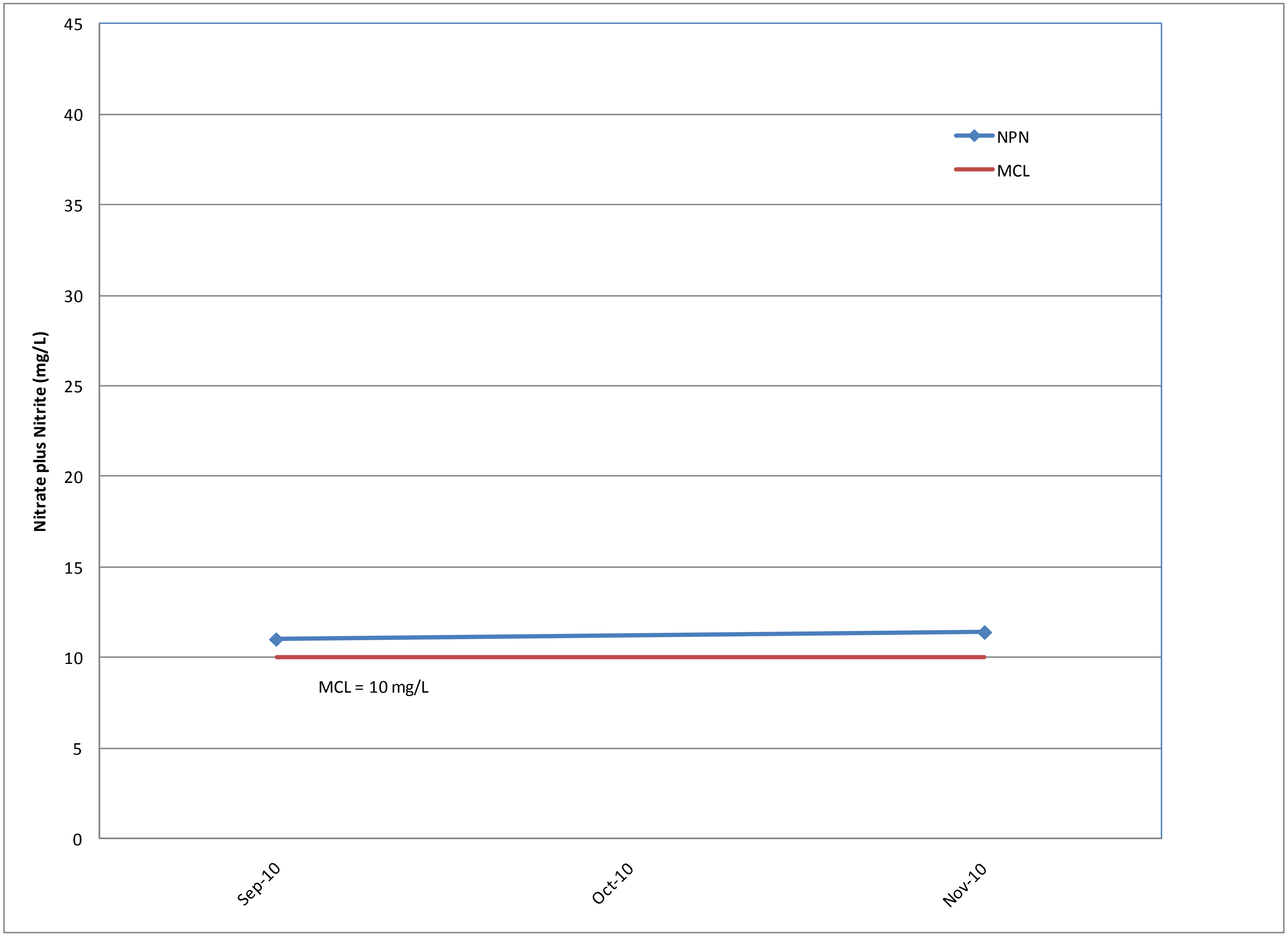

Figure 7B-5. Nitrate plus Nitrite Concentrations, CYN-MW10

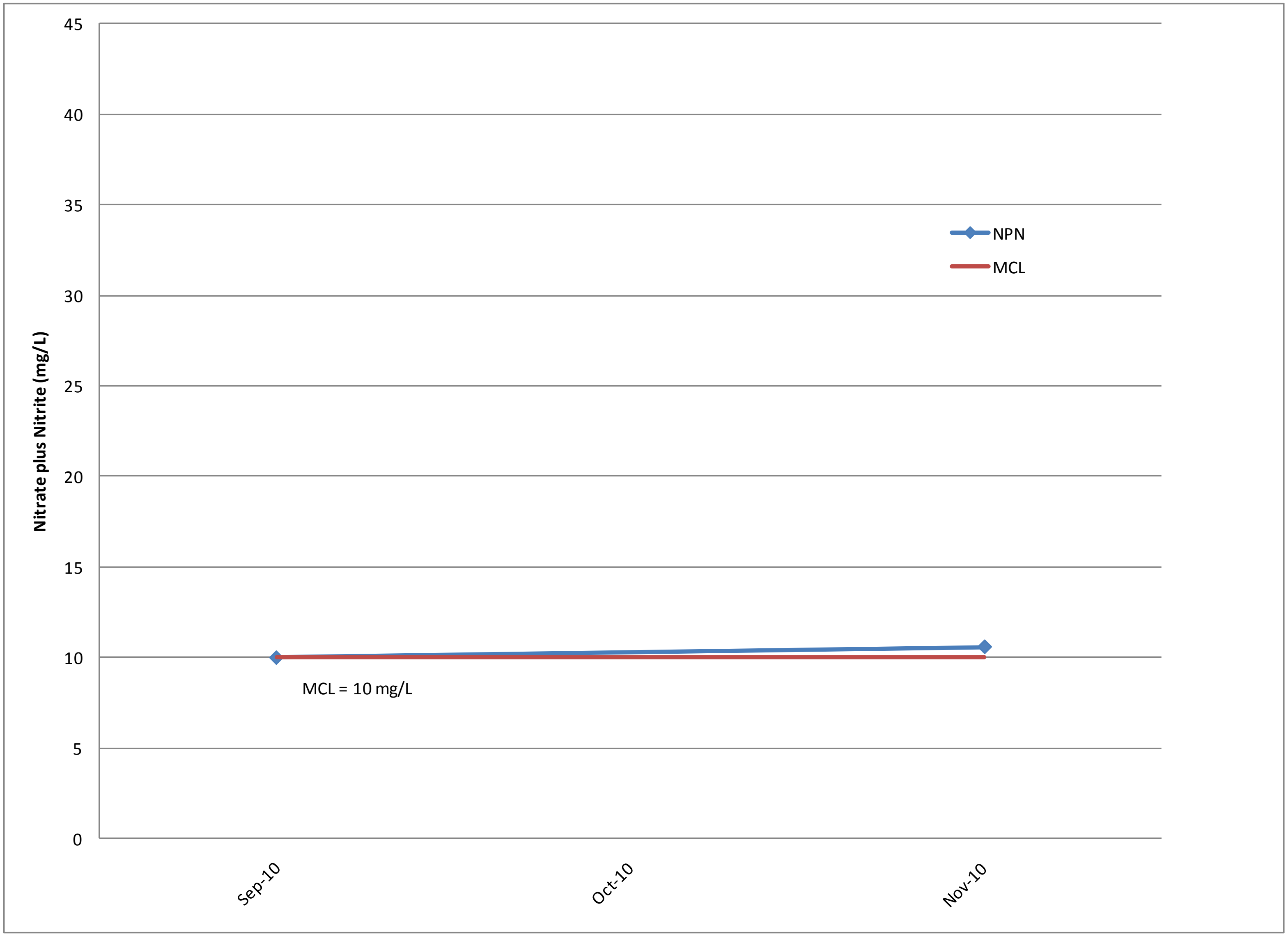

