SANDIA REPORT
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Unlimited Release
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Calendar Year 2008

Annual Groundwater Monitoring Report

Prepared by
Sandia National Laboratories, Albuquerque, New Mexico

Sandia is a multiprogram 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-AC04-94A185000

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Groundwater Protection Program
Sandia National Laboratories, New Mexico
June 2009

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The production of this document is a joint effort between the Sandia National Laboratories, New Mexico (SNL/NM) Groundwater Protection Program (GWPP) and the Environmental Restoration (ER) Project.

Subject Areas

GWPP, SNL/NM site and hydrogeological setting

Chemical Waste Landfill (CWL)

Mixed Waste Landfill (MWL)

Technical Area V (TA-V), Tijeras Arroyo Groundwater (TAG) Investigation, and Burn Site Groundwater Area

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. This annual report summarizes data and the compliance status of the Sandia environmental protection and monitoring programs through December 31, 2008. Major environmental programs include air quality, water quality, groundwater protection, terrestrial surveillance, waste management, pollution prevention, environmental restoration, oil and chemical spill prevention, and the National Environmental Policy Act. Environmental monitoring and surveillance programs are required by DOE Order 450.1A, *Environmental Protection Program* (DOE 2008) and DOE Order 231.1A, *Environment, Safety, and Health Reporting* (DOE 2007).

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Chapter Tables

Chapter Tables (Continued)

Chapter Figures

Chapter Figures (Continued)

Abbreviations and Acronyms

AIA	Albuquerque International Airport
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
CMS	Corrective Measures Study
COA	City of Albuquerque
COC	constituent of concern
CWL	Chemical Waste Landfill
CY07	Calendar Year 2007
CY08	Calendar Year 2008
DO	dissolved oxygen
DOE	U.S. Department of Energy
DSS	Drain and Septic Systems
EB	equipment blank
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
ERFO	Environmental Restoration Field Office
FB	field blank
FOP	field operating procedure
FSO	Field Support Operations
FY	Fiscal Year
GEL	General Engineering Laboratories, Inc.
GWPP	Groundwater Protection Program
HE	high explosives
HPT	High Performance Team
HSWA	Hazardous and Solid Waste Amendments
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 quantification limit)
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 limits
MWL	Mixed Waste Landfill

Abbreviations and Acronyms (concluded)

NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
NNSA	National Nuclear Security Administration
NPN	nitrate plus nitrite
ORP	oxidation-reduction potential
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PGWS	perched groundwater system
PQL	practical quantification limit
PVC	Polyvinyl chloride
QA	quality assurance
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
SMO	Sample Management Office
SNL/NM	Sandia National Laboratories, New Mexico
SVOC	semivolatile organic compound
SWDA	Safe Water Drinking Act
SWMU	Solid Waste Management Unit
TA	Technical Area
TAG	Tijeras Arroyo Groundwater (Investigation)
TAL	Target Analyte List
TB	trip blank
TCE	trichloroethene (equivalent to trichlorethylene)
TPH-DRO	Total Petroleum Hydrocarbons-Diesel Range Organics
TPH-GRO	Total Petroleum Hydrocarbons-Gasoline Range Organics
TOX	total organic halogens
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)
CTF-#	Coyote Test Field
CWL-#	Chemical Waste Landfill
CYN-#	Lurance Canyon
LWDS-#	Liquid Waste Disposal
MP-#	Montessa Park
MRN-#	Magazine Road North
MVMWJ	Mountain View Monitoring Well J
MVMWK	Mountain View Monitoring Well K
MWL-#	Mixed Waste Landfill
NMED-#	New Mexico Environment Department
NWTA3-#	Northwest Technical Area III
PGS-#	Parade Ground South
PL-#	Power Line Road
SFR-#	South Fence Road
STW-#	Solar Tower (West)
SWTA-#	Southwest Technical Area III
TA1-W-#	Technical Area I (Well)
TA2-NW-#	Technical Area II (Northwest)
TA2-SW-#	Technical Area II (Southwest)
TA2-W-#	Technical Area II (Well)
TAV-#	Technical Area V
TJA-#	Tijeras Arroyo
TRE-#	Thunder Road East
TRN-#	Target Road North
TRS-#	Target Road South
TSA-#	Transportation Safeguards Academy
WYO-#	Wyoming
12AUP-#	ER Site 12A Underflow Piezometer

** Meteorological Towers*

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

Units

°C	degree Celsius
% Sat	percent saturation
µg/L	microgram(s) per liter
µmho/cm	microhm(s) per centimeter (unit of specific conductance)
ac-ft	acre feet
Ci	Curie
Ci/yr	curies per year
fbtoc	feet below top of casing
ft	foot (feet)
ft^3	cubic feet
ft/yr	feet per year
gal	gallon(s)
gpm	gallons per minute
in.	inches
in./yr	inches per year
km	kilometer(s)
m	meter(s)
mg/L	milligram(s) per liter
mL	milliliter(s)
mrem/yr	millirem per year
mV	millivolt(s)
NTU	nephelometric turbidity units
pCi/g	picocuries per gram
pCi/L	picocuries per liter
pH	potential of hydrogen
PL-3*	last measurement prior to well going dry
ppb	part(s) per billion, equivalent to µg/L in water
ppbv	part(s) per billion by volume
sq km	square kilometer(s)
sq mi	square mile(s)
yd	yard(s)
yd^3	cubic yard(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) Project sites with with an ongoing groundwater investigation. The SNL/NM facility is located on Kirtland Air Force Base (KAFB) and is a government-owned, contractor-operated, multiprogram laboratory overseen by the U.S. Department of Energy (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 for the DOE under Contract DE-AC04-94AL85000.

This Annual Groundwater Monitoring Reports documents the results of Sandia's groundwater monitoring activities for Calendar Year 2008 (CY08). 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 the Burn Site (Chapter 7.0). In addition to reporting the activities and results for CY08, the reporting period for this year's report includes the last three months of Calendar Year 2007. This is necessary to accommodate the shift from a fiscal year (FY) (October 1 to September 30) reporting period to the calendar year period that covers monitoring from January 1 to December 31.

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 250 ft bgs).

Currently there are five ER Project groundwater monitoring networks: (1) TAG; (2) TA-V; (3) CWL; (4) MWL; and (5) the Burn Site Groundwater study area. 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 CWL and MWL falls into this category. The remaining three ER Project groundwater investigations (TAG, TA-V, and Burn Site) 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.

Groundwater Quality Monitoring Activities and Results

During CY08, samples were collected from GWPP, CWL, MWL, TA-V, TAG, and Burn Site 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 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.

GWPP

Chapter 2.0 documents the results of the CY08 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 14 monitoring wells and 1 surface water sample from a spring. Water levels were measured at 74 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 the period from March 11 to April 21, 2008. Samples collected from all locations were analyzed for 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-235 and uranium-238; mercury; high explosives (HE); gamma spectroscopy; gross alpha/beta activity; radium-226; and radium-228.

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 hexahydro-trinitro-triazine (RDX) was detected in the groundwater sample and associated duplicate sample from monitoring well CTF-MW2 at concentrations of 0.183 and 0.226 micrograms per liter (µg/L), respectively. Resampling of the same well occurred in July 2008. The results of the reanalysis confirmed the presence of RDX. The concentrations detected were 0.508 and 0.187 µg/L. All the quantitative results for RDX at CTF-MW2 are qualified with a "J" designator which identifies the results as estimated values above the method detection limit (MDL) and below the reporting limit.

Fluoride was detected above the NMWQCC groundwater protection standard of 1.6 milligrams per liter (mg/L). The concentrations range from 1.65 to 2.53 mg/L. The EPA MCL for fluoride is 4.0 mg/L. Arsenic was detected above the MCL of 0.01 mg/L in CTF-MW2 at concentrations ranging from 0.483 to 0.0507 mg/L. Beryllium was detected in the surface water sample from Coyote Springs at a concentration of 0.00721 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.

Gross alpha activity values in samples from wells CTF-MW1, CTF-MW2, CTF-MW3, SFR-2S, and TRE-1 exceed the MCL of 15 picocuries per liter (pCi/L). Uncorrected activities range from 30.2 to 106 pCi/L. When these activities are adjusted to subtract uranium and radium activities, the values range from 19.14 to 88.39 pCi/L. The wells with elevated gross alpha activity levels are located west of the Tijeras fault zone in an area of shallow bedrock with naturally high uranium values.

Water level elevation measurements obtained from 36 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 similar 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 CY08 and CY07 indicate the areas of greatest declines in the vicinity of TA-V and southwest of TA-III. A slight increase in the regional water table was observed in the northeast portion of base. Hydrographs for wells in the TA-V area show an annual decline in water level elevations of 0.88 feet per year (ft/yr) based on a three-year trend. For the southwest region the decline is 0.95 ft/yr. The slight increase of 0.15 ft/yr in the elevation of the water table in the northeast sector may be attributed to recharge from the Tijeras Arroyo.

Water level elevations were also obtained in wells completed in the perched groundwater system (PGWS). Fourteen wells were used to construct a water level elevation contour map. 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 presumably due to the drainage of the system to the east and perhaps some additional recharge from the Tijeras Arroyo.

CWL

Chapter 3.0 discusses the CWL semiannual groundwater monitoring activities performed during October and November 2007 and in June, October, and December 2008. Groundwater samples were collected from nine monitoring wells and analyzed for VOCs and total metals plus iron. Additional biannual analyses were conducted for semivolatile organic compounds, chlorinated herbicides, polychlorinated biphenyls, total cyanide, sulfides, and dissolved chromium.

For groundwater samples collected from CWL groundwater monitoring wells during October and November 2007, June, October, and December 2008, no analytes were detected at concentrations exceeding the associated EPA MCLs, except for chromium. Chromium was detected above the MCL of 0.1 mg/L in the November 2007 CWL-MW2BU sample at a concentration of 0.218 mg/L. Groundwater samples collected from CWL-MW2BU in June and October 2008 had reported detections of chromium at concentrations of 0.0178 and 0.0127 mg/L, respectively. Historically, chromium values from CWL-MW2BU have been reported below the MCL. The November 2007 result correlates with an increased field turbidity measurement at CWL-MW2BU. The analytical results are comparable to historical values, with the exception of the chromium detections noted.

As agreed to in recent negotiations, the DOE/Sandia submitted to the NMED a CWL Closure Plan amendment that addresses the decommissioning of monitoring wells CWL-MW4 and CWL-BW4A and the installation of new monitoring wells CWL-MW9 and CWL-BW5, as well as reducing groundwater sampling requirements for the four monitoring wells proposed for post-closure monitoring (CWL-BW5, CWL-MW5U, CWL-MW6U, and CWL-MW9). These negotiations are still in progress. Upon NMED approval of the CWL Post-Closure Care Permit and Final CWL RCRA Closure Report (to be submitted after approval of the Permit and Corrective Measures Study Report), the Post-Closure Care Permit will supersede the Closure Plan, and the Closure Plan will no longer be effective.

MWL

Chapter 4.0 addresses the groundwater sampling activities conducted during CY08 at the MWL located in TA-III at SNL/NM. Seven monitoring wells at the MWL were sampled, including one downgradient well (MWL-BW-2), one on-site monitoring well (MWL-MW4) and five downgradient monitoring wells (MWL-MW5, MWL-MW6, MWL-MW7, MWL-MW8, and MWL-MW9). Three sampling events occurred at the MWL during CY08 on the following dates: April 8 to April 16, July 14 to July 17, and October 1 to October 8, 2008. The analytical parameters selected for monitoring at the MWL groundwater wells during CY08 include TAL metals, total uranium, VOCs, NPN, bromide, fluoride, chloride, sulfate, manganese II, total organic carbon, carbon dioxide, total dissolved solids, ferrous iron, and biochemical oxygen demand. Added to the list of sampling parameters this year is perchlorate, as the Order requires perchlorate analysis for newly installed monitoring wells for four quarters. Alkalinity titrations were performed in the field on groundwater samples collected at each well. Radiochemical analysis included gross alpha/beta radioactivity, tritium, and gamma-emitting radionuclides.

During CY08, no inorganic or organic constituents were detected at concentrations that exceed the respective MCLs in any of the groundwater samples collected from MWL monitoring wells. In addition, no detections of organic compounds greater than the MCLs (where applicable) or practical quanitation limits (PQLs) were reported. Toluene was detected at a concentration less than the MCL and PQL but greater than the MDL in one sample, and thus qualified as an estimated value.

Total uranium results from the CY08 samples are consistent with data from previous sampling events and are well within the range of historic MWL groundwater data. Groundwater data from the newly installed wells do not have a sufficient historical data set to identify trends for the results.

No general chemistry parameters exceed the established MCLs in any of the groundwater samples. The analytical results for radioactivity and radionuclides show no levels greater than the corresponding MCLs. Based on the results of the three groundwater monitoring events conducted at the MWL during CY08, constituent concentrations remain within the historical ranges for the site.

TA-V Study Area

Chapter 5.0 discusses the TA-V groundwater monitoring activities conducted from October 2007 through December 2008. 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 13 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 site conceptual 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.

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-MW5. The distribution of nitrate above the background level is laterally widespread in the study area, and concentrations of nitrate above the MCL are limited.

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

TAG Study Area
Chapter 6.0 addresses groundwater monitoring activities conducted from October 2007 through December 2008 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 a regional aquifer groundwater system at approximately 440 to 570 ft bgs. Groundwater monitoring wells are completed either in the PGWS or regional aquifer. Nitrate and TCE have been identified as COCs in groundwater at the TAG study area based on historical groundwater monitoring results. Detections of these COCs exceed the EPA MCLs of 10 mg/L for nitrate (as nitrogen) and 5 µg/L for TCE in samples collected from TAG study area monitoring wells. 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.

The analytical results from this reporting period for the TAG study area are consistent with historical concentrations. 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-4, and TJA-7 during all sampling events, with a maximum concentration of 29.8 mg/L in the sample from TJA-4 collected during the November 2008 sampling event. NPN concentrations occasionally exceeded the MCL in TJA-2 and TA2-W-19.

TCE exceeds the MCL of 5 µg/L in two PGWS wells, TA2-W-19 and WYO-4. The maximum concentration of TCE detected during this reporting period was 9.15 mg/L in the sample from WYO-4 collected during the January 2008 sampling event. TCE concentrations in TA2-W-19 and WYO-4 wells have barely exceeded the MCL for the life of the wells, and trends are level to slightly increasing over time. The current conceptual model for the TAG study area does not require modification based on the analytical results from this reporting period.

Burn Site Groundwater

Chapter 7.0 discusses the groundwater monitoring activities conducted at the Burn Site from October 2007 through December 2008. Currently six wells in the Burn Site Groundwater Study Area are being monitored for water quality (CYN-MW1D, CYN-MW3, CYN-MW4, CYN-MW6, CYN-MW7, and CYN-MW8). 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 they were installed. Quarterly groundwater sampling was conducted at three wells (CYN-MW6, CYN-MW7, and CYN-MW8) in December 2007 and at one well (CYN-MW6) in June 2008. Nitrate has been identified as a COC in groundwater at the Burn Site based on detections above the EPA MCL (10 mg/L as nitrogen) in samples collected from monitoring wells. Unique features of the Burn Site Groundwater Study Area include low concentrations of nitrate in a deep bedrock aquifer.

For the Burn Site Groundwater Study Area, only NPN and gross alpha activity were detected above MCLs during this reporting period. NPN results exceeded the MCL of 10 mg/L in samples from CYN-MW6 during all sampling events, with a maximum concentration of 33.0 mg/L during the September 2008 sampling event. Nitrate concentrations in this well have consistently exceeded the MCL. NPN concentrations in CYN-MW3 exceeded the MCL in two sampling events, with a maximum concentration of 13.8 mg/L during the September 2008 sampling event. Nitrate concentrations are relatively stable over time in CYN-MW3. NPN results from CYN-MW1D exceeded the MCL in two sampling events with a maximum concentration of 21.3 mg/L during the March 2008 sampling event.

The analytical results from this reporting period are consistent with historical concentrations. The current conceptual model for Burn Site groundwater does not require modification based on the analytical results from this reporting period.

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 Project sites will continue on a quarterly, semiannually, annually, and biannually basis during FY09 and FY10, as specified by regulatory guidance. The results of these monitoring events will be presented in the Annual Groundwater Monitoring Report for CY09.

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) Project sites with an ongoing groundwater investigation. The purpose of this document is to report to regulators and other stakeholders the results of Sandia's groundwater monitoring activities for Calendar Year 2008 (CY08). 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 (Chapter 7.0). In addition to reporting the activities and results for CY08, the reporting period for this year's report includes the last three months of Calendar Year 2007. This is necessary to accommodate the shift from a fiscal year (FY) (October 1 to September 30) reporting period to the calendar year period that covers monitoring from January 1 to December 31.

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 above mean sea level (amsl) and a maximum elevation of 7,986 feet 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)

The SNL/NM facility is a government-owned, contractor-operated, multiprogram laboratory overseen by the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) 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.

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

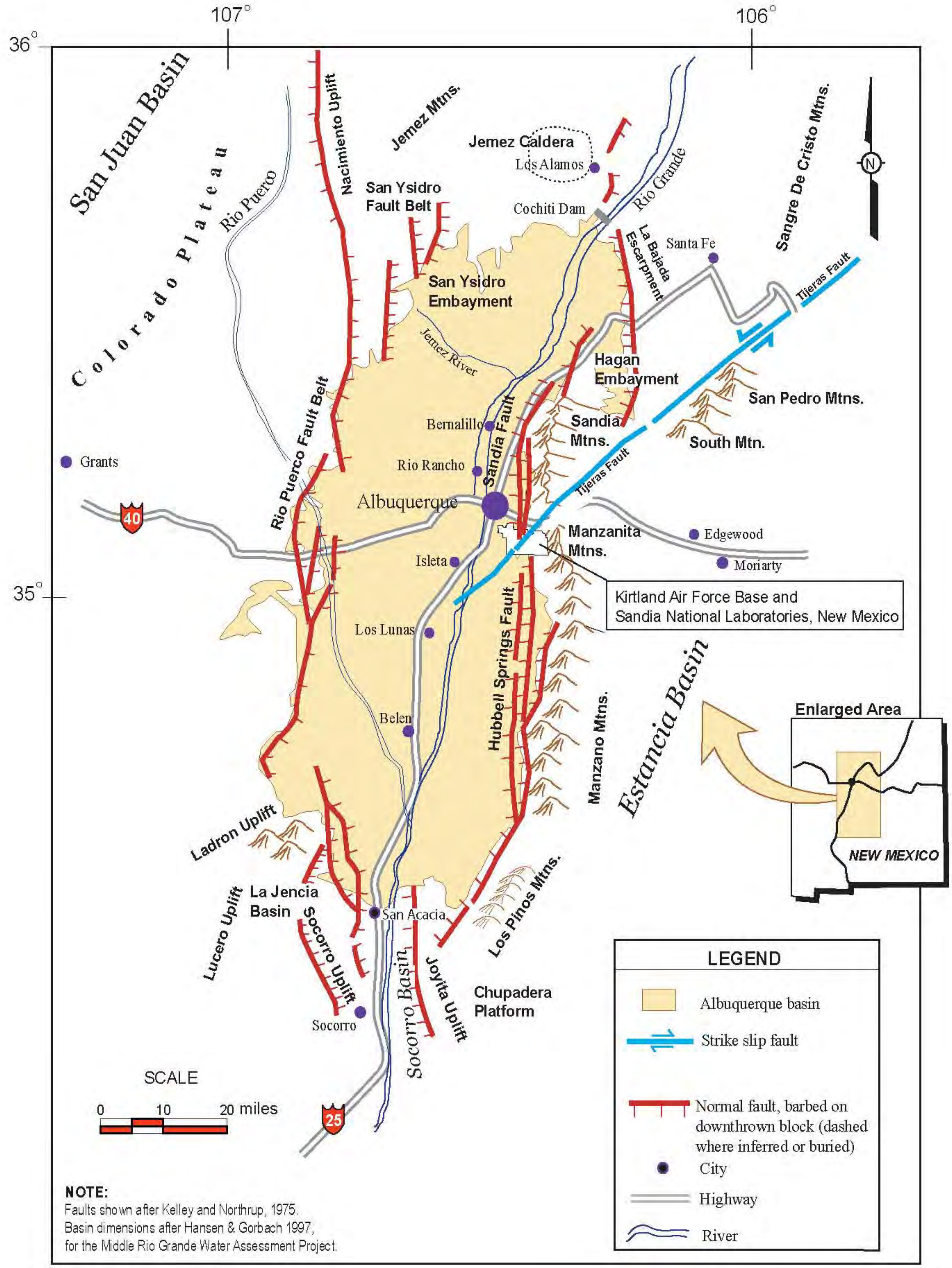

Figure 1-1. Albuquerque Basin, North Central New Mexico

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

- the Nacimiento Uplift and the Jemez Mountains to the north;
- the La Bajada Escarpment to the northeast;
- the Sandia, Manzanita, Manzano, and Los Pinos mountains to the east;
- the Joyita and Socorro uplifts to the south;
- the Ladron and Lucero uplifts to the southwest; and
- the Rio Puerco Fault Belt to the west.

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 & Haase 1992). This sequence of sediments is called the Santa Fe Group. The Santa Fe Group is up to 14,500 feet (ft) (4,420 meters [m]) thick at the deepest part of the basin. 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 (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.

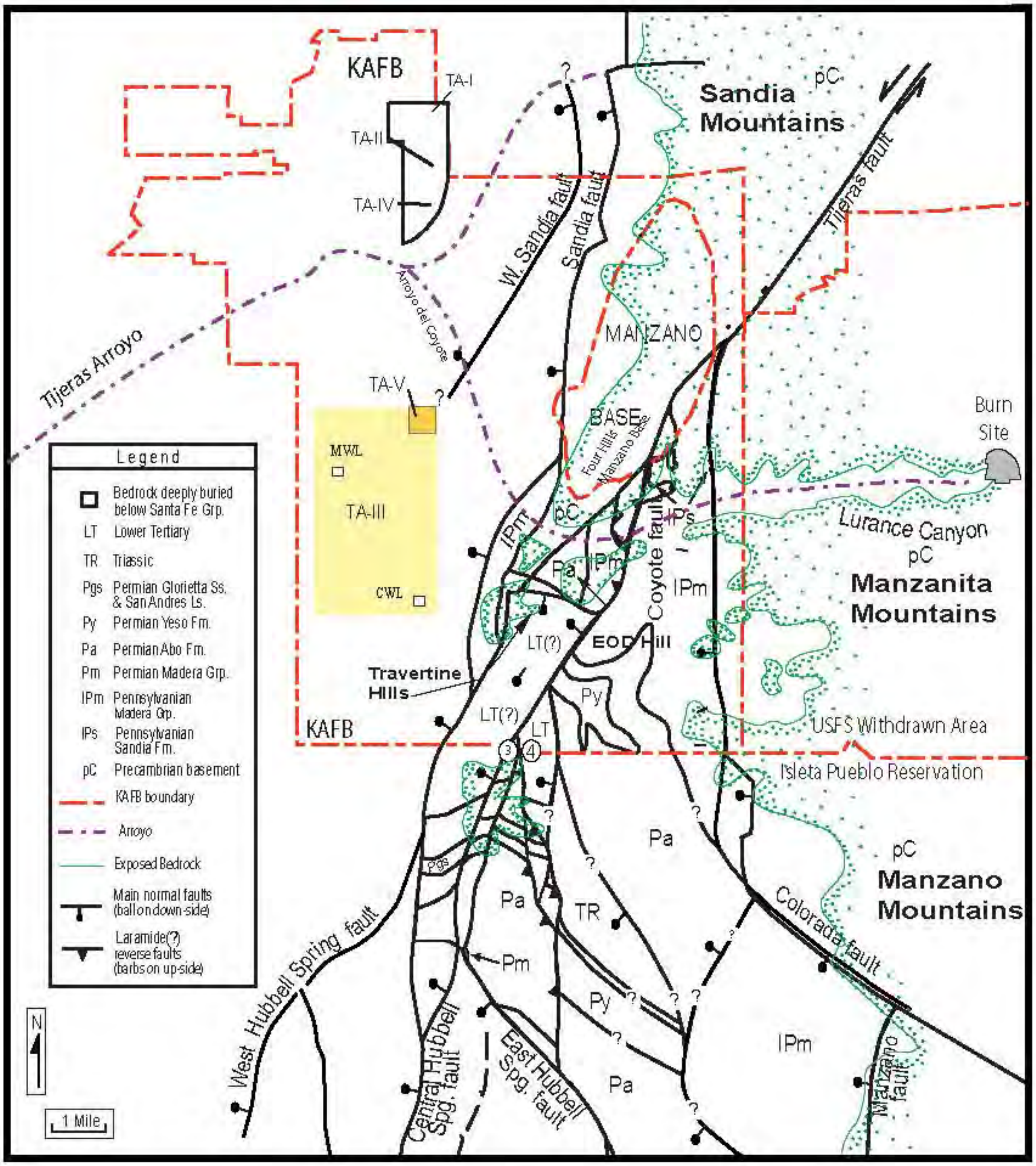

Figure 1-2. Generalized Geology in the Vicinity of SNL/KAFB

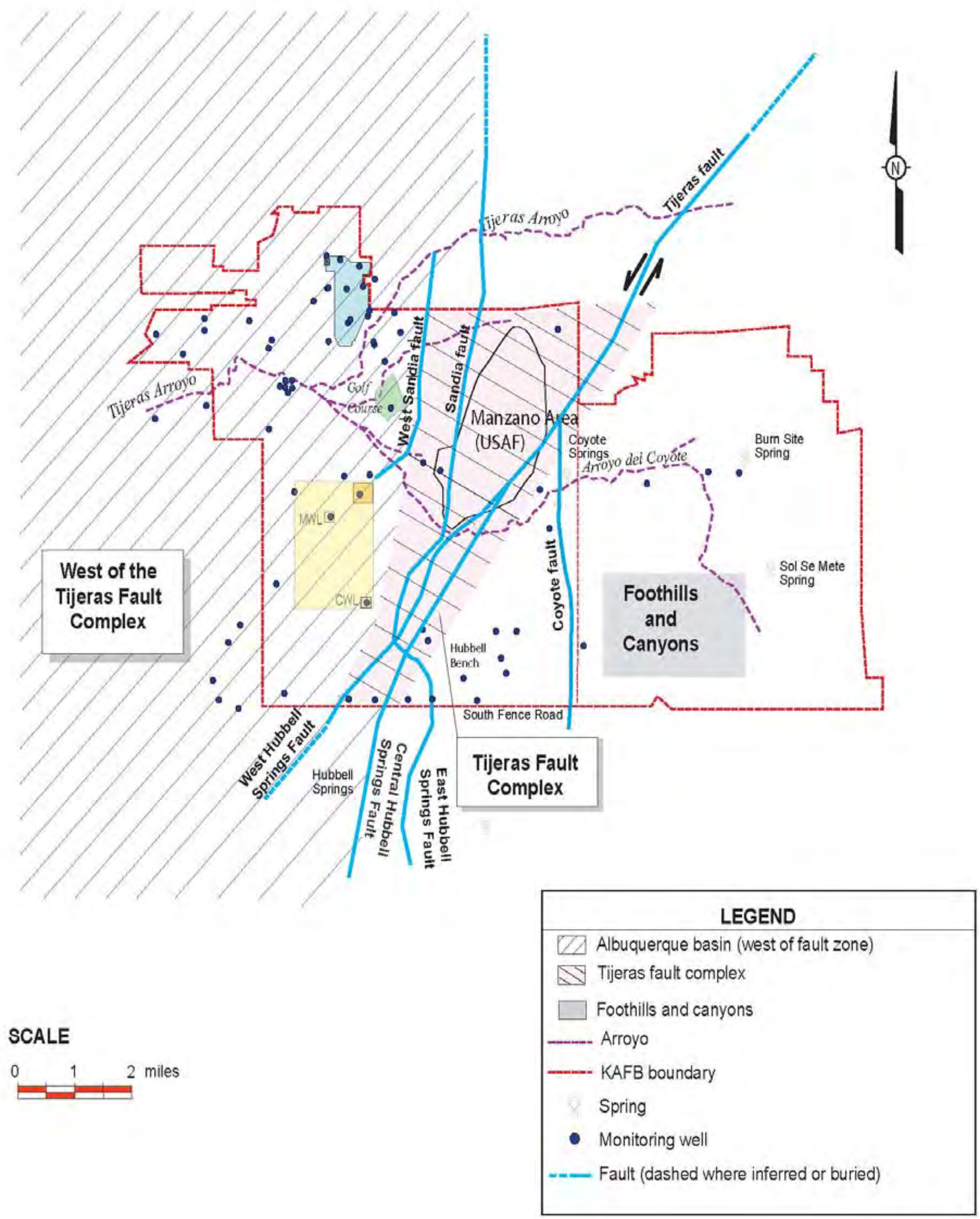

Figure 1-3. Hydrogeologically Distinct Areas Primarily Controlled by Faults

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).

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 50 to 200 ft (15 to 61 m) bgs. Most of the water supply and monitoring wells east of the faults are completed in fractured bedrock at relatively shallow depth 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 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 at 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) (U.S. Army COA 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 (U.S. Army COA 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 (ft^3)/year (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 the ER Project and the GWPP. Figure 1-4 illustrates the extensive monitoring well network at KAFB.

1.2.1 ER Project Monitoring

The ER Project 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 Project groundwater monitoring networks: (1) TAG; (2) TA-V; (3) CWL; (4) MWL; and (5) the Burn Site Groundwater study area. The ER Project groundwater monitoring wells are located upgradient and downgradient of known legacy surface contamination sites with associated groundwater contamination.

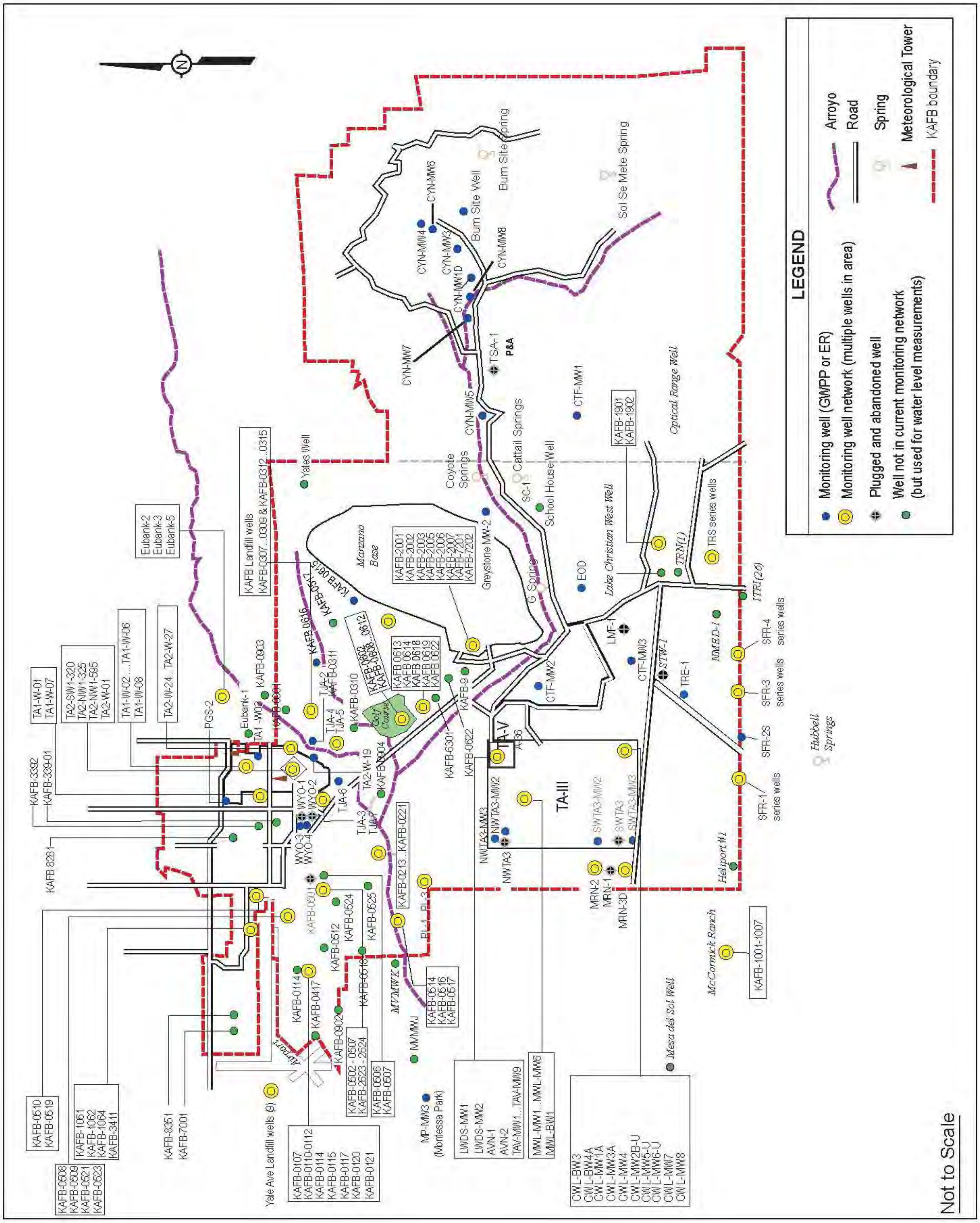

Figure 1-4. Wells and Springs on SNL/NM and KAFB

1.2.2 GWPP Monitoring

The 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.

1.2.3 Groundwater Monitoring Regulatory Criteria and DOE Orders

Groundwater monitoring performed by the GWPP and the ER Project are directed by 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). This DOE order establishes the criteria and guidelines for developing Groundwater Protection Management Programs for all DOE sites and facilities. Groundwater monitoring results from both the GWPP and the ER Project are compared with federal and state water quality standards and DOE drinking water guidelines, where established.

In addition to DOE orders, ER Project 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 CWL and MWL falls into this category. Some groundwater monitoring activities (e.g., TAG, Burn Site, and TA-V investigations) are more broadly based and have historically been conducted by the ER Project as Voluntary Corrective Measures.

Three of the ER Project groundwater investigations are under the direction of the Compliance Order on Consent (the Order) between the New Mexico Environment Department (NMED), Sandia, and the DOE (NMED 2004). These three AOCs (TAG, TA-V, and Burn Site) 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 TAG, TA-V, and Burn Site Groundwater AOCs, and, accordingly, the DOE/NNSA and Sandia were required to complete a CME Report for the TAG, TA-V, and Burn Site Groundwater 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. In FY04, 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.

1.3 References

DOE 2008 DOE Order 450.1A, *Environmental Protection Program*, June 4, 2008

DOE 2007 DOE Order 231.1A, *Environment, Safety, and Health Reporting*

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 1995.

Hawley & 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.

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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.

SNL 1998 Sandia National Laboratories/New Mexico, 1998. *Site-Wide Hydrogeologic Characterization Project, 1995 Annual Report* (Revised February 1998), Environmental Restoration Project, 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.

U.S. Army COA 1979 U.S. Army Corps of Engineers, 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.

2.0 Groundwater Protection Program

2.1 Introduction

This chapter documents the results of the Calendar Year 2008 (CY08) 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 14 monitoring wells and 1 surface water sample from a spring. Water levels were measured at 74 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:

- Determines the effects of SNL/NM operations on groundwater through groundwater quality sampling and water level measurement and analysis;
- Records 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;
- 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; and
- 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:

- Establish baseline water quality and groundwater flow information for the groundwater system at SNL/NM;

- Determine the impact, if any, of SNL/NM's operations on the quality and quantity of groundwater; and
- Demonstrate compliance with all federal, state, and local groundwater requirements.

The GWPP is responsible for tracking information on all wells operated by Sandia Corporation (Sandia), including Environmental Restoration (ER) Project wells and characterization boreholes. The GWPP Well Registry and Oversight Task was established to ensure that all wells owned by Sandia are properly constructed and maintained to protect groundwater resources (OSE 2005). The GWPP Project Lead works with well owners to review new well design plans, record construction information, track well ownership and maintenance records, perform annual well inspections, and consult with owners when plugging and abandonment or replacement of a well or borehole is required. The goal is to provide full life-cycle management of wells and boreholes. Additional information on the GWPP can be found in the SNL/NM 2008 GWPP Plan (SNL 2008a)

2.2 Regulatory Criteria

SNL/NM is required by U.S. Department of Energy (DOE) Order 450.1A to develop and implement a Groundwater Protection Management Program (DOE 2008). Groundwater surveillance is one element within DOE's overall Environmental Protection Program. The Compliance Order on Consent (the Order) lists the following requirements for groundwater monitoring programs:

- Obtain data to determine baseline conditions of groundwater quality and quantity;
- Demonstrate compliance with and implementation of all applicable regulations and DOE Orders;
- Provide data to detect groundwater pollution or contamination;
- Provide a reporting mechanism for detected groundwater pollution or contamination;
- Identify existing and potential groundwater contamination sources and maintain surveillance of these sources; and
- Provide data for decisions concerning land disposal practices and the management and protection of groundwater sources.

In April 2004, the DOE and Sandia agreed to the Order (NMED 2004) issued by the New Mexico Environment Department (NMED). In addition, for newly constructed monitoring wells, the Order requires four continuous quarters of sampling and analysis for perchlorate. The protocol establishes a screening level of 4 micrograms per liter (µg/L) with a minimum detection level of 4 µg/L. If the sample results indicate the presence of perchlorate either at or greater than 4 µg/L, then SNL/NM is 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 frequency until at least four consecutive nondetections are obtained (NMED 2004).

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. 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 Surveillance Quality Monitoring

Annual sampling of groundwater was conducted during the period from March 11 to April 21, 2008. Samples were collected from 14 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, NWTA3-MW3D, PL-2, SFR-2S, SFR-4T, SWTA3-MW2, SWTA3-MW3, SWTA3-MW4, and TRE-1. A surface water sample was collected from Coyote Springs. In addition, during July 2008, monitoring well CTF-MW2 was resampled to confirm the results for high explosives (HE) obtained during the March sample collection. Well locations are shown in Figure 2B-1.

Samples collected from all locations were analyzed for:

- Safe Water Drinking Act (SWDA) list volatile organic compounds (VOCs);
- total organic halogens (TOX);
- total phenols;
- total alkalinity;
- nitrate plus nitrite (NPN);
- total cyanide;
- major anions;
- target analyte list (TAL) metals plus uranium-235 and uranium-238,
- mercury;
- HE compounds;
- gamma spectroscopy;
- gross alpha and beta activity; and
- radium-226 and radium-228.

Analysis for HE 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**.** Two duplicate samples were submitted for all analyses from CTF-MW2 and SWTA3-MW2. Additional samples were collected from CTF-MW2 for metals and radiological fractions in unpreserved sample containers due to the high buffering capacity of water from this location.

2.3.2 Groundwater Level Monitoring

Water levels are a means to assess the physical changes of the groundwater system over time. This includes changes in the local water table, the quantity of water available, as well as the direction and speed of groundwater movement. The GWPP gathers groundwater level measurements from a large network of wells on and around 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). In CY08, data from 156 wells were incorporated into the monitoring well water level database. Frequency of measurement of water levels in wells was quarterly or monthly, 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 wells are the primary sources of groundwater withdrawal. Water level elevation data collected during common time period at a group of representative wells are analyzed, and the data are interpolated and plotted as same elevation contours. From this water table map, groundwater flow directions can be visualized and horizontal gradients can be determined. Comparisons of water levels measured over time in a well when plotted on a graph are called a hydrograph. Specific results for annual precipitation, water production, and the impact on the water table are discussed in Section 2.6.2.

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 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 SNL/NM Field Support Operations (FSO) and the Sample Management Office (SMO) as provided in a mini-SAP (SNL 2008b). The min-SAP is prepared by the Sampling Coordinator at the request of the GWPP Project Lead. The mini-SAP provides detailed information on the wells to be sampled, and the analyses to be conducted, the methods to be used, and any special conditions that may apply.

2.4.2 Sample Collection 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 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 [NMAC]). Annual sampling is conducted for metals, VOCs, and inorganic constituents, including nitrates. Sample collection is conducted per the instructions and requirements contained in the Field Operating Procedure (FOP) *Groundwater Monitoring Well Sampling and Field Analytical Measurements* (SNL 2007a).

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 through 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 indicates the effectiveness of well purging in removing stagnant water from the well so that 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).

Table 2-2. Field Parameters Measured at the Wellhead

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 (µmho/cm)	Stability measure: Four measurements within 5%.
Turbidity (NTU)	Stability measure: Four consecutive measurements within 10% or < 5 NTU.
Alkalinity*	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: *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 = Degrees Celsius.
$CaCO_3$ = Calcium carbonate.
gpm = Gallon(s) per minute.
µmho/cm = Microhm(s) per centimeter.
mg/L = Milligram(s) per liter.
mL = Milliliter(s).
mV = Millivolt(s).
NTU = Nephelometric turbidity units.

2.4.4 Water Level Measurements

Water level measurements are conducted at a frequency of monthly or quarterly on a network of 79 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 per the instructions and requirements of FOP 03-02, *Groundwater Level Data Acquisition and Management*, Rev 02 (SNL 2007b)

2.5 Analytical Methods

Analytical methods for groundwater sample analyses are identified for the specific analytes for each sampling event in the mini-SAP. The methods are defined in EPA SW846 *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, Update IV of the 3rd 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.

2.6 Summary of Monitoring Results

2.6.1 Analytical Results

Groundwater and surface water samples were submitted to General Engineering 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 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, method detection limits (MDLs), practical quantitation limits, minimal detectable activity (MDA), critical levels, dates of analyses, results of QC analyses, and data validation findings are filed in the SNL/NM Customer Funded Records Center. Table numbers refer to tables provided in Attachment 2A at the end of this chapter.

Table 2A-1 summarizes detected VOC and HE compound results for groundwater samples collected in March and April 2008. No VOCs or HE compounds were detected at concentrations above established MCLs or MACs in any groundwater sample. Chloroform and dibromochloromethane were the only VOCs detected above laboratory MDLs. Chloroform was detected at a concentration of 0.693 μg/L in the sample from CTF-MW3 and at 0.867 μg/L in TRE-1. Dibromochloromethane was detected in CTF-MW3 at a concentration of 0.363 μg/L. Methylene chloride and toluene were qualified during data validation as not detected in the sample from NWTA3-MW3D due to associated trip blank sample contamination.

The initial analysis of the sample from CTF-MW2 using EPA Method SW846 8330 resulted in detection of the HE compounds 4-amino-2,6-dinitrotoluene and m-nitrotoluene. The results for these compounds were subsequently rejected during verification analysis using a more reliable method, SW846 8321A, because the detections could not be confirmed. However, hexahydro-trinitro-triazine (RDX) was detected in the verification analysis of the original sample from CTF-MW2 and in the associated duplicate sample at concentrations of 0.183 and 0.226 μg/L, respectively, using EPA Method SW846 8321A. Method SW846 8330 is used as a screening method for HE. Method SW846 8321A, which is a relatively new technique, is more accurate and is used for verification of HE detections but is also a more expensive analysis. Table 2A-2 presents the MDLs for associated VOC and HE analyses.

Monitoring well CTF-MW2 was resampled on July 18, 2008, to verify the HE results obtained during the initial sampling on March 15, 2008. The same sampling protocol and analytical methods were used in the resampling event. No compounds were detected above laboratory MDLs, except for RDX, which was detected in samples at concentrations of 0.508 and 0.187 μg/L. The result of 0.508 μg/L was obtained using Method SW846 8330; the lower concentration of 0.187 μg/L was obtained by using SW846 8321A for the analysis. Method SW846 8321A is a more reliable analytical method. The results of the reanalysis are presented in Table 2A-1. The field parameters measured during the resampling event are shown in Table 2A-8.

All the quantitative results for RDX at CTF-MW2 are qualified with a "J" designator which identifies the results as estimated values above the MDL and below the reporting limit.

Table 2A-3 summarizes alkalinity, major anions (as bromide, chloride, fluoride, and sulfate), NPN, TOX, total phenols, and total cyanide results. No parameters 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-MW2 duplicate sample, CTF-MW3, SFR-4T, and SWTA3-MW4 at concentrations of 1.73, 2.26, 2.27, 2.36, 2.53, and 1.65 mg/L, respectively. The time trend plots for wells exceeding the MCL for fluoride concentrations are presented in Figures 2B-2 through 2B-6. The results for TOX were qualified during data validation as not detected in various samples due to contamination in initial calibration and continuing calibration blank samples.

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 samples from CTF-MW2 at concentrations ranging from 0.0483 to 0.0507 mg/L. The time trend plot for arsenic concentrations in well CTF-MW2 is shown in Figure 2B-7. Beryllium was detected above the MCL of 0.004 mg/L in the surface sample from Coyote Springs at a concentration of 0.00721 mg/L. The time trend plot for beryllium concentrations in Coyote Springs is shown in Figure 2B-8. Dissolved TAL metal results are summarized in Table 2A-4.

Mercury was also 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.

Gamma spectroscopy results for short-list radionuclides are summarized in Table 2A-6. All isotope activities are less than associated MDAs, except for potassium-40. Potassium-40 was reported above the MDA in samples from Coyote Springs, CTF-MW2, CTF-MW2 duplicate sample, Greystone-MW2, and SWTA3-MW3 at activities of 47.6 ± 32.9, 59.7 ± 45.8, 82.8 ± 40.5, 71.9 ± 43.2, and 50.4 ± 41.5 picocuries per liter (pCi/L), respectively. Potassium-40 results for the sample from CTF-MW1 and the duplicate sample from CTF-MW2; cesium-137 results for the samples from SFR-4T and SWTA3-MW4; and americium-241 results for the sample from SWTA3 MW3 were qualified as usable during data validation due to the peak not meeting identification criteria for each isotope (please refer to analytical data package and data validation report).

Radioisotopic analyses included gross alpha and gross beta activity, radium-226, and radium-228. Gross alpha results for samples from CTF-MW1, CTF-MW2, CTF-MW3, SFR-2S, TRE-1, and the TRE-1 duplicate sample exceed the MCL of 15 pCi/L at activities ranging from 30.2 ± 7.15 to 106 ± 27.6 pCi/L. In this region, groundwater contacts bedrock that contains materials high in naturally occurring uranium. Gross alpha results are reported as uncorrected gross alpha activities (not corrected by subtracting naturally occurring uranium and radium activities). After subtracting the uranium and radium activities from the uncorrected values, the values for gross alpha range from 19.14 to 88.39 pCi/L. These values still exceed the MCL. Trend plots of the unadjusted gross alpha activity for SFR-2S and TRE-1 are shown in Figures 2B-9 and 2B-10, respectively. No trend plots are presented for the other wells in which the gross alpha activity exceeds the MCL as only single data points are available at each well. Combined radium-226 and radium-228 activities from four CTF-MW2 samples exceed the MCL of 5.0 pCi/L. Radium-226 was reported in the sample from CTF-MW2 at activities ranging from 3.32 ± 0.919 to 4.56 ± 1.17 pCi/L, and radium-228 from 8.90 ± 2.37 to 10.0 ± 2.69 pCi/L. Gross beta results do not exceed established limits. Radioisotopic results are summarized in Table 2A-7.

Table 2A-8 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 CY08, water levels were measured in 156 monitoring wells. Data were provided by the USAF IRP, the COA, the USGS, and SNL/NM. Data are available in the Environmental Data Management System. The number of wells represented in the database is provided by the organization listed in Table 2-3.

Table 2-3. Water Levels Measured by SNL/NM and Other Agencies

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

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.
TAG = Tijeras Arroyo Groundwater.
TA-V = Technical Area V
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 9.47 inches per year (in./yr) (30-year norm) at Albuquerque International Airport (AIA) to 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. 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 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 AIA, adjacent to KAFB. Annual precipitation during CY08 at the four sites is shown in Table 2-4. Data for Calendar Year 2007 (CY07) is also presented for comparison. The 11.87 inches (in.) of precipitation measured at AIA during CY08 is 3.52 in. less than the corresponding period for the previous year and is 1.12 in. below the 30-year norm of 9.47 in. for the same period. Monthly distribution of precipitation during CY08 at the four locations is shown in Figure 2C-1. Figure 2C-2 shows the annual distribution of precipitation at these four locations for the period from 2000 to 2008.

Table 2-4. CY07–CY08 Precipitation Data at KAFB

Site	A21	A36	SC1	AIA
CY07	8.57	9.65	14.63	11.87
CY08	6.01*	7.13	8.35	8.35

NOTES: Data are in inches of rainfall.
*Precipitation at this location is under-reported because of instrument problems during two rain events.
AIA = Albuquerque International Airport.
CY07 = Calendar Year 2007.
CY08 = Calendar Year 2008.
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 CY08, 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 shows the CY08 monthly production for KAFB water supply wells. The highest level of production was 114,768,000 gallons (gal) in June; the lowest occurred in February at 41,557,000 gal. The variability 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 CY08 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 1999. Reductions in water demand have been achieved through conservation. In addition, in CY07, a portion of the base housing was switched to the COA drinking water supply, reducing demand on the KAFB system. Table 2-5 provides a comparison of water pumped in CY08 to the previous year.

Table 2-5. Total KAFB Groundwater Well Production

Units	CY07	CY08
Million gal	970	896
Acre-feet	2,976	2,748

CY07 = Calendar Year 2007.
CY08 = Calendar Year 2008.
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 from monitoring wells installed by the DOE and Sandia, USAF IRP, COA, and the State of New Mexico were used to construct the CY08 regional water table elevation contour map shown in Figure 2C-6. The extent of the contoured area was constructed using September and October 2008 static water level elevation data from 36 wells completed in the regional aquifer underlying 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 comprise the eastern boundary of the area in Figure 2C-6 (Figures 1-2 and 1-3). These bounding faults are assumed to be barriers to groundwater flow into the central basin from foothills to the east. The contours are developed using Surfer software (Golden 2002).

Hydrographs for the wells used to construct the contours are shown in Attachment 2C at the end of this chapter. The hydrographs represent data only for the most recent three years of water level measurement.

Regional Groundwater Flow System

In general, the open-to-the-north, U-shaped contour lines depicted in Figure 2C-6 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 west and northwest.

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 vertical offset along the faults is manifested in the topographic relief. The fault also presents a hydrologic barrier to the westward movement of groundwater. The dashed contour lines in the south east corner of Figure 2C-6 are inferred contours of groundwater elevations impacted by the Tijeras fault zone, which intersects the map at this location.

Figure 2C-7 maps contours of changes in water level elevations observed in CY08 from the same period of measurement in CY07. Areas of greatest declines in the water table are in the vicinity of TA-V and in the area southwest of TA-III. The decline in the vicinity of TA-V is approximately 0.88 feet per year (ft/yr) as determined from the three-year trend of the hydrograph for monitoring well LWDS-MW1 shown in Figure 2C-8. The trend for the area southwest of TA-III is approximately 0.95 ft/yr as determined from the hydrograph for monitoring well SWTA3-MW2 presented in Figure 2C-9. The wells in the northeast quadrant of Figure 2C-7 show a modest increase in groundwater elevation. The trend in the hydrograph for monitoring well KAFB 0308 in Figure 2C-10 shows an increase of 0.15 ft/yr. This increase may be attributed to recharge from Tijeras Arroyo or draining of the perched groundwater system (PGWS) described in the following section. Figures 2C-11 and 2C-12 present regional water table hydrographs for the northwest and north central wells, respectively.

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 a PGWS. The extent of the PGWS 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 the southern edge of the golf course.

The elevation data to the first water level of the PGWS are contoured in Figure 2C-13. The contour map was constructed using data from 14 monitoring wells 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 has indicated a layer of fine sediments that dips to the southeast (Van Hart 2001) and may serve as the perching horizon. No water is produced from the PGWS.

Figure 2C-14 illustrates the changing water level elevations in the PGWS between CY07 and CY08. In general, the elevation of the water table of the uppermost layer is decreasing in the northwest as illustrated by the hydrographs shown in Figure 2C-15. The hydrographs for wells located in the eastern portion of the PGWS shown in Figure 2C-16 demonstrate an increasing trend in water levels. The dashed contours along the southern and eastern portions of the map represent increasing water levels.

The decreasing water levels in the west shown in Figure 2C-14 are dominated by monitoring well WYO-4. The annual decline in water level elevations at this location as determined by the three-year trend in the hydrograph for WYO-4 is approximately 1.64 ft/yr (Figure 2C-15). One possible explanation for the rapid decline of water levels at this location is a hole in the perching layer that allows water to drain to the regional water table at this location. The increase in water levels in KAFB-0506, which is located on the western edge of the PGWS, runs counter to the general decline of water levels in wells at this location. This is shown in the hydrographs in Figure 2C-15.

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 Figures 2C-6 and 2C-7 and the PGWS contours in Figures 2C-13 and 2C-14. 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 are 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 2005 through 2008.

Figures 2C-8 through 2C-12 depict the hydrographs representing the regional aquifer, and Figures 2C-15 and 2C-16 show the hydrographs for the PGWS.

Each figure contains representative hydrographs for monitoring wells located in the geographical area identified in the figure title. One or more representative hydrographs were selected in each group to demonstrate the characteristic trends of groundwater levels in the particular area. A trend line was constructed for the representative hydrographs using a linear regression of data for the recent 36-month period. The trend lines are superimposed on the representative hydrograph and are defined by the linear equation y = ax + y intercept, where the coefficient of x is the slope of the line and represents water level changes in ft/day. The slope value multiplied by 365 days is the annual change in ft/yr based on a three-year trend. The hydrograph trend lines generally exhibit relatively good correlation with the linear models as demonstrated by R^2 coefficient values near one. R^2 values near zero indicate a poor linear model representation. On some hydrographs oscillations are prominent. These oscillations correlate with changes in the rate of groundwater pumping at the supply wells in response to seasonal water demand. Generally wells closer to the water supply wells demonstrate the greatest response.

2.7 Quality Control Results

The SNL/NM SMO processes environmental samples collected by both the GWPP and the ER Project. The SMO reviews the SAP, 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 2007c). All groundwater samples are analyzed by off-site laboratories using EPA-specified protocols.

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

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, and 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 the data validation procedure (SNL 2007c).

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

QC Sample Type	Description
Field QC	
Equipment blanks*	Determine the effectiveness of the decontamination process of the portable sampling pump (Bennett™) to ensure that cross-contamination did not occur between wells.
Duplicate samples	Establish the precision of sampling process.

Table 2-6. QC Sample Types for Groundwater Sampling and Analysis *(Concluded)*

QC Sample Type	Description
Trip blanks	Deionized water samples submitted with environmental samples to determine whether contamination by VOCs occurred during sample handling, shipment, or storage.
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 samples 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: *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 CY08 annual groundwater surveillance monitoring event.

2.9 Summary and Conclusions

The annual groundwater surveillance monitoring sampling event was conducted during March and April 2008. 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 and associated duplicate sample from monitoring well CTF-MW2 at concentrations of 0.183 and 0.226 µg/L, respectively. Resampling of the same well occurred in July 2008. The results of the reanalysis confirmed the presence of RDX. The concentrations detected were 0.508 and 0.187 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 wells CTF-MW2, CTF-MW3, SFR-4T, and SWTA3-MW3. The surface water sample from Coyote Springs also contained elevated fluoride levels. The concentrations range from 1.65 to 2.53 mg/L. The EPA SWDA-regulated MCL for fluoride is 4.0 mg/L.

Arsenic was detected above the MCL of 0.01 mg/L in CTF-MW2 at concentrations ranging from 0.483 to 0.0507 mg/L. Beryllium was detected in the surface water sample from Coyote Springs at a concentration of 0.00721 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.

Gross alpha activity values in samples from wells CTF-MW1, CTF-MW2, CTF-MW3, SFR-2S, and TRE-1 exceed the MCL of 15 pCi/L. Uncorrected activities range from 30.2 to 106 pCi/L. When these activities are adjusted to subtract uranium and radium activities, the values range from 19.14 to 88.39 pCi/L. The wells with elevated gross alpha activity levels are located west of the Tijeras fault zone in an area of shallow bedrock with naturally high uranium values. Water table elevation measurements were obtained throughout CY08 on a monthly and quarterly basis. Water level elevation measurements obtained from 36 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 similar 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 CY08 and CY07 indicate the areas of greatest declines in the vicinity of TA-V and southwest of TA-III. A slight increase in the regional water table was observed in the northeast portion of base. Hydrographs for wells in the TA-V area show an annual decline in water level elevations of 0.88 ft/yr based on a three-year trend. For the southwest region the decline is 0.95 ft/yr. The slight increase of 0.15 ft/yr in the elevation of the water table in the northeast sector may be attributed to recharge from the Tijeras Arroyo.

Water level elevations were also obtained in wells completed in the PGWS. Fourteen wells were used to construct a water level elevation contour map. 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 presumably due to the drainage of the system to the east and perhaps some additional recharge from the Tijeras Arroyo.

2.10 References

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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 Compounds and High Explosive Compounds
Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

Calendar Year 2008

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]
CTF-MW2	4-Amino-2,6-dinitrotoluene	0.621	0.162	0.487	NE	NE		R	085680-024	SW846-8330
25-Mar-08	m-Nitrotoluene	0.514	0.126	0.325	NE	NE	P, X	R	085680-024	SW846-8330
CTF-MW2 (Verification) 25-Mar-08	RDX	0.183	0.130	0.325	NE	NE	J	J	085680-025	SW846-8321A
CFT-MW2 (Duplicate) 25-Mar-08	4-Amino-2,6-dinitrotoluene	0.642	0.162	0.487	NE	NE		R	085682-024	SW846-8330
CTF-MW2 (Duplicate Verification) 25-Mar-08	RDX	0.226	0.130	0.325	NE	NE	J	J	085682-025	SW846-8321A
CFT-MW2 (Re-sample) 18-Jul-08	RDX	0.508	0.162	0.487	NE	NE	P	J	086373-024	SW846-8330
CFT-MW2 (Re-sample) 18-Jul-08	RDX	0.187	0.130	0.325	NE	NE	J		086373-025	SW846-8321A
CTF-MW3	Chloroform	0.693	0.250	1.0	NE	100	J		085685-001	SW846-8260
14-Mar-08	Dibromochloromethane	0.363	0.250	1.0	NE	NE	J		085685-001	SW846-8260
NWTA3-MW3D	Methylene chloride	3.10	2.0	5.0	5.0	100	J	5.0U	085695-001	SW846-8260
02-Apr-08	Toluene	0.612	0.25	1.0	1000	750	J	1.0U	085695-001	SW846-8260
TRE-1 11-Mar-08	Chloroform	0.867	0.25	1.0	NE	100	J		085714-001	SW846-8260

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

Analyte	Method Detection Limit (µg/L)	Analytical Method[g]	Analyte	Method Detection Limit (µg/L)	Analytical Method[g]
1,1,1,2-Tetrachloroethane	0.25	SW846-8260	Ethyl benzene	0.25	SW846-8260
1,1,1-Trichloroethane	0.30	SW846-8260	Hexachlorobutadiene	0.25	SW846-8260
1,1,2,2-Tetrachloroethane	0.25	SW846-8260	Isopropylbenzene	0.25	SW846-8260
1,1,2-Trichloroethane	0.25	SW846-8260	Methylene chloride	2.0	SW846-8260
1,1-Dichloroethane	0.30	SW846-8260	Naphthalene	0.25	SW846-8260
1,1-Dichloroethene	0.30	SW846-8260	Styrene	0.25	SW846-8260
1,1-Dichloropropene	0.25	SW846-8260	Tert-butyl methyl ether	0.25	SW846-8260
1,2,3-Trichlorobenzene	0.30	SW846-8260	Tetrachloroethene	0.25	SW846-8260
1,2,3-Trichloropropane	0.30	SW846-8260	Toluene	0.25	SW846-8260
1,2,4-Trichlorobenzene	0.30	SW846-8260	Trichloroethene	0.25	SW846-8260
1,2,4-Trimethylbenzene	0.25	SW846-8260	Trichlorofluoromethane	0.31	SW846-8260
1,2-Dibromo-3-chloropropane	0.50	SW846-8260	Vinyl chloride	0.50	SW846-8260
1,2-Dibromoethane	0.25	SW846-8260	cis-1,2-Dichloroethene	0.30	SW846-8260
1,2-Dichlorobenzene	0.25	SW846-8260	cis-1,3-Dichloropropene	0.25	SW846-8260
1,2-Dichloroethane	0.25	SW846-8260	m-, p-Xylene	0.25	SW846-8260
1,2-Dichloropropane	0.25	SW846-8260	n-Butylbenzene	0.25	SW846-8260
1,3,5-Trimethylbenzene	0.25	SW846-8260	n-Propylbenzene	0.25	SW846-8260
1,3-Dichlorobenzene	0.25	SW846-8260	o-Xylene	0.25	SW846-8260
1,3-Dichloropropane	0.25	SW846-8260	sec-Butylbenzene	0.25	SW846-8260
1,4-Dichlorobenzene	0.25	SW846-8260	tert-Butylbenzene	0.25	SW846-8260
2,2-Dichloropropane	0.30	SW846-8260	trans-1,2-Dichloroethene	0.30	SW846-8260
2-Chlorotoluene	0.25	SW846-8260	trans-1,3-Dichloropropene	0.25	SW846-8260
4-Chlorotoluene	0.25	SW846-8260	1,3,5-Trinitrobenzene	0.0649 – 0.104	SW846-8330
4-Isopropyltoluene	0.25	SW846-8260	1,3-Dinitrobenzene	0.0649 – 0.117	SW846-8330
Benzene	0.30	SW846-8260	2,4,6-Trinitrotoluene	0.0779 – 0.162	SW846-8330
Bromobenzene	0.25	SW846-8260	2,4-Dinitrotoluene	0.130 – 0.162	SW846-8330
Bromochloromethane	0.30	SW846-8260	2,6-Dinitrotoluene	0.0779 – 0.162	SW846-8330
Bromodichloromethane	0.25	SW846-8260	2-Amino-4,6-dinitrotoluene	0.117 – 0.162	SW846-8330
Bromoform	0.25	SW846-8260	2-Nitrotoluene	0.143 – 0.162	SW846-8330
Carbon tetrachloride	0.25	SW846-8260	3-Nitrotoluene	0.126 – 0.143	SW846-8330
Chlorobenzene	0.25	SW846-8260	4-Amino-2,6-dinitrotoluene	0.130 – 0.162	SW846-8330
Chloroethane	0.50	SW846-8260	4-Nitrotoluene	0.162 – 0.182	SW846-8330
Chloroform	0.25	SW846-8260	HMX	0.104 – 0.162	SW846-8330
Chloromethane	0.50	SW846-8260	Nitro-benzene	0.0649 – 0.156	SW846-8330
Dibromochloromethane	0.25	SW846-8260	RDX	0.130 – 0.162	SW846-8330
Dibromomethane	0.30	SW846-8260	Tetryl	0.130 – 0.487	SW846-8330
Dichlorodifluoromethane	0.50	SW846-8260			

Refer to footnotes on page 2A-41.

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 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
Coyote Springs	Alkalinity as CACO3	1060	0.725	1.0	NE	NE	B		085674-016	SM 2320B
24-Mar-08	Bromide	2.19	0.067	0.2	NE	NE			085674-016	SW846 9056
	Chloride	497	3.3	10	NE	NE			085674-016	SW846 9056
	Fluoride	**1.73**	0.033	0.1	4.0	1.6			085674-016	SW846 9056
	Sulfate	129	5.0	20	NE	NE			085674-016	SW846 9056
	Nitrate plus nitrite as N	0.354	0.05	0.25	10	10			085674-018	EPA 353.2
	Total Organic Halogens	0.0397	0.00161	0.01	NE	NE		0.051U	085674-003	SW846 9020
	Total Phenols	ND	0.00165	0.005	NE	NE	U	UJ	085674-026	SW846 9066
	Total Cyanide	ND	0.005	0.005	0.2	0.2	U		085674-027	SW846 9012
CTF-MW1	Alkalinity as CACO3	191	0.725	1.0	NE	NE	B		085676-016	SM 2320B
24-Mar-08	Bromide	0.681	0.067	0.2	NE	NE			085676-016	SW846 9056
	Chloride	44.4	0.66	2.0	NE	NE			085676-016	SW846 9056
	Fluoride	1.36	0.033	0.1	4.0	1.6			085676-016	SW846 9056
	Sulfate	82.7	1.0	4.0	NE	NE			085676-016	SW846 9056
	Nitrate plus nitrite as N	7.80	0.25	1.25	10	10			085676-018	EPA 353.2
	Total Organic Halogens	0.0103	0.00161	0.01	NE	NE		0.051U	085676-003	SW846 9020
	Total Phenols	ND	0.00165	0.005	NE	NE	U	UJ	085676-026	SW846 9066
	Total Cyanide	ND	0.005	0.005	0.2	0.2	U		085676-027	SW846 9012
CTF-MW2	Alkalinity as CACO3	1550	0.725	1.0	NE	NE	B		085680-016	SM 2320B
25-Mar-08	Bromide	1.92	0.067	0.2	NE	NE			085680-016	SW846 9056
	Chloride	437	3.3	10	NE	NE			085680-016	SW846 9056
	Fluoride	**2.26**	0.033	0.1	4.0	1.6			085680-016	SW846 9056
	Sulfate	151	5.0	20	NE	NE			085680-016	SW846 9056
	Nitrate plus nitrite as N	ND	0.05	0.25	10	10	U		085680-018	EPA 353.2
	Total Organic Halogens	0.0192	0.00161	0.01	NE	NE		0.051U	085680-003	SW846 9020
	Total Phenols	ND	0.00165	0.005	NE	NE	U	UJ	085680-026	SW846 9066
	Total Cyanide	ND	0.005	0.005	0.2	0.2	B, U		085680-027	SW846 9012

Refer to footnotes on page 2A-41.

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 2008

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 (Duplicate) 25-Mar-08	Alkalinity as CACO3	1540	0.725	1.0	NE	NE	B		085682-016	SM 2320B
	Bromide	2.24	0.067	0.2	NE	NE			085682-016	SW846 9056
	Chloride	413	3.3	10	NE	NE			085682-016	SW846 9056
	Fluoride	**2.27**	0.033	0.1	4.0	1.6			085682-016	SW846 9056
	Sulfate	142	5.0	20	NE	NE			085682-016	SW846 9056
	Nitrate plus nitrite as N	ND	0.05	0.25	10	10	U		085682-018	EPA 353.2
	Total Organic Halogens	0.0264	0.00161	0.01	NE	NE		0.051U	085682-003	SW846 9020
	Total Phenols	ND	0.00165	0.005	NE	NE	U	UJ	085682-026	SW846 9066
	Total Cyanide	ND	0.005	0.005	0.2	0.2	U		085682-027	SW846 9012
CTF-MW3 14-Mar-08	Alkalinity as CACO3	362	0.725	1.0	NE	NE	B		085685-016	SM 2320B
	Bromide	1.29	0.067	0.2	NE	NE			085685-016	SW846 9056
	Chloride	132	1.32	4.0	NE	NE			085685-016	SW846 9056
	Fluoride	**2.36**	0.033	0.1	4.0	1.6			085685-016	SW846 9056
	Sulfate	502	2.0	8.0	NE	NE			085685-016	SW846 9056
	Nitrate plus nitrite as N	6.12	0.1	0.5	10	10			085685-018	EPA 353.2
	Total Organic Halogens	0.0123	0.00161	0.01	NE	NE		0.026UJ	085685-003	SW846 9020
	Total Phenols	ND	0.00165	0.005	NE	NE	U	UJ	085685-026	SW846 9066
	Total Cyanide	ND	0.005	0.005	0.2	0.2	U		085685-027	SW846 9012
Eubank-1 31-Mar-08	Alkalinity as CACO3	174	0.725	1.0	NE	NE	B		085687-016	SM 2320B
	Bromide	0.196	0.067	0.2	NE	NE	J		085687-016	SW846 9056
	Chloride	12.6	0.066	0.2	NE	NE			085687-016	SW846 9056
	Fluoride	0.370	0.033	0.1	4.0	1.6			085687-016	SW846 9056
	Sulfate	73.4	1.0	4.0	NE	NE			085687-016	SW846 9056
	Nitrate plus nitrite as N	1.99	0.05	0.25	10	10			085687-018	EPA 353.2
	Total Organic Halogens	ND	0.00161	0.01	NE	NE	U		085687-003	SW846 9020
	Total Phenols	ND	0.00165	0.005	NE	NE	U		085687-026	SW846 9066
	Total Cyanide	ND	0.005	0.005	0.2	0.2	B, U		085687-027	SW846 9012

Refer to footnotes on page 2A-41.

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 2008

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	Alkalinity as CACO3	436	0.725	1.0	NE	NE	B		085689-016	SM 2320B
27-Mar-08	Bromide	0.662	0.067	0.2	NE	NE			085689-016	SW846 9056
	Chloride	112	0.66	2.0	NE	NE			085689-016	SW846 9056
	Fluoride	0.758	0.033	0.1	4.0	1.6			085689-016	SW846 9056
	Sulfate	47.7	1.0	4.0	NE	NE			085689-016	SW846 9056
	Nitrate plus nitrite as N	4.88	0.25	1.25	10	10			085689-018	EPA 353.2
	Total Organic Halogens	0.0135	0.00161	0.01	NE	NE	B	0.039U	085689-003	SW846 9020
	Total Phenols	ND	0.00165	0.005	NE	NE	U	UJ	085689-026	SW846 9066
	Total Cyanide	ND	0.005	0.005	0.2	0.2	U		085689-027	SW846 9012
MRN-2	Alkalinity as CACO3	151	0.725	1.0	NE	NE	B		085691-016	SM 2320B
26-Mar-08	Bromide	0.227	0.067	0.2	NE	NE			085691-016	SW846 9056
	Chloride	15.0	0.066	0.2	NE	NE			085691-016	SW846 9056
	Fluoride	0.555	0.033	0.1	4.0	1.6			085691-016	SW846 9056
	Sulfate	51.6	1.0	4.0	NE	NE			085691-016	SW846 9056
	Nitrate plus nitrite as N	4.90	0.25	1.25	10	10			085691-018	EPA 353.2
	Total Organic Halogens	ND	0.00161	0.01	NE	NE	B, U		085691-003	SW846 9020
	Total Phenols	0.00536	0.00165	0.005	NE	NE		UJ	085691-026	SW846 9066
	Total Cyanide	ND	0.005	0.005	0.2	0.2	U		085691-027	SW846 9012
NWTA3-MW3D	Alkalinity as CACO3	134	0.725	1.0	NE	NE	B		085695-016	SM 2320B
02-Apr-08	Bromide	0.194	0.067	0.2	NE	NE	J		085695-016	SW846 9056
	Chloride	11.1	0.066	0.2	NE	NE			085695-016	SW846 9056
	Fluoride	0.726	0.033	0.1	4.0	1.6			085695-016	SW846 9056
	Sulfate	47.7	1.0	4.0	NE	NE			085695-016	SW846 9056
	Nitrate plus nitrite as N	0.925	0.05	0.25	10	10			085695-018	EPA 353.2
	Total Organic Halogens	0.00388	0.00161	0.01	NE	NE	J		085695-003	SW846 9020
	Total Phenols	ND	0.00165	0.005	NE	NE	U		085695-026	SW846 9066
	Total Cyanide	ND	0.005	0.005	0.2	0.2	U		085695-027	SW846 9012

Refer to footnotes on page 2A-41.

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 2008

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	Alkalinity as CACO3	142	0.725	1.0	NE	NE	B		085698-016	SM 2320B
01-Apr-08	Bromide	0.220	0.067	0.2	NE	NE			085698-016	SW846 9056
	Chloride	14.0	0.066	0.2	NE	NE			085698-016	SW846 9056
	Fluoride	0.498	0.033	0.1	4.0	1.6			085698-016	SW846 9056
	Sulfate	62.2	1.0	4.0	NE	NE			085698-016	SW846 9056
	Nitrate plus nitrite as N	1.82	0.05	0.25	10	10			085698-018	EPA 353.2
	Total Organic Halogens	ND	0.00161	0.01	NE	NE	U		085698-003	SW846 9020
	Total Phenols	ND	0.0165	0.05	NE	NE	U		085698-026	SW846 9066
	Total Cyanide	ND	0.005	0.005	0.2	0.2	U		085698-027	SW846 9012
SFR-2S	Alkalinity as CACO3	390	0.725	1.0	NE	NE	B		085700-016	SM 2320B
19-Mar-08	Bromide	0.696	0.067	0.2	NE	NE			085700-016	SW846 9056
	Chloride	127	0.66	2.0	NE	NE			085700-016	SW846 9056
	Fluoride	1.45	0.033	0.1	4.0	1.6			085700-016	SW846 9056
	Sulfate	68.6	1.0	4.0	NE	NE			085700-016	SW846 9056
	Nitrate plus nitrite as N	0.870	0.05	0.25	10	10			085700-018	EPA 353.2
	Total Organic Halogens	0.00186	0.00161	0.01	NE	NE	J	0.01U	085700-003	SW846 9020
	Total Phenols	ND	0.00165	0.005	NE	NE	U	UJ	085700-026	SW846 9066
	Total Cyanide	ND	0.005	0.005	0.2	0.2	U		085700-027	SW846 9012
SFR-4T	Alkalinity as CACO3	111	0.725	1.0	NE	NE	B		085702-016	SM 2320B
12-Mar-08	Bromide	1.76	0.067	0.2	NE	NE			085702-016	SW846 9056
	Chloride	197	1.32	4.0	NE	NE			085702-016	SW846 9056
	Fluoride	**2.53**	0.033	0.1	4.0	1.6			085702-016	SW846 9056
	Sulfate	1880	10	40	NE	NE			085702-016	SW846 9056
	Nitrate plus nitrite as N	0.303	0.05	0.25	10	10			085702-018	EPA 353.2
	Total Organic Halogens	0.027	0.00161	0.01	NE	NE		J+	085702-003	SW846 9020
	Total Phenols	ND	0.00165	0.005	NE	NE	U	UJ	085702-026	SW846 9066
	Total Cyanide	ND	0.005	0.005	0.2	0.2	U		085702-027	SW846 9012

Refer to footnotes on page 2A-41.

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 2008

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	Alkalinity as CACO3	163	0.725	1.0	NE	NE	B		085706-016	SM 2320B
20-Mar-08	Bromide	0.190	0.067	0.2	NE	NE	J		085706-016	SW846 9056
	Chloride	14.1	0.066	0.2	NE	NE			085706-016	SW846 9056
	Fluoride	0.931	0.033	0.1	4.0	1.6			085706-016	SW846 9056
	Sulfate	54.6	0.5	2.0	NE	NE			085706-016	SW846 9056
	Nitrate plus nitrite as N	0.765	0.05	0.25	10	10	B		085706-018	EPA 353.2
	Total Organic Halogens	ND	0.00161	0.01	NE	NE	U		085706-003	SW846 9020
	Total Phenols	ND	0.00165	0.005	NE	NE	U	UJ	085706-026	SW846 9066
	Total Cyanide	ND	0.005	0.005	0.2	0.2	U		085706-027	SW846 9012
SWTA3-MW2 (Duplicate)	Alkalinity as CACO3	164	0.725	1.0	NE	NE	B		085707-016	SM 2320B
20-Mar-08	Bromide	0.229	0.067	0.2	NE	NE			085707-016	SW846 9056
	Chloride	13.9	0.066	0.2	NE	NE			085707-016	SW846 9056
	Fluoride	0.940	0.033	0.1	4.0	1.6			085707-016	SW846 9056
	Sulfate	54.8	0.5	2.0	NE	NE			085707-016	SW846 9056
	Nitrate plus nitrite as N	0.845	0.05	0.25	10	10	B		085707-018	EPA 353.2
	Total Organic Halogens	ND	0.00161	0.01	NE	NE	U		085707-003	SW846 9020
	Total Phenols	0.0181	0.00165	0.005	NE	NE		UJ	085707-026	SW846 9066
	Total Cyanide	ND	0.005	0.005	0.2	0.2	U		085707-027	SW846 9012
SWTA3-MW3	Alkalinity as CACO3	158	0.725	1.0	NE	NE	B		085709-016	SM 2320B
18-Mar-08	Bromide	0.220	0.067	0.2	NE	NE			085709-016	SW846 9056
	Chloride	14.5	0.066	0.2	NE	NE			085709-016	SW846 9056
	Fluoride	1.26	0.033	0.1	4.0	1.6			085709-016	SW846 9056
	Sulfate	63.2	1.0	4.0	NE	NE			085709-016	SW846 9056
	Nitrate plus nitrite as N	0.520	0.05	0.25	10	10			085709-018	EPA 353.2
	Total Organic Halogens	ND	0.00161	0.01	NE	NE	U		085709-003	SW846 9020
	Total Phenols	ND	0.00165	0.005	NE	NE	U	UJ	085709-026	SW846 9066
	Total Cyanide	ND	0.005	0.005	0.2	0.2	U		085709-027	SW846 9012

Refer to footnotes on page 2A-41.