Figure 7B-6. Nitrate plus Nitrite Concentrations, CYN-MW11

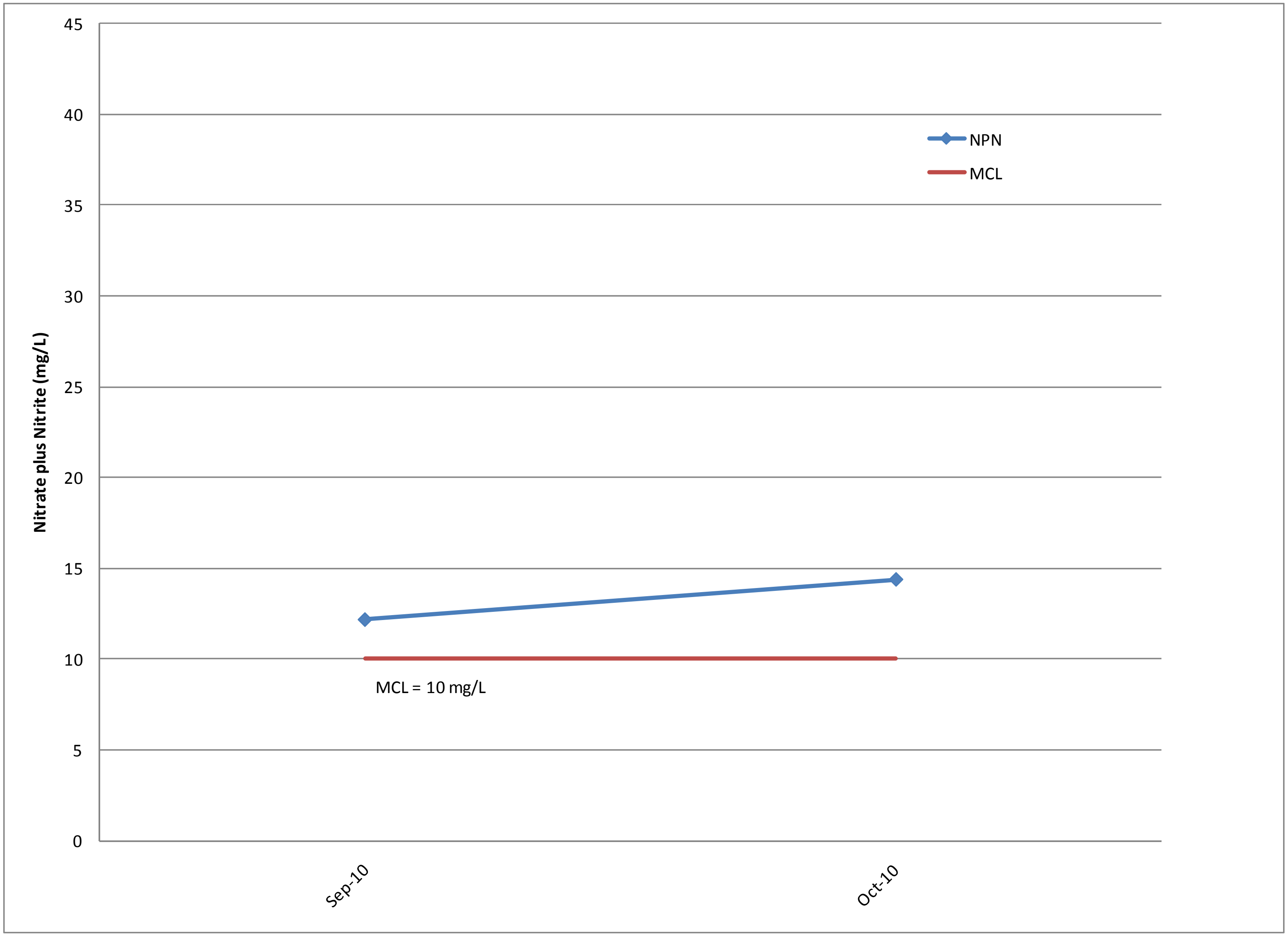

Figure 7B-7. Nitrate plus Nitrite Concentrations, CYN-MW12

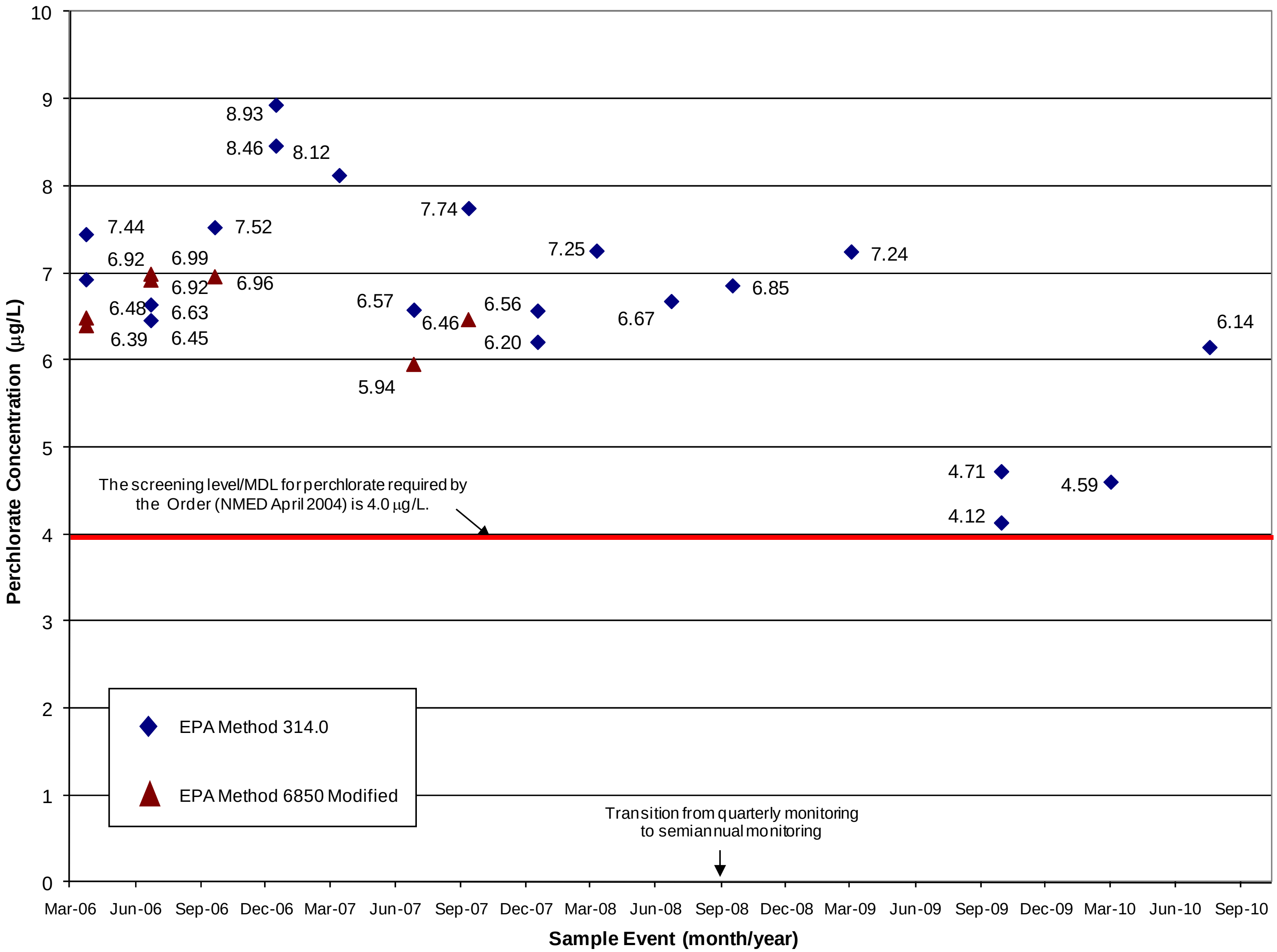

Figure 7B-8. Perchlorate