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 2008

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	Alkalinity as CACO3	178	0.725	1.0	NE	NE	B		085711-016	SM 2320B
17-Mar-08	Bromide	0.192	0.067	0.2	NE	NE	J		085711-016	SW846 9056
	Chloride	15.3	0.066	0.2	NE	NE			085711-016	SW846 9056
	Fluoride	**1.65**	0.033	0.1	4.0	1.6			085711-016	SW846 9056
	Sulfate	50.7	1.0	4.0	NE	NE			085711-016	SW846 9056
	Nitrate plus nitrite as N	0.885	0.05	0.25	10	10			085711-018	EPA 353.2
	Total Organic Halogens	ND	0.00161	0.01	NE	NE	U		085711-003	SW846 9020
	Total Phenols	ND	0.00165	0.005	NE	NE	U	UJ	085711-026	SW846 9066
	Total Cyanide	ND	0.005	0.005	0.2	0.2	U		085711-027	SW846 9012
TRE-1	Alkalinity as CACO3	486	0.725	1.0	NE	NE	B		085714-016	SM 2320B
11-Mar-08	Bromide	0.959	0.067	0.2	NE	NE			085714-016	SW846 9056
	Chloride	135	1.32	4.0	NE	NE			085714-016	SW846 9056
	Fluoride	1.52	0.033	0.1	4.0	1.6			085714-016	SW846 9056
	Sulfate	102	2.0	8.0	NE	NE			085714-016	SW846 9056
	Nitrate plus nitrite as N	2.24	0.1	0.5	10	10			085714-018	EPA 353.2
	Total Organic Halogens	0.0164	0.00161	0.01	NE	NE		0.026UJ	085714-003	SW846 9020
	Total Phenols	ND	0.00165	0.005	NE	NE	U	UJ	085714-026	SW846 9066
	Total Cyanide	ND	0.005	0.005	0.2	0.2	U		085714-027	SW846 9012

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
Coyote Springs	Aluminum	0.213	0.01	0.02	NE	NE			085674-009	SW846 6020
24-Mar-08	Antimony	ND	0.0005	0.002	0.006	NE	B, U		085674-009	SW846 6020
	Arsenic	0.00593	0.0015	0.005	0.01	0.1	B	0.0098U	085674-009	SW846 6020
	Barium	0.0419	0.0005	0.002	2.0	1.0			085674-009	SW846 6020
	Beryllium	**0.00721**	0.0001	0.0005	0.004	NE			085674-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.01	U		085674-009	SW846 6020
	Calcium	282	0.4	2.0	NE	NE	B		085674-009	SW846 6020
	Chromium	ND	0.0025	0.01	0.1	0.05	U		085674-009	SW846 6020
	Cobalt	0.0114	0.0001	0.001	NE	NE			085674-009	SW846 6020
	Copper	0.00193	0.0003	0.001	NE	NE		J+	085674-009	SW846 6020
	Iron	0.521	0.01	0.025	NE	NE	B		085674-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.05	U		085674-009	SW846 6020
	Magnesium	68.8	0.1	0.3	NE	NE			085674-009	SW846 6020
	Manganese	1.55	0.02	0.1	NE	NE			085674-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	0.002	U	UJ	085674-009	SW846 7470
	Nickel	0.0319	0.0005	0.002	NE	NE			085674-009	SW846 6020
	Potassium	30.7	0.08	0.3	NE	NE			085674-009	SW846 6020
	Selenium	ND	0.001	0.005	0.05	0.05	U	UJ	085674-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.05	U	UJ	085674-009	SW846 6020
	Sodium	444	1.6	5.0	NE	NE			085674-009	SW846 6020
	Thallium	0.00167	0.0003	0.001	0.002	NE			085674-009	SW846 6020
	Uranium-235	0.00005	0.00001	0.00007	0.03	5.0	J	J+	085674-009	SW846 6020
	Uranium-238	0.00696	0.00005	0.0002	0.03	5.0			085674-009	SW846 6020
	Vanadium	ND	0.003	0.01	NE	NE	U		085674-009	SW846 6020
	Zinc	0.0563	0.0026	0.01	NE	NE		J+	085674-009	SW846 6020

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

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	ND	0.01	0.02	NE	NE	U		085676-009	SW846 6020
24-Mar-08	Antimony	0.000578	0.0005	0.002	0.006	NE	B, J	0.0099U	085676-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.01	0.1	B, U		085676-009	SW846 6020
	Barium	0.0484	0.0005	0.002	2.0	1.0			085676-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		085676-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.01	U		085676-009	SW846 6020
	Calcium	95.8	0.4	2.0	NE	NE	B		085676-009	SW846 6020
	Chromium	ND	0.0025	0.01	0.1	0.05	U		085676-009	SW846 6020
	Cobalt	0.000247	0.0001	0.001	NE	NE	J		085676-009	SW846 6020
	Copper	0.000687	0.0003	0.001	NE	NE	J		085676-009	SW846 6020
	Iron	0.143	0.01	0.025	NE	NE	B		085676-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.05	U		085676-009	SW846 6020
	Magnesium	20.1	0.005	0.015	NE	NE			085676-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		085676-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	0.002	U	UJ	085676-009	SW846 7470
	Nickel	0.00129	0.0005	0.002	NE	NE	J		085676-009	SW846 6020
	Potassium	1.81	0.08	0.3	NE	NE			085676-009	SW846 6020
	Selenium	0.00471	0.001	0.005	0.05	0.05	J		085676-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.05	U	UJ	085676-009	SW846 6020
	Sodium	30.6	0.08	0.25	NE	NE			085676-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		085676-009	SW846 6020
	Uranium-235	0.000077	0.00001	0.00007	0.03	5.0		J+	085676-009	SW846 6020
	Uranium-238	0.0106	0.00005	0.0002	0.03	5.0			085676-009	SW846 6020
	Vanadium	ND	0.003	0.01	NE	NE	U		085676-009	SW846 6020
	Zinc	0.00336	0.0026	0.01	NE	NE	J		085676-009	SW846 6020

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

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	0.110	0.01	0.02	NE	NE			085680-009	SW846 6020
25-Mar-08	Antimony	ND	0.0005	0.002	0.006	NE	B, U		085680-009	SW846 6020
	Arsenic	**0.0507**	0.0015	0.005	0.01	0.1	B		085680-009	SW846 6020
	Barium	0.0769	0.0005	0.002	2.0	1.0			085680-009	SW846 6020
	Beryllium	0.00296	0.0001	0.0005	0.004	NE			085680-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.01	U		085680-009	SW846 6020
	Calcium	373	0.4	2.0	NE	NE	B		085680-009	SW846 6020
	Chromium	ND	0.0025	0.01	0.1	0.05	U		085680-009	SW846 6020
	Cobalt	0.00909	0.0001	0.001	NE	NE		J+	085680-009	SW846 6020
	Copper	0.0012	0.0003	0.001	NE	NE		J+	085680-009	SW846 6020
	Iron	2.36	0.01	0.025	NE	NE	B		085680-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.05	U		085680-009	SW846 6020
	Magnesium	89.0	0.1	0.3	NE	NE			085680-009	SW846 6020
	Manganese	3.35	0.02	0.1	NE	NE			085680-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	0.002	U	UJ	085680-009	SW846 7470
	Nickel	0.0169	0.0005	0.002	NE	NE		J+	085680-009	SW846 6020
	Potassium	46.0	0.08	0.3	NE	NE			085680-009	SW846 6020
	Selenium	ND	0.001	0.005	0.05	0.05	U	UJ	085680-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.05	U	UJ	085680-009	SW846 6020
	Sodium	478	1.6	5.0	NE	NE			085680-009	SW846 6020
	Thallium	0.00113	0.0003	0.001	0.002	NE			085680-009	SW846 6020
	Uranium-235	0.000211	0.00001	0.00007	0.03	5.0		J+	085680-009	SW846 6020
	Uranium-238	0.0291	0.00005	0.0002	0.03	5.0			085680-009	SW846 6020
	Vanadium	ND	0.003	0.01	NE	NE	U		085680-009	SW846 6020
	Zinc	0.0102	0.0026	0.01	NE	NE		J+	085680-009	SW846 6020

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

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 (Unpreserved)	Aluminum	0.0996	0.01	0.02	NE	NE			085681-009	SW846 6020
25-Mar-08	Antimony	ND	0.0005	0.002	0.006	NE	B, U		085681-009	SW846 6020
	Arsenic	**0.0495**	0.0015	0.005	0.01	0.1	B		085681-009	SW846 6020
	Barium	0.0752	0.0005	0.002	2.0	1.0			085681-009	SW846 6020
	Beryllium	0.00312	0.0001	0.0005	0.004	NE			085681-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.01	U		085681-009	SW846 6020
	Calcium	387	0.4	2.0	NE	NE	B		085681-009	SW846 6020
	Chromium	ND	0.0025	0.01	0.1	0.05	U		085681-009	SW846 6020
	Cobalt	0.00931	0.0001	0.001	NE	NE		J+	085681-009	SW846 6020
	Copper	0.00128	0.0003	0.001	NE	NE		J+	085681-009	SW846 6020
	Iron	2.31	0.01	0.025	NE	NE	B		085681-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.05	U		085681-009	SW846 6020
	Magnesium	88.9	0.1	0.3	NE	NE			085681-009	SW846 6020
	Manganese	3.43	0.02	0.1	NE	NE			085681-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	0.002	U	UJ	085681-009	SW846 7470
	Nickel	0.0172	0.0005	0.002	NE	NE		J+	085681-009	SW846 6020
	Potassium	46.9	0.08	0.3	NE	NE			085681-009	SW846 6020
	Selenium	ND	0.001	0.005	0.05	0.05	U	UJ	085681-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.05	U	UJ	085681-009	SW846 6020
	Sodium	505	1.6	5.0	NE	NE			085681-009	SW846 6020
	Thallium	0.00111	0.0003	0.001	0.002	NE			085681-009	SW846 6020
	Uranium-235	0.00019	0.00001	0.00007	0.03	5.0		J+	085681-009	SW846 6020
	Uranium-238	0.0265	0.00005	0.0002	0.03	5.0			085681-009	SW846 6020
	Vanadium	ND	0.003	0.01	NE	NE	U		085681-009	SW846 6020
	Zinc	0.0105	0.0026	0.01	NE	NE		J+	085681-009	SW846 6020

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

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 (Duplicate)	Aluminum	0.0915	0.01	0.02	NE	NE			085682-009	SW846 6020
25-Mar-08	Antimony	ND	0.0005	0.002	0.006	NE	B, U		085682-009	SW846 6020
	Arsenic	**0.0483**	0.0015	0.005	0.01	0.1	B		085682-009	SW846 6020
	Barium	0.0729	0.0005	0.002	2.0	1.0			085682-009	SW846 6020
	Beryllium	0.00274	0.0001	0.0005	0.004	NE			085682-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.01	U		085682-009	SW846 6020
	Calcium	395	0.4	2.0	NE	NE	B		085682-009	SW846 6020
	Chromium	ND	0.0025	0.01	0.1	0.05	U		085682-009	SW846 6020
	Cobalt	0.00855	0.0001	0.001	NE	NE		J+	085682-009	SW846 6020
	Copper	0.00126	0.0003	0.001	NE	NE		J+	085682-009	SW846 6020
	Iron	2.20	0.01	0.025	NE	NE	B		085682-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.05	U		085682-009	SW846 6020
	Magnesium	93.8	0.1	0.3	NE	NE			085682-009	SW846 6020
	Manganese	3.48	0.02	0.1	NE	NE			085682-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	0.002	U	UJ	085682-009	SW846 7470
	Nickel	0.0166	0.0005	0.002	NE	NE		J+	085682-009	SW846 6020
	Potassium	47.1	0.08	0.3	NE	NE			085682-009	SW846 6020
	Selenium	ND	0.001	0.005	0.05	0.05	U	UJ	085682-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.05	U	UJ	085682-009	SW846 6020
	Sodium	503	1.6	5.0	NE	NE			085682-009	SW846 6020
	Thallium	0.00117	0.0003	0.001	0.002	NE			085682-009	SW846 6020
	Uranium-235	0.000186	0.00001	0.00007	0.03	5.0		J+	085682-009	SW846 6020
	Uranium-238	0.0261	0.00005	0.0002	0.03	5.0			085682-009	SW846 6020
	Vanadium	ND	0.003	0.01	NE	NE	U		085682-009	SW846 6020
	Zinc	0.0103	0.0026	0.01	NE	NE		J+	085682-009	SW846 6020

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

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 (Duplicate - Unpreserved) 25-Mar-08	Aluminum	0.0902	0.01	0.02	NE	NE			085683-009	SW846 6020
	Antimony	ND	0.0005	0.002	0.006	NE	B, U		085683-009	SW846 6020
	Arsenic	**0.0488**	0.0015	0.005	0.01	0.1	B		085683-009	SW846 6020
	Barium	0.0724	0.0005	0.002	2.0	1.0			085683-009	SW846 6020
	Beryllium	0.00274	0.0001	0.0005	0.004	NE			085683-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.01	U		085683-009	SW846 6020
	Calcium	357	0.4	2.0	NE	NE	B		085683-009	SW846 6020
	Chromium	ND	0.0025	0.01	0.1	0.05	U		085683-009	SW846 6020
	Cobalt	0.00863	0.0001	0.001	NE	NE		J+	085683-009	SW846 6020
	Copper	0.00126	0.0003	0.001	NE	NE		J+	085683-009	SW846 6020
	Iron	2.21	0.01	0.025	NE	NE	B		085683-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.05	U		085683-009	SW846 6020
	Magnesium	86.2	0.1	0.3	NE	NE			085683-009	SW846 6020
	Manganese	3.19	0.02	0.1	NE	NE			085683-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	0.002	U	UJ	085683-009	SW846 7470
	Nickel	0.0164	0.0005	0.002	NE	NE		J+	085683-009	SW846 6020
	Potassium	46.0	0.08	0.3	NE	NE			085683-009	SW846 6020
	Selenium	ND	0.001	0.005	0.05	0.05	U	UJ	085683-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.05	U	UJ	085683-009	SW846 6020
	Sodium	430	1.6	5.0	NE	NE			085683-009	SW846 6020
	Thallium	0.00118	0.0003	0.001	0.002	NE			085683-009	SW846 6020
	Uranium-235	0.000177	0.00001	0.00007	0.03	5.0		J+	085683-009	SW846 6020
	Uranium-238	0.0238	0.00005	0.0002	0.03	5.0			085683-009	SW846 6020
	Vanadium	ND	0.003	0.01	NE	NE	U		085683-009	SW846 6020
	Zinc	0.0106	0.0026	0.01	NE	NE		J+	085683-009	SW846 6020

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

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	0.01	0.02	NE	NE	U	UJ	085685-009	SW846 6020
14-Mar-08	Antimony	ND	0.0005	0.002	0.006	NE	U		085685-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.01	0.1	U		085685-009	SW846 6020
	Barium	0.0303	0.0005	0.002	2.0	1.0		J+	085685-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		085685-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.01	B, U		085685-009	SW846 6020
	Calcium	227	0.2	1.0	NE	NE	B	J	085685-009	SW846 6020
	Chromium	ND	0.0025	0.01	0.1	0.05	U		085685-009	SW846 6020
	Cobalt	0.000346	0.0001	0.001	NE	NE	B, J	0.00052U	085685-009	SW846 6020
	Copper	0.00206	0.0003	0.001	NE	NE		J+	085685-009	SW846 6020
	Iron	0.480	0.01	0.025	NE	NE	B	J	085685-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.05	U		085685-009	SW846 6020
	Magnesium	59.2	0.025	0.075	NE	NE			085685-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		085685-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	0.002	U		085685-009	SW846 7470
	Nickel	0.00315	0.0005	0.002	NE	NE			085685-009	SW846 6020
	Potassium	11.9	0.08	0.3	NE	NE			085685-009	SW846 6020
	Selenium	0.0176	0.001	0.005	0.05	0.05			085685-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.05	U		085685-009	SW846 6020
	Sodium	202	0.4	1.25	NE	NE			085685-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		085685-009	SW846 6020
	Uranium-235	0.000066	0.00001	0.00007	0.03	5.0	J		085685-009	SW846 6020
	Uranium-238	0.00976	0.00005	0.0002	0.03	5.0			085685-009	SW846 6020
	Vanadium	ND	0.003	0.01	NE	NE	U		085685-009	SW846 6020
	Zinc	0.00623	0.0026	0.01	NE	NE	B, J	0.013UJ	085685-009	SW846 6020

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

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	0.01	0.02	NE	NE	U		085687-009	SW846 6020
31-Mar-08	Antimony	ND	0.0005	0.002	0.006	NE	B, U		085687-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.01	0.1	U		085687-009	SW846 6020
	Barium	0.0464	0.0005	0.002	2.0	1.0			085687-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		085687-009	SW846 6020
	Cadmium	0.000398	0.00011	0.001	0.005	0.01	J		085687-009	SW846 6020
	Calcium	68.6	0.1	0.5	NE	NE			085687-009	SW846 6020
	Chromium	ND	0.0025	0.01	0.1	0.05	U		085687-009	SW846 6020
	Cobalt	0.00023	0.0001	0.001	NE	NE	J		085687-009	SW846 6020
	Copper	0.00228	0.0003	0.001	NE	NE			085687-009	SW846 6020
	Iron	0.555	0.01	0.025	NE	NE			085687-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.05	U		085687-009	SW846 6020
	Magnesium	10.3	0.005	0.015	NE	NE			085687-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		085687-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	0.002	U	UJ	085687-009	SW846 7470
	Nickel	0.00247	0.0005	0.002	NE	NE			085687-009	SW846 6020
	Potassium	1.79	0.08	0.3	NE	NE			085687-009	SW846 6020
	Selenium	0.00278	0.001	0.005	0.05	0.05	J		085687-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.05	U	UJ	085687-009	SW846 6020
	Sodium	24.4	0.08	0.25	NE	NE			085687-009	SW846 6020
	Thallium	0.000345	0.0003	0.001	0.002	NE	J		085687-009	SW846 6020
	Uranium-235	0.000018	0.00001	0.00007	0.03	5.0	J		085687-009	SW846 6020
	Uranium-238	0.0026	0.00005	0.0002	0.03	5.0			085687-009	SW846 6020
	Vanadium	ND	0.003	0.01	NE	NE	U		085687-009	SW846 6020
	Zinc	0.00657	0.0026	0.01	NE	NE	J		085687-009	SW846 6020

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

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	0.01	0.02	NE	NE	U		085689-009	SW846 6020
27-Mar-08	Antimony	ND	0.0005	0.002	0.006	NE	B, U		085689-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.01	0.1	B, U		085689-009	SW846 6020
	Barium	0.149	0.0005	0.002	2.0	1.0			085689-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		085689-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.01	U		085689-009	SW846 6020
	Calcium	145	0.2	1.0	NE	NE	B		085689-009	SW846 6020
	Chromium	ND	0.0025	0.01	0.1	0.05	U		085689-009	SW846 6020
	Cobalt	0.000669	0.0001	0.001	NE	NE	J	J+	085689-009	SW846 6020
	Copper	0.000677	0.0003	0.001	NE	NE	J	J+	085689-009	SW846 6020
	Iron	0.216	0.01	0.025	NE	NE	B		085689-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.05	U		085689-009	SW846 6020
	Magnesium	30.3	0.005	0.015	NE	NE			085689-009	SW846 6020
	Manganese	0.00101	0.001	0.005	NE	NE	J		085689-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	0.002	U	UJ	085689-009	SW846 7470
	Nickel	0.00211	0.0005	0.002	NE	NE		J+	085689-009	SW846 6020
	Potassium	5.06	0.08	0.3	NE	NE			085689-009	SW846 6020
	Selenium	ND	0.001	0.005	0.05	0.05	U	UJ	085689-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.05	U	UJ	085689-009	SW846 6020
	Sodium	94.8	0.8	2.5	NE	NE			085689-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		085689-009	SW846 6020
	Uranium-235	0.000055	0.00001	0.00007	0.03	5.0	J	J+	085689-009	SW846 6020
	Uranium-238	0.00778	0.00005	0.0002	0.03	5.0			085689-009	SW846 6020
	Vanadium	ND	0.003	0.01	NE	NE	U		085689-009	SW846 6020
	Zinc	0.00286	0.0026	0.01	NE	NE	J	J+	085689-009	SW846 6020

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

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	0.0192	0.01	0.02	NE	NE	J		085691-009	SW846 6020
26-Mar-08	Antimony	ND	0.0005	0.002	0.006	NE	B, U		085691-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.01	0.1	B, U		085691-009	SW846 6020
	Barium	0.0547	0.0005	0.002	2.0	1.0			085691-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		085691-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.01	U		085691-009	SW846 6020
	Calcium	48.4	0.02	0.1	NE	NE	B		085691-009	SW846 6020
	Chromium	ND	0.0025	0.01	0.1	0.05	U		085691-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	NE	U		085691-009	SW846 6020
	Copper	0.000568	0.0003	0.001	NE	NE	J		085691-009	SW846 6020
	Iron	0.0854	0.01	0.025	NE	NE	B		085691-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.05	U		085691-009	SW846 6020
	Magnesium	16.0	0.005	0.015	NE	NE			085691-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		085691-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	0.002	U	UJ	085691-009	SW846 7470
	Nickel	0.00085	0.0005	0.002	NE	NE	J		085691-009	SW846 6020
	Potassium	3.31	0.08	0.3	NE	NE			085691-009	SW846 6020
	Selenium	ND	0.001	0.005	0.05	0.05	U		085691-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.05	U	UJ	085691-009	SW846 6020
	Sodium	21.5	0.08	0.25	NE	NE			085691-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		085691-009	SW846 6020
	Uranium-235	0.000024	0.00001	0.00007	0.03	5.0	J	J+	085691-009	SW846 6020
	Uranium-238	0.00319	0.00005	0.0002	0.03	5.0			085691-009	SW846 6020
	Vanadium	0.0035	0.003	0.01	NE	NE	J		085691-009	SW846 6020
	Zinc	0.00262	0.0026	0.01	NE	NE	J		085691-009	SW846 6020

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
NWTA3-MW3D	Aluminum	ND	0.01	0.02	NE	NE	U		085695-009	SW846 6020
02-Apr-08	Antimony	ND	0.0005	0.002	0.006	NE	B, U		085695-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.01	0.1	U		085695-009	SW846 6020
	Barium	0.0821	0.0005	0.002	2.0	1.0			085695-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		085695-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.01	U		085695-009	SW846 6020
	Calcium	33.0	0.02	0.1	NE	NE			085695-009	SW846 6020
	Chromium	ND	0.0025	0.01	0.1	0.05	U		085695-009	SW846 6020
	Cobalt	0.000126	0.0001	0.001	NE	NE	J		085695-009	SW846 6020
	Copper	0.00102	0.0003	0.001	NE	NE			085695-009	SW846 6020
	Iron	0.283	0.01	0.025	NE	NE			085695-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.05	U		085695-009	SW846 6020
	Magnesium	6.96	0.005	0.015	NE	NE			085695-009	SW846 6020
	Manganese	0.0014	0.001	0.005	NE	NE	J		085695-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	0.002	U	UJ	085695-009	SW846 7470
	Nickel	0.000784	0.0005	0.002	NE	NE	J		085695-009	SW846 6020
	Potassium	3.82	0.08	0.3	NE	NE			085695-009	SW846 6020
	Selenium	0.00104	0.001	0.005	0.05	0.05	J		085695-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.05	U	UJ	085695-009	SW846 6020
	Sodium	31.3	0.08	0.25	NE	NE			085695-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		085695-009	SW846 6020
	Uranium-235	0.000023	0.00001	0.00007	0.03	5.0	J		085695-009	SW846 6020
	Uranium-238	0.00328	0.00005	0.0002	0.03	5.0			085695-009	SW846 6020
	Vanadium	ND	0.003	0.01	NE	NE	U		085695-009	SW846 6020
	Zinc	0.00826	0.0026	0.01	NE	NE	J		085695-009	SW846 6020

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

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	0.01	0.02	NE	NE	U		085698-009	SW846 6020
01-Apr-08	Antimony	ND	0.0005	0.002	0.006	NE	B, U		085698-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.01	0.1	U		085698-009	SW846 6020
	Barium	0.0762	0.0005	0.002	2.0	1.0			085698-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		085698-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.01	U		085698-009	SW846 6020
	Calcium	55.4	0.1	0.5	NE	NE			085698-009	SW846 6020
	Chromium	0.00343	0.0025	0.01	0.1	0.05	J		085698-009	SW846 6020
	Cobalt	0.00017	0.0001	0.001	NE	NE	J		085698-009	SW846 6020
	Copper	0.00119	0.0003	0.001	NE	NE			085698-009	SW846 6020
	Iron	0.429	0.01	0.025	NE	NE			085698-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.05	U		085698-009	SW846 6020
	Magnesium	8.81	0.005	0.015	NE	NE			085698-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		085698-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	0.002	U	UJ	085698-009	SW846 7470
	Nickel	0.00395	0.0005	0.002	NE	NE			085698-009	SW846 6020
	Potassium	3.28	0.08	0.3	NE	NE			085698-009	SW846 6020
	Selenium	0.00128	0.001	0.005	0.05	0.05	J		085698-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.05	U	UJ	085698-009	SW846 6020
	Sodium	26.3	0.08	0.25	NE	NE			085698-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		085698-009	SW846 6020
	Uranium-235	0.000021	0.00001	0.00007	0.03	5.0	J		085698-009	SW846 6020
	Uranium-238	0.00303	0.00005	0.0002	0.03	5.0			085698-009	SW846 6020
	Vanadium	ND	0.003	0.01	NE	NE	U		085698-009	SW846 6020
	Zinc	0.0163	0.0026	0.01	NE	NE			085698-009	SW846 6020

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SFR-2S	Aluminum	ND	0.01	0.02	NE	NE	U		085700-009	SW846 6020
19-Mar-08	Antimony	ND	0.0005	0.002	0.006	NE	B, U		085700-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.01	0.1	U		085700-009	SW846 6020
	Barium	0.0581	0.0005	0.002	2.0	1.0		J+	085700-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		085700-009	SW846 6020
	Cadmium	0.000872	0.00011	0.001	0.005	0.01	J	J+	085700-009	SW846 6020
	Calcium	123	0.1	0.5	NE	NE			085700-009	SW846 6020
	Chromium	ND	0.0025	0.01	0.1	0.05	U		085700-009	SW846 6020
	Cobalt	0.000768	0.0001	0.001	NE	NE	J		085700-009	SW846 6020
	Copper	0.00163	0.0003	0.001	NE	NE		J+	085700-009	SW846 6020
	Iron	0.942	0.01	0.025	NE	NE			085700-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.05	U		085700-009	SW846 6020
	Magnesium	36.1	0.005	0.015	NE	NE			085700-009	SW846 6020
	Manganese	0.00576	0.001	0.005	NE	NE		J+	085700-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	0.002	U		085700-009	SW846 7470
	Nickel	0.044	0.0005	0.002	NE	NE		J+	085700-009	SW846 6020
	Potassium	6.96	0.08	0.3	NE	NE			085700-009	SW846 6020
	Selenium	0.00185	0.001	0.005	0.05	0.05	J	J-	085700-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.05	U		085700-009	SW846 6020
	Sodium	83.5	0.4	1.25	NE	NE			085700-009	SW846 6020
	Thallium	0.000305	0.0003	0.001	0.002	NE	J		085700-009	SW846 6020
	Uranium-235	0.000113	0.00001	0.00007	0.03	5.0		J+	085700-009	SW846 6020
	Uranium-238	0.0164	0.00005	0.0002	0.03	5.0			085700-009	SW846 6020
	Vanadium	ND	0.003	0.01	NE	NE	U		085700-009	SW846 6020
	Zinc	0.00401	0.0026	0.01	NE	NE	J	J+	085700-009	SW846 6020

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

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	0.0108	0.01	0.02	NE	NE	J		085702-009	SW846 6020
12-Mar-08	Antimony	ND	0.0005	0.002	0.006	NE	B, U		085702-009	SW846 6020
	Arsenic	0.00713	0.0015	0.005	0.01	0.1	B	0.017U	085702-009	SW846 6020
	Barium	0.010	0.0005	0.002	2.0	1.0			085702-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		085702-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.01	B, U		085702-009	SW846 6020
	Calcium	56.8	0.4	2.0	NE	NE	B		085702-009	SW846 6020
	Chromium	0.00301	0.0025	0.01	0.1	0.05	J		085702-009	SW846 6020
	Cobalt	0.000129	0.0001	0.001	NE	NE	J		085702-009	SW846 6020
	Copper	0.00693	0.0003	0.001	NE	NE			085702-009	SW846 6020
	Iron	0.465	0.01	0.025	NE	NE			085702-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.05	U		085702-009	SW846 6020
	Magnesium	3.67	0.005	0.015	NE	NE			085702-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		085702-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	0.002	U	UJ	085702-009	SW846 7470
	Nickel	0.00391	0.0005	0.002	NE	NE			085702-009	SW846 6020
	Potassium	2.45	0.08	0.3	NE	NE			085702-009	SW846 6020
	Selenium	ND	0.001	0.005	0.05	0.05	U		085702-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.05	U		085702-009	SW846 6020
	Sodium	968	8.0	25	NE	NE	B		085702-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		085702-009	SW846 6020
	Uranium-235	ND	0.00001	0.00007	0.03	5.0	U		085702-009	SW846 6020
	Uranium-238	0.000298	0.00005	0.0002	0.03	5.0			085702-009	SW846 6020
	Vanadium	0.00543	0.003	0.01	NE	NE	B, J	0.026U	085702-009	SW846 6020
	Zinc	0.0249	0.0026	0.01	NE	NE			085702-009	SW846 6020

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

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	0.01	0.02	NE	NE	U		085706-009	SW846 6020
20-Mar-08	Antimony	ND	0.0005	0.002	0.006	NE	B, U		085706-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.01	0.1	U		085706-009	SW846 6020
	Barium	0.0683	0.0005	0.002	2.0	1.0			085706-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		085706-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.01	U		085706-009	SW846 6020
	Calcium	43.7	0.02	0.1	NE	NE			085706-009	SW846 6020
	Chromium	0.00321	0.0025	0.01	0.1	0.05	J		085706-009	SW846 6020
	Cobalt	0.000175	0.0001	0.001	NE	NE	J		085706-009	SW846 6020
	Copper	0.000812	0.0003	0.001	NE	NE	J		085706-009	SW846 6020
	Iron	0.306	0.01	0.025	NE	NE			085706-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.05	U		085706-009	SW846 6020
	Magnesium	12.6	0.005	0.015	NE	NE			085706-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		085706-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	0.002	U		085706-009	SW846 7470
	Nickel	0.00132	0.0005	0.002	NE	NE	J		085706-009	SW846 6020
	Potassium	3.97	0.08	0.3	NE	NE			085706-009	SW846 6020
	Selenium	ND	0.001	0.005	0.05	0.05	U		085706-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.05	U		085706-009	SW846 6020
	Sodium	32.8	0.08	0.25	NE	NE			085706-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		085706-009	SW846 6020
	Uranium-235	0.000021	0.00001	0.00007	0.03	5.0	J	J+	085706-009	SW846 6020
	Uranium-238	0.00318	0.00005	0.0002	0.03	5.0			085706-009	SW846 6020
	Vanadium	ND	0.003	0.01	NE	NE	U		085706-009	SW846 6020
	Zinc	ND	0.0026	0.01	NE	NE	U		085706-009	SW846 6020

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

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 (Duplicate)	Aluminum	ND	0.01	0.02	NE	NE	U		085707-009	SW846 6020
20-Mar-08	Antimony	ND	0.0005	0.002	0.006	NE	B, U		085707-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.01	0.1	U		085707-009	SW846 6020
	Barium	0.0679	0.0005	0.002	2.0	1.0			085707-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		085707-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.01	U		085707-009	SW846 6020
	Calcium	44.3	0.02	0.1	NE	NE			085707-009	SW846 6020
	Chromium	0.00344	0.0025	0.01	0.1	0.05	J		085707-009	SW846 6020
	Cobalt	0.00018	0.0001	0.001	NE	NE	J		085707-009	SW846 6020
	Copper	0.000829	0.0003	0.001	NE	NE	J		085707-009	SW846 6020
	Iron	0.399	0.01	0.025	NE	NE			085707-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.05	U		085707-009	SW846 6020
	Magnesium	13.8	0.005	0.015	NE	NE			085707-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		085707-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	0.002	U		085707-009	SW846 7470
	Nickel	0.00138	0.0005	0.002	NE	NE	J		085707-009	SW846 6020
	Potassium	4.13	0.08	0.3	NE	NE			085707-009	SW846 6020
	Selenium	0.00106	0.001	0.005	0.05	0.05	J		085707-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.05	U		085707-009	SW846 6020
	Sodium	32.0	0.08	0.25	NE	NE			085707-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	NE	U		085707-009	SW846 6020
	Uranium-235	0.000019	0.00001	0.00007	0.03	5.0	J	J+	085707-009	SW846 6020
	Uranium-238	0.00309	0.00005	0.0002	0.03	5.0			085707-009	SW846 6020
	Vanadium	ND	0.003	0.01	NE	NE	U		085707-009	SW846 6020
	Zinc	ND	0.0026	0.01	NE	NE	U		085707-009	SW846 6020

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

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	0.01	0.02	NE	NE	U		085709-009	SW846 6020
18-Mar-08	Antimony	ND	0.0005	0.002	0.006	NE	B, U		085709-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.01	0.1	U		085709-009	SW846 6020
	Barium	0.0639	0.0005	0.002	2.0	1.0			085709-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		085709-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	0.01	U		085709-009	SW846 6020
	Calcium	40.2	0.02	0.1	NE	NE	B		085709-009	SW846 6020
	Chromium	ND	0.0025	0.01	0.1	0.05	U		085709-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	NE	U		085709-009	SW846 6020
	Copper	0.000502	0.0003	0.001	NE	NE	J		085709-009	SW846 6020
	Iron	0.0738	0.01	0.025	NE	NE			085709-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.05	U		085709-009	SW846 6020
	Magnesium	13.7	0.005	0.015	NE	NE	B		085709-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		085709-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	0.002	U		085709-009	SW846 7470
	Nickel	0.000669	0.0005	0.002	NE	NE	J		085709-009	SW846 6020
	Potassium	4.83	0.08	0.3	NE	NE			085709-009	SW846 6020
	Selenium	ND	0.001	0.005	0.05	0.05	U		085709-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.05	U		085709-009	SW846 6020
	Sodium	53.4	0.4	1.25	NE	NE			085709-009	SW846 6020
	Thallium	0.00047	0.0003	0.001	0.002	NE	J		085709-009	SW846 6020
	Uranium-235	0.000017	0.00001	0.00007	0.03	5.0	J		085709-009	SW846 6020
	Uranium-238	0.00244	0.00005	0.0002	0.03	5.0			085709-009	SW846 6020
	Vanadium	ND	0.003	0.01	NE	NE	U		085709-009	SW846 6020
	Zinc	ND	0.0026	0.01	NE	NE	U		085709-009	SW846 6020

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

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	0.0171	0.01	0.02	NE	NE	J	J	085711-009	SW846 6020
17-Mar-08	Antimony	ND	0.0005	0.002	0.006	NE	U		085711-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.01	0.1	U		085711-009	SW846 6020
	Barium	0.054	0.0005	0.002	2.0	1.0			085711-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	NE	U		085711-009	SW846 6020
	Cadmium	0.000538	0.00011	0.001	0.005	0.01	B, J	0.00080U	085711-009	SW846 6020
	Calcium	35.2	0.02	0.1	NE	NE	B	J	085711-009	SW846 6020
	Chromium	ND	0.0025	0.01	0.1	0.05	U		085711-009	SW846 6020
	Cobalt	0.00014	0.0001	0.001	NE	NE	B, J	0.00052U	085711-009	SW846 6020
	Copper	0.000675	0.0003	0.001	NE	NE	J		085711-009	SW846 6020
	Iron	0.108	0.01	0.025	NE	NE	B	J	085711-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.05	U		085711-009	SW846 6020
	Magnesium	12.1	0.005	0.015	NE	NE			085711-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		085711-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	0.002	U		085711-009	SW846 7470
	Nickel	0.000949	0.0005	0.002	NE	NE	J		085711-009	SW846 6020
	Potassium	4.42	0.08	0.3	NE	NE			085711-009	SW846 6020
	Selenium	ND	0.001	0.005	0.05	0.05	U		085711-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.05	U		085711-009	SW846 6020
	Sodium	65.6	0.4	1.25	NE	NE			085711-009	SW846 6020
	Thallium	0.000414	0.0003	0.001	0.002	NE	J		085711-009	SW846 6020
	Uranium-235	0.000015	0.00001	0.00007	0.03	5.0	J		085711-009	SW846 6020
	Uranium-238	0.00228	0.00005	0.0002	0.03	5.0			085711-009	SW846 6020
	Vanadium	0.00527	0.003	0.01	NE	NE	J		085711-009	SW846 6020
	Zinc	0.00799	0.0026	0.01	NE	NE	B, J	0.013U	085711-009	SW846 6020

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

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	0.01	0.02	NE	NE	U		085714-009	SW846 6020
11-Mar-08	Antimony	ND	0.0005	0.002	0.006	NE	B, U		085714-009	SW846 6020
	Arsenic	0.00547	0.0015	0.005	0.01	0.1	B	0.017U	085714-009	SW846 6020
	Barium	0.0432	0.0005	0.002	2.0	1.0			085714-009	SW846 6020
	Beryllium	0.00019	0.0001	0.0005	0.004	NE	J		085714-009	SW846 6020
	Cadmium	0.000654	0.00011	0.001	0.005	0.01	B, J		085714-009	SW846 6020
	Calcium	155	0.4	2.0	NE	NE	B		085714-009	SW846 6020
	Chromium	ND	0.0025	0.01	0.1	0.05	U		085714-009	SW846 6020
	Cobalt	0.000353	0.0001	0.001	NE	NE	J	J+	085714-009	SW846 6020
	Copper	0.00122	0.0003	0.001	NE	NE		J+	085714-009	SW846 6020
	Iron	1.24	0.01	0.025	NE	NE			085714-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	0.05	U		085714-009	SW846 6020
	Magnesium	35.9	0.005	0.015	NE	NE			085714-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	NE	U		085714-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	0.002	U	UJ	085714-009	SW846 7470
	Nickel	0.00297	0.0005	0.002	NE	NE		J+	085714-009	SW846 6020
	Potassium	6.43	0.08	0.3	NE	NE			085714-009	SW846 6020
	Selenium	ND	0.001	0.005	0.05	0.05	U	UJ	085714-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	0.05	U		085714-009	SW846 6020
	Sodium	106	1.6	5.0	NE	NE	B		085714-009	SW846 6020
	Thallium	0.000684	0.0003	0.001	0.002	NE	J	0.0033U	085714-009	SW846 6020
	Uranium-235	0.000118	0.00001	0.00007	0.03	5.0			085714-009	SW846 6020
	Uranium-238	0.0173	0.00005	0.0002	0.03	5.0			085714-009	SW846 6020
	Vanadium	0.00887	0.003	0.01	NE	NE	B, J	0.026U	085714-009	SW846 6020
	Zinc	0.0035	0.0026	0.01	NE	NE	J	J+	085714-009	SW846 6020

Refer to footnotes on page 2A-41.

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 2008

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 Springs	24-Mar-08	ND	0.00003	0.0002	0.002	0.002	U	UJ	085674-010
CTF-MW1	24-Mar-08	ND	0.00003	0.0002	0.002	0.002	U	UJ	085676-010
CTF-MW2	25-Mar-08	ND	0.00003	0.0002	0.002	0.002	U	UJ	085680-010
CTF-MW2 (Unpreserved)	25-Mar-08	ND	0.00003	0.0002	0.002	0.002	U	UJ	085681-010
CTF-MW2 (Duplicate)	25-Mar-08	ND	0.00003	0.0002	0.002	0.002	U	UJ	085682-010
CTF-MW2 (Duplicate - Unpreserved)	25-Mar-08	ND	0.00003	0.0002	0.002	0.002	U	UJ	085683-010
CTF-MW3	14-Mar-08	ND	0.00003	0.0002	0.002	0.002	U	UJ	085685-010
Eubank-1	31-Mar-08	ND	0.00003	0.0002	0.002	0.002	U	UJ	085687-010
Greystone-MW2	27-Mar-08	ND	0.00003	0.0002	0.002	0.002	U	UJ	085689-010
MRN-2	26-Mar-08	ND	0.00003	0.0002	0.002	0.002	U	UJ	085691-010
NWTA3-MW3D	02-Apr-08	ND	0.00003	0.0002	0.002	0.002	U	UJ	085695-010
PL-2	01-Apr-08	ND	0.00003	0.0002	0.002	0.002	U	UJ	085698-010
SFR-2S	19-Mar-08	ND	0.00003	0.0002	0.002	0.002	U		085700-010
SFR-4T	12-Mar-08	ND	0.00003	0.0002	0.002	0.002	U	UJ	085702-010
SWTA3-MW2	20-Mar-08	ND	0.00003	0.0002	0.002	0.002	U		085706-010
SWTA3-MW2 (Duplicate)	20-Mar-08	ND	0.00003	0.0002	0.002	0.002	U		085707-010
SWTA3-MW3	18-Mar-08	ND	0.00003	0.0002	0.002	0.002	U		085709-010
SWTA3-MW4	17-Mar-08	ND	0.00003	0.0002	0.002	0.002	U	UJ	085711-010
TRE-1	11-Mar-08	ND	0.00003	0.0002	0.002	0.002	U	UJ	085714-010

Refer to footnotes on page 2A-41.

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 2008

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 Springs	Americium-241	-4.19 ± 5.59	5.96	2.98	NE	NE	U	BD	085674-033
24-Mar-08	Cesium-137	-2.32 ± 3.83	4.75	2.37	NE	NE	U	BD	085674-033
	Cobalt-60	0.301 ± 3.31	4.73	2.36	NE	NE	U	BD	085674-033
	Potassium-40	47.6 ± 32.9	46.8	23.4	NE	NE		J	085674-033
CTF-MW1	Americium-241	5.27 ± 13.3	22.9	11.5	NE	NE	U	BD	085676-033
24-Mar-08	Cesium-137	0.349 ± 2.04	3.06	1.53	NE	NE	U	BD	085676-033
	Cobalt-60	1.24 ± 2.10	3.70	1.85	NE	NE	U	BD	085676-033
	Potassium-40	40.6 ± 51.1	32.2	16.1	NE	NE	X	R	085676-033
CTF-MW2	Americium-241	10.7 ± 11.5	18.2	9.08	NE	NE	U	BD	085680-033
25-Mar-08	Cesium-137	1.90 ± 2.06	3.64	1.82	NE	NE	U	BD	085680-033
	Cobalt-60	0.958 ± 2.21	3.82	1.91	NE	NE	U	BD	085680-033
	Potassium-40	59.7 ± 45.8	29.9	15.0	NE	NE		J	085680-033
CTF-MW2 (Unpreserved)	Americium-241	-30.8 ± 11.4	17.4	8.68	NE	NE	U	BD	085681-033
25-Mar-08	Cesium-137	-2.13 ± 2.77	3.33	1.67	NE	NE	U	BD	085681-033
	Cobalt-60	1.52 ± 2.11	3.69	1.84	NE	NE	U	BD	085681-033
	Potassium-40	17.4 ± 43.8	34.2	17.1	NE	NE	U	BD	085681-033
CTF-MW2 (Duplicate)	Americium-241	-4.53 ± 10.4	17.6	8.81	NE	NE	U	BD	085682-033
25-Mar-08	Cesium-137	-0.797 ± 2.02	3.36	1.68	NE	NE	U	BD	085682-033
	Cobalt-60	2.29 ± 2.19	3.95	1.98	NE	NE	U	BD	085682-033
	Potassium-40	33.3 ± 46.0	29.9	15.0	NE	NE	X	R	085682-033
CTF-MW2 (Duplicate -	Americium-241	-2.49 ± 5.94	8.52	4.26	NE	NE	U	BD	085683-033
Unpreserved)	Cesium-137	-0.905 ± 1.52	2.41	1.21	NE	NE	U	BD	085683-033
25-Mar-08	Cobalt-60	1.98 ± 1.74	2.83	1.41	NE	NE	U	BD	085683-033
	Potassium-40	82.8 ± 40.5	24.1	12.1	NE	NE			085683-033
CTF-MW3	Americium-241	-36.7 ± 11.1	16.2	8.10	NE	NE	U	BD	085685-033
14-Mar-08	Cesium-137	-0.317 ± 1.96	3.26	1.63	NE	NE	U	BD	085685-033
	Cobalt-60	0.566 ± 2.07	3.50	1.75	NE	NE	U	BD	085685-033
	Potassium-40	20.0 ± 36.9	46.8	23.4	NE	NE	U	BD	085685-033
Eubank-1	Americium-241	8.10 ± 11.5	18.0	9.00	NE	NE	U	BD	085687-033
31-Mar-08	Cesium-137	-0.241 ± 2.01	3.39	1.70	NE	NE	U	BD	085687-033
	Cobalt-60	1.27 ± 3.31	3.71	1.85	NE	NE	U	BD	085687-033
	Potassium-40	-21.1 ± 46.8	47.1	23.6	NE	NE	U	BD	085687-033
Greystone-MW2	Americium-241	-1.68 ± 5.61	6.17	3.09	NE	NE	U	BD	085689-033
27-Mar-08	Cesium-137	-1.98 ± 3.72	4.53	2.27	NE	NE	U	BD	085689-033
	Cobalt-60	-1.52 ± 2.98	4.64	2.32	NE	NE	U	BD	085689-033
	Potassium-40	71.9 ± 43.2	45.0	22.5	NE	NE		J	085689-033

Refer to footnotes on page 2A-41.

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 2008

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.
MRN-2	Americium-241	3.81 ± 6.48	9.64	4.82	NE	NE	U	BD	085691-033
26-Mar-08	Cesium-137	0.373 ± 1.51	2.60	1.30	NE	NE	U	BD	085691-033
	Cobalt-60	-0.771 ± 1.43	2.34	1.17	NE	NE	U	BD	085691-033
	Potassium-40	21.9 ± 37.3	23.4	11.7	NE	NE	U	BD	085691-033
NWTA3-MW3D	Americium-241	-1.22 ± 4.51	5.14	2.57	NE	NE	U	BD	085695-033
02-Apr-08	Cesium-137	-2.07 ± 4.39	4.40	2.20	NE	NE	U	BD	085695-033
	Cobalt-60	-1.84 ± 4.20	4.31	2.16	NE	NE	U	BD	085695-033
	Potassium-40	-17.8 ± 52.8	46.5	23.3	NE	NE	U	BD	085695-033
PL-2	Americium-241	-0.315 ± 4.78	8.09	4.05	NE	NE	U	BD	085698-033
01-Apr-08	Cesium-137	0.122 ± 1.68	2.86	1.43	NE	NE	U	BD	085698-033
	Cobalt-60	-1.55 ± 1.76	2.75	1.38	NE	NE	U	BD	085698-033
	Potassium-40	-13.2 ± 36.2	40.8	20.4	NE	NE	U	BD	085698-033
SFR-2S	Americium-241	3.75 ± 12.1	18.7	9.34	NE	NE	U	BD	085700-033
19-Mar-08	Cesium-137	-0.406 ± 2.08	3.48	1.74	NE	NE	U	BD	085700-033
	Cobalt-60	-1.89 ± 2.10	3.25	1.62	NE	NE	U	BD	085700-033
	Potassium-40	0.546 ± 53.8	33.6	16.8	NE	NE	U	BD	085700-033
SFR-4T	Americium-241	-8.96 ± 12.0	19.2	9.61	NE	NE	U	BD	085702-033
12-Mar-08	Cesium-137	3.72 ± 2.54	3.31	1.66	NE	NE	X	R	085702-033
	Cobalt-60	-2.72 ± 3.83	3.76	1.88	NE	NE	U	BD	085702-033
	Potassium-40	-25.1 ± 46.8	50.7	25.4	NE	NE	U	BD	085702-033
SWTA3-MW2	Americium-241	3.68 ± 4.13	5.81	2.90	NE	NE	U	BD	085706-033
20-Mar-08	Cesium-137	2.43 ± 2.85	4.88	2.44	NE	NE	U	BD	085706-033
	Cobalt-60	-0.351 ± 3.05	4.94	2.47	NE	NE	U	BD	085706-033
	Potassium-40	-27.4 ± 44.7	55.2	27.6	NE	NE	U	BD	085706-033
SWTA3-MW2 (Duplicate)	Americium-241	-4.56 ± 10.3	17.4	8.73	NE	NE	U	BD	085707-033
20-Mar-08	Cesium-137	2.14 ± 2.00	3.55	1.78	NE	NE	U	BD	085707-033
	Cobalt-60	3.32 ± 2.61	3.71	1.85	NE	NE	U	BD	085707-033
	Potassium-40	-15.6 ± 41.6	46.0	23.0	NE	NE	U	BD	085707-033
SWTA3-MW3	Americium-241	19.2 ± 8.51	11.8	5.91	NE	NE	X	R	085709-033
18-Mar-08	Cesium-137	0.551 ± 2.11	3.05	1.53	NE	NE	U	BD	085709-033
	Cobalt-60	1.70 ± 1.95	3.13	1.57	NE	NE	U	BD	085709-033
	Potassium-40	50.4 ± 41.5	31.4	15.7	NE	NE		J	085709-033

Refer to footnotes on page 2A-41.

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 2008

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	-4.65 ± 9.69	13.9	6.94	NE	NE	U	BD	085711-033
17-Mar-08	Cesium-137	4.34 ± 3.19	2.93	1.47	NE	NE	X	R	085711-033
	Cobalt-60	0.443 ± 1.79	3.07	1.54	NE	NE	U	BD	085711-033
	Potassium-40	-25.5 ± 39.6	41.8	20.9	NE	NE	U	BD	085711-033
TRE-1	Americium-241	-3.25 ± 4.97	6.20	3.10	NE	NE	U	BD	085714-033
11-Mar-08	Cesium-137	2.97 ± 4.46	5.38	2.69	NE	NE	U	BD	085714-033
	Cobalt-60	-2.94 ± 3.89	4.97	2.49	NE	NE	U	BD	085714-033
	Potassium-40	-26.4 ± 52.0	58.7	29.4	NE	NE	U	BD	085714-033

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

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 Springs	Gross Alpha	14.4 ± 7.86	11.3	5.31	15	NE		J	085674-034	EPA 900.0
24-Mar-08	Gross Beta	33.7 ± 8.12	8.02	3.84	4mrem/yr	NE			085674-034	EPA 900.0
	Radium-226	0.564 ± 0.320	0.365	0.138	5	30		J	085674-038	EPA 903.1
	Radium-228	1.04 ± 0.442	0.536	0.257	5	30		J	085674-039	EPA 904.0
CTF-MW1	Gross Alpha	**33.6 ± 6.36**	0.920	0.357	15	NE			085676-034	EPA 900.0
24-Mar-08	Gross Beta	5.04 ± 1.31	1.32	0.631	4mrem/yr	NE			085676-034	EPA 900.0
	Radium-226	1.03 ± 0.501	0.506	0.191	5	30		J	085676-038	EPA 903.1
	Radium-228	0.384 ± 0.307	0.473	0.221	5	30	U	BD	085676-039	EPA 904.0
CTF-MW2	Gross Alpha	**78.5 ± 22.3**	15.1	6.67	15	NE			085680-034	EPA 900.0
25-Mar-08	Gross Beta	57.9 ± 15.1	16.2	7.80	4mrem/yr	NE			085680-034	EPA 900.0
	Radium-226	**4.07 ± 1.06**	0.527	0.214	5	30			085680-038	EPA 903.1
	Radium-228	**10.0 ± 2.69**	0.488	0.221	5	30			085680-039	EPA 904.0
CTF-MW2	Gross Alpha	**100 ± 26.2**	12.7	5.50	15	NE			085681-034	EPA 900.0
(Unpreserved)	Gross Beta	57.2 ± 13.3	11.3	5.35	4mrem/yr	NE			085681-034	EPA 900.0
25-Mar-08	Radium-226	**3.32 ± 0.919**	0.501	0.204	5	30			085681-038	EPA 903.1
	Radium-228	**9.68 ± 2.58**	0.428	0.193	5	30			085681-039	EPA 904.0
CTF-MW2 (Duplicate)	Gross Alpha	**106 ± 27.6**	13.7	5.93	15	NE			085682-034	EPA 900.0
25-Mar-08	Gross Beta	86.2 ± 16.4	8.92	4.28	4mrem/yr	NE			085682-034	EPA 900.0
	Radium-226	**3.89 ± 1.05**	0.362	0.124	5	30			085682-038	EPA 903.1
	Radium-228	**8.90 ± 2.37**	0.463	0.212	5	30			085682-039	EPA 904.0
CTF-MW2	Gross Alpha	**89.5 ± 24.1**	13.0	5.64	15	NE			085683-034	EPA 900.0
(Duplicate -	Gross Beta	69.0 ± 13.8	8.79	4.20	4mrem/yr	NE			085683-034	EPA 900.0
Unpreserved)	Radium-226	**4.56 ± 1.17**	0.533	0.217	5	30			085683-038	EPA 903.1
25-Mar-08	Radium-228	**9.73 ± 2.58**	0.438	0.201	5	30			085683-039	EPA 904.0
CTF-MW3	Gross Alpha	**17.8 ± 5.37**	3.84	1.67	15	NE			085685-034	EPA 900.0
14-Mar-08	Gross Alpha (reanalysis)	12.6 ± 8.67	9.47	2.99	15	NE		J	085685-R34	EPA 900.0
	Gross Beta	17.4 ± 8.77	11.8	5.25	4mrem/yr	NE		J	085685-034	EPA 900.0
	Gross Beta (reanalysis)	19.4 ± 4.16	3.41	1.64	4mrem/yr	NE		None	085685-R34	EPA 900.0
	Radium-226	0.767 ± 0.361	0.306	0.105	5	30		J	085685-038	EPA 903.1
	Radium-228	1.33 ± 0.488	0.527	0.254	5	30		J	085685-039	EPA 904.0
Eubank-1	Gross Alpha	4.58 ± 1.46	1.09	0.475	15	NE			085687-034	EPA 900.0
31-Mar-08	Gross Beta	4.15 ± 1.13	1.29	0.621	4mrem/yr	NE			085687-034	EPA 900.0
	Radium-226	0.775 ± 0.406	0.482	0.196	5	30		J	085687-038	EPA 903.1
	Radium-228	0.618 ± 0.343	0.442	0.198	5	30		J	085687-039	EPA 904.0

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

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]
Greystone-MW2	Gross Alpha	11.5 ± 3.29	2.42	1.09	15	NE			085689-034	EPA 900.0
27-Mar-08	Gross Beta	7.83 ± 2.22	2.48	1.18	4mrem/yr	NE			085689-034	EPA 900.0
	Radium-226	2.60 ± 0.784	0.531	0.216	5	30			085689-038	EPA 903.1
	Radium-228	0.553 ± 0.356	0.534	0.258	5	30		J	085689-039	EPA 904.0
MRN-2	Gross Alpha	5.94 ± 1.62	0.926	0.403	15	NE			085691-034	EPA 900.0
26-Mar-08	Gross Beta	2.87 ± 0.825	0.901	0.428	4mrem/yr	NE			085691-034	EPA 900.0
	Radium-226	0.746 ± 0.432	0.548	0.223	5	30		J	085691-038	EPA 903.1
	Radium-228	0.623 ± 0.362	0.473	0.209	5	30		J	085691-039	EPA 904.0
NWTA3-MW3D	Gross Alpha	6.11 ± 1.72	1.10	0.490	15	NE			085695-034	EPA 900.0
02-Apr-08	Gross Beta	4.29 ± 1.01	0.828	0.392	4mrem/yr	NE			085695-034	EPA 900.0
	Radium-226	1.05 ± 0.416	0.287	0.0986	5	30		J	085695-038	EPA 903.1
	Radium-228	0.293 ± 0.293	0.463	0.199	5	30	U	BD	085695-039	EPA 904.0
PL-2	Gross Alpha	5.43 ± 1.56	0.983	0.433	15	NE			085698-034	EPA 900.0
01-Apr-08	Gross Beta	3.84 ± 1.04	1.21	0.582	4mrem/yr	NE			085698-034	EPA 900.0
	Radium-226	0.659 ± 0.421	0.561	0.228	5	30		J	085698-038	EPA 903.1
	Radium-228	0.375 ± 0.214	0.261	0.111	5	30		J	085698-039	EPA 904.0
SFR-2S	Gross Alpha	**30.2 ± 7.15**	1.82	0.761	15	NE			085700-034	EPA 900.0
19-Mar-08	Gross Beta	8.30 ± 4.52	5.99	2.58	4mrem/yr	NE		J	085700-034	EPA 900.0
	Radium-226	0.410 ± 0.245	0.262	0.090	5	30		J	085700-038	EPA 903.1
	Radium-228	0.891 ± 0.407	0.468	0.212	5	30		J	085700-039	EPA 904.0
SFR-4T	Gross Alpha	1.47 ± 4.00	7.28	3.11	15	NE	U	BD	085702-034	EPA 900.0
12-Mar-08	Gross Beta	5.97 ± 5.14	8.29	3.94	4mrem/yr	NE	U	BD	085702-034	EPA 900.0
	Radium-226	0.404 ± 0.290	0.408	0.166	5	30	U	BD	085702-038	EPA 903.1
	Radium-228	0.410 ± 0.312	0.446	0.189	5	30	U	BD	085702-039	EPA 904.0
SWTA3-MW2	Gross Alpha	4.45 ± 2.59	2.53	0.826	15	NE		J	085706-034	EPA 900.0
20-Mar-08	Gross Beta	7.05 ± 1.34	0.722	0.345	4mrem/yr	NE			085706-034	EPA 900.0
	Radium-226	0.0518 ± 0.161	0.319	0.120	5	30	U	BD	085706-038	EPA 903.1
	Radium-228	0.769 ± 0.382	0.490	0.228	5	30		NJ+	085706-039	EPA 904.0
SWTA3-MW2	Gross Alpha	5.18 ± 2.76	2.39	0.752	15	NE		J	085707-034	EPA 900.0
(Duplicate)	Gross Beta	4.42 ± 0.940	0.661	0.314	4mrem/yr	NE			085707-034	EPA 900.0
20-Mar-08	Radium-226	0.656 ± 0.394	0.502	0.202	5	30		J	085707-038	EPA 903.1
	Radium-228	0.363 ± 0.328	0.513	0.234	5	30	U	BD	085707-039	EPA 904.0

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

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	Gross Alpha	4.05 ± 2.98	3.27	0.980	15	NE		J	085709-034	EPA 900.0
18-Mar-08	Gross Beta	5.00 ± 2.63	3.49	1.51	4mrem/yr	NE		J	085709-034	EPA 900.0
	Radium-226	0.354 ± 0.265	0.365	0.142	5	30	U	BD	085709-038	EPA 903.1
	Radium-228	0.0161 ± 0.268	0.486	0.223	5	30	U	BD	085709-039	EPA 904.0
SWTA3-MW4	Gross Alpha	13.9 ± 3.32	0.948	0.399	15	NE			085711-034	EPA 900.0
17-Mar-08	Gross Alpha (reanalysis)	4.65 ± 1.55	1.72	0.807	15	NE		J	085711-R34	EPA 900.0
	Gross Beta	7.47 ± 2.91	3.10	1.33	4mrem/yr	NE		J	085711-034	EPA 900.0
	Radium-226	0.127 ± 0.219	0.390	0.157	5	30	U	BD	085711-038	EPA 903.1
	Radium-228	0.725 ± 0.370	0.467	0.212	5	30		J	085711-039	EPA 904.0
TRE-1	Gross Alpha	**34.1 ± 8.04**	2.41	1.04	15	NE			085714-034	EPA 900.0
11-Mar-08	Gross Beta	8.83 ± 4.10	4.74	2.01	4mrem/yr	NE		J	085714-034	EPA 900.0
	Radium-226	0.453 ± 0.311	0.431	0.175	5	30		J	085714-038	EPA 903.1
	Radium-228	0.634 ± 0.367	0.481	0.213	5	30		J	085714-039	EPA 904.0

Refer to footnotes on page 2A-41.

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

Calendar Year 2008

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 Springs	24-Mar-08	n/a	n/a	n/a	n/a	12.48	2,835	190.4	6.05	0.86	28.1	975
CTF-MW1	24-Mar-08	Bennett Pump	236.35	260	38	16.20	673	274.4	7.24	0.60	72.5	192
CTF-MW2	25-Mar-08	Bennett Pump	43.72	130	56	18.48	3,582	8.9	6.11	5.45	26.4	1,525
	18-Jul-08	Bennett Pump	43.71	130	56	18.98	3,576	9.2	6.20	19.1	14.1	NA
CTF-MW3	14-Mar-08	Bennett Pump	304.55	360	77	19.68	1,731	301.5	6.82	0.74	67.1	325
Eubank-1	31-Mar-08	Bennett Pump	552.59	607	107	19.59	486	290.4	7.34	0.73	84.9	175
Greystone-MW2	27-Mar-08	Bennett Pump	51.11	80	56	18.52	1,146	312.5	6.94	0.68	72.3	445
MRN-2	26-Mar-08	Bennett Pump	433.70	439	34	18.42	437	304.2	7.40	0.64	59.8	157
NWTA3-MW3D	02-Apr-08	Bennett Pump	466.37	673	61	19.26	374	302.6	7.50	2.47	42.4	139
PL-2	01-Apr-08	Bennett Pump	468.82	597	56	17.99	420	301.0	7.57	0.76	65.7	138
SFR-2S	19-Mar-08	Bennett Pump	99.71	116	43	15.91	1,114	144.4	6.78	7.68	79.7	395
SFR-4T	12-Mar-08	Bennett Pump	146.49	359	72	18.85	4,218	204.4	7.96	0.61	17.9	92
SWTA3-MW2	20-Mar-08	Bennett Pump	448.72	474	56	18.73	432	274.9	7.50	0.66	53.5	139
SWTA3-MW3	18-Mar-08	Bennett Pump	445.83	639	56	19.26	444	305.7	7.49	1.74	48.3	136
SWTA3-MW4	17-Mar-08	Bennett Pump	446.15	455	32	18.30	449	300.6	7.47	0.79	54.8	167
TRE-1	11-Mar-08	Bennett Pump	175.42	294	114	16.21	1,328	276.6	6.69	0.45	77.7	455

Refer to footnotes on page 2A-41.

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Footnotes for Groundwater Protection Program Groundwater Surveillance Task

[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.
- 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

[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

[d]MCL/MAC

- Maximum contaminant level. Established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11(b)), and subsequent amendments or the New Mexico Environmental Improvement Board in Title 20, Chapter 7, Part 1 of the New Mexico Administrative Code (20MAC 7.1).
- 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 = the maximum gross alpha activity, including radium-226, but excluding radon and total uranium.
- 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]Lab Qualifier

B = Analyte is detected in associated laboratory method blank.
J = Amount detected is below the practical quantitation limit (PQL).
P = The response between the confirmation column and the primary column is > 40 percent difference.
U = Analyte is absent or below the method detection limit.
X = Used in chemical analyses to indicate presumptive evidence that the analyte is not present.
X = Used in radiochemistry to identify data rejected due to interference, low abundance, peak not meeting identification criteria, or uncertain identification for gamma spectroscopy.

[f]Validation Qualifier

If cell is blank, then all quality control samples meet acceptance criteria with respect to submitted samples.
BD = 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 suspected negative bias.
NJ+ = Presumptive evidence of the presence of the material at an estimated quantity with a suspected positive bias.

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

[f]Validation Qualifier (continued)

R = The data are unusable for their intended purpose. The analyte may or may not be present.
U = The analyte was analyzed for but not detected. The associated numerical value is the sample quantitation limit.
UJ = The analyte was analyzed for but not detected. The associated value is an estimate and may be inaccurate or imprecise.

[g]Analytical Method

- U.S. Environmental Protection Agency, 1990, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.
- U.S. Environmental Protection Agency, 1983, "The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0,"
- EPA-600/4-84-017.
- Analytical method used to detect radionuclides is HASL 300 4.5.2.3;
- U.S. Department of Energy, Environmental Measurements Laboratory, 1990, "EML Procedures Manual," 27th ed., Vol. 1, Rev. 1992, HASL-300.
- EPA 9310: U.S. Environmental Protection Agency, 1990, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.
- EPA 903.0/904.0: U.S. Environmental Protection Agency, 1980, "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032.
- "Standard Methods for the Examination of Water and Wastewater," 1992, 18th Edition, Method 2320B.

[h]Field Water Quality Measurements

- Field measurements collected prior to sampling.

^{O}C = degrees Celsius.
% Sat = percent saturation.
fbtoc = feet below top of casing.
gal = gallons.
μmhos/cm = micromhos per centimeter.
mg/L = milligrams per liter.
mV = millivolts.
NA = not analyzed.
NTU = nephelometric turbidity units.
pH = potential of hydrogen (negative logarithm of the hydrogen ion concentration).

Attachment 2B
Groundwater Protection Program
Plots

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Attachment 2B Plots

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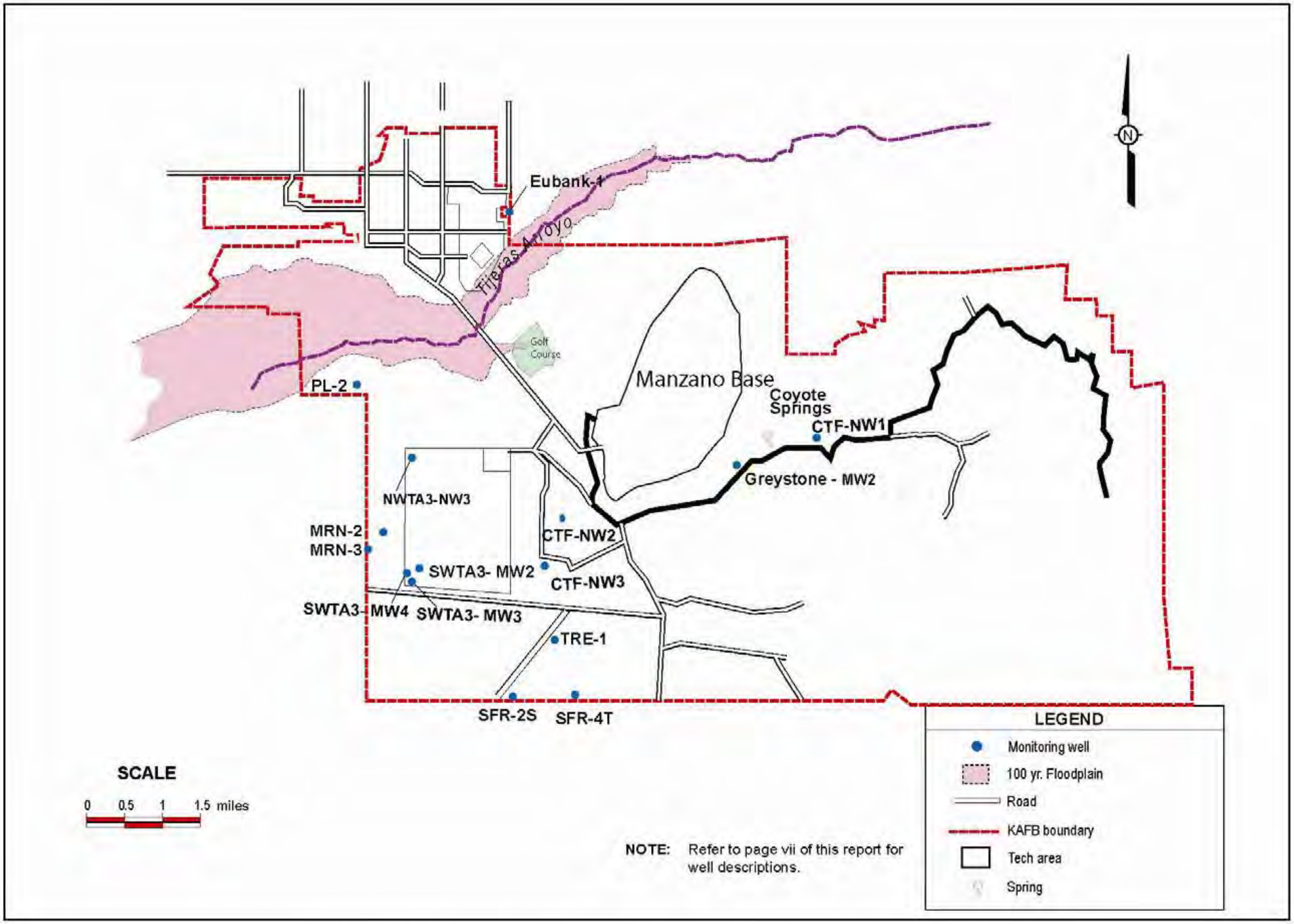