Concentrations, CYN-MW6

Attachment 7C
Burn Site Groundwater
Hydrographs

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Attachment 7C Hydrographs

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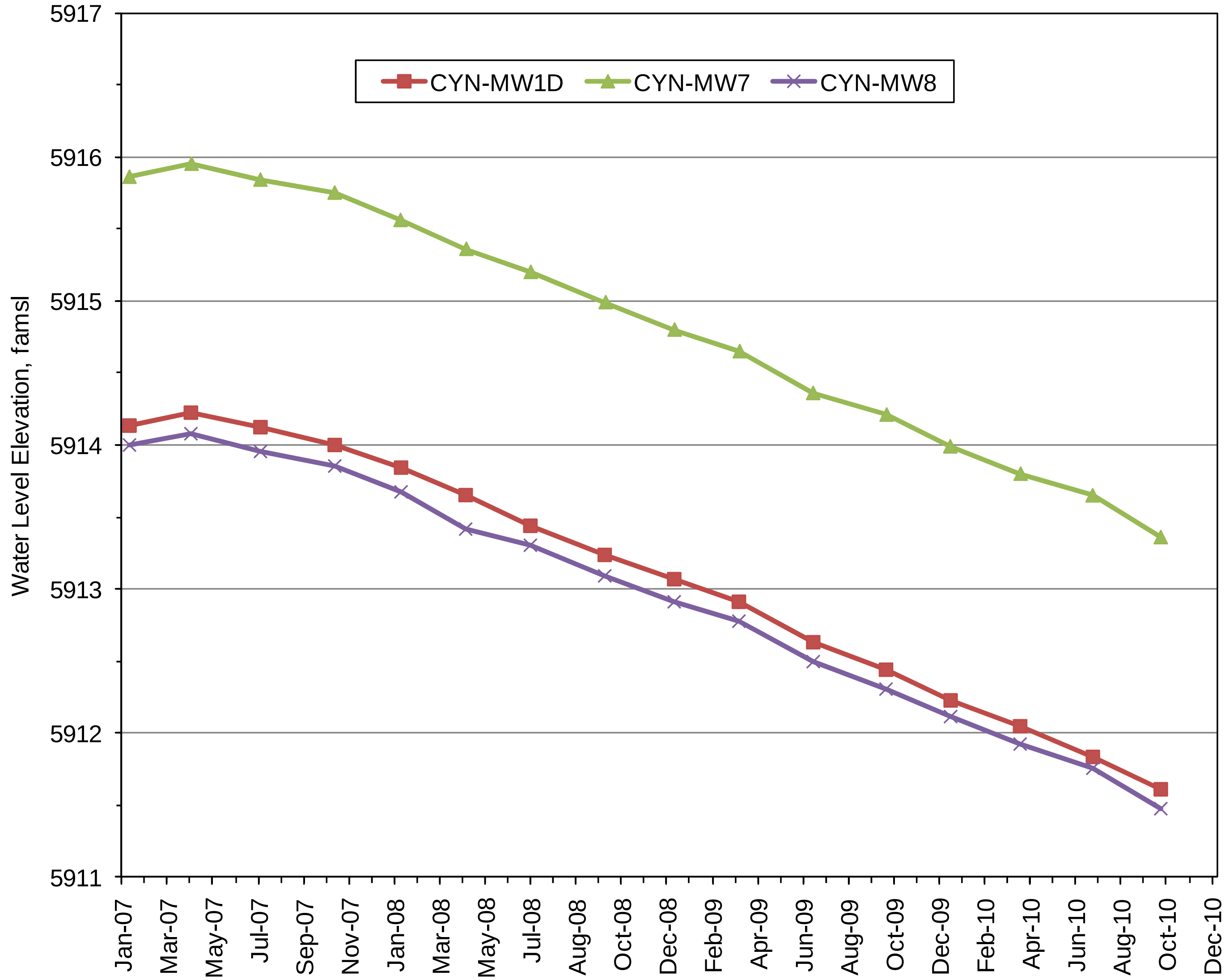