Figure 2B-1. Groundwater Protection Program (GWPP) Water Quality Network

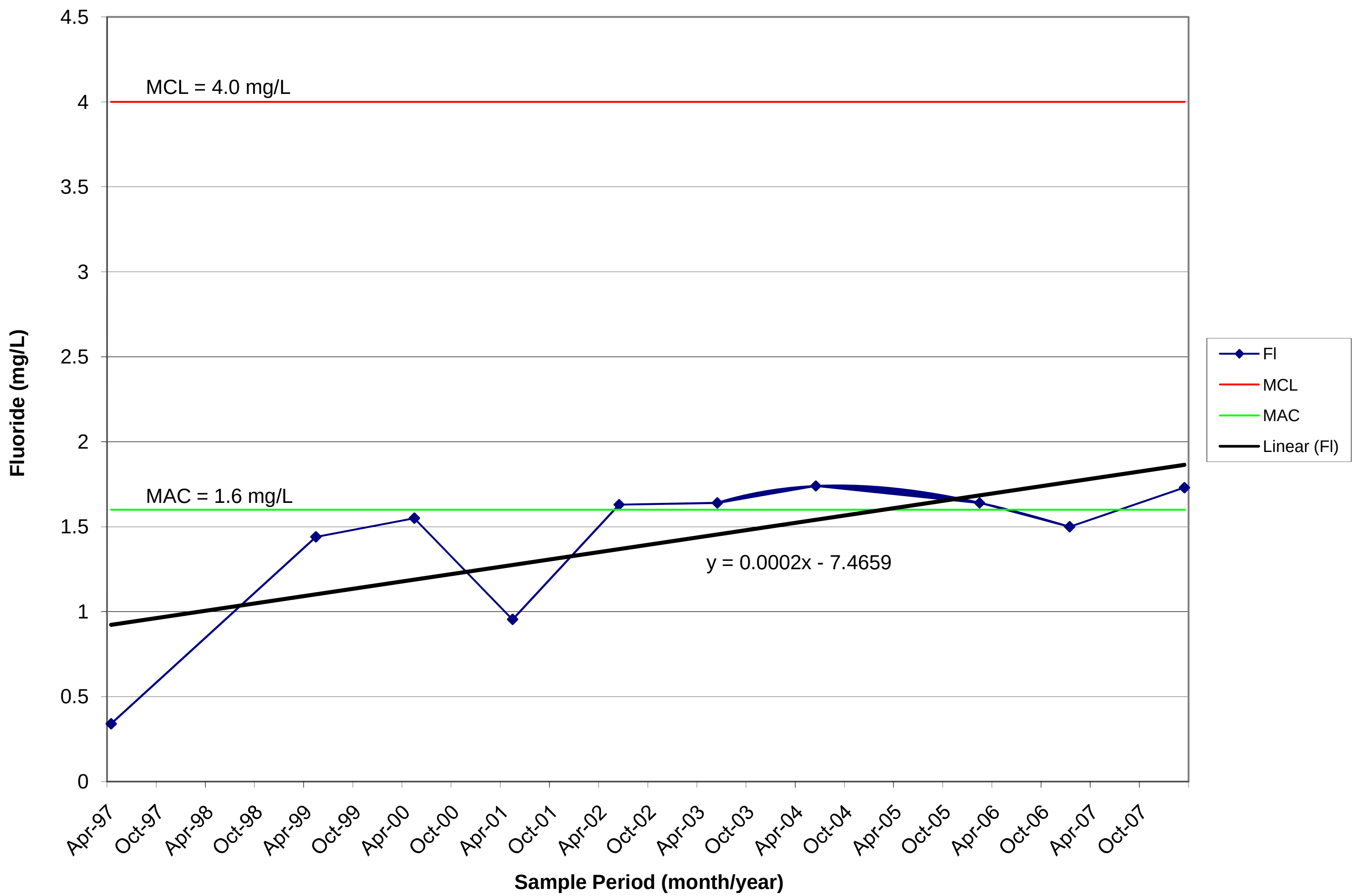

Figure 2B-2. Fluoride Concentrations, Coyote Springs

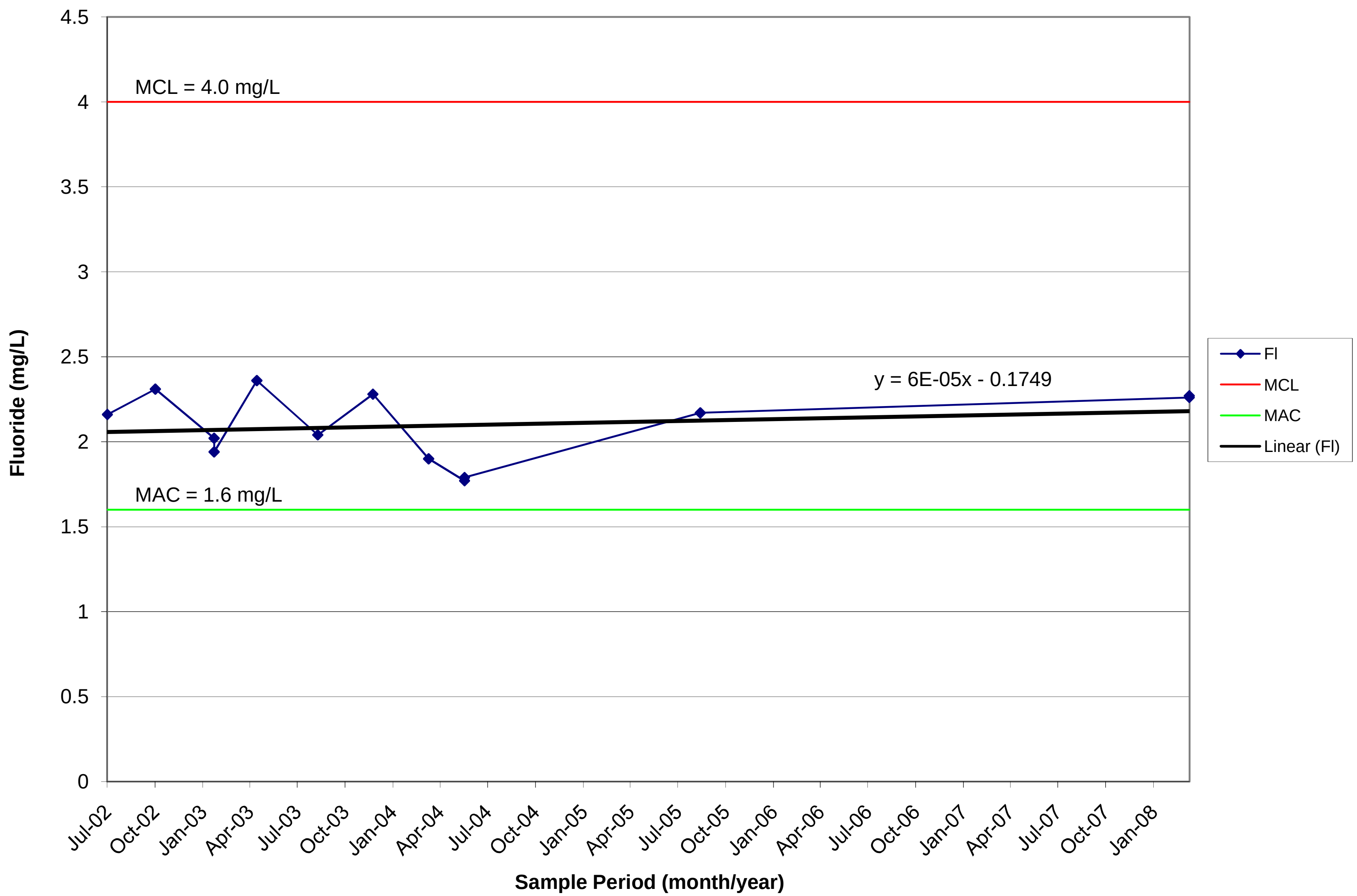

Figure 2B-3. Fluoride Concentrations, CTF-MW2

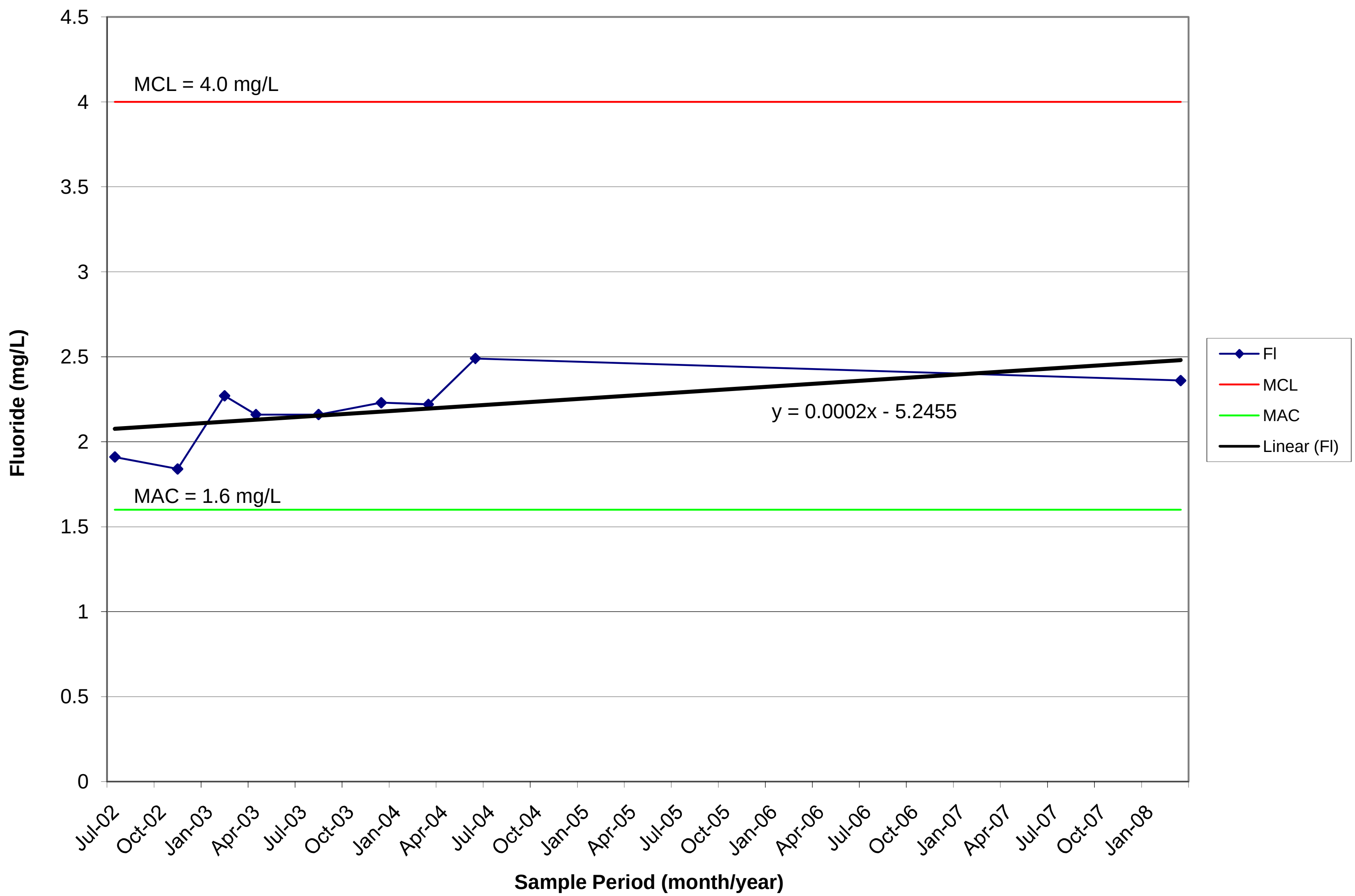

Figure 2B-4. Fluoride Concentrations, CTF-MW3

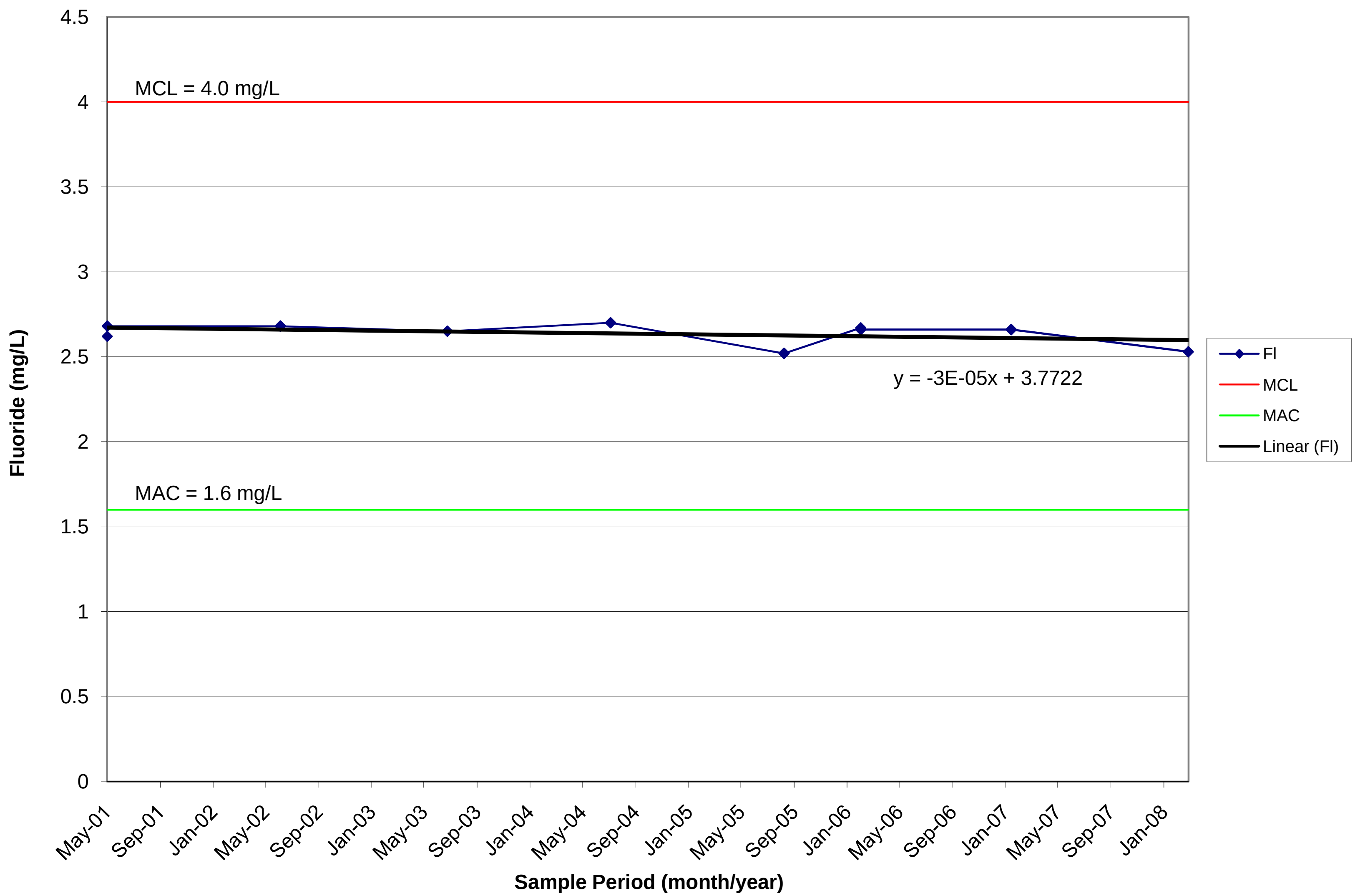

Figure 2B-5. Fluoride Concentrations, SFR-4T

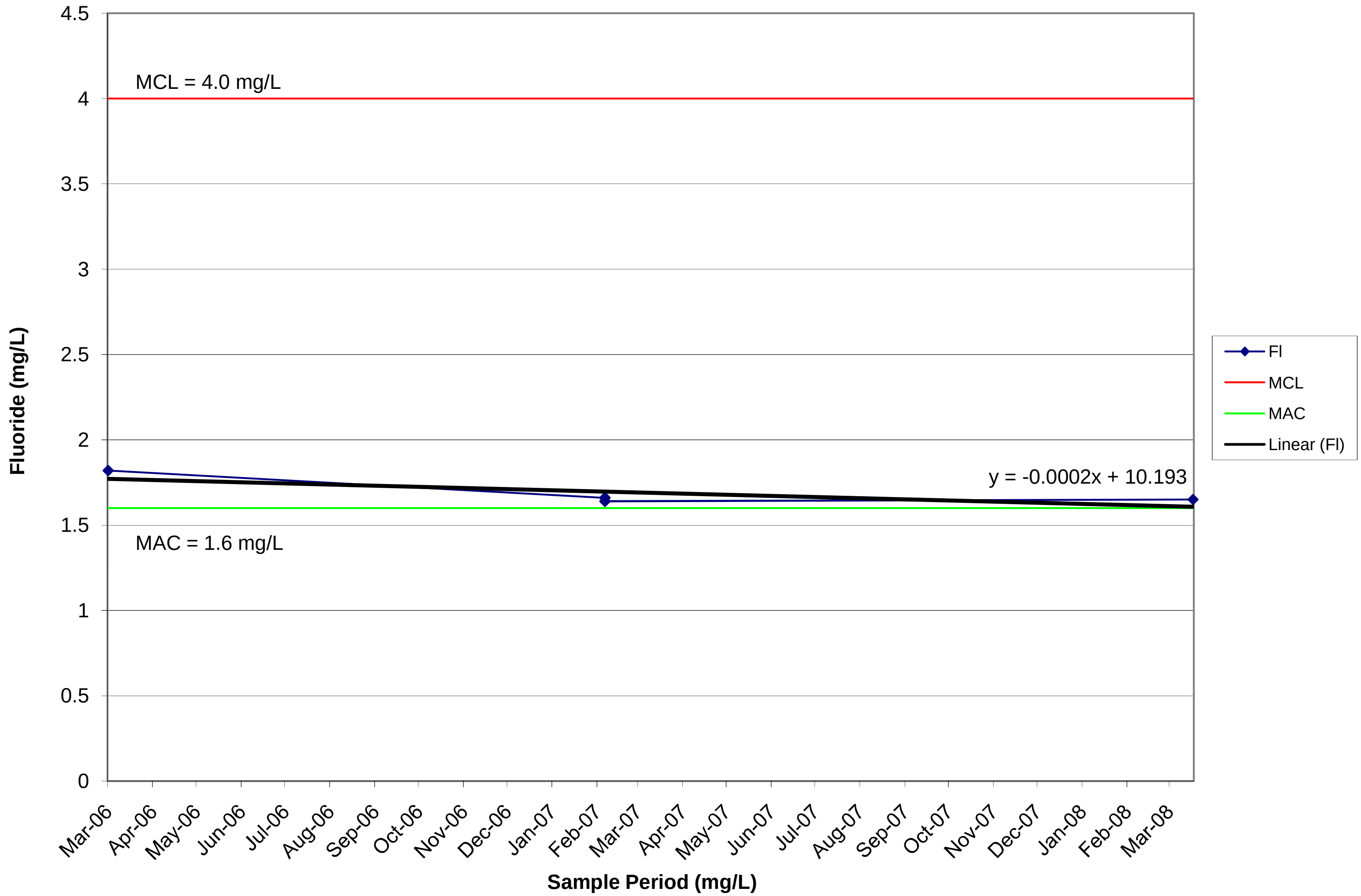

Figure 2B-6. Fluoride Concentrations, SWTA3-MW4

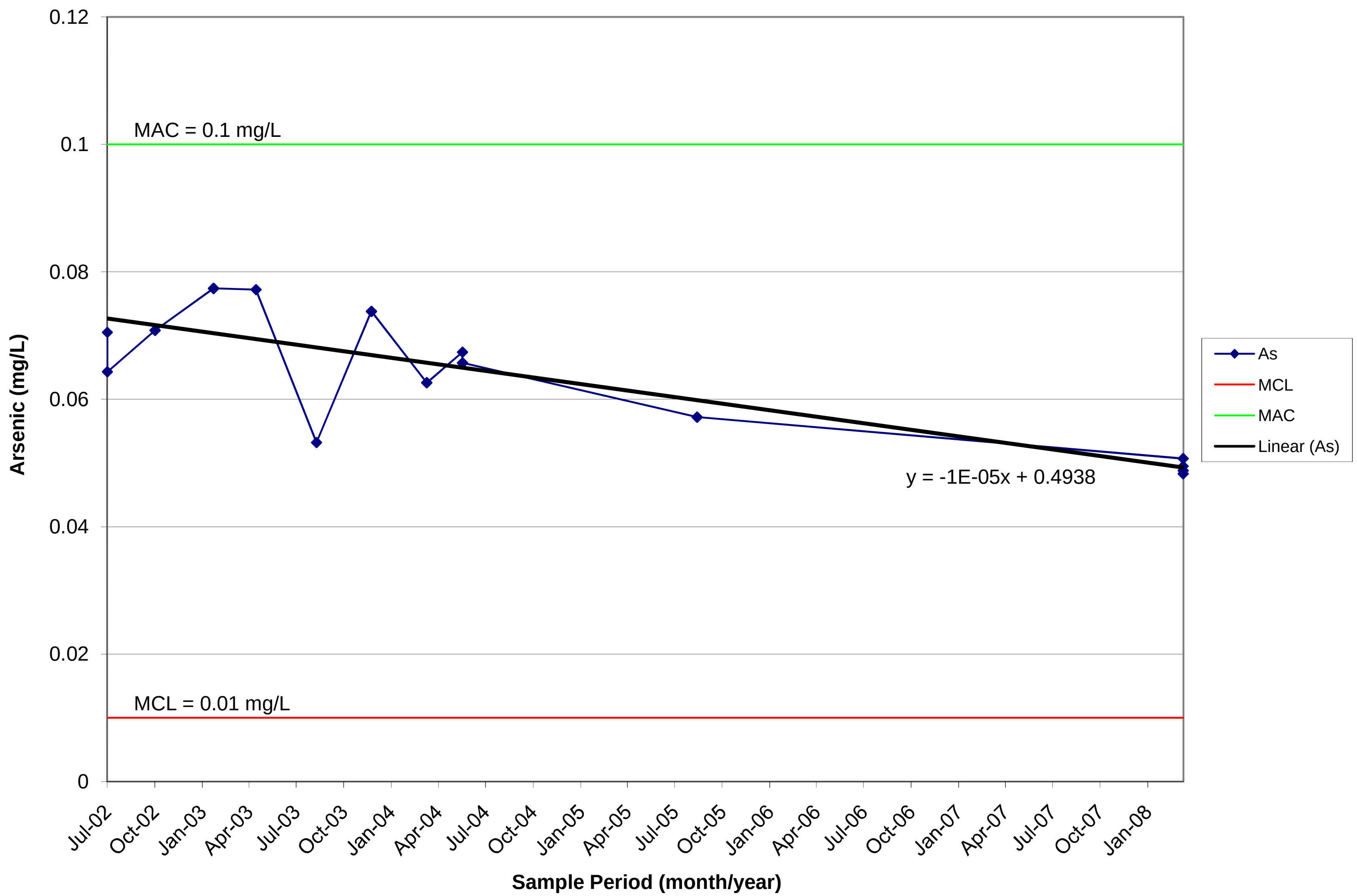

Figure 2B-7. Arsenic Concentrations, CTF-MW2

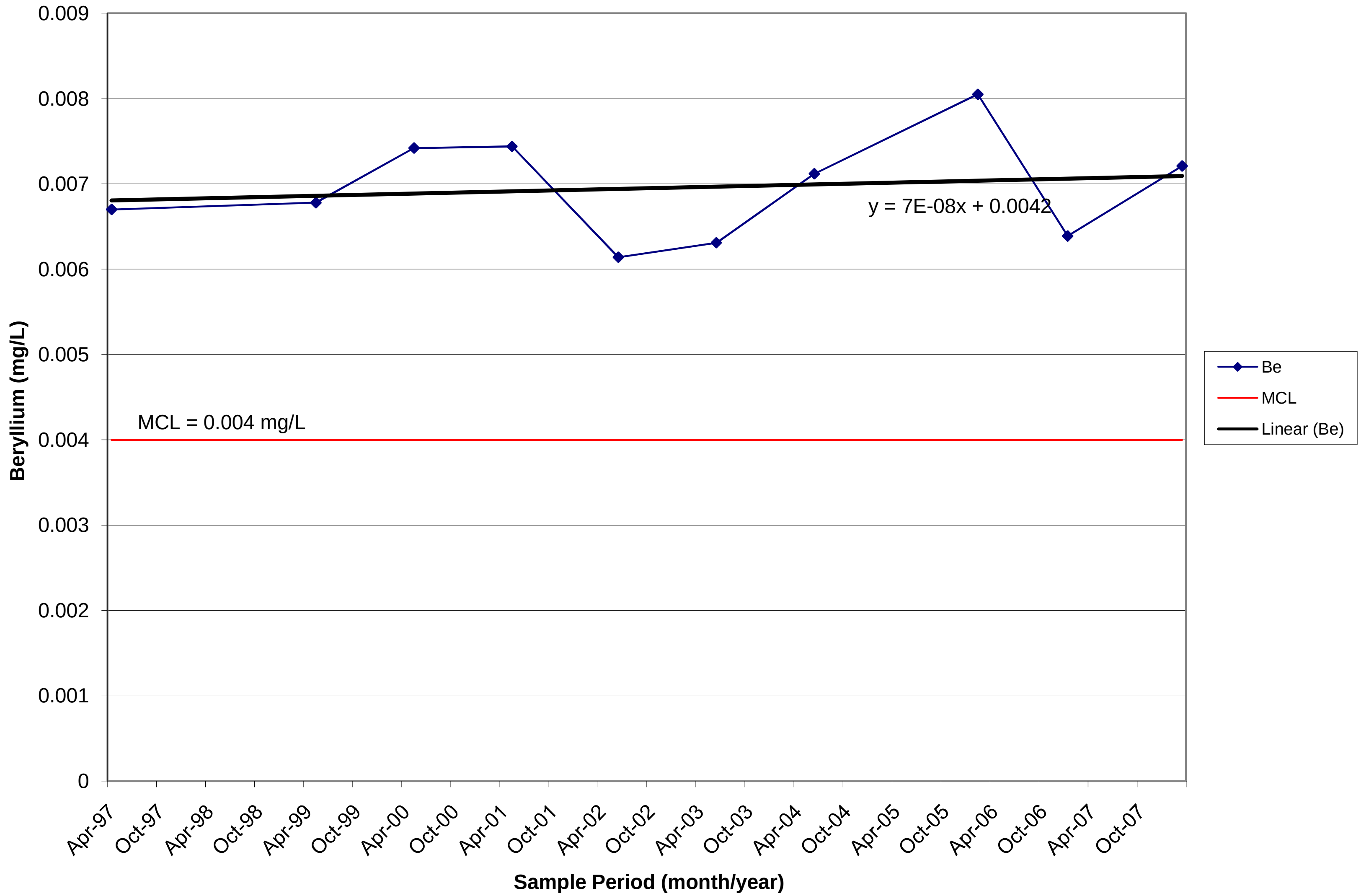

Figure 2B-8. Beryllium Concentrations, Coyote Springs

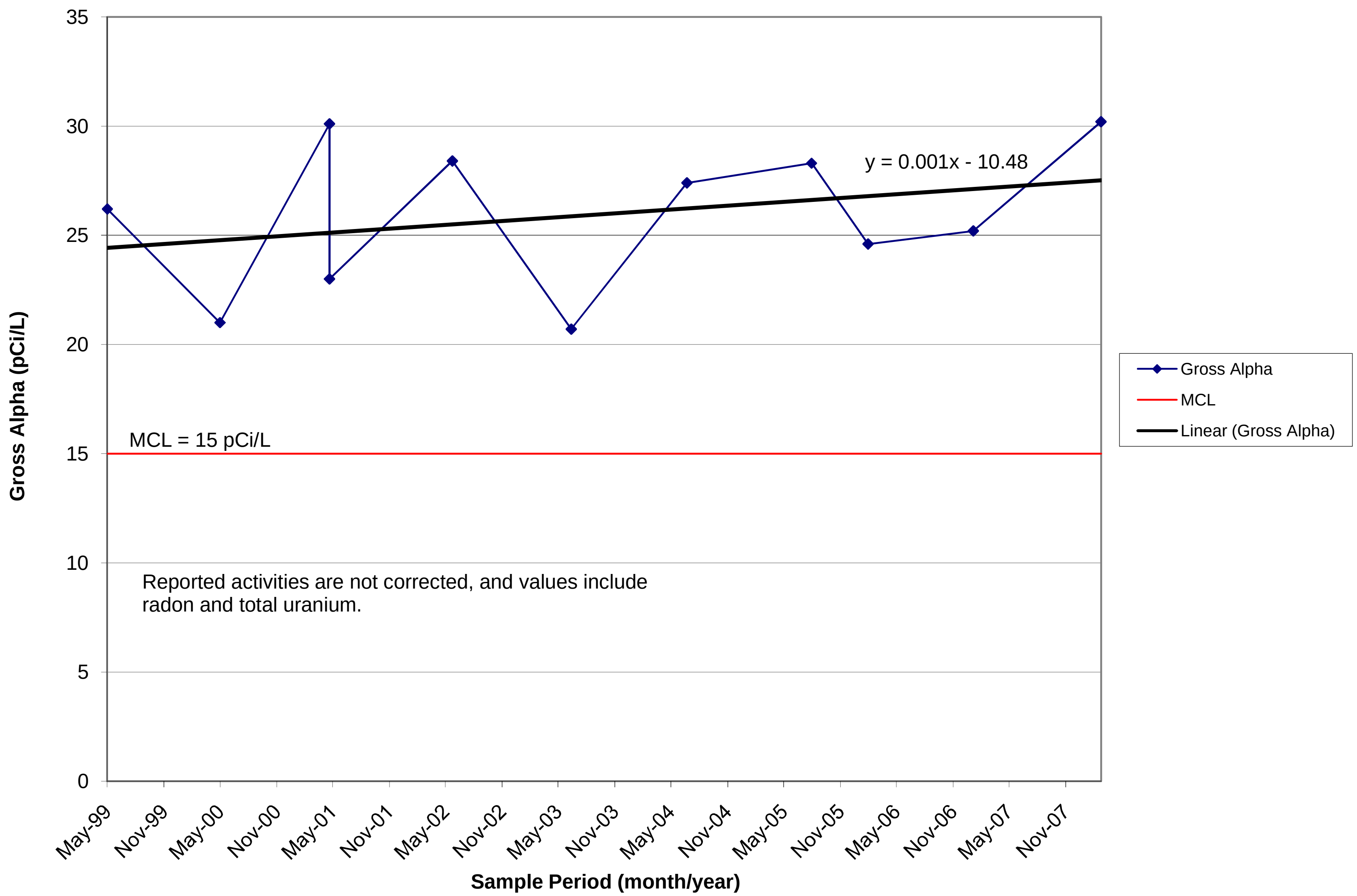

Figure 2B-9. Gross Alpha Activities, SFR-2S

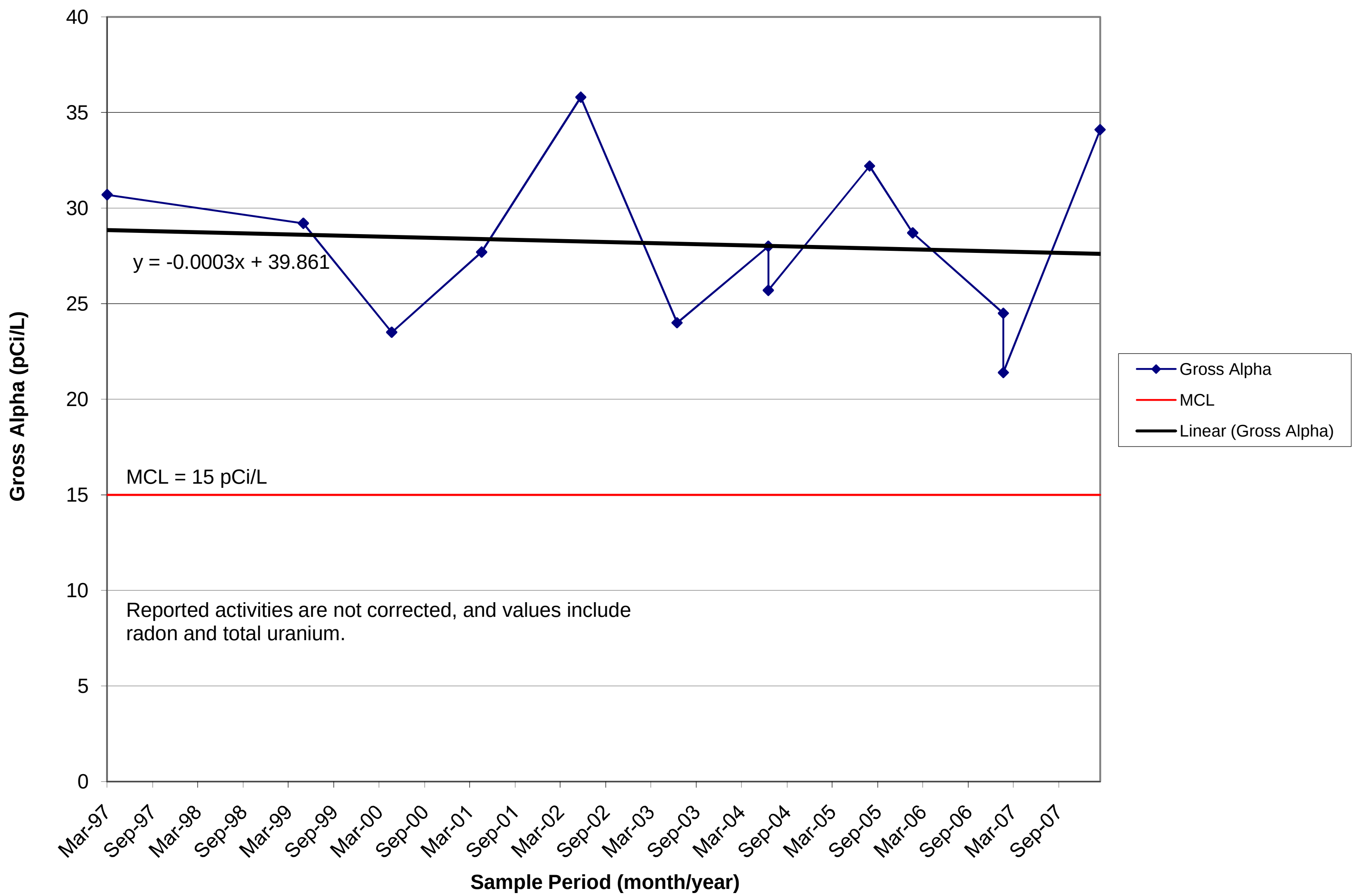

Figure 2B-10. Gross Alpha Activities, TRE-1

Attachment 2C
Groundwater Protection Program
Hydrographs

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Attachment 2C Hydrographs

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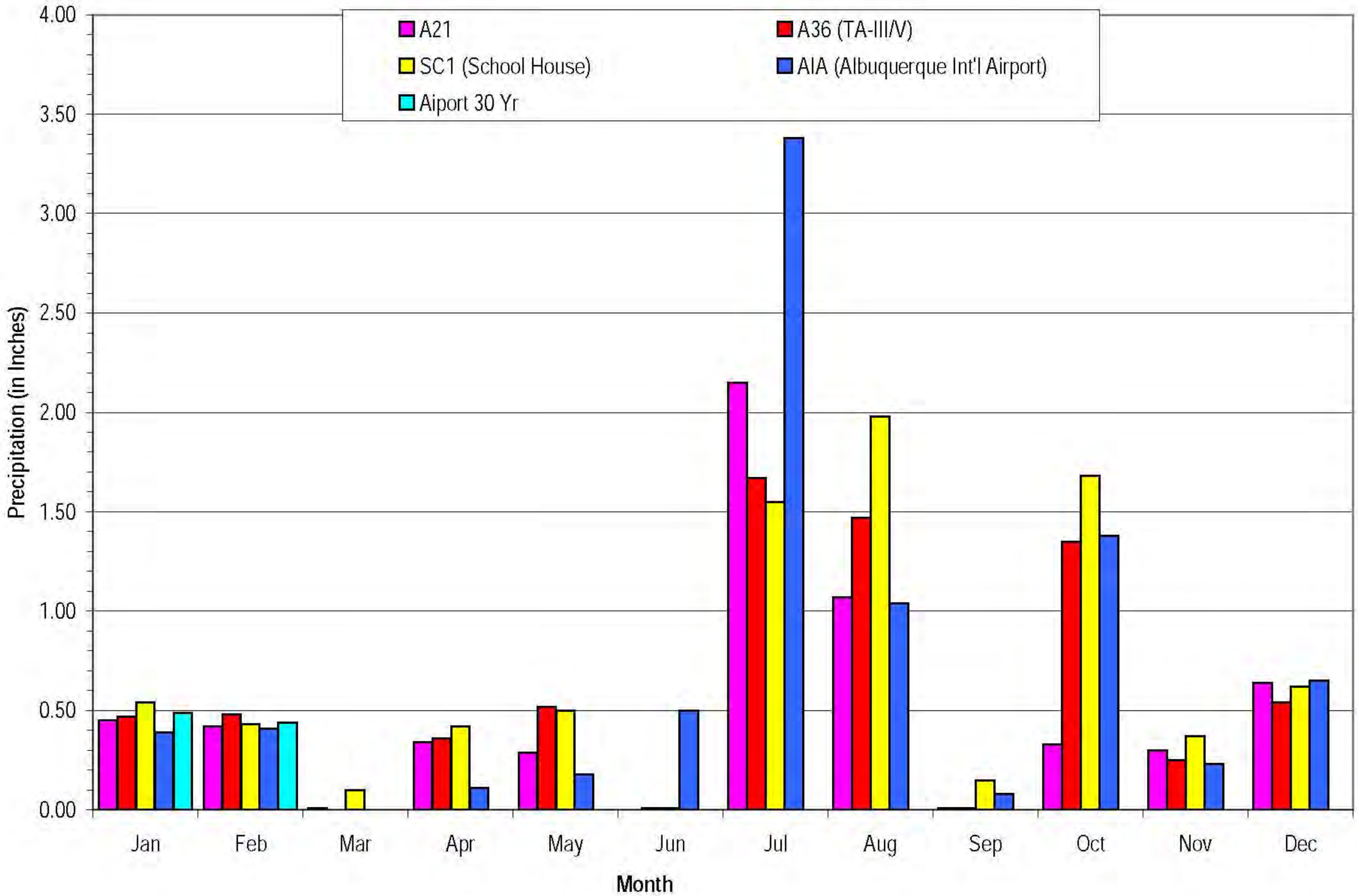

Figure 2C-1. Precipitation Data for SNL/NM, CY08

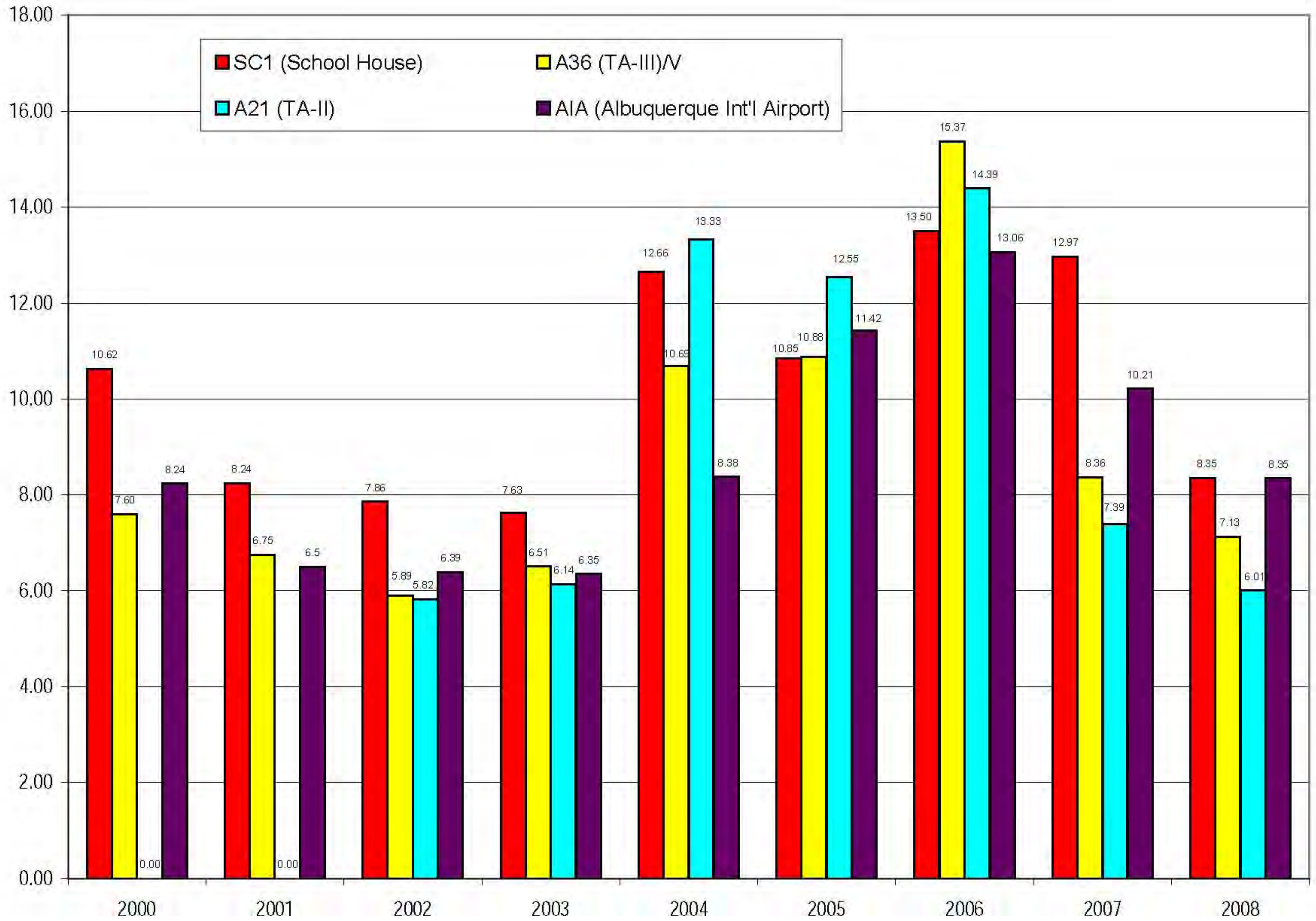

Figure 2C-2. Annual Precipitation Data for SNL/NM, January 2000 to December 2008

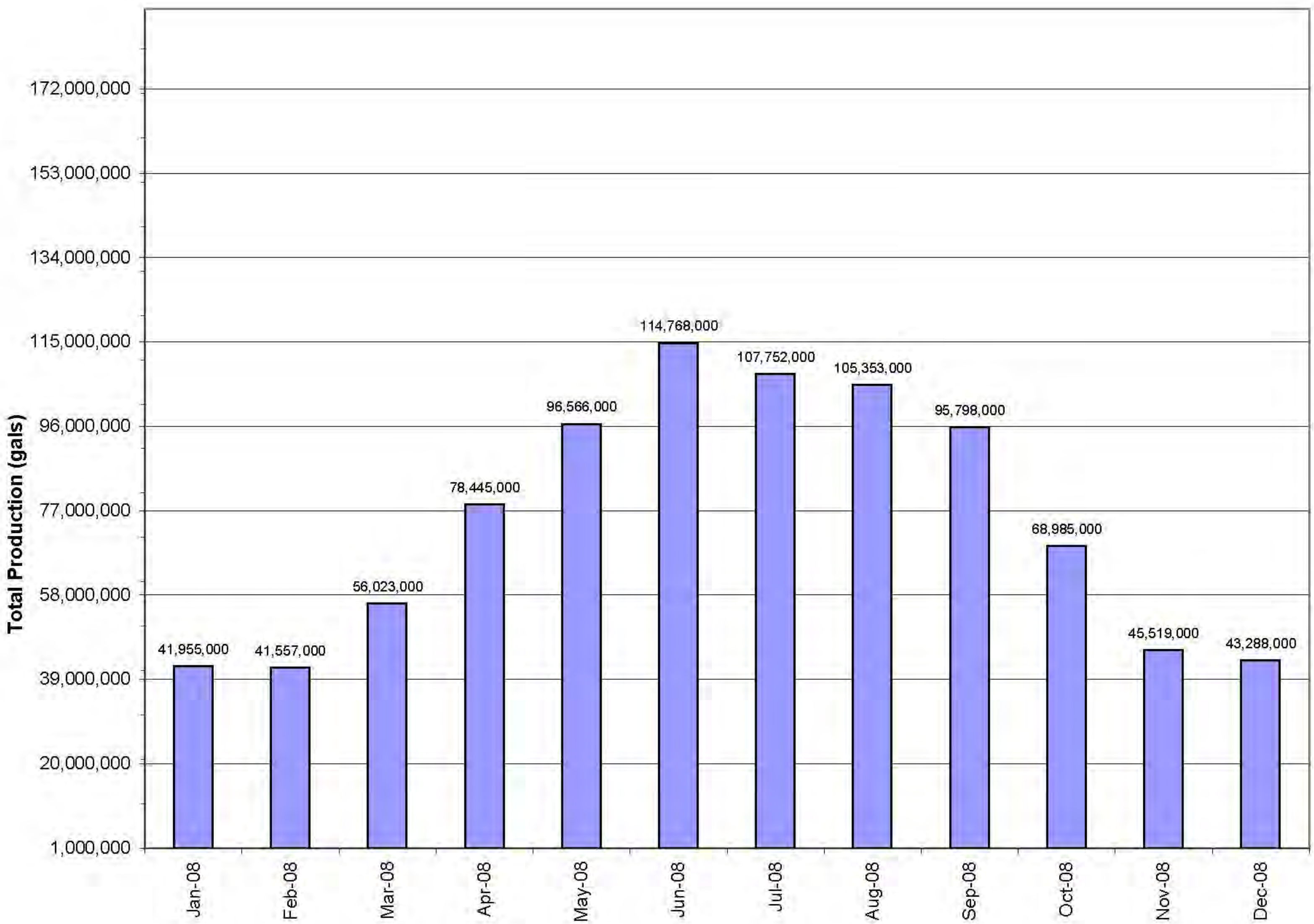

Figure 2C-3. Monthly Groundwater Pumped by KAFB Water Supply Wells, CY08

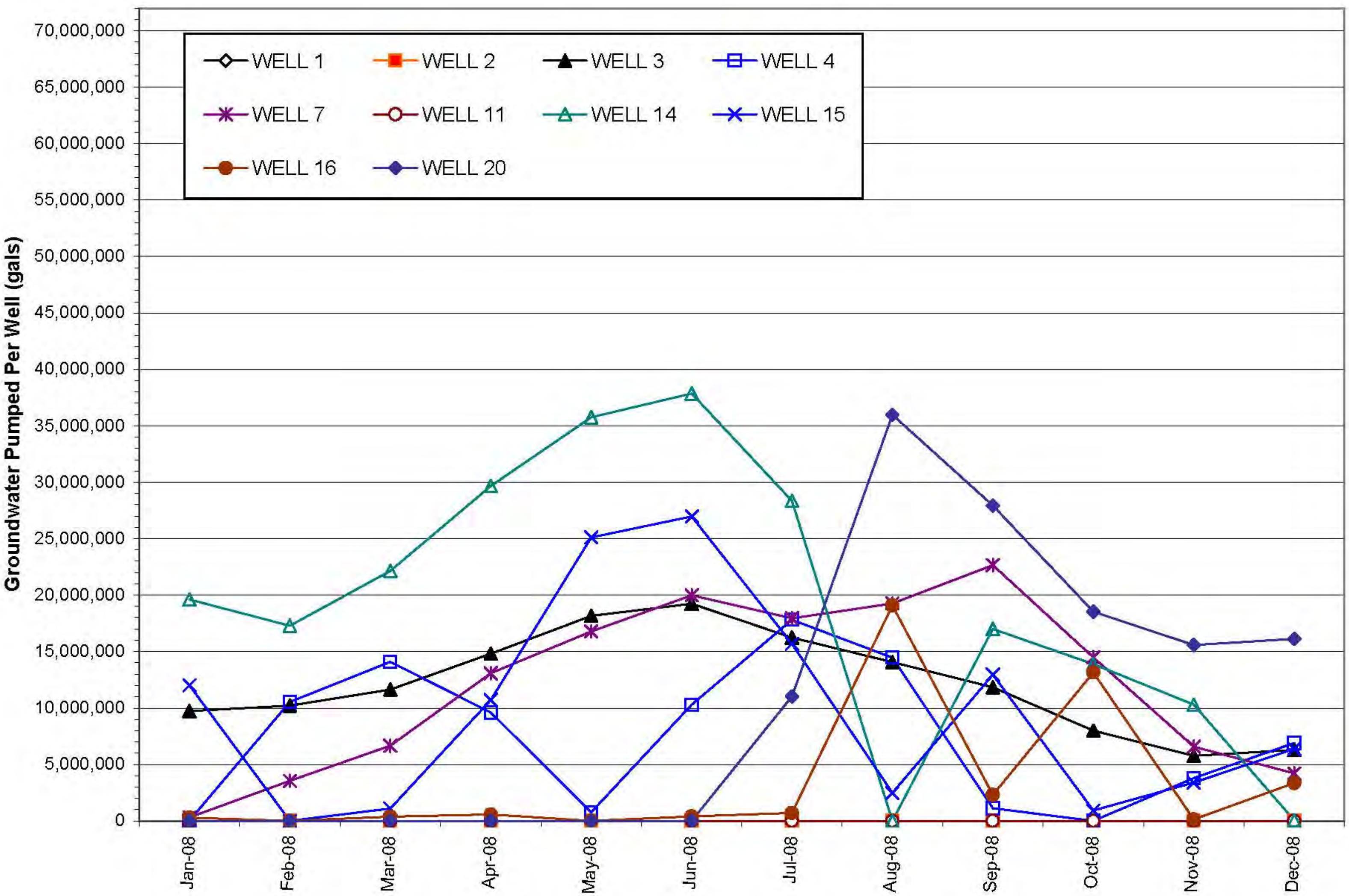

Figure 2C-4. Groundwater Pumped by KAFB Water Supply Wells, CY08

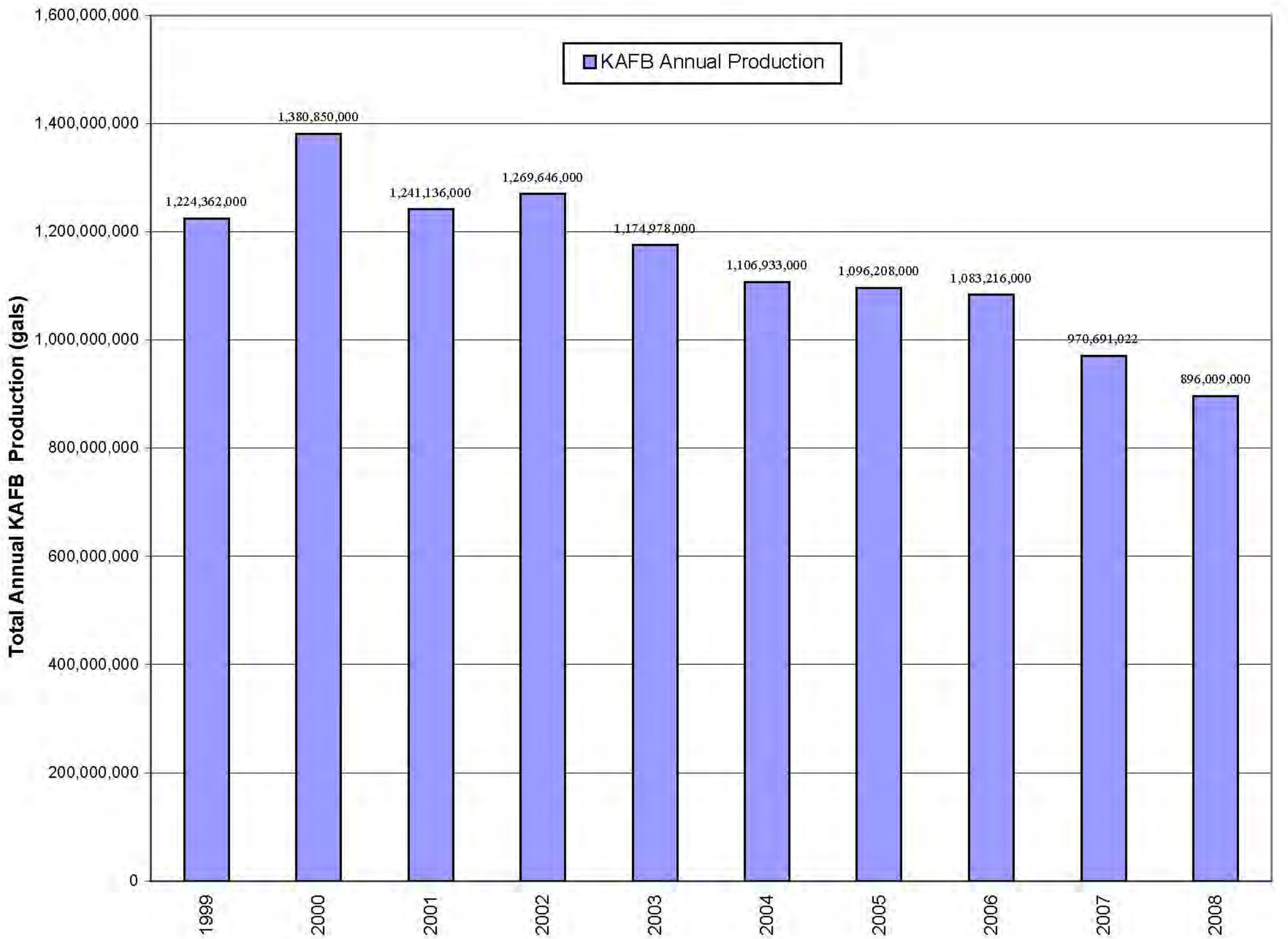

Figure 2C-5. Annual Groundwater Pumped by KAFB Water Supply Wells, 1999 to 2008

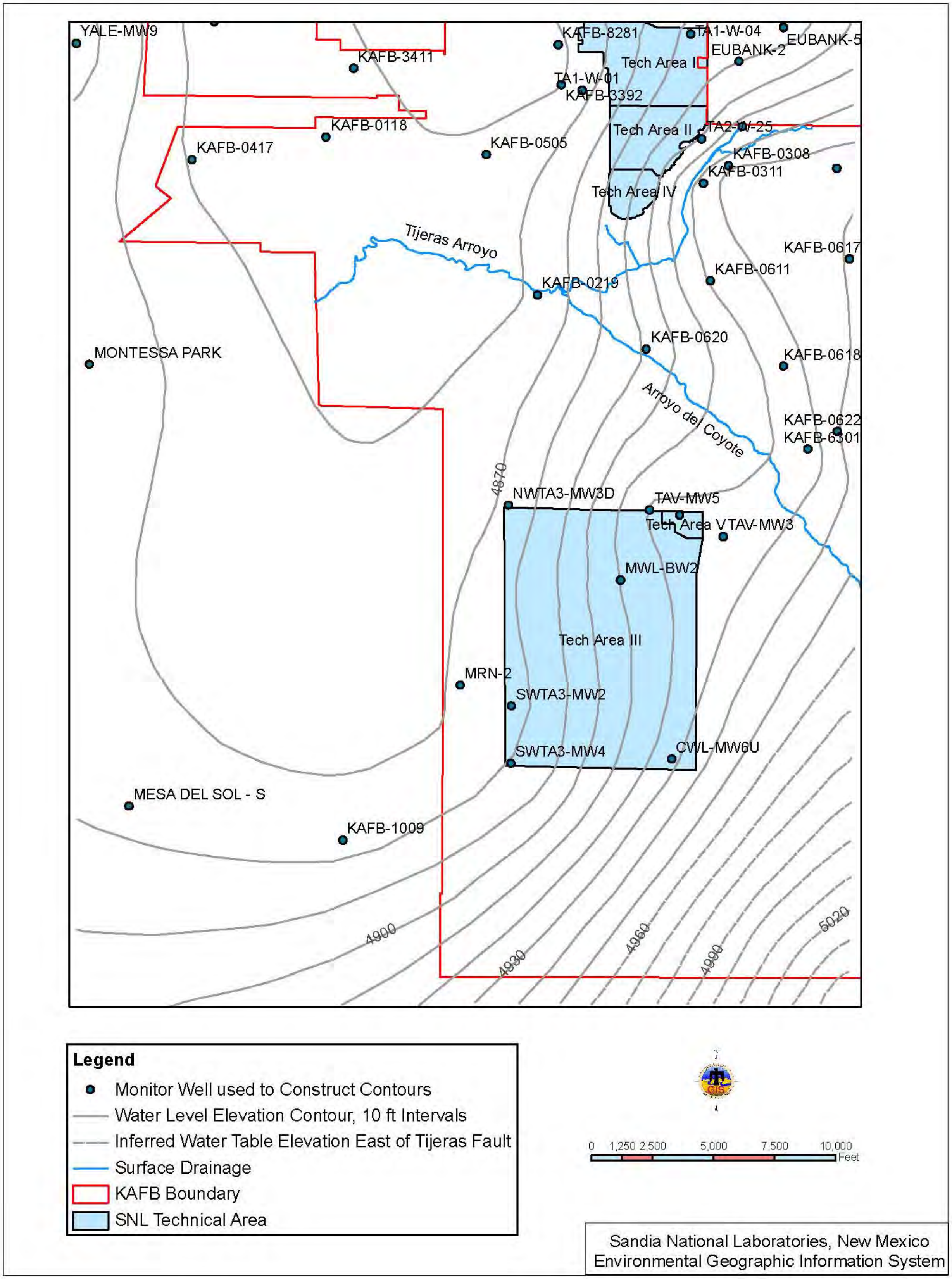

Figure 2C-6. CY08 Regional Groundwater Water Table Elevation

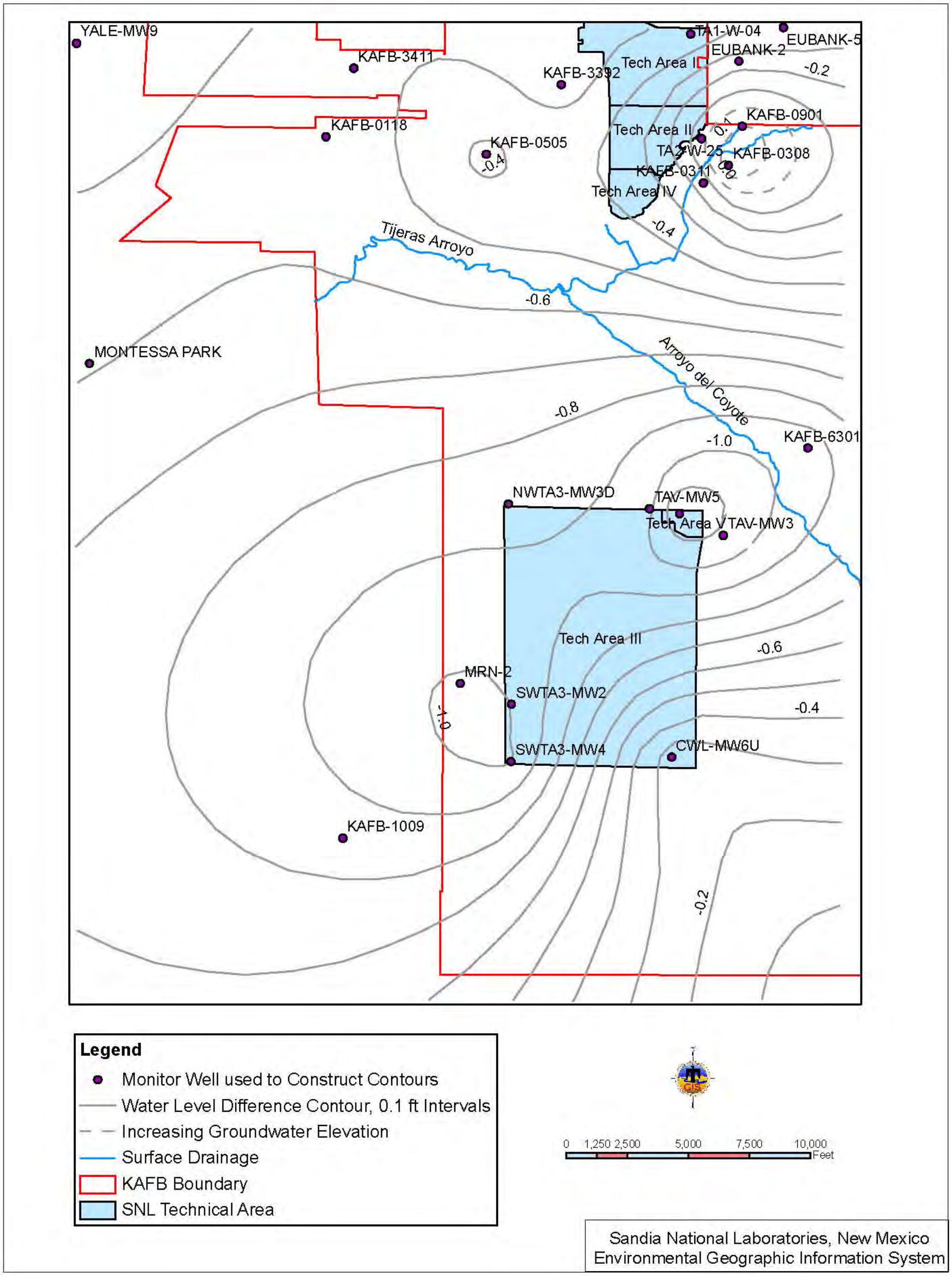

Figure 2C-7. Regional Groundwater Water Table Elevation Difference, CY08-CY07

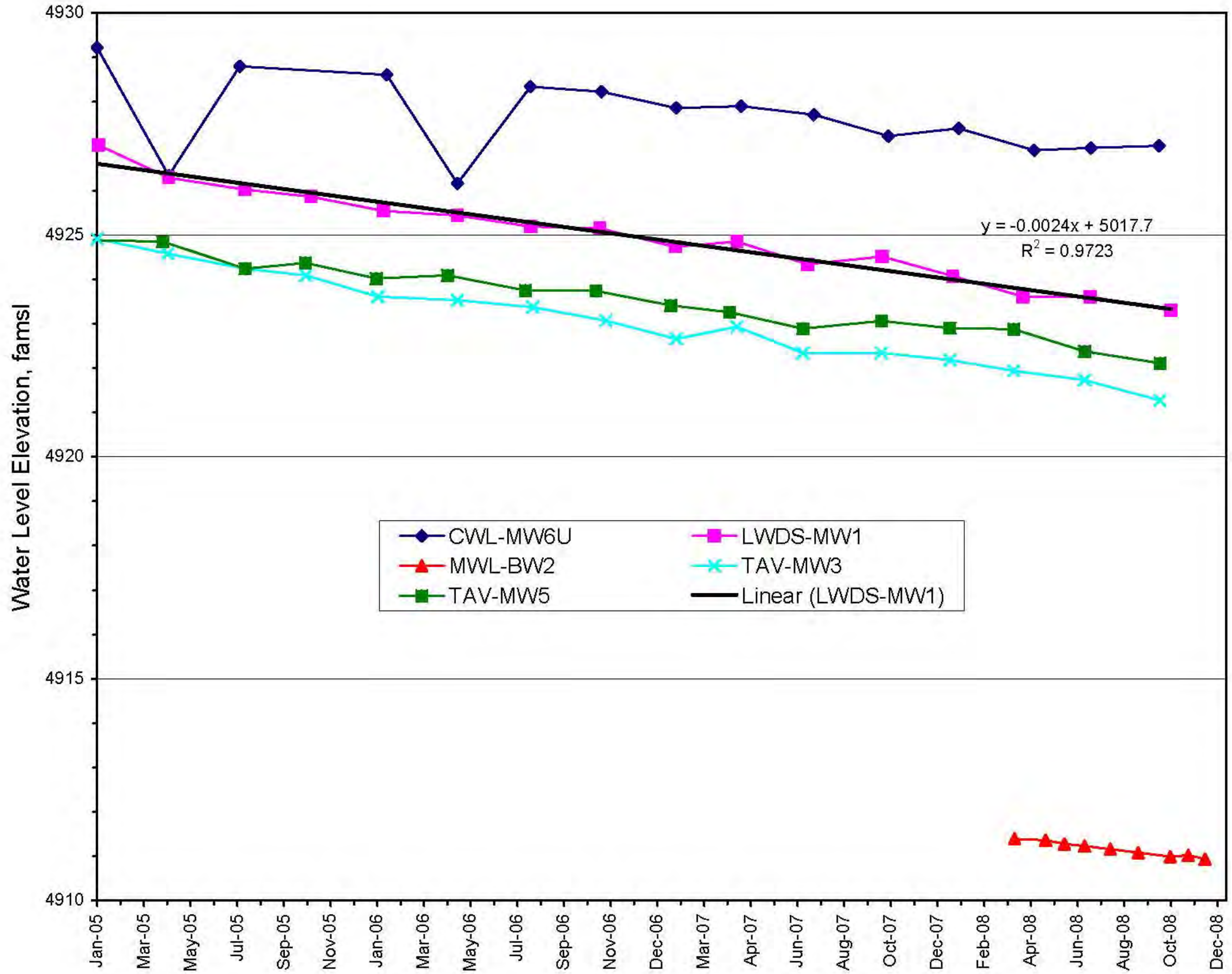

Figure 2C-8. Regional Water Table Hydrographs – Southeast Wells

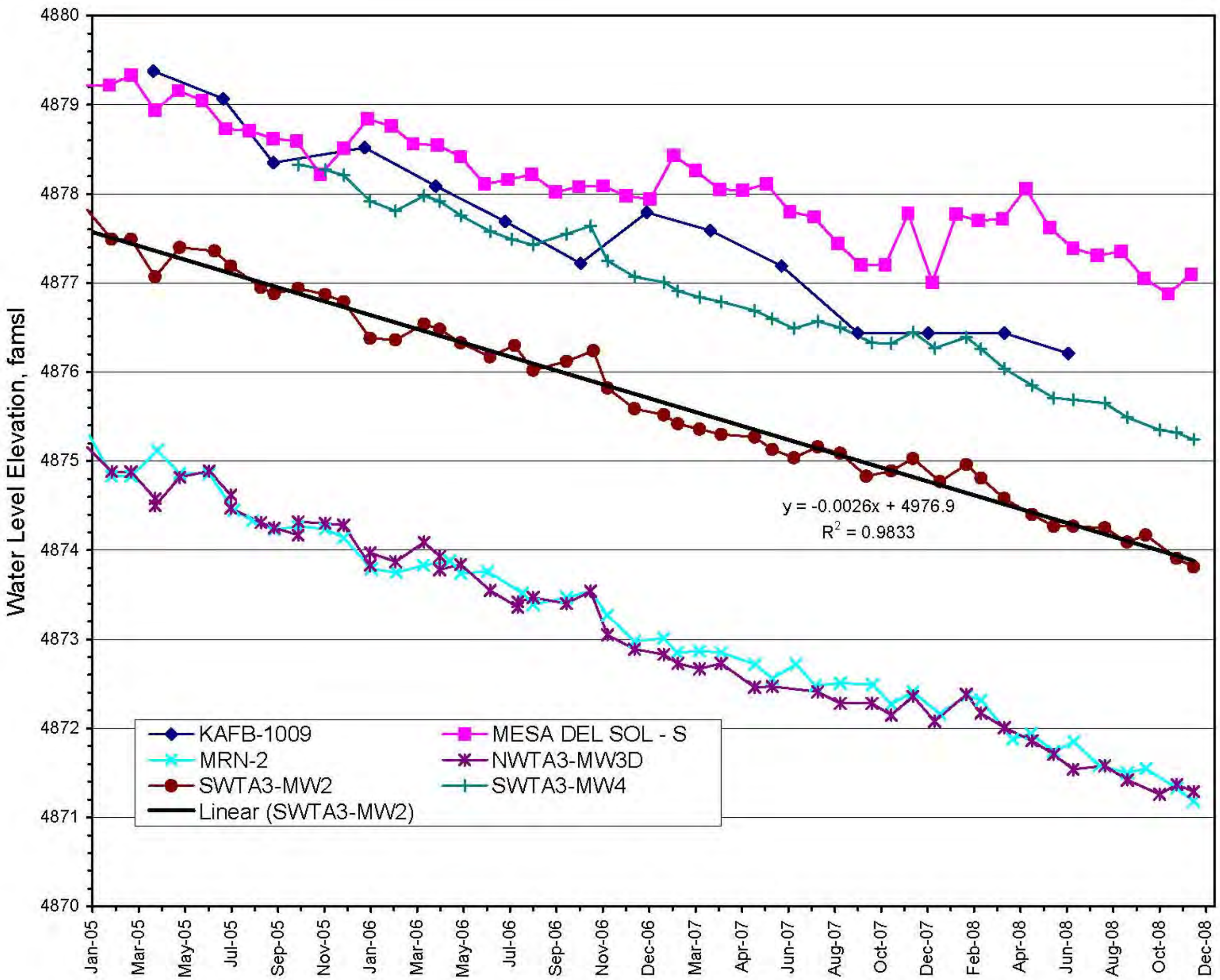

Figure 2C-9. Regional Water Table Hydrographs – Southwest Wells

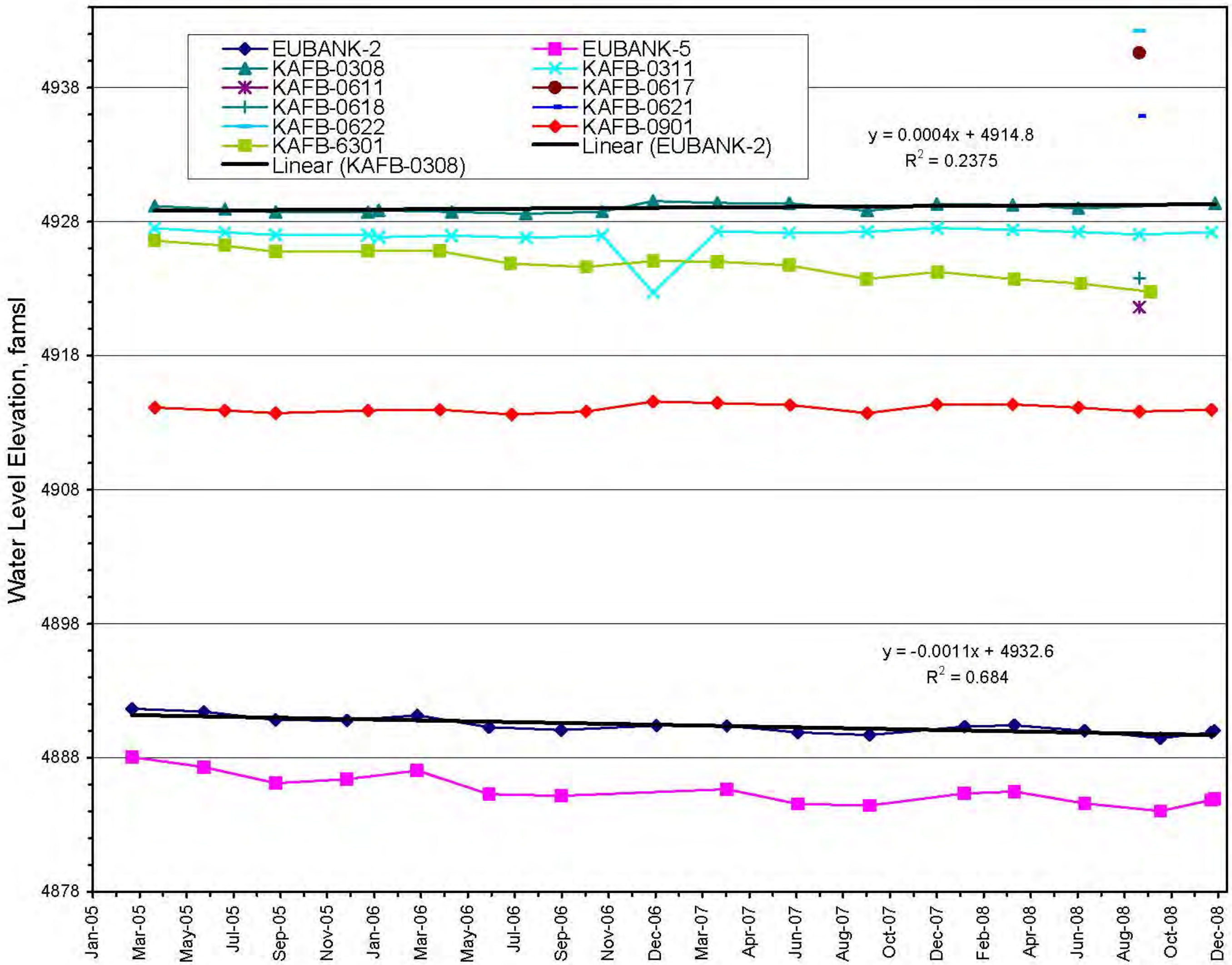

Figure 2C-10. Regional Water Table Hydrographs – Northeast Wells

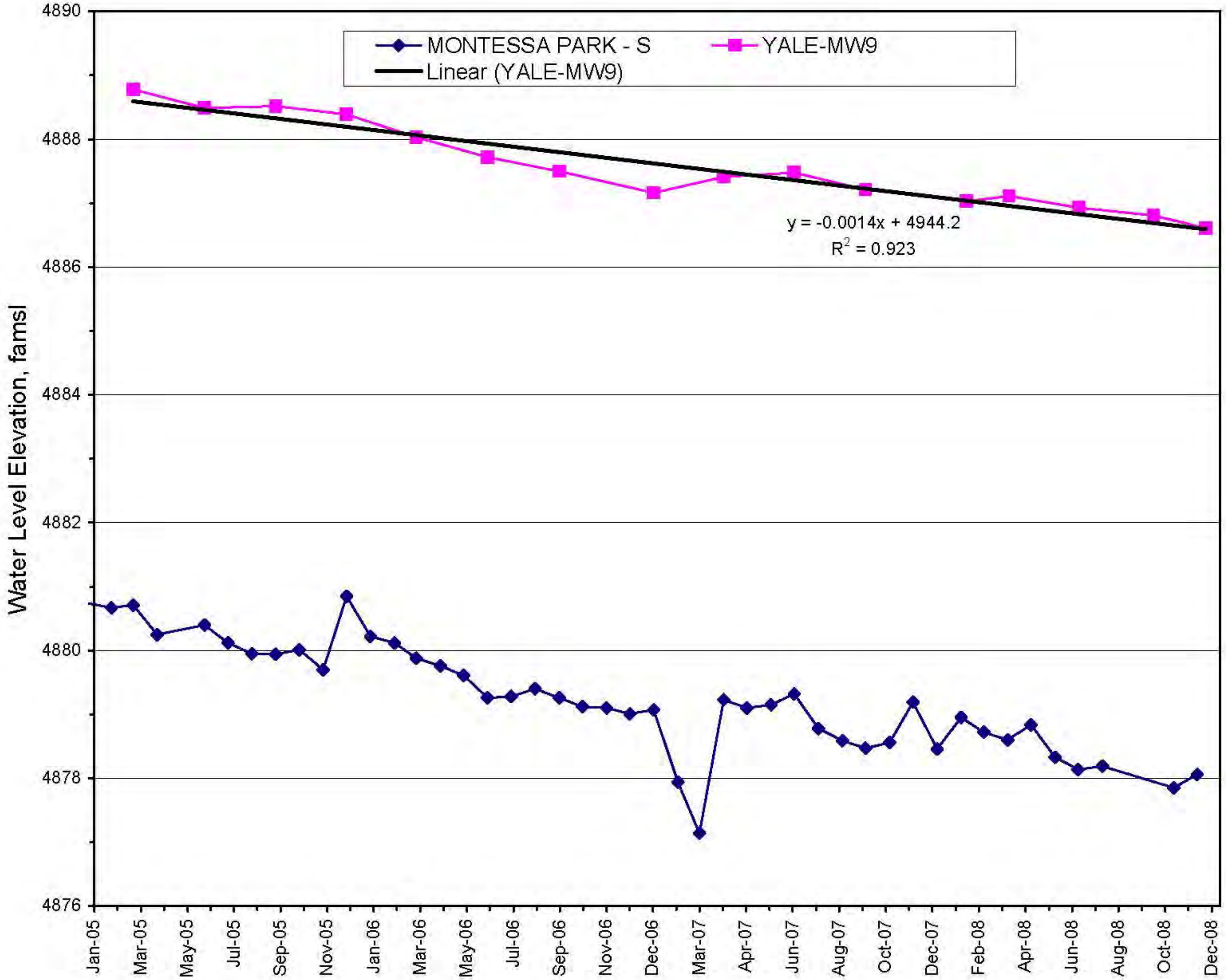

Figure 2C-11. Regional Water Table Hydrographs – Northwest Wells

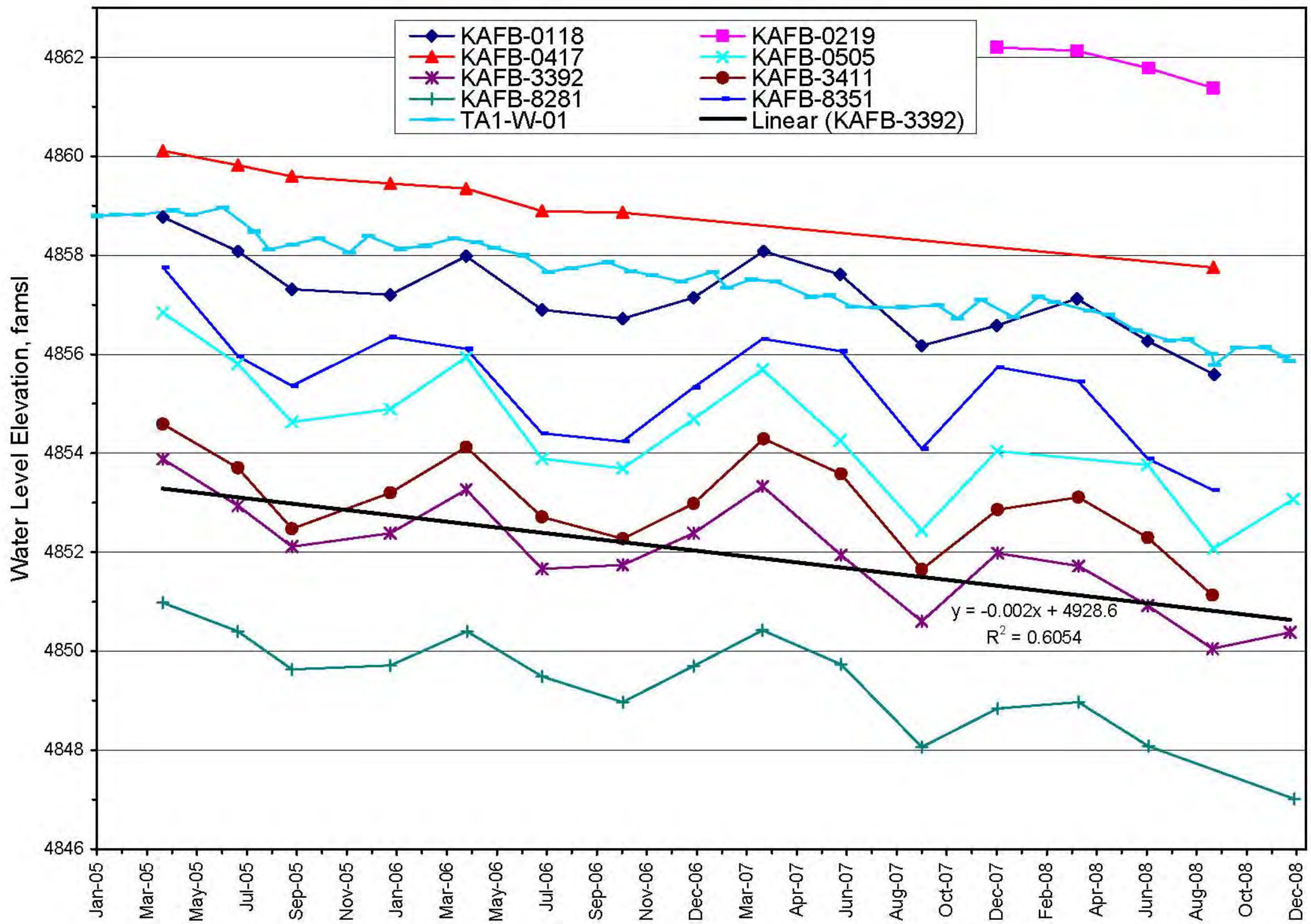

Figure 2C-12. Regional Water Table Hydrographs – North Central Wells

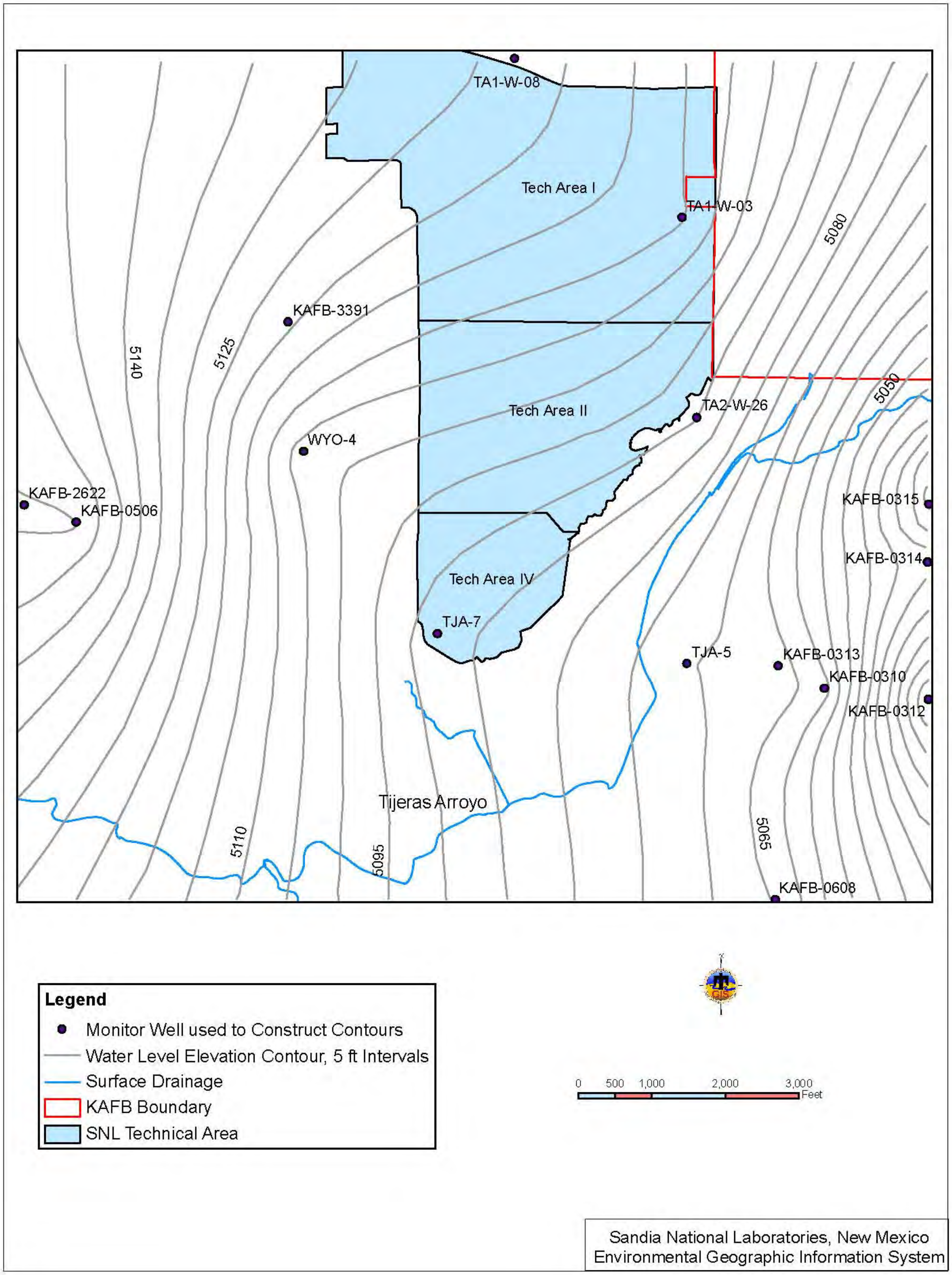

Figure 2C-13. CY08 Perched Groundwater System Water Table Elevation

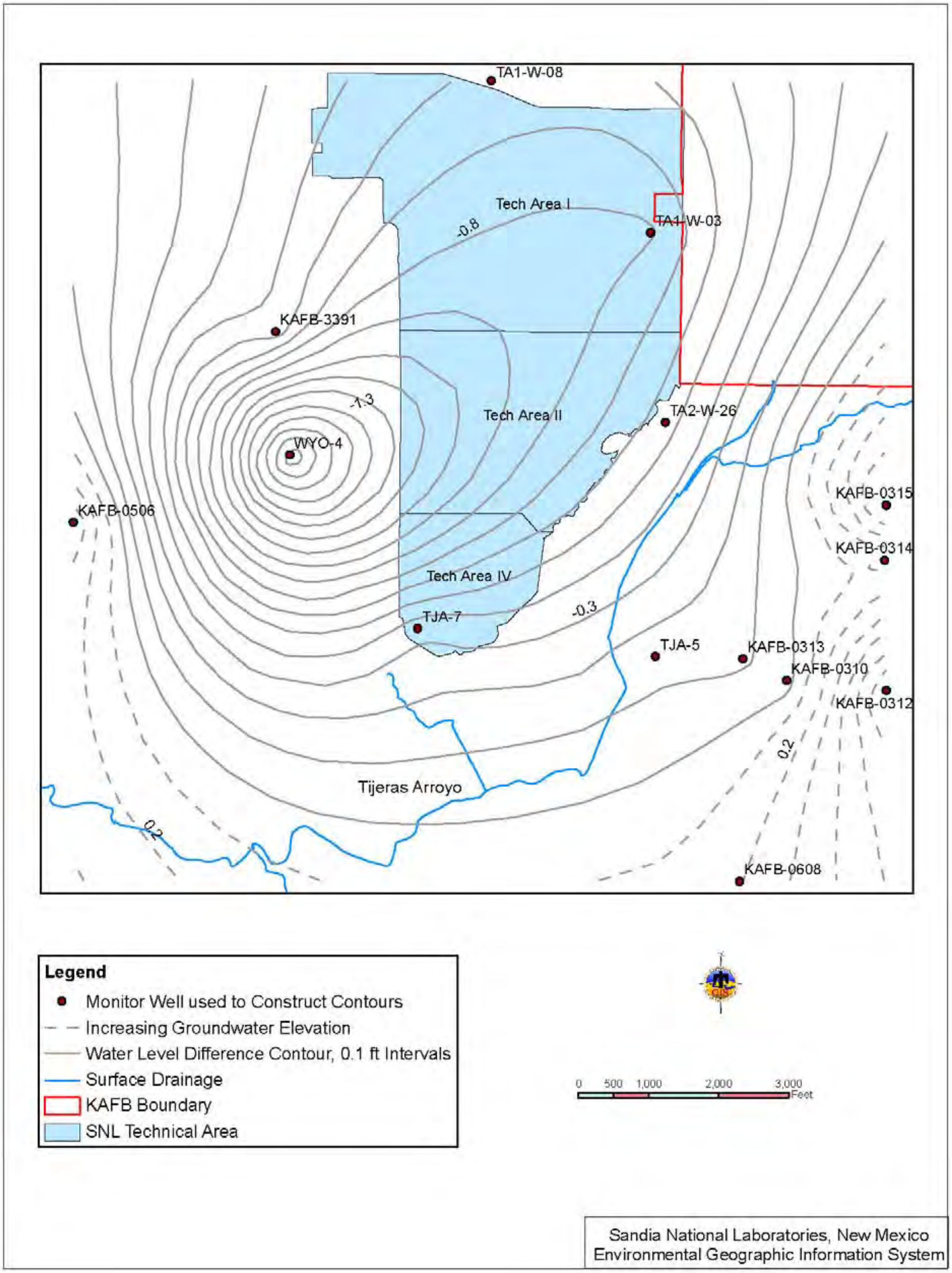

Figure 2C-14. Perched Groundwater System Water Table Elevation Difference, CY08-CY07

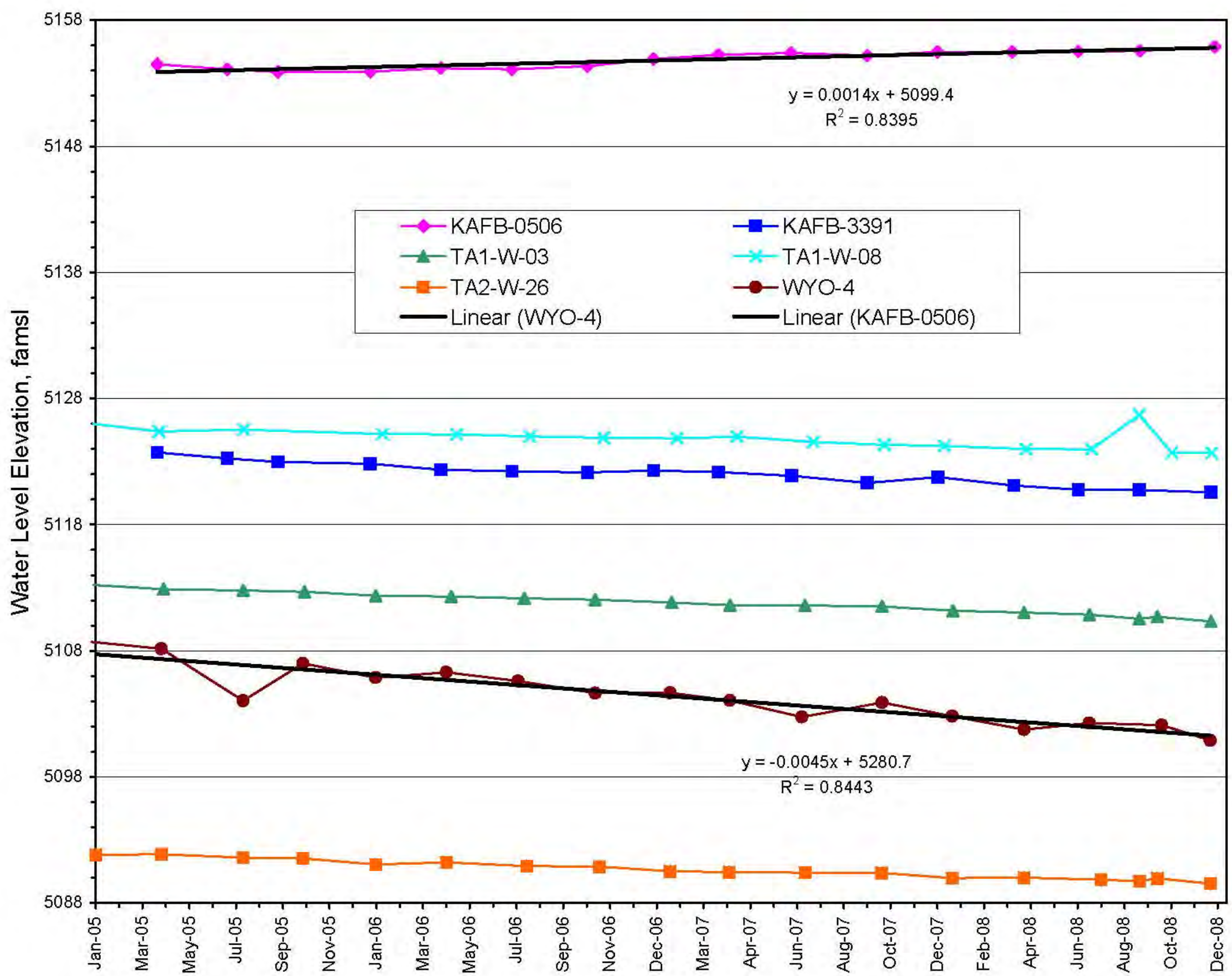

Figure 2C-15. Perched Groundwater Water Table Hydrographs – West Wells

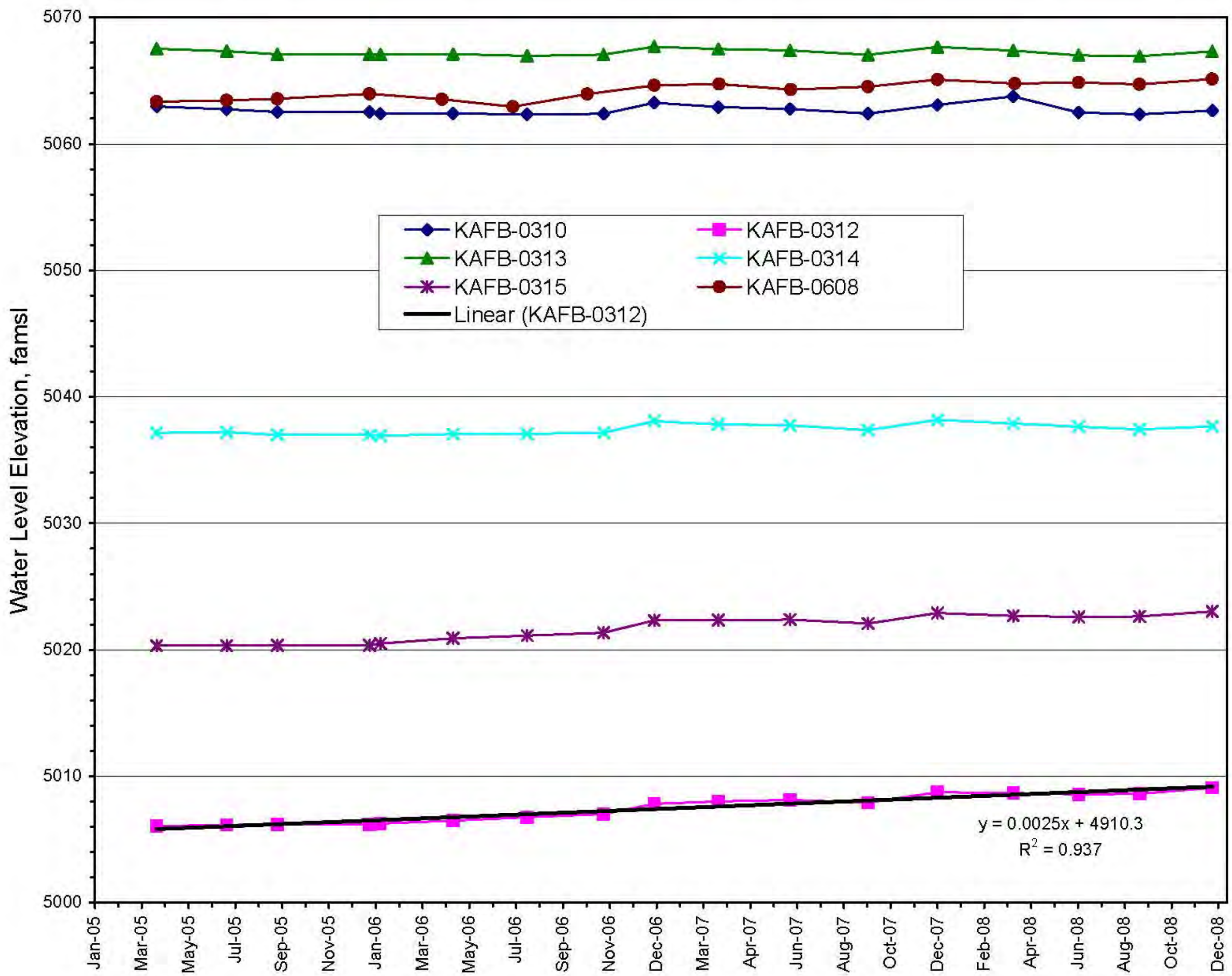

Figure 2C-16. Perched Groundwater Water Table Hydrographs – East Wells

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). SNL/NM implemented two voluntary corrective measures (VCMs), the Vapor Extraction (VE) VCM and the Landfill Excavation (LE) VCM. The VE VCM was designed to reduce and control the volatile organic compound (VOC) soil-gas plume, to prevent further degradation of groundwater beneath the CWL, and reduce TCE concentrations in groundwater below the regulatory limit. As part of the LE VCM, the CWL was excavated from September 1998 through February 2002, which resulted in the removal of more than 52,000 cubic yards of contaminated soil and debris.

3.1.1 Monitoring History

In 1985, groundwater monitoring began at the CWL (IT December 1985) as required in 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 New Mexico Environment Department (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 on-going 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. Monitoring well CWL-MW2A was plugged and abandoned in June 2004 due to well integrity issues.

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 any well. During the following sampling quarter in March 1990, TCE was detected above the drinking water standard of 5 µg/L in 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

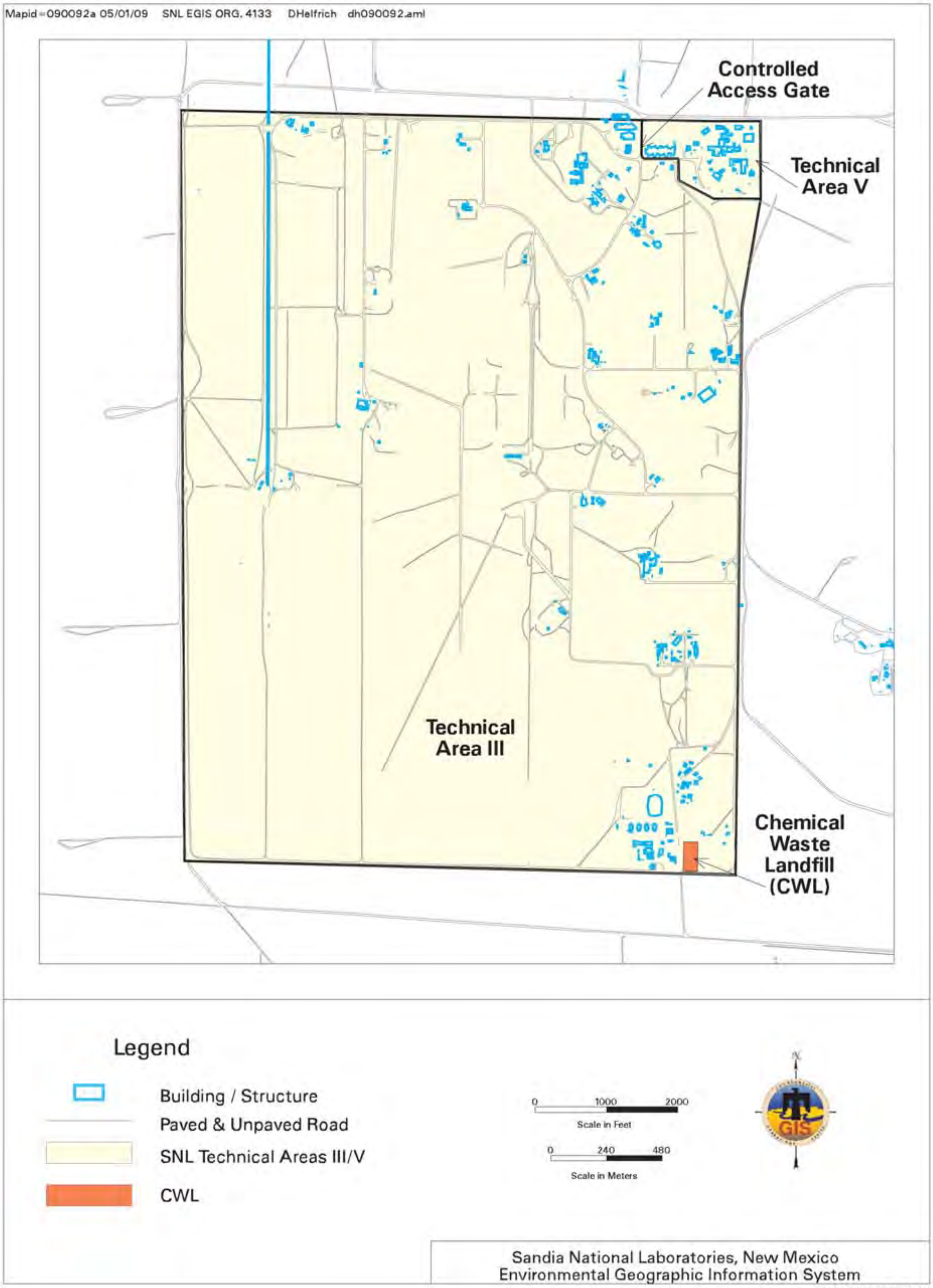

Figure 3-1. Location of the Chemical Waste Landfill within Technical Area III

quarterly sampling requirement, and, thereafter, all indicator parameters have been resampled in accordance with 40 CFR 265.93(c)(2).

In 1995, Appendix G of the Closure Plan 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 partially approved the revised Appendix G, which included reducing the groundwater sampling frequency from quarterly to semiannually at the CWL for VOCs and metals and reducing Appendix IX sampling from annually to biannually. Sampling for pesticides, dioxins, and furans were also eliminated as part of the biannual Appendix IX events.

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 on 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).

3.1.2 Monitoring Network

The current monitoring network at the CWL consists of 13 wells, as shown in Figure 3-2 and listed in Table 3-1. Nine wells were sampled from October 2007 through December 2008, including two background wells and seven downgradient monitoring wells.

3.1.3 Summary of Activities

CWL semiannual groundwater monitoring activities were performed during October and November 2007 and in June, October, and December 2008. Groundwater samples were collected from nine monitoring wells and analyzed for 40 CFR 264 (Appendix IX) VOCs and Appendix IX total metals plus iron. Additional biannual analyses were collected for Appendix IX semivolatile organic compounds (SVOCs), chlorinated herbicides, polychlorinated biphenyls (PCBs), total cyanide, sulfides, and dissolved chromium. The Environmental Restoration Project quarterly progress reports (SNL March 2008 and March 2009) provide full details of each sampling event.

3.1.4 Summary of Future Activities

On May 21, 2007, the NMED issued the CWL CMS Report (SNL December 2004) and a Draft Post-Closure Care Permit (NMED 2007) for a 60-day public comment period that was completed on July 20, 2007. At the request of interested citizens, the NMED provided additional time for public comment from July 24 to August 20, 2007. The U.S. Department of Energy (DOE) and Sandia Corporation (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. These negotiations are still in progress. Upon NMED approval of

Table 3-1. Monitoring Wells at the CWL

Well[1]	Installation Year	WQ	WL	Comments
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	✓	✓	Background well with stainless steel screen
CWL-MW4	1990	✓	✓	Stainless steel screen
CWL-MW2BU	1994	✓	✓	Upper section of nested well, 2-inch diameter well
CWL-MW2BL	1994	✓	✓	Lower section of nested well
CWL-MW5U	1994	✓	✓	Upper section of nested well
CWL-MW5L	1994	✓	✓	Lower section of nested well, 2-inch diameter well
CWL-MW6U	1994	✓	✓	Upper section of nested well
CWL-MW6L	1994	✓	✓	Lower section of nested well, 2-inch diameter well
CWL-BW4A	1994	✓	✓	Background well
CWL-MW7	2003		✓	Deep monitoring well
CWL-MW8	2003		✓	Deep monitoring well

NOTES: [1] Refer to page xi of this report for well descriptions.
Check marks in the WQ and WL columns indicate WQ sampling and WL measurements during period from October 2007 to December 2008.
CWL = Chemical Waste Landfill.
VCM = Voluntary Corrective Measure.
VE = Vapor Extraction.
WL = Water level.
WQ = Water quality.

the CWL Post-Closure Care Permit and Final CWL Resource Conservation and Recovery Act Closure Report (to be submitted after approval of the Permit and CMS Report), the Permit will supersede the Closure Plan (SNL December 1992), and the Closure Plan will no longer be effective. As required by 20.4.1.500 NMAC, incorporating 40 CFR 264.117(a)(1), the post-closure care period is 30 years. This period may be shortened or extended by the NMED under 20.4.1.500 NMAC, incorporating 40 CFR 264.117(a)(2).

As agreed to in recent negotiations, the DOE/Sandia recently submitted to the NMED a CWL Closure Plan amendment that addresses the decommissioning of monitoring wells CWL-MW4 and CWL-BW4A and the installation of new monitoring wells CWL-MW9 and CWL-BW5, as well as reducing groundwater sampling requirements for the four monitoring wells proposed for post-closure monitoring (CWL-BW5, CWL-MW5U, CWL-MW6U, and CWL-MW9). Proposed locations for the two new monitoring wells are shown in Figure 3-2.

3.1.5 Conceptual Model

With respect to impacts on water resources and risk to human health and the environment, TCE, chromium, and nickel are identified as the constituents of concern (COCs) at the CWL, consistent with the Draft Post-Closure Care Permit (NMED 2007).

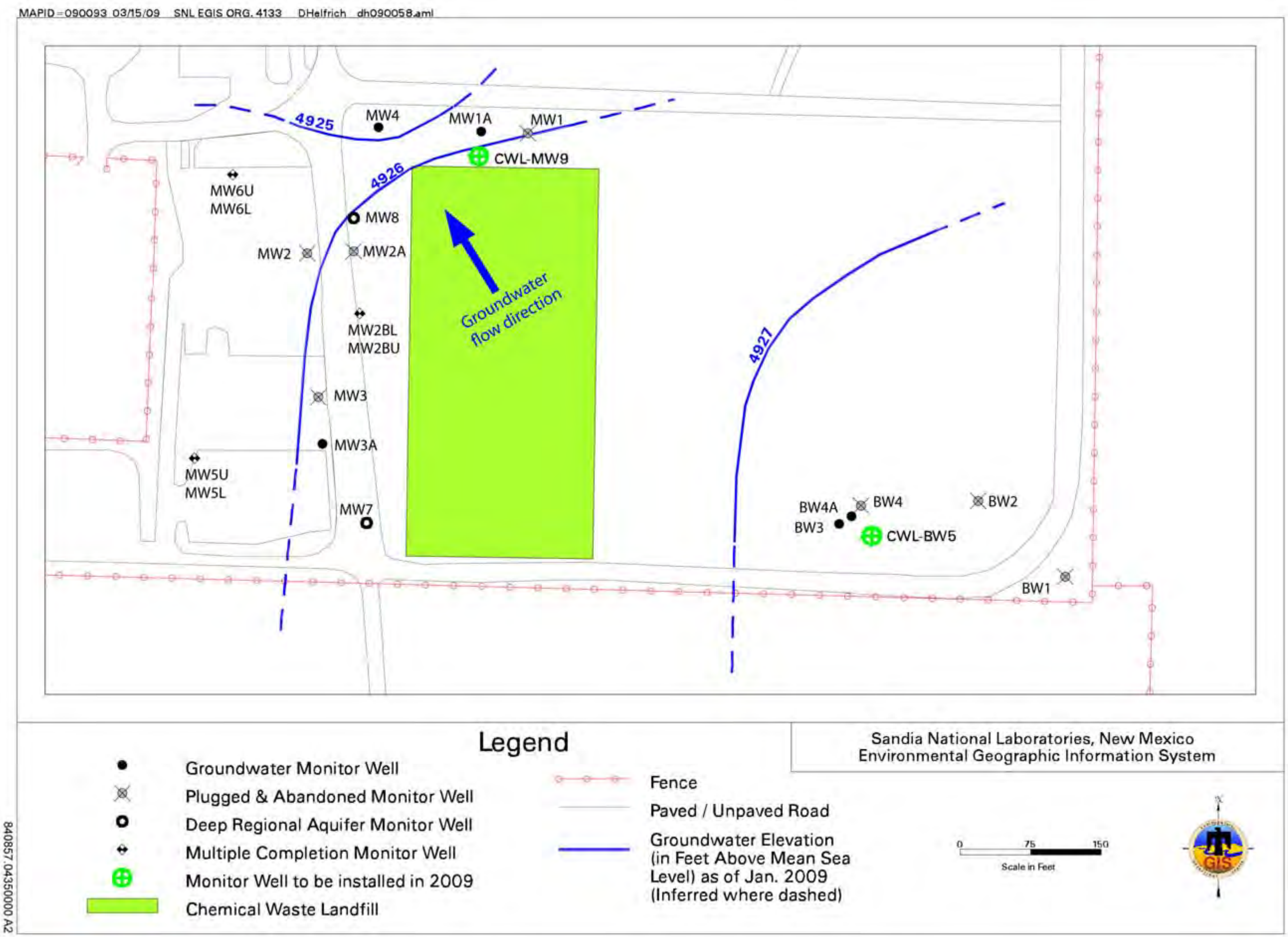

Figure 3-2. Chemical Waste Landfill Monitoring Well Locations

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. Water levels at the CWL have been declining since January 2004 at an approximate rate of 0.79 feet per year (ft/yr). Detailed hydrographs of specific CWL wells are presented in Attachment 3C, Figures 3C-1 and 3C-2, and in the MW2A Class 2 Closure Plan Amendment Request (SNL July 2004).

Historically, water levels were measured quarterly at all CWL wells. However, since 2001, only wells CWL-MW2BL, CWL-MW5U, and CWL-MW6U have been measured quarterly; the other wells are measured prior to sampling. Potentiometric surface maps of the CWL (Figure 3-2) using January 2009 water level measurements are consistent with the hydrogeologic conceptual model for the Kirtland Air Force Base (KAFB) area, which shows the local groundwater flow direction is to the northwest due to the influence of groundwater withdrawals by the City of Albuquerque and KAFB. Groundwater travel times from the CWL to these KAFB and municipal supply wells are on the order of hundreds to thousands of years (SNL February 2001).

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 summary of the CWL disposal history is presented in the NMED-approved Closure Plan (SNL December 1992) and the LE VCM Final Report (SNL April 2003). The investigation history of the CWL is presented and summarized in the CWL CMS Report (SNL December 2004), including post-VE VCM soil-gas and groundwater monitoring results that establish current conditions.

3.2 Regulatory Criteria

The CWL is an interim status landfill undergoing 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. After NMED approval of CWL closure and the CWL Post-Closure Care Permit, all monitoring will be conducted following the requirements stipulated in the Permit.

3.3 Scope of Activities

Groundwater monitoring at the CWL was performed during October and November 2007 and in June, October, and December 2008. Environmental groundwater samples were collected from nine monitoring wells and submitted for analysis of 40 CFR 264 (Appendix IX) VOCs, SVOCs, chlorinated herbicides, PCBs, total cyanide, sulfides, total metals plus iron, and dissolved chromium analyses. Table 3-2 lists the parameters and wells sampled.

Groundwater samples collected for chemical analyses were submitted to General Engineering Laboratories, Inc. (GEL) in Charleston, South Carolina. All chemical analytical results are compared with EPA maximum contaminant levels (MCLs) for drinking water supplies. Analytical results are summarized in Attachment 3A, Tables 3A-1 through 3A-8.

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

Parameter	October / November 2007	June 2008	October / December 2008
Appendix IX VOCs	CWL-BW3, CWL-BW4A, CWL-MW2BL, CWL-MW2BU, CWL-MW4, CWL-MW4 (dup), CWL-MW5L, CWL-MW5U, CWL-MW5U (dup), CWL-MW6U	CWL-BW3, CWL-BW4A, CWL-MW2BL, CWL-MW2BU, CWL-MW4, CWL-MW4 (dup), CWL-MW5L, CWL-MW5U, CWL-MW6L, CWL-MW6U, CWL-MW6U (dup)	CWL-MW2BL, CWL-MW2BU, CWL-MW4, CWL-MW5L, CWL-MW5U, CWL-MW5U (dup), CWL-MW6L, CWL-MW6U
Appendix IX SVOCs	CWL-BW3, CWL-BW4A, CWL-MW2BL, CWL-MW4, CWL-MW4 (dup), CWL-MW5L, CWL-MW5U, CWL-MW5U (dup), CWL-MW6U	CWL-MW6L	
Appendix IX Chlorinated Herbicides	CWL-BW3, CWL-BW4A, CWL-MW2BL, CWL-MW4, CWL-MW4 (dup), CWL-MW5L, CWL-MW5U, CWL-MW5U (dup), CWL-MW6U	CWL-MW6L	
Appendix IX PCBs	CWL-BW3, CWL-BW4A, CWL-MW2BL, CWL-MW4, CWL-MW4 (dup), CWL-MW5L, CWL-MW5U, CWL-MW5U (dup), CWL-MW6U	CWL-MW6L	
Total Cyanide	CWL-BW3, CWL-BW4A, CWL-MW2BL, CWL-MW4, CWL-MW4 (dup), CWL-MW5L, CWL-MW5U, CWL-MW5U (dup), CWL-MW6U	CWL-MW6L	
Sulfides	CWL-BW3, CWL-BW4A, CWL-MW2BL, CWL-MW4, CWL-MW4 (dup), CWL-MW5L, CWL-MW5U, CWL-MW5U (dup), CWL-MW6U	CWL-MW6L	
Appendix IX Total Metals plus Iron	CWL-BW3, CWL-BW4A, CWL-MW2BL, CWL-MW2BU, CWL-MW4, CWL-MW4 (dup), CWL-MW5L, CWL-MW5U, CWL-MW5U (dup), CWL-MW6U	CWL-BW3, CWL-BW4A, CWL-MW2BL, CWL-MW2BU, CWL-MW4, CWL-MW4 (dup), CWL-MW5L, CWL-MW5U, CWL-MW6L, CWL-MW6U, CWL-MW6U (dup)	CWL-MW2BL, CWL-MW2BU, CWL-MW4, CWL-MW5L, CWL-MW5U, CWL-MW5U (dup), CWL-MW6L, CWL-MW6U
Dissolved Chromium	CWL-BW3, CWL-BW4A, CWL-MW2BL, CWL-MW4, CWL-MW4 (dup), CWL-MW5L, CWL-MW5U, CWL-MW5U (dup), CWL-MW6U	CWL-MW6L	

NOTES: Refer to page xi of this report for well descriptions. "U" and "L" denote upper and lower completions for nested wells in the same borehole.
CWL = Chemical Waste Landfill.
dup = Duplicate.
PCB = Polychlorinated biphenyl.
SVOC = Semivolatile organic compound.
VOC = Volatile organic compound.

Field and laboratory quality control (QC) samples were prepared to determine the accuracy of the methods used and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process. 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.

3.4 Field Methods and Measurements

Groundwater sampling was conducted in conformance with procedures outlined in the *Sampling and Analysis Plan [SAP] for Groundwater Assessment Monitoring at the Chemical Waste Landfill*, Appendix G, Revision 4 of the CWL Closure Plan (SNL December 1992).

A Bennett™ groundwater sampling system was used to collect groundwater samples from all wells, except small-diameter wells (2 inches or less). Wells CWL-MW2BU, 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-BW3, CWL-BW4A, CWL-MW2BU, CWL-MW5U, and CWL-MW6U, 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 were purged a minimum of three well-bore volumes prior to sampling. Wells CWL-MW5L and CWL-MW6L were purged a minimum of two tubing water volumes prior to sampling. Well CWL-MW2BU was purged to dryness and then sampled. Based on historical sampling events, CWL-MW2BU will purge dry between 0.13 and 0.66 gallons per each purging event.

Collection of field analytical measurements and groundwater samples was performed in accordance with procedures described in the CWL SAP (SNL December 1992). 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, and SC is within 1 percent or 10 microhms per centimeter (whichever is greater).

3.5 Analytical Methods

Groundwater samples collected for chemical analyses were submitted to GEL in Charleston, South Carolina. 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 March 2003). 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 between October 2007 and December 2008.

3.6 Summary of Analytical Results

The analytical results are presented in Attachment 3A, Tables 3A-1 through 3A-8. Any analytical results exceeding parameter-specific MCLs are presented graphically in Attachment 3B. Groundwater samples were collected during October and November 2007, June 2008, and October and December 2008 and submitted for VOC, SVOC, chlorinated herbicide, PCB, total cyanide, sulfide, total metal plus iron, and dissolved chromium analyses. Analytical sample results were compared with MCLs, where established.

Table 3-3. Analysis, 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 Semivolatile Organic Compounds	SW846-8270C	Amber Glass; 3 x 1L; 4°C	7 days
Appendix IX Chlorinated Herbicides	SW846-8151A	Amber Glass; 3 x 1L; 4°C	7 days
Appendix IX Polychlorinated Biphenyls	SW846-8082	Amber Glass; 3 x 1L; 4°C	7 days
Total Cyanide	SW846-9012A	Polyethylene; 500 mL; NaOH, 4°C	28 days
Sulfides	SW846-9034	Nalgene; 1L; NaOH, 4°C	28 days
Appendix IX Total metals + iron	SW846-6020/7470A	Polyethylene; 500 mL; HNO_3, 4°C	28 days/180 days[b]

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

°C = Degrees Celsius.
NaOH = Sodium Hydroxide.
HCl = Hydrochloric acid.
HNO_3 = Nitric acid.
L = Liter(s).
mL = Milliliter(s).

3.6.1 VOCs, SVOCs, Chlorinated Herbicides, and PCBs

Detected VOCs, SVOCs, chlorinated herbicides, and PCBs are presented in Attachment 3A, Table 3A-1. No VOCs, SVOCs, chlorinated herbicides, or PCBs were detected above established MCLs during the period from October 2007 through December 2008. The VOC TCE was detected below the MCL of 5 µg/L at concentrations ranging from 0.258 to 2.39 µg/L. No SVOCs were detected above laboratory method detection limits (MDLs), except bis(2-ethylhexyl)phthalate. This compound was detected below the MCL of 6 µg/L. No herbicides or PCBs were detected above laboratory MDLs. Associated laboratory MDLs are presented in Attachment 3A, Tables 3A-2 through 3A-4.

3.6.2 Total Cyanide and Sulfide

Total cyanide was not detected above the laboratory MDL in any groundwater sample. Sulfides were detected in four monitoring wells at concentrations ranging from 0.810 to 1.87 milligrams per liter (mg/L). Sulfide and total cyanide results are summarized in Attachment 3A, Table 3A-5.

3.6.3 Total Metals

As required by the NMED Hazardous Waste Bureau, all metal samples were analyzed for total metals. No metals were detected above established MCLs, except for chromium. Chromium was detected above the MCL of 0.10 mg/L in the November 2007 sample from monitoring well CWL-MW2BU at a concentration of 0.218 mg/L. Groundwater samples collected from CWL-MW2BU in June and October 2008 had reported chromium concentrations at 0.0178 and 0.0127 mg/L, respectively. Metal results are presented in Attachment 3A, Table 3A-6. Attachment 3B, Figure 3B-1, shows that chromium concentrations in well CWL-MW2BU have historically been below the MCL of 0.10 mg/L. In addition, the November 2007 chromium result correlates with an increased field turbidity measurement.

3.6.4 Dissolved Chromium

Dissolved chromium results are presented in Attachment 3A, Table 3A-7. Dissolved chromium was detected below the MCL of 0.10 mg/L in three CWL groundwater samples. Dissolved chromium was reported at concentrations ranging from 0.00190 to 0.00302 mg/L.

3.6.5 Water Quality Parameters

Attachment 3A, Table 3A-8 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. The following sections discuss each sample type.

3.7.1 Field QC Samples

Field QC samples included environmental duplicate, FB, and TB samples. The field QC samples were submitted for analysis along with the groundwater samples in accordance with QC procedures specified in the CWL SAP (SNL December 1992).

3.7.2 Duplicate Environmental Samples

Duplicate environmental samples were collected and analyzed for all parameters in order to determine the overall reproducibility of the sampling and analysis process. Each duplicate sample was collected immediately after the original environmental sample in order to reduce variability caused by time and/or sampling mechanics. During the period from October 2007 to December 2008, a total of five duplicate environmental samples were collected.

Relative percent difference (RPD) calculations for duplicate samples were performed for all analytes. The results show that sampling and analysis precision was in conformance with the CWL SAP requirements for all measured parameters except sulfides and selenium. The RPD for sulfide in the November 2007 CWL-MW4 sample was calculated at 24. The RPDs for selenium in the October 2007 CWL-MW5U sample and June 2008 samples for CWL-MW4 and CWL-MW6U were calculated at 27, 24, and 21, respectively. The RPD calculations for these parameters were estimated, as associated results were reported at concentrations below effective practical quantitation limits.

3.7.3 Field Blank Samples

A total of four FB samples were collected for VOCs 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 the sample collection point to simulate the transfer of environmental samples from the sampling system to the sample container. The FB samples were collected at CWL-MW2BL, CWL-MW5L, and CWL-MW5U. No VOCs were detected above laboratory MDLs in the FB samples, except for bromodichloromethane, bromoform, chloroform, and dibromochloromethane. No corrective action was necessary for bromodichloromethane, bromoform, or dibromochloromethane, as these compounds were not detected in associated environmental samples. Chloroform was detected at a concentration of 0.274 μg/L. Because the associated environmental sample result was detected at a concentration less than five times the blank contamination, the result for chloroform in the October 2008 CWL-MW5L sample was qualified during data validation as not detected.

3.7.4 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 VOC 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 28 TBs were submitted with the samples discussed in this report.

No VOCs were detected above laboratory MDLs in any TB sample, except for carbon disulfide, toluene, and tetrachloroethene (PCE). No corrective action was required for carbon disulfide, as this compound was not detected in the associated environmental samples. Toluene and PCE results in associated samples were qualified as not detected during data validation, as results in all samples were at concentrations less than five times the blank contamination.

3.7.5 Laboratory QC

Internal laboratory QC analyses performed included method blank, LCS, matrix spike, matrix spike duplicate, and surrogate spike analyses. 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, as estimated values, or as unusable during the data validation process, no significant data quality problems were noted for any CWL COCs, including TCE, nickel, and chromium. The results for VOCs and SVOCs including acetone, allyl chloride, bromomethane, isobutyl alcohol, naphthalene, dibenzo[a,h]anthracene, and indeno(1,2,3-cd)pyrene in October and November 2007 samples were qualified as unusable in various samples due to the initial calibration not meeting acceptance criteria. SNL/NM is currently reviewing QC procedures for both data validation and laboratory requirements. 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 not contained water. The wells had partially filled with sediment during the VE VCM and have not recovered. The BaroBall™ control valve installed on these wells could not be removed during the October and November 2007 sampling period, and SNL/NM could not verify that the wells are dry.

- In October and November 2008, monitoring well CWL-MW6L could not be sampled due to several leaks in the air line on the dedicated sampling system.

- During October and November 2007 and June 2008, CWL-BW3, CWL-BW4A, CWL-MW2BU, CWL-MW5U, and CWL-MW6U were purged to dryness, allowed to recover, and then sampled to collect the most representative groundwater sample possible given the low yield of these wells.

- Samples for Appendix IX constituents (SVOCs, chlorinated herbicides, PCBs, total cyanide, sulfides, and dissolved chromium) were not collected from well CWL-MW2BU due to insufficient water.

- CWL-MW2BU, CWL-MW5L, and CWL-MW6L were sampled using dedicated sampling systems manufactured by QED Environmental Systems, Inc.

- In June 2008, SNL/NM replaced tubing on the CWL-MW6L dedicated sampling system and collected samples for Appendix IX analyses.

- During the June 2008 sampling event, GEL did not report results for silver and tin in original data packages. Silver and tin results were submitted in revised data packages, or logged again and submitted in separate data packages. All data packages have been submitted to the SNL/NM Customer Funded Records Center.

- During October 2008, a groundwater sample could not be collected from CWL-MW6L because the air line on the dedicated sampling system ruptured. SNL/NM replaced tubing on the CWL-MW6L dedicated sampling system and collected groundwater samples in December 2008.

- In October 2008, no samples were collected from CWL-BW3 and CWL-BW4A, as neither well produced enough water to collect a representative sample. SNL/NM notified the NMED of this issue.

- In October 2008, the personnel from the NMED DOE Oversight Bureau were on site and collected sample splits at monitoring well CWL-MW4. The results for the NMED sample splits are not included in this report.

3.9 Summary and Conclusions

Groundwater samples were collected from CWL groundwater monitoring wells during October and November 2007, June 2008, and October and December 2008. The groundwater samples were analyzed for VOCs, SVOCs, chlorinated herbicides, PCBs, total cyanide, sulfides, total metals plus iron, and dissolved chromium. Analytical sample results were compared with MCLs, where established. No analytes were detected at concentrations exceeding the associated EPA MCLs, except for chromium. Chromium was detected above the MCL of 0.1 mg/L in the November 2007 CWL-MW2BU sample at a concentration of 0.218 mg/L. Groundwater samples collected from CWL-MW2BU in June and October 2008 had reported detections of chromium at concentrations of 0.0178 and 0.0127 mg/L, respectively. Historically, chromium values from CWL-MW2BU have been reported below the MCL. The November 2007 result correlates with an increased field turbidity measurement at CWL-MW2BU. The analytical results are comparable to historical values, with the exception of the chromium detections noted.

3.10 References

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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 and Semivolatile Organic Compounds, Chlorinated Herbicides, and Polychlorinated Biphenyls
Chemical Waste Landfill Groundwater Monitoring

October 2007 through December 2008

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-BW3 24-Oct-07	bis(2-Ethylhexyl)phthalate	4.97	2.00	10.0	6.00	J		085324-002	SW846 8270
CWL-BW4A	Acetone	1.37	1.25	5.00	NE	J	J-	085326-001	SW846 8260
18-Oct-07	Xylenes	0.767	0.250	1.00	10,000	J		085326-001	SW846 8260
CWL-MW2BL 16-Oct-07	Xylenes	0.604	0.250	1.00	10,000	J		085328-001	SW846 8260
CWL-MW2BU	Trichloroethene	0.648	0.250	1.00	5.00	J		085330-001	SW846 8260
07-Nov-07	Xylenes	0.477	0.250	1.00	10,000	J		085330-001	SW846 8260
CWL-MW4	Xylenes	0.666	0.250	1.00	10,000	J		085334-001	SW846 8260
05-Nov-07	bis(2-Ethylhexyl)phthalate	3.65	2.00	10.0	6.00	B, J	10.0U	085334-002	SW846 8270
CWL-MW4 (Duplicate)	Trichloroethene	0.262	0.250	1.00	5.00	J		085335-001	SW846 8260
05-Nov-07	Xylenes	0.582	0.250	1.00	10,000	J		085335-001	SW846 8260
	bis(2-Ethylhexyl)phthalate	4.03	2.15	10.8	6.00	B, J	10.8U	085335-002	SW846 8270
CWL-MW5L	Trichloroethene	0.712	0.250	1.00	5.00	J		085337-001	SW846 8260
25-Oct-07	bis(2-Ethylhexyl)phthalate	2.75	2.02	10.1	6.00	J		085337-002	SW846 8270
CWL-MW5U	Trichloroethene	1.77	0.250	1.00	5.00			085342-001	SW846 8260
30-Oct-07	Xylenes	0.633	0.250	1.00	10,000	J		085342-001	SW846 8260
CWL-MW5U (Duplicate)	Trichloroethene	1.70	0.250	1.00	5.00			085343-001	SW846 8260
30-Oct-07	Xylenes	0.610	0.250	1.00	10,000	J		085343-001	SW846 8260
CWL-MW6U	Trichloroethene	0.258	0.250	1.00	5.00	J		085348-001	SW846 8260
01-Nov-07	Xylenes	0.541	0.250	1.00	10,000	J		085348-001	SW846 8260
CWL-BW3	Toluene	0.666	0.25	1.00	1,000	J		086247-001	SW846 8260
09-Jun-08	Trichloroethene	0.719	0.25	1.00	5.00	J		086247-001	SW846 8260
CWL-BW4A	Acetone	1.60	1.25	5.00	NE	B, J	5.00U	086249-001	SW846 8260
02-Jun-08	Toluene	1.38	0.25	1.00	1,000			086249-001	SW846 8260
	Trichloroethene	0.374	0.25	1.00	5.00	J		086249-001	SW846 8260
CWL-MW2BL 10-Jun-08	Chloroform	0.271	0.25	1.00	NE	J		086251-001	SW846 8260
CWL-MW2BU 11-Jun-08	Trichloroethene	2.39	0.25	1.00	5.00			086254-001	SW846 8260
CWL-MW4	Acetone	2.14	1.25	5.00	NE	J	5.00U	086258-001	SW846 8260
17-Jun-08	Toluene	0.383	0.25	1.00	1,000	J		086258-001	SW846 8260

Refer to footnotes on page 3A-29.

Table 3A-1 *(Concluded)*
Summary of Detected Volatile and Semivolatile Organic Compounds, Chlorinated Herbicides, and Polychlorinated Biphenyls
Chemical Waste Landfill Groundwater Monitoring

October 2007 through December 2008

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-MW4 (Duplicate)	Acetone	1.56	1.25	5.00	NE	J	5.00U	086259-001	SW846 8260
17-Jun-08	Toluene	0.379	0.25	1.00	1,000	J		086259-001	SW846 8260
CWL-MW5L 05-Jun-08	Trichloroethene	0.629	0.25	1.00	5.00	J		086261-001	SW846 8260
CWL-MW5U	Acetone	2.02	1.25	5.00	NE	J		086264-001	SW846 8260
16-Jun-08	Toluene	0.645	0.250	1.00	1,000	J		086264-001	SW846 8260
	Trichloroethene	1.65	0.250	1.00	5.00			086264-001	SW846 8260
CWL-MW6U	Acetone	1.33	1.25	5.00	NE	B, J	5.00U	086270-001	SW846 8260
04-Jun-08	Toluene	0.311	0.250	1.00	1,000	J	1.00U	086270-001	SW846 8260
	Trichloroethene	0.333	0.250	1.00	5.00	J	1.00U	086270-001	SW846 8260
CWL-MW6U (Duplicate)	Toluene	0.336	0.250	1.00	1,000	J	1.00U	086271-001	SW846 8260
04-Jun-08	Trichloroethene	0.319	0.250	1.00	5.00	J	1.00U	086271-001	SW846 8260
CWL-MW2BL	Chloroform	0.401	0.250	1.00	NE	J		086835-001	SW846 8260
20-Oct-08	Tetrachloroethene	0.378	0.250	1.00	5.00	B, J	1.00U	086835-001	SW846 8260
CWL-MW2BU 30-Oct-08	Trichloroethene	1.47	0.250	1.00	5.00			086846-001	SW846 8260
CWL-MW5L	Chloroform	0.283	0.250	1.00	NE	J	1.00U	086843-001	SW846 8260
28-Oct-08	Trichloroethene	0.707	0.250	1.00	5.00	J		086843-001	SW846 8260
CWL-MW5U 24-Oct-08	Trichloroethene	1.25	0.250	1.00	5.00			086848-001	SW846 8260
CWL-MW5U (Duplicate) 24-Oct-08	Trichloroethene	1.23	0.250	1.00	5.00			086849-001	SW846 8260
CWL-MW6U	Tetrachloroethene	0.287	0.250	1.00	5.00	B, J	1.00U	086837-001	SW846 8260
22-Oct-08	Trichloroethene	0.315	0.250	1.00	5.00	J		086837-001	SW846 8260

Refer to footnotes on page 3A-29.

Table 3A-2
Method Detection Limits for Appendix IX Volatile Organic Compounds
Chemical Waste Landfill Groundwater Monitoring

October 2007 through December 2008

Analyte	MDL[b] (µg/L)	Analytical Method[g]	Analyte	MDL[b] (µg/L)	Analytical Method[g]
1,1,1,2-Tetrachloroethane	0.250 – 0.300	SW846 8260	Chloroform	0.250	SW846 8260
1,1,1-Trichloroethane	0.300 – 0.325	SW846 8260	Chloromethane	0.300 – 0.500	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	0.250 – 0.260	SW846 8260
1,1-Dichloroethane	0.300	SW846 8260	Dibromomethane	0.300	SW846 8260
1,1-Dichloroethene	0.300	SW846 8260	Dichlorodifluoromethane	0.500	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	0.500	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 – 50.0	SW846 8260
1,2-Dichloropropane	0.250	SW846 8260	Methacrylonitrile	1.00	SW846 8260
1,1,2-Trichloro-1,2,2-trifluoroethane	1.00	SW846 8260	Methyl methacrylate	1.00	SW846 8260
2-Butanone	1.25	SW846 8260	Methylene chloride	2.00 – 5.00	SW846 8260
2-Hexanone	1.25	SW846 8260	Pentachloroethane	1.00	SW846 8260
4-methyl-, 2-Pentanone	1.25	SW846 8260	Styrene	0.250	SW846 8260
Acetone	1.25 – 15.0	SW846 8260	Tetrachloroethene	0.250 – 0.450	SW846 8260
Acetonitrile	6.25	SW846 8260	Toluene	0.250	SW846 8260
Acrolein	1.25 - 3.00	SW846 8260	Trichloroethene	0.250	SW846 8260
Acrylonitrile	1.00	SW846 8260	Trichlorofluoromethane	0.310	SW846 8260
Allyl chloride	1.50 - 3.70	SW846 8260	Vinyl acetate	1.50	SW846 8260
Benzene	0.300 – 1.00	SW846 8260	Vinyl chloride	0.500	SW846 8260
Bromodichloromethane	0.250	SW846 8260	Xylene	0.250 – 0.600	SW846 8260
Bromoform	0.250	SW846 8260	bis-Chloroisopropyl ether	1.50	SW846 8260
Bromomethane	0.500	SW846 8260	cis-1,3-Dichloropropene	0.250	SW846 8260
Carbon disulfide	1.25	SW846 8260	trans-1,2-Dichloroethene	0.300	SW846 8260
Carbon tetrachloride	0.250 – 0.260	SW846 8260	trans-1,3-Dichloropropene	0.250	SW846 8260
Chlorobenzene	0.250	SW846 8260	trans-1,4-Dichloro-2-butene	1.00	SW846 8260
Chloroethane	0.300 - 0.500	SW846 8260			

Refer to footnotes on page 3A-29.

Table 3A-3
Method Detection Limits for Appendix IX Semivolatile Organic Compounds
Chemical Waste Landfill Groundwater Monitoring

October 2007 through December 2008

Analyte	MDL[b] (µg/L)	Analytical Method[g]	Analyte	MDL[b] (µg/L)	Analytical Method[g]
.alpha.,.alpha. Dimethylphenethylamine	4.00 - 4.57	SW846 8270	3-Nitroaniline	2.00 - 2.29	SW846 8270
1,2,4,5-Tetrachlorobenzene	2.00 - 2.29	SW846 8270	3-benzodioxole, 5-(2-Propenyl)-1	2.00 - 2.29	SW846 8270
1,2,4-Trichlorobenzene	2.00 - 2.29	SW846 8270	4-Aminobiphenyl	3.00 - 3.43	SW846 8270
1,2-Dichlorobenzene	2.00 - 2.29	SW846 8270	4-Bromophenyl phenyl ether	2.00 - 2.29	SW846 8270
1,2-Diphenylhydrazine	2.00 - 2.29	SW846 8270	4-Chloro-3-methylphenol	2.00 - 2.29	SW846 8270
1,3,5-Trinitrobenzene	2.00 - 2.29	SW846 8270	4-Chlorobenzenamine	2.00 - 2.29	SW846 8270
1,3-Dichlorobenzene	2.00 - 2.29	SW846 8270	4-Chlorophenyl phenyl ether	2.00 - 2.29	SW846 8270
1,3-Dinitrobenzene	2.00 - 2.29	SW846 8270	4-Dimethylaminoazobenzene	2.00 - 2.29	SW846 8270
1,4-Dichlorobenzene	2.00 - 2.29	SW846 8270	4-Nitroaniline	3.00 - 3.43	SW846 8270
1,4-Dioxane	1.00 - 1.14	SW846 8270	4-Nitrophenol	2.00 - 2.29	SW846 8270
1,4-Naphthoquinone	2.00 - 2.29	SW846 8270	4-Nitroquinoline-1-oxide	3.00 - 3.43	SW846 8270
1-Methylnaphthalene	0.300 - 0.343	SW846 8270	5-Nitro-o-toluidine	2.00 - 2.29	SW846 8270
1-Naphthylamine	2.00 - 2.29	SW846 8270	7,12-Dimethylbenz(a)anthracene	2.00 - 2.29	SW846 8270
2,3,4,6-Tetrachlorophenol	2.00 - 2.29	SW846 8270	Acenaphthene	0.310 - 0.354	SW846 8270
2,4,5-Trichlorophenol	1.00 - 1.14	SW846 8270	Acenaphthylene	0.200 - 0.229	SW846 8270
2,4,6-Trichlorophenol	2.00 - 2.29	SW846 8270	Acetophenone	2.00 - 2.29	SW846 8270
2,4-Dichlorophenol	2.00 - 2.29	SW846 8270	Aniline	2.50 - 2.86	SW846 8270
2,4-Dimethylphenol	2.00 - 2.29	SW846 8270	Anthracene	0.200 - 0.229	SW846 8270
2,4-Dinitrophenol	10.0 - 11.4	SW846 8270	Aramite	3.00 - 3.43	SW846 8270
2,4-Dinitrotoluene	2.00 - 2.29	SW846 8270	Benzidine	2.00 - 2.29	SW846 8270
2,6-Dichlorophenol	2.00 - 2.29	SW846 8270	Benzo(a)anthracene	0.200 - 0.229	SW846 8270
2,6-Dinitrotoluene	2.00 - 2.29	SW846 8270	Benzo(a)pyrene	0.200 - 0.229	SW846 8270
2-Acetylaminofluorene	2.00 - 2.29	SW846 8270	Benzo(b)fluoranthene	0.200 - 0.229	SW846 8270
2-Chloronaphthalene	0.350 - 0.400	SW846 8270	Benzo(ghi)perylene	0.200 - 0.229	SW846 8270
2-Chlorophenol	2.00 - 2.29	SW846 8270	Benzo(k)fluoranthene	0.200 - 0.229	SW846 8270
2-Methylnaphthalene	0.300 - 0.343	SW846 8270	Benzoic acid	6.00 - 6.86	SW846 8270
2-Methylpyridine	2.00 - 2.29	SW846 8270	Benzyl alcohol	2.00 - 2.29	SW846 8270
2-Naphthalenamine	2.00 - 2.29	SW846 8270	Butylbenzyl phthalate	2.00 - 2.29	SW846 8270
2-Nitroaniline	2.00 - 2.29	SW846 8270	Carbazole	0.200 - 0.229	SW846 8270
2-Nitrophenol	2.00 - 2.29	SW846 8270	Chlorobenzilate	2.00 - 2.29	SW846 8270
3,3'-Dichlorobenzidine	1.00 - 1.14	SW846 8270	Chrysene	0.200 - 0.229	SW846 8270
3,3'-Dimethylbenzidine	2.00 - 2.29	SW846 8270	Di-n-butyl phthalate	2.00 - 2.29	SW846 8270
3-Methylcholanthrene	2.00 - 2.29	SW846 8270	Di-n-octyl phthalate	3.00 - 3.43	SW846 8270

Refer to footnotes on page 3A-29.

Table 3A-3 *(Concluded)*
Method Detection Limits for Appendix IX Semivolatile Organic Compounds
Chemical Waste Landfill Groundwater Monitoring

October 2007 through December 2008

Analyte	MDL[b] (µg/L)	Analytical Method[g]
Diallate	2.00 - 2.29	SW846 8270
Dibenz[a,h]anthracene	0.200 - 0.229	SW846 8270
Dibenzofuran	2.00 - 2.29	SW846 8270
Diethylphthalate	2.00 - 2.29	SW846 8270
Dimethoate	2.00 - 2.29	SW846 8270
Dimethylphthalate	2.00 - 2.29	SW846 8270
Dinitro-o-cresol	3.00 - 3.43	SW846 8270
Dinoseb	2.00 - 2.29	SW846 8270
Diphenyl amine	3.00 - 3.43	SW846 8270
Disulfoton	2.00 - 2.29	SW846 8270
Ethyl methacrylate	2.00 - 2.29	SW846 8270
Ethyl methanesulfonate	2.00 - 2.29	SW846 8270
Famphur	2.00 - 2.29	SW846 8270
Fluoranthene	0.200 - 0.229	SW846 8270
Fluorene	0.200 - 0.229	SW846 8270
Hexachlorobenzene	2.00 - 2.29	SW846 8270
Hexachlorobutadiene	2.00 - 2.29	SW846 8270
Hexachlorocyclopentadiene	2.00 - 2.29	SW846 8270
Hexachloroethane	2.00 - 2.29	SW846 8270
Hexachlorophene	200 - 229	SW846 8270
Hexachloropropene	2.00 - 2.29	SW846 8270
Indeno(1,2,3-c,d)pyrene	0.200 - 0.229	SW846 8270
Isodrin	2.00 - 2.29	SW846 8270
Isophorone	2.00 - 2.29	SW846 8270
Isosafrole	2.00 - 2.29	SW846 8270
Kepone	2.00 - 2.29	SW846 8270
Methapyrilene	2.00 - 2.29	SW846 8270
Methoxychlor	2.00 - 2.29	SW846 8270
Methyl methacrylate	2.00 - 2.29	SW846 8270
Methyl methanesulfonate	2.00 - 2.29	SW846 8270
Methyl parathion	2.00 - 2.29	SW846 8270
Naphthalene	0.300 - 0.343	SW846 8270
Nitro-benzene	3.00 - 3.43	SW846 8270
O,O,O-Triethylphosphorothioate	2.00 - 2.29	SW846 8270
Parathion	3.00 - 3.43	SW846 8270
Pentachlorobenzene	2.00 - 2.29	SW846 8270
Pentachloroethane	2.00 - 2.29	SW846 8270
Pentachloronitrobenzene	2.00 - 2.29	SW846 8270
Pentachlorophenol	2.00 - 2.29	SW846 8270
Phenacetin	2.00 - 2.29	SW846 8270
Phenanthrene	0.200 - 0.229	SW846 8270
Phenol	1.00 - 1.14	SW846 8270
Phorate	2.00 - 2.29	SW846 8270
Pronamide	2.00 - 2.29	SW846 8270
Pyrene	0.300 - 0.343	SW846 8270
Pyridine	1.00 - 1.14	SW846 8270
Sulfotepp	2.00 - 2.29	SW846 8270
Thionazin	2.00 - 2.29	SW846 8270
Tributylphosphate	2.00 - 2.29	SW846 8270
bis(2-Chloroethoxy)methane	3.00 - 3.43	SW846 8270
bis(2-Chloroethyl)ether	2.00 - 2.29	SW846 8270
bis(2-Ethylhexyl)phthalate	2.00 - 2.29	SW846 8270
bis-Chloroisopropyl ether	2.00 - 2.29	SW846 8270
m,p-Cresol	3.00 - 3.43	SW846 8270
n-Nitroso-di-n-butylamine	2.00 - 2.29	SW846 8270
n-Nitrosodiethylamine	2.00 - 2.29	SW846 8270
n-Nitrosodimethylamine	2.00 - 2.29	SW846 8270
n-Nitrosodipropylamine	2.00 - 2.29	SW846 8270
n-Nitrosomethylethylamine	2.00 - 2.29	SW846 8270
n-Nitrosomorpholine	2.00 - 2.29	SW846 8270
n-Nitrosopiperidine	2.00 - 2.29	SW846 8270
n-Nitrosopyrrolidine	2.00 - 2.29	SW846 8270
o-Cresol	2.00 - 2.29	SW846 8270
o-Toluidine	2.00 - 2.29	SW846 8270
para-Phenylenediamine	2.00 - 2.29	SW846 8270

Refer to footnotes on page 3A-29.

Table 3A-4
Method Detection Limits for Chlorinated Herbicides and Polychlorinated Biphenyls
Chemical Waste Landfill Groundwater Monitoring

October 2007 through December 2008

Analyte	MDL[b] (μg/L)	Analytical Method[g]
2,4,5-T	0.0838 – 0.104	SW846-8151A
2,4,5-TP	0.0838 – 0.104	SW846-8151A
2,4-D	0.0838 – 0.104	SW846-8151A
Aroclor 1016	0.0340 – 0.0416	SW846-8082
Aroclor 1221	0.0340 – 0.0416	SW846-8082
Aroclor 1232	0.0340 – 0.0416	SW846-8082
Aroclor 1242	0.0340 – 0.0416	SW846-8082
Aroclor 1248	0.0340 – 0.0416	SW846-8082
Aroclor 1254	0.0340 – 0.0416	SW846-8082
Aroclor 1260	0.0340 – 0.0416	SW846-8082

Refer to footnotes on page 3A-29.

Table 3A-5
Summary of Sulfide and Total Cyanide Results
Chemical Waste Landfill Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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-BW3	Sulfides	ND	0.670	2.50	NE	U		085324-029	SW846 9034
24-Oct-07	Total Cyanide	ND	0.0015	0.005	0.200	B, U	UJ	085324-027	SW846 9012
CWL-BW4A	Sulfides	1.01	0.670	2.50	NE	J		085326-029	SW846 9034
18-Oct-07	Total Cyanide	ND	0.0015	0.005	0.200	U	UJ	085326-027	SW846 9012
CWL-MW2BL	Sulfides	0.810	0.670	2.50	NE	J	J-	085328-029	SW846 9034
16-Oct-07	Total Cyanide	ND	0.0015	0.005	0.200	U	UJ	085328-027	SW846 9012
CWL-MW4	Sulfides	1.87	0.670	2.50	NE	J		085334-029	SW846 9034
05-Nov-07	Total Cyanide	ND	0.005	0.005	0.200	U		085334-027	SW846 9012
CWL-MW4 (Duplicate)	Sulfides	1.47	0.670	2.50	NE	J		085335-029	SW846 9034
05-Nov-07	Total Cyanide	ND	0.005	0.005	0.200	U		085335-027	SW846 9012
CWL-MW5L	Sulfides	ND	0.670	2.50	NE	U		085337-029	SW846 9034
25-Oct-07	Total Cyanide	ND	0.0015	0.005	0.200	B, U	UJ	085337-027	SW846 9012
CWL-MW5U	Sulfides	ND	0.670	2.50	NE	U		085342-029	SW846 9034
30-Oct-07	Total Cyanide	ND	0.0015	0.005	0.200	U	UJ	085342-027	SW846 9012
CWL-MW5U (Duplicate)	Sulfides	ND	0.670	2.50	NE	U		085343-029	SW846 9034
30-Oct-07	Total Cyanide	ND	0.0015	0.005	0.200	U	UJ	085343-027	SW846 9012
CWL-MW6L	Sulfides	0.868	0.670	2.50	NE	J		086266-029	SW846 9034
12-Jun-08	Total Cyanide	ND	0.0015	0.005	0.200	U		086266-027	SW846 9012
CWL-MW6U	Sulfides	ND	0.670	2.50	NE	U		085348-029	SW846 9034
01-Nov-07	Total Cyanide	ND	0.005	0.005	0.200	U		085348-027	SW846 9012

Refer to footnotes on page 3A-29.

Table 3A-6
Summary of Total Metal Results
Chemical Waste Landfill Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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-BW3	Antimony	ND	0.0005	0.002	0.006	U		085324-010	SW846 6020
24-Oct-07	Arsenic	ND	0.0015	0.005	0.010	U		085324-010	SW846 6020
	Barium	0.0487	0.0005	0.002	2.00			085324-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		085324-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		085324-010	SW846 6020
	Chromium	0.0605	0.001	0.003	0.100			085324-010	SW846 6020
	Cobalt	0.00063	0.0001	0.001	NE	J		085324-010	SW846 6020
	Copper	0.00336	0.0002	0.001	NE			085324-010	SW846 6020
	Iron	0.825	0.010	0.025	NE			085324-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		085324-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U		085324-010	SW846 7470
	Nickel	0.0610	0.0005	0.002	NE			085324-010	SW846 6020
	Selenium	0.00157	0.001	0.005	0.050	J		085324-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		085324-010	SW846 6020
	Thallium	0.000378	0.0003	0.001	0.002	J		085324-010	SW846 6020
	Tin	0.00123	0.001	0.005	NE	B, J	0.033U	085324-010	SW846 6020
	Vanadium	0.0128	0.003	0.010	NE			085324-010	SW846 6020
	Zinc	0.0103	0.0026	0.010	NE			085324-010	SW846 6020
CWL-BW4A	Antimony	ND	0.0005	0.002	0.006	U		085326-010	SW846 6020
18-Oct-07	Arsenic	ND	0.0015	0.005	0.010	U		085326-010	SW846 6020
	Barium	0.0538	0.0005	0.002	2.00			085326-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		085326-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		085326-010	SW846 6020
	Chromium	0.00288	0.001	0.003	0.100	B, J	0.0051U	085326-010	SW846 6020
	Cobalt	0.000344	0.0001	0.001	NE	J		085326-010	SW846 6020
	Copper	0.00175	0.0002	0.001	NE			085326-010	SW846 6020
	Iron	0.643	0.010	0.025	NE	B		085326-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		085326-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	085326-010	SW846 7470
	Nickel	0.00402	0.0005	0.002	NE			085326-010	SW846 6020
	Selenium	0.00113	0.001	0.005	0.050	J		085326-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		085326-010	SW846 6020
	Thallium	0.000317	0.0003	0.001	0.002	J		085326-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		085326-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		085326-010	SW846 6020
	Zinc	0.00975	0.0026	0.010	NE	J		085326-010	SW846 6020

Refer to footnotes on page 3A-29.

Table 3A-6
Summary of Total Metal Results
Chemical Waste Landfill Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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	Antimony	ND	0.0005	0.002	0.006	B, U		085328-010	SW846 6020
16-Oct-07	Arsenic	ND	0.0015	0.005	0.010	U		085328-010	SW846 6020
	Barium	0.0627	0.0005	0.002	2.00			085328-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		085328-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		085328-010	SW846 6020
	Chromium	ND	0.001	0.003	0.100	U		085328-010	SW846 6020
	Cobalt	0.000354	0.0001	0.001	NE	J		085328-010	SW846 6020
	Copper	0.000985	0.0002	0.001	NE	J		085328-010	SW846 6020
	Iron	0.480	0.010	0.025	NE			085328-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		085328-010	SW846 6020
	Mercury	0.000035	0.00003	0.0002	0.002	J	NJ-	085328-010	SW846 7470
	Nickel	0.00323	0.0005	0.002	NE			085328-010	SW846 6020
	Selenium	0.00165	0.001	0.005	0.050	J		085328-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		085328-010	SW846 6020
	Thallium	0.00054	0.0003	0.001	0.002	J		085328-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		085328-010	SW846 6020
	Vanadium	0.00511	0.003	0.010	NE	J		085328-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		085328-010	SW846 6020
CWL-MW2BU	Antimony	0.000903	0.0005	0.002	0.006	J	0.005UJ	085330-010	SW846 6020
07-Nov-07	Arsenic	0.00971	0.0015	0.005	0.010	B	0.013U	085330-010	SW846 6020
	Barium	0.433	0.0005	0.002	2.00			085330-010	SW846 6020
	Beryllium	0.00275	0.0001	0.0005	0.004			085330-010	SW846 6020
	Cadmium	0.000552	0.00011	0.001	0.005	B, J	0.00062U	085330-010	SW846 6020
	Chromium	**0.218**	0.001	0.003	0.100			085330-010	SW846 6020
	Cobalt	0.0067	0.0001	0.001	NE			085330-010	SW846 6020
	Copper	0.0474	0.0002	0.001	NE	B		085330-010	SW846 6020
	Iron	20.8	0.010	0.025	NE			085330-010	SW846 6020
	Lead	0.0525	0.0005	0.002	NE			085330-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	085330-010	SW846 7470
	Nickel	0.170	0.0025	0.010	NE			085330-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		085330-010	SW846 6020
	Silver	0.0125	0.0002	0.001	NE			085330-010	SW846 6020
	Thallium	0.000869	0.0003	0.001	0.002	J	0.003U	085330-010	SW846 6020
	Tin	0.0224	0.001	0.005	NE			085330-010	SW846 6020
	Vanadium	0.0199	0.003	0.010	NE			085330-010	SW846 6020
	Zinc	0.454	0.0026	0.010	NE	B		085330-010	SW846 6020

Refer to footnotes on page 3A-29.

Table 3A-6
Summary of Total Metal Results
Chemical Waste Landfill Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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	Antimony	ND	0.0005	0.002	0.006	B, U		085334-010	SW846 6020
05-Nov-07	Arsenic	ND	0.0015	0.005	0.010	B, U		085334-010	SW846 6020
	Barium	0.0593	0.0005	0.002	2.00			085334-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		085334-010	SW846 6020
	Cadmium	0.000315	0.00011	0.001	0.005	J		085334-010	SW846 6020
	Chromium	0.00783	0.001	0.003	0.100			085334-010	SW846 6020
	Cobalt	0.00282	0.0001	0.001	NE			085334-010	SW846 6020
	Copper	0.0018	0.0002	0.001	NE			085334-010	SW846 6020
	Iron	0.559	0.010	0.025	NE			085334-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		085334-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	085334-010	SW846 7470
	Nickel	0.210	0.0005	0.002	NE			085334-010	SW846 6020
	Selenium	0.0014	0.001	0.005	0.050	J		085334-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		085334-010	SW846 6020
	Thallium	0.000647	0.0003	0.001	0.002	J	0.0027U	085334-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		085334-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		085334-010	SW846 6020
	Zinc	0.00356	0.0026	0.010	NE	J		085334-010	SW846 6020
CWL-MW4 (Duplicate)	Antimony	ND	0.0005	0.002	0.006	B, U		085335-010	SW846 6020
05-Nov-07	Arsenic	ND	0.0015	0.005	0.010	B, U		085335-010	SW846 6020
	Barium	0.0599	0.0005	0.002	2.00			085335-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		085335-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		085335-010	SW846 6020
	Chromium	0.00764	0.001	0.003	0.100			085335-010	SW846 6020
	Cobalt	0.00285	0.0001	0.001	NE			085335-010	SW846 6020
	Copper	0.00194	0.0002	0.001	NE			085335-010	SW846 6020
	Iron	0.632	0.010	0.025	NE			085335-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		085335-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	085335-010	SW846 7470
	Nickel	0.212	0.0005	0.002	NE			085335-010	SW846 6020
	Selenium	0.00126	0.001	0.005	0.050	J		085335-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		085335-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		085335-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		085335-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		085335-010	SW846 6020
	Zinc	0.00383	0.0026	0.010	NE	J		085335-010	SW846 6020

Refer to footnotes on page 3A-29.

Table 3A-6
Summary of Total Metal Results
Chemical Waste Landfill Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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	0.002	0.006	U		085337-010	SW846 6020
25-Oct-07	Arsenic	ND	0.0015	0.005	0.010	U		085337-010	SW846 6020
	Barium	0.0600	0.0005	0.002	2.00			085337-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		085337-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		085337-010	SW846 6020
	Chromium	ND	0.001	0.003	0.100	U		085337-010	SW846 6020
	Cobalt	0.000289	0.0001	0.001	NE	J		085337-010	SW846 6020
	Copper	0.000995	0.0002	0.001	NE	J		085337-010	SW846 6020
	Iron	0.510	0.010	0.025	NE			085337-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		085337-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U		085337-010	SW846 7470
	Nickel	0.00221	0.0005	0.002	NE			085337-010	SW846 6020
	Selenium	0.00204	0.001	0.005	0.050	J		085337-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		085337-010	SW846 6020
	Thallium	0.000363	0.0003	0.001	0.002	J		085337-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		085337-010	SW846 6020
	Vanadium	0.00379	0.003	0.010	NE	J		085337-010	SW846 6020
	Zinc	0.00346	0.0026	0.010	NE	J		085337-010	SW846 6020
CWL-MW5U	Antimony	ND	0.0005	0.002	0.006	U		085342-010	SW846 6020
30-Oct-07	Arsenic	ND	0.0015	0.005	0.010	U		085342-010	SW846 6020
	Barium	0.0680	0.0005	0.002	2.00			085342-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		085342-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		085342-010	SW846 6020
	Chromium	0.00258	0.001	0.003	0.100	B, J	0.012U	085342-010	SW846 6020
	Cobalt	0.00025	0.0001	0.001	NE	J		085342-010	SW846 6020
	Copper	0.00178	0.0002	0.001	NE			085342-010	SW846 6020
	Iron	0.296	0.010	0.025	NE			085342-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		085342-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U		085342-010	SW846 7470
	Nickel	0.00295	0.0005	0.002	NE			085342-010	SW846 6020
	Selenium	0.00133	0.001	0.005	0.050	J		085342-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		085342-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		085342-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		085342-010	SW846 6020
	Vanadium	0.00522	0.003	0.010	NE	B, J	0.018U	085342-010	SW846 6020
	Zinc	0.0551	0.0026	0.010	NE			085342-010	SW846 6020

Refer to footnotes on page 3A-29.

Table 3A-6
Summary of Total Metal Results
Chemical Waste Landfill Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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)	Antimony	ND	0.0005	0.002	0.006	U		085343-010	SW846 6020
30-Oct-07	Arsenic	0.00202	0.0015	0.005	0.010	J		085343-010	SW846 6020
	Barium	0.0700	0.0005	0.002	2.00			085343-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		085343-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		085343-010	SW846 6020
	Chromium	0.00215	0.001	0.003	0.100	B, J	0.012U	085343-010	SW846 6020
	Cobalt	0.00025	0.0001	0.001	NE	J		085343-010	SW846 6020
	Copper	0.00171	0.0002	0.001	NE			085343-010	SW846 6020
	Iron	0.348	0.010	0.025	NE			085343-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		085343-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U		085343-010	SW846 7470
	Nickel	0.00279	0.0005	0.002	NE			085343-010	SW846 6020
	Selenium	0.00101	0.001	0.005	0.050	J		085343-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		085343-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		085343-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		085343-010	SW846 6020
	Vanadium	0.00534	0.003	0.010	NE	B, J	0.018U	085343-010	SW846 6020
	Zinc	0.0534	0.0026	0.010	NE			085343-010	SW846 6020
CWL-MW6U	Antimony	ND	0.0005	0.002	0.006	U		085348-010	SW846 6020
01-Nov-07	Arsenic	ND	0.0015	0.005	0.010	U		085348-010	SW846 6020
	Barium	0.0692	0.0005	0.002	2.00			085348-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		085348-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		085348-010	SW846 6020
	Chromium	0.00367	0.001	0.003	0.100			085348-010	SW846 6020
	Cobalt	0.000254	0.0001	0.001	NE	J		085348-010	SW846 6020
	Copper	0.00197	0.0002	0.001	NE			085348-010	SW846 6020
	Iron	0.372	0.010	0.025	NE			085348-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		085348-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	085348-010	SW846 7470
	Nickel	0.00312	0.0005	0.002	NE			085348-010	SW846 6020
	Selenium	0.00164	0.001	0.005	0.050	J		085348-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		085348-010	SW846 6020
	Thallium	0.000491	0.0003	0.001	0.002	J		085348-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		085348-010	SW846 6020
	Vanadium	0.00439	0.003	0.010	NE	J		085348-010	SW846 6020
	Zinc	0.0185	0.0026	0.010	NE			085348-010	SW846 6020

Refer to footnotes on page 3A-29.

Table 3A-6
Summary of Total Metal Results
Chemical Waste Landfill Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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-BW3	Antimony	ND	0.0005	0.002	0.006	U		086247-010	SW846 6020
09-Jun-08	Arsenic	ND	0.0015	0.005	0.010	U		086247-010	SW846 6020
	Barium	0.0481	0.0005	0.002	2.00			086247-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	B, U		086247-010	SW846 6020
	Cadmium	0.000928	0.00011	0.001	0.005	J		086247-010	SW846 6020
	Chromium	0.0131	0.0025	0.010	0.100			086247-010	SW846 6020
	Cobalt	0.000362	0.0001	0.001	NE	B, J	0.00055U	086247-010	SW846 6020
	Copper	0.00175	0.0003	0.001	NE			086247-010	SW846 6020
	Iron	0.565	0.010	0.025	NE			086247-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086247-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086247-010	SW846 7470
	Nickel	0.0445	0.0005	0.002	NE			086247-010	SW846 6020
	Selenium	0.00153	0.001	0.005	0.050	J		086247-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086247-R10	SW846 6020
	Thallium	0.000331	0.0003	0.001	0.002	J		086247-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		086247-R10	SW846 6020
	Vanadium	0.0038	0.003	0.010	NE	J		086247-010	SW846 6020
	Zinc	0.00954	0.0026	0.010	NE	J		086247-010	SW846 6020
CWL-BW4A	Antimony	0.00154	0.0005	0.002	0.006	B, J	0.004U	086249-010	SW846 6020
02-Jun-08	Arsenic	ND	0.0015	0.005	0.010	B, U		086249-010	SW846 6020
	Barium	0.0543	0.0005	0.002	2.00			086249-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086249-010	SW846 6020
	Cadmium	0.000373	0.00011	0.001	0.005	J	J+	086249-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		086249-010	SW846 6020
	Cobalt	0.000665	0.0001	0.001	NE	J	J+	086249-010	SW846 6020
	Copper	0.00206	0.0003	0.001	NE		J+	086249-010	SW846 6020
	Iron	1.06	0.010	0.025	NE			086249-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086249-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086249-010	SW846 7470
	Nickel	0.00398	0.0005	0.002	NE		J+	086249-010	SW846 6020
	Selenium	0.00112	0.001	0.005	0.050	J	J-	086249-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086249-010	SW846 6020
	Thallium	0.000574	0.0003	0.001	0.002	J	0.0017U	086249-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		086249-R10	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086249-010	SW846 6020
	Zinc	0.0145	0.0026	0.010	NE		J+	086249-010	SW846 6020

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Table 3A-6
Summary of Total Metal Results
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October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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	Antimony	ND	0.0005	0.002	0.006	U		086251-010	SW846 6020
10-Jun-08	Arsenic	ND	0.0015	0.005	0.010	U		086251-010	SW846 6020
	Barium	0.0559	0.0005	0.002	2.00			086251-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086251-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086251-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		086251-010	SW846 6020
	Cobalt	0.00017	0.0001	0.001	NE	J		086251-010	SW846 6020
	Copper	0.0016	0.0003	0.001	NE			086251-010	SW846 6020
	Iron	0.358	0.010	0.025	NE			086251-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086251-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086251-010	SW846 7470
	Nickel	0.00185	0.0005	0.002	NE	J		086251-010	SW846 6020
	Selenium	0.0013	0.001	0.005	0.050	J		086251-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086251-R10	SW846 6020
	Thallium	0.000502	0.0003	0.001	0.002	J		086251-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		086251-R10	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086251-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		086251-010	SW846 6020
CWL-MW2BU	Antimony	0.000653	0.0005	0.002	0.006	J	0.0044U	086254-010	SW846 6020
11-Jun-08	Arsenic	ND	0.0015	0.005	0.010	U		086254-010	SW846 6020
	Barium	0.0776	0.0005	0.002	2.00			086254-010	SW846 6020
	Beryllium	0.000171	0.0001	0.0005	0.004	J		086254-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086254-010	SW846 6020
	Chromium	0.0178	0.0025	0.010	0.100			086254-010	SW846 6020
	Cobalt	0.000634	0.0001	0.001	NE	J		086254-010	SW846 6020
	Copper	0.00381	0.0003	0.001	NE			086254-010	SW846 6020
	Iron	1.79	0.010	0.025	NE			086254-010	SW846 6020
	Lead	0.00296	0.0005	0.002	NE			086254-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086254-010	SW846 7470
	Nickel	0.129	0.001	0.004	NE			086254-010	SW846 6020
	Selenium	0.00173	0.001	0.005	0.050	J		086254-010	SW846 6020
	Silver	0.00136	0.0002	0.001	NE			086254-R10	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086254-010	SW846 6020
	Tin	0.00179	0.001	0.005	NE	J		086254-R10	SW846 6020
	Vanadium	0.00874	0.003	0.010	NE	J		086254-010	SW846 6020
	Zinc	0.0284	0.0026	0.010	NE			086254-010	SW846 6020

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Table 3A-6
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]
CWL-MW4	Antimony	ND	0.0005	0.002	0.006	B, U		086258-010	SW846 6020
17-Jun-08	Arsenic	0.00167	0.0015	0.005	0.010	B, J	0.013U	086258-010	SW846 6020
	Barium	0.0595	0.0005	0.002	2.00			086258-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086258-010	SW846 6020
	Cadmium	0.000146	0.00011	0.001	0.005	J	J+	086258-010	SW846 6020
	Chromium	0.00733	0.0025	0.010	0.100	B, J	0.023U	086258-010	SW846 6020
	Cobalt	0.00263	0.0001	0.001	NE	B	J+	086258-010	SW846 6020
	Copper	0.00151	0.0003	0.001	NE		J+	086258-010	SW846 6020
	Iron	0.860	0.010	0.025	NE			086258-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086258-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086258-010	SW846 7470
	Nickel	0.221	0.0005	0.002	NE			086258-010	SW846 6020
	Selenium	0.00178	0.001	0.005	0.050	J		086258-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086258-010	SW846 6020
	Thallium	0.000482	0.0003	0.001	0.002	J		086258-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		086258-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086258-010	SW846 6020
	Zinc	0.00295	0.0026	0.010	NE	J	J+	086258-010	SW846 6020
CWL-MW4 (Duplicate)	Antimony	ND	0.0005	0.002	0.006	B, U		086259-010	SW846 6020
17-Jun-08	Arsenic	0.00516	0.0015	0.005	0.010	B	0.013U	086259-010	SW846 6020
	Barium	0.0605	0.0005	0.002	2.00			086259-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086259-010	SW846 6020
	Cadmium	0.000143	0.00011	0.001	0.005	J	J+	086259-010	SW846 6020
	Chromium	0.00695	0.0025	0.010	0.100	B, J	0.023U	086259-010	SW846 6020
	Cobalt	0.00271	0.0001	0.001	NE	B	J+	086259-010	SW846 6020
	Copper	0.00149	0.0003	0.001	NE		0.0015U	086259-010	SW846 6020
	Iron	0.815	0.010	0.025	NE			086259-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086259-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086259-010	SW846 7470
	Nickel	0.211	0.0005	0.002	NE			086259-010	SW846 6020
	Selenium	0.0014	0.001	0.005	0.050	J		086259-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086259-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086259-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		086259-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086259-010	SW846 6020
	Zinc	0.00302	0.0026	0.010	NE	J	J+	086259-010	SW846 6020

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Table 3A-6
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]
CWL-MW5L	Antimony	ND	0.0005	0.002	0.006	U		086261-010	SW846 6020
05-Jun-08	Arsenic	ND	0.0015	0.005	0.010	U		086261-010	SW846 6020
	Barium	0.0594	0.0005	0.002	2.00			086261-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086261-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086261-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		086261-010	SW846 6020
	Cobalt	0.000537	0.0001	0.001	NE	J	J+	086261-010	SW846 6020
	Copper	0.00163	0.0003	0.001	NE		J+	086261-010	SW846 6020
	Iron	1.02	0.010	0.025	NE			086261-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086261-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086261-010	SW846 7470
	Nickel	0.00286	0.0005	0.002	NE		J+	086261-010	SW846 6020
	Selenium	0.00233	0.001	0.005	0.050	J	J-	086261-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086261-R10	SW846 6020
	Thallium	0.000353	0.0003	0.001	0.002	J		086261-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		086261-R10	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086261-010	SW846 6020
	Zinc	0.00403	0.0026	0.010	NE	B, J	0.013U	086261-010	SW846 6020
CWL-MW5U	Antimony	0.00107	0.0005	0.002	0.006	B, J	0.011U	086264-010	SW846 6020
16-Jun-08	Arsenic	0.00435	0.0015	0.005	0.010	B, J	0.017U	086264-010	SW846 6020
	Barium	0.0745	0.0005	0.002	2.00			086264-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086264-010	SW846 6020
	Cadmium	0.000749	0.00011	0.001	0.005	J	J+	086264-010	SW846 6020
	Chromium	0.00492	0.0025	0.010	0.100	B, J	0.020U	086264-010	SW846 6020
	Cobalt	0.000216	0.0001	0.001	NE	J	J+	086264-010	SW846 6020
	Copper	0.00776	0.0003	0.001	NE		J+	086264-010	SW846 6020
	Iron	0.409	0.010	0.025	NE			086264-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086264-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086264-010	SW846 7470
	Nickel	0.0025	0.0005	0.002	NE		J+	086264-010	SW846 6020
	Selenium	0.00157	0.001	0.005	0.050	J		086264-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086264-010	SW846 6020
	Thallium	0.000462	0.0003	0.001	0.002	J		086264-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		086264-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086264-010	SW846 6020
	Zinc	0.0472	0.0026	0.010	NE		J+	086264-010	SW846 6020

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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]
CWL-MW6L	Antimony	ND	0.0005	0.002	0.006	U		086266-010	SW846 6020
12-Jun-08	Arsenic	0.00156	0.0015	0.005	0.010	J		086266-010	SW846 6020
	Barium	0.0947	0.0005	0.002	2.00			086266-010	SW846 6020
	Beryllium	0.000219	0.0001	0.0005	0.004	J		086266-010	SW846 6020
	Cadmium	0.000229	0.00011	0.001	0.005	J		086266-010	SW846 6020
	Chromium	0.0361	0.0025	0.010	0.100			086266-010	SW846 6020
	Cobalt	0.00155	0.0001	0.001	NE			086266-010	SW846 6020
	Copper	0.00519	0.0003	0.001	NE	B		086266-010	SW846 6020
	Iron	5.04	0.010	0.025	NE		J-	086266-010	SW846 6020
	Lead	0.00344	0.0005	0.002	NE			086266-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086266-010	SW846 7470
	Nickel	0.0160	0.0005	0.002	NE			086266-010	SW846 6020
	Selenium	0.00126	0.001	0.005	0.050	J		086266-010	SW846 6020
	Silver	0.00056	0.0002	0.001	NE	J		086266-R10	SW846 6020
	Thallium	0.000492	0.0003	0.001	0.002	J		086266-010	SW846 6020
	Tin	0.00104	0.001	0.005	NE	J		086266-R10	SW846 6020
	Vanadium	0.0178	0.003	0.010	NE			086266-010	SW846 6020
	Zinc	0.0200	0.0026	0.010	NE			086266-010	SW846 6020
CWL-MW6U	Antimony	ND	0.0005	0.002	0.006	B, U		086270-010	SW846 6020
04-Jun-08	Arsenic	ND	0.0015	0.005	0.010	B, U		086270-010	SW846 6020
	Barium	0.0659	0.0005	0.002	2.00			086270-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086270-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086270-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		086270-010	SW846 6020
	Cobalt	0.000626	0.0001	0.001	NE	J	J+	086270-010	SW846 6020
	Copper	0.00263	0.0003	0.001	NE		J+	086270-010	SW846 6020
	Iron	0.831	0.010	0.025	NE			086270-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086270-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086270-010	SW846 7470
	Nickel	0.0033	0.0005	0.002	NE		J+	086270-010	SW846 6020
	Selenium	0.00167	0.001	0.005	0.050	J	J-	086270-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086270-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086270-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		086270-R10	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086270-010	SW846 6020
	Zinc	0.00673	0.0026	0.010	NE	J	J+	086270-010	SW846 6020

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CWL-MW6U (Duplicate)	Antimony	ND	0.0005	0.002	0.006	B, U		086271-010	SW846 6020
04-Jun-08	Arsenic	ND	0.0015	0.005	0.010	B, U		086271-010	SW846 6020
	Barium	0.0693	0.0005	0.002	2.00			086271-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086271-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086271-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		086271-010	SW846 6020
	Cobalt	0.000544	0.0001	0.001	NE	J	J+	086271-010	SW846 6020
	Copper	0.00248	0.0003	0.001	NE		J+	086271-010	SW846 6020
	Iron	0.792	0.010	0.025	NE			086271-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086271-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086271-010	SW846 7470
	Nickel	0.00304	0.0005	0.002	NE		J+	086271-010	SW846 6020
	Selenium	0.00135	0.001	0.005	0.050	J	J-	086271-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086271-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086271-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		086271-R10	SW846 6020
	Vanadium	0.00769	0.003	0.010	NE	J	0.032U	086271-010	SW846 6020
	Zinc	0.00661	0.0026	0.010	NE	J	J+	086271-010	SW846 6020
CWL-MW2BL	Antimony	ND	0.0005	0.002	0.006	U		086835-010	SW846 6020
20-Oct-08	Arsenic	ND	0.0015	0.005	0.010	U		086835-010	SW846 6020
	Barium	0.0626	0.0005	0.002	2.00			086835-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086835-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086835-010	SW846 6020
	Chromium	0.00229	0.0015	0.003	0.100	J		086835-010	SW846 6020
	Cobalt	0.000402	0.0001	0.001	NE	J		086835-010	SW846 6020
	Copper	0.00127	0.0003	0.001	NE			086835-010	SW846 6020
	Iron	0.546	0.010	0.025	NE			086835-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086835-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		086835-010	SW846 7470
	Nickel	0.00293	0.0005	0.002	NE			086835-010	SW846 6020
	Selenium	0.00139	0.001	0.005	0.050	J		086835-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086835-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086835-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		086835-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086835-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		086835-010	SW846 6020

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October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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-MW2BU	Antimony	ND	0.0005	0.002	0.006	U		086846-010	SW846 6020
30-Oct-08	Arsenic	0.00722	0.0015	0.005	0.010	B	0.014U	086846-010	SW846 6020
	Barium	0.0550	0.0005	0.002	2.00			086846-010	SW846 6020
	Beryllium	0.000106	0.0001	0.0005	0.004	J		086846-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086846-010	SW846 6020
	Chromium	0.0127	0.0015	0.003	0.100			086846-010	SW846 6020
	Cobalt	0.00048	0.0001	0.001	NE	B, J	0.00057U	086846-010	SW846 6020
	Copper	0.0032	0.0003	0.001	NE			086846-010	SW846 6020
	Iron	1.11	0.010	0.025	NE	B		086846-010	SW846 6020
	Lead	0.0015	0.0005	0.002	NE	J		086846-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	086846-010	SW846 7470
	Nickel	0.0391	0.0005	0.002	NE			086846-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		086846-010	SW846 6020
	Silver	0.0011	0.0002	0.001	NE			086846-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086846-010	SW846 6020
	Tin	0.00356	0.001	0.005	NE	J		086846-010	SW846 6020
	Vanadium	0.00834	0.003	0.010	NE	B, J	0.019U	086846-010	SW846 6020
	Zinc	0.0267	0.0026	0.010	NE	B		086846-010	SW846 6020
CWL-MW4	Antimony	ND	0.0005	0.002	0.006	U		086839-010	SW846 6020
27-Oct-08	Arsenic	0.00274	0.0015	0.005	0.010	B, J	0.014U	086839-010	SW846 6020
	Barium	0.0596	0.0005	0.002	2.00			086839-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086839-010	SW846 6020
	Cadmium	0.000356	0.00011	0.001	0.005	J		086839-010	SW846 6020
	Chromium	0.0101	0.0015	0.003	0.100			086839-010	SW846 6020
	Cobalt	0.00217	0.0001	0.001	NE	B		086839-010	SW846 6020
	Copper	0.00243	0.0003	0.001	NE			086839-010	SW846 6020
	Iron	0.639	0.010	0.025	NE	B		086839-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086839-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	086839-010	SW846 7470
	Nickel	0.168	0.0005	0.002	NE			086839-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		086839-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086839-010	SW846 6020
	Thallium	0.000947	0.0003	0.001	0.002	B, J	0.0066U	086839-010	SW846 6020
	Tin	0.00198	0.001	0.005	NE	J		086839-010	SW846 6020
	Vanadium	0.0051	0.003	0.010	NE	B, J	0.019U	086839-010	SW846 6020
	Zinc	0.00518	0.0026	0.010	NE	B, J	0.016U	086839-010	SW846 6020

Refer to footnotes on page 3A-29.

Table 3A-6
Summary of Total Metal Results
Chemical Waste Landfill Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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	0.002	0.006	U		086843-010	SW846 6020
28-Oct-08	Arsenic	0.00444	0.0015	0.005	0.010	B, J	0.014U	086843-010	SW846 6020
	Barium	0.0554	0.0005	0.002	2.00			086843-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086843-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086843-010	SW846 6020
	Chromium	0.00226	0.0015	0.003	0.100	J		086843-010	SW846 6020
	Cobalt	0.000326	0.0001	0.001	NE	B, J	0.00057U	086843-010	SW846 6020
	Copper	0.000815	0.0003	0.001	NE	J		086843-010	SW846 6020
	Iron	0.427	0.010	0.025	NE	B		086843-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086843-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	086843-010	SW846 7470
	Nickel	0.00238	0.0005	0.002	NE			086843-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		086843-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086843-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086843-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		086843-010	SW846 6020
	Vanadium	0.00754	0.003	0.010	NE	B, J	0.019U	086843-010	SW846 6020
	Zinc	0.00388	0.0026	0.010	NE	B, J	0.016U	086843-010	SW846 6020
CWL-MW5U	Antimony	0.000574	0.0005	0.002	0.006	J	0.003U	086848-010	SW846 6020
24-Oct-08	Arsenic	0.00518	0.0015	0.005	0.010	B	0.014U	086848-010	SW846 6020
	Barium	0.0696	0.0005	0.002	2.00			086848-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086848-010	SW846 6020
	Cadmium	0.000169	0.00011	0.001	0.005	J		086848-010	SW846 6020
	Chromium	0.00274	0.0015	0.003	0.100	J	0.013U	086848-010	SW846 6020
	Cobalt	0.000302	0.0001	0.001	NE	B, J	0.00057U	086848-010	SW846 6020
	Copper	0.00186	0.0003	0.001	NE			086848-010	SW846 6020
	Iron	0.375	0.010	0.025	NE	B		086848-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086848-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	086848-010	SW846 7470
	Nickel	0.00261	0.0005	0.002	NE			086848-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		086848-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086848-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086848-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		086848-010	SW846 6020
	Vanadium	0.00531	0.003	0.010	NE	B, J	0.019U	086848-010	SW846 6020
	Zinc	0.0365	0.0026	0.010	NE	B		086848-010	SW846 6020

Refer to footnotes on page 3A-29.

Table 3A-6
Summary of Total Metal Results
Chemical Waste Landfill Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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)	Antimony	ND	0.0005	0.002	0.006	U		086849-010	SW846 6020
24-Oct-08	Arsenic	0.0054	0.0015	0.005	0.010	B	0.014U	086849-010	SW846 6020
	Barium	0.0693	0.0005	0.002	2.00			086849-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086849-010	SW846 6020
	Cadmium	0.000118	0.00011	0.001	0.005	J		086849-010	SW846 6020
	Chromium	0.00292	0.0015	0.003	0.100	J	0.013U	086849-010	SW846 6020
	Cobalt	0.000287	0.0001	0.001	NE	B, J	0.00057U	086849-010	SW846 6020
	Copper	0.00185	0.0003	0.001	NE			086849-010	SW846 6020
	Iron	0.362	0.010	0.025	NE	B	0.058U	086849-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086849-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	086849-010	SW846 7470
	Nickel	0.00265	0.0005	0.002	NE			086849-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		086849-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086849-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086849-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		086849-010	SW846 6020
	Vanadium	0.00633	0.003	0.010	NE	B, J	0.019U	086849-010	SW846 6020
	Zinc	0.0350	0.0026	0.010	NE	B		086849-010	SW846 6020
CWL-MW6L	Antimony	ND	0.0005	0.002	0.006	U		086851-010	SW846 6020
17-Dec-08	Arsenic	0.00169	0.0015	0.005	0.010	J		086851-010	SW846 6020
	Barium	0.0556	0.0005	0.002	2.00			086851-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086851-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086851-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086851-010	SW846 6020
	Cobalt	0.000162	0.0001	0.001	NE	J	J+	086851-010	SW846 6020
	Copper	0.000982	0.0003	0.001	NE	J	J+	086851-010	SW846 6020
	Iron	0.296	0.010	0.025	NE	B		086851-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086851-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		086851-010	SW846 7470
	Nickel	0.00233	0.0005	0.002	NE		J+	086851-010	SW846 6020
	Selenium	0.00127	0.001	0.005	0.050	J		086851-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086851-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086851-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		086851-010	SW846 6020
	Vanadium	0.00331	0.003	0.010	NE	J		086851-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		086851-010	SW846 6020

Refer to footnotes on page 3A-29.

Table 3A-6 *(Concluded)*
Summary of Total Metal Results
Chemical Waste Landfill Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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	0.0005	0.002	0.006	U		086837-010	SW846 6020
22-Oct-08	Arsenic	ND	0.0015	0.005	0.010	U		086837-010	SW846 6020
	Barium	0.0802	0.0005	0.002	2.00			086837-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086837-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086837-010	SW846 6020
	Chromium	0.00429	0.0015	0.003	0.100			086837-010	SW846 6020
	Cobalt	0.000317	0.0001	0.001	NE	J		086837-010	SW846 6020
	Copper	0.0034	0.0003	0.001	NE			086837-010	SW846 6020
	Iron	0.563	0.010	0.025	NE			086837-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086837-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		086837-010	SW846 7470
	Nickel	0.00454	0.0005	0.002	NE			086837-010	SW846 6020
	Selenium	0.00116	0.001	0.005	0.050	J		086837-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086837-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086837-010	SW846 6020
	Tin	ND	0.001	0.005	NE	U		086837-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086837-010	SW846 6020
	Zinc	0.0118	0.0026	0.010	NE			086837-010	SW846 6020

Refer to footnotes on page 3A-29.

Table 3A-7
Summary of Dissolved Chromium Results
Chemical Waste Landfill Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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-BW3 24-Oct-07	Dissolved Chromium	0.00227	0.001	0.003	0.100	J		085324-013	SW846 6020
CWL-BW4A 18-Oct-07	Dissolved Chromium	0.00473	0.001	0.003	0.100	B	0.0051U	085326-013	SW846 6020
CWL-MW2BL 16-Oct-07	Dissolved Chromium	ND	0.001	0.003	0.100	U		085328-013	SW846 6020
CWL-MW4 05-Nov-07	Dissolved Chromium	ND	0.001	0.003	0.100	U		085334-013	SW846 6020
CWL-MW4 (Duplicate) 05-Nov-07	Dissolved Chromium	ND	0.001	0.003	0.100	U		085335-013	SW846 6020
CWL-MW5L 25-Oct-07	Dissolved Chromium	ND	0.001	0.003	0.100	U		085337-013	SW846 6020
CWL-MW5U 30-Oct-07	Dissolved Chromium	0.00127	0.001	0.003	0.100	B, J	0.012U	085342-013	SW846 6020
CWL-MW5U (Duplicate) 30-Oct-07	Dissolved Chromium	0.00108	0.001	0.003	0.100	B, J	0.012U	085343-013	SW846 6020
CWL-MW6L 12-Jun-08	Dissolved Chromium	0.00302	0.0025	0.010	0.100	J		086266-013	SW846 6020
CWL-MW6U 01-Nov-07	Dissolved Chromium	0.00190	0.001	0.003	0.100	J		085348-013	SW846 6020

Refer to footnotes on page 3A-29.

Table 3A-8
Summary of Field Water Quality Measurements[h]
Chemical Waste Landfill Groundwater Monitoring

October 2007 through December 2008

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-BW3	24-Oct-07	18.80	838	295.7	7.82	2.98	42.4	3.86
	09-Jun-08	19.62	847	187.4	7.74	4.84	78.7	7.16
CWL-BW4A	18-Oct-07	18.31	987	275.1	7.05	2.01	65.0	6.08
	02-Jun-08	23.32	1,059	215.9	7.05	1.52	76.9	6.53
CWL-MW2BL	16-Oct-07	21.31	1,084	208.6	6.88	0.24	79.1	6.98
	10-Jun-08	23.31	1,129	240.6	6.81	0.56	91.3	7.80
	20-Oct-08	21.55	1,224	192.3	6.78	0.72	76.4	6.71
CWL-MW2BU	07-Nov-07	16.04	769	174.0	8.52	85.9	84.9	8.33
	11-Jun-08	18.87	815	265.8	8.17	31.0	86.2	8.00
	30-Oct-08	16.91	852	142.1	8.34	7.56	80.2	7.77
CWL-MW4	05-Nov-07	19.00	944	69.3	7.09	2.20	61.7	5.69
	17-Jun-08	22.64	986	118.6	6.95	4.15	64.6	5.50
	27-Oct-08	18.26	1,069	110.3	6.94	5.68	59.6	5.59
CWL-MW5L	25-Oct-07	18.37	1,052	289.1	6.98	0.91	80.0	7.45
	05-Jun-08	16.60	1,076	259.2	6.83	0.29	76.2	7.44
	28-Oct-08	17.19	1,190	196.4	6.84	0.43	75.8	7.27
CWL-MW5U	30-Oct-07	18.80	914	289.6	7.10	0.46	67.1	6.22
	16-Jun-08	22.63	949	380.0	6.92	0.20	64.4	5.55
	24-Oct-08	18.41	1,049	180.4	6.99	0.89	58.8	5.50
CWL-MW6L	12-Jun-08	23.45	1,070	255.4	6.94	2.02	49.2	4.18
	17-Dec-08	15.05	1,152	187.1	7.05	0.95	52.1	5.21
CWL-MW6U	01-Nov-07	15.65	895	278.8	7.17	0.64	63.8	6.34
	04-Jun-08	20.99	932	231.7	6.95	0.31	63.0	6.00
	22-Oct-08	14.59	1,017	154.7	7.00	2.62	69.4	6.96

Refer to footnotes on page 3A-29.

Footnotes for Chemical Waste Landfill Groundwater Monitoring

[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, July 2002.

- NE = not established.

[e]Lab 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.
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

- U.S. Environmental Protection Agency, 1990, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.
- EPA 9310: U.S. Environmental Protection Agency, 1990, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.

[h]Field Water Quality Measurements

- Field measurements collected prior to sampling.