Figure 7C-1. Burn Site Groundwater Wells (1 of 4)

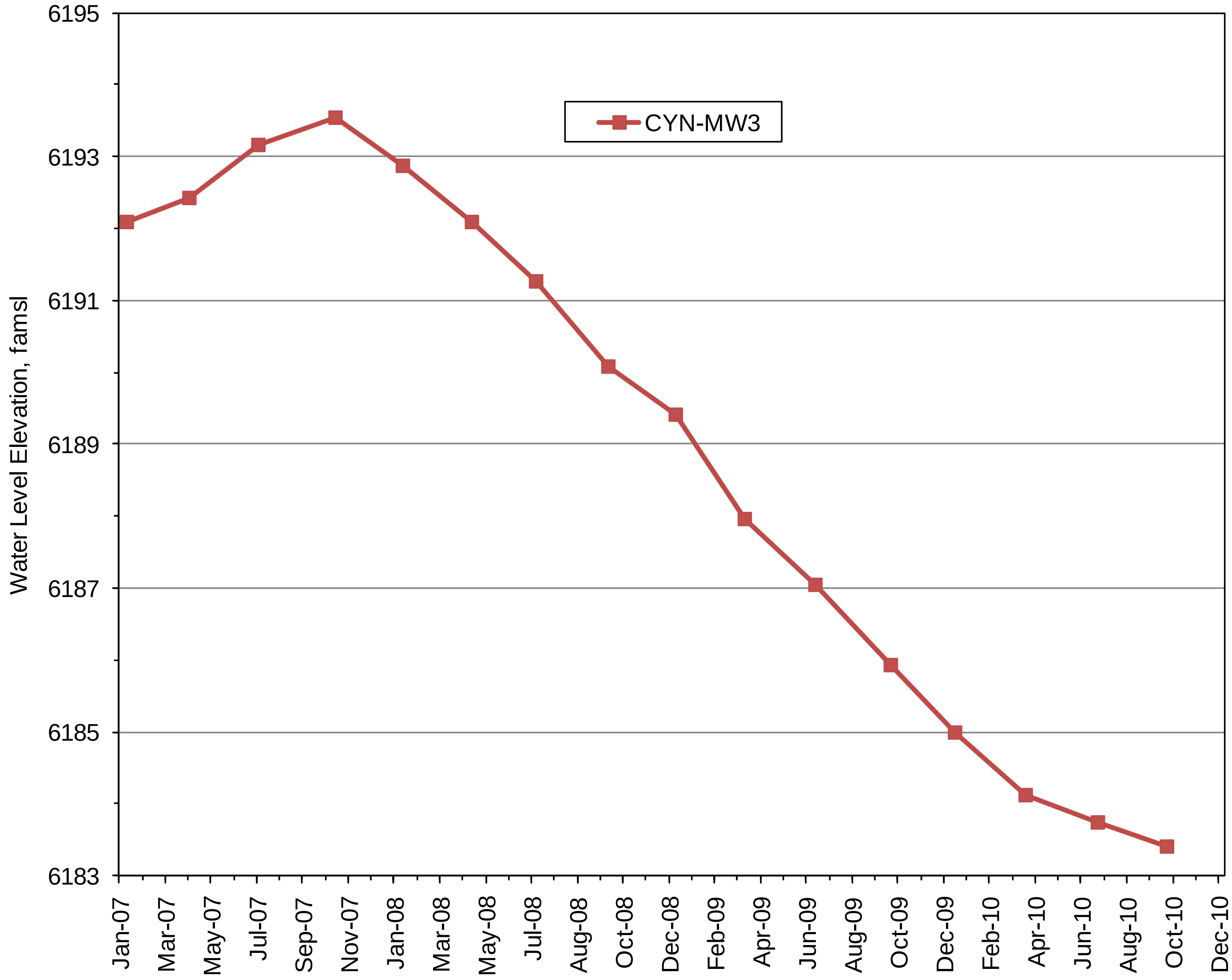

Figure 7C-2. Burn Site Groundwater Wells (2 of 4)