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

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Attachment 3B
Chemical Waste Landfill
Plots

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Attachment 3B Plots

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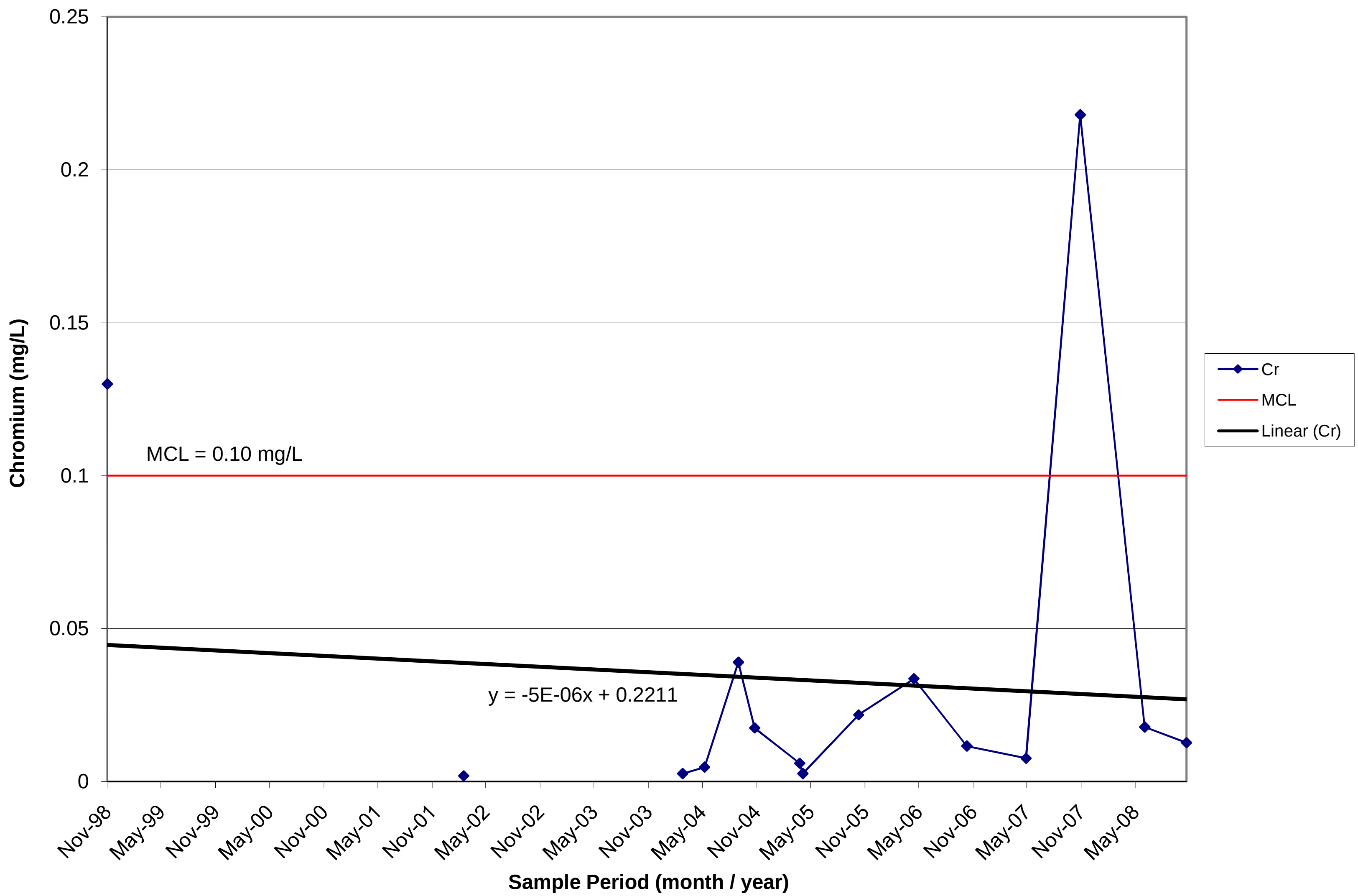

Figure 3B-1. Chromium Concentrations, CWL-MW2BU

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Attachment 3C
Chemical Waste Landfill
Hydrographs

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Attachment 3C Hydrographs

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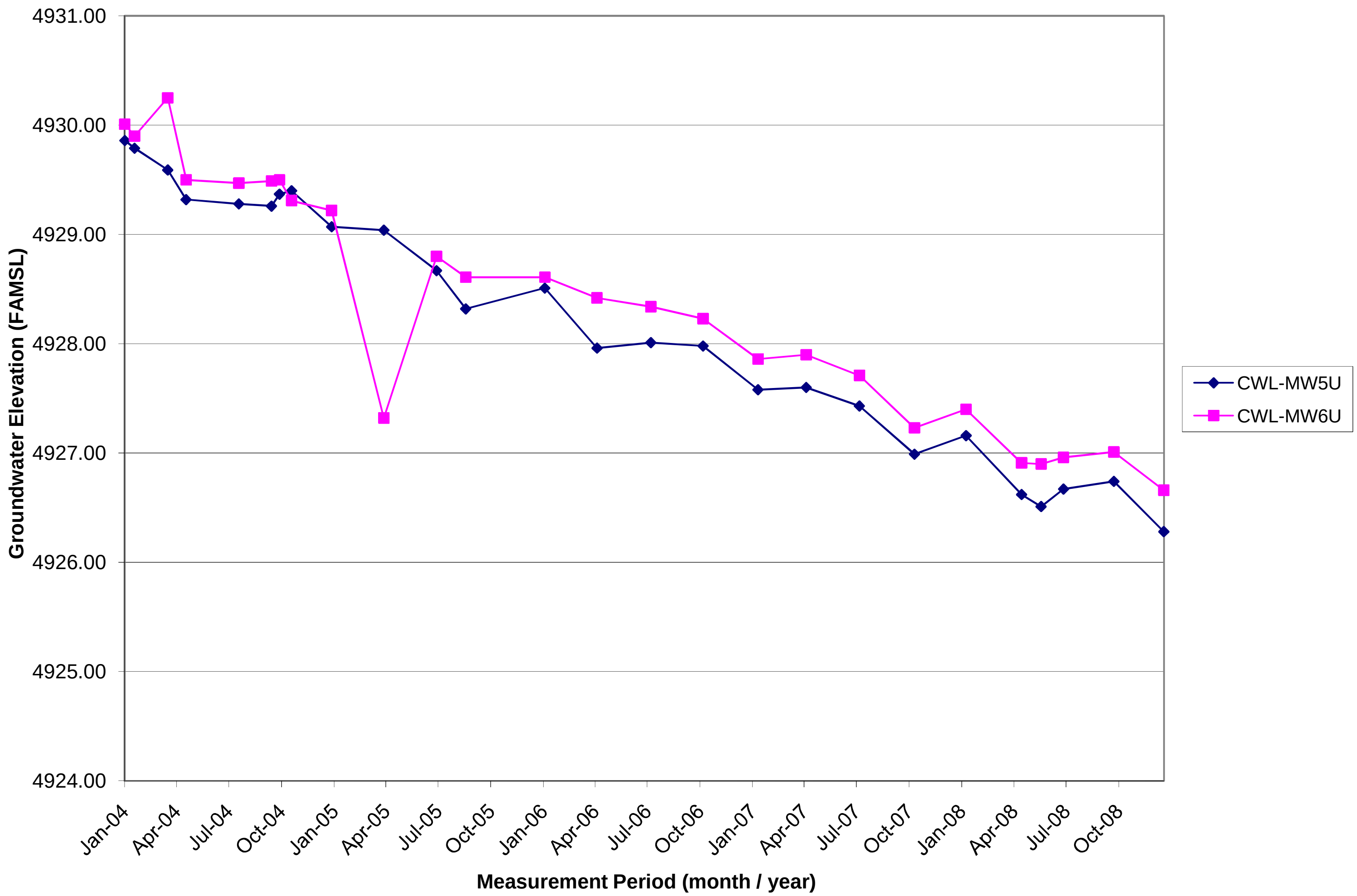

Figure 3C-1. CWL Water Table Hydrographs for Monitoring Wells CWL-MW5U and CWL-MW6U

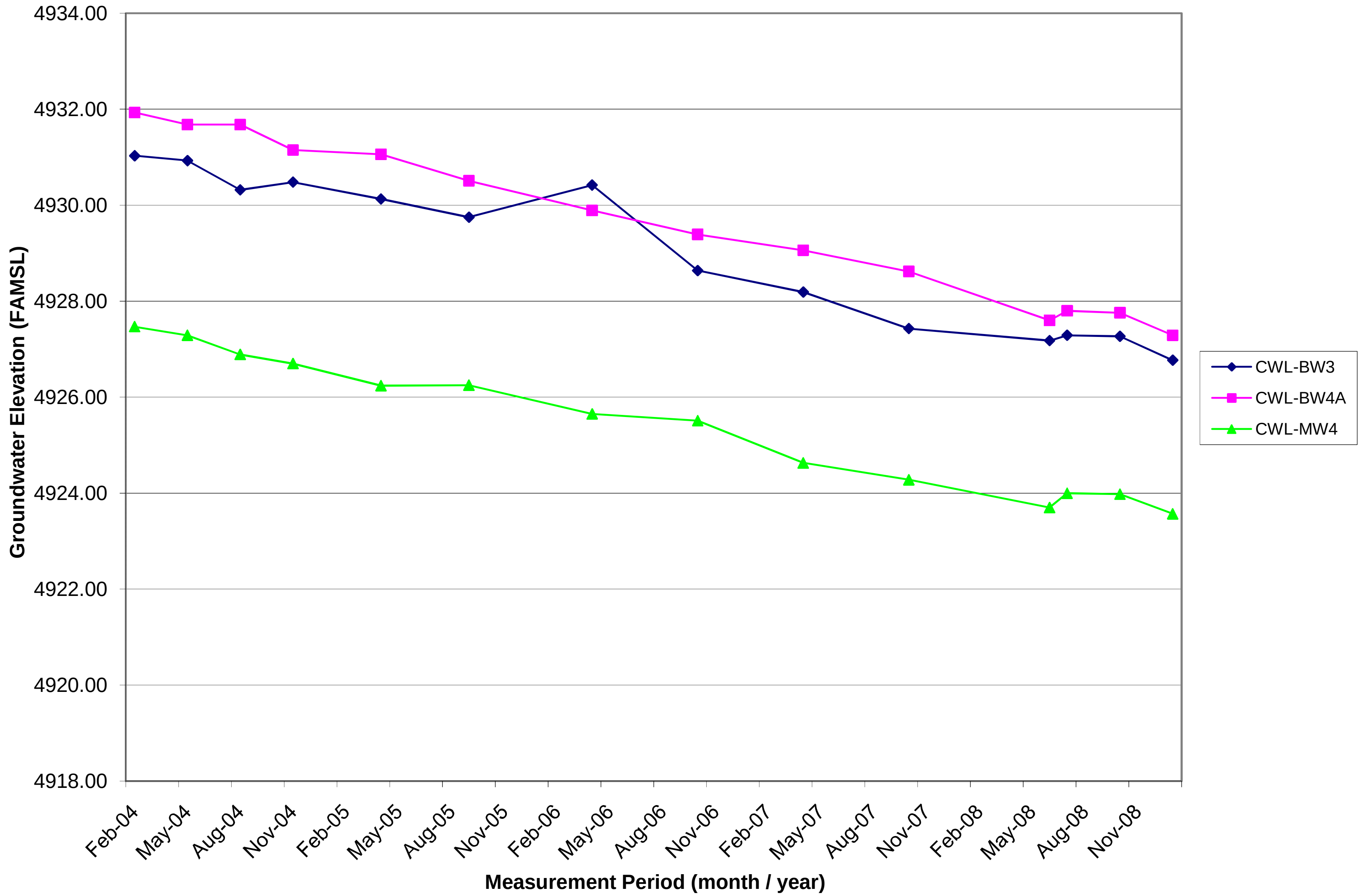

Figure 3C-2. CWL Water Table Hydrographs for Monitoring Wells CWL-BW3, CWL-BW4A, and CWL-MW4

4.0 Mixed Waste Landfill

4.1 Introduction

The Mixed Waste Landfill (MWL) is located on Kirtland Air Force Base 4 miles south of Sandia National Laboratories, New Mexico (SNL/NM) Technical Area (TA)-I facilities, and 5 miles southeast of Albuquerque International Sunport (Figure 1-2). The landfill is a 2.6-acre site in the north-central portion of TA-III. The landfill was operated from March 1959 through December 1988. 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 landfill.

The MWL consists of two distinct disposal areas: the classified area (occupying 0.6 acres) and the unclassified area (occupying 2.0 acres). Low-level radioactive and mixed waste was disposed of in each of these areas. Classified wastes were buried in cylindrical pits in the classified area. 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. 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 landfill.

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 of the landfill. 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.

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

4.2 Regulatory Criteria

Historically, the New Mexico Environment Department (NMED) Hazardous Waste Bureau 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, 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 Compliance Order on Consent (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 at the MWL, the information related to radionuclides is provided voluntarily by the U.S. Department of Energy and Sandia Corporation. 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).

4.3 Scope of Activities

Annual groundwater sampling was conducted during Calendar Year 2008 (CY08) at the MWL located in TA-III at SNL/NM. Seven monitoring wells at the MWL were sampled, including one downgradient well (MWL-BW-2), one on-site monitoring well (MWL-MW4) and five downgradient monitoring wells (MWL-MW5, MWL-MW6, MWL-MW7, MWL-MW8, and MWL-MW9). Three sampling events occurred at the MWL during CY08 on the following dates: April 8 to April 16, July 14 to July 17, and October 1 to October 8, 2008. Table 4-1 describes the sampling events.

Table 4-1. Calendar Year 2008 Groundwater Sampling Events and Monitoring Well Network Changes at the Mixed Waste Landfill

Well/Date	Jan 2008	April 2008	May 2008	July 2008	Oct 2008
MWL-BW-1	Plugged and Abandoned				
MWL-BW-2	Well Installed	1st quarterly sampling		2nd quarterly sampling	3rd quarterly sampling
MWL-MW1			Plugged and Abandoned		
MWL-MW2			Plugged and Abandoned		
MWL-MW3			Plugged and Abandoned		
MWL-MW4		Annual sampling			
MWL-MW5		Annual sampling			
MWL-MW6		Annual sampling			
MWL-MW7			Well installed	1st quarterly sampling	2nd quarterly sampling
MWL-MW8			Well installed	1st quarterly sampling	2nd quarterly sampling
MWL-MW9			Well installed	1st quarterly sampling	2nd quarterly sampling

The on-site monitoring well, MWL-MW4, is screened in two discrete intervals; however, only the upper interval was sampled, as this is the uppermost water-bearing interval beneath the MWL. References in this report to groundwater samples from MWL-MW4 refer to groundwater withdrawn from the upper interval.

The analytical parameters selected for monitoring at the MWL groundwater wells during CY08 include target analyte list (TAL) metals, total uranium, VOCs, nitrate plus nitrite (NPN), bromide, fluoride, chloride, sulfate, manganese II, total organic carbon, carbon dioxide, total dissolved solids, ferrous iron, and biochemical oxygen demand. Added to the list of sampling parameters this year is perchlorate. The Order requires perchlorate analysis for newly installed monitoring wells for four quarters unless it is detected above the screening level of 4 micrograms per liter (µg/L) at which time a new sampling schedule is to be negotiated with the NMED (NMED 2004, Table XI-1). Alkalinity titrations were performed in the field on groundwater collected at each well. Radiochemical analysis included gross alpha/beta radioactivity, tritium, and gamma-emitting radionuclides. The analytical results are presented in Section 4.6.

The MWL groundwater samples were submitted for analysis to General Engineering Laboratories, Inc. (GEL) in Charleston, South Carolina; Hall Analytical in Albuquerque, New Mexico; and Metrohm Peak in Houston, Texas. All groundwater samples were collected using a Bennett™ pump.

Field quality control (QC) samples submitted to GEL included field duplicate, equipment blank (EB), and field blank (FB) samples. Section 4.7 discusses the QC results.

4.3.1 Monitoring History

The groundwater monitoring well network at the MWL was initially installed in 1989 and was revised in 2008. 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). Figure 4-1 shows the current groundwater monitoring network at the MWL. The well network currently consists of seven wells completed within the interfingering, fine-grained, alluvial fan deposits and coarse-grained Ancestral Rio Grande alluvial deposits.

4.3.2 Monitoring Network

In 2007, the NMED requested the abandonment of background well MWL-BW1 (Bearzi March 2007) and monitoring wells MWL-MW1 and MWL-MW3 (Bearzi July 2007). These wells were abandoned in situ, and new wells, MWL-BW2, MWL-MW7 and MWL-MW8, were installed (SNL April 2008 and September 2008). In February 2008, the NMED requested a work plan to abandon well MWL-MW2 and install a new well, MWL-MW9 (SNL February 2008, Bearzi March 2008). All the fieldwork occurred in 2008, with the resulting sampling activities depending on those wells that were completed and ready for sampling. Table 4-1 outlines the plugging and abandonment activities, well installations, and sampling events that occurred during CY08.

Wells MWL-MW-7, MWL-MW-8, MWL-MW-9, and MWL-BW2 are considered new wells and, as required by the Order (NMED 2004), will be sampled for eight consecutive quarters for a defined suite of parameters in addition to sampling for perchlorate for at least four consecutive quarters. Wells MWL-MW4, MWL-MW5, and MWL-MW6 are preexisting wells and will continue to be sampled on an annual basis.

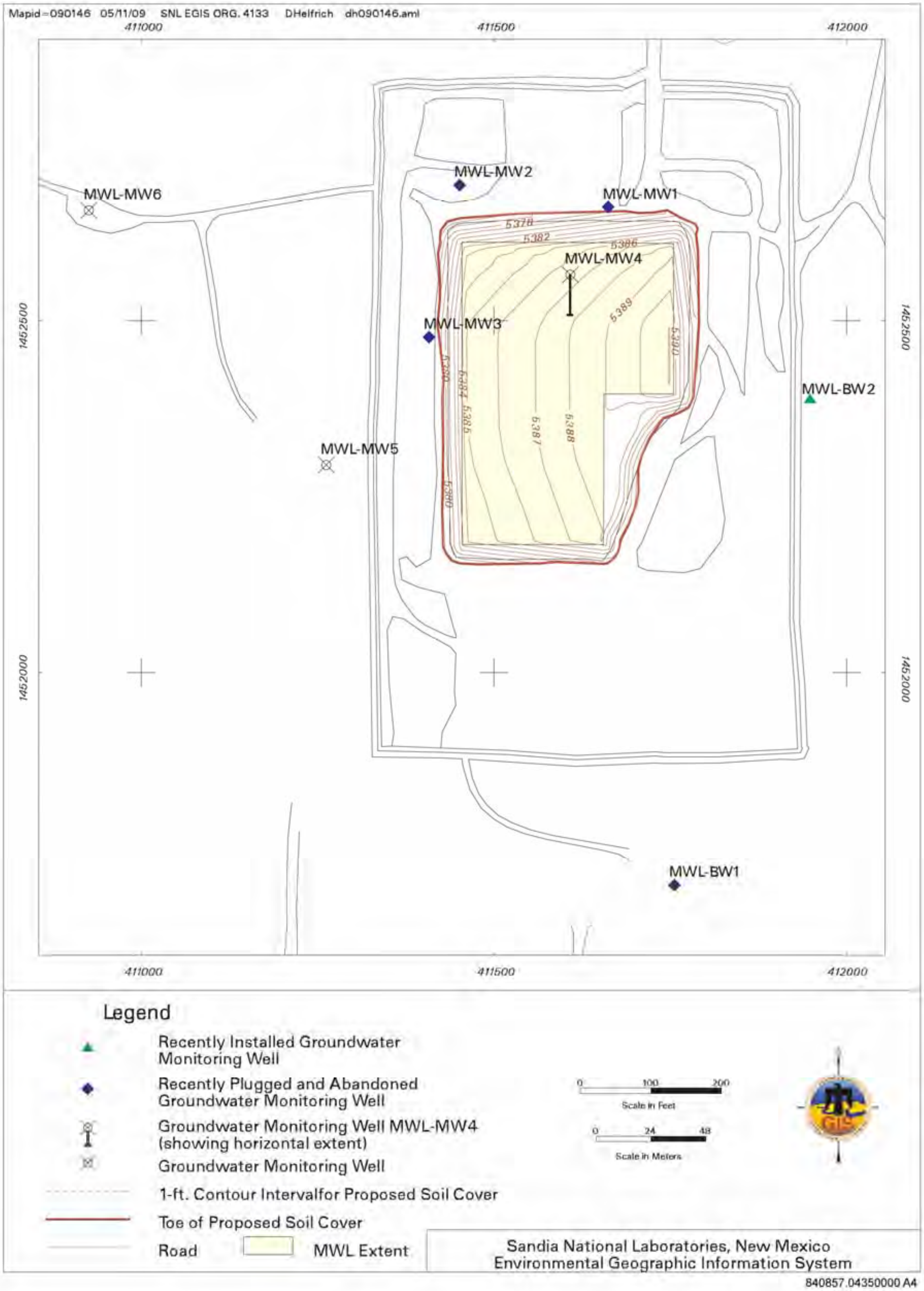

Figure 4-1. Location of Recently Plugged and Abandoned Groundwater Monitoring Wells and Recently Installed Groundwater Monitoring Wells at the Mixed Waste Landfill

Plug and abandonment reports for the replaced wells, as well as installation reports for the new wells were submitted and approved by the NMED (Bearzi January 2009). All seven MWL wells are constructed of 5-inch, Schedule 80 polyvinyl chloride (PVC) casing and have screens composed of slotted Schedule 80 PVC. Water level measurements obtained during the CY08 sampling events are presented in Attachment 4A, Table 4A-1.

In 1993, MWL-MW4 was completed at an angle of 6 degrees from vertical and is screened at two discrete intervals 20 feet 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. Although monitoring well MWL-MW4 is screened in two discrete intervals, only the upper interval was sampled, as this is the uppermost water-bearing interval beneath the MWL. References in this report to groundwater samples from MWL-MW4 refer to groundwater withdrawn from the upper interval, and references made to the bottom of this well means the depth to the top of the packer.

4.4 Field Methods and Measurements

Field measurements performed during groundwater sampling activities included groundwater elevation and water quality. 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 (LTES) Groundwater Monitoring Well Sampling and Field Analytical Measurements,* FOP 05-01 (SNL August 2007). Measurements were obtained from all monitoring wells. Table 4A-1 (Attachment 4A) presents groundwater elevations, static water heights, and water level information.

The MWL monitoring wells are sampled using a portable Bennett™ pump (SNL August 2007), with the exception of MWL-MW4, which has a dedicated sampling system. The pump intake is set near to or at the bottom of the screen interval. The minimum flow rate, given limitations of equipment and well characteristics, is required for all purging and sampling activities. Each well is either purged to dryness (if recovery is slow) or purged until select water quality parameters stabilize. Typically two wells were allowed to recover to 80 percent of the original water level and then sampled to collect the most representative groundwater sample possible given the low yield of these wells.

Groundwater samples from MWL wells were collected and shipped to off-site laboratories using analysis request/chain of custody protocol.

Groundwater occurs approximately 500 ft bgs within Santa Fe Group deposits (basin fill) in either fine-grained alluvial fan deposits or coarse-grained Ancestral Rio Grande deposits. Figure 4-2 shows the localized potentiometric surface of the basin fill aquifer at the MWL. Detailed hydrographs are presented in Attachment 4C that represent water levels obtained from the established wells MWL-MW4, MWL-MW5, and MWL-MW6, measured quarterly.

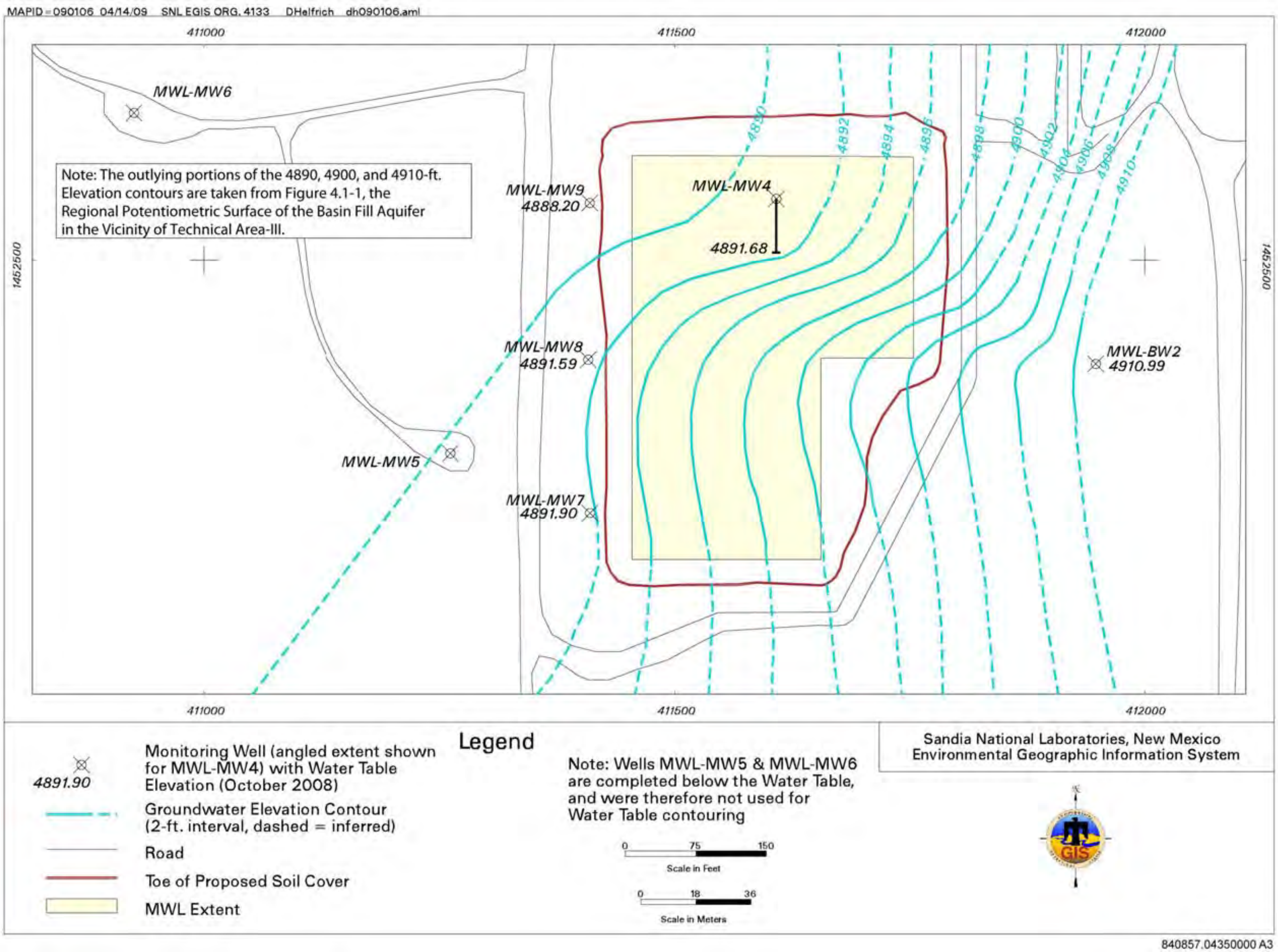

Figure 4-2. Localized Potentiometric Surface of the Basin Fill Aquifer at the Mixed Waste Landfill

The four newly installed wells do not have sufficient water level data to establish trends. Water level measurements in MWL-MW4 are obtained from the upper screened interval. Over the past four years, water levels have dropped in MWL-MW5 and MWL-MW6 by an average of .4 feet per year (ft/yr). Over the past three years, MWL-MW4 has also exhibited a trend of decline in water levels by an average of .4ft/yr.

4.5 Analytical Methods

The analytical laboratories analyzed samples using U.S. Environmental Protection Agency (EPA)-approved analytical methods (EPA 1979, 1986, and 1999) and specified performance criteria in accordance with the *SNL/NM Statement of Work for Analytical Laboratories* (SNL March 2003). The analytical laboratory provided appropriate sample containers prepared with the required sample preservative. Table 4-2 summarizes analytical requirements and EPA Methods applicable to groundwater sampling at the MWL during CY08.

Table 4-2. Analytical Parameters, Test Methods, and Target Quantitation Limits, Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Analytical Parameter	Test Method[a]	Target Quantitation Limit[b]
Total Metals TAL and Uranium	SW846-6020 SW846-7470A	0.00007 – 2.50 mg/L
Volatile Organic Compounds	SW846-8260B	1.00 – 15.0 µg/L
Semivolatile Organic Compounds	SW846-8270C	1.00 – 24.1 µg/L
Nitrate plus Nitrite (as nitrogen)	EPA 353.2	0.250 – 0.500 mg/L
Major Anions Bromide, Fluoride, Chloride, and Sulfate	SW846-9056	0.100 – 4.0 mg/L
Total Alkalinity as Calcium Carbonate	SM 2320B[c]	1.00 mg/L
Perchlorate	EPA 314.0[d]	0.012 mg/L
Radionuclides Gamma-Emitting Radionuclides Gross Alpha Activity Gross Beta Activity Tritium	 EPA 901.1[e] EPA 900.0[e] EPA 900.0[e] EPA 906.0[e]	 MDA is isotope specific 0.954 – 15.5 pCi/L 1.16 – 5.28 pCi/L 131 – 176 pCi/L

[a]Analytical methods used are referenced to either 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, or U.S. Environmental Protection Agency, 1986. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* SW-846, 3rd ed., Rev. 1, U.S. Environmental Protection Agency, Washington, D.C.
[b]For target compounds only. Reporting limits may be elevated if an interfering component is present or if sample dilution is required.
[c]Laboratory-specific analytical methods.
[d]U.S. Environmental Protection Agency, November 1999, *Perchlorate in Drinking Water Using Ion Chromatography*, EPA 815/R-00-014, U.S. Environmental Protection Agency, Washington, D.C..
[e]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.
µg/L = Microgram(s) per liter.
mg/L = Milligram(s) per liter.
MDA = Minimum detectable activity.
pCi/L = Picocurie(s) per liter.
TAL = Target analyte list.

4.6 Summary of Analytical Results

The results for chemical and radiological constituent analysis are compared with established EPA Safe Drinking Water Act (SWDA) regulations maximum contaminant levels (MCLs) (EPA 2001), where applicable.

The QC samples associated with each sampling event are included in the analysis of results and are discussed in Section 4.7. Data qualifiers resulting from QC samples or data validation are presented with the related data in the respective data tables.

4.6.1 General Chemistry Parameters

The general chemistry analytical results are presented in Attachment 4A, Table 4A-2. No general chemistry parameters exceed the MCLs (where established) 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) range from 0.885 mg/L in the sample collected in July from MWL-MW8 to 3.24 mg/L in the sample collected in October from MWL-MW7. Fluoride was detected at concentrations ranging from 0.658 mg/L (April sample from MWL-BW2) to 1.06 mg/L (July sample from MWL-MW9).

4.6.2 VOCs and SVOCs

Table 4A-3 (Attachment 4A) summarizes the results for detected VOCs and semivolatile organic compounds (SVOCs), and Table 4A-4 presents the analytical method and corresponding method detection limits (MDLs) for VOCs and SVOCs. Trace concentrations of acetone and toluene were reported for groundwater samples from the MWL monitoring wells. The MCL for toluene is 1,000 µg/L, and the concentration detected in the sample from MWL-MW9 collected in July 2008 is 0.51 µg/L. No MCL is established for acetone, and the concentrations detected in two samples collected in April 2008 were 3.82 mg/L (MWL-MW4) and 2.31 mg/L (MWL-MW6). The results for acetone and toluene presented in Table 4A-3 are qualified as estimated values and are less than the respective practical quantitation limits (PQLs).

4.6.3 Perchlorate

During 2008, recently installed groundwater monitoring wells MWL-MW7, MWL-MW8, and MWL-MW9 and background monitoring well MWL-BW2 were added to the perchlorate screening monitoring well network.

The Order (NMED 2004) requires that new wells be sampled for perchlorate for a minimum of four quarters. If perchlorate is detected above the screening level in a specific well, monitoring will continue for that well at a frequency negotiated with the NMED. Four consecutive nondetections using the screening level of 4 µg/L are considered by the NMED to be reason to remove that well from the perchlorate screening monitoring network.

The sampling results for perchlorate for these wells are presented in Table 4A-5 (Attachment 4A). No detections of perchlorate at or above the screening level of 4 µg/L were reported for the environmental samples from the groundwater monitoring wells MWL-MW7, MWL-MW8, MWL-MW9, or MWL-BW2.

4.6.4 Metals

Table 4A-6 (Attachment 4A) summarizes the metal results from all unfiltered groundwater samples collected during the CY08 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 exceed the established MCLs.

Table 4A-7 (Attachment 4A) summarizes the results for TAL metal analysis for the filtered samples collected during the CY08 groundwater monitoring events. No detections of any metals in the filtered samples exceed the respective MCLs.

Samples from MWL-MW7, MWL-MW8, and MWL-MW9 were analyzed for total uranium during both quarterly sampling events (July and October). All results, presented in Tables 4A-6 and 4A-7, are less than the MCL of 0.03 mg/L and are consistent with previous sampling events at the MWL.

Uranium isotopes uranium-235 and uranium-238 were determined as mass concentrations during metal analysis on the inductively-coupled plasma mass spectrometer using EPA Method 6020. The isotopic mass concentrations are reported in units of mg/L and are presented in Tables 4A-6 and 4A-7 with the results for unfiltered and filtered samples analyzed by this method. All uranium isotope values are consistent with previous results.

Uranium-235 values range from 0.000047 mg/L in unfiltered samples collected from MWL-BW2 in October and from MWL-MW8 in July and in the filtered sample collected from MWL-BW2 in April to 0.000066 mg/L in the filtered sample collected from MWL-MW5 (duplicate) in April. Uranium-238 values range from 0.00661 mg/L in the unfiltered sample collected from MWL-BW2 in April to 0.009 mg/L in the unfiltered sample collected from MWL-MW5 in April.

4.6.5 Radiological Parameters

Groundwater samples from the MWL monitoring wells were analyzed for gamma-emitting radionuclides, gross alpha/beta activity, and tritium. The results for tritium, gross alpha/beta, and gamma spectroscopy activity are presented in Table 4A-8 (Attachment 4A) and are compared with the established EPA SWDA MCLs (EPA 2001) (no MCL has been established for tritium). No radiological parameters were detected above established MCLs.

Gross alpha activity levels were detected above laboratory reporting limits in all environmental samples. Uncorrected gross alpha activity levels range from 4.06 ± 2.08 picocuries per liter (pCi/L) in the MWL-MW7 sample from October to 17.8 ± 10.5 pCi/L in the MWL-MW6 sample from April.

Gross beta activity levels range from 3.25 ± 1.84 pCi/L in the MWL-BW2 sample from July to 12.1 ± 4.75 pCi/L in the MWL-MW5 sample from April. A reanalysis of the uncorrected gross alpha sample from MWL-MW6 was requested. The reanalysis conducted included samples from MWL-MW4 and MWL-MW5, as these were contained in the same laboratory QC batch as the sample from MWL-MW6. The results from the reanalysis confirmed the initial results; however, after subtracting activity associated with uranium (corrected alpha activity); the values are below the established MCL (Table 4A-9).

Corrected gross alpha activity values (Table 4A-9) are obtained by subtracting uranium alpha contribution from the gross alpha activity. Two methods were used to determine corrected gross alpha activity (Table 4A-9). Neither method resulted in corrected gross alpha activity that exceeds the established MCL of 15 pCi/L.

Neither tritium, analyzed by EPA Method 906.0, nor gamma-emitting isotopes, analyzed by EPA Method 901.1, were detected above the minimum detectable activity (MDA) in any of the groundwater samples.

Although no detections of tritium above the MDA were reported, the results are presented in Table 4A-8 as tritium is considered a COC at the MWL.

4.6.6 Water Quality Parameters

The general chemistry analytical results are presented in Attachment 4A, Table 4A-2. No general chemistry parameters exceed the MCLs (where established) in the groundwater samples. The only two parameters that have established MCLs are NPN (as nitrogen) and fluoride (10 and 4 mg/L, respectively). Concentrations of NPN (as nitrogen) range from 0.885 mg/L in the sample collected in July from MWL-MW8 to 3.24 mg/L in the sample collected in October from MWL-MW7. Fluoride was detected at concentrations ranging from 0.658 mg/L in the sample collected from MWL-BW2 in April to 1.06 mg/L in the sample collected from MWL-MW9 in July.

4.7 Quality Control Results

Field and laboratory QC samples were prepared both in the field and in the laboratory 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.

4.7.1 Field Quality Control Samples

The QC samples collected in the field included EB, laboratory-prepared FB, and field duplicate samples. An FB sample provides a method to check for potential sources of sample contamination or sampling error. An EB sample is collected to verify the effectiveness of the sampling equipment decontamination process, and a duplicate sample is collected immediately after the environmental sample and provides information about sampling variability. The following sections discuss the analytical results for each QC sample type.

4.7.2 Duplicate Environmental Samples

Duplicate groundwater samples were collected at MWL-MW5 (April), MWL-MW7 (July), and MWL-BW2 (October). Relative percent difference (RPD) calculations were performed for all detected chemical analytes for duplicate samples to measure sample variability and are presented in Table 4A-10 (Attachment 4A). The QC acceptance criteria for bromide in duplicate sample MWL-MW7 (July) showed an RPD of 81 percent. The remaining values are all less than the 20-percent threshold.

4.7.3 Equipment Blank Samples

A total of four EB samples were collected during the CY08 sampling events at the MWL:

- April 2008—Two EB samples were collected prior to sampling MWL-BW2 and MWL-MW5. Detected VOCs include acetone and dibromochloromethane. No corrective action is required as these compounds were not detected in the associated environmental samples. Detected metal constituents include aluminum, calcium, chromium, iron, magnesium, and sodium. No corrective action is required for aluminum, calcium, iron, magnesium, or sodium as the results for the associated environmental samples are either not detected or detected at concentrations greater than five times the blank contamination. The chromium result in the MWL-MW5 duplicate sample was qualified as not detected as the result for the associated environmental sample is less than the blank contamination.

- July 2008 (Quarterly)—One EB sample was collected prior to sampling MWL-MW7. Sodium, chloride, and sulfate were detected in the EB sample. No corrective action is required as the results for the associated environmental samples are greater than five times the blank contamination.

- October 2008 (Quarterly)—One EB sample was collected prior to sampling MWL-BW2. The VOCs bromodichloromethane and dibromochloromethane were detected in the EB but not in the associated environmental samples. Magnesium was the only metal detected in the EB sample. The results for the associated environmental samples were not qualified as the results are greater than five times the blank contamination. Alkalinity and fluoride were also detected in the EB sample. The results for the associated environmental samples were not qualified as the results are greater than five times the blank contamination.

4.7.4 Field Blank Samples

An FB sample was returned to the laboratory with each shipment containing environmental samples for VOC analysis. Six FB samples that were submitted during annual groundwater sampling were used to assess VOC contamination that might have occurred during sample storage and shipping. Low levels (between the MDL and the PQL) of acetone were detected in FB samples MWL-TB1, MWL-TB3, and MWL-TB7. However, due to laboratory blank contamination, these FB samples were qualified as not detected at the PQL and do not affect other sample results.

4.7.5 Laboratory Quality Control Samples

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 CY08 MWL groundwater monitoring samples, except for potassium-40. Potassium-40 activities were qualified as unusable in three MWL samples, as the peak did not meet identification criteria during gamma spectroscopy analysis at the laboratory.

General laboratory QC issues included calibration verification samples and matrix spike samples outside acceptance criteria for organic analyses and method blank and calibration blank contamination for inorganic analyses.

4.8 Variances and Nonconformances

All analytical and field methods were performed according to the requirements specified in the MWL groundwater monitoring mini-sampling and analysis plans (SAPs) for Fiscal Years 2008 and 2009 (SNL March 2008, June 2008, and October 2008) and there were no variances from the plans.

The sample from MWL-MW6 was reanalyzed for gross alpha because this was the first time a detection above 15 pCi/L was reported for this well. The reanalysis of MWL-MW5 was requested because the variance between the sample and its duplicate was suspect, and also the sample from MWL-MW5 was included in the same QC batch as MWL-MW6. The reanalysis produced more representative results, and when uranium activity is subtracted, the results are below the MCL.

The acetone and toluene results presented in Table 4A-3 show both analytes as detected, though the toluene result for MWL-MW4 is significantly below the MCL of 1,000 μg/L and below the PQL. Acetone has no MCL and the results for MWL-MW4 and MWL-MW6 were qualified during the data validation process as estimated values with bias that could be attributed to calibration verification error. Neither constituent is a COC at the MWL, although historically, toluene has been detected at the MWL.

The bromide duplicate results from the newly installed MWL-MW7 well showed a high RPD between the initial result and its duplicate sample (81 percent). More data is necessary to determine whether a trend is occurring. Bromide is not a COC at the MWL.

4.9 Summary and Conclusions

Groundwater sampling and analysis were conducted at the MWL according to the mini-SAPs (SNL March 2008, June 2008, and October 2008) during three different monitoring events in CY08. No inorganic or organic constituents were detected at concentrations that exceed the respective MCLs in any of the groundwater samples. In addition, no detections of organic compounds greater than the MCLs (where applicable) or PQLs were reported. Toluene was detected at a concentration less than the MCL and PQL but greater than the MDL in one sample, and thus qualified as an estimated value.

Total uranium results from the CY08 samples are consistent with data from previous sampling events and are well within the range of historic MWL groundwater data. Groundwater data from the newly installed wells do not have a sufficient historical data set to identify trends for the results.

No general chemistry parameters exceed the established MCLs in any of the groundwater samples. The analytical results for radioactivity and radionuclides show no levels greater than the corresponding MCLs. Based on the results of the three groundwater monitoring events conducted at the MWL during CY08, constituent concentrations remain within the historical ranges for the site.

The results for the laboratory QC samples and the data validation results indicate that the CY08 groundwater sampling results for the MWL are defensible as representative of the uppermost portion of the regional aquifer.

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Attachment 4A
Mixed Waste Landfill
Analytical Results Tables

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Attachment 4A Tables

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Table 4A-1
Groundwater Elevations, Pump Setting Depths, and Water Level Information
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well Number	Date of Measurement	Measurement Point Elevation (FAMSL[a])	Depth to Water (FBTOC)	Groundwater Elevation (FAMSL[a])	Total Well Depth[b] (FAMSL)	Static Water Height (feet)	Pump Setting Depth (FBTOC)
MWL-MW4	04-07-08	5383.46	494.44	4891.73[c]	4878.59[c]	13.14[c]	503[d]
MWL-MW5	04-07-08	5379.89	492.66	4887.23	4856.15	31.08	517
MWL-MW6	04-07-08	5372.64	486.53	4886.11	4839.46	46.65	527
MWL-MW7	07-16-08	5380.63	488.88	4891.75	4878.96	12.79	493
	10-06-08		488.82	4891.81		12.85	
MWL-MW8	07-14-08	5381.99	490.55	4891.44	4880.07	11.37	496.5
	10-07-08		490.71	4891.28		11.21	
MWL-MW9	07-15-08	5379.24	492.07	4887.17	4876.63	10.54	497
	10-08-08		491.23	4888.01		11.38	
MWL-BW2	04-07-08	5388.35	477.18	4911.17	4884.00	27.17	499
	07-17-08		477.47	4910.88		26.88	
	10-01-08		477.62	4910.73		26.73	

[a]Measurement point is the top of well casing.

[b]Total well depth to bottom of sump.

[c]Elevation, well depth, and pump depth reflects well MWL-MW4 orientation of 6 degrees from vertical.

[d]Depth to the bottom of the dedicated pump is 503.01 feet below ground surface, equivalent to the ‘bottom of the well’.

BW = Background well.
FAMSL = Feet above mean sea level.
FBTOC = Feet below top of casing.
MW = Monitoring well.
MWL = Mixed Waste Landfill.

Table 4A-2
Summary of Alkalinity, Anions, and Nitrate plus Nitrite Analytical Results
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-BW2	Alkalinity, Total	243	0.725	1.00	NE	B		085758-016	SM 2320B
09-Apr-08	Bromide	0.400	0.067	0.200	NE			085758-016	SW846 9056
	Chloride	66.2	0.660	2.00	NE			085758-016	SW846 9056
	Fluoride	0.658	0.033	0.100	4.0			085758-016	SW846 9056
	Sulfate	46.4	1.00	4.00	NE			085758-016	SW846 9056
	Nitrate plus Nitrite as N	1.86	0.100	0.500	10			085758-018	EPA 353.2
MWL-MW4	Alkalinity, Total	219	0.725	1.00	NE	B		085770-016	SM 2320B
16-Apr-08	Bromide	0.354	0.067	0.200	NE			085770-016	SW846 9056
	Chloride	49.1	0.660	2.00	NE			085770-016	SW846 9056
	Fluoride	0.893	0.033	0.100	4.0			085770-016	SW846 9056
	Sulfate	39.7	0.100	0.400	NE			085770-016	SW846 9056
	Nitrate plus Nitrite as N	1.09	0.050	0.250	10			085770-018	EPA 353.2
MWL-MW5	Alkalinity, Total	317	0.725	1.00	NE	B		085775-016	SM 2320B
10-Apr-08	Bromide	0.496	0.067	0.200	NE			085775-016	SW846 9056
	Chloride	84.2	0.660	2.00	NE			085775-016	SW846 9056
	Fluoride	0.697	0.033	0.100	4.0			085775-016	SW846 9056
	Sulfate	53.0	1.00	4.00	NE			085775-016	SW846 9056
	Nitrate plus Nitrite as N	1.37	0.100	0.500	10			085775-018	EPA 353.2
MWL-MW5	Alkalinity, Total	316	0.725	1.00	NE	B		085776-016	SM 2320B
(Duplicate)	Bromide	0.509	0.067	0.200	NE			085776-016	SW846 9056
10-Apr-08	Chloride	85.6	0.660	2.00	NE			085776-016	SW846 9056
	Fluoride	0.709	0.033	0.100	4.0			085776-016	SW846 9056
	Sulfate	53.9	1.00	4.00	NE			085776-016	SW846 9056
	Nitrate plus Nitrite as N	1.36	0.100	0.500	10			085776-018	EPA 353.2
MWL-MW6	Alkalinity, Total	298	0.725	1.00	NE	B		085779-016	SM 2320B
08-Apr-08	Bromide	0.469	0.067	0.200	NE			085779-016	SW846 9056
	Chloride	76.0	0.660	2.00	NE			085779-016	SW846 9056
	Fluoride	0.711	0.033	0.100	4.0			085779-016	SW846 9056
	Sulfate	49.9	1.00	4.00	NE			085779-016	SW846 9056
	Nitrate plus Nitrite as N	1.64	0.050	0.250	10			085779-018	EPA 353.2

Refer to footnotes on page 4A-50.

Table 4A-2
Summary of Alkalinity, Anions, and Nitrate plus Nitrite Analytical Results
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-BW2	Alkalinity, Total	243	0.725	1.0	NE	B		086358-016	SM 2320B
17-Jul-08	Bromide	0.403	0.067	0.200	NE			086358-016	SW846 9056
	Chloride	62.1	0.660	2.00	NE			086358-016	SW846 9056
	Fluoride	0.659	0.033	0.100	4.0			086358-016	SW846 9056
	Sulfate	44.5	1.00	4.00	NE			086358-016	SW846 9056
	Nitrate plus Nitrite as N	1.98	0.100	0.500	10	B		086358-018	EPA 353.2
MWL-MW7	Alkalinity, Total	212	0.725	1.00	NE	B		086362-016	SM 2320B
16-Jul-08	Bromide	0.276	0.067	0.200	NE			086362-016	SW846 9056
	Chloride	42.0	0.660	2.00	NE			086362-016	SW846 9056
	Fluoride	0.995	0.033	0.100	4.0			086362-016	SW846 9056
	Sulfate	38.8	0.100	0.400	NE			086362-016	SW846 9056
	Nitrate plus Nitrite as N	3.13	0.100	0.500	10	B		086362-018	EPA 353.2
MWL-MW7	Alkalinity, Total	213	0.725	1.00	NE	B		086363-016	SM 2320B
(Duplicate)	Bromide	0.650	0.067	0.200	NE			086363-016	SW846 9056
16-Jul-08	Chloride	41.9	0.660	2.00	NE			086363-016	SW846 9056
	Fluoride	0.986	0.033	0.100	4.0			086363-016	SW846 9056
	Sulfate	38.9	0.100	0.400	NE			086363-016	SW846 9056
	Nitrate plus Nitrite as N	3.21	0.100	0.500	10	B		086363-018	EPA 353.2
MWL-MW8	Alkalinity, Total	220	0.725	1.00	NE	B		086365-016	SM 2320B
14-Jul-08	Bromide	0.350	0.067	0.200	NE			086365-016	SW846 9056
	Chloride	48.8	0.660	2.00	NE			086365-016	SW846 9056
	Fluoride	0.949	0.033	0.100	4.0			086365-016	SW846 9056
	Sulfate	39.6	0.100	0.400	NE			086365-016	SW846 9056
	Nitrate plus Nitrite as N	0.885	0.050	0.250	10	B		086365-018	EPA 353.2
MWL-MW9	Alkalinity, Total	206	0.725	1.00	NE	B		086367-016	SM 2320B
15-Jul-08	Bromide	0.286	0.067	0.200	NE			086367-016	SW846 9056
	Chloride	40.9	0.660	2.00	NE			086367-016	SW846 9056
	Fluoride	1.06	0.033	0.100	4.0			086367-016	SW846 9056
	Sulfate	36.9	1.00	4.00	NE			086367-016	SW846 9056
	Nitrate plus Nitrite as N	2.32	0.100	0.500	10	B		086367-018	EPA 353.2

Refer to footnotes on page 4A-50.

Table 4A-2 *(Concluded)*
Summary of Alkalinity, Anions, and Nitrate plus Nitrite Analytical Results
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-BW2	Alkalinity, Total	241	0.725	1.00	NE			086812-016	SM 2320B
01-Oct-08	Bromide	0.328	0.067	0.200	NE			086812-016	SW846 9056
	Chloride	62.6	0.660	2.00	NE	B		086812-016	SW846 9056
	Fluoride	0.712	0.033	0.100	4.0			086812-016	SW846 9056
	Sulfate	44.5	1.00	4.00	NE			086812-016	SW846 9056
	Nitrate plus Nitrite as N	2.34	0.050	0.250	10	B		086812-018	EPA 353.2
MWL-BW2	Alkalinity, Total	241	0.725	1.00	NE			086813-016	SM 2320B
(Duplicate)	Bromide	0.331	0.067	0.200	NE			086813-016	SW846 9056
01-Oct-08	Chloride	62.3	0.660	2.00	NE	B		086813-016	SW846 9056
	Fluoride	0.719	0.033	0.100	4.0			086813-016	SW846 9056
	Sulfate	45.4	1.00	4.00	NE			086813-016	SW846 9056
	Nitrate plus Nitrite as N	1.98	0.050	0.250	10	B		086813-018	EPA 353.2
MWL-MW7	Alkalinity, Total	212	0.725	1.00	NE			086815-016	SM 2320B
06-Oct-08	Bromide	0.294	0.067	0.200	NE			086815-016	SW846 9056
	Chloride	40.9	0.330	1.00	NE			086815-016	SW846 9056
	Fluoride	1.02	0.033	0.100	4.0			086815-016	SW846 9056
	Sulfate	36.9	0.100	0.400	NE			086815-016	SW846 9056
	Nitrate plus Nitrite as N	3.24	0.100	0.500	10	B	0.060U	086815-018	EPA 353.2
MWL-MW8	Alkalinity, Total	217	0.725	1.00	NE	B		086817-016	SM 2320B
07-Oct-08	Bromide	0.291	0.067	0.200	NE			086817-016	SW846 9056
	Chloride	45.2	0.330	1.00	NE			086817-016	SW846 9056
	Fluoride	1.02	0.033	0.100	4.0			086817-016	SW846 9056
	Sulfate	35.4	0.100	0.400	NE			086817-016	SW846 9056
	Nitrate plus Nitrite as N	1.36	0.050	0.250	10	B	0.060U	086817-018	EPA 353.2
MWL-MW9	Alkalinity, Total	210	0.725	1.00	NE			086820-016	SM 2320B
08-Oct-08	Bromide	0.292	0.067	0.200	NE			086820-016	SW846 9056
	Chloride	40.9	0.330	1.00	NE			086820-016	SW846 9056
	Fluoride	0.952	0.033	0.100	4.0			086820-016	SW846 9056
	Sulfate	37.5	1.00	4.00	NE			086820-016	SW846 9056
	Nitrate plus Nitrite as N	2.03	0.050	0.250	10	B	0.060U	086820-018	EPA 353.2

Refer to footnotes on page 4A-50.

Table 4A-3
Summary of Detected Volatile Organic Compounds and Semivolatile Organic Compounds
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW4 16-Apr-08	Acetone	3.82	1.25	5.00	NE	J	J-	085770-001	SW846 8260
MWL-MW6 08-Apr-08	Acetone	2.31	1.25	5.00	NE	J	J+	085779-001	SW846 8260
MWL-MW9 15-Jul-08	Toluene	0.510	0.250	1.00	1000	J		086367-001	SW846 8260

Refer to footnotes on page 4A-50.

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

Calendar Year 2008

Analyte	MDL[b] (µg/L)	Analytical Method[g]	Analyte	MDL[b] (µg/L)	Analytical Method[g]
1,1,1-Trichloroethane	0.300 – 0.325	SW846-8260	2-Nitrophenol	2.00 - 2.41	SW846-8270
1,1,2,2-Tetrachloroethane	0.250	SW846-8260	3,3'-Dichlorobenzidine	1.00 - 1.20	SW846-8270
1,1,2-Trichloroethane	0.250	SW846-8260	3-Nitroaniline	2.00 - 2.41	SW846-8270
1,1-Dichloroethane	0.300	SW846-8260	4-Bromophenyl phenyl ether	2.00 - 2.41	SW846-8270
1,1-Dichloroethene	0.300	SW846-8260	4-Chloro-3-methylphenol	2.00 - 2.41	SW846-8270
1,2-Dichloroethane	0.250	SW846-8260	4-Chlorobenzenamine	2.00 - 2.41	SW846-8270
1,2-Dichloropropane	0.250	SW846-8260	4-Chlorophenyl phenyl ether	2.00 - 2.41	SW846-8270
2-Butanone	1.25	SW846-8260	4-Nitroaniline	3.00 - 3.61	SW846-8270
2-Hexanone	1.25	SW846-8260	4-Nitrophenol	2.00 - 2.41	SW846-8270
4-methyl-, 2-Pentanone	1.25	SW846-8260	Acenaphthene	0.310 - 0.373	SW846-8270
Acetone	1.25 – 5.00	SW846-8260	Acenaphthylene	0.200 - 0.241	SW846-8270
Benzene	0.300 – 1.00	SW846-8260	Anthracene	0.200 - 0.241	SW846-8270
Bromodichloromethane	0.250	SW846-8260	Benzo(a)anthracene	0.200 - 0.241	SW846-8270
Bromoform	0.250	SW846-8260	Benzo(a)pyrene	0.200 - 0.241	SW846-8270
Bromomethane	0.500	SW846-8260	Benzo(b)fluoranthene	0.200 - 0.241	SW846-8270
Carbon disulfide	1.25	SW846-8260	Benzo(ghi)perylene	0.200 - 0.241	SW846-8270
Carbon tetrachloride	0.250 – 0.260	SW846-8260	Benzo(k)fluoranthene	0.200 - 0.241	SW846-8270
Chlorobenzene	0.250	SW846-8260	Butylbenzyl phthalate	2.00 - 2.41	SW846-8270
Chloroethane	0.300 - 0.500	SW846-8260	Carbazole	0.200 - 0.241	SW846-8270
Chloroform	0.250	SW846-8260	Chrysene	0.200 - 0.241	SW846-8270
Chloromethane	0.300 - 0.500	SW846-8260	Di-n-butyl phthalate	2.00 - 2.41	SW846-8270
Dibromochloromethane	0.250 – 0.260	SW846-8260	Di-n-octyl phthalate	3.00 - 3.61	SW846-8270
Ethyl benzene	0.250	SW846-8260	Dibenz[a,h]anthracene	0.200 - 0.241	SW846-8270
Methylene chloride	2.00 – 5.00	SW846-8260	Dibenzofuran	2.00 - 2.41	SW846-8270
Styrene	0.250	SW846-8260	Diethylphthalate	2.00 - 2.41	SW846-8270
Tetrachloroethene	0.250 – 0.450	SW846-8260	Dimethylphthalate	2.00 - 2.41	SW846-8270
Toluene	0.250 – 1.00	SW846-8260	Dinitro-o-cresol	3.00 - 3.61	SW846-8270
Trichloroethene	0.250	SW846-8260	Diphenyl amine	3.00 - 3.61	SW846-8270
Vinyl acetate	1.50 – 5.00	SW846-8260	Fluoranthene	0.200 - 0.241	SW846-8270
Vinyl chloride	0.500	SW846-8260	Fluorene	0.200 - 0.241	SW846-8270
Xylene	0.250 – 0.600	SW846-8260	Hexachlorobenzene	2.00 - 2.41	SW846-8270
cis-1,2-Dichloroethene	0.300	SW846-8260	Hexachlorobutadiene	2.00 - 2.41	SW846-8270
cis-1,3-Dichloropropene	0.250	SW846-8260	Hexachlorocyclopentadiene	2.00 - 2.41	SW846-8270
trans-1,2-Dichloroethene	0.300	SW846-8260	Hexachloroethane	2.00 - 2.41	SW846-8270
trans-1,3-Dichloropropene	0.250	SW846-8260	Indeno(1,2,3-c,d)pyrene	0.200 - 0.241	SW846-8270
1,2,4-Trichlorobenzene	2.00 - 2.41	SW846-8270	Isophorone	2.00 - 2.41	SW846-8270
1,2-Dichlorobenzene	2.00 - 2.41	SW846-8270	Naphthalene	0.300 - 0.361	SW846-8270
1,3-Dichlorobenzene	2.00 - 2.41	SW846-8270	Nitro-benzene	3.00 - 3.61	SW846-8270
1,4-Dichlorobenzene	2.00 - 2.41	SW846-8270	Pentachlorophenol	2.00 - 2.41	SW846-8270
2,4,5-Trichlorophenol	1.00 - 1.20	SW846-8270	Phenanthrene	0.200 - 0.241	SW846-8270
2,4,6-Trichlorophenol	2.00 - 2.41	SW846-8270	Phenol	1.00 - 1.20	SW846-8270
2,4-Dichlorophenol	2.00 - 2.41	SW846-8270	Pyrene	0.300 - 0.361	SW846-8270
2,4-Dimethylphenol	2.00 - 2.41	SW846-8270	bis(2-Chloroethoxy)methane	3.00 - 3.61	SW846-8270
2,4-Dinitrophenol	10.0 – 12.0	SW846-8270	bis(2-Chloroethyl)ether	2.00 - 2.41	SW846-8270
2,4-Dinitrotoluene	2.00 - 2.41	SW846-8270	bis(2-Ethylhexyl)phthalate	2.00 - 2.41	SW846-8270
2,6-Dinitrotoluene	2.00 - 2.41	SW846-8270	bis-Chloroisopropyl ether	2.00 - 2.41	SW846-8270
2-Chloronaphthalene	0.350 - 0.422	SW846-8270	m,p-Cresol	3.00 - 3.61	SW846-8270
2-Chlorophenol	2.00 - 2.41	SW846-8270	n-Nitrosodipropylamine	2.00 - 2.41	SW846-8270
2-Methylnaphthalene	0.300 - 0.361	SW846-8270	o-Cresol	2.00 - 2.41	SW846-8270
2-Nitroaniline	2.00 - 2.41	SW846-8270			

Refer to footnotes on page 4A-50.

Table 4A-5
Summary of Perchlorate Results
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Perchlorate Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-BW2 09-Apr-08	ND	0.004	0.012	NE	U		085758-020	EPA 314.0
MWL-BW2 17-Jul-08	ND	0.004	0.012	NE	U		086358-020	EPA 314.0
MWL-MW7 16-Jul-08	ND	0.004	0.012	NE	U		086362-020	EPA 314.0
MWL-MW7 (Duplicate) 16-Jul-08	ND	0.004	0.012	NE	U		086363-020	EPA 314.0
MWL-MW8 14-Jul-08	ND	0.004	0.012	NE	U		086365-020	EPA 314.0
MWL-MW9 15-Jul-08	ND	0.004	0.012	NE	U		086367-020	EPA 314.0
MWL-BW2 01-Oct-08	ND	0.004	0.012	NE	U		086812-020	EPA 314.0
MWL-BW2 (Duplicate) 01-Oct-08	ND	0.004	0.012	NE	U		086813-020	EPA 314.0
MWL-MW7 06-Oct-08	ND	0.004	0.012	NE	U		086815-020	EPA 314.0
MWL-MW8 07-Oct-08	ND	0.004	0.012	NE	U		086817-020	EPA 314.0
MWL-MW9 08-Oct-08	ND	0.004	0.012	NE	U		086820-020	EPA 314.0

Refer to footnotes on page 4A-50.

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

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-BW2	Aluminum	0.0861	0.010	0.020	NE			085758-009	SW846 6020
16-Apr-08	Antimony	ND	0.0005	0.002	0.006	B, U		085758-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	B, U		085758-009	SW846 6020
	Barium	0.0952	0.0005	0.002	2.00			085758-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		085758-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		085758-009	SW846 6020
	Calcium	63.2	0.100	0.500	NE			085758-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		085758-009	SW846 6020
	Cobalt	0.000366	0.0001	0.001	NE	B, J	0.00094U	085758-009	SW846 6020
	Copper	0.00112	0.0003	0.001	NE			085758-009	SW846 6020
	Iron	0.716	0.0100	0.025	NE	B		085758-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		085758-009	SW846 6020
	Magnesium	23.0	0.025	0.075	NE			085758-009	SW846 6020
	Manganese	0.0199	0.001	0.005	NE			085758-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	085758-009	SW846 7470
	Nickel	0.00094	0.0005	0.002	NE	J		085758-009	SW846 6020
	Potassium	3.49	0.080	0.300	NE			085758-009	SW846 6020
	Selenium	0.00136	0.001	0.005	0.050	J		085758-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U	UJ	085758-009	SW846 6020
	Sodium	61.9	0.400	1.25	NE			085758-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		085758-009	SW846 6020
	Uranium-235	0.000049	0.00001	0.00007	0.030	J		085758-009	SW846 6020
	Uranium-238	0.00661	0.00005	0.0002	0.030			085758-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		085758-009	SW846 6020
	Zinc	0.00342	0.0026	0.010	NE	J		085758-009	SW846 6020

Refer to footnotes on page 4A-50.

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

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW4	Aluminum	ND	0.010	0.020	NE	U		085770-009	SW846 6020
16-Apr-08	Antimony	ND	0.0005	0.002	0.006	U		085770-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		085770-009	SW846 6020
	Barium	0.105	0.0005	0.002	2.00			085770-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		085770-009	SW846 6020
	Cadmium	0.000136	0.00011	0.001	0.005	J		085770-009	SW846 6020
	Calcium	61.7	0.100	0.500	NE			085770-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		085770-009	SW846 6020
	Cobalt	0.000547	0.0001	0.001	NE	J		085770-009	SW846 6020
	Copper	0.000914	0.0003	0.001	NE	J		085770-009	SW846 6020
	Iron	0.569	0.010	0.025	NE			085770-009	SW846 6020
	Lead	0.000722	0.0005	0.002	NE	J		085770-009	SW846 6020
	Magnesium	19.1	0.005	0.015	NE			085770-009	SW846 6020
	Manganese	0.0542	0.001	0.005	NE			085770-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	085770-009	SW846 7470
	Molybdenum	0.00903	0.0001	0.0005	NE			085770-009	SW846 6020
	Nickel	0.00506	0.0005	0.002	NE			085770-009	SW846 6020
	Potassium	4.28	0.080	0.300	NE			085770-009	SW846 6020
	Selenium	0.00144	0.001	0.005	0.050	J		085770-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		085770-009	SW846 6020
	Sodium	45.0	0.080	0.250	NE			085770-009	SW846 6020
	Thallium	0.00039	0.0003	0.001	0.002	J		085770-009	SW846 6020
	Uranium-235	0.000055	0.00001	0.00007	0.030	J		085770-009	SW846 6020
	Uranium-238	0.00759	0.00005	0.0002	0.030			085770-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		085770-009	SW846 6020
	Zinc	0.010	0.0026	0.010	NE			085770-009	SW846 6020

Refer to footnotes on page 4A-50.

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

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW5	Aluminum	0.0135	0.010	0.020	NE	J		085775-009	SW846 6020
10-Apr-08	Antimony	ND	0.0005	0.002	0.006	U		085775-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		085775-009	SW846 6020
	Barium	0.128	0.0005	0.002	2.00			085775-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		085775-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		085775-009	SW846 6020
	Calcium	94.5	0.100	0.500	NE	B		085775-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		085775-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		085775-009	SW846 6020
	Copper	0.00122	0.0003	0.001	NE	B	0.0032U	085775-009	SW846 6020
	Iron	0.129	0.010	0.025	NE	B		085775-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		085775-009	SW846 6020
	Magnesium	28.1	0.005	0.015	NE			085775-009	SW846 6020
	Manganese	0.0124	0.001	0.005	NE			085775-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	085775-009	SW846 7470
	Molybdenum	0.00336	0.0001	0.0005	NE			085775-009	SW846 6020
	Nickel	0.00199	0.0005	0.002	NE	J		085775-009	SW846 6020
	Potassium	5.57	0.080	0.300	NE			085775-009	SW846 6020
	Selenium	0.00115	0.001	0.005	0.050	J		085775-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		085775-009	SW846 6020
	Sodium	70.1	0.400	1.25	NE			085775-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		085775-009	SW846 6020
	Uranium-235	0.000063	0.00001	0.00007	0.030	J	J+	085775-009	SW846 6020
	Uranium-238	0.009	0.00005	0.0002	0.030			085775-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		085775-009	SW846 6020
	Zinc	0.00435	0.0026	0.010	NE	J		085775-009	SW846 6020

Refer to footnotes on page 4A-50.

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

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW5 (Duplicate)	Aluminum	0.0114	0.010	0.020	NE	J		085776-009	SW846 6020
10-Apr-08	Antimony	ND	0.0005	0.002	0.006	U		085776-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		085776-009	SW846 6020
	Barium	0.127	0.0005	0.002	2.00			085776-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		085776-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		085776-009	SW846 6020
	Calcium	90.2	0.100	0.500	NE	B		085776-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		085776-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		085776-009	SW846 6020
	Copper	0.00125	0.0003	0.001	NE	B	0.0032U	085776-009	SW846 6020
	Iron	0.121	0.010	0.025	NE	B		085776-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		085776-009	SW846 6020
	Magnesium	29.0	0.005	0.015	NE			085776-009	SW846 6020
	Manganese	0.0107	0.001	0.005	NE			085776-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	085776-009	SW846 7470
	Molybdenum	0.00325	0.0001	0.0005	NE			085776-009	SW846 6020
	Nickel	0.00185	0.0005	0.002	NE	J		085776-009	SW846 6020
	Potassium	5.42	0.080	0.300	NE			085776-009	SW846 6020
	Selenium	0.00181	0.001	0.005	0.050	J		085776-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		085776-009	SW846 6020
	Sodium	64.1	0.400	1.25	NE			085776-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		085776-009	SW846 6020
	Uranium-235	0.000065	0.00001	0.00007	0.030	J	J+	085776-009	SW846 6020
	Uranium-238	0.00876	0.00005	0.0002	0.030			085776-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		085776-009	SW846 6020
	Zinc	0.00318	0.0026	0.010	NE	J		085776-009	SW846 6020

Refer to footnotes on page 4A-50.

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

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW6	Aluminum	ND	0.010	0.020	NE	U		085779-009	SW846 6020
08-Apr-08	Antimony	ND	0.0005	0.002	0.006	B, U		085779-009	SW846 6020
	Arsenic	0.00295	0.0015	0.005	0.010	B, J		085779-009	SW846 6020
	Barium	0.115	0.0025	0.010	2.00			085779-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		085779-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		085779-009	SW846 6020
	Calcium	81.5	0.100	0.500	NE			085779-009	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		085779-009	SW846 6020
	Cobalt	0.000347	0.0001	0.001	NE	B, J	0.00094U	085779-009	SW846 6020
	Copper	0.00138	0.0003	0.001	NE			085779-009	SW846 6020
	Iron	0.675	0.010	0.025	NE	B		085779-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		085779-009	SW846 6020
	Magnesium	29.2	0.025	0.075	NE			085779-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		085779-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	085779-009	SW846 6020
	Molybdenum	0.00274	0.0001	0.0005	NE			085779-009	SW846 6020
	Nickel	0.00111	0.0005	0.002	NE	J	NJ-	085779-009	SW846 6020
	Potassium	4.44	0.080	0.300	NE			085779-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		085779-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U	UJ	085779-009	SW846 6020
	Sodium	63.5	0.400	1.25	NE			085779-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		085779-009	SW846 6020
	Uranium-235	0.000059	0.00001	0.00007	0.030	J		085779-009	SW846 6020
	Uranium-238	0.00856	0.00005	0.0002	0.030			085779-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		085779-009	SW846 6020
	Zinc	0.00287	0.0026	0.010	NE	J		085779-009	SW846 6020

Refer to footnotes on page 4A-50.

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

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-BW2	Aluminum	0.0449	0.005	0.015	NE			086358-009	SW846 6020
17-Jul-08	Antimony	ND	0.0005	0.002	0.006	U		086358-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086358-009	SW846 6020
	Barium	0.118	0.0005	0.002	2.00			086358-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086358-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086358-009	SW846 6020
	Calcium	67.3	0.200	1.00	NE	B		086358-009	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086358-009	SW846 6020
	Cobalt	0.000421	0.0001	0.001	NE	J		086358-009	SW846 6020
	Copper	0.00064	0.0003	0.001	NE	J		086358-009	SW846 6020
	Iron	0.340	0.010	0.025	NE			086358-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086358-009	SW846 6020
	Magnesium	20.2	0.0052	0.015	NE			086358-009	SW846 6020
	Manganese	0.0704	0.001	0.005	NE			086358-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086358-009	SW846 7470
	Nickel	0.00133	0.0005	0.002	NE	J		086358-009	SW846 6020
	Potassium	4.36	0.080	0.300	NE			086358-009	SW846 6020
	Selenium	0.00185	0.001	0.005	0.050	J		086358-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086358-009	SW846 6020
	Sodium	48.7	0.080	0.250	NE		J	086358-009	SW846 6020
	Thallium	0.000352	0.0003	0.001	0.002	J		086358-009	SW846 6020
	Uranium	0.00715	0.00005	0.0002	0.030			086358-009	SW846 6020
	Uranium-235	0.00005	0.00001	0.00007	0.030	J	J+	086358-009	SW846 6020
	Uranium-238	0.0071	0.00005	0.0002	0.030			086358-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086358-009	SW846 6020
	Zinc	ND	0.0026	0.010	NE	B, U		086358-009	SW846 6020

Refer to footnotes on page 4A-50.

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

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW7	Aluminum	0.00694	0.005	0.015	NE	J		086362-009	SW846 6020
16-Jul-08	Antimony	ND	0.0005	0.002	0.006	B, U		086362-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086362-009	SW846 6020
	Barium	0.104	0.0005	0.002	2.00			086362-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086362-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086362-009	SW846 6020
	Calcium	54.2	0.200	1.00	NE	B		086362-009	SW846 6020
	Chromium	0.0017	0.0015	0.003	0.100	B, J	0.0086U	086362-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		086362-009	SW846 6020
	Copper	0.000792	0.0003	0.001	NE	J		086362-009	SW846 6020
	Iron	0.187	0.010	0.025	NE	B		086362-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086362-009	SW846 6020
	Magnesium	17.4	0.0052	0.015	NE			086362-009	SW846 6020
	Manganese	0.00926	0.001	0.005	NE			086362-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086362-009	SW846 7470
	Nickel	0.0014	0.0005	0.002	NE	J		086362-009	SW846 6020
	Potassium	4.83	0.080	0.300	NE			086362-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		086362-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086362-009	SW846 6020
	Sodium	46.0	0.080	0.250	NE			086362-009	SW846 6020
	Thallium	0.000311	0.0003	0.001	0.002	J		086362-009	SW846 6020
	Uranium	0.00781	0.00005	0.0002	0.030			086362-009	SW846 6020
	Uranium-235	0.000056	0.00001	0.00007	0.030	J	J+	086362-009	SW846 6020
	Uranium-238	0.00775	0.00005	0.0002	0.030			086362-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086362-009	SW846 6020
	Zinc	0.00261	0.0026	0.010	NE	J		086362-009	SW846 6020

Refer to footnotes on page 4A-50.

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

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW7 (Duplicate)	Aluminum	0.0275	0.005	0.015	NE			086363-009	SW846 6020
16-Jul-08	Antimony	ND	0.0005	0.002	0.006	B, U		086363-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086363-009	SW846 6020
	Barium	0.105	0.0005	0.002	2.00			086363-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086363-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086363-009	SW846 6020
	Calcium	54.5	0.200	1.00	NE	B		086363-009	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	B, U		086363-009	SW846 6020
	Cobalt	0.000125	0.0001	0.001	NE	J	UJ	086363-009	SW846 6020
	Copper	0.000876	0.0003	0.001	NE	J		086363-009	SW846 6020
	Iron	0.194	0.010	0.025	NE	B		086363-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086363-009	SW846 6020
	Magnesium	16.8	0.0052	0.015	NE			086363-009	SW846 6020
	Manganese	0.01	0.001	0.005	NE			086363-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086363-009	SW846 7470
	Nickel	0.00129	0.0005	0.002	NE	J		086363-009	SW846 6020
	Potassium	4.97	0.080	0.300	NE			086363-009	SW846 6020
	Selenium	0.00116	0.001	0.005	0.050	J		086363-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086363-009	SW846 6020
	Sodium	42.9	0.080	0.250	NE			086363-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086363-009	SW846 6020
	Uranium	0.00808	0.00005	0.0002	0.030			086363-009	SW846 6020
	Uranium-235	0.000057	0.00001	0.00007	0.030	J	J+	086363-009	SW846 6020
	Uranium-238	0.00803	0.00005	0.0002	0.030			086363-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086363-009	SW846 6020
	Zinc	0.00268	0.0026	0.010	NE	J		086363-009	SW846 6020

Refer to footnotes on page 4A-50.

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

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW8	Aluminum	0.0211	0.005	0.015	NE			086365-009	SW846 6020
14-Jul-08	Antimony	0.000595	0.0005	0.002	0.006	B, J	0.0060U	086365-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086365-009	SW846 6020
	Barium	0.133	0.0005	0.002	2.00			086365-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086365-009	SW846 6020
	Cadmium	0.000195	0.00011	0.001	0.005	J		086365-009	SW846 6020
	Calcium	55.1	0.200	1.00	NE	B		086365-009	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086365-009	SW846 6020
	Cobalt	0.000171	0.0001	0.001	NE	J		086365-009	SW846 6020
	Copper	0.00111	0.0003	0.001	NE			086365-009	SW846 6020
	Iron	0.167	0.010	0.025	NE	B		086365-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086365-009	SW846 6020
	Magnesium	17.3	0.0052	0.015	NE		J	086365-009	SW846 6020
	Manganese	0.238	0.001	0.005	NE			086365-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086365-009	SW846 7470
	Nickel	0.00223	0.0005	0.002	NE			086365-009	SW846 6020
	Potassium	5.80	0.080	0.300	NE			086365-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	B, U		086365-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086365-009	SW846 6020
	Sodium	52.5	0.800	2.50	NE			086365-009	SW846 6020
	Thallium	0.000312	0.0003	0.001	0.002	J		086365-009	SW846 6020
	Uranium	0.00705	0.00005	0.0002	0.030			086365-009	SW846 6020
	Uranium-235	0.000047	0.00001	0.00007	0.030	J	J+	086365-009	SW846 6020
	Uranium-238	0.007	0.00005	0.0002	0.030			086365-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086365-009	SW846 6020
	Zinc	0.00324	0.0026	0.010	NE	B, J	0.030U	086365-009	SW846 6020

Refer to footnotes on page 4A-50.

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

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW9	Aluminum	0.104	0.005	0.015	NE			086367-009	SW846 6020
15-Jul-08	Antimony	ND	0.0005	0.002	0.006	B, U		086367-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086367-009	SW846 6020
	Barium	0.101	0.0005	0.002	2.00			086367-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086367-009	SW846 6020
	Cadmium	0.000127	0.00011	0.001	0.005	J		086367-009	SW846 6020
	Calcium	51.8	0.200	1.00	NE	B		086367-009	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	B, U		086367-009	SW846 6020
	Cobalt	0.000203	0.0001	0.001	NE	J	UJ	086367-009	SW846 6020
	Copper	0.00105	0.0003	0.001	NE			086367-009	SW846 6020
	Iron	0.300	0.010	0.025	NE	B		086367-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086367-009	SW846 6020
	Magnesium	16.8	0.0052	0.015	NE			086367-009	SW846 6020
	Manganese	0.023	0.001	0.005	NE			086367-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086367-009	SW846 7470
	Nickel	0.00139	0.0005	0.002	NE	J		086367-009	SW846 6020
	Potassium	5.54	0.080	0.300	NE			086367-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		086367-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086367-009	SW846 6020
	Sodium	39.5	0.080	0.250	NE			086367-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086367-009	SW846 6020
	Uranium	0.00879	0.00005	0.0002	0.030			086367-009	SW846 6020
	Uranium-235	0.000061	0.00001	0.00007	0.030	J	J+	086367-009	SW846 6020
	Uranium-238	0.00873	0.00005	0.0002	0.030			086367-009	SW846 6020
	Vanadium	ND	0.030	0.100	NE	U		086367-009	SW846 6020
	Zinc	0.00396	0.0026	0.010	NE	J		086367-009	SW846 6020

Refer to footnotes on page 4A-50.

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

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-BW2	Aluminum	0.0166	0.005	0.015	NE	B	0.042U	086812-009	SW846 6020
01-Oct-08	Antimony	ND	0.0005	0.002	0.006	U		086812-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086812-009	SW846 6020
	Barium	0.0984	0.005	0.020	2.00			086812-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086812-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086812-009	SW846 6020
	Calcium	67.3	0.200	1.00	NE	B		086812-009	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086812-009	SW846 6020
	Cobalt	0.0001	0.0001	0.001	NE	J		086812-009	SW846 6020
	Copper	0.000713	0.0003	0.001	NE	J		086812-009	SW846 6020
	Iron	0.243	0.010	0.025	NE	B		086812-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086812-009	SW846 6020
	Magnesium	21.6	0.0052	0.015	NE			086812-009	SW846 6020
	Manganese	0.00267	0.001	0.005	NE	J		086812-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		086812-009	SW846 7470
	Nickel	0.000983	0.0005	0.002	NE	J		086812-009	SW846 6020
	Potassium	4.15	0.080	0.300	NE			086812-009	SW846 6020
	Selenium	0.00156	0.001	0.005	0.050	J		086812-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086812-009	SW846 6020
	Sodium	56.2	0.800	2.50	NE			086812-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086812-009	SW846 6020
	Uranium	0.00697	0.00005	0.0002	0.030			086812-009	SW846 6020
	Uranium-235	0.000047	0.00001	0.00007	0.030	J	J+	086812-009	SW846 6020
	Uranium-238	0.00692	0.00005	0.0002	0.030		J	086812-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086812-009	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		086812-009	SW846 6020

Refer to footnotes on page 4A-50.

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

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-BW2 (Duplicate)	Aluminum	0.00578	0.005	0.015	NE	B, J	0.042U	086813-009	SW846 6020
01-Oct-08	Antimony	ND	0.0005	0.002	0.006	U		086813-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086813-009	SW846 6020
	Barium	0.0962	0.005	0.020	2.00			086813-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086813-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086813-009	SW846 6020
	Calcium	68.1	0.200	1.00	NE	B		086813-009	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086813-009	SW846 6020
	Cobalt	0.000113	0.0001	0.001	NE	J		086813-009	SW846 6020
	Copper	0.0005	0.0003	0.001	NE	J		086813-009	SW846 6020
	Iron	0.240	0.010	0.025	NE	B		086813-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086813-009	SW846 6020
	Magnesium	21.9	0.0052	0.015	NE			086813-009	SW846 6020
	Manganese	0.00262	0.001	0.005	NE	J		086813-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		086813-009	SW846 7470
	Nickel	0.00104	0.0005	0.002	NE	J		086813-009	SW846 6020
	Potassium	3.98	0.080	0.300	NE			086813-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		086813-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086813-009	SW846 6020
	Sodium	56.2	0.800	2.50	NE			086813-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086813-009	SW846 6020
	Uranium	0.00696	0.00005	0.0002	0.030			086813-009	SW846 6020
	Uranium-235	0.000047	0.00001	0.00007	0.030	J	J+	086813-009	SW846 6020
	Uranium-238	0.00692	0.00005	0.0002	0.030		J	086813-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086813-009	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		086813-009	SW846 6020

Refer to footnotes on page 4A-50.

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

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW7	Aluminum	0.0162	0.005	0.015	NE	B	0.043U	086815-009	SW846 6020
06-Oct-08	Antimony	ND	0.0005	0.002	0.006	U		086815-009	SW846 6020
	Arsenic	0.00253	0.0015	0.005	0.010	B, J	0.0087U	086815-009	SW846 6020
	Barium	0.103	0.0005	0.002	2.00			086815-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086815-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086815-009	SW846 6020
	Calcium	53.9	0.200	1.00	NE			086815-009	SW846 6020
	Chromium	0.00164	0.0015	0.003	0.100	J		086815-009	SW846 6020
	Cobalt	0.000185	0.0001	0.001	NE	J		086815-009	SW846 6020
	Copper	0.000992	0.0003	0.001	NE	J		086815-009	SW846 6020
	Iron	0.250	0.010	0.025	NE			086815-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086815-009	SW846 6020
	Magnesium	19.4	0.052	0.150	NE		J	086815-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		086815-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	086815-009	SW846 7470
	Nickel	0.00119	0.0005	0.002	NE	J		086815-009	SW846 6020
	Potassium	5.03	0.080	0.300	NE			086815-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		086815-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086815-009	SW846 6020
	Sodium	39.6	0.080	0.250	NE		J	086815-009	SW846 6020
	Thallium	0.000376	0.0003	0.001	0.002	J		086815-009	SW846 6020
	Uranium	0.00791	0.00005	0.0002	0.030			086815-009	SW846 6020
	Uranium-235	0.000056	0.00001	0.00007	0.030	J	J+	086815-009	SW846 6020
	Uranium-238	0.00785	0.00005	0.0002	0.030			086815-009	SW846 6020
	Vanadium	0.00651	0.003	0.010	NE	J		086815-009	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		086815-009	SW846 6020

Refer to footnotes on page 4A-50.

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

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW8	Aluminum	0.216	0.005	0.015	NE	B		086817-009	SW846 6020
07-Oct-08	Antimony	ND	0.0005	0.002	0.006	U		086817-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086817-009	SW846 6020
	Barium	0.118	0.0005	0.002	2.00			086817-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086817-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086817-009	SW846 6020
	Calcium	55.1	0.200	1.00	NE			086817-009	SW846 6020
	Chromium	0.00201	0.0015	0.003	0.100	J		086817-009	SW846 6020
	Cobalt	0.000226	0.0001	0.001	NE	J		086817-009	SW846 6020
	Copper	0.00147	0.0003	0.001	NE			086817-009	SW846 6020
	Iron	0.483	0.010	0.025	NE			086817-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086817-009	SW846 6020
	Magnesium	20.1	0.052	0.150	NE		J	086817-009	SW846 6020
	Manganese	0.0221	0.001	0.005	NE			086817-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	086817-009	SW846 7470
	Nickel	0.00183	0.0005	0.002	NE	J		086817-009	SW846 6020
	Potassium	6.51	0.080	0.300	NE			086817-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		086817-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086817-009	SW846 6020
	Sodium	49.2	0.080	0.250	NE		J	086817-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086817-009	SW846 6020
	Uranium	0.00809	0.00005	0.0002	0.030			086817-009	SW846 6020
	Uranium-235	0.000058	0.00001	0.00007	0.030	J	J+	086817-009	SW846 6020
	Uranium-238	0.00803	0.00005	0.0002	0.030			086817-009	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086817-009	SW846 6020
	Zinc	0.00387	0.0026	0.010	NE	J		086817-009	SW846 6020

Refer to footnotes on page 4A-50.

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

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW9	Aluminum	0.140	0.005	0.015	NE	B		086820-009	SW846 6020
08-Oct-08	Antimony	ND	0.0005	0.002	0.006	U		086820-009	SW846 6020
	Arsenic	0.00365	0.0015	0.005	0.010	B, J	0.0087U	086820-009	SW846 6020
	Barium	0.0858	0.0005	0.002	2.00			086820-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086820-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086820-009	SW846 6020
	Calcium	51.2	0.200	1.00	NE			086820-009	SW846 6020
	Chromium	0.00158	0.0015	0.003	0.100	J		086820-009	SW846 6020
	Cobalt	0.000255	0.0001	0.001	NE	J		086820-009	SW846 6020
	Copper	0.00102	0.0003	0.001	NE			086820-009	SW846 6020
	Iron	0.394	0.010	0.025	NE			086820-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086820-009	SW846 6020
	Magnesium	18.9	0.052	0.150	NE		J	086820-009	SW846 6020
	Manganese	0.0189	0.001	0.005	NE			086820-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	086820-009	SW846 7470
	Nickel	0.00122	0.0005	0.002	NE	J		086820-009	SW846 6020
	Potassium	4.67	0.080	0.300	NE			086820-009	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		086820-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086820-009	SW846 6020
	Sodium	40.7	0.080	0.250	NE		J	086820-009	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086820-009	SW846 6020
	Uranium	0.00846	0.00005	0.0002	0.030			086820-009	SW846 6020
	Uranium-235	0.000059	0.00001	0.00007	0.030	J	J+	086820-009	SW846 6020
	Uranium-238	0.0084	0.00005	0.0002	0.030			086820-009	SW846 6020
	Vanadium	0.00849	0.003	0.010	NE	J		086820-009	SW846 6020
	Zinc	0.00324	0.0026	0.010	NE	J		086820-009	SW846 6020

Refer to footnotes on page 4A-50.

Table 4A-7
Summary of Total Metal Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-BW2	Aluminum	ND	0.010	0.020	NE	U		085758-010	SW846 6020
09-Apr-08	Antimony	ND	0.0005	0.002	0.006	B, U		085758-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	B, U		085758-010	SW846 6020
	Barium	0.0969	0.0005	0.002	2.00			085758-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		085758-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		085758-010	SW846 6020
	Calcium	63.3	0.100	0.500	NE			085758-010	SW846 6020
	Chromium	0.00254	0.0025	0.010	0.100	J	0.013U	085758-010	SW846 6020
	Cobalt	0.000362	0.0001	0.001	NE	B, J	0.00094U	085758-010	SW846 6020
	Copper	0.00109	0.0003	0.001	NE			085758-010	SW846 6020
	Iron	0.626	0.010	0.025	NE	B		085758-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		085758-010	SW846 6020
	Magnesium	22.0	0.005	0.015	NE			085758-010	SW846 6020
	Manganese	0.0227	0.001	0.005	NE			085758-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	085758-010	SW846 7470
	Molybdenum	0.0021	0.0001	0.0005	NE			085758-010	SW846 6020
	Nickel	0.00102	0.0005	0.002	NE	J	NJ-	085758-010	SW846 6020
	Potassium	3.56	0.080	0.300	NE			085758-010	SW846 6020
	Selenium	0.00108	0.001	0.005	0.050	J		085758-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U	UJ	085758-010	SW846 6020
	Sodium	57.0	0.400	1.25	NE			085758-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		085758-010	SW846 6020
	Uranium-235	0.000047	0.00001	0.00007	0.030	J		085758-010	SW846 6020
	Uranium-238	0.00679	0.00005	0.0002	0.030			085758-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		085758-010	SW846 6020
	Zinc	0.00307	0.0026	0.010	NE	J		085758-010	SW846 6020

Refer to footnotes on page 4A-50.

Table 4A-7
Summary of Total Metal Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW4	Aluminum	ND	0.010	0.020	NE	U		085770-010	SW846 6020
16-Apr-08	Antimony	ND	0.0005	0.002	0.006	U		085770-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		085770-010	SW846 6020
	Barium	0.110	0.0005	0.002	2.00			085770-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		085770-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		085770-010	SW846 6020
	Calcium	57.2	0.100	0.500	NE			085770-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		085770-010	SW846 6020
	Cobalt	0.000536	0.0001	0.001	NE	J		085770-010	SW846 6020
	Copper	0.000778	0.0003	0.001	NE	J		085770-010	SW846 6020
	Iron	0.390	0.010	0.025	NE			085770-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		085770-010	SW846 6020
	Magnesium	18.8	0.005	0.015	NE			085770-010	SW846 6020
	Manganese	0.0552	0.001	0.005	NE			085770-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	085770-010	SW846 7470
	Molybdenum	0.00866	0.0001	0.0005	NE			085770-010	SW846 6020
	Nickel	0.00498	0.0005	0.002	NE			085770-010	SW846 6020
	Potassium	4.60	0.080	0.300	NE			085770-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		085770-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		085770-010	SW846 6020
	Sodium	45.5	0.080	0.250	NE			085770-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		085770-010	SW846 6020
	Uranium-235	0.000057	0.00001	0.00007	0.030	J		085770-010	SW846 6020
	Uranium-238	0.00785	0.00005	0.0002	0.030			085770-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		085770-010	SW846 6020
	Zinc	0.00794	0.0026	0.010	NE	J		085770-010	SW846 6020

Refer to footnotes on page 4A-50.

Table 4A-7
Summary of Total Metal Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW5	Aluminum	ND	0.010	0.020	NE	U		085775-010	SW846 6020
10-Apr-08	Antimony	ND	0.0005	0.002	0.006	U		085775-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		085775-010	SW846 6020
	Barium	0.126	0.0005	0.002	2.00			085775-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		085775-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		085775-010	SW846 6020
	Calcium	93.0	0.100	0.500	NE	B		085775-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		085775-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		085775-010	SW846 6020
	Copper	0.00233	0.0003	0.001	NE	B	0.0032U	085775-010	SW846 6020
	Iron	0.110	0.010	0.025	NE	B		085775-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		085775-010	SW846 6020
	Magnesium	28.4	0.005	0.015	NE			085775-010	SW846 6020
	Manganese	0.00801	0.001	0.005	NE			085775-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	085775-010	SW846 7470
	Molybdenum	0.00327	0.0001	0.0005	NE			085775-010	SW846 6020
	Nickel	0.00223	0.0005	0.002	NE			085775-010	SW846 6020
	Potassium	5.51	0.080	0.300	NE			085775-010	SW846 6020
	Selenium	0.00108	0.001	0.005	0.050	J		085775-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		085775-010	SW846 6020
	Sodium	63.7	0.400	1.25	NE			085775-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		085775-010	SW846 6020
	Uranium-235	0.000063	0.00001	0.00007	0.030	J	J+	085775-010	SW846 6020
	Uranium-238	0.00869	0.00005	0.0002	0.030			085775-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		085775-010	SW846 6020
	Zinc	0.00374	0.0026	0.010	NE	J		085775-010	SW846 6020

Refer to footnotes on page 4A-50.

Table 4A-7
Summary of Total Metal Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW5 (Duplicate) 10-Apr-08	Aluminum	ND	0.010	0.020	NE	U		085776-010	SW846 6020
	Antimony	ND	0.0005	0.002	0.006	U		085776-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		085776-010	SW846 6020
	Barium	0.129	0.0005	0.002	2.00			085776-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		085776-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		085776-010	SW846 6020
	Calcium	94.0	0.100	0.500	NE	B		085776-010	SW846 6020
	Chromium	0.0027	0.0025	0.010	0.100	J	0.016U	085776-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		085776-010	SW846 6020
	Copper	0.00127	0.0003	0.001	NE	B	0.0032U	085776-010	SW846 6020
	Iron	0.115	0.010	0.025	NE	B		085776-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		085776-010	SW846 6020
	Magnesium	29.9	0.005	0.015	NE			085776-010	SW846 6020
	Manganese	0.00884	0.001	0.005	NE			085776-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	085776-010	SW846 7470
	Molybdenum	0.00329	0.0001	0.0005	NE			085776-010	SW846 6020
	Nickel	0.00208	0.0005	0.002	NE			085776-010	SW846 6020
	Potassium	5.90	0.080	0.300	NE			085776-010	SW846 6020
	Selenium	0.00145	0.001	0.005	0.050	J		085776-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		085776-010	SW846 6020
	Sodium	64.3	0.400	1.25	NE			085776-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		085776-010	SW846 6020
	Uranium-235	0.000066	0.00001	0.00007	0.030	J	J+	085776-010	SW846 6020
	Uranium-238	0.00892	0.00005	0.0002	0.030			085776-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		085776-010	SW846 6020
	Zinc	0.00333	0.0026	0.010	NE	J		085776-010	SW846 6020

Refer to footnotes on page 4A-50.

Table 4A-7
Summary of Total Metal Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW6	Aluminum	ND	0.010	0.020	NE	U		085779-010	SW846 6020
08-Apr-08	Antimony	ND	0.0005	0.002	0.006	B, U		085779-010	SW846 6020
	Arsenic	0.00169	0.0015	0.005	0.010	B, J		085779-010	SW846 6020
	Barium	0.112	0.0025	0.010	2.00			085779-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		085779-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		085779-010	SW846 6020
	Calcium	77.9	0.100	0.500	NE			085779-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		085779-010	SW846 6020
	Cobalt	0.000329	0.0001	0.001	NE	B, J	0.00094U	085779-010	SW846 6020
	Copper	0.00129	0.0003	0.001	NE			085779-010	SW846 6020
	Iron	0.698	0.010	0.025	NE	B		085779-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		085779-010	SW846 6020
	Magnesium	27.4	0.025	0.075	NE			085779-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		085779-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	085779-010	SW846 6020
	Molybdenum	0.00279	0.0001	0.0005	NE			085779-010	SW846 6020
	Nickel	0.00105	0.0005	0.002	NE	J	NJ-	085779-010	SW846 6020
	Potassium	4.52	0.080	0.300	NE			085779-010	SW846 6020
	Selenium	0.0011	0.001	0.005	0.050	J		085779-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U	UJ	085779-010	SW846 6020
	Sodium	61.9	0.400	1.25	NE			085779-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		085779-010	SW846 6020
	Uranium-235	0.000064	0.00001	0.00007	0.030	J		085779-010	SW846 6020
	Uranium-238	0.00895	0.00005	0.0002	0.030			085779-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		085779-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		085779-010	SW846 6020

Refer to footnotes on page 4A-50.

Table 4A-7
Summary of Total Metal Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-BW2	Aluminum	ND	0.005	0.015	NE	U		086358-010	SW846 6020
17-Jul-08	Antimony	ND	0.0005	0.002	0.006	U		086358-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086358-010	SW846 6020
	Barium	0.116	0.0005	0.002	2.00			086358-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086358-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086358-010	SW846 6020
	Calcium	68.1	0.200	1.00	NE	B		086358-010	SW846 6020
	Chromium	0.00186	0.0015	0.003	0.100	J		086358-010	SW846 6020
	Cobalt	0.000389	0.0001	0.001	NE	J		086358-010	SW846 6020
	Copper	0.000539	0.0003	0.001	NE	J		086358-010	SW846 6020
	Iron	0.273	0.010	0.025	NE			086358-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086358-010	SW846 6020
	Magnesium	21.5	0.0052	0.015	NE			086358-010	SW846 6020
	Manganese	0.0608	0.001	0.005	NE			086358-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086358-010	SW846 7470
	Molybdenum	0.00271	0.0001	0.0005	NE	B		086358-010	SW846 6020
	Nickel	0.00135	0.0005	0.002	NE	J		086358-010	SW846 6020
	Potassium	4.35	0.080	0.300	NE			086358-010	SW846 6020
	Selenium	0.00211	0.001	0.005	0.050	J		086358-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086358-010	SW846 6020
	Sodium	56.3	0.800	2.50	NE		J	086358-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086358-010	SW846 6020
	Uranium	0.0072	0.00005	0.0002	0.030			086358-010	SW846 6020
	Uranium-235	0.00005	0.00001	0.00007	0.030	J	J+	086358-010	SW846 6020
	Uranium-238	0.00715	0.00005	0.0002	0.030			086358-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086358-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	B, U		086358-010	SW846 6020

Refer to footnotes on page 4A-50.

Table 4A-7
Summary of Total Metal Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW7	Aluminum	ND	0.005	0.015	NE	U		086362-010	SW846 6020
16-Jul-08	Antimony	0.000797	0.0005	0.002	0.006	B, J	0.0048U	086362-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086362-010	SW846 6020
	Barium	0.106	0.0005	0.002	2.00			086362-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086362-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086362-010	SW846 6020
	Calcium	51.5	0.200	1.00	NE	B		086362-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	B, U		086362-010	SW846 6020
	Cobalt	0.000114	0.0001	0.001	NE	J	UJ	086362-010	SW846 6020
	Copper	0.00089	0.0003	0.001	NE	J		086362-010	SW846 6020
	Iron	0.127	0.010	0.025	NE	B		086362-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086362-010	SW846 6020
	Magnesium	17.7	0.0052	0.015	NE			086362-010	SW846 6020
	Manganese	0.00914	0.001	0.005	NE			086362-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086362-010	SW846 7470
	Molybdenum	0.0061	0.0001	0.0005	NE			086362-010	SW846 6020
	Nickel	0.00128	0.0005	0.002	NE	J		086362-010	SW846 6020
	Potassium	5.06	0.080	0.300	NE			086362-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		086362-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086362-010	SW846 6020
	Sodium	45.2	0.080	0.250	NE			086362-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086362-010	SW846 6020
	Uranium	0.00818	0.00005	0.0002	0.030			086362-010	SW846 6020
	Uranium-235	0.000056	0.00001	0.00007	0.030	J	J+	086362-010	SW846 6020
	Uranium-238	0.00812	0.00005	0.0002	0.030			086362-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086362-010	SW846 6020
	Zinc	0.0134	0.0026	0.010	NE			086362-010	SW846 6020

Refer to footnotes on page 4A-50.

Table 4A-7
Summary of Total Metal Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW7 (Duplicate)	Aluminum	ND	0.005	0.015	NE	U		086363-010	SW846 6020
16-Jul-08	Antimony	ND	0.0005	0.002	0.006	B, U		086363-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086363-010	SW846 6020
	Barium	0.104	0.0005	0.002	2.00			086363-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086363-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086363-010	SW846 6020
	Calcium	53.3	0.200	1.00	NE	B		086363-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	B, U		086363-010	SW846 6020
	Cobalt	0.000118	0.0001	0.001	NE	J	UJ	086363-010	SW846 6020
	Copper	0.000778	0.0003	0.001	NE	J		086363-010	SW846 6020
	Iron	0.124	0.010	0.025	NE	B		086363-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086363-010	SW846 6020
	Magnesium	17.3	0.0052	0.015	NE			086363-010	SW846 6020
	Manganese	0.00862	0.001	0.005	NE			086363-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086363-010	SW846 7470
	Molybdenum	0.00592	0.0001	0.0005	NE			086363-010	SW846 6020
	Nickel	0.00132	0.0005	0.002	NE	J		086363-010	SW846 6020
	Potassium	4.79	0.080	0.300	NE			086363-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		086363-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086363-010	SW846 6020
	Sodium	42.6	0.080	0.250	NE			086363-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086363-010	SW846 6020
	Uranium	0.00807	0.00005	0.0002	0.030			086363-010	SW846 6020
	Uranium-235	0.000057	0.00001	0.00007	0.030	J	J+	086363-010	SW846 6020
	Uranium-238	0.00801	0.00005	0.0002	0.030			086363-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086363-010	SW846 6020
	Zinc	0.00262	0.0026	0.010	NE	J		086363-010	SW846 6020

Refer to footnotes on page 4A-50.

Table 4A-7
Summary of Total Metal Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW8	Aluminum	ND	0.005	0.015	NE	U		086365-010	SW846 6020
14-Jul-08	Antimony	0.000613	0.0005	0.002	0.006	B, J	0.00060U	086365-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086365-010	SW846 6020
	Barium	0.132	0.0005	0.002	2.00			086365-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086365-010	SW846 6020
	Cadmium	0.000171	0.00011	0.001	0.005	J		086365-010	SW846 6020
	Calcium	53.5	0.200	1.00	NE	B		086365-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086365-010	SW846 6020
	Cobalt	0.000133	0.0001	0.001	NE	J		086365-010	SW846 6020
	Copper	0.000858	0.0003	0.001	NE	J		086365-010	SW846 6020
	Iron	0.125	0.010	0.025	NE	B		086365-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086365-010	SW846 6020
	Magnesium	16.8	0.0052	0.015	NE		J	086365-010	SW846 6020
	Manganese	0.218	0.001	0.005	NE			086365-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086365-010	SW846 7470
	Molybdenum	0.0241	0.0001	0.0005	NE	B		086365-010	SW846 6020
	Nickel	0.00207	0.0005	0.002	NE			086365-010	SW846 6020
	Potassium	5.31	0.080	0.300	NE			086365-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	B, U		086365-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086365-010	SW846 6020
	Sodium	47.3	0.080	0.250	NE			086365-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086365-010	SW846 6020
	Uranium	0.00695	0.00005	0.0002	0.030			086365-010	SW846 6020
	Uranium-235	0.000048	0.00001	0.00007	0.030	J	J+	086365-010	SW846 6020
	Uranium-238	0.0069	0.00005	0.0002	0.030			086365-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086365-010	SW846 6020
	Zinc	0.00342	0.0026	0.010	NE	B, J	0.030U	086365-010	SW846 6020

Refer to footnotes on page 4A-50.

Table 4A-7
Summary of Total Metal Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW9	Aluminum	ND	0.005	0.015	NE	U		086367-010	SW846 6020
15-Jul-08	Antimony	ND	0.0005	0.002	0.006	B, U		086367-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086367-010	SW846 6020
	Barium	0.096	0.0005	0.002	2.00			086367-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086367-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086367-010	SW846 6020
	Calcium	46.4	0.200	1.00	NE	B		086367-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	B, U		086367-010	SW846 6020
	Cobalt	0.000128	0.0001	0.001	NE	J	UJ	086367-010	SW846 6020
	Copper	0.000973	0.0003	0.001	NE	J		086367-010	SW846 6020
	Iron	0.119	0.010	0.025	NE	B		086367-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086367-010	SW846 6020
	Magnesium	13.9	0.0052	0.015	NE			086367-010	SW846 6020
	Manganese	0.019	0.001	0.005	NE			086367-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086367-010	SW846 7470
	Molybdenum	0.0143	0.0001	0.0005	NE			086367-010	SW846 6020
	Nickel	0.00127	0.0005	0.002	NE	J		086367-010	SW846 6020
	Potassium	6.48	0.080	0.300	NE			086367-010	SW846 6020
	Selenium	0.00196	0.001	0.005	0.050	J		086367-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086367-010	SW846 6020
	Sodium	39.0	0.080	0.250	NE			086367-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086367-010	SW846 6020
	Uranium	0.00774	0.00005	0.0002	0.030			086367-010	SW846 6020
	Uranium-235	0.000056	0.00001	0.00007	0.030	J	J+	086367-010	SW846 6020
	Uranium-238	0.00769	0.00005	0.0002	0.030			086367-010	SW846 6020
	Vanadium	ND	0.030	0.100	NE	U		086367-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		086367-010	SW846 6020

Refer to footnotes on page 4A-50.

Table 4A-7
Summary of Total Metal Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-BW2	Aluminum	0.0182	0.005	0.015	NE	B	0.042U	086812-010	SW846 6020
01-Oct-08	Antimony	ND	0.0005	0.002	0.006	U		086812-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086812-010	SW846 6020
	Barium	0.0948	0.005	0.020	2.00			086812-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086812-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086812-010	SW846 6020
	Calcium	65.3	0.200	1.00	NE	B		086812-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086812-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		086812-010	SW846 6020
	Copper	0.000792	0.0003	0.001	NE	J		086812-010	SW846 6020
	Iron	0.232	0.010	0.025	NE	B		086812-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086812-010	SW846 6020
	Magnesium	21.5	0.0052	0.015	NE			086812-010	SW846 6020
	Manganese	0.00216	0.001	0.005	NE	J		086812-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		086812-010	SW846 7470
	Nickel	0.00112	0.0005	0.002	NE	J		086812-010	SW846 6020
	Potassium	4.21	0.080	0.300	NE			086812-010	SW846 6020
	Selenium	0.00188	0.001	0.005	0.050	J		086812-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086812-010	SW846 6020
	Sodium	53.4	0.800	2.50	NE			086812-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086812-010	SW846 6020
	Uranium	0.00705	0.00005	0.0002	0.030			086812-010	SW846 6020
	Uranium-235	0.000051	0.00001	0.00007	0.030	J	J+	086812-010	SW846 6020
	Uranium-238	0.007	0.00005	0.0002	0.030		J	086812-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086812-010	SW846 6020
	Zinc	0.00291	0.0026	0.010	NE	J		086812-010	SW846 6020

Refer to footnotes on page 4A-50.

Table 4A-7
Summary of Total Metal Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-BW2 (Duplicate) 01-Oct-08	Aluminum	0.0799	0.005	0.015	NE	B		086813-010	SW846 6020
	Antimony	ND	0.0005	0.002	0.006	U		086813-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086813-010	SW846 6020
	Barium	0.100	0.005	0.020	2.00			086813-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086813-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086813-010	SW846 6020
	Calcium	70.1	0.200	1.00	NE	B		086813-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086813-010	SW846 6020
	Cobalt	0.000104	0.0001	0.001	NE	J		086813-010	SW846 6020
	Copper	0.00053	0.0003	0.001	NE	J		086813-010	SW846 6020
	Iron	0.234	0.010	0.025	NE	B		086813-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086813-010	SW846 6020
	Magnesium	22.7	0.0052	0.015	NE			086813-010	SW846 6020
	Manganese	0.00211	0.001	0.005	NE	J		086813-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		086813-010	SW846 7470
	Nickel	0.00109	0.0005	0.002	NE	J		086813-010	SW846 6020
	Potassium	3.95	0.080	0.300	NE			086813-010	SW846 6020
	Selenium	0.00199	0.001	0.005	0.050	J		086813-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086813-010	SW846 6020
	Sodium	58.2	0.800	2.50	NE			086813-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086813-010	SW846 6020
	Uranium	0.00724	0.00005	0.0002	0.030			086813-010	SW846 6020
	Uranium-235	0.00005	0.00001	0.00007	0.030	J	J+	086813-010	SW846 6020
	Uranium-238	0.00719	0.00005	0.0002	0.030		J	086813-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086813-010	SW846 6020
	Zinc	0.00285	0.0026	0.010	NE	J		086813-010	SW846 6020

Refer to footnotes on page 4A-50.

Table 4A-7
Summary of Total Metal Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW7	Aluminum	0.0163	0.005	0.015	NE	B	0.043U	086815-010	SW846 6020
06-Oct-08	Antimony	0.000612	0.0005	0.002	0.006	J	0.014U	086815-010	SW846 6020
	Arsenic	0.00211	0.0015	0.005	0.010	B, J	0.0087U	086815-010	SW846 6020
	Barium	0.0973	0.0005	0.002	2.00			086815-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086815-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086815-010	SW846 6020
	Calcium	53.8	0.200	1.00	NE			086815-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086815-010	SW846 6020
	Cobalt	0.000123	0.0001	0.001	NE	J		086815-010	SW846 6020
	Copper	0.00095	0.0003	0.001	NE	J		086815-010	SW846 6020
	Iron	0.218	0.010	0.025	NE			086815-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086815-010	SW846 6020
	Magnesium	18.4	0.052	0.150	NE		J	086815-010	SW846 6020
	Manganese	0.00154	0.001	0.005	NE	J		086815-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	086815-010	SW846 7470
	Nickel	0.00111	0.0005	0.002	NE	J		086815-010	SW846 6020
	Potassium	5.09	0.080	0.300	NE			086815-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		086815-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086815-010	SW846 6020
	Sodium	42.5	0.080	0.250	NE		J	086815-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086815-010	SW846 6020
	Uranium	0.00774	0.00005	0.0002	0.030			086815-010	SW846 6020
	Uranium-235	0.000054	0.00001	0.00007	0.030	J	J+	086815-010	SW846 6020
	Uranium-238	0.00768	0.00005	0.0002	0.030			086815-010	SW846 6020
	Vanadium	0.00462	0.003	0.010	NE	J		086815-010	SW846 6020
	Zinc	0.0133	0.0026	0.010	NE			086815-010	SW846 6020

Refer to footnotes on page 4A-50.

Table 4A-7
Summary of Total Metal Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW8	Aluminum	0.00855	0.005	0.015	NE	B, J	0.043U	086817-010	SW846 6020
07-Oct-08	Antimony	ND	0.0005	0.002	0.006	U		086817-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086817-010	SW846 6020
	Barium	0.117	0.0005	0.002	2.00			086817-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086817-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086817-010	SW846 6020
	Calcium	54.9	0.200	1.00	NE			086817-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086817-010	SW846 6020
	Cobalt	0.000129	0.0001	0.001	NE	J		086817-010	SW846 6020
	Copper	0.00102	0.0003	0.001	NE			086817-010	SW846 6020
	Iron	0.211	0.010	0.025	NE			086817-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086817-010	SW846 6020
	Magnesium	18.3	0.052	0.150	NE		J	086817-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		086817-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	086817-010	SW846 7470
	Nickel	0.00112	0.0005	0.002	NE	J		086817-010	SW846 6020
	Potassium	6.28	0.080	0.300	NE			086817-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		086817-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086817-010	SW846 6020
	Sodium	47.6	0.080	0.250	NE		J	086817-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086817-010	SW846 6020
	Uranium	0.00811	0.00005	0.0002	0.030			086817-010	SW846 6020
	Uranium-235	0.000058	0.00001	0.00007	0.030	J	J+	086817-010	SW846 6020
	Uranium-238	0.00805	0.00005	0.0002	0.030			086817-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086817-010	SW846 6020
	Zinc	0.00388	0.0026	0.010	NE	J		086817-010	SW846 6020

Refer to footnotes on page 4A-50.

Table 4A-7 *(Concluded)*
Summary of Total Metal Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW9	Aluminum	0.00786	0.005	0.015	NE	B, J	0.043U	086820-010	SW846 6020
08-Oct-08	Antimony	ND	0.0005	0.002	0.006	U		086820-010	SW846 6020
	Arsenic	0.00355	0.0015	0.005	0.010	B, J	0.0087U	086820-010	SW846 6020
	Barium	0.0872	0.0005	0.002	2.00			086820-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086820-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086820-010	SW846 6020
	Calcium	65.5	0.200	1.00	NE			086820-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086820-010	SW846 6020
	Cobalt	0.000127	0.0001	0.001	NE	J		086820-010	SW846 6020
	Copper	0.000686	0.0003	0.001	NE	J		086820-010	SW846 6020
	Iron	0.206	0.010	0.025	NE			086820-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086820-010	SW846 6020
	Magnesium	22.7	0.052	0.150	NE		J	086820-010	SW846 6020
	Manganese	0.00715	0.001	0.005	NE			086820-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	086820-010	SW846 7470
	Nickel	0.00108	0.0005	0.002	NE	J		086820-010	SW846 6020
	Potassium	4.77	0.080	0.30	NE			086820-010	SW846 6020
	Selenium	0.00157	0.001	0.005	0.050	J		086820-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086820-010	SW846 6020
	Sodium	42.2	0.080	0.250	NE		J	086820-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086820-010	SW846 6020
	Uranium	0.00868	0.00005	0.0002	0.030			086820-010	SW846 6020
	Uranium-235	0.000061	0.00001	0.00007	0.030	J	J+	086820-010	SW846 6020
	Uranium-238	0.00862	0.00005	0.0002	0.030			086820-010	SW846 6020
	Vanadium	0.00854	0.003	0.010	NE	J		086820-010	SW846 6020
	Zinc	0.0033	0.0026	0.010	NE	J		086820-010	SW846 6020

Refer to footnotes on page 4A-50.

Table 4A-8
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Activity[a] (pCi/L)	MDA[h] (pCi/L)	Critical Level[b] (pCi/L)	MCL[d] (pCi/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-BW2	Americium-241	-1.85 ± 14.3	18.9	9.47	NE	U	BD	085758-033	EPA 901.1
09-Apr-08	Cesium-137	0.821 ± 2.20	3.78	1.89	NE	U	BD	085758-033	EPA 901.1
	Cobalt-60	-0.507 ± 2.39	3.39	1.70	NE	U	BD	085758-033	EPA 901.1
	Potassium-40	34.5 ± 52.4	35.7	17.9	NE	U	BD	085758-033	EPA 901.1
	Gross Alpha	11.2 ± 2.92	1.16	0.478	15			085758-034	EPA 900.0
	Gross Beta	5.95 ± 1.61	1.81	0.871	4mrem/yr			085758-034	EPA 900.0
	Tritium	77.8 ± 79.5	131	63.7	NE	U	BD	085758-036	EPA 906.0 M
MWL-MW4	Americium-241	2.05 ± 15.1	23.3	11.6	NE	U	BD	085770-033	EPA 901.1
16-Apr-08	Cesium-137	-1.7 ± 3.66	3.24	1.62	NE	U	BD	085770-033	EPA 901.1
	Cobalt-60	2.52 ± 2.17	3.73	1.87	NE	U	BD	085770-033	EPA 901.1
	Potassium-40	12.1 ± 58.2	32.4	16.2	NE	U	BD	085770-033	EPA 901.1
	Gross Alpha	15.5 ± 3.72	1.02	0.425	15			085770-034	EPA 900.0
	Gross Alpha (re-analysis)	15.9 ± 7.32	4.91	1.47	15			085770-R34	EPA 900.0
	Gross Beta	5.84 ± 1.89	1.78	0.769	4mrem/yr			085770-034	EPA 900.0
	Tritium	-65.1 ± 76.3	136	66.0	NE	U	BD	085770-036	EPA 906.0 M
MWL-MW5	Americium-241	-1.97 ± 11.3	16.8	8.38	NE	U	BD	085775-033	EPA 901.1
10-Apr-08	Cesium-137	0.671 ± 2.01	3.21	1.61	NE	U	BD	085775-033	EPA 901.1
	Cobalt-60	0.812 ± 2.20	3.75	1.88	NE	U	BD	085775-033	EPA 901.1
	Potassium-40	9.64 ± 36.0	47.6	23.8	NE	U	BD	085775-033	EPA 901.1
	Gross Alpha	20.7 ± 5.07	1.65	0.692	15			085775-034	EPA 900.0
	Gross Alpha (re-analysis)	16.4 ± 9.19	8.87	2.92	15		J	085775-R34	EPA 900.0
	Gross Beta	12.1 ± 4.75	5.23	2.26	4mrem/yr		J	085775-034	EPA 900.0
	Tritium	-5.05 ± 77.0	133	64.8	NE	U	BD	085775-036	EPA 906.0 M
MWL-MW5 (Duplicate)	Americium-241	1.23 ± 5.60	8.99	4.50	NE	U	BD	085776-033	EPA 901.1
10-Apr-08	Cesium-137	0.364 ± 1.55	2.60	1.30	NE	U	BD	085776-033	EPA 901.1
	Cobalt-60	0.227 ± 1.58	2.65	1.33	NE	U	BD	085776-033	EPA 901.1
	Potassium-40	30.4 ± 36.8	23.9	12.0	NE	X	R	085776-033	EPA 901.1
	Gross Alpha	17.0 ± 4.46	2.54	1.14	15			085776-034	EPA 900.0
	Gross Alpha (re-analysis)	15.7 ± 8.29	7.93	2.74	15		J	085776-R34	EPA 900.0
	Gross Beta	8.41 ± 3.75	4.08	1.70	4mrem/yr		J	085776-034	EPA 900.0
	Tritium	-100 ± 73.7	132	64.2	NE	U	BD	085776-036	EPA 906.0 M

Refer to footnotes on page 4A-50.

Table 4A-8
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Activity[a] (pCi/L)	MDA[h] (pCi/L)	Critical Level[b] (pCi/L)	MCL[d] (pCi/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW6 08-Apr-08	Americium-241	5.17 ± 5.87	8.92	4.46	NE	U	BD	085779-033	EPA 901.1
	Cesium-137	-0.33 ± 1.49	2.44	1.22	NE	U	BD	085779-033	EPA 901.1
	Cobalt-60	0.546 ± 1.87	2.75	1.38	NE	U	BD	085779-033	EPA 901.1
	Potassium-40	45.2 ± 40.8	21.2	10.6	NE	X	R	085779-033	EPA 901.1
	Gross Alpha	17.9 ± 4.42	1.42	0.588	15			085779-034	EPA 900.0
	Gross Alpha (re-analysis)	17.8 ± 10.5	15.5	7.14	15		J	085779-R34	EPA 900.0
	Gross Beta	6.62 ± 3.67	4.76	2.03	4mrem/yr		J	085779-034	EPA 900.0
	Tritium	-5.01 ± 76.3	132	64.2	NE	U	BD	085779-036	EPA 906.0 M
MWL-BW2 17-Jul-08	Americium-241	0.510 ± 11.8	17.3	8.66	NE	U	BD	086358-033	EPA 901.1
	Cesium-137	0.622 ± 2.00	3.46	1.73	NE	U	BD	086358-033	EPA 901.1
	Cobalt-60	-1.13 ± 2.09	3.29	1.65	NE	U	BD	086358-033	EPA 901.1
	Potassium-40	11.3 ± 47.2	33.3	16.7	NE	U	BD	086358-033	EPA 901.1
	Gross Alpha	10.8 ± 2.86	1.60	0.711	15			086358-034	EPA 900.0
	Gross Beta	3.25 ± 1.84	2.88	1.40	4mrem/yr		J	086358-034	EPA 900.0
	Tritium	14.4 ± 90.6	176	73.5	NE	U	BD	086358-036	EPA 906.0 M
MWL-MW7 16-Jul-08	Americium-241	0.584 ± 6.17	9.07	4.54	NE	U	BD	086362-033	EPA 901.1
	Cesium-137	-0.492 ± 1.65	2.69	1.35	NE	U	BD	086362-033	EPA 901.1
	Cobalt-60	2.09 ± 1.63	2.96	1.48	NE	U	BD	086362-033	EPA 901.1
	Potassium-40	3.87 ± 36.7	41.2	20.6	NE	U	BD	086362-033	EPA 901.1
	Gross Alpha	11.7 ± 2.65	1.11	0.483	15			086362-034	EPA 900.0
	Gross Beta	10.6 ± 2.13	1.52	0.733	4mrem/yr			086362-034	EPA 900.0
	Tritium	-23.3 ± 80.2	171	71.6	NE	U	BD	086362-036	EPA 906.0 M
MWL-MW7 (Duplicate) 16-Jul-08	Americium-241	2.02 ± 8.92	13.4	6.72	NE	U	BD	086363-033	EPA 901.1
	Cesium-137	1.09 ± 1.99	3.14	1.57	NE	U	BD	086363-033	EPA 901.1
	Cobalt-60	1.15 ± 1.76	3.08	1.54	NE	U	BD	086363-033	EPA 901.1
	Potassium-40	-25.1 ± 37.4	41.6	20.8	NE	U	BD	086363-033	EPA 901.1
	Gross Alpha	10.3 ± 2.56	1.43	0.646	15			086363-034	EPA 900.0
	Gross Beta	7.59 ± 1.74	1.72	0.833	4mrem/yr			086363-034	EPA 900.0
	Tritium	102 ± 107	173	72.4	NE	U	BD	086363-036	EPA 906.0 M

Refer to footnotes on page 4A-50.

Table 4A-8
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Activity[a] (pCi/L)	MDA[h] (pCi/L)	Critical Level[b] (pCi/L)	MCL[d] (pCi/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW8	Americium-241	-7.78 ± 7.66	11.9	5.97	NE	U	BD	086365-033	EPA 901.1
14-Jul-08	Cesium-137	-0.748 ± 2.97	2.84	1.42	NE	U	BD	086365-033	EPA 901.1
	Cobalt-60	-0.0617 ± 1.79	3.01	1.50	NE	U	BD	086365-033	EPA 901.1
	Potassium-40	26.5 ± 37.1	30.1	15.1	NE	U	BD	086365-033	EPA 901.1
	Gross Alpha	9.43 ± 2.29	1.25	0.553	15			086365-034	EPA 900.0
	Gross Beta	6.53 ± 1.43	1.16	0.556	4mrem/yr			086365-034	EPA 900.0
	Tritium	61.8 ± 99.7	174	72.9	NE	U	BD	086365-036	EPA 906.0 M
MWL-MW9	Americium-241	1.40 ± 4.60	7.86	3.93	NE	U	BD	086367-033	EPA 901.1
15-Jul-08	Cesium-137	-1.15 ± 3.44	2.88	1.44	NE	U	BD	086367-033	EPA 901.1
	Cobalt-60	-5.38 ± 4.89	3.13	1.57	NE	U	BD	086367-033	EPA 901.1
	Potassium-40	19.8 ± 43.4	27.4	13.7	NE	U	BD	086367-033	EPA 901.1
	Gross Alpha	11.6 ± 2.53	1.10	0.484	15			086367-034	EPA 900.0
	Gross Beta	6.50 ± 1.53	1.50	0.727	4mrem/yr			086367-034	EPA 900.0
	Tritium	71.8 ± 99.6	170	71.1	NE	U	BD	086367-036	EPA 906.0 M
MWL-BW2	Americium-241	8.10 ± 9.18	14.1	7.05	NE	U	BD	086812-033	EPA 901.1
01-Oct-08	Cesium-137	1.11 ± 2.23	3.17	1.59	NE	U	BD	086812-033	EPA 901.1
	Cobalt-60	0.620 ± 1.93	3.29	1.65	NE	U	BD	086812-033	EPA 901.1
	Potassium-40	-5.87 ± 36.3	43.0	21.5	NE	U	BD	086812-033	EPA 901.1
	Gross Alpha	13.3 ± 5.99	5.13	1.80	15		J	086812-034	EPA 900.0
	Gross Beta	9.48 ± 4.15	5.28	2.38	4mrem/yr		J	086812-034	EPA 900.0
	Tritium	21.9 ± 100	171	83.4	NE	U	BD	086812-036	EPA 906.0 M
MWL-BW2 (Duplicate)	Americium-241	7.52 ± 8.28	12.3	6.16	NE	U	BD	086813-033	EPA 901.1
01-Oct-08	Cesium-137	0.574 ± 1.63	2.78	1.39	NE	U	BD	086813-033	EPA 901.1
	Cobalt-60	-0.354 ± 1.94	3.22	1.61	NE	U	BD	086813-033	EPA 901.1
	Potassium-40	-19.0 ± 36.5	39.6	19.8	NE	U	BD	086813-033	EPA 901.1
	Gross Alpha	4.24 ± 3.21	3.93	1.28	15		J	086813-034	EPA 900.0
	Gross Beta	4.80 ± 2.79	3.83	1.66	4mrem/yr		J	086813-034	EPA 900.0
	Tritium	107 ± 104	171	83.2	NE	U	BD	086813-036	EPA 906.0 M

Refer to footnotes on page 4A-50.

Table 4A-8 *(Concluded)*
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Analyte	Activity[a] (pCi/L)	MDA[h] (pCi/L)	Critical Level[b] (pCi/L)	MCL[d] (pCi/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW7	Americium-241	0.864 ± 11.4	12.3	6.13	NE	U	BD	086815-033	EPA 901.1
06-Oct-08	Cesium-137	0.514 ± 1.82	3.04	1.52	NE	U	BD	086815-033	EPA 901.1
	Cobalt-60	1.37 ± 1.90	3.33	1.67	NE	U	BD	086815-033	EPA 901.1
	Potassium-40	-11.9 ± 39.6	39.2	19.6	NE	U	BD	086815-033	EPA 901.1
	Gross Alpha	4.06 ± 2.08	1.59	0.466	15		J	086815-034	EPA 900.0
	Gross Beta	5.44 ± 1.66	2.15	1.04	4mrem/yr		J	086815-034	EPA 900.0
	Tritium	85.1 ± 103	170	82.9	NE	U	BD	086815-036	EPA 906.0 M
MWL-MW8	Americium-241	-3.41 ± 7.91	12.6	6.30	NE	U	BD	086817-033	EPA 901.1
07-Oct-08	Cesium-137	1.33 ± 1.65	2.87	1.44	NE	U	BD	086817-033	EPA 901.1
	Cobalt-60	0.721 ± 1.84	3.18	1.59	NE	U	BD	086817-033	EPA 901.1
	Potassium-40	42.5 ± 41.3	29.1	14.6	NE	X	R	086817-033	EPA 901.1
	Gross Alpha	7.39 ± 1.96	0.969	0.389	15			086817-034	EPA 900.0
	Gross Beta	8.35 ± 2.10	2.36	1.15	4mrem/yr			086817-034	EPA 900.0
	Tritium	56.2 ± 101	171	83.0	NE	U	BD	086817-036	EPA 906.0 M
MWL-MW9	Americium-241	-0.877 ± 3.84	5.01	2.51	NE	U	BD	086820-033	EPA 901.1
08-Oct-08	Cesium-137	0.820 ± 2.24	3.85	1.93	NE	U	BD	086820-033	EPA 901.1
	Cobalt-60	1.72 ± 2.38	4.18	2.09	NE	U	BD	086820-033	EPA 901.1
	Potassium-40	59.6 ± 28.4	59.7	27.3	NE	U	BD	086820-033	EPA 901.1
	Gross Alpha	10.5 ± 2.35	0.954	0.421	15			086820-034	EPA 900.0
	Gross Beta	8.57 ± 2.25	2.68	1.31	4mrem/yr			086820-034	EPA 900.0
	Tritium	41.9 ± 101	172	83.5	NE	U	BD	086820-036	EPA 906.0 M

Refer to footnotes on page 4A-50.

Table 4A-9
Corrected Gross Alpha (only uranium subtracted)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Well ID	Sample date	Gross Alpha (pCi/L)	Method 1 Total Uranium[a] (pCi/L)	Gross Alpha Corrected (pCi/L)	Method 2 Total Uranium[b] (pCi/L)	Gross Alpha Corrected (pCi/L)
MWL-MW4	16-Apr-08	15.5	5.12	10.38	5.23	10.27
MWL-MW4 (re-analysis)	16-Apr-08	15.9	5.12	10.78	5.23	10.67
MWL-MW5	10-Apr-08	20.7	5.86	14.84	5.98	14.72
MWL-MW5 (re-analysis)	10-Apr-08	16.4	5.86	10.54	5.98	10.42
MWL-MW5 (duplicate)	10-Apr-08	17.0	5.86	11.14	5.98	11.02
MWL-MW5 (dup - re-analysis)	10-Apr-08	15.7	5.86	9.84	5.98	9.72
MWL-MW6	8-Apr-08	17.9	5.77	12.13	5.89	12.01
MWL-MW6 (re-analysis)	8-Apr-08	17.8	5.77	12.03	5.89	11.91

The MCL for gross A is 15 pCi/L; however, total uranium is not intended in the standard and can be subtracted as needed.

[a]Method 1: Used conversion factor of 670 pCi/mg natural uranium as listed in CFR volume 65, No 236, and "Recommendations for a Uranium Health-Based Ground Water Standard, NMED, May 2003.

[b]Method 2: Used radiological unit converter at web link http://www.antenna.nl/wise/uranium/cunit.html.

Table 4A-10
Duplicate Sample Analytical Results for Chemical Analyses
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Sample No. Sample Location	085775 MWL-MW5 Environmental	085776 MWL-MW5 Duplicate	
	Result (R_1)	Result (R_2)	
Parameter[a]	All results in mg/L		RPD[b]
Bromide	0.496	0.509	3
Chloride	84.2	85.6	2
Fluoride	0.697	0.709	2
Sulfate	53	53.9	2
Nitrate plus Nitrite, as N	1.37	1.36	1
Alkalinity, Total	317	316	< 1
Aluminum	0.0135 J	0.0114 J	NC
Barium	0.128	0.127	1
Calcium	94.5	90.2	5
Iron	0.129	0.121	6
Magnesium	28.1	29.0	3
Manganese	0.0124	0.0107	15
Molybdenum	0.00336	0.00325	3
Nickel	0.00199 J	0.00185 J	NC
Potassium	5.57	5.42	3
Selenium	0.00115 J	0.00181 J	NC
Sodium	70.1	64.1	9
Uranium-235	0.000063 J	0.000065 J	NC
Uranium-238	0.009	0.00876	3
Zinc	0.00435 J	0.00318 J	NC
Barium (filtered)	0.126	0.129	2
Calcium (filtered)	93.0	94.0	1
Iron (filtered)	0.110	0.115	4
Magnesium (filtered)	28.4	29.9	5
Manganese (filtered)	0.00801	0.00884	10
Molybdenum (filtered)	0.00327	0.00329	1
Nickel (filtered)	0.00223	0.00208	7
Potassium (filtered)	5.51	5.90	7
Selenium (filtered)	0.00108 J	0.00145 J	NC
Sodium (filtered)	63.7	64.3	1
Uranium-235 (filtered)	0.000063 J	0.000066 J	NC
Uranium-238 (filtered)	0.00869	0.00892	3
Zinc (filtered)	0.00374 J	0.00333 J	NC

Refer to footnotes on page 4A-50.

Table 4A-10
Duplicate Sample Analytical Results for Chemical Analyses
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Sample No. Sample Location	086362 MWL-MW7 Environmental	086363 MWL-MW7 Duplicate	
	Result (R_1)	Result (R_2)	
Parameter[a]	All results in mg/L		RPD[b]
Bromide	0.276	0.650	81
Chloride	42.0	41.9	< 1
Fluoride	0.995	0.986	1
Sulfate	38.8	38.9	0
Nitrate plus Nitrite, as N	3.13	3.21	3
Alkalinity, Total	212	213	< 1
Aluminum	0.00694 J	0.0275	NC
Barium	0.104	0.105	1
Calcium	54.2	54.5	1
Copper	0.000792 J	0.000876 J	NC
Iron	0.187	0.194	4
Magnesium	17.4	16.8	4
Manganese	0.00926	0.010	8
Nickel	0.0014 J	0.00129 J	NC
Potassium	4.83	4.97	3
Sodium	46.0	42.9	7
Uranium	0.00781	0.00808	3
Uranium-235	0.000056 J	0.000057 J	NC
Uranium-238	0.00775	0.00803	4
Zinc	0.00261 J	0.00268 J	NC
Barium (filtered)	0.106	0.104	2
Calcium (filtered)	51.5	53.3	3
Copper (filtered)	0.00089 J	0.000778 J	NC
Iron (filtered)	0.127	0.124	2
Magnesium (filtered)	17.7	17.3	2
Manganese (filtered)	0.00914	0.00862	6
Molybdenum (filtered)	0.0061	0.00592	3
Nickel (filtered)	0.00128 J	0.00132 J	NC
Potassium (filtered)	5.06	4.79	5
Sodium (filtered)	45.2	42.6	6
Uranium (filtered)	0.00818	0.00807	1
Uranium-235 (filtered)	0.000056 J	0.000057 J	NC
Uranium-238 (filtered)	0.00812	0.00801	1
Zinc (filtered)	0.0134	0.00262 J	NC

Refer to footnotes on page 4A-50.

Table 4A-10 *(Concluded)*
Duplicate Sample Analytical Results for Chemical Analyses
Mixed Waste Landfill, Sandia National Laboratories/New Mexico

Calendar Year 2008

Sample No. Sample Location	086812 MWL-BW2 Environmental	086813 MWL-BW2 Duplicate	
	Result (R_1)	Result (R_2)	
Parameter[a]	All results in mg/L		RPD[b]
Bromide	0.328	0.331	1
Chloride	62.6	62.3	< 1
Fluoride	0.712	0.719	1
Sulfate	44.5	45.4	2
Nitrate plus Nitrite, as N	2.34	1.98	17
Alkalinity, Total	241	241	< 1
Barium	0.0984	0.0962	2
Calcium	67.3	68.1	1
Cobalt	0.0001 J	0.000113 J	NC
Copper	0.000713 J	0.0005 J	NC
Iron	0.243	0.240	1
Magnesium	21.6	21.9	1
Manganese	0.00267 J	0.00262 J	NC
Nickel	0.000983 J	0.00104 J	NC
Potassium	4.15	3.98	4
Sodium	56.2	56.2	< 1
Uranium	0.00697	0.00696	< 1
Uranium-235	0.000047 J	0.000047 J	NC
Uranium-238	0.00692 J	0.00692 J	NC
Barium (filtered)	0.0948	0.100	5
Calcium (filtered)	65.3	70.1	7
Copper (filtered)	0.000792 J	0.00053 J	NC
Iron (filtered)	0.232	0.234	1
Magnesium (filtered)	21.5	22.7	5
Manganese (filtered)	0.00216 J	0.00211 J	NC
Nickel (filtered)	0.00112 J	0.00109 J	NC
Potassium (filtered)	4.21	3.95	6
Selenium (filtered)	0.00188	0.00199 J	NC
Sodium (filtered)	53.4 J	58.2	9
Uranium (filtered)	0.00705	0.00724	3
Uranium-235 (filtered)	0.000051 J	0.000050 J	NC
Uranium-238 (filtered)	0.00700	0.00719	3
Zinc (filtered)	0.0029 J	0.00285 J	NC

[a]Parameters not detected in both samples are not listed.
[b]RPD is not calculated for estimated values.

J = Analyte detected below practical quantitation limit or reported as an estimated concentration.
mg/L = Milligram(s) per liter.
MW = Monitoring well.
MWL = Mixed Waste Landfill.
N = Nitrogen.
NC = Not calculated.
RPD = Relative percent difference is calculated with the following equation and rounded to nearest whole number:

$$RPD = \frac{|R_1 - R_2|}{[(R_1 + R_2)/2]} \times 100$$

where:

R_1 = analysis result
R_2 = duplicate analysis result

*Footnotes for **Mixed Waste Landfill Groundwater Monitoring***

[a]Result and/or Activity

- 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.
- 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

[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

[d]MCL

- Maximum contaminant level. Established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11(b)), and subsequent amendments.
- NE = not established.
- 15 pCi/L = the maximum gross alpha activity, but not including radon and total uranium.
- 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]Lab 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.
X = Used in radiochemistry to identify data rejected due to interference, low abundance, peak not meeting identification criteria, or uncertain identification for gamma spectroscopy.

[f]Validation Qualifier

If cell is blank, then all quality control samples meet acceptance criteria with respect to submitted samples.
BD = 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.
K- = The associated numerical value is an estimated quantity with suspected negative bias.
NJ- = Presumptive evidence of the presence of the material at an estimated quantity with a suspected negative bias.

*Footnotes for **Mixed Waste Landfill Groundwater Monitoring** (Concluded)*

[f]Validation Qualifier (continued)

R = The data are unusable for their intended purpose. The analyte may or may not be present.

U = The analyte was analyzed for but not detected. The associated numerical value is the sample quantitation limit.

UJ = The analyte was analyzed for but not detected. The associated value is an estimate and may be inaccurate or imprecise.

[g]Analytical Method

- U.S. Environmental Protection Agency, 1990, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.
- U.S. Environmental Protection Agency, 1983, "The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0," EPA-600/4-84-017.
- Analytical method used to detect radionuclides is HASL 300 4.5.2.3;
- U.S. Department of Energy, Environmental Measurements Laboratory, 1990, "EML Procedures Manual," 27th ed., Vol. 1, Rev. 1992, HASL-300.
- EPA 9310: U.S. Environmental Protection Agency, 1990, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.
- EPA 903.0/904.0: U.S. Environmental Protection Agency, 1980, "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032.
- "Standard Methods for the Examination of Water and Wastewater," 1992, 18th Edition, Method 2320B.

[h]Field Water Quality Measurements

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

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Attachment 4B
Mixed Waste Landfill
Hydrographs

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Attachment 4B Hydrographs

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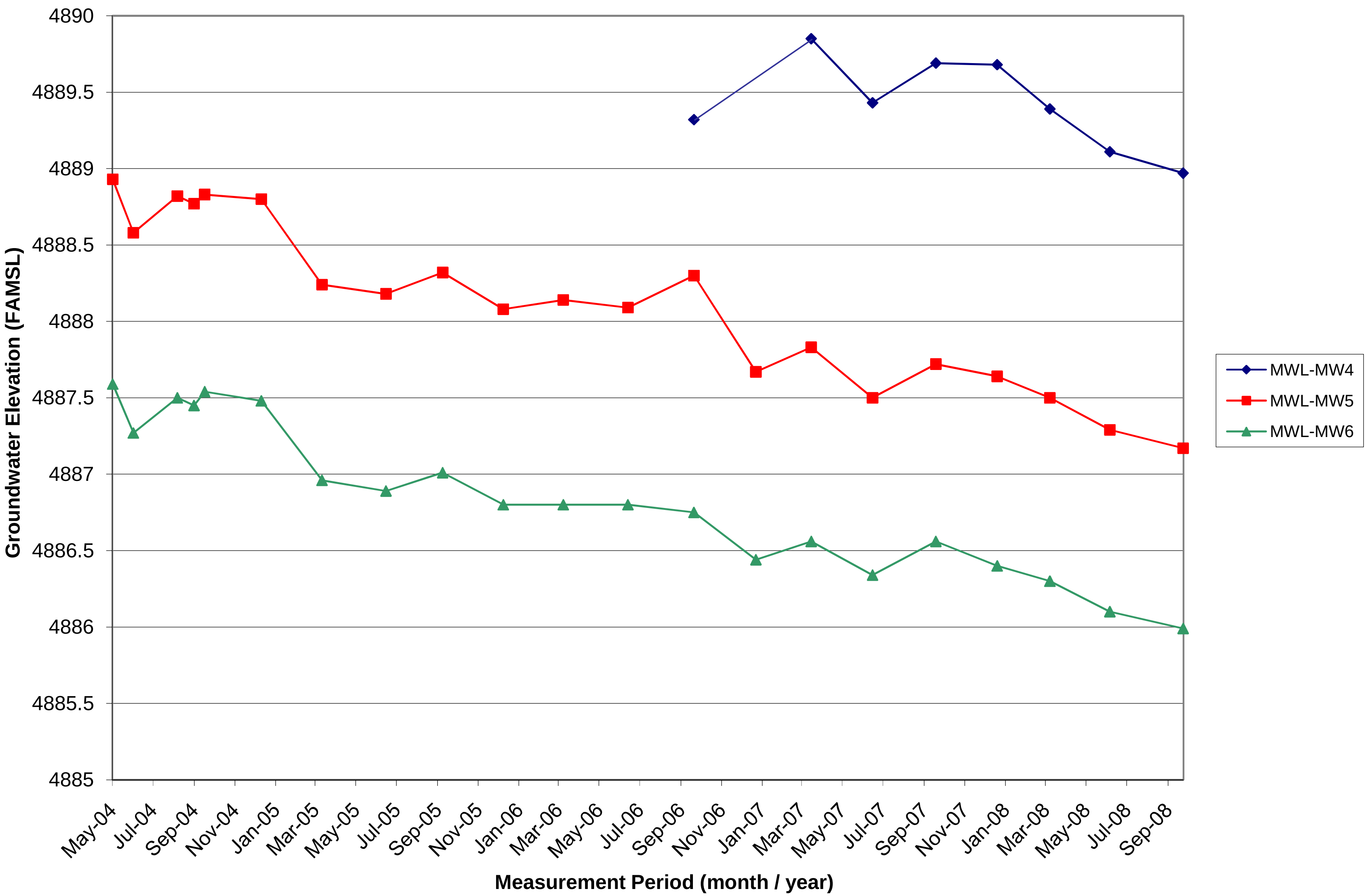

Figure 4B-1. Water Levels for MWL-MW4, MWL-MW5, and MWL-MW6

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5.0 Technical Area V Groundwater

5.1 Introduction

Trichloroethene (TCE) and nitrate have been identified as constituents of concern (COC) 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 level (MCL) in samples collected from monitoring wells. Since 1993, the maximum concentrations detected at the site 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 micrograms per liter (µg/L) and 10 milligrams per liter (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

Sandia National Laboratories, New Mexico (SNL/NM) manages TA-V, which occupies approximately 35 acres in the northeastern corner of TA-III (Figure 5-1). TA-V is located in the central part 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, multiprogram 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 facilities are designed to test radiation effects on components. These facilities include two research reactors, an intense gamma irradiation facility, and a hot-cell facility. Historically, wastewater containing contaminants derived from these facilities was disposed of to drain fields, seepage pits, and unlined ponds.

TA-V lies within the Albuquerque Basin, and the vadose zone at TA-V is approximately 500 feet (ft) thick 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 large municipal well fields north of KAFB.

5.1.2 Site History

The SNL/NM Environmental Restoration (ER) Project has 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).

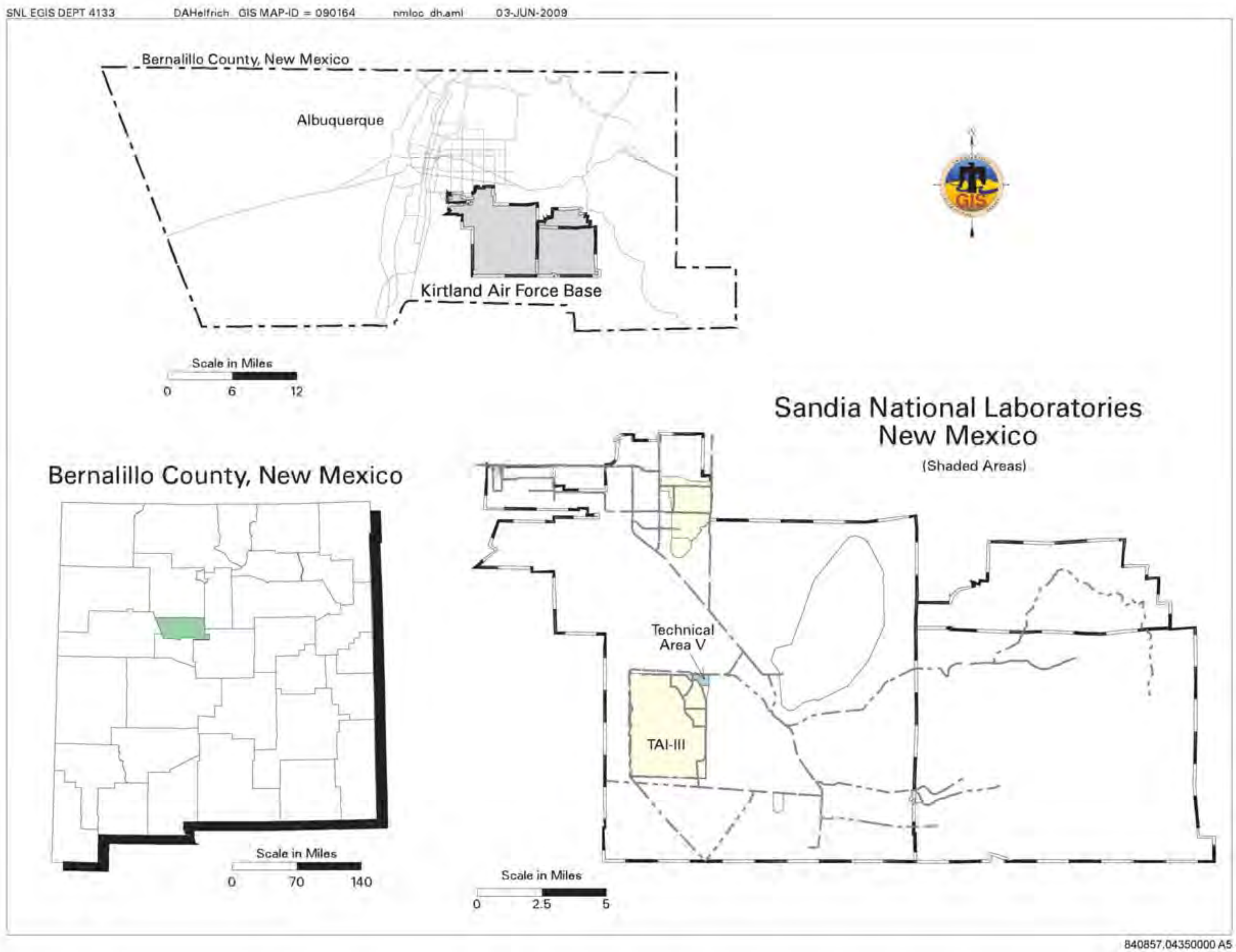

Figure 5-1. Location of the TA-V Study Area

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 written. The investigation will examine SWMUs 4, 5, and 52.	SNL March 1993
August July	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 November 1993 reveals TCE near the method detection limit, and was 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 discussing water quality issues reported in the calendar year 1994 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 sample analytical results for TA-V wells reported in the calendar year 1995 SNL/NM Annual Groundwater Monitoring Report	SNL March 1996
March	1996	DOE sends a letter to the NMED with notification of a single elevated nitrate from groundwater monitoring well LWDS-MW1. The result was 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 to the ground water.	SNL April 1996
March	1997	Groundwater sample 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 / SNL/NM provide responses to the NMED September 1997 RSI.	SNL January 1998
March	1998	Groundwater sample analytical results for TA-V wells reported in the calendar year 1997 SNL/NM Annual Groundwater Monitoring Report	SNL March 1998
October	1998	DOE / SNL/NM provide cross sections to NMED for the LWDS as required in the September 1997 RSI from NMED.	DOE October 1998

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

Month	Year	Event	Reference
March	1999	Groundwater sample 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 prepares 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 sample analytical results for TA-V wells reported in the fiscal year 1999 SNL/NM Annual Groundwater Monitoring Report	SNL March 2000
April	2001	Groundwater sample 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, -MW7, -MW8, and -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 sample analytical results for TA-V wells reported in the fiscal year 2001 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2002
March	2003	Groundwater sample 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 sample 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 issued the Compliance Order on Consent (the Order) to the DOE / SNL/NM which identified TA-V as an area with groundwater contamination requiring a CME.	NMED April 2004
May	2004	DOE / SNL/NM submits 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 NMED April 2004 Order.	SNL April 2004a
May	2004	DOE / SNL/NM submit the *Corrective Measures Evaluation Work Plan, Technical Area V Groundwate*r. This document was required by the NMED April 2004 Order.	SNL April 2004b
October	2004	The NMED issues an approval with modifications to the TA-V Corrective Measures Evaluation Work Plan, and the Current Conceptual Model of Groundwater Flow and Contaminant Transport.	NMED October 2004
December	2004	DOE / SNL/NM submit responses to the NMED request of October 2004. The responses are included in a revised *Corrective Measures Evaluation Work Plan Technical Area V Groundwater, Revision 0*.	SNL December 2004
July	2005	DOE / SNL/NM 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

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

Month	Year	Event	Reference
October	2005	DOE / SNL/NM request to NMED for change in sampling frequency from TA-V wells.	DOE October 2005
October	2005	Groundwater sample analytical results for TA-V wells reported in the fiscal year 2004 SNL/NM Annual Groundwater Monitoring Report.	SNL October 2005
March	2006	DOE / SNL/NM request the removal of well AVN-2 from the TA-V monitoring network due to insufficient water for sampling due to declining water levels. The well would be returned to service if water levels in the well recovered.	DOE March 2006
November	2006	Groundwater sample analytical results for TA-V wells reported in the fiscal year 2005 SNL/NM Annual Groundwater Monitoring Report.	SNL November 2006
March	2007	Groundwater sample 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 sample 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 Corrective Measures Evaluation Report for Technical Area-V Groundwater.	NMED July 2008
September	2008	The 13 TA-V monitoring wells were re-surveyed to establish new northing and easting coordinates, and elevations for each well.	SNL October 2008a
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 in TA-V.	SRNL December 2008

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.
mg/L = Milligram(s) per liter.
MNA = Monitored Natural Attenuation.
µg/L = Microgram(s) per liter.
MW = Monitoring well.
NMED = New Mexico Environment Department.
NOD = Notice of Disapproval.
OU = Operable Unit.
RCRA = Resource Conservation and Recovery Act.
RFI = RCRA Facility Investigation.
RSI = Request for Supplemental Information.
SNL/NM = Sandia National Laboratories/New Mexico.
SWMU = Solid Waste Management Unit.
TA = Technical Area.
TCE = Trichloroethene.

5.1.3 Monitoring History

Investigations of groundwater quality in the TA-V study area have been conducted by Sandia over the past 17 years (Table 5-1). Groundwater monitoring at TA-V began in October 1992. TCE was first detected in LWDS-MW1 in October 1993 and was later detected in TAV-MW1 in September 1995. TCE concentrations in LWDS-MW1 have consistently exceeded the MCL of 5 μg/L. In Fiscal Year (FY) 1998, TCE was detected at very low, nonquantifiable levels in TAV-MW4. In FY06, TCE was detected above the MCL in LWDS-MW1 during all four sampling events, in TAV-MW1 during two sampling events, and in TAV-MW6 during one sampling event. Potential sources for TCE in groundwater include both the Liquid Waste Disposal System (LWDS) and the TA-V seepage pits, discussed in Section 5.1.7.

In April 2004, the Compliance Order on Consent (the Order) between the New Mexico Environment Department (NMED), the DOE and Sandia specified that TA-V was an area of groundwater contamination (NMED April 2004). In response to the Order, Sandia submitted the *Corrective Measures Evaluation (CME) Work Plan, TA-V Groundwater* to the NMED in April 2004 (SNL April 2004b). Since the initial discoveries of TCE and nitrate at the TA-V study area, numerous characterization activities have been conducted (Table 1-1), 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) that was submitted along with the CME Work Plan. 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

Currently 13 wells in the TA-V study area are 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 Fiscal Year Activities

The following activities took place for the TA-V study area during October 2007 through December 2008:

- Monthly water level measurements were obtained for all TA-V wells.
- Quarterly groundwater sampling events were conducted at 12 wells (Table 5-2) in November/December 2007, January/February 2008, May/April 2008, August/September 2008, and November/December 2008.
- The NMED approved the *Monitoring Well Plug and Abandonment Plan: Decommissioning of Groundwater Monitoring Well TAV-MW1 and Installation of Replacement Groundwater Monitoring Well TAV-MW10* (NMED October 2007).
- Monitoring Well TAV-MW1 was plugged and abandoned and TAV-MW10 was installed (SNL June 2008).

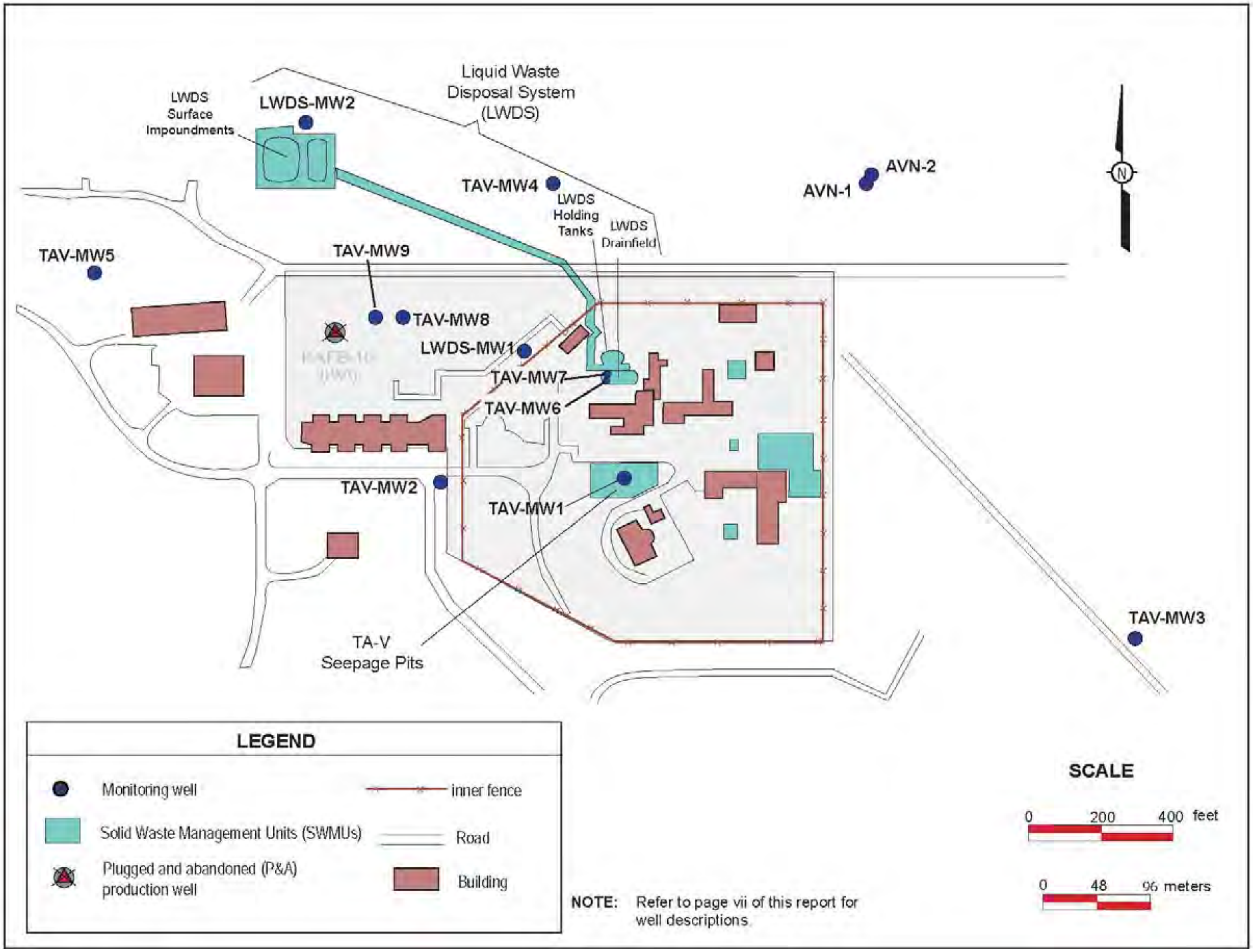

Figure 5-2. TA-V Monitoring Well Locations (13 Active Wells)

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

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

- The *Summary Report for Technical Area V Monitoring Well Plug and Abandonment and Installation; Decommissioning of Groundwater Monitoring Well TAV-MW1, Installation of Groundwater Monitoring Well TAV-MW10* was prepared and submitted to the NMED (SNL June 2008).

- The NMED issued *Notice of Disapproval: Corrective Measures Evaluation Report for Technical Area-V Groundwater, July 2005* (NMED July 2008).

- The NMED issued *Notice of Disapproval:* S*ummary Report for Technical Area V Monitoring Well Plug and Abandonment and Installation; Decommissioning of Groundwater Monitoring Well TAV-MW1, Installation of Groundwater Monitoring Well TAV-MW10* (NMED August 2008).

- The 13 TA-V monitoring wells were resurveyed to establish new coordinates and elevations (SNL October 2008a).

- The *DOE/Sandia Responses to NMED Notice of Disapproval: Summary Report for Technical Area V Monitoring Well Plug and Abandonment and Installation; Decommissioning of Groundwater Monitoring Well TAV-MW1, Installation of Groundwater Monitoring Well TAV-MW10* were prepared and submitted to the NMED (SNL October 2008b).

- The NMED approved the *Summary Report for Technical Area V Monitoring Well Plug and Abandonment and Installation; Decommissioning of Groundwater Monitoring Well TAV-MW1, Installation of Groundwater Monitoring Well TAV-MW10* (NMED November 2008).

- Tables of analytical results (Attachment 5A), concentration versus time graphs (Attachment 5B), and hydrographs (Attachment 5C) were prepared in support of this report.

5.1.6 Summary of Future Activities

The following activities are anticipated for the TA-V study area in FY09:

- Obtain monthly water level measurements for all TA-V wells.

- Conduct quarterly groundwater sampling at 12 wells.

- Submit a response to the NMED's July 2008 *Notice of Disapproval: Corrective Measures Evaluation Report for Technical Area-V Groundwater, July 2005* (NMED July 2008, DOE April 2009).

5.1.7 Current Conceptual Model

The site conceptual 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 did not contain 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 beneath the seepage pits until 1992 probably removed any residual COCs in the vadose zone. Rapid drainage and continued flushing removed any significant secondary contaminant source.

Small concentrations of TCE present in the aquifer today represent 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-MW5.

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 at TA-V. 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 at TA-V is not known.

The alluvial fan lithofacies is further subdivided into a lower and an upper section. 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.

ARG deposits interfinger with alluvial fan deposits west of TA-V. These deposits consist predominantly of uniformly coarse sands and gravels 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. Annual precipitation at TA-V is 8.7 inches (SNL April 2004a). Much of this precipitation is derived from summer thunderstorms from July to 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.

The Tijeras and Coyote arroyos to the north of TA-V and Hells Canyon arroyo to the south 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 probably 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 characterized. However, they probably are highly variable and anisotropic because of the heterogeneous textures, lenticularity, layering, and changes in cementation. Disposal of wastewater from the LWDS drain field and seepage pits probably 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 recent 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, 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). The potentiometric surface indicates that the regional groundwater flow beneath TA-V is to the west and southwest. The hydraulic gradient is about 14 ft per mile. Calculated flow velocities range from 4 to 10 ft/yr (SNL March 1999a). Water-table contours

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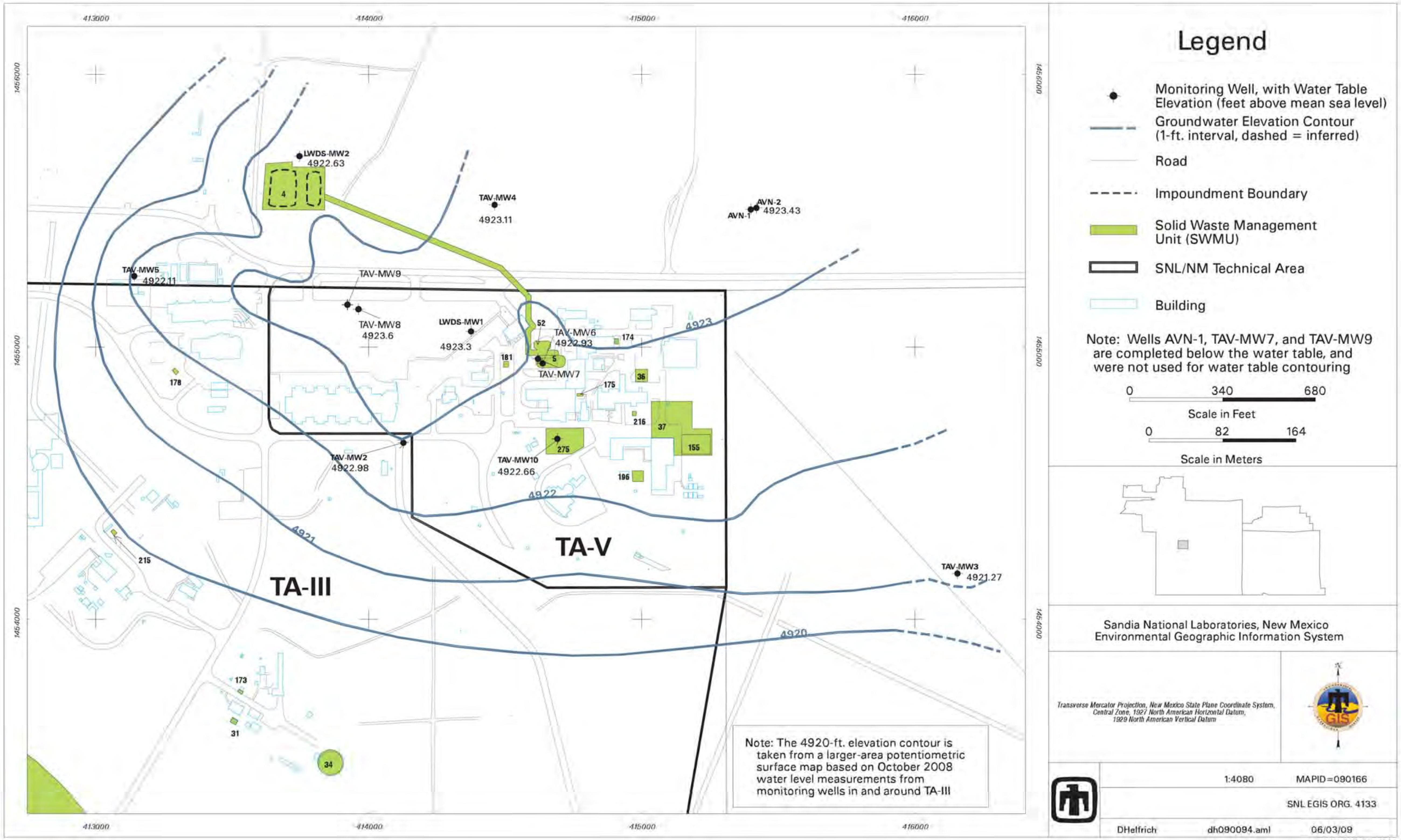

Figure 5-3. TA-V Study Area Potentiometric Surface Map (October 2008)

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for 2008 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. 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 through them.

The horizontal gradient of the regional aquifer across the study area is approximately 0.009 ft/ft with steeper gradients evident near the mountain front. Vertical flow gradients within the TA-V study area have been measured to be strongly downward. Historically, water levels in the regional aquifer have been declining approaching 1 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 capability of sedimentary units in the vadose zone and aquifer to store and transmit fluids and solutes. Possible sources of recharge include infiltration of wastewater disposed of at TA-V, areal precipitation, and stream flow.

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 volume. After 1992, wastewater was disposed of to the COA sewage system.

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

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

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

Sampling and analysis have been conducted in the vadose zone in order to characterize the presence of COCs in the vadose zone. Locations of investigations are based upon 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.

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 and from collected 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 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, 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 dense compared to the density of soil air, the physical properties of TCE are conducive to vapor transport; therefore, vapor transport is a possible mechanism for the presence of TCE in the aquifer. Three physical processes, occurring in the vadose zone, affect the migration of TCE to the aquifer:

- 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 was most likely 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 additional parameters in the aquifer are discussed in this section. TCE is present in small concentrations in water from 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 moved in the localized direction of groundwater flow. TCE distribution shows the center of the mass near well LWDS-MW1, about 300 ft northwest of the drain field and about 450 ft northwest of the seepage pits.

Peak TCE concentrations reported at TA-V were 23 to 26 µg/L from 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 AVN-1, AVN-2, LWDS-MW1, and TAV-MW5, although concentrations do not appear to be increasing over time. The highest reported concentrations for TA-V wells include the following: AVN-1 at 13 mg/L on May 14, 2001; AVN-2 at 16 mg/L on October 27, 1999; TAV-MW5 at 13 mg/L on August 18, 1999; and LWDS-MW1 at 19 mg/L on November 13, 2000 and February 16, 2001. Upgradient wells, AVN-1 and AVN-2, were completed at different depths and show relatively consistent 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 upgradient and to the northeast of TA-V.

5.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of the ER Project as well as implements and enforces federal regulations mandated by the Resource Conservation and Recovery Act (RCRA). All ER Project 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 the ER Project.

The Order, which became effective in April 2004, transferred regulatory authority for the investigation of SWMUs and areas with groundwater contamination (including TA-V) from the HWSA module to the Order. The TA-V investigations 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 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 the other groundwater sites in the Groundwater Protection Program 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 from October 2007 through November 2008, including plans and reports, are listed in Section 5.1.5. However, the only field activity completed in the study area was groundwater monitoring. The October 2007 through December 2008 sampling events (five 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, October 2007 through December 2008

Date of Sampling Event	Wells Sampled[1]	SAP
November/ December 2007	AVN-1, LWDS-MW1, LWDS-MW2, TAV-MW2, TAV-MW3, TAV-MW4, TAV-MW5, TAV-MW6, TAV-MW7, TAV-MW8, and TAV-MW9	*TA-V Groundwater Monitoring Mini-SAP for First Quarter, Fiscal Year 2008* (SNL October 2007)
January/ February 2008	AVN-1, LWDS-MW1, LWDS-MW2, TAV-MW2, TAV-MW3, TAV-MW4, TAV-MW5, TAV-MW6, TAV-MW7, TAV-MW8, and TAV-MW9	*TA-V Groundwater Monitoring Mini-SAP for Second Quarter, Fiscal Year 2008* (SNL January 2008)
April/ May 2008	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 2008* (SNL April 2008)
August/ September 2008	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 2008* (SNL July 2008)
November/ December 2008	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 2009* (SNL November 2008)

NOTE: [1] Refer to page xi 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

Parameter	Nov/Dec 2007	Parameter	Jan/Feb 2008
NPN VOCs	AVN-1 LWDS-MW1 LWDS-MW2 TAV-MW2 TAV-MW3 TAV-MW3 (dup) TAV-MW4 TAV-MW5 TAV-MW5 (dup) TAV-MW6 TAV-MW7 TAV-MW8 TAV-MW9	NPN VOCs	AVN-1 LWDS-MW1 LWDS-MW2 TAV-MW2 TAV-MW3 TAV-MW4 TAV-MW4 (dup) TAV-MW5 TAV-MW6 TAV-MW7 TAV-MW7 (dup) TAV-MW8 TAV-MW9
Parameter	**Apr/May 2008**	**Parameter**	**Aug/Sep 2008**
NPN VOCs	AVN-1 AVN-1 (dup) LWDS-MW1 LWDS-MW2 TAV-MW2 TAV-MW3 TAV-MW4 TAV-MW5 TAV-MW6 TAV-MW6 (dup) TAV-MW7 TAV-MW8 TAV-MW9 TAV-MW10	Gamma Spec* Gross Alpha Gross Beta NPN Total Metals Tritium VOCs	AVN-1 LWDS-MW1 LWDS-MW2 LWDS-MW2 (dup) TAV-MW2 TAV-MW2 (dup) TAV-MW3 TAV-MW4 TAV-MW5 TAV-MW6 TAV-MW7 TAV-MW8 TAV-MW9 TAV-MW10
Anions SVOCs Total Cyanide Total Metals Total Phenol	TAV-MW10		
Parameter	**Nov/Dec 2007**		
NPN VOCs	AVN-1 LWDS-MW1 LWDS-MW1 (dup) LWDS-MW2 TAV-MW2 TAV-MW3 TAV-MW4 TAV-MW5 TAV-MW6 TAV-MW7 TAV-MW8 TAV-MW9 TAV-MW10 TAV-MW10 (dup)		

NOTE: [1] Refer to page xi 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 nitrate (reported as nitrogen).
SVOC = Semivolatile organic compound.
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 equipment blanks, duplicate samples, split samples, and trip blanks. Field QC samples are used to monitor the sampling process. Equipment blanks 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. Trip blanks 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 the ER Project, 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

During October 2007 through December 2008, water level measurements were obtained to determine groundwater flow directions, hydraulic gradients, and changes in water table elevations. Water levels are measured by ER Field Office (ERFO) crew immediately prior to presampling purging at each well being sampled. 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 from the well, prior to the collection of groundwater samples according to SNL/NM Field Operating Procedure (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 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 degrees Celsius, and SC 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 Groundwater Sampling Equipment Decontamination,* SNL/NM FOP 05-03 (SNL August

2007b). An equipment blank 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 the ER Project. 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 (CVR), 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 ERFO 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 sample 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 General Engineering Laboratories, Inc. (GEL) 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).

- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (EPA 1990).