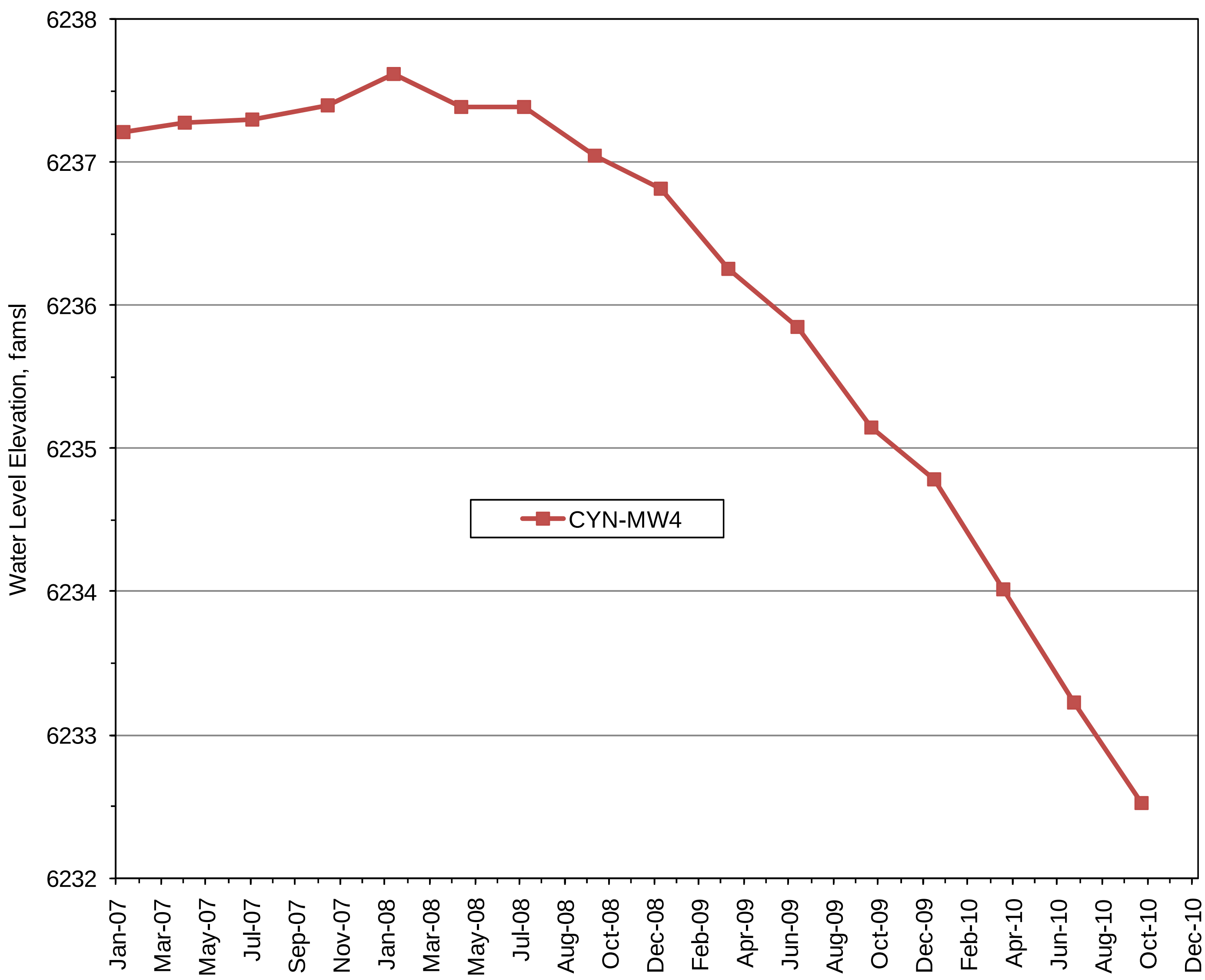

Figure 7C-3. Burn Site Groundwater Wells (3 of 4)