- *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]
Major Anions	SW846-9056
NPN	EPA 353.2
SVOC	SW846-8270
Total Cyanide	SW846-9012
Total Metals plus Uranium	SW846-6020/7470
Total Phenol	SW846-9066
VOC	SW846-8260

Notes: [a]U.S. Environmental Protection Agency (EPA), 1990, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed., U.S. Environmental Protection Agency, Washington, D.C.
[b]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.

EPA = U.S. Environmental Protection Agency.
NPN = Nitrate plus Nitrite (reported as nitrogen).
SVOC = Semivolatile organic compound.
SW = Solid Waste.
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

The following section includes a discussion of monitoring results, exceedances of standards, and pertinent trends in concentrations for COCs 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-6; concentration trend plots for COCs that exceed the MCL are presented in Attachment 5B, Figures 5B-1 through 5B-5. A summary of detected VOC and semivolatile organic compound (SVOC) results are presented in Table 5A-1. The method detection limits (MDLs) for all analyzed VOCs and SVOCs are listed in Table 5A-2. The VOCs detected in low concentrations include:

- Acetone
- Carbon Disulfide
- Chloroform
- cis-1,2-Dichloroethene
- Methylene Chloride
- Toluene

- TCE
- Xylenes (total)

Of the eight VOCs detected, only TCE exceeds the MCL of 5 µg/L (Table 5A-1). TCE was detected in three wells: LWDS-MW1, TAV-MW6, and TAV-MW10. The maximum concentration of TCE detected during this reporting period is 16.2 µg/L detected in the sample from LWDS-MW1 (duplicate) during the December 2008 sampling event. 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 nitrate plus nitrite (NPN) (reported as nitrogen), anions, total phenol, and total cyanide 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 12.6 mg/L in the sample collected from LWDS-MW1 during the November/December 2007 sampling event. Figures 5B-4 and 5B-5 (Attachment 5B) show that the NPN concentrations in LWDS-MW1 have generally exceeded the MCL for the life of the well, with concentrations being stable over time. In contrast, 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, total phenol, and total cyanide are also presented in Table 5A-3 (Attachment 5A). None of these analytes exceed established MCLs. Total metal analysis results are presented in Table 5A-4. 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 5A-5. All radionuclide activities are below MCLs, where established.

Field water quality parameters are measured during presample purging of each well and include temperature, SC, ORP, pH, turbidity, and DO. The parameter measurements obtained immediately before collecting the sample are presented in Table 5A-6.

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. 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 samples and equipment blank 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 October 2007, January 2008, April 2008, July 2008, and November 2008).

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 of 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 of less than 20) for all calculated parameters.

5.7.1.2 Equipment Decontamination Samples

The Bennett™ 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 equipment blank or rinsate sample was collected to verify the effectiveness of the equipment decontamination process. The results of the rinsate sample analyses are as follows:

- **November/December 2007 Sampling Event—**Equipment rinsate samples were collected prior to sampling at TAV-MW3 and TAV-MW5 and submitted for VOC and NPN analysis. NPN was not detected above the MDL in either equipment blank sample. Methylene chloride was detected in the equipment blank sample associated with TAV-MW5. No corrective action is required as methylene chloride was not detected in the TAV-MW5 environmental samples. Total xylenes were detected in the equipment sample associated with TAV-MW3. Total xylenes were qualified as not detected during data validation as this compound was detected in TAV-MW3 samples at a concentration less than 5 times the equipment blank contamination.

- **January/February 2008 Sampling Event—**Equipment rinsate samples were collected prior to sampling at TAV-MW4 and TAV-MW7 and submitted for VOC and NPN analysis. Bromodichloromethane, dibromochloromethane, and NPN were detected in the equipment blank sample associated with TAV-MW4. No corrective action is required as the VOCs were not detected in the associated environmental samples, and NPN was detected in TAV-MW4 samples at concentrations less than 5 times the equipment blank contamination.

- **April/May 2008 Sampling Event—**Equipment rinsate samples were collected prior to sampling at AVN-1 and TAV-MW6 and submitted for VOC and NPN analysis. Acetone, bromodichloromethane, chloroform, dibromochloromethane, methylene chloride, and NPN were detected in equipment blank samples. No corrective action is required as the VOCs were not detected in the associated environmental samples, and NPN was detected in AVN-1 and TAV-MW6 samples at concentrations less than 5 times the equipment blank contamination.

- **August/September 2008 Sampling Event—**Equipment rinsate samples were collected prior to sampling at LWDS-MW2 and TAV-MW2 and submitted for VOC and NPN analysis. Dibromochloromethane was detected in the equipment blank sample associated with LWDS-MW2. No corrective action is required as the VOC was not detected in the associated environmental sample.

- **November/December 2008 Sampling Event—**Equipment rinsate samples were collected prior to sampling at LWDS-MW1 and TAV-MW10 and submitted for VOC and NPN analyses. Bromodichloromethane, carbon disulfide, and dibromochloromethane were detected above the laboratory MDL. No corrective action is necessary, as these compounds were not detected in associated environmental samples.

5.7.1.3 Trip Blank Samples

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

5.7.2 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 was 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 on Tables 5A-1 through 5A-5 (Attachment 5A).

5.8 Variances and Nonconformances

The following section describes differences between planned work and actual work, findings of the data validation process, and impacts to the monitoring schedule.

5.8.1 Variances and Nonconformances

Several variances and nonconformances from field or sampling requirements in the TA-V groundwater monitoring mini-SAPs (SNL October 2007, January 2008, April 2008, July 2008, and November 2008) occurred during sampling activities. The following project-specific variances associated with these sampling events are noted:

- **November/December 2007 Sampling Event—**Monitoring well TAV-MW1 was not sampled due to insufficient water. On December 3, 2007, the water level measurement indicated only 0.01 ft of water remained above the bottom of the well screen.

- **January/February 2008 Sampling Event—**Monitoring well TAV-MW1 was not sampled due to insufficient water.

- **August/September 2008 Sampling Event—**VOC results from TAV-MW10 and the associated trip blank sample were suspect and unusable. In reviewing the sample data results, it was determined by laboratory staff and the SNL/NM SMO that a batching problem during the analysis of TAV-MW10 samples caused all of the results for the two samples to be qualified during data validation as unusable. Because the holding time had expired, no reanalysis of the samples could be performed to determine whether the original results were valid.

- **November/December 2008 Sampling Event—**The original NPN result for the sample from TAV-MW3 was qualified during data validation as unusable. SNL/NM requested GEL to reanalyze the sample as the original result was not comparable to historical values. The result for NPN reported in the initial analysis was 27.8 mg/L, and the result for the reanalysis was 4.95 mg/L.

No other variances and nonconformances occurred; however, the following project-specific issues associated with these sampling events are noted:

- **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 the most representative groundwater sample possible given the low yield of this well.

- **January/February 2008 Sampling Event—**The sampling period was extended due to equipment repairs required for the sampling truck.

- **April/May 2008 Sampling Event—**Initial sampling was performed at newly installed monitoring well TAV-MW10. Sampling was completed approximately one month prior to other TA-V wells due to compliance requirements.

5.8.2 Data Validation

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. Data validation qualifiers are provided with the analytical results in Tables 5A-1 through 5A-5 (Attachment 5A). The data validation report associated with each sampling event has been submitted to the SNL/NM Customer Funded Records Center. Specific data validation issues associated with these sampling events are noted as follows:

- **January/February 2008 Sampling Event—**The result for the VOC acetone was qualified as unusable in various samples because the initial calibration did not meet acceptance criteria. SNL/NM reviewed the QC procedures for both data validation and laboratory requirements. However, all analytical data from the January 2008 samples are consistent with historical values.

- **November/December 2008 Sampling Event—**The original NPN sample result for TAV-MW3 was qualified during data validation as unusable, because the result (27.8 mg/L) could not be confirmed by the analytical laboratory and was not comparable to historical data. In addition, the laboratory analyst indicated that reanalysis would provide corroborating data. However, the analytical result for the reanalysis (4.95 mg/L) is consistent with historical values.

5.9 Summary and Conclusions

The site conceptual 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 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 did not contain 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 that occurred until 1992 probably removed any residual COCs present in the vadose zone. Rapid drainage and continued flushing removed any significant secondary contaminant source. Small concentrations of TCE present in the aquifer today represent these initial releases. The slow rate of groundwater flow (4 to 20 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-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:

- 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 study area, and concentrations of nitrate above the MCL are limited.

- The potential sources of TCE and/or nitrate in the TA-V study area include wastewater disposal systems and seepage pits.

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

SNL/NM recommends the following approach as part of the ongoing environmental studies of the TA-V study area:

- Continue collection of groundwater samples at the 12 TA-V groundwater monitoring wells on a quarterly basis. At a minimum, the analytes for groundwater sampling will consist of VOCs and NPN.

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

- Continue to report future TA-V investigation results in the SNL/NM Groundwater Protection Program Annual Groundwater Monitoring Report.

- Complete and submit the response (DOE April 2009) to the NMED's Notice of Disapproval of the TA-V CME Report (NMED July 2008).

- Upon NMED approval of the TA-V CME Report (SNL July 2005), prepare a Corrective Measures Implementation Plan.

5.10 References

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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 and Semivolatile Organic Compounds
Technical Area V Groundwater Monitoring

October 2007 through December 2008

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	**12.8**	0.250	1.00	5.00			085406-001	SW846-8260B
07-Dec-07	cis-1,2-Dichloroethene	2.41	0.300	1.00	70.0			085406-001	SW846-8260B
TAV-MW2 28-Nov-07	Trichloroethene	0.582	0.250	1.00	5.00	J		085398-001	SW846-8260B
TAV-MW3 12-Nov-07	Total Xylenes	0.357	0.250	1.00	NE	J	1.00U	085381-001	SW846-8260B
TAV-MW3 (Duplicate) 12-Nov-07	Total Xylenes	0.382	0.250	1.00	NE	J	1.00U	085382-001	SW846-8260B
TAV-MW4 04-Dec-07	Trichloroethene	1.01	0.250	1.00	5.00			085400-001	SW846-8260B
TAV-MW5 15-Nov-07	Total Xylenes	0.713	0.250	1.00	NE	J		085388-001	SW846-8260B
TAV-MW6	Trichloroethene	**7.39**	0.250	1.00	5.00			085404-001	SW846-8260B
29-Nov-07	cis-1,2-Dichloroethene	1.16	0.300	1.00	70.0			085404-001	SW846-8260B
TAV-MW8 05-Dec-07	Trichloroethene	1.36	0.250	1.00	5.00			085402-001	SW846-8260B
AVN-1 04-Feb-08	Acetone	3.28	1.25	5.00	NE	B, J	5.0 UJ	085557-001	SW846-8260B
LWDS-MW1	Trichloroethene	**12.4**	0.250	1.00	5.00	H	J	085560-001	SW846-8260B
25-Feb-08	cis-1,2-Dichloroethene	2.83	0.300	1.00	70.0	H	J	085560-001	SW846-8260B
LWDS-MW2 01-Feb-08	Acetone	3.25	1.25	5.00	NE	B, J	5.0 UJ	085562-001	SW846-8260B
TAV-MW2 21-Feb-08	Trichloroethene	0.923	0.250	1.00	5.00	J		085564-001	SW846-8260B
TAV-MW4	Chloroform	0.424	0.250	1.00	NE	J		085570-001	SW846-8260B
26-Feb-08	Trichloroethene	1.25	0.250	1.00	5.00			085570-001	SW846-8260B
TAV-MW4 (Duplicate)	Chloroform	0.390	0.250	1.00	NE	J		085571-001	SW846-8260B
26-Feb-08	Trichloroethene	1.31	0.250	1.00	5.00			085571-001	SW846-8260B
TAV-MW6	Acetone	1.70	1.25	5.00	NE	J		085575-001	SW846-8260B
27-Feb-08	Trichloroethene	**10.2**	0.250	1.00	5.00			085575-001	SW846-8260B
	cis-1,2-Dichloroethene	1.56	0.300	1.00	70.0			085575-001	SW846-8260B
TAV-MW8 28-Feb-08	Trichloroethene	1.27	0.250	1.00	5.00			085582-001	SW846-8260B

Refer to footnotes on page 5A-31.

Table 5A-1
Summary of Detected Volatile and Semivolatile Organic Compounds
Technical Area V Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
AVN-1	Acetone	1.39	1.25	5.00	NE	B, J	5.00UJ	085864-001	SW846-8260B
12-May-08	Methylene Chloride	2.84	2.00	5.00	5.00	B, J	5.00U	085864-001	SW846-8260B
AVN-1 (Duplicate) 12-May-08	Acetone	2.14	1.25	5.00	NE	B, J	5.00UJ	085865-001	SW846-8260B
LWDS-MW1	Carbon Disulfide	1.49	1.25	5.00	NE	J		085867-001	SW846-8260B
22-May-08	Trichloroethene	**13.8**	0.250	1.00	5.00			085867-001	SW846-8260B
	cis-1,2-Dichloroethene	2.72	0.300	1.00	70.0			085867-001	SW846-8260B
LWDS-MW2 09-May-08	Methylene Chloride	2.03	2.00	5.00	5.00	B, J	5.00U	085869-001	SW846-8260B
TAV-MW2 13-May-08	Trichloroethene	0.688	0.250	1.00	5.00	J		085871-001	SW846-8260B
TAV-MW4	Chloroform	0.453	0.250	1.00	NE	J		085875-001	SW846-8260B
15-May-08	Methylene Chloride	2.57	2.00	5.00	5.00	B, J	5.00U	085875-001	SW846-8260B
	Trichloroethene	1.35	0.250	1.00	5.00			085875-001	SW846-8260B
TAV-MW6	Trichloroethene	**8.71**	0.250	1.00	5.00			085881-001	SW846-8260B
20-May-08	cis-1,2-Dichloroethene	1.32	0.300	1.00	70.0			085881-001	SW846-8260B
TAV-MW6 (Duplicate)	Trichloroethene	**8.13**	0.250	1.00	5.00			085882-001	SW846-8260B
20-May-08	cis-1,2-Dichloroethene	1.32	0.300	1.00	70.0			085882-001	SW846-8260B
TAV-MW8	Methylene Chloride	2.01	2.00	5.00	5.00	B, J	5.00U	085886-001	SW846-8260B
14-May-08	Trichloroethene	1.27	0.250	1.00	5.00			085886-001	SW846-8260B
TAV-MW10	Methylene Chloride	3.62	2.00	5.00	5.00	J	5.00U	085801-001	SW846-8260B
04-Apr-08	Toluene	0.390	0.250	1.00	1000	J	1.00U	085801-001	SW846-8260B
	Trichloroethene	**9.80**	0.250	1.00	5.00			085801-001	SW846-8260B
	cis-1,2-Dichloroethene	1.80	0.300	1.00	70.0			085801-001	SW846-8260B
LWDS-MW1	Toluene	0.251	0.250	1.00	1000	J		086709-001	SW846-8260B
08-Sep-08	Trichloroethene	**12.7**	0.250	1.00	5.00			086709-001	SW846-8260B
	cis-1,2-Dichloroethene	2.61	0.300	1.00	70.0			086709-001	SW846-8260B
TAV-MW2 02-Sep-08	Trichloroethene	0.869	0.250	1.00	5.00	J		086697-001	SW846-8260B
TAV-MW2 (Duplicate)	Methylene Chloride	2.02	2.00	5.00	5.00	J	5.00U	086698-001	SW846-8260B
02-Sep-08	Trichloroethene	0.938	0.250	1.00	5.00	J		086698-001	SW846-8260B
TAV-MW4	Chloroform	0.423	0.250	1.00	NE	J		086703-001	SW846-8260B
04-Sep-08	Trichloroethene	1.47	0.250	1.00	5.00			086703-001	SW846-8260B

Refer to footnotes on page 5A-31.

Table 5A-1 *(Concluded)*
Summary of Detected Volatile and Semivolatile Organic Compounds
Technical Area V Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW6 09-Sep-08	Carbon Disulfide	1.49	1.25	5.00	NE	J		086705-001	SW846-8260B
	Trichloroethene	**9.81**	0.250	1.00	5.00			086705-001	SW846-8260B
	cis-1,2-Dichloroethene	1.53	0.300	1.00	70.0			086705-001	SW846-8260B
TAV-MW8 03-Sep-08	Methylene Chloride	2.16	2.00	5.00	5.00	J	5.00U	086700-001	SW846-8260B
	Trichloroethene	1.48	0.250	1.00	5.00			086700-001	SW846-8260B
LWDS-MW1 11-Dec-08	Trichloroethene	**15.9**	0.250	1.00	5.00			086920-001	SW846-8260B
	cis-1,2-Dichloroethene	2.60	0.300	1.00	70.0			086920-001	SW846-8260B
LWDS-MW1 (Duplicate) 11-Dec-08	Trichloroethene	**16.2**	0.250	1.00	5.00			086921-001	SW846-8260B
	cis-1,2-Dichloroethene	2.63	0.300	1.00	70.0			086921-001	SW846-8260B
TAV-MW2 03-Dec-08	Trichloroethene	0.939	0.250	1.00	5.00	J		086905-001	SW846-8260B
TAV-MW4 05-Dec-08	Chloroform	0.428	0.250	1.00	NE	J		086909-001	SW846-8260B
	Trichloroethene	1.33	0.250	1.00	5.00			086909-001	SW846-8260B
TAV-MW6 08-Dec-08	Trichloroethene	**9.97**	0.250	1.00	5.00			086911-001	SW846-8260B
	cis-1,2-Dichloroethene	1.39	0.300	1.00	70.0			086911-001	SW846-8260B
TAV-MW8 04-Dec-08	Trichloroethene	1.44	0.250	1.00	5.00			086907-001	SW846-8260B
TAV-MW10 09-Dec-08	Trichloroethene	**12.6**	0.250	1.00	5.00			086915-001	SW846-8260B
	cis-1,2-Dichloroethene	1.94	0.300	1.00	70.0			086915-001	SW846-8260B
TAV-MW10 (Duplicate) 09-Dec-08	Trichloroethene	**14.1**	0.250	1.00	5.00			086916-001	SW846-8260B
	cis-1,2-Dichloroethene	2.03	0.300	1.00	70.0			086916-001	SW846-8260B

Refer to footnotes on page 5A-31.

Table 5A-2
Method Detection Limits for Volatile and Semivolatile Organic Compounds
Technical Area V Groundwater Monitoring

October 2007 through December 2008

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	0.300 – 0.325	8260	1,2,4-Trichlorobenzene	2.00	8270	Di-n-butyl phthalate	2.00	8270
1,1,2,2-Tetrachloroethane	0.250	8260	1,2-Dichlorobenzene	2.00	8270	Di-n-octyl phthalate	3.00	8270
1,1,2-Trichloroethane	0.250	8260	1,3-Dichlorobenzene	2.00	8270	Dibenz[a,h]anthracene	0.200	8270
1,1-Dichloroethane	0.300	8260	1,4-Dichlorobenzene	2.00	8270	Dibenzofuran	2.00	8270
1,1-Dichloroethene	0.300	8260	2,4,5-Trichlorophenol	1.00	8270	Diethylphthalate	2.00	8270
1,2-Dichloroethane	0.250	8260	2,4,6-Trichlorophenol	2.00	8270	Dimethylphthalate	2.00	8270
1,2-Dichloropropane	0.250	8260	2,4-Dichlorophenol	2.00	8270	Dinitro-o-cresol	3.00	8270
2-Butanone	1.25	8260	2,4-Dimethylphenol	2.00	8270	Diphenyl amine	3.00	8270
2-Hexanone	1.25 - 5.00	8260	2,4-Dinitrophenol	10.0	8270	Fluoranthene	0.200	8270
4-methyl-, 2-Pentanone	1.25	8260	2,4-Dinitrotoluene	2.00	8270	Fluorene	0.200	8270
Acetone	1.25 – 15.0	8260	2,6-Dinitrotoluene	2.00	8270	Hexachlorobenzene	2.00	8270
Benzene	0.300 – 1.00	8260	2-Chloronaphthalene	0.35	8270	Hexachlorobutadiene	2.00	8270
Bromodichloromethane	0.250	8260	2-Chlorophenol	2.00	8270	Hexachlorocyclopentadiene	2.00	8270
Bromoform	0.250	8260	2-Methylnaphthalene	0.300	8270	Hexachloroethane	2.00	8270
Bromomethane	0.500	8260	2-Nitroaniline	2.00	8270	Indeno(1,2,3-c,d)pyrene	0.200	8270
Carbon disulfide	1.25	8260	2-Nitrophenol	2.00	8270	Isophorone	2.00	8270
Carbon tetrachloride	0.250 – 0.260	8260	3,3'-Dichlorobenzidine	1.00	8270	Naphthalene	0.300	8270
Chlorobenzene	0.250	8260	3-Nitroaniline	2.00	8270	Nitro-benzene	3.00	8270
Chloroethane	0.300 - 0.500	8260	4-Bromophenyl phenyl ether	2.00	8270	Pentachlorophenol	2.00	8270
Chloroform	0.250	8260	4-Chloro-3-methylphenol	2.00	8270	Phenanthrene	0.200	8270
Chloromethane	0.300 - 0.500	8260	4-Chlorobenzenamine	2.00	8270	Phenol	1.00	8270
Dibromochloromethane	0.250 – 0.260	8260	4-Chlorophenyl phenyl ether	2.00	8270	Pyrene	0.300	8270
Ethyl benzene	0.250	8260	4-Nitroaniline	3.00	8270	bis(2-Chloroethoxy)methane	3.00	8270
Methylene chloride	2.00 – 5.00	8260	4-Nitrophenol	2.00	8270	bis(2-Chloroethyl)ether	2.00	8270
Styrene	0.250	8260	Acenaphthene	0.310	8270	bis(2-Ethylhexyl)phthalate	2.00	8270
Tetrachloroethene	0.250 – 0.450	8260	Acenaphthylene	0.200	8270	bis-Chloroisopropyl ether	2.00	8270
Toluene	0.250	8260	Anthracene	0.200	8270	m,p-Cresol	3.00	8270
Trichloroethene	0.250	8260	Benzo(a)anthracene	0.200	8270	n-Nitrosodipropylamine	2.00	8270
Vinyl acetate	1.50 - 5.00	8260	Benzo(a)pyrene	0.200	8270	o-Cresol	2.00	8270
Vinyl chloride	0.500	8260	Benzo(b)fluoranthene	0.200	8270			
Xylene	0.250 – 0.600	8260	Benzo(ghi)perylene	0.200	8270			
cis-1,2-Dichloroethene	0.300	8260	Benzo(k)fluoranthene	0.200	8270			
cis-1,3-Dichloropropene	0.250	8260	Butylbenzyl phthalate	2.00	8270			
trans-1,2-Dichloroethene	0.300	8260	Carbazole	0.200	8270			
trans-1,3-Dichloropropene	0.250	8260	Chrysene	0.200	8270			

Refer to footnotes on page 5A-31.

Table 5A-3
Summary of Nitrate plus Nitrite, Anion, Total Phenol, and Total Cyanide Results
Technical Area V Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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 **26-Nov-07**	Nitrate plus nitrite as N	8.86	0.100	0.500	10.0			085396-018	EPA 353.2
LWDS-MW1 **07-Dec-07**	Nitrate plus nitrite as N	**12.6**	0.250	1.25	10.0			085406-018	EPA 353.2
LWDS-MW2 **19-Nov-07**	Nitrate plus nitrite as N	7.60	0.100	0.500	10.0			085393-018	EPA 353.2
TAV-MW2 **28-Nov-07**	Nitrate plus nitrite as N	2.25	0.050	0.250	10.0			085398-018	EPA 353.2
TAV-MW3 **12-Nov-07**	Nitrate plus nitrite as N	4.88	0.100	0.500	10.0			085381-018	EPA 353.2
TAV-MW3 **(Duplicate) 12-Nov-07**	Nitrate plus nitrite as N	5.06	0.100	0.500	10.0			085382-018	EPA 353.2
TAV-MW4 **04-Dec-07**	Nitrate plus nitrite as N	6.25	0.050	0.250	10.0			085400-018	EPA 353.2
TAV-MW5 **15-Nov-07**	Nitrate plus nitrite as N	7.02	0.100	0.500	10.0			085388-018	EPA 353.2
TAV-MW5 **(Duplicate) 15-Nov-07**	Nitrate plus nitrite as N	7.48	0.100	0.500	10.0			085389-018	EPA 353.2
TAV-MW6 **29-Nov-07**	Nitrate plus nitrite as N	8.45	0.100	0.500	10.0			085404-018	EPA 353.2
TAV-MW7 **14-Nov-07**	Nitrate plus nitrite as N	4.15	0.100	0.500	10.0			085391-018	EPA 353.2
TAV-MW8 **05-Dec-07**	Nitrate plus nitrite as N	5.29	0.050	0.250	10.0			085402-018	EPA 353.2
TAV-MW9 **13-Nov-07**	Nitrate plus nitrite as N	4.72	0.200	1.00	10.0			085384-018	EPA 353.2
AVN-1 **04-Feb-08**	Nitrate plus nitrite as N	9.58	0.250	1.25	10.0			085557-018	EPA 353.2
LWDS-MW1 **25-Feb-08**	Nitrate plus nitrite as N	**11.9**	0.500	2.50	10.0			085560-018	EPA 353.2
LWDS-MW2 **01-Feb-08**	Nitrate plus nitrite as N	7.98	0.250	1.25	10.0			085562-018	EPA 353.2
TAV-MW2 **21-Feb-08**	Nitrate plus nitrite as N	3.08	0.050	0.250	10.0			085564-018	EPA 353.2
TAV-MW3 **28-Jan-08**	Nitrate plus nitrite as N	5.15	0.100	0.500	10.0			085566-018	EPA 353.2

Refer to footnotes on page 5A-31.

Table 5A-3
Summary of Nitrate plus Nitrite, Anion, Total Phenol, and Total Cyanide Results
Technical Area V Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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 **26-Feb-08**	Nitrate plus nitrite as N	6.89	0.100	0.500	10			085570-018	EPA 353.2
TAV-MW4 **(Duplicate) 26-Feb-08**	Nitrate plus nitrite as N	7.10	0.100	0.500	10.0			085571-018	EPA 353.2
TAV-MW5 **30-Jan-08**	Nitrate plus nitrite as N	7.73	0.250	1.25	10.0			085573-018	EPA 353.2
TAV-MW6 **27-Feb-08**	Nitrate plus nitrite as N	8.72	0.100	0.500	10.0			085575-018	EPA 353.2
TAV-MW7 **31-Jan-08**	Nitrate plus nitrite as N	4.22	0.100	0.500	10.0			085579-018	EPA 353.2
TAV-MW7 **(Duplicate) 31-Jan-08**	Nitrate plus nitrite as N	4.16	0.100	0.500	10.0			085580-018	EPA 353.2
TAV-MW8 **28-Feb-08**	Nitrate plus nitrite as N	5.73	0.100	0.500	10.0			085582-018	EPA 353.2
TAV-MW9 **29-Jan-08**	Nitrate plus nitrite as N	5.08	0.100	0.500	10.0			085584-018	EPA 353.2
AVN-1 **12-May-08**	Nitrate plus nitrite as N	8.65	0.500	2.50	10.0	B		085864-018	EPA 353.2
AVN-1 **(Duplicate) 12-May-08**	Nitrate plus nitrite as N	8.60	0.500	2.50	10.0	B		085865-018	EPA 353.2
LWDS-MW1 **22-May-08**	Nitrate plus nitrite as N	**11.6**	0.250	1.25	10.0	B		085867-018	EPA 353.2
LWDS-MW2 **09-May-08**	Nitrate plus nitrite as N	7.60	0.250	1.25	10.0	B		085869-018	EPA 353.2
TAV-MW2 **13-May-08**	Nitrate plus nitrite as N	3.56	0.100	0.500	10.0	B		085871-018	EPA 353.2
TAV-MW3 **07-May-08**	Nitrate plus nitrite as N	5.37	0.100	0.500	10.0	B		085873-018	EPA 353.2
TAV-MW4 **15-May-08**	Nitrate plus nitrite as N	7.13	0.250	1.25	10.0	B		085875-018	EPA 353.2
TAV-MW5 **08-May-08**	Nitrate plus nitrite as N	7.25	0.250	1.25	10.0			085877-018	EPA 353.2
TAV-MW6 **20-May-08**	Nitrate plus nitrite as N	8.50	0.250	1.25	10.0	B		085881-018	EPA 353.2
TAV-MW6 **(Duplicate) 20-May-08**	Nitrate plus nitrite as N	8.58	0.250	1.25	10.0	B		085882-018	EPA 353.2

Refer to footnotes on page 5A-31.

Table 5A-3
Summary of Nitrate plus Nitrite, Anion, Total Phenol, and Total Cyanide Results
Technical Area V Groundwater Monitoring
October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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 **05-May-08**	Nitrate plus nitrite as N	4.23	0.250	1.25	10.0			085884-018	EPA 353.2
TAV-MW8 **14-May-08**	Nitrate plus nitrite as N	5.85	0.250	1.25	10.0	B		085886-018	EPA 353.2
TAV-MW9 **06-May-08**	Nitrate plus nitrite as N	3.99	0.100	0.500	10.0			085889-018	EPA 353.2
TAV-MW10 **04-Apr-08**	Nitrate plus nitrite as N	9.78	0.250	1.25	10.0			085801-018	EPA 353.2
	Bromide	0.471	0.067	0.200	NE			085801-016	SW846-9086
	Chloride	47.0	0.660	2.00	NE			085801-016	SW846-9086
	Fluoride	1.29	0.033	0.100	4.00			085801-016	SW846-9086
	Sulfate	42.8	1.00	4.00	NE			085801-016	SW846-9086
	Total Cyanide	ND	0.0015	0.005	0.200	U		085801-026	SW846-9012
	Total Phenol	0.00297	0.00165	0.005	NE	J		085801-027	SW846-9066
AVN-1 **28-Aug-08**	Nitrate plus nitrite as N	9.20	0.250	1.25	10.0			086693-018	EPA 353.2
LWDS-MW1 **08-Sep-08**	Nitrate plus nitrite as N	**11.5**	0.250	1.25	10.0			086709-018	EPA 353.2
LWDS-MW2 **27-Aug-08**	Nitrate plus nitrite as N	7.80	0.250	1.25	10.0			086690-018	EPA 353.2
LWDS-MW2 **(Duplicate)** **27-Aug-08**	Nitrate plus nitrite as N	7.75	0.250	1.25	10.0			086691-018	EPA 353.2
TAV-MW2 **02-Sep-08**	Nitrate plus nitrite as N	3.65	0.100	0.500	10.0	B		086697-018	EPA 353.2
TAV-MW2 **(Duplicate)** **02-Sep-08**	Nitrate plus nitrite as N	3.82	0.100	0.500	10.0	B		086698-018	EPA 353.2
TAV-MW3 **19-Aug-08**	Nitrate plus nitrite as N	5.17	0.100	0.500	10.0			086682-018	EPA 353.2
TAV-MW4 **04-Sep-08**	Nitrate plus nitrite as N	7.88	0.250	1.25	10.0	B		086703-018	EPA 353.2
TAV-MW5 **25-Aug-08**	Nitrate plus nitrite as N	7.30	0.250	1.25	10.0			086684-018	EPA 353.2
TAV-MW6 **09-Sep-08**	Nitrate plus nitrite as N	8.65	0.250	1.25	10.0			086705-018	EPA 353.2
TAV-MW7 **26-Aug-08**	Nitrate plus nitrite as N	3.94	0.100	0.500	10.0			086686-018	EPA 353.2

Refer to footnotes on page 5A-31.

Table 5A-3 *(Concluded)*
Summary of Nitrate plus Nitrite, Anion, Total Phenol, and Total Cyanide Results
Technical Area V Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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 **03-Sep-08**	Nitrate plus nitrite as N	5.86	0.100	0.500	10.0	B		086700-018	EPA 353.2
TAV-MW9 **18-Aug-08**	Nitrate plus nitrite as N	3.93	0.100	0.500	10.0			086680-018	EPA 353.2
TAV-MW10 **10-Sep-08**	Nitrate plus nitrite as N	**10.3**	0.250	1.25	10.0			086707-018	EPA 353.2
AVN-1 **02-Dec-08**	Nitrate plus nitrite as N	8.43	0.250	1.25	10.0	B		086903-018	EPA 353.2
LWDS-MW1 **11-Dec-08**	Nitrate plus nitrite as N	**11.7**	0.250	1.25	10.0			086920-018	EPA 353.2
LWDS-MW1 **(Duplicate) 11-Dec-08**	Nitrate plus nitrite as N	**11.6**	0.250	1.25	10.0			086921-018	EPA 353.2
LWDS-MW2 **01-Dec-08**	Nitrate plus nitrite as N	8.28	0.100	0.500	10.0	B		086901-018	EPA 353.2
TAV-MW2 **03-Dec-08**	Nitrate plus nitrite as N	2.78	0.250	1.25	10.0	B		086905-018	EPA 353.2
TAV-MW3 **20-Nov-08**	Nitrate plus nitrite as N	**27.8**	0.250	1.25	10.0		R	086892-018	EPA 353.2
TAV-MW3 **(Re-analysis) 20-Nov-08**	Nitrate plus nitrite as N	4.95	0.250	1.25	10.0	H	J	086892-R18	EPA 353.2
TAV-MW4 **05-Dec-08**	Nitrate plus nitrite as N	6.26	0.100	0.500	10.0			086909-018	EPA 353.2
TAV-MW5 **24-Nov-08**	Nitrate plus nitrite as N	8.15	0.250	1.25	10.0			086897-018	EPA 353.2
TAV-MW6 **08-Dec-08**	Nitrate plus nitrite as N	8.48	0.100	0.500	10.0			086911-018	EPA 353.2
TAV-MW7 **25-Nov-08**	Nitrate plus nitrite as N	3.88	0.100	0.500	10.0			086899-018	EPA 353.2
TAV-MW8 **04-Dec-08**	Nitrate plus nitrite as N	5.30	0.250	1.25	10.0	B		086907-018	EPA 353.2
TAV-MW9 **21-Nov-08**	Nitrate plus nitrite as N	4.30	0.250	1.25	10.0			086894-018	EPA 353.2
TAV-MW10 **09-Dec-08**	Nitrate plus nitrite as N	**10.1**	0.100	0.500	10.0			086915-018	EPA 353.2
TAV-MW10 **(Duplicate) 09-Dec-08**	Nitrate plus nitrite as N	**10.1**	0.100	0.500	10.0			086916-018	EPA 353.2

Refer to footnotes on page 5A-31.

Table 5A-4
Summary of Total Metal Results
Technical Area V Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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	0.0233	0.010	0.020	NE			085801-009	SW846 6020
04-Apr-08	Antimony	ND	0.0005	0.002	0.006	B, U		085801-009	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	B, U		085801-009	SW846 6020
	Barium	0.0573	0.0005	0.002	2.00			085801-009	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		085801-009	SW846 6020
	Cadmium	0.000361	0.00011	0.001	0.005	J		085801-009	SW846 6020
	Calcium	54.1	0.100	0.500	NE			085801-009	SW846 6020
	Chromium	0.00398	0.0025	0.010	0.100	J		085801-009	SW846 6020
	Cobalt	0.000372	0.0001	0.001	NE	B, J	0.00091U	085801-009	SW846 6020
	Copper	0.0014	0.0003	0.001	NE			085801-009	SW846 6020
	Iron	0.620	0.010	0.025	NE	B		085801-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		085801-009	SW846 6020
	Magnesium	17.2	0.005	0.015	NE			085801-009	SW846 6020
	Manganese	0.00458	0.001	0.005	NE	J		085801-009	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U		085801-009	SW846 7470
	Molybdenum	0.00408	0.0001	0.0005	NE			085801-009	SW846 7470
	Nickel	0.00105	0.0005	0.002	NE	J		085801-009	SW846 6020
	Potassium	3.97	0.080	0.300	NE			085801-009	SW846 6020
	Selenium	0.00169	0.001	0.005	0.050	J		085801-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U	UJ	085801-009	SW846 6020
	Sodium	64.9	0.400	1.25	NE			085801-009	SW846 6020
	Thallium	0.00039	0.0003	0.001	0.002	J		085801-009	SW846 6020
	Vanadium	0.00329	0.003	0.010	NE	J		085801-009	SW846 6020
	Zinc	0.00682	0.0026	0.010	NE	J		085801-009	SW846 6020

Refer to footnotes on page 5A-31.

Table 5A-4
Summary of Total Metal Results
Technical Area V Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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	0.0271	0.005	0.015	NE			086693-010	SW846 6020
28-Aug-08	Antimony	ND	0.0005	0.002	0.006	U		086693-010	SW846 6020
	Arsenic	0.00172	0.0015	0.005	0.010	J		086693-010	SW846 6020
	Barium	0.0802	0.0005	0.002	2.00			086693-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086693-010	SW846 6020
	Cadmium	0.000147	0.00011	0.001	0.005	J		086693-010	SW846 6020
	Calcium	42.7	0.020	0.100	NE	B		086693-010	SW846 6020
	Chromium	0.00384	0.0015	0.003	0.100	B	0.0086U	086693-010	SW846 6020
	Cobalt	0.000131	0.0001	0.001	NE	J		086693-010	SW846 6020
	Copper	0.00151	0.0003	0.001	NE			086693-010	SW846 6020
	Iron	0.155	0.010	0.025	NE	B		086693-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086693-010	SW846 6020
	Magnesium	9.67	0.0052	0.015	NE			086693-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		086693-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U		086693-010	SW846 7470
	Nickel	0.00116	0.0005	0.002	NE	J		086693-010	SW846 6020
	Potassium	3.27	0.080	0.300	NE			086693-010	SW846 6020
	Selenium	0.00186	0.001	0.005	0.050	J		086693-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086693-010	SW846 6020
	Sodium	36.7	0.080	0.250	NE			086693-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086693-010	SW846 6020
	Uranium	0.0024	0.00005	0.0002	0.030			086693-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086693-010	SW846 6020
	Zinc	0.00345	0.0026	0.010	NE	J		086693-010	SW846 6020

Refer to footnotes on page 5A-31.

Table 5A-4
Summary of Total Metal Results
Technical Area V Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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	0.005	0.015	NE	U		086709-010	SW846 6020
08-Sep-08	Antimony	ND	0.0005	0.002	0.006	U		086709-010	SW846 6020
	Arsenic	0.00306	0.0015	0.005	0.010	J		086709-010	SW846 6020
	Barium	0.0841	0.0005	0.002	2.00			086709-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086709-010	SW846 6020
	Cadmium	0.000183	0.00011	0.001	0.005	J		086709-010	SW846 6020
	Calcium	61.6	0.400	2.00	NE	B	J	086709-010	SW846 6020
	Chromium	0.00329	0.0015	0.003	0.100			086709-010	SW846 6020
	Cobalt	0.000141	0.0001	0.001	NE	J		086709-010	SW846 6020
	Copper	0.00106	0.0003	0.001	NE			086709-010	SW846 6020
	Iron	0.265	0.010	0.025	NE			086709-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086709-010	SW846 6020
	Magnesium	21.4	0.0052	0.015	NE			086709-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		086709-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U		086709-010	SW846 7470
	Nickel	0.00176	0.0005	0.002	NE	J		086709-010	SW846 6020
	Potassium	2.82	0.080	0.300	NE			086709-010	SW846 6020
	Selenium	0.00482	0.001	0.005	0.050	J		086709-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086709-010	SW846 6020
	Sodium	57.0	1.60	5.0	NE			086709-010	SW846 6020
	Thallium	0.000941	0.0003	0.001	0.002	J	0.0039U	086709-010	SW846 6020
	Uranium	0.00342	0.00005	0.0002	0.030			086709-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086709-010	SW846 6020
	Zinc	0.00521	0.0026	0.010	NE	J		086709-010	SW846 6020

Refer to footnotes on page 5A-31.

Table 5A-4
Summary of Total Metal Results
Technical Area V Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
LWDS-MW2	Aluminum	0.0417	0.005	0.015	NE			086690-010	SW846 6020
27-Aug-08	Antimony	ND	0.0005	0.002	0.006	U		086690-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086690-010	SW846 6020
	Barium	0.073	0.0005	0.002	2.00			086690-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086690-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086690-010	SW846 6020
	Calcium	48.3	0.020	0.100	NE	B		086690-010	SW846 6020
	Chromium	0.00569	0.0015	0.003	0.100	B	0.0086U	086690-010	SW846 6020
	Cobalt	0.000217	0.0001	0.001	NE	J		086690-010	SW846 6020
	Copper	0.00267	0.0003	0.001	NE			086690-010	SW846 6020
	Iron	0.213	0.010	0.025	NE	B		086690-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086690-010	SW846 6020
	Magnesium	15.5	0.0052	0.015	NE			086690-010	SW846 6020
	Manganese	0.00122	0.001	0.005	NE	J		086690-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U		086690-010	SW846 7470
	Nickel	0.00168	0.0005	0.002	NE	J		086690-010	SW846 6020
	Potassium	2.63	0.080	0.300	NE			086690-010	SW846 6020
	Selenium	0.0022	0.001	0.005	0.050	J		086690-010	SW846 6020
	Silver	0.000201	0.0002	0.001	NE	J		086690-010	SW846 6020
	Sodium	46.5	0.080	0.250	NE			086690-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086690-010	SW846 6020
	Uranium	0.00372	0.00005	0.0002	0.030			086690-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086690-010	SW846 6020
	Zinc	0.00371	0.0026	0.010	NE	J		086690-010	SW846 6020

Refer to footnotes on page 5A-31.

Table 5A-4
Summary of Total Metal Results
Technical Area V Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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	0.0321	0.005	0.015	NE	B		086697-010	SW846 6020
02-Sep-08	Antimony	0.00122	0.0005	0.002	0.006	B, J	0.0093U	086697-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086697-010	SW846 6020
	Barium	0.0657	0.0005	0.002	2.00			086697-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086697-010	SW846 6020
	Cadmium	0.00025	0.00011	0.001	0.005	J		086697-010	SW846 6020
	Calcium	66.0	0.200	1.00	NE	B		086697-010	SW846 6020
	Chromium	0.00243	0.0015	0.003	0.100	J		086697-010	SW846 6020
	Cobalt	0.000218	0.0001	0.001	NE	J		086697-010	SW846 6020
	Copper	0.000877	0.0003	0.001	NE	J		086697-010	SW846 6020
	Iron	0.289	0.010	0.025	NE			086697-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086697-010	SW846 6020
	Magnesium	23.5	0.0052	0.015	NE			086697-010	SW846 6020
	Manganese	0.00139	0.001	0.005	NE	J		086697-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U		086697-010	SW846 7470
	Nickel	0.00177	0.0005	0.002	NE	J		086697-010	SW846 6020
	Potassium	3.23	0.080	0.300	NE			086697-010	SW846 6020
	Selenium	0.00287	0.001	0.005	0.050	J		086697-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086697-010	SW846 6020
	Sodium	57.7	0.800	2.50	NE			086697-010	SW846 6020
	Thallium	0.000646	0.0003	0.001	0.002	J	0.0017U	086697-010	SW846 6020
	Uranium	0.00641	0.00005	0.0002	0.030			086697-010	SW846 6020
	Vanadium	0.00528	0.003	0.010	NE	J		086697-010	SW846 6020
	Zinc	0.00343	0.0026	0.010	NE	J		086697-010	SW846 6020

Refer to footnotes on page 5A-31.

Table 5A-4
Summary of Total Metal Results
Technical Area V Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW3	Aluminum	0.0299	0.005	0.015	NE	B	0.032U	086682-010	SW846 6020
19-Aug-08	Antimony	ND	0.0005	0.002	0.006	U		086682-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086682-010	SW846 6020
	Barium	0.0443	0.0005	0.002	2.00			086682-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086682-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086682-010	SW846 6020
	Calcium	58.5	0.100	0.500	NE	B		086682-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	B, U		086682-010	SW846 6020
	Cobalt	0.000127	0.0001	0.001	NE	J		086682-010	SW846 6020
	Copper	0.000581	0.0003	0.001	NE	J		086682-010	SW846 6020
	Iron	0.194	0.010	0.025	NE			086682-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086682-010	SW846 6020
	Magnesium	13.4	0.0052	0.015	NE			086682-010	SW846 6020
	Manganese	0.00155	0.001	0.005	NE	J		086682-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U		086682-010	SW846 7470
	Nickel	0.00143	0.0005	0.002	NE	J		086682-010	SW846 6020
	Potassium	4.10	0.080	0.300	NE			086682-010	SW846 6020
	Selenium	0.00199	0.001	0.005	0.050	J		086682-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086682-010	SW846 6020
	Sodium	53.2	0.400	1.25	NE			086682-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086682-010	SW846 6020
	Uranium	0.00347	0.00005	0.0002	0.030			086682-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086682-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	B, U		086682-010	SW846 6020

Refer to footnotes on page 5A-31.

Table 5A-4
Summary of Total Metal Results
Technical Area V Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW4	Aluminum	0.0822	0.005	0.015	NE			086703-010	SW846 6020
04-Sep-08	Antimony	ND	0.0005	0.002	0.006	U		086703-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086703-010	SW846 6020
	Barium	0.0976	0.0005	0.002	2.00	B		086703-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086703-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086703-010	SW846 6020
	Calcium	51.4	0.200	1.00	NE	B		086703-010	SW846 6020
	Chromium	0.0162	0.0015	0.003	0.100			086703-010	SW846 6020
	Cobalt	0.000126	0.0001	0.001	NE	J		086703-010	SW846 6020
	Copper	0.000644	0.0003	0.001	NE	J		086703-010	SW846 6020
	Iron	0.156	0.010	0.025	NE	B		086703-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086703-010	SW846 6020
	Magnesium	15.0	0.0052	0.015	NE	B	J	086703-010	SW846 6020
	Manganese	0.00203	0.001	0.005	NE	B, J	0.0098U	086703-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U		086703-010	SW846 7470
	Nickel	0.00105	0.0005	0.002	NE	J		086703-010	SW846 6020
	Potassium	3.48	0.080	0.300	NE			086703-010	SW846 6020
	Selenium	0.00306	0.001	0.005	0.050	J		086703-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086703-010	SW846 6020
	Sodium	44.4	0.800	2.50	NE	B		086703-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086703-010	SW846 6020
	Uranium	0.00327	0.00005	0.0002	0.030			086703-010	SW846 6020
	Vanadium	0.00603	0.003	0.010	NE	J		086703-010	SW846 6020
	Zinc	0.00453	0.0026	0.010	NE	B, J		086703-010	SW846 6020

Refer to footnotes on page 5A-31.

Table 5A-4
Summary of Total Metal Results
Technical Area V Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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	0.005	0.015	NE	U		086684-010	SW846 6020
25-Aug-08	Antimony	ND	0.0005	0.002	0.006	U		086684-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086684-010	SW846 6020
	Barium	0.0589	0.0005	0.002	2.00			086684-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086684-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086684-010	SW846 6020
	Calcium	44.4	0.020	0.100	NE	B		086684-010	SW846 6020
	Chromium	0.00375	0.0015	0.003	0.100	B	0.0086U	086684-010	SW846 6020
	Cobalt	0.000158	0.0001	0.001	NE	J		086684-010	SW846 6020
	Copper	0.000553	0.0003	0.001	NE	J		086684-010	SW846 6020
	Iron	0.152	0.010	0.025	NE	B		086684-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086684-010	SW846 6020
	Magnesium	14.0	0.0052	0.015	NE			086684-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		086684-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U		086684-010	SW846 7470
	Nickel	0.00125	0.0005	0.002	NE	J		086684-010	SW846 6020
	Potassium	2.58	0.080	0.300	NE			086684-010	SW846 6020
	Selenium	0.00224	0.001	0.005	0.050	J		086684-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086684-010	SW846 6020
	Sodium	45.4	0.080	0.250	NE			086684-010	SW846 6020
	Thallium	0.000976	0.0003	0.001	0.002	J	0.0025U	086684-010	SW846 6020
	Uranium	0.00378	0.00005	0.0002	0.030			086684-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086684-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		086684-010	SW846 6020

Refer to footnotes on page 5A-31.

Table 5A-4
Summary of Total Metal Results
Technical Area V Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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	0.0098	0.005	0.015	NE	J		086705-010	SW846 6020
09-Sep-08	Antimony	0.00071	0.0005	0.002	0.006	B, J	0.0055U	086705-010	SW846 6020
	Arsenic	0.00263	0.0015	0.005	0.010	J		086705-010	SW846 6020
	Barium	0.062	0.0005	0.002	2.00			086705-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086705-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086705-010	SW846 6020
	Calcium	11.0	0.400	2.00	NE	B	J	086705-010	SW846 6020
	Chromium	0.00434	0.0015	0.003	0.100			086705-010	SW846 6020
	Cobalt	0.000133	0.0001	0.001	NE	J		086705-010	SW846 6020
	Copper	0.000856	0.0003	0.001	NE	J		086705-010	SW846 6020
	Iron	0.251	0.010	0.025	NE			086705-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086705-010	SW846 6020
	Magnesium	18.6	0.0052	0.015	NE			086705-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		086705-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U		086705-010	SW846 7470
	Nickel	0.00173	0.0005	0.002	NE	J		086705-010	SW846 6020
	Potassium	3.45	0.080	0.300	NE			086705-010	SW846 6020
	Selenium	0.00225	0.001	0.005	0.050	J		086705-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086705-010	SW846 6020
	Sodium	9.84	1.60	5.00	NE			086705-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086705-010	SW846 6020
	Uranium	0.00389	0.00005	0.0002	0.030			086705-010	SW846 6020
	Vanadium	0.00464	0.003	0.010	NE	J		086705-010	SW846 6020
	Zinc	0.00282	0.0026	0.010	NE	J		086705-010	SW846 6020

Refer to footnotes on page 5A-31.

Table 5A-4
Summary of Total Metal Results
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October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW7	Aluminum	0.0307	0.005	0.015	NE			086686-010	SW846 6020
26-Aug-08	Antimony	ND	0.0005	0.002	0.006	U		086686-010	SW846 6020
	Arsenic	0.00229	0.0015	0.005	0.010	J		086686-010	SW846 6020
	Barium	0.0555	0.0005	0.002	2.00			086686-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086686-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086686-010	SW846 6020
	Calcium	58.3	0.100	0.500	NE	B		086686-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086686-010	SW846 6020
	Cobalt	0.000232	0.0001	0.001	NE	J		086686-010	SW846 6020
	Copper	0.000854	0.0003	0.001	NE	J		086686-010	SW846 6020
	Iron	0.219	0.010	0.025	NE	B		086686-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086686-010	SW846 6020
	Magnesium	20.7	0.0052	0.015	NE			086686-010	SW846 6020
	Manganese	0.00256	0.001	0.005	NE	J		086686-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U		086686-010	SW846 7470
	Nickel	0.00176	0.0005	0.002	NE	J		086686-010	SW846 6020
	Potassium	3.77	0.080	0.300	NE			086686-010	SW846 6020
	Selenium	0.00203	0.001	0.005	0.050	J		086686-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086686-010	SW846 6020
	Sodium	59.7	0.400	1.25	NE			086686-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086686-010	SW846 6020
	Uranium	0.00539	0.00005	0.0002	0.030			086686-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086686-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		086686-010	SW846 6020

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Table 5A-4
Summary of Total Metal Results
Technical Area V Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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	0.056	0.005	0.015	NE			086700-010	SW846 6020
03-Sep-08	Antimony	ND	0.0005	0.002	0.006	U		086700-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086700-010	SW846 6020
	Barium	0.0553	0.0005	0.002	2.00	B		086700-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086700-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086700-010	SW846 6020
	Calcium	53.4	0.200	1.00	NE	B		086700-010	SW846 6020
	Chromium	0.00178	0.0015	0.003	0.100	J		086700-010	SW846 6020
	Cobalt	0.00014	0.0001	0.001	NE	J		086700-010	SW846 6020
	Copper	0.000707	0.0003	0.001	NE	J		086700-010	SW846 6020
	Iron	0.177	0.010	0.025	NE	B		086700-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086700-010	SW846 6020
	Magnesium	16.4	0.0052	0.015	NE	B	J	086700-010	SW846 6020
	Manganese	0.00183	0.001	0.005	NE	B, J	0.0098U	086700-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U		086700-010	SW846 7470
	Nickel	0.00108	0.0005	0.002	NE	J		086700-010	SW846 6020
	Potassium	3.74	0.080	0.300	NE			086700-010	SW846 6020
	Selenium	0.00212	0.001	0.005	0.050	J		086700-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086700-010	SW846 6020
	Sodium	53.5	0.800	2.50	NE	B		086700-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086700-010	SW846 6020
	Uranium	0.00431	0.00005	0.0002	0.030			086700-010	SW846 6020
	Vanadium	0.00511	0.003	0.010	NE	J		086700-010	SW846 6020
	Zinc	0.00352	0.0026	0.010	NE	B, J		086700-010	SW846 6020

Refer to footnotes on page 5A-31.

Table 5A-4
Summary of Total Metal Results
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October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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	0.0241	0.005	0.015	NE	B	0.075U	086680-010	SW846 6020
18-Aug-08	Antimony	ND	0.0005	0.002	0.006	U		086680-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086680-010	SW846 6020
	Barium	0.0691	0.0005	0.002	2.00			086680-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086680-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086680-010	SW846 6020
	Calcium	63.5	0.200	1.00	NE	B		086680-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086680-010	SW846 6020
	Cobalt	0.000141	0.0001	0.001	NE	J		086680-010	SW846 6020
	Copper	0.000551	0.0003	0.001	NE	J		086680-010	SW846 6020
	Iron	0.162	0.010	0.025	NE			086680-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086680-010	SW846 6020
	Magnesium	19.2	0.0052	0.015	NE			086680-010	SW846 6020
	Manganese	0.00262	0.001	0.005	NE	J		086680-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086680-010	SW846 7470
	Nickel	0.00111	0.0005	0.002	NE	J		086680-010	SW846 6020
	Potassium	3.91	0.080	0.300	NE			086680-010	SW846 6020
	Selenium	0.00258	0.001	0.005	0.050	J		086680-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086680-010	SW846 6020
	Sodium	57.2	0.800	2.50	NE			086680-010	SW846 6020
	Thallium	0.000559	0.0003	0.001	0.002	J	0.0024U	086680-010	SW846 6020
	Uranium	0.00629	0.00005	0.0002	0.030	B		086680-010	SW846 6020
	Vanadium	0.00485	0.003	0.010	NE	J		086680-010	SW846 6020
	Zinc	0.00297	0.0026	0.010	NE	J		086680-010	SW846 6020

Refer to footnotes on page 5A-31.

Table 5A-4 *(Concluded)*
Summary of Total Metal Results
Technical Area V Groundwater Monitoring

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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	0.0129	0.005	0.015	NE	J		086707-010	SW846 6020
10-Sep-08	Antimony	0.000858	0.0005	0.002	0.006	B, J	0.0069U	086707-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086707-010	SW846 6020
	Barium	0.0672	0.0005	0.002	2.00			086707-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086707-010	SW846 6020
	Cadmium	0.000247	0.00011	0.001	0.005	J		086707-010	SW846 6020
	Calcium	62.9	0.200	1.00	NE	B		086707-010	SW846 6020
	Chromium	0.00244	0.0015	0.003	0.100	J		086707-010	SW846 6020
	Cobalt	0.000155	0.0001	0.001	NE	J		086707-010	SW846 6020
	Copper	0.000414	0.0003	0.001	NE	J		086707-010	SW846 6020
	Iron	0.259	0.010	0.025	NE			086707-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086707-010	SW846 6020
	Magnesium	19.1	0.0052	0.015	NE			086707-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		086707-010	SW846 6020
	Mercury	0.000049	0.00003	0.0002	0.002	J		086707-010	SW846 7470
	Nickel	0.00127	0.0005	0.002	NE	J		086707-010	SW846 6020
	Potassium	4.51	0.080	0.300	NE			086707-010	SW846 6020
	Selenium	0.00221	0.001	0.005	0.050	J		086707-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086707-010	SW846 6020
	Sodium	58.5	0.800	2.50	NE			086707-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086707-010	SW846 6020
	Uranium	0.00395	0.00005	0.0002	0.030			086707-010	SW846 6020
	Vanadium	0.00445	0.003	0.010	NE	J		086707-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		086707-010	SW846 6020

Refer to footnotes on page 5A-31.

Table 5A-5
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results
Technical Area V Groundwater Monitoring

October 2007 through December 2008

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	Tritium	-144 ± 106	191	92.8	NE	U	BD	086693-036	EPA 906.0 M
28-Aug-08	Gross Alpha	4.08 ± 1.15	0.685	0.282	15			086693-034	EPA 900.0
	Gross Beta	3.34 ± 0.954	0.875	0.394	4mrem/yr			086693-034	EPA 900.0
	Americium-241	2.51 ± 12.4	19.2	9.58	NE	U	BD	086693-033	EPA 901.1
	Cesium-137	0.0437 ± 2.07	3.51	1.76	NE	U	BD	086693-033	EPA 901.1
	Cobalt-60	1.15 ± 1.95	3.40	1.70	NE	U	BD	086693-033	EPA 901.1
	Potassium-40	-45.1 ± 42.8	54.0	27.0	NE	U	BD	086693-033	EPA 901.1
LWDS-MW1	Tritium	-95.4 ± 108	196	94.2	NE	U	BD	086709-036	EPA 906.0 M
08-Sep-08	Gross Alpha	6.51 ± 3.73	3.38	1.04	15		J	086709-034	EPA 900.0
	Gross Beta	5.53 ± 3.65	5.40	2.40	4mrem/yr		J	086709-034	EPA 900.0
	Americium-241	-4.41 ± 7.76	12.3	6.15	NE	U	BD	086709-033	EPA 901.1
	Cesium-137	1.22 ± 1.70	2.95	1.48	NE	U	BD	086709-033	EPA 901.1
	Cobalt-60	1.57 ± 1.94	3.43	1.72	NE	U	BD	086709-033	EPA 901.1
	Potassium-40	-6.69 ± 48.6	41.2	20.6	NE	U	BD	086709-033	EPA 901.1
LWDS-MW2	Tritium	-150 ± 107	193	93.6	NE	U	BD	086690-036	EPA 906.0 M
27-Aug-08	Gross Alpha	5.18 ± 1.31	0.755	0.318	15			086690-034	EPA 900.0
	Gross Beta	4.75 ± 1.11	1.07	0.513	4mrem/yr			086690-034	EPA 900.0
	Americium-241	3.26 ± 2.75	4.20	2.10	NE	U	BD	086690-033	EPA 901.1
	Cesium-137	-1.02 ± 1.96	3.21	1.61	NE	U	BD	086690-033	EPA 901.1
	Cobalt-60	0.520 ± 2.17	3.64	1.82	NE	U	BD	086690-033	EPA 901.1
	Potassium-40	46.9 ± 23.2	46.9	21.9	NE	U	BD	086690-033	EPA 901.1
TAV-MW2	Tritium	-24.5 ± 112	197	94.7	NE	U	BD	086697-036	EPA 906.0 M
02-Sep-08	Gross Alpha	7.65 ± 2.30	2.27	1.06	15			086697-034	EPA 900.0
	Gross Beta	9.99 ± 2.48	2.76	1.35	4mrem/yr			086697-034	EPA 900.0
	Americium-241	2.50 ± 3.16	4.80	2.40	NE	U	BD	086697-033	EPA 901.1
	Cesium-137	-0.10 ± 2.39	4.01	2.00	NE	U	BD	086697-033	EPA 901.1
	Cobalt-60	2.88 ± 2.75	4.89	2.45	NE	U	BD	086697-033	EPA 901.1
	Potassium-40	59.1 ± 28.8	59.2	27.5	NE	U	BD	086697-033	EPA 901.1

Refer to footnotes on page 5A-31.

Table 5A-5
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results
Technical Area V Groundwater Monitoring

October 2007 through December 2008

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	Tritium	-38.8 ± 83.9	165	74.3	NE	U	BD	086682-036	EPA 906.0 M
19-Aug-08	Gross Alpha	3.74 ± 2.37	2.28	0.686	15		J	086682-034	EPA 900.0
	Gross Beta	8.00 ± 1.59	1.12	0.540	4mrem/yr			086682-034	EPA 900.0
	Americium-241	5.09 ± 14.1	21.7	10.9	NE	U	BD	086682-033	EPA 901.1
	Cesium-137	0.264 ± 1.73	2.98	1.49	NE	U	BD	086682-033	EPA 901.1
	Cobalt-60	-0.0816 ± 2.07	3.49	1.75	NE	U	BD	086682-033	EPA 901.1
	Potassium-40	12.5 ± 47.2	32.0	16.0	NE	U	BD	086682-033	EPA 901.1
TAV-MW4	Tritium	-11.1 ± 112	197	94.6	NE	U	BD	086703-036	EPA 906.0 M
04-Sep-08	Gross Alpha	5.16 ± 1.31	0.668	0.277	15			086703-034	EPA 900.0
	Gross Beta	2.32 ± 1.01	1.47	0.712	4mrem/yr		J	086703-034	EPA 900.0
	Americium-241	-3.01 ± 9.02	14.3	7.15	NE	U	BD	086703-033	EPA 901.1
	Cesium-137	0.949 ± 1.67	2.84	1.42	NE	U	BD	086703-033	EPA 901.1
	Cobalt-60	1.49 ± 1.87	3.26	1.63	NE	U	BD	086703-033	EPA 901.1
	Potassium-40	-7.79 ± 37.0	44.8	22.4	NE	U	BD	086703-033	EPA 901.1
TAV-MW5	Tritium	53.9 ± 85.2	146	65.9	NE	U	BD	086684-036	EPA 906.0 M
25-Aug-08	Gross Alpha	5.99 ± 1.57	0.900	0.386	15			086684-034	EPA 900.0
	Gross Beta	3.38 ± 1.16	1.58	0.766	4mrem/yr		J	086684-034	EPA 900.0
	Americium-241	4.06 ± 8.35	12.2	6.11	NE	U	BD	086684-033	EPA 901.1
	Cesium-137	-1.16 ± 1.65	2.65	1.33	NE	U	BD	086684-033	EPA 901.1
	Cobalt-60	1.32 ± 1.86	3.28	1.64	NE	U	BD	086684-033	EPA 901.1
	Potassium-40	16.1 ± 33.7	38.5	19.3	NE	U	BD	086684-033	EPA 901.1
TAV-MW6	Tritium	0.00 ± 112	196	94.3	NE	U	BD	086705-036	EPA 906.0 M
09-Sep-08	Gross Alpha	8.20 ± 4.13	3.43	1.09	15		J	086705-034	EPA 900.0
	Gross Beta	3.88 ± 1.78	2.68	1.31	4mrem/yr		J	086705-034	EPA 900.0
	Americium-241	0.764 ± 15.4	22.7	11.3	NE	U	BD	086705-033	EPA 901.1
	Cesium-137	1.11 ± 2.02	3.53	1.77	NE	U	BD	086705-033	EPA 901.1
	Cobalt-60	1.08 ± 2.30	3.91	1.96	NE	U	BD	086705-033	EPA 901.1
	Potassium-40	27.2 ± 45.7	30.5	15.2	NE	U	BD	086705-033	EPA 901.1

Refer to footnotes on page 5A-31.

Table 5A-5 *(Concluded)*
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results
Technical Area V Groundwater Monitoring

October 2007 through December 2008

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-MW7	Tritium	-157 ± 106	193	93.6	NE	U	BD	086686-036	EPA 906.0 M
26-Aug-08	Gross Alpha	7.60 ± 1.95	1.23	0.540	15			086686-034	EPA 900.0
	Gross Beta	5.71 ± 1.45	1.54	0.742	4mrem/yr			086686-034	EPA 900.0
	Americium-241	-5.39 ± 6.10	9.71	4.86	NE	U	BD	086686-033	EPA 901.1
	Cesium-137	0.0624 ± 1.48	2.53	1.27	NE	U	BD	086686-033	EPA 901.1
	Cobalt-60	-0.548 ± 1.55	2.57	1.29	NE	U	BD	086686-033	EPA 901.1
	Potassium-40	-12.5 ± 29.7	35.4	17.7	NE	U	BD	086686-033	EPA 901.1
TAV-MW8	Tritium	-13.4 ± 112	197	94.6	NE	U	BD	086700-036	EPA 906.0 M
03-Sep-08	Gross Alpha	6.36 ± 1.61	0.854	0.364	15			086700-034	EPA 900.0
	Gross Beta	4.49 ± 1.38	1.78	0.862	4mrem/yr		J	086700-034	EPA 900.0
	Americium-241	7.65 ± 11.5	18.1	9.03	NE	U	BD	086700-033	EPA 901.1
	Cesium-137	1.88 ± 1.95	3.46	1.73	NE	U	BD	086700-033	EPA 901.1
	Cobalt-60	-0.196 ± 2.27	3.78	1.89	NE	U	BD	086700-033	EPA 901.1
	Potassium-40	-0.699 ± 52.6	48.3	24.2	NE	U	BD	086700-033	EPA 901.1
TAV-MW9	Tritium	0.00 ± 87.4	163	73.4	NE	U	BD	086680-036	EPA 906.0 M
18-Aug-08	Gross Alpha	9.46 ± 4.41	2.63	0.701	15			086680-034	EPA 900.0
	Gross Beta	3.91 ± 1.04	1.08	0.514	4mrem/yr			086680-034	EPA 900.0
	Americium-241	-1.08 ± 10.7	14.6	7.32	NE	U	BD	086680-033	EPA 901.1
	Cesium-137	0.478 ± 5.20	4.04	2.02	NE	U	BD	086680-033	EPA 901.1
	Cobalt-60	-3.45 ± 5.31	6.10	3.05	NE	U	BD	086680-033	EPA 901.1
	Potassium-40	57.3 ± 29.2	57.4	27.3	NE	U	BD	086680-033	EPA 901.1
TAV-MW10	Tritium	106 ± 87.4	135	59.4	NE	U	BD	086707-036	EPA 906.0 M
10-Sep-08	Gross Alpha	4.02 ± 3.00	3.80	1.31	15		J	086707-034	EPA 900.0
	Gross Beta	6.48 ± 3.61	5.10	2.28	4mrem/yr		J	086707-034	EPA 900.0
	Americium-241	4.10 ± 3.06	4.74	2.37	NE	U	BD	086707-033	EPA 901.1
	Cesium-137	1.85 ± 2.40	4.20	2.10	NE	U	BD	086707-033	EPA 901.1
	Cobalt-60	-4.58 ± 3.65	4.16	2.08	NE	U	BD	086707-033	EPA 901.1
	Potassium-40	68.9 ± 27.2	68.9	26.8	NE	U	BD	086707-033	EPA 901.1

Refer to footnotes on page 5A-31.

Table 5A-6
Summary of Field Water Quality Measurements[h]
Technical Area V Groundwater Monitoring

October 2007 through December 2008

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)
AVN-1	26-Nov-07	16.33	410	230.7	7.44	2.38	42.0	4.10
	04-Feb-08	17.73	411	290.6	7.47	0.91	39.2	3.73
	12-May-08	21.56	413	255.0	7.58	7.46	44.9	3.96
	28-Aug-08	22.40	413	356.6	7.76	0.89	43.1	3.75
	02-Dec-08	19.40	448	198.1	7.66	0.39	42.2	3.88
LWDS-MW1	07-Dec-07	16.93	718	382.2	7.28	1.95	66.1	6.39
	25-Feb-08	18.14	715	308.2	7.38	0.77	76.4	7.18
	22-May-08	14.43	704	236.1	7.46	2.02	77.1	7.88
	08-Sep-08	21.81	716	364.1	7.58	0.52	69.4	6.07
	11-Dec-08	19.18	779	198.3	7.44	0.38	6.55	71.0
LWDS-MW2	19-Nov-07	21.31	459	207.7	7.41	2.41	57.4	5.05
	01-Feb-08	16.94	474	305.1	7.39	0.26	33.0	3.19
	09-May-08	20.06	475	301.0	7.49	0.36	53.9	4.89
	27-Aug-08	21.19	473	370.8	7.65	0.84	46.0	4.08
	01-Dec-08	19.46	513	192.6	7.56	0.39	49.0	4.50
TAV-MW2	28-Nov-07	17.88	720	215.7	7.14	0.66	58.7	5.58
	21-Feb-08	15.08	710	265.7	7.17	0.17	55.8	5.59
	13-May-08	22.72	720	269.8	7.30	0.59	66.3	5.80
	02-Sep-08	22.59	718	378.5	7.49	1.26	59.2	5.11
	03-Dec-08	16.84	770	206.6	7.33	0.52	52.4	5.07
TAV-MW3	12-Nov-07	21.12	527	271.4	7.55	0.41	85.7	7.60
	28-Jan-08	17.21	545	357.2	7.40	0.71	77.9	7.48
	07-May-08	20.80	547	300.9	7.43	1.95	84.4	7.54
	19-Aug-08	21.61	545	348.2	7.53	1.11	73.8	6.55
	20-Nov-08	18.20	592	209.6	7.51	0.99	73.7	6.94
TAV-MW4	04-Dec-07	18.31	505	332.5	7.41	1.29	69.8	6.56
	26-Feb-08	18.80	504	351.8	7.36	0.46	66.9	6.22
	15-May-08	16.65	505	316.6	7.50	0.41	71.5	6.91
	04-Sep-08	20.74	505	372.9	7.73	0.88	56.2	5.02
	05-Dec-08	18.49	552	209.7	7.56	1.57	68.7	6.44

Refer to footnotes on page 5A-31.

Table 5A-6 *(Concluded)*
Summary of Field Water Quality Measurements[h]
Technical Area V Groundwater Monitoring

October 2007 through December 2008

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-MW5	15-Nov-07	19.50	472	252.5	7.40	0.35	53.1	4.87
	30-Jan-08	15.27	487	351.9	7.47	0.22	11.3	1.10
	08-May-08	21.67	491	285.7	7.43	0.22	53.3	4.69
	25-Aug-08	22.79	492	370.6	7.60	0.47	51.5	4.44
	24-Nov-08	19.47	533	202.0	7.53	0.27	49.8	4.57
TAV-MW6	29-Nov-07	16.20	651	259.0	7.26	0.81	69.1	6.79
	27-Feb-08	18.81	653	365.4	7.34	0.58	69.7	6.48
	20-May-08	21.46	656	260.3	7.41	0.31	76.5	6.70
	09-Sep-08	20.89	660	376.2	7.49	0.51	68.0	6.06
	08-Dec-08	17.08	720	200.0	7.46	0.27	70.0	6.73
TAV-MW7	14-Nov-07	20.37	580	131.6	7.27	0.99	3.0	0.27
	31-Jan-08	16.18	598	208.5	7.27	1.20	2.9	0.28
	05-May-08	21.31	603	303.5	7.34	1.22	3.7	0.33
	26-Aug-08	22.20	602	235.9	7.47	0.88	2.8	0.24
	25-Nov-08	18.66	655	127.1	7.37	1.28	2.6	0.25
TAV-MW8	05-Dec-07	18.32	567	348.6	7.38	1.31	70.2	6.61
	28-Feb-08	19.76	567	353.9	7.34	1.01	70.9	6.46
	14-May-08	18.60	565	296.4	7.45	0.79	74.5	6.97
	03-Sep-08	20.11	567	383.7	7.66	1.32	63.1	5.71
	04-Dec-08	17.62	619	196.4	7.50	0.58	66.9	6.38
TAV-MW9	13-Nov-07	20.10	635	233.6	7.20	2.38	18.3	1.65
	29-Jan-08	16.05	656	336.9	7.23	0.96	17.9	1.74
	06-May-08	21.05	660	306.5	7.25	0.78	19.7	1.77
	18-Aug-08	22.41	641	370.0	7.39	0.79	18.2	1.51
	21-Nov-08	18.80	680	174.0	7.31	0.76	20.5	1.91
TAV-MW10	04-Apr-08	19.86	645	310.6	7.33	2.47	76.2	6.95
	10-Sep-08	21.11	649	371.6	7.49	0.60	72.9	6.31
	09-Dec-08	15.72	703	211.7	7.45	2.01	74.1	7.41

Refer to footnotes on page 5A-31.

Footnotes for ***Technical Area V Groundwater Monitoring***

[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.
- μg/L = micrograms per liter
- mg/L = milligrams per liter
- pCi/L = pico curies 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

[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

[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 (including radon and total uranium).
  4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (as dose rate).

[e]Lab 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).
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.
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.

*Footnotes for **Technical Area V Groundwater Monitoring** (Concluded)*

[g]Analytical Method

- U.S. Environmental Protection Agency, 1990, “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,” SW-846, 3rd ed.
- EPA 9310: U.S. Environmental Protection Agency, 1990, “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,” SW-846, 3rd ed.
- 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.

[h]Field Water Quality Measurements

- Field measurements collected prior to sampling.