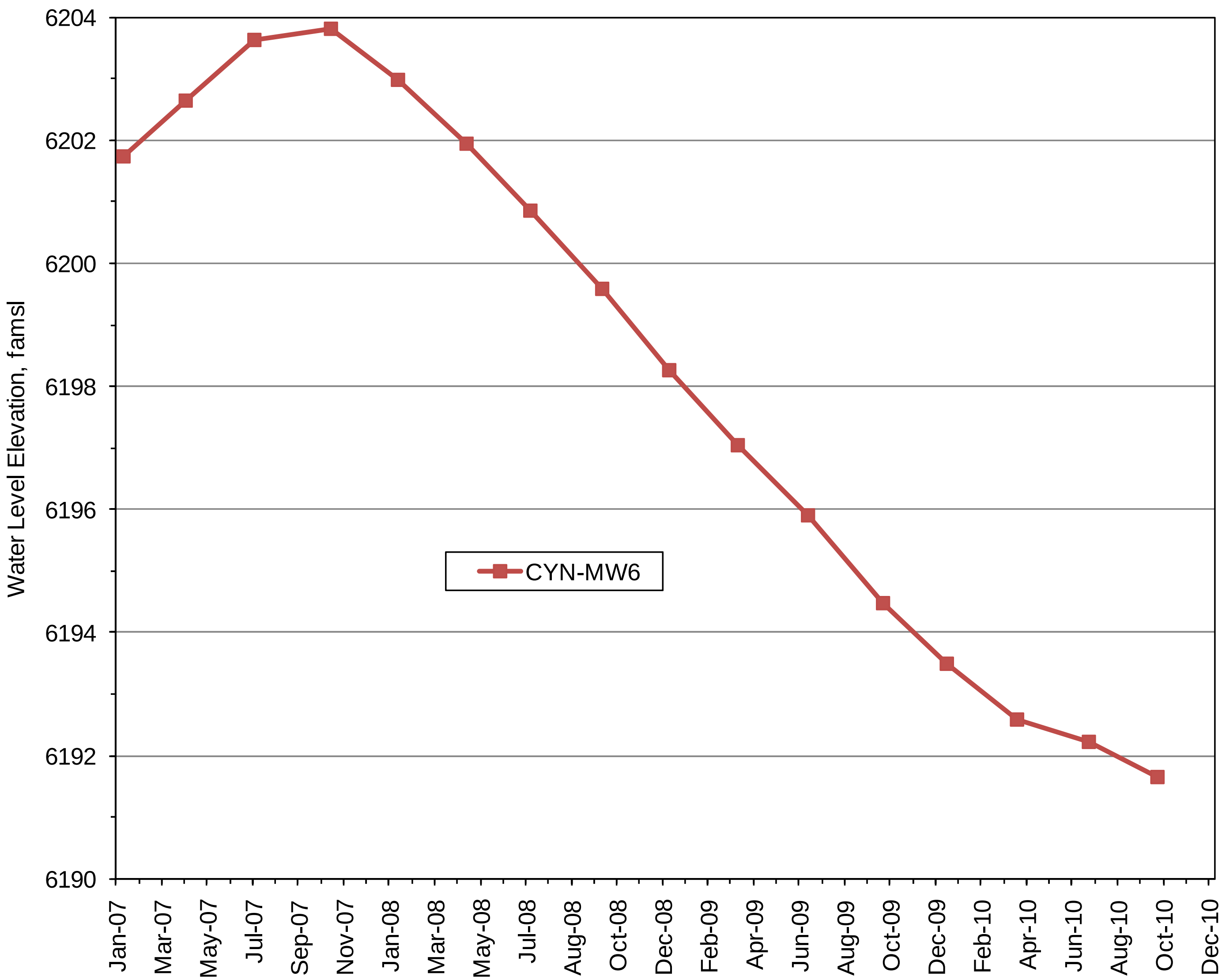

Figure 7C-4. Burn Site Groundwater Wells (4 of 4)