^{O}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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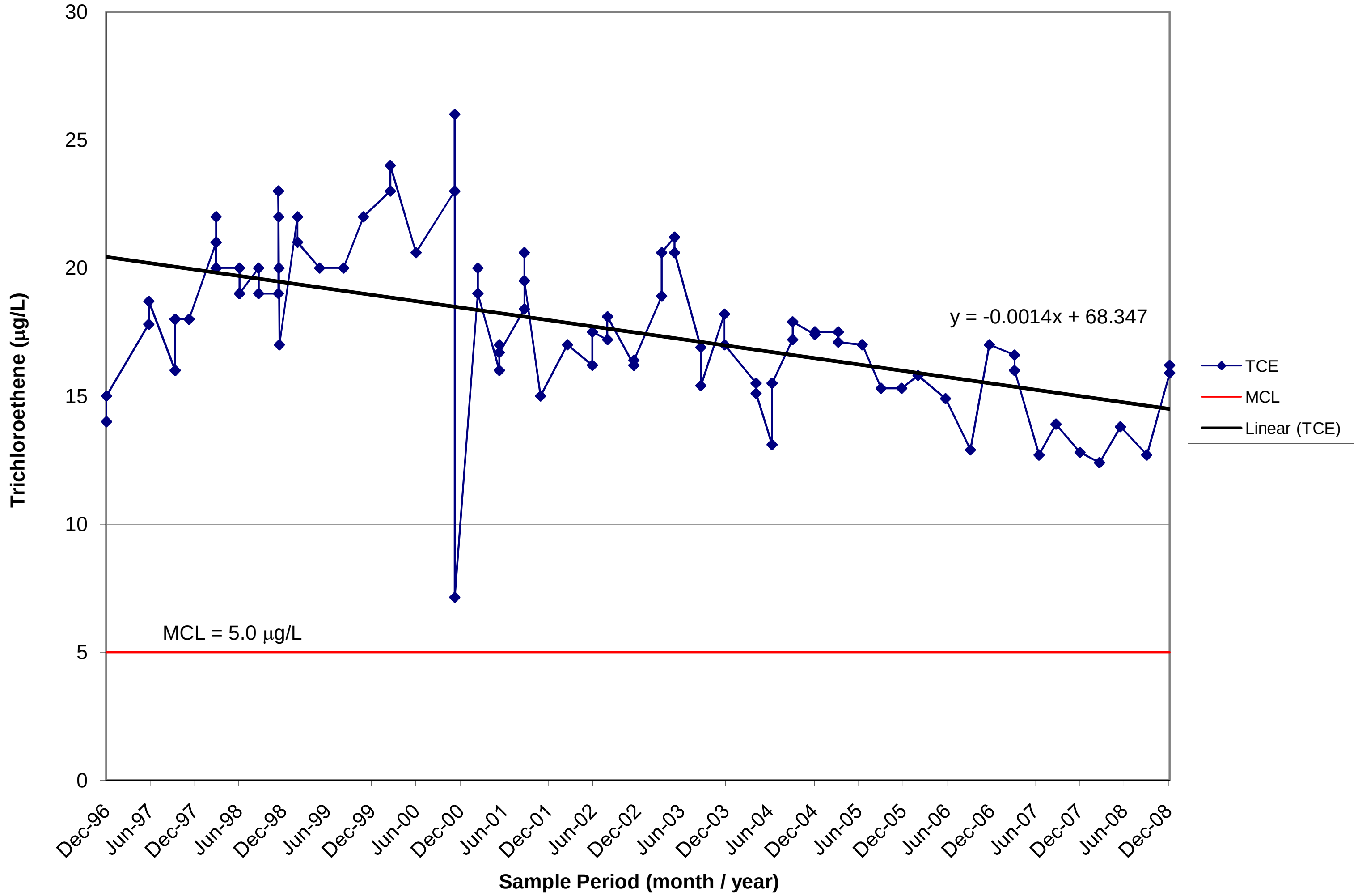

Figure 5B-1. Trichloroethene Concentrations, LWDS-MW1

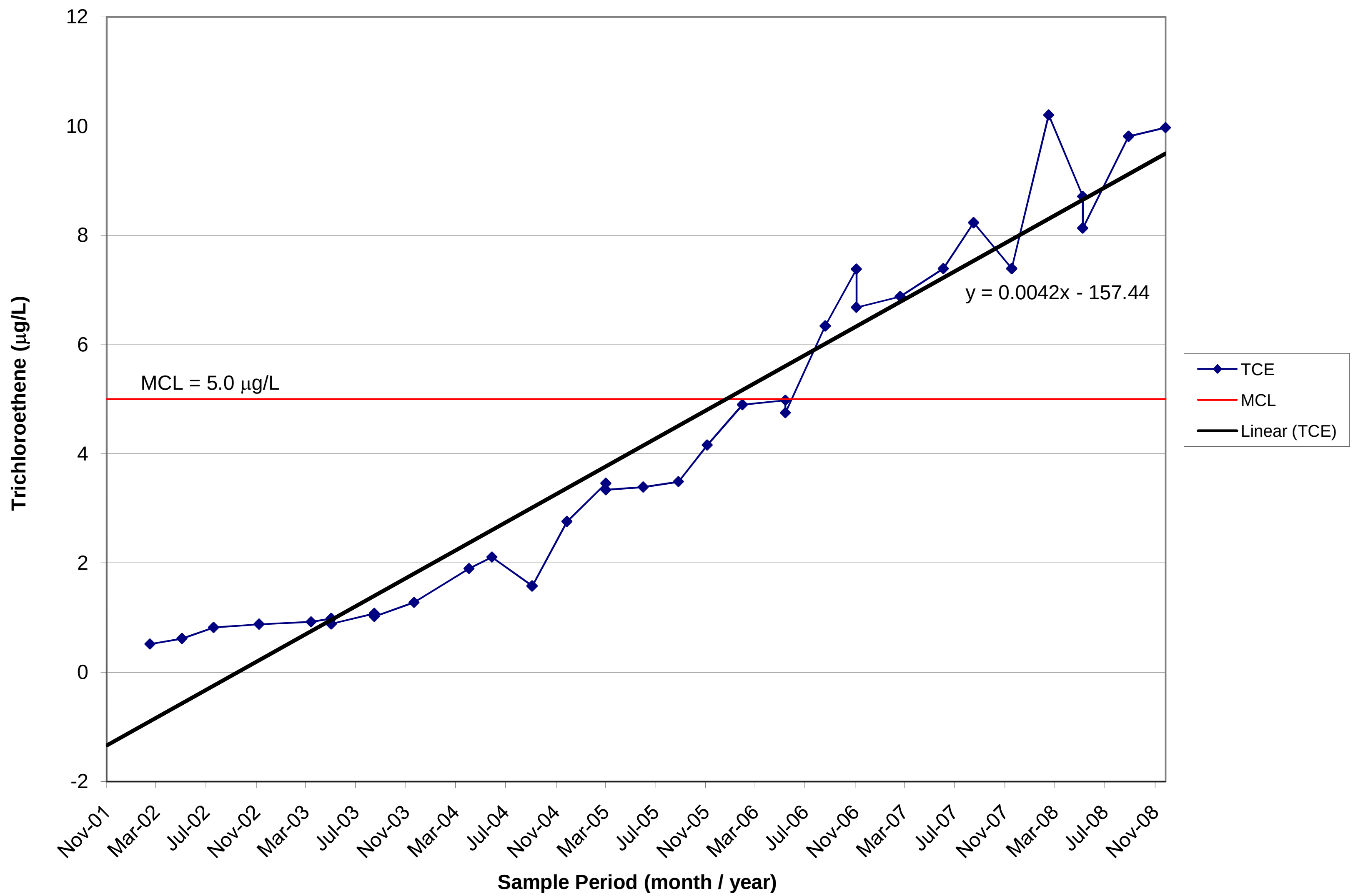

Figure 5B-2. Trichloroethene Concentrations, TAV-MW6

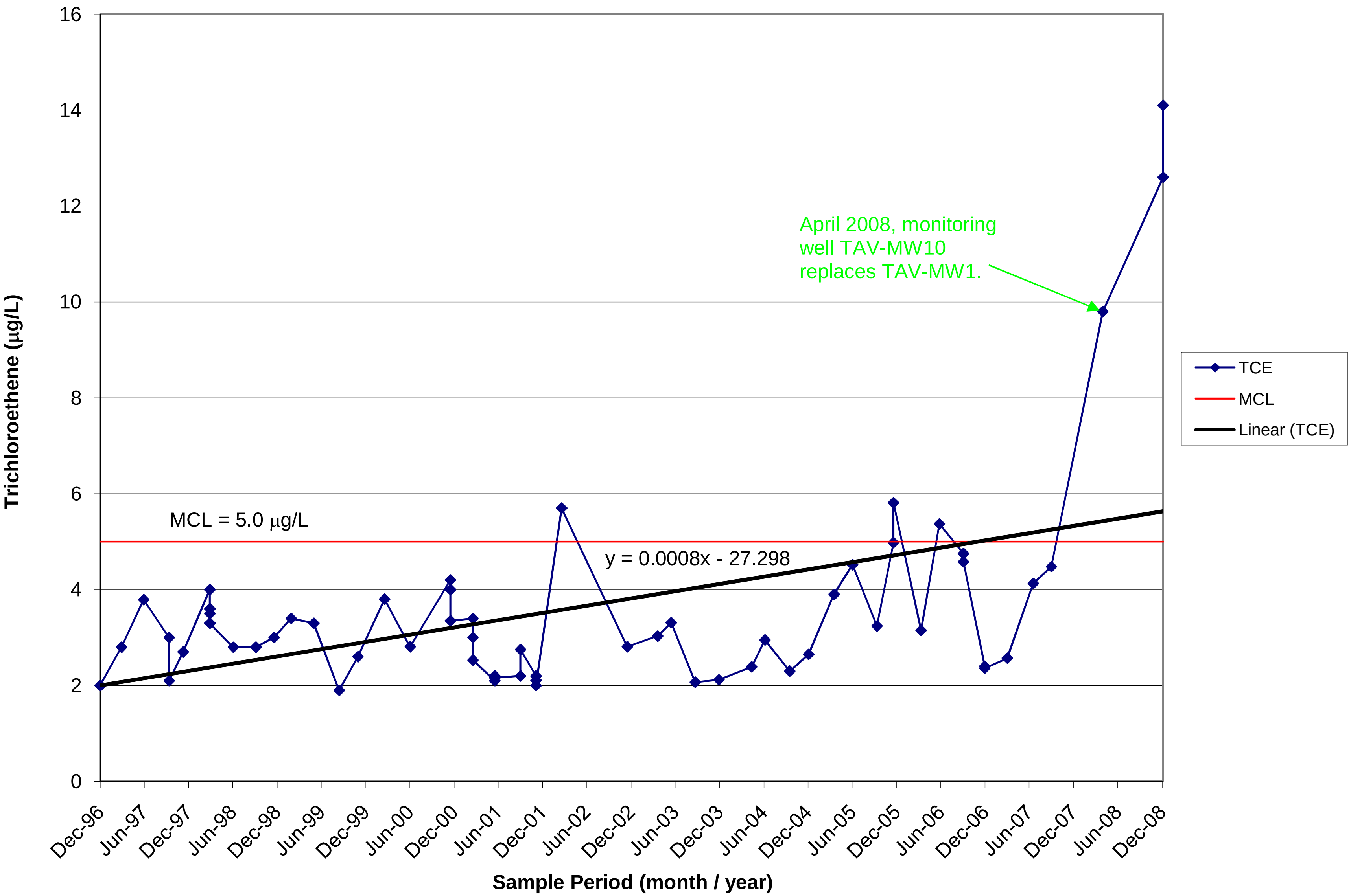

Figure 5B-3. Trichloroethene Concentrations, TAV-MW10

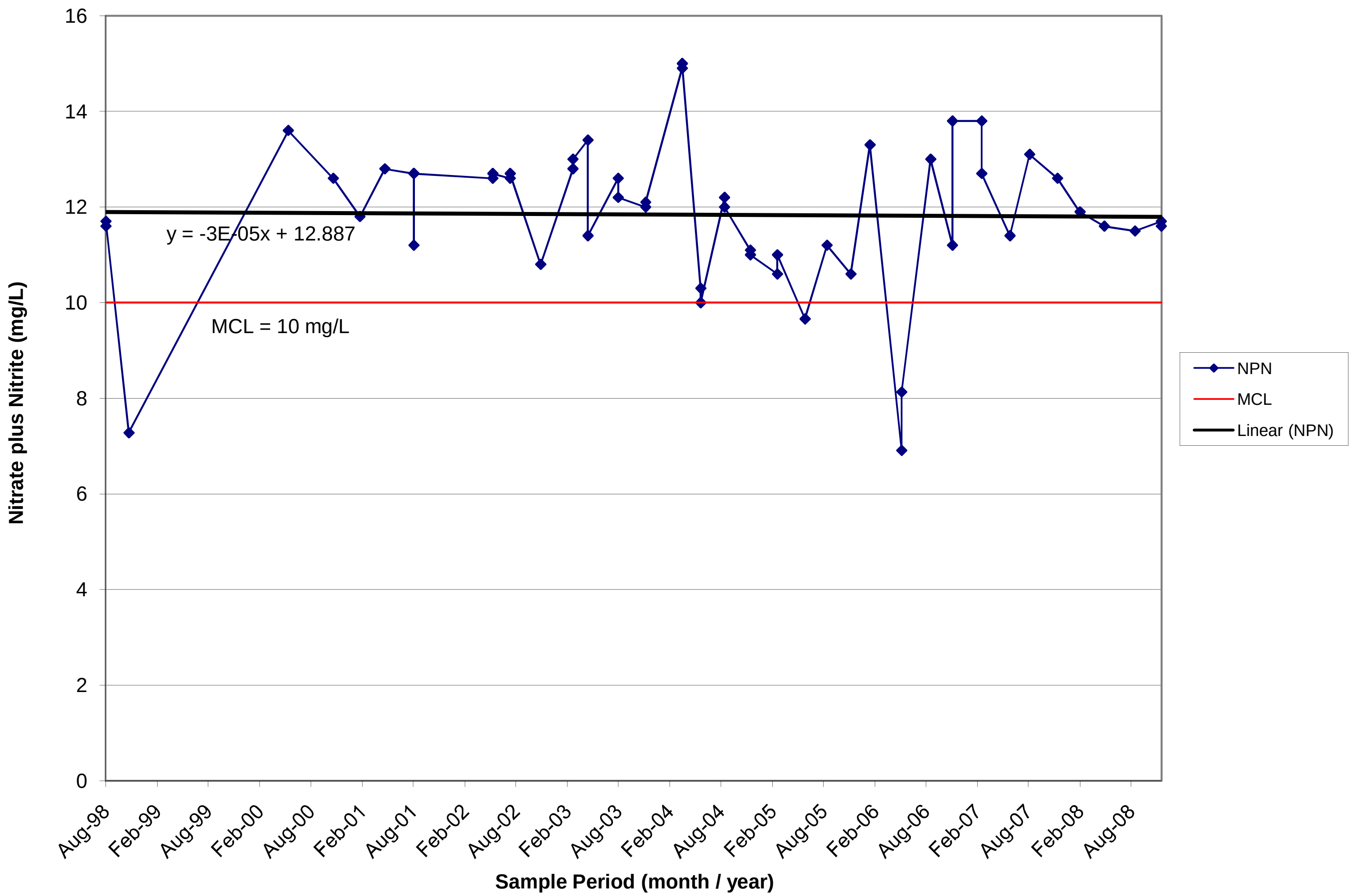

Figure 5B-4. Nitrate plus Nitrite Concentrations, LWDS-MW1

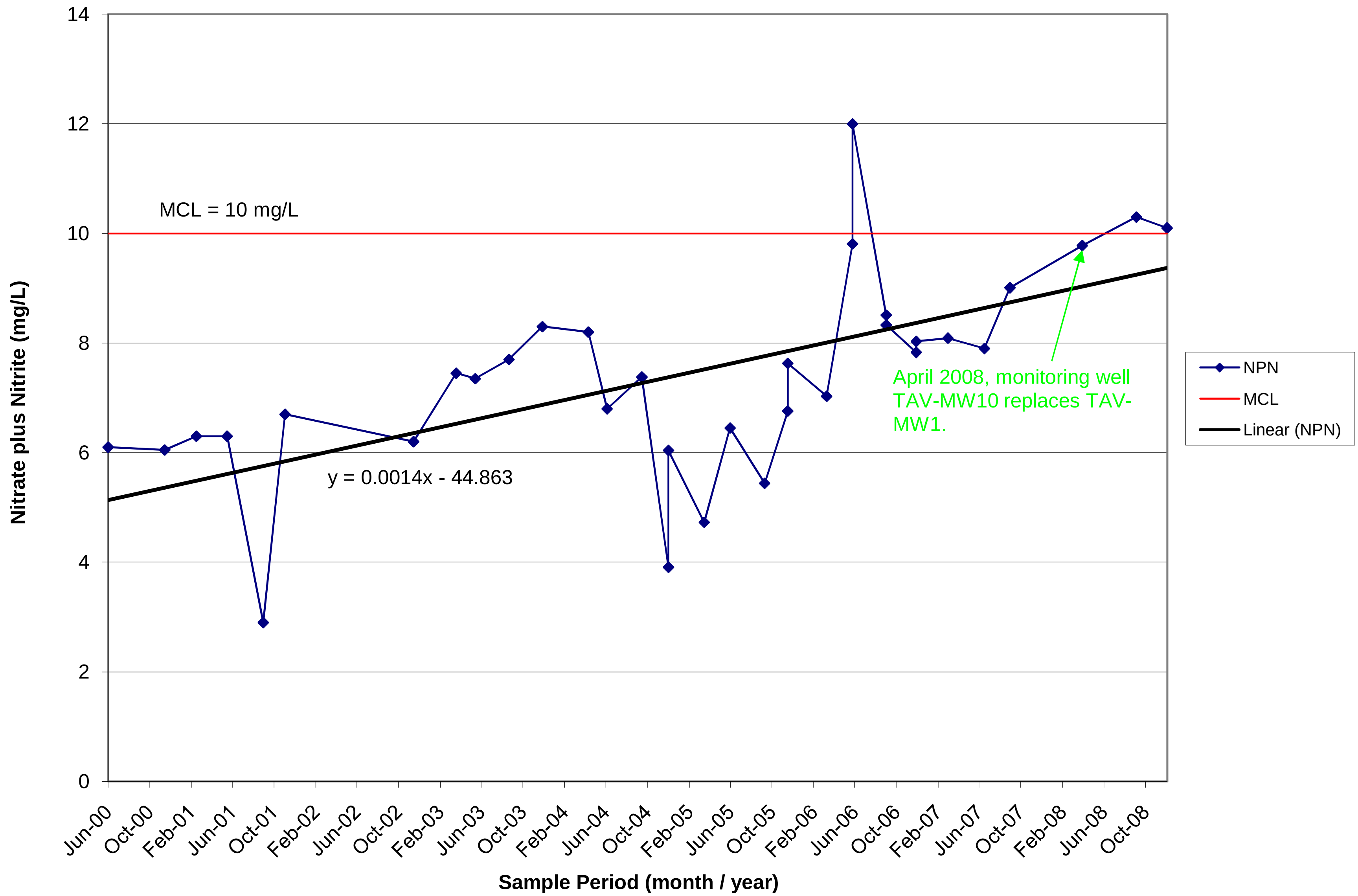

Figure 5B-5. Nitrate plus Nitrite Concentrations, TAV-MW10

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Attachment 5C
Technical Area V
Hydrographs

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Attachment 5C Hydrographs

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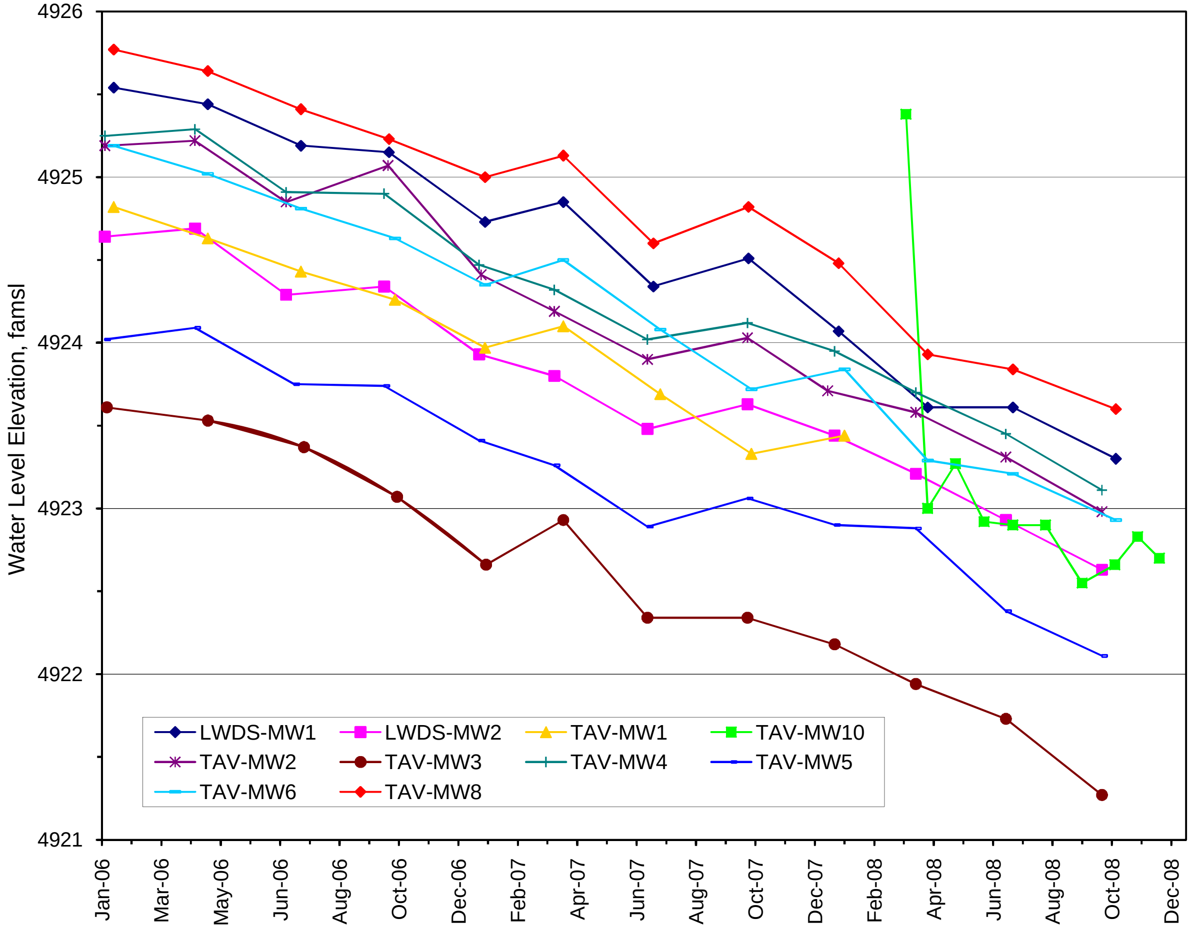

Figure 5C-1. TA-V Study Area Water Table Completion Wells

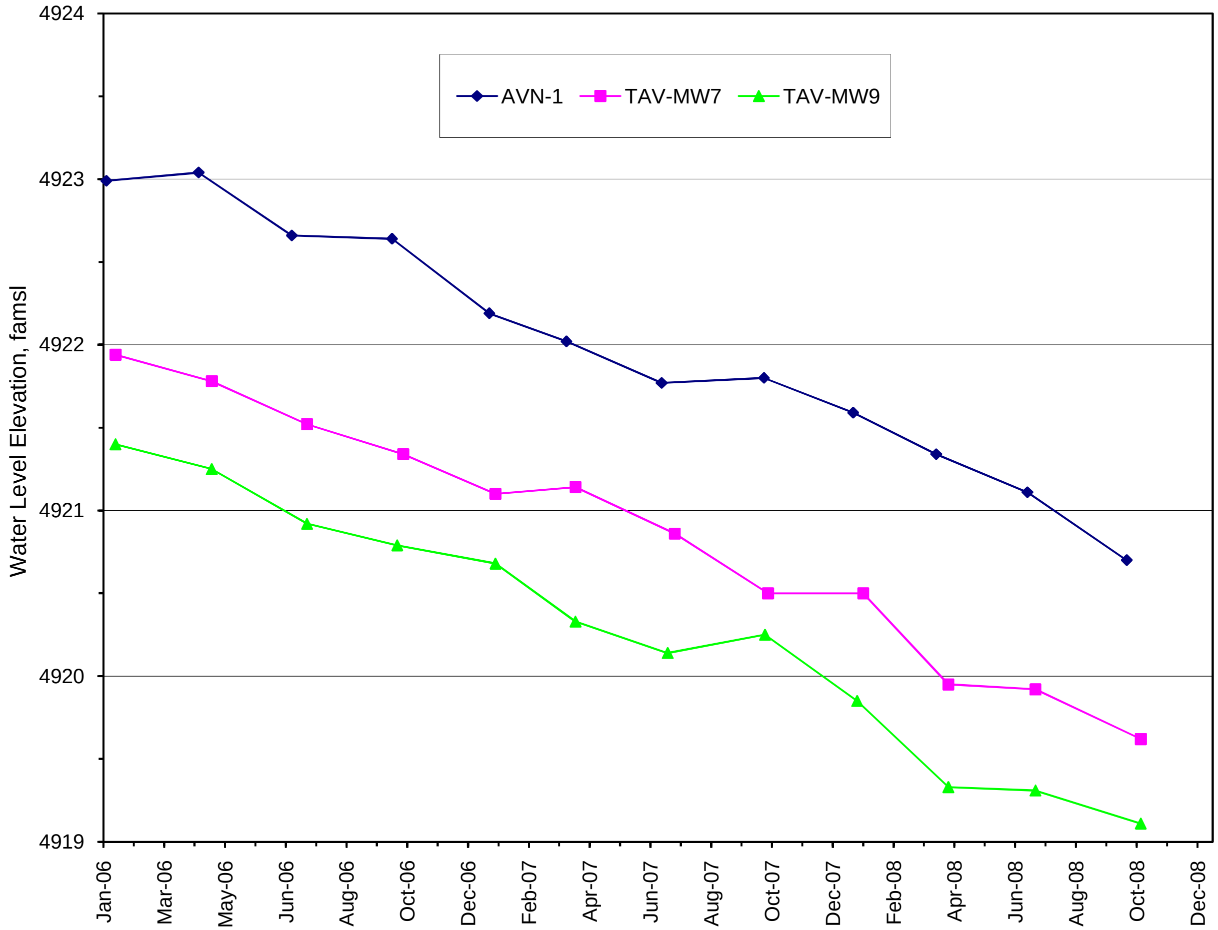

Figure 5C-2. TA-V Study Area Deeply Completed Wells

6.0 Tijeras Arroyo Groundwater Study Area

6.1 Introduction

Nitrate and trichloroethene (TCE) 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 level (MCL) in samples collected from 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 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 an area of 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, multiprogram 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.

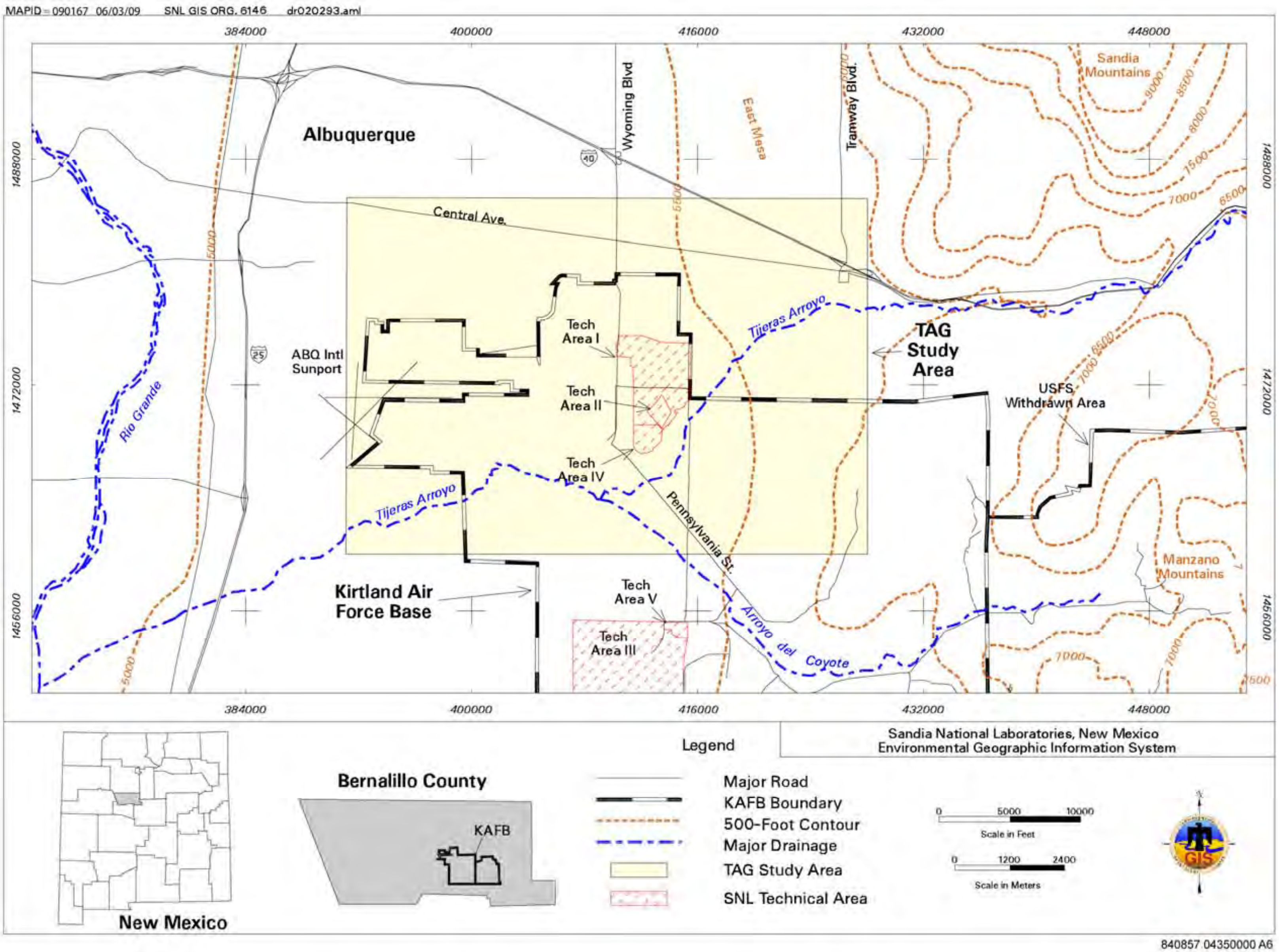

Figure 6-1. Location of the TAG Study Area

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 1942, 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 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 laboratories has resulted in an inventory of numerous chemicals, which are generally stored and used indoors in small quantities.

The SNL/NM Environmental Restoration (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 elsewhere (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 17 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 Performance Team (HPT) served as a forum for discussing TAG issues. During these meetings, members of the HPT declared that all groundwater analytical results previously collected using low-flow sampling devices are suspect. Based on this perceived inadequacy of the sampling method, TAG quarterly groundwater sampling was suspended 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

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. Perched system discovered as first wells were installed (TA2-SW1-320, TA2-NW1-325, and TA2-NW1-595).	SNL March 1995a
March	1994	Groundwater sample 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 sample 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 sample 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 sample 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 sample 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 sample 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 sample 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
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

Table 6-1. Historical Timeline of the TAG Study Area *(Concluded)*

Month	Year	Event	Reference
February	2001	Preliminary model of the perched system updated.	BGW February 2001
April	2001	Groundwater sample 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 perched system 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 sample 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 sample 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 2003 to January 2004	2003-2004	ER Project conducts slug (hydraulic conductivity) tests at groundwater monitoring wells	Collins 2004
March	2004	Groundwater sample 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 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 sample 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 sample analytical results for TAG wells reported in the fiscal year 2005 SNL/NM Annual Groundwater Monitoring Report	SNL November 2006
March	2007	Groundwater sample analytical results for TAG wells reported in the fiscal year 2006 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2007
March	2008	Groundwater sample analytical results for TAG wells reported in the fiscal year 2007 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2008a
August	2008	NMED issues Notice of Disapproval on November 2005 TAG Investigation Report	NMED August 2008

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.
SNL/NM = Sandia National Laboratories/New Mexico.
TA = Technical Area.
TAG = Tijeras Arroyo Groundwater.
TCE = Trichloroethene.
USGS = U.S. Geological Survey.

COA. Based on the requirements of the work plan, quarterly groundwater sampling resumed 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 *Tijeras Arroyo Groundwater Investigation Report* (SNL November 2005). The November 2005 report presents a conceptual model that provides a comprehensive list of groundwater monitoring data sources used to support the summary of investigations.

In April 2004, the Compliance Order on Consent (the Order), issued by the NMED, specified that TAG was an area of groundwater contamination (NMED April 2004). In response to the Order, Sandia submitted the *Corrective Measures Evaluation (CME) Work Plan, Tijeras Arroyo Groundwater* 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 XI-1 of the Order (NMED April 2004) specifies the minimum sampling frequency for 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 (FY) 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 since FY05 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 a 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).

6.1.5 Summary of Fiscal Year Activities.

The following activities took place for the TAG investigation during October 2007 through November 2008:

- 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 October 2007, January 2008, April/May 2008, July/August 2008, and November 2008 (SNL September 2007, December 2007, March 2008b, June 2008, and October 2008).

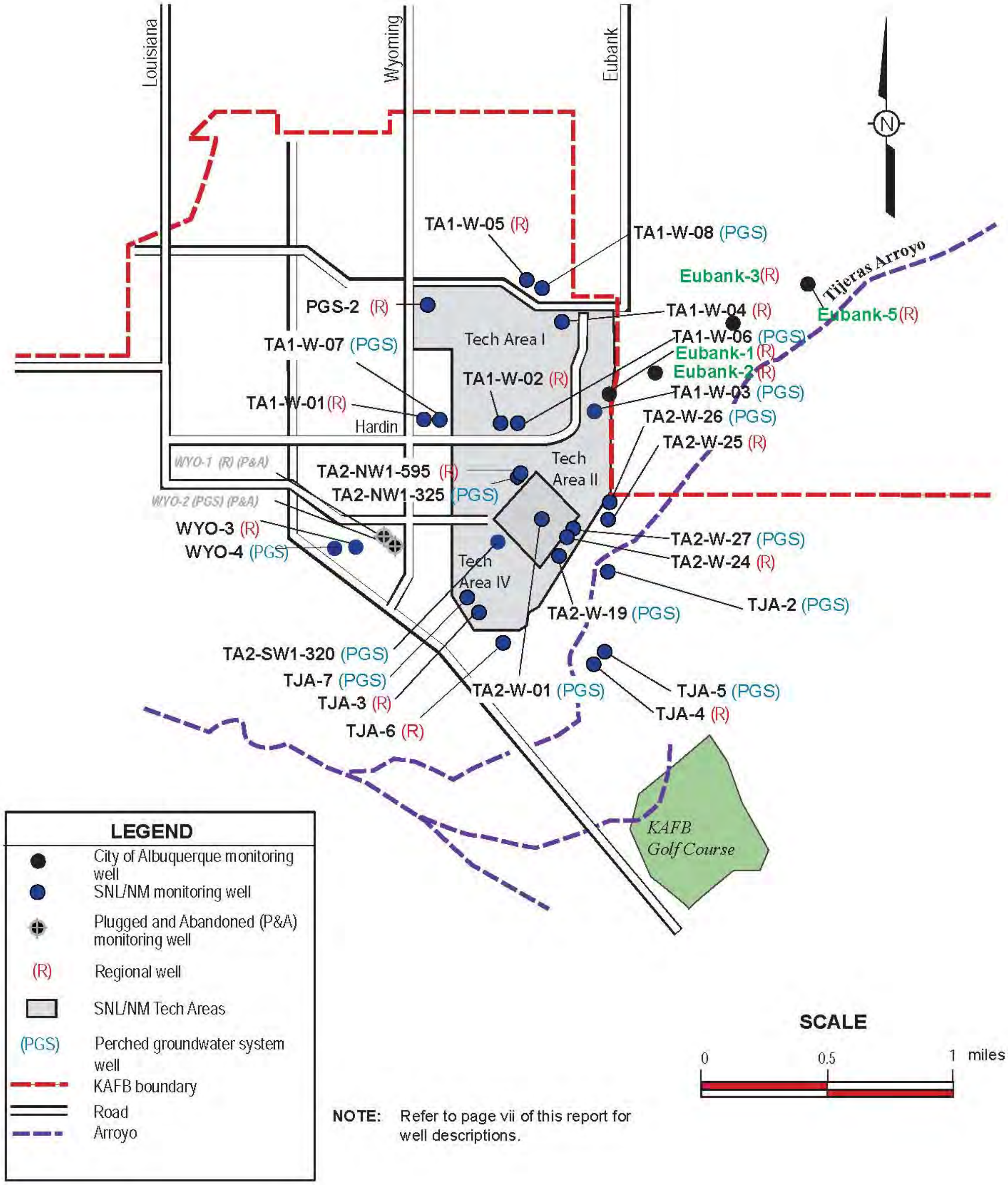

Figure 6-2. Tijeras Arroyo Groundwater (TAG) Investigation Monitoring Well Locations (30 Active Wells)

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)
Eubank-3	1997		✓	Regional aquifer (COA well)
Eubank-5	1997		✓	Regional aquifer (COA well)
PGS-2	1995	✓	✓	Regional aquifer
TA1-W-01	1997	✓	✓	Regional aquifer
TA1-W-02	1998	✓	✓	Regional aquifer
TA1-W-03	1998	✓	✓	Perched system
TA1-W-04	1998	✓	✓	Regional aquifer
TA1-W-05	1998	✓	✓	Regional aquifer
TA1-W-06	1998	✓	✓	Perched system
TA1-W-08	2001	✓	✓	Perched system
TA2-NW1-595	1993	✓	✓	Regional aquifer
TA2-SW1-320	1992	✓	✓	Perched system
TA2-W-01	1994	✓	✓	Perched system
TA2-W-19	1995	✓	✓	Perched system
TA2-W-25	1997		✓	Regional aquifer
TA2-W-26	1998	✓	✓	Perched system
TA2-W-27	1998	✓	✓	Perched system
TJA-2	1994	✓	✓	Perched system
TJA-3	1998	✓	✓	Regional aquifer
TJA-4	1998	✓	✓	Regional aquifer
TJA-5	1998		✓	Perched system
TJA-6	2001	✓	✓	Regional aquifer
TJA-7	2001	✓	✓	Perched system
WYO-3	2001	✓	✓	Regional aquifer
WYO-4	2001	✓	✓	Perched system

NOTE: Check marks in the WQ and WL columns indicate WQ sampling and WL measurements were obtained during this reporting period.

COA = City of Albuquerque.
TAG = Tijeras Arroyo Groundwater.
WL = Water level.
WQ = Water quality.

- Semiannual groundwater sampling was conducted at four wells (TA2-W-01, TA2-W-27, TJA-3, and TJA-6) in January 2008 and July/August 2008 (SNL December 2007 and June 2008).

- Annual groundwater sampling was conducted at 10 wells (PGS-2, TA1-W-01, TA1-W-02, TA1-W-03, TA1-W-04, TA1-W-05, TA1-W-06, TA1-W-08, TA2-NW1-595, and WYO-3) in July/August 2008 (SNL June 2008).

- The *Notice of Disapproval of the November 2005 TAG Investigation Report* (NMED August 2008) was received from the NMED.

- Responses to the NMED's *Notice of Disapproval of November 2005 TAG Investigation Report* were developed.

- 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:

- Monthly water level measurements in 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.

- Submission of responses to the NMED's *Notice of Disapproval of November 2005 TAG Investigation Report* (NMED August 2008).

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 a regional aquifer groundwater system at approximately 440 to 570 ft bgs. The uppermost saturated interval of the PGWS is between 10 and 30 ft thick. 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 present a diagram of the TAG conceptual model.

Data pertaining to the hydrogeologic setting have been synthesized into the TAG conceptual model. The hydrogeologic setting for the TAG study area is well understood based on a significant number of monitoring wells. Groundwater occurs in both the PGWS and the regional aquifer. However, the PGWS has a limited lateral extent that encompasses approximately 3.8 sq mi of north-central KAFB. The PGWS may extend northward across the KAFB boundary. In the TAG 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

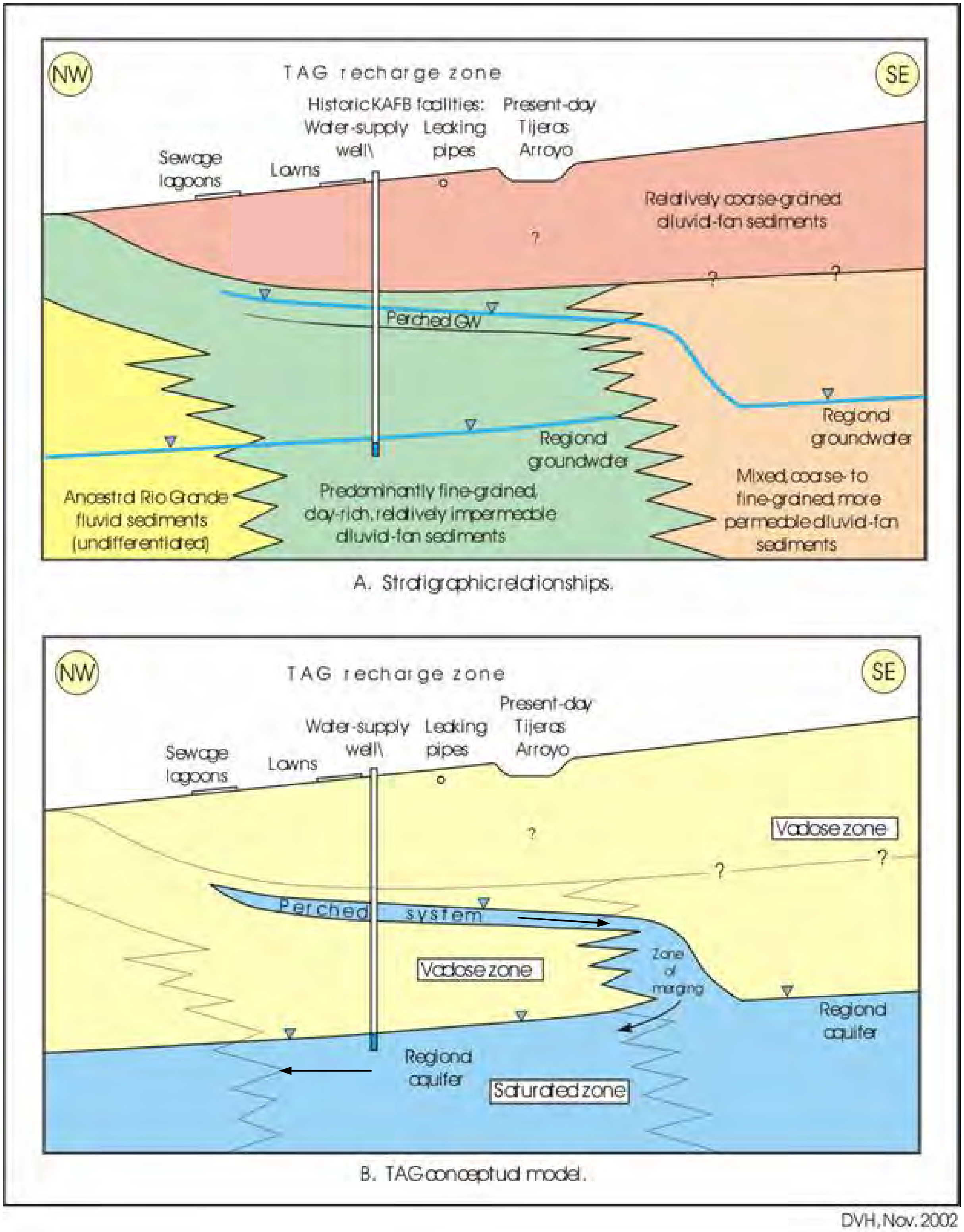

Figure 6-3. TAG Conceptual Model Illustration

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 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 the regional aquifer. Groundwater in the regional aquifer exhibits higher bicarbonate/alkalinity concentrations.

6.1.7.1 Regional Hydrogeologic Conditions

Tijeras Arroyo is the most significant surface-water drainage feature on KAFB and trends southwest across KAFB and eventually drains into the Rio Grande, approximately 6 miles west of KAFB. Surface water flows in the arroyo several times per year as a result of storm events. The 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 composed mostly 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 3.5 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 of approximately 0.007 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 TAG PGWS (December 2008). The direction of groundwater flow in the PGWS is toward the southeast. The horizontal gradient of the PGWS is approximately 0.007 ft/ft with steeper gradients near the mountain front.

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).

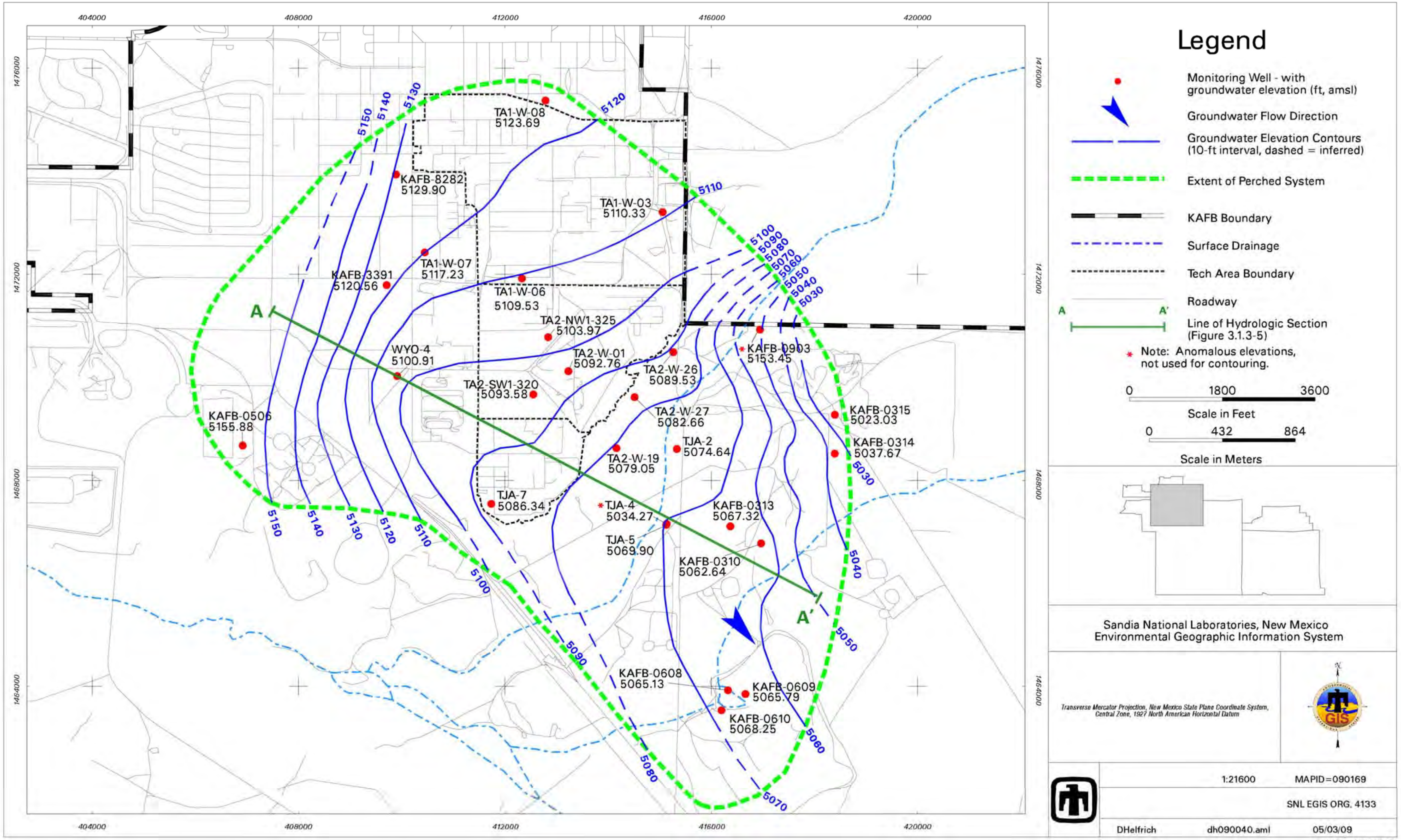

Figure 6-4. Tijeras Arroyo Groundwater Investigation Potentiometric Surface Map for the Perched System (December 2008)

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Table 6-3. Comparison of the Perched System and the Regional Aquifer in the Tijeras Arroyo Groundwater Study Area (SNL November 2005)

Characteristic	Perched System	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 thick	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/yr = Feet per year.
KAFB = Kirtland Air Force Base.
TAG = Tijeras Arroyo Groundwater.
VA = Veteran's Administration.

Figure 6-5 presents the current potentiometric surface for the TAG regional aquifer (December 2008). The direction of groundwater flow in the regional aquifer is to the northwest toward 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 0.009 ft/ft with steeper gradients evident near the mountain front. Vertical flow gradients within the TAG study area have not been measured but are inferred to be downward, consistent with TA-V groundwater studies.

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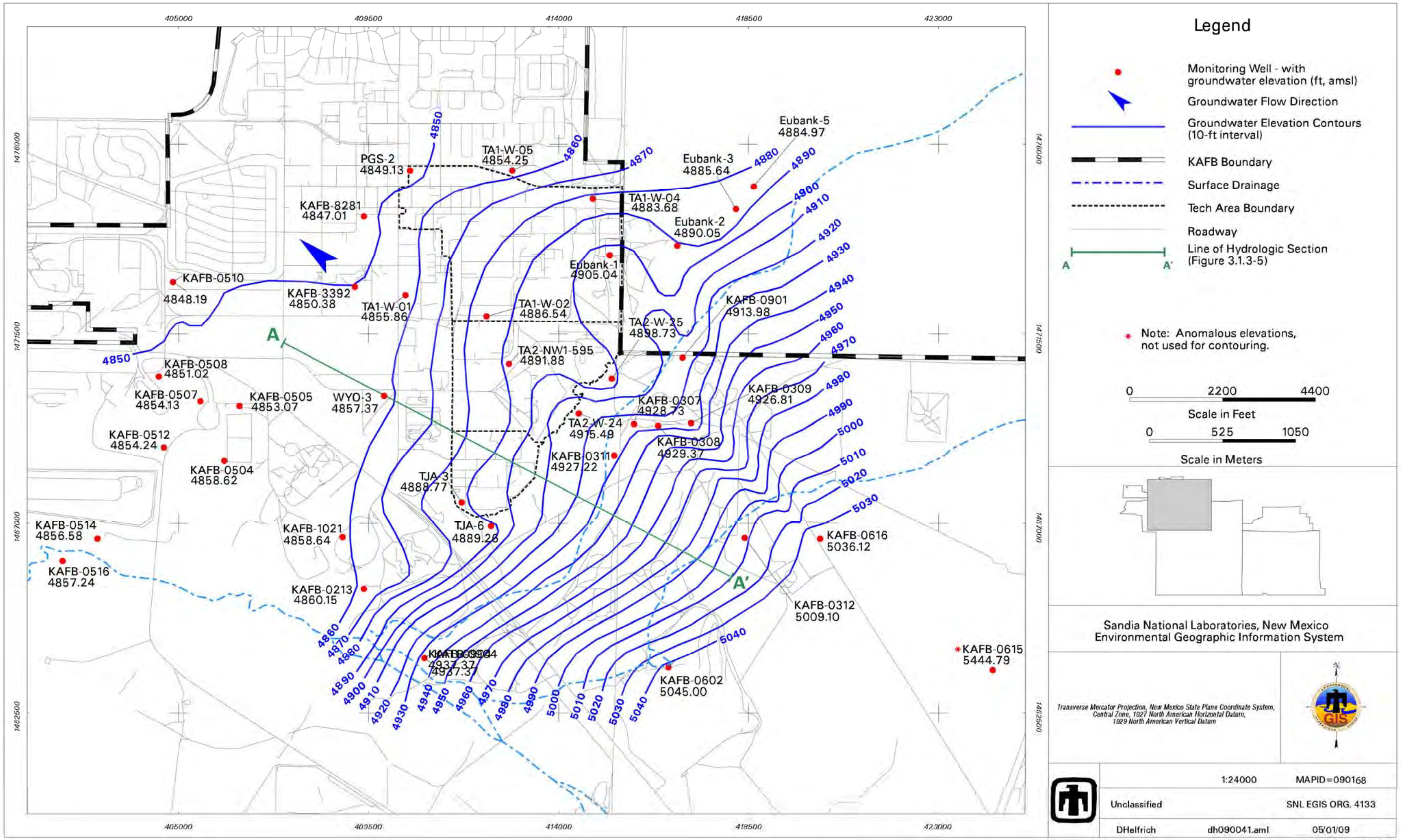

Figure 6-5. Tijeras Arroyo Groundwater Investigation Potentiometric Surface Map for the Regional Aquifer (December 2008)

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Historically, water levels in the regional aquifer have fluctuated across the study area (SNL November 2005). A line of demarcation between increasing water levels and declining water levels is evident along the eastern extent of the ARG-fluvial lithofacies, which coincidentally trends along Wyoming Boulevard. Declining water levels approaching 1.5 ft/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 probably 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 TAG Investigation 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: 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 in 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 was 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: Leachfield connected to personnel shower/laundry facility (Building 901) and small research/machine shop (Building 902). Possible TCE and high explosives (HE) in wastewater. No significant contamination 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: Possibly leaking sewer lines and several cross-connects with wastewater lines. System connected to numerous research/office buildings in TA-I. No significant contamination 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 products 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.

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 probably associated with multiple releases of aqueous-phase solvents and subsequent transport through the vadose zone.

Historically, the maximum historical concentration of TCE in the PGWS was 9.6 μg/L in Well TA2-W-26; only three TAG study area wells have exceeded the MCL for TCE (TA2-W-19, TA2-W-26, and WYO-4).

The maximum historical concentration of nitrate in the PGWS within the TAG study area was 44 mg/L in well TA2-SW1-320. Concentrations of nitrate in the PGWS exceeding MCLs are scattered across the TAG study area. According to KAFB-IRP terminology, the nitrate contamination in the PGWS forms what is referred to as Plume 3 (MWH Americas, Inc., July 2003). Plume 3, which is centered on monitoring well TA2-SW1-320, is located under the southwest portion of TA-II and may extend southward to TJA-7. Monitoring wells in the PGWS that have nitrate concentrations below the MCL surround these wells. The plume is 0.3 miles long and 0.2 miles wide (MWH Americas, Inc., July 2003) and is thought 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 concentrations in TJA-3. No samples from SNL/NM TAG study area regional aquifer wells exceed the MCL 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 was 49 mg/L in monitoring well TJA-4. However, this is the only monitoring well that has ever had nitrate concentrations that exceed the MCL. The nitrate contamination in the regional aquifer southeast of TA-II forms what is referred to as Plume 4 (MWH Americas, Inc., July 2003). Plume 4 is most likely responsible for the nitrate concentrations in TJA-4, a well near where the PGWS and the regional aquifer merge. Plume 4 is 1.9 miles long and 1 mile wide and is associated with the active KAFB Landfill (MWH Americas, Inc., July 2003).

Potential downgradient receptors for the TAG plume 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 the ER Project as well as implements and enforces federal regulations mandated by RCRA. All ER Project 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, finalized by the NMED in April 2004, transferred regulatory authority for the investigation of SWMUs and areas with groundwater contamination (including TAG) from the HWSA 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 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 activities for the TAG investigation from October 2007 through November 2008 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 October 2007 through November 2008 sampling events (five quarterly events) are summarized in Table 6-4, and the analytical parameters for each well for 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 blanks, duplicate samples, split samples, and trip blanks. Field QC samples are used to monitor the sampling process. Equipment blanks 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. Trip blanks 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 the ER Project, 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

During October 2007 through November 2008, water level measurements were obtained to determine groundwater flow directions, hydraulic gradients, and changes in water table elevations. Water levels are measured by the ER Field Office (ERFO) crew immediately before presampling purging at each well being sampled. 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.

Table 6-4. Groundwater Monitoring Well Network and Sampling Dates for the TAG Study Area, October 2007 through November 2008

Date of Sampling Event	Wells Sampled[1]		SAP
October 2007	TA2-SW1-320 TA2-W-19 TA2-W-26 TJA-2	TJA-4 TJA-7 WYO-4	*Tijeras Arroyo Groundwater Investigation, Mini-SAP FY08, 1st Quarter Sampling, October 2007* (SNL September 2007)
January 2008	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 FY08, 2nd Quarter Sampling, January 2008* (SNL December 2007)
April/May 2008	TA2-SW1-320 TA2-W-19 TA2-W-26 TJA-2	TJA-4 TJA-7 WYO-4	*Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY08, 3rd Quarter Sampling, April – May 2008* (SNL March 2008b)
July/August 2008	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 FY08, 4th Quarter Sampling, July 2008* (SNL June 2008)
November 2008	TA2-SW1-320 TA2-W-19 TA2-W-26 TJA-2	TJA-4 TJA-7 WYO-4	*Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY09, 1st Quarter Sampling, November 2008* (SNL October 2008)

Note: [1] Refer to page xi of this report for well descriptions.
FY = Fiscal Year.
SAP = Sampling and Analysis Plan.
TAG = Tijeras Arroyo Groundwater.

Table 6-5. Parameters Sampled at TAG Wells[1] for Each Sampling Event

<table>
<tr><th>Parameter</th><th>October 2007</th><th>Parameter</th><th>January 2008</th></tr>
<tr><td>Nitrate plus Nitrite (reported as Nitrogen)
VOCs</td><td>TA2-SW1-320 (QED)
TA2-SW1-320 (QED) (dup)
TA2-W-19
TA2-W-26
TJA-2
TJA-4
TJA-7
WYO-4</td><td>Nitrate plus Nitrite (reported as Nitrogen)
VOCs</td><td>TA2-SW1-320 (QED)
TA2-W-01
TA2-W-01 (dup)
TA2-W-19
TA2-W-26
TA2-W-26 (dup)
TA2-W-27
TJA-2
TJA-3
TJA-4
TJA-6
TJA-7
WYO-4</td></tr>
<tr><th>Parameter</th><th>April/May 2008</th><th>Parameter</th><th>July/August 2008</th></tr>
<tr><td>Nitrate plus Nitrite (reported as Nitrogen)
VOCs</td><td>TA2-SW1-320 (QED)
TA2-W-19
TA2-W-19 (dup)
TA2-W-26
TJA-2
TJA-4
TJA-7
WYO-4</td><td>Gamma spec
Gross alpha/beta
Metals
Nitrate plus Nitrite (reported as Nitrogen)
Tritium
Total Uranium
VOCs</td><td>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
TA2-NW1-595
TA2-SW1-320 (QED)
TA2-W-01
TA2-W-19
TA2-W-26
TA2-W-27
TJA-2
TJA-3
TJA-3 (dup)
TJA-4
TJA-6
TJA-7
WYO-3
WYO-4
WYO-4 (dup)</td></tr>
<tr><th colspan="2">Parameter</th><th colspan="2">November 2008</th></tr>
<tr><td colspan="2">Nitrate plus Nitrite (reported as Nitrogen)
VOCs</td><td colspan="2">TA2-SW1-320 (QED)
TA2-W-19
TA2-W-26
TJA-2
TJA-2 (dup)
TJA-4
TJA-4 (dup)
TJA-7
WYO-4</td></tr>
</table>

NOTE: [1] Refer to page xi of this report for well descriptions.
dup = Duplicate sample.
Gamma spec = Gamma spectroscopy
QED = MicroPurge, low-flow sampling method.
TAG = Tijeras Arroyo Groundwater.
VOC = Volatile organic compound.

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 the collection of groundwater samples according to SNL/NM Field Operating Procedure (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), 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 degrees Celsius, and SC 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.

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 equipment blank 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 the ER Project. The SMO reviews the mini- SAPs (Table 6-4), 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 duplicate, and surrogate spike samples. Reported laboratory analytical and QC data are reviewed against quality assurance (QA) requirements specified in the *Procedure for Completing the Contract Verification Review (CVR), 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 ERFO waste accumulation area. All waste was managed in accordance with SNL/NM FOP 05-04 (SNL August 2007c)as nonregulated waste, based on historical sample results and process knowledge of the monitoring well location. Associated environmental sample results provide supplemental data for approval to discharge water to the sanitary sewer. All data were compared to 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 General Engineering Laboratories, Inc. (GEL) for analysis. Samples were analyzed in accordance with applicable EPA methods (Tables-6-6 and 6-7), including:

- *The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0* (EPA 1983).
- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (EPA 1990).
- *Prescribed Procedures for Measurement of Radioactivity in Drinking Water* (EPA 1980).

Table 6-6. TAG Study Area Chemical Analytical Methods

Analyte	Analytical Method[a,b]
VOC	SW846-8260
NPN	EPA 353.2
TAL Metals plus total-uranium	SW846-6020/7470

Notes: [a]U.S. Environmental Protection Agency (EPA), 1990, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed., U.S. Environmental Protection Agency, Washington, D.C.
[b]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.
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.

6.6 Summary of Analytical Results

The following section includes a discussion of monitoring results, exceedances of standards, and pertinent trends in concentrations for COCs that exceed standards.

The analytical results and field measurements for all TAG sampling events are presented in Attachment 6A, Tables 6A-1 through 6A-6; and concentration trend plots for COCs that exceed the MCL are presented in Attachment 6B, Figures 6B-1 through 6B-7. A summary of detected VOC results are presented in Table 6A-1. The method detection limits for all analyzed VOCs are listed in Table 6A-2. The VOCs detected in low concentrations include:

- 1,1-Dichloroethane
- Acetone
- Carbon Disulfide
- Chloroform
- cis-1,2-Dichloroethene
- Methylene Chloride
- Tetrachloroethene
- TCE
- Xylenes (total)

Of the nine VOCs detected, only TCE exceeds the MCL of 5 μg/L (Table 6A-1). TCE was detected in two PGWS wells, TA2-W-19 and WYO-4. The maximum concentration of TCE detected during this reporting period is 9.15 μg/L detected in WYO-4 during the January 2008 sampling event. Figures 6B-1 and 6B-2 show that the TCE concentrations in TA2-W-19 and WYO-4 wells have barely exceeded the MCL for the life of the wells, and trends are 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, andTJA-7. Figures 6B-3 through 6B-7 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.

Total metal analysis results are presented in Table 6A-4. 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-5. All radionuclide activities are below MCLs, where established.

Field water quality parameters are measured during presample purging of each well and include temperature, SC, ORP, pH, turbidity, and DO. The parameter measurements obtained immediately before collecting the sample are presented in Table 6A-6.

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. The following sections discuss site-specific QA/QC samples for the TAG quarterly sampling events.

6.7.1 Field Quality Control Samples

Field QC samples included an environmental duplicate sample and an equipment blank sample. The field QC samples were submitted for analysis along with the groundwater samples in accordance with QC procedures specified in the mini-SAPs (SNL September 2007, December 2007, March 2008b, June 2008, and October 2008).

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 of 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.

6.7.1.2 Equipment Decontamination Samples

A portable Bennett™ groundwater sampling system was used to collect groundwater samples from all wells except TA2-SW1-320. 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 equipment blank or rinsate sample was collected to verify the effectiveness of the equipment decontamination process. The results of the rinsate sample analyses are as follows:

- **October 2007 Sampling Event—**The equipment blank sample was collected prior to sampling TA2-W-26, and submitted for VOC and NPN analyses. Acetone and NPN were detected in the equipment blank sample. No corrective action was required for acetone, as this compound was not detected in the associated environmental sample. NPN was reported in the equipment blank sample at a concentration of 0.025 mg/L. No corrective action was required as NPN was detected in the associated environmental sample at concentrations greater than 5 times the blank concentration.

- **January 2008 Sampling Event—**Equipment blank samples were collected prior to sampling TA2-W-01 and TA2-W-26, and submitted for VOC and nitrate analyses.

VOCs detected in equipment blank samples include bromodichloromethane, bromoform, chloroform, and dibromochloromethane. No corrective action is required, as these compounds were not detected in the associated environmental samples. Nitrate was reported in the equipment blank sample associated with TA2-W-26 at a concentration of 0.064 mg/L. No corrective action is required as nitrate was detected in the associated environmental samples at concentrations greater than 5 times the blank concentration.

- **April/May 2008 Sampling Event—**A sample was collected prior to sampling TA2-W-19 and submitted for VOC and NPN analyses. Acetone, bromodichloromethane, dibromochloromethane, and NPN were detected in the equipment blank sample. No corrective action is required for acetone, bromodichloromethane, or dibromochloromethane, as these compounds were not detected in the associated environmental sample. NPN was reported in the equipment blank sample at a concentration of 0.245 mg/L. No corrective action is required as NPN was detected in the associated samples at concentrations greater than 5 times the blank concentration.

- **July/August 2008 Sampling Event—**Samples were collected prior to sampling TA1-W-03, TJA-3, and WYO-4 and submitted for VOC and NPN analyses. Carbon disulfide, methylene chloride, dibromochloromethane, and NPN were detected in various equipment blank samples. No corrective action is required for carbon disulfide, dibromochloromethane, or NPN. The VOCs were not detected in the associated environmental sample, and NPN was reported in the equipment blank samples at concentration less than 10 times the associated environmental samples. Methylene chloride was qualified during data validation as not detected in the duplicate sample from TA1-W-03 as the blank contamination was within 10 times the environmental sample.

- **November 2008 Sampling Event—**A sample was collected prior to sampling TJA-4 and submitted for VOC and NPN analyses. Dibromochloromethane was the only compound detected in the equipment blank sample. No corrective action is required, as this compound was not detected in the associated environmental or duplicate samples.

6.7.1.3 Trip Blank Samples

Trip blank samples are submitted whenever samples are collected for VOC analysis to assess whether contamination of the samples has occurred during shipment and storage. Trip blanks consist of laboratory reagent grade water with hydrochloric acid preservative contained in 40-milliliter VOC vials prepared by the analytical laboratory, which accompany the empty sample containers supplied by the laboratory. Trip blanks were brought to the field and accompanied each sample shipment. Trip blank qualifiers are provided with the analytical results in Tables 6A-1 through 6A-5 (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-5 (Attachment 6A).

6.8 Variances and Nonconformances

The following sections describe differences between planned work and actual work, findings of the data validation process, and any impacts to schedule.

6.8.1 Variances and Nonconformances

Several variances and nonconformances from field or sampling requirements in the TAG Investigation mini-SAPs (SNL September 2007, December 2007, March 2008b, June 2008, and October 2008) occurred during sampling activities. Project-specific variances associated with these sampling events are noted as follows:

- **January 2008 Sampling Event—(**1) WYO-4 was purged dry prior to sampling. This well was allowed to recover to a minimum of 80 percent of original water level and then samples were collected. It took two days for this well to recover during January 2008. As a result, sampling was performed on a Friday, and SNL/NM could not meet the 24-hour hold time requirement for nitrate analysis. SNL/NM instructed GEL to perform NPN analysis. (2) A groundwater sample was collected prior to meeting water quality stability requirements at TJA-3. Only three stable temperature measurements were collected prior to sampling. Changes in radiant heat, due to weather conditions, on both water lines and water quality equipment prior to sampling affected temperature readings. The field team was notified of the variance. The results are comparable to historical values.

No other variances and nonconformances were noted; 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 original water level and then samples were collected. (2) A QED sampling system was used to collect a groundwater sample from TA2-SW1-320. Conventional sampling equipment cannot be lowered to the proper sample depth, due to well construction issues. The pump intake was set at 279 ft bgs in TA2-W-19 due to sediment at bottom of well.

- **October 2007 Sampling Event—**SNL/NM instructed GEL to reanalyze the NPN sample from TA2-W-26, as the initial result was not comparable to historical values. Both initial and reanalysis results are reported.

- **July/August 2008 Sampling Event—**In addition to WYO-4 as discussed for previous sampling events, PGS-2 and WYO-3 were purged dry prior to sampling.

These wells were allowed to recover to a minimum of 80 percent of original water level and then samples were collected.

6.8.2 Data Validation

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-5 (Attachment 6A). The data validation report associated with each sampling event has been submitted to the SNL/NM Customer Funded Records Center. Specific data validation issues associated with these sampling events are noted as follows:

- **January 2008 Sampling Event—**The VOCs acetone and 2-butanone were qualified as unusable in various samples because the initial calibration did not meet acceptance criteria. SNL/NM reviewed the QC procedures for both data validation and laboratory requirements. However, all analytical data from January 2008 samples are consistent with historical values.

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 the next Fiscal Year 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 October 2007, January 2008, April/May 2008, July/August 2008, and November 2008. The samples were analyzed for VOCs, NPN, 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 TAG study area wells. 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 29.8 mg/L in the sample from TJA-4 collected during the November 2008 sampling event. NPN concentrations occasionally exceeded the MCL in TJA-2 and TA2-W-19.

TCE exceeded the MCL of 5 μg/L in two PGWS wells, TA2-W-19 and WYO-4. The maximum concentration of TCE detected during this reporting period was 9.15 mg/L detected in the sample from WYO-4 during the January 2008 sampling event. TCE concentrations in TA2-W-19 and WYO-4 wells have barely exceeded the MCL for the life of the wells, and trends are level to slightly increasing over time.

The analytical results from 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 from this reporting period.

SNL/NM recommends 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 Groundwater Protection Program Annual Groundwater Monitoring Report.

- Complete and submit the response to the NMED's *Notice of Disapproval of November 2005 TAG Investigation Report* (NMED August 2008).

- Upon NMED approval of the TAG CME Report (SNL August 2005), prepare a Corrective Measures Implementation Plan.

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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 (EPA Method[g] 8260)
Tijeras Arroyo Groundwater Investigation

October 2007 through December 2008

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.
TA2-W-19 08-Oct-07	1,1-Dichloroethane	0.765	0.300	1.00	NE	J		085300-001
	Trichloroethene	**6.23**	0.250	1.00	5.00			085300-001
	cis-1,2-Dichloroethene	0.965	0.300	1.00	70.0	J	J+	085300-001
TA2-W-26 04-Oct-07	Chloroform	0.522	0.250	1.00	NE	J		085296-001
	Tetrachloroethene	0.873	0.250	1.00	5.00	J		085296-001
	Trichloroethene	1.35	0.250	1.00	5.00			085296-001
TJA-2 05-Oct-07	1,1-Dichloroethane	0.670	0.300	1.00	NE	J		085298-001
	Trichloroethene	4.17	0.250	1.00	5.00			085298-001
	cis-1,2-Dichloroethene	0.700	0.300	1.00	70.0	J	J+	085298-001
TJA-7 10-Oct-07	Trichloroethene	0.400	0.250	1.00	5.00	J		085305-001
WYO-4 03-Oct-07	1,1-Dichloroethane	0.753	0.300	1.00	NE	J		085292-001
	Trichloroethene	**6.94**	0.250	1.00	5.00			085292-001
	cis-1,2-Dichloroethene	1.60	0.300	1.00	70.0			085292-001
TA2-W-01 08-Jan-08	Trichloroethene	1.86	0.250	1.00	5.00			085489-001
TA2-W-01 (Duplicate) 08-Jan-08	Trichloroethene	1.74	0.250	1.00	5.00			085490-001
TA2-W-19 22-Jan-08	1,1-Dichloroethane	0.603	0.300	1.00	NE	J		085507-001
	Trichloroethene	**5.79**	0.250	1.00	5.00			085507-001
	cis-1,2-Dichloroethene	0.648	0.300	1.00	70.0	J		085507-001
TA2-W-26 15-Jan-08	Trichloroethene	0.935	0.250	1.00	5.00	J		085500-001
TA2-W-26 (Duplicate) 15-Jan-08	Trichloroethene	1.06	0.250	1.00	5.00			085501-001
TA2-W-27 09-Jan-08	Chloroform	0.271	0.250	1.00	NE	J		085492-001
	Tetrachloroethene	0.858	0.250	1.00	5.00	J		085492-001
	Trichloroethene	0.773	0.250	1.00	5.00	J		085492-001
TJA-2 21-Jan-08	1,1-Dichloroethane	0.470	0.300	1.00	NE	J		085505-001
	Trichloroethene	3.67	0.250	1.00	5.00			085505-001
	cis-1,2-Dichloroethene	0.580	0.300	1.00	70.0	J		085505-001
TJA-7 24-Jan-08	Trichloroethene	0.354	0.250	1.00	5.00	J		085512-001

Refer to footnotes on page 6A-42.

Table 6A-1
Summary of Detected Volatile Organic Compounds (EPA Method[g] 8260)
Tijeras Arroyo Groundwater Investigation

October 2007 through December 2008

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.
WYO-4 18-Jan-08	1,1-Dichloroethane	0.863	0.300	1.00	NE	J		085503-001
	Tetrachloroethene	0.354	0.250	1.00	5.00	J		085503-001
	Trichloroethene	**9.15**	0.250	1.00	5.00			085503-001
	cis-1,2-Dichloroethene	1.61	0.300	1.00	70.0			085503-001
TA2-SW1-320 22-Apr-08	Acetone	2.48	1.25	5.00	NE	J	5.00UJ	085996-001
TA2-W-19 02-May-08	1,1-Dichloroethane	0.580	0.300	1.00	NE	J		086007-001
	Trichloroethene	4.92	0.250	1.00	5.00			086007-001
	cis-1,2-Dichloroethene	0.591	0.300	1.00	70.0	J		086007-001
TA2-W-19 (Duplicate) 02-May-08	1,1-Dichloroethane	0.568	0.300	1.00	NE	J		086008-001
	Trichloroethene	**5.16**	0.250	1.00	5.00			086008-001
	cis-1,2-Dichloroethene	0.602	0.300	1.00	70.0	J		086008-001
TA2-W-26 29-Apr-08	Acetone	3.39	1.25	5.00	NE	J	J-	085999-001
	Chloroform	0.292	0.250	1.00	NE	J		085999-001
TJA-2 23-Apr-08	1,1-Dichloroethane	0.413	0.300	1.00	NE	J		086003-001
	Trichloroethene	2.57	0.250	1.00	5.00			086003-001
	cis-1,2-Dichloroethene	0.488	0.300	1.00	70.0	J		086003-001
WYO-4 28-Apr-08	1,1-Dichloroethane	0.722	0.300	1.00	NE	J		086001-001
	Trichloroethene	4.70	0.250	1.00	5.00			086001-001
	cis-1,2-Dichloroethene	1.49	0.300	1.00	70.0			086001-001
TA1-W-03 11-Jul-08	Carbon Disulfide	2.96	1.25	5.00	NE	J		086314-001
	Chloroform	0.494	0.250	1.00	NE	J		086314-001
TA1-W-03 (Duplicate) 11-Jul-08	Chloroform	0.533	0.250	1.00	NE	J		086315-001
	Methylene Chloride	2.60	2.00	5.00	5.00	J	5.00U	086315-001
TA1-W-04 21-Jul-08	Carbon Disulfide	5.06	1.25	5.00	NE			086317-001
TA1-W-06 23-Jul-08	1,1-Dichloroethene	0.551	0.300	1.00	7.00	J		086322-001
	Chloroform	0.282	0.250	1.00	NE	J		086322-001
TA2-NW1-595 29-Jul-08	Xylenes (total)	0.424	0.250	1.00	10,000	J	1.00U	086326-001
TA2-W-01 30-Jul-08	Tetrachloroethene	0.278	0.250	1.00	5.00	J		086331-001
	Trichloroethene	1.46	0.250	1.00	5.00			086331-001
	Xylenes (total)	0.269	0.250	1.00	10,000	J		086331-001

Refer to footnotes on page 6A-42.

Table 6A-1
Summary of Detected Volatile Organic Compounds (EPA Method[g] 8260)
Tijeras Arroyo Groundwater Investigation

October 2007 through December 2008

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.
TA2-W-19 13-Aug-08	1,1-Dichloroethane	0.546	0.300	1.00	NE	J		086351-001
	Trichloroethene	4.53	0.250	1.00	5.00			086351-001
	cis-1,2-Dichloroethene	0.519	0.300	1.00	70.0	J		086351-001
TA2-W-26 05-Aug-08	Chloroform	0.308	0.250	1.00	NE	J		086342-001
	Tetrachloroethene	0.647	0.250	1.00	5.00	J		086342-001
	Trichloroethene	1.11	0.250	1.00	5.00			086342-001
TA2-W-27 06-Aug-08	Tetrachloroethene	0.842	0.250	1.00	5.00	J		086333-001
	Trichloroethene	0.622	0.250	1.00	5.00	J		086333-001
TJA-2 07-Aug-08	1,1-Dichloroethane	0.427	0.300	1.00	NE	J		086349-001
	Trichloroethene	3.04	0.250	1.00	5.00			086349-001
	cis-1,2-Dichloroethene	0.478	0.300	1.00	70.0	J		086349-001
TJA-3 01-Aug-08	Trichloroethene	2.39	0.250	1.00	5.00			086337-001
TJA-3 (Duplicate) 01-Aug-08	Trichloroethene	2.08	0.250	1.00	5.00			086338-001
TJA-7 15-Aug-08	Trichloroethene	0.602	0.250	1.00	5.00	J		086355-001
WYO-3 28-Jul-08	Ethylbenzene	0.301	0.250	1.00	700	J		086328-001
	Toluene	0.519	0.250	1.00	1,000	J		086328-001
	Xylenes (total)	1.60	0.250	1.00	10,000		1.00U	086328-001
WYO-4 11-Aug-08	1,1-Dichloroethane	0.803	0.300	1.00	NE	J		086346-001
	Trichloroethene	**6.69**	0.250	1.00	5.00			086346-001
	cis-1,2-Dichloroethene	1.55	0.300	1.00	70.0			086346-001
WYO-4 (Duplicate) 11-Aug-08	1,1-Dichloroethane	0.837	0.300	1.00	NE	J		086347-001
	Trichloroethene	**6.44**	0.250	1.00	5.00			086347-001
	cis-1,2-Dichloroethene	1.49	0.300	1.00	70.0			086347-001
TA2-W-19 10-Nov-08	1,1-Dichloroethane	0.484	0.300	1.00	NE	J		086862-001
	Trichloroethene	4.24	0.250	1.00	5.00			086862-001
	cis-1,2-Dichloroethene	0.495	0.300	1.00	70.0	J		086862-001
TA2-W-26 07-Nov-08	Chloroform	0.332	0.250	1.00	NE	J		086859-001
	Tetrachloroethene	0.845	0.250	1.00	5.00	J		086859-001
	Trichloroethene	1.46	0.250	1.00	5.00			086859-001

Refer to footnotes on page 6A-42.

Table 6A-1 *(Concluded)*
Summary of Detected Volatile Organic Compounds (EPA Method[g] 8260)
Tijeras Arroyo Groundwater Investigation

October 2007 through December 2008

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.
TJA-2 11-Nov-08	1,1-Dichloroethane	0.424	0.300	1.00	NE	J		086864-001
	Carbon Disulfide	1.26	1.25	5.00	NE	J		086864-001
	Trichloroethene	2.95	0.250	1.00	5.00			086864-001
	cis-1,2-Dichloroethene	0.446	0.300	1.00	70.0	J		086864-001
TJA-2 11-Nov-08	1,1-Dichloroethane	0.425	0.300	1.00	NE	J		086865-001
	Trichloroethene	3.13	0.250	1.00	5.00			086865-001
	cis-1,2-Dichloroethene	0.420	0.300	1.00	70.0	J		086865-001
TJA-4 (Duplicate) 18-Nov-08	Methylene Chloride	2.11	2.00	10.0	5.00	J	10.0U	086872-001
TJA-7 19-Nov-08	Methylene Chloride	2.43	2.00	10.0	5.00	J	10.0U	086874-001
	Trichloroethene	0.483	0.250	1.00	5.00	J		086874-001
WYO-4 13-Nov-08	1,1-Dichloroethane	0.796	0.300	1.00	NE	J		086867-001
	Trichloroethene	**6.87**	0.250	1.00	5.00			086867-001
	cis-1,2-Dichloroethene	1.40	0.300	1.00	70.0			086867-001

Refer to footnotes on page 6A-42.

Table 6A-2
Method Detection Limits for Volatile Organic Compounds (EPA Method[g] 8260)
Tijeras Arroyo Groundwater Investigation

October 2007 through December 2008

Analyte	MDL[b] (µg/L)
1,1,1-Trichloroethane	0.300 – 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 – 5.00
4-methyl-, 2-Pentanone	1.25
Acetone	1.25 – 15.0
Benzene	0.300 – 1.00
Bromodichloromethane	0.250
Bromoform	0.250
Bromomethane	0.500
Carbon disulfide	1.25
Carbon tetrachloride	0.250 – 0.260
Chlorobenzene	0.250
Chloroethane	0.300 - 0.500
Chloroform	0.250
Chloromethane	0.300 - 0.500
Dibromochloromethane	0.250 – 0.260
Ethyl benzene	0.250
Methylene chloride	2.00
Styrene	0.250
Tetrachloroethene	0.250 – 0.450
Toluene	0.250 – 1.00
Trichloroethene	0.250
Vinyl acetate	1.50 – 5.00
Vinyl chloride	0.500
Xylene	0.250 – 0.600
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-42.

Table 6A-3
Summary of Nitrate and Nitrate plus Nitrite Results
Tijeras Arroyo Groundwater Investigation

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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 **01-Oct-07**	Nitrate plus nitrite as N	**22.2**	0.200	1.00	10	B		085307-018	EPA 353.2
TA2-SW1-320 (Duplicate) **01-Oct-07**	Nitrate plus nitrite as N	**22.2**	0.200	1.00	10	B		085308-018	EPA 353.2
TA2-W-19 **08-Oct-07**	Nitrate plus nitrite as N	9.76	0.100	0.500	10			085300-018	EPA 353.2
TA2-W-26 **04-Oct-07**	Nitrate plus nitrite as N	9.46	0.100	0.500	10		R	085296-018	EPA 353.2
TA2-W-26 (Re-analysis) **04-Oct-07**	Nitrate plus nitrite as N	3.66	0.050	0.250	10	H	J	085296-R18	EPA 353.2
TJA-2 **05-Oct-07**	Nitrate plus nitrite as N	9.97	0.100	0.500	10			085298-018	EPA 353.2
TJA-4 **09-Oct-07**	Nitrate plus nitrite as N	**27.5**	0.250	1.25	10			085303-018	EPA 353.2
TJA-7 **10-Oct-07**	Nitrate plus nitrite as N	**24.3**	0.250	1.25	10			085305-018	EPA 353.2
WYO-4 **03-Oct-07**	Nitrate plus nitrite as N	2.92	0.050	0.250	10			085292-018	EPA 353.2
TA2-SW1-320 **07-Jan-08**	Nitrate as N	**21.6**	0.165	0.500	10			085485-019	EPA 300.0
TA2-W-01 **08-Jan-08**	Nitrate as N	4.58	0.033	0.100	10			085489-019	EPA 300.0
TA2-W-01 **(Duplicate) 08-Jan-08**	Nitrate as N	4.58	0.033	0.100	10			085490-019	EPA 300.0
TA2-W-19 **22-Jan-08**	Nitrate as N	9.32	0.033	0.100	10			085507-019	EPA 300.0
TA2-W-26 **15-Jan-08**	Nitrate as N	4.25	0.033	0.100	10			085500-019	EPA 300.0
TA2-W-26 **(Duplicate) 15-Jan-08**	Nitrate as N	4.26	0.033	0.100	10			085501-019	EPA 300.0
TA2-W-27 **09-Jan-08**	Nitrate as N	3.93	0.033	0.100	10			085492-019	EPA 300.0
TJA-2 **21-Jan-08**	Nitrate as N	9.87	0.033	0.100	10			085505-019	EPA 300.0

Refer to footnotes on page 6A-42.

Table 6A-3
Summary of Nitrate and Nitrate plus Nitrite Results
Tijeras Arroyo Groundwater Investigation

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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 **10-Jan-08**	Nitrate as N	2.25	0.033	0.100	10			085494-019	EPA 300.0
TJA-4 **23-Jan-08**	Nitrate as N	**25.0**	1.65	5.00	10	H	J	085510-019	EPA 300.0
TJA-6 **14-Jan-08**	Nitrate as N	2.30	0.033	0.100	10			085496-019	EPA 300.0
TJA-7 **24-Jan-08**	Nitrate as N	**22.0**	0.165	0.500	10	H	J	085512-019	EPA 300.0
WYO-4 **18-Jan-08**	Nitrate plus Nitrite as N	2.99	0.100	0.500	10			085503-018	EPA 353.2
TA2-SW1-320 **22-Apr-08**	Nitrate plus nitrite as N	**21.9**	0.500	2.50	10	B		085996-018	EPA 353.2
TA2-W-19 **02-May-08**	Nitrate plus nitrite as N	9.70	0.500	2.50	10			086007-018	EPA 353.2
TA2-W-19 **(Duplicate)** **02-May-08**	Nitrate plus nitrite as N	9.60	0.500	2.50	10			086008-018	EPA 353.2
TA2-W-26 **29-Apr-08**	Nitrate plus nitrite as N	5.00	0.100	0.500	10	B		085999-018	EPA 353.2
TJA-2 **23-Apr-08**	Nitrate plus nitrite as N	**10.3**	0.250	1.25	10	B		086003-018	EPA 353.2
TJA-4 **30-Apr-08**	Nitrate plus nitrite as N	**27.8**	0.250	1.25	10	B		086010-018	EPA 353.2
TJA-7 **01-May-08**	Nitrate plus nitrite as N	**24.4**	0.250	1.25	10	B		086012-018	EPA 353.2
WYO-4 **28-Apr-08**	Nitrate plus nitrite as N	3.00	0.100	0.500	10	B		086001-018	EPA 353.2
PGS-2 **09-Jul-08**	Nitrate plus nitrite as N	0.875	0.050	0.250	10			086305-018	EPA 353.2
TA1-W-01 **09-Jul-08**	Nitrate plus nitrite as N	2.83	0.100	0.500	10			086307-018	EPA 353.2
TA1-W-02 **10-Jul-08**	Nitrate plus nitrite as N	1.06	0.050	0.250	10			086310-018	EPA 353.2

Refer to footnotes on page 6A-42.

Table 6A-3
Summary of Nitrate and Nitrate plus Nitrite Results
Tijeras Arroyo Groundwater Investigation

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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 **11-Jul-08**	Nitrate plus nitrite as N	6.68	0.250	1.25	10			086314-018	EPA 353.2
TA1-W-03 **(Duplicate)** **11-Jul-08**	Nitrate plus nitrite as N	6.43	0.100	0.500	10			086315-018	EPA 353.2
TA1-W-04 **21-Jul-08**	Nitrate plus nitrite as N	1.29	0.100	0.500	10	B		086317-018	EPA 353.2
TA1-W-05 **22-Jul-08**	Nitrate plus nitrite as N	0.891	0.100	0.500	10	B		086319-018	EPA 353.2
TA1-W-06 **23-Jul-08**	Nitrate plus nitrite as N	2.64	0.100	0.500	10	B		086322-018	EPA 353.2
TA1-W-08 **24-Jul-08**	Nitrate plus nitrite as N	6.25	0.100	0.500	10	B		086324-018	EPA 353.2
TA2-NW1-595 **29-Jul-08**	Nitrate plus nitrite as N	3.32	0.100	0.500	10			086326-018	EPA 353.2
TA2-SW1-320 **04-Aug-08**	Nitrate plus nitrite as N	**23.4**	0.500	2.50	10			086303-018	EPA 353.2
TA2-W-01 **30-Jul-08**	Nitrate plus nitrite as N	4.74	0.100	0.500	10			086331-018	EPA 353.2
TA2-W-19 **13-Aug-08**	Nitrate plus nitrite as N	9.95	0.250	1.25	10	B		086351-018	EPA 353.2
TA2-W-26 **05-Aug-08**	Nitrate plus nitrite as N	4.82	0.100	0.500	10			086342-018	EPA 353.2
TA2-W-27 **06-Aug-08**	Nitrate plus nitrite as N	4.34	0.100	0.500	10			086333-018	EPA 353.2
TJA-2 **07-Aug-08**	Nitrate plus nitrite as N	10.0	0.100	0.500	10			086349-018	EPA 353.2
TJA-3 **01-Aug-08**	Nitrate plus nitrite as N	2.74	0.100	0.500	10			086337-018	EPA 353.2
TJA-3 **(Duplicate)** **01-Aug-08**	Nitrate plus nitrite as N	2.59	0.100	0.500	10			086338-018	EPA 353.2
TJA-4 **14-Aug-08**	Nitrate plus nitrite as N	**27.4**	0.500	2.50	10	B		086353-018	EPA 353.2
TJA-6 **31-Jul-08**	Nitrate plus nitrite as N	2.52	0.100	0.500	10			086340-018	EPA 353.2
TJA-7 **15-Aug-08**	Nitrate plus nitrite as N	**23.7**	0.500	2.50	10			086355-018	EPA 353.2

Refer to footnotes on page 6A-42.

Table 6A-3 *(Concluded)*
Summary of Nitrate and Nitrate plus Nitrite Results
Tijeras Arroyo Groundwater Investigation

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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 **28-Jul-08**	Nitrate plus nitrite as N	1.84	0.050	0.250	10	B		086328-018	EPA 353.2
WYO-4 **11-Aug-08**	Nitrate plus nitrite as N	2.98	0.100	0.500	10	B		086346-018	EPA 353.2
WYO-4 **(Duplicate) 11-Aug-08**	Nitrate plus nitrite as N	2.92	0.100	0.500	10	B		086347-018	EPA 353.2
TA2-SW1-320 **06-Nov-08**	Nitrate plus nitrite as N	**24.0**	0.500	2.50	10			086857-018	EPA 353.2
TA2-W-19 **10-Nov-08**	Nitrate plus nitrite as N	**10.4**	0.250	1.25	10			086862-018	EPA 353.2
TA2-W-26 **07-Nov-08**	Nitrate plus nitrite as N	4.85	0.100	0.500	10			086859-018	EPA 353.2
TJA-2 **11-Nov-08**	Nitrate plus nitrite as N	**10.9**	0.500	2.50	10			086864-018	EPA 353.2
TJA-2 **(Duplicate) 11-Nov-08**	Nitrate plus nitrite as N	**10.6**	0.500	2.50	10			086865-018	EPA 353.2
TJA-4 **18-Nov-08**	Nitrate plus nitrite as N	**29.8**	0.500	2.50	10			086871-018	EPA 353.2
TJA-4 **(Duplicate) 18-Nov-08**	Nitrate plus nitrite as N	**29.6**	0.500	2.50	10			086872-018	EPA 353.2
TJA-7 **19-Nov-08**	Nitrate plus nitrite as N	**25.6**	0.500	2.50	10			086874-018	EPA 353.2
WYO-4 **13-Nov-08**	Nitrate plus nitrite as N	3.03	0.100	0.500	10			086867-018	EPA 353.2

Refer to footnotes on page 6A-42.

Table 6A-4
Summary of Total Metal Results
Tijeras Arroyo Groundwater Investigation

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
PGS-2	Aluminum	ND	0.010	0.020	NE	U		086305-010	SW846 6020
09-Jul-08	Antimony	0.000536	0.0005	0.002	0.006	B, J	0.0058U	086305-010	SW846 6020
	Arsenic	0.00205	0.0015	0.005	0.010	J		086305-010	SW846 6020
	Barium	0.0594	0.0005	0.002	2.00			086305-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086305-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086305-010	SW846 6020
	Calcium	49.6	0.020	0.100	NE	B		086305-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		086305-010	SW846 6020
	Cobalt	0.000297	0.0001	0.001	NE	B, J	0.00051U	086305-010	SW846 6020
	Copper	0.0012	0.0003	0.001	NE			086305-010	SW846 6020
	Iron	0.491	0.010	0.025	NE			086305-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086305-010	SW846 6020
	Magnesium	11.3	0.005	0.015	NE			086305-010	SW846 6020
	Manganese	0.00125	0.001	0.005	NE	J		086305-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086305-010	SW846 7470
	Nickel	0.00892	0.0005	0.002	NE			086305-010	SW846 6020
	Potassium	2.55	0.080	0.300	NE			086305-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		086305-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086305-010	SW846 6020
	Sodium	29.2	0.080	0.250	NE			086305-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086305-010	SW846 6020
	Uranium	0.00139	0.00005	0.0002	0.030			086305-010	SW846 6020
	Uranium-235	0.00001	0.00001	0.00007	0.030	J		086305-010	SW846 6020
	Uranium-238	0.00138	0.00005	0.0002	0.030			086305-010	SW846 6020
	Vanadium	0.0061	0.003	0.010	NE	J		086305-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		086305-010	SW846 6020

Refer to footnotes on page 6A-42.

Table 6A-4
Summary of Total Metal Results
Tijeras Arroyo Groundwater Investigation

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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	0.020	NE	U		086307-010	SW846 6020
09-Jul-08	Antimony	0.00051	0.0005	0.002	0.006	B, J	0.0058U	086307-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086307-010	SW846 6020
	Barium	0.0427	0.0005	0.002	2.00			086307-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086307-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086307-010	SW846 6020
	Calcium	70.7	0.100	0.500	NE	B		086307-010	SW846 6020
	Chromium	ND	0.0025	0.010	0.100	U		086307-010	SW846 6020
	Cobalt	0.000287	0.0001	0.001	NE	B, J	0.00051U	086307-010	SW846 6020
	Copper	0.00143	0.0003	0.001	NE			086307-010	SW846 6020
	Iron	0.622	0.010	0.025	NE			086307-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086307-010	SW846 6020
	Magnesium	11.8	0.005	0.015	NE			086307-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		086307-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086307-010	SW846 7470
	Nickel	0.00177	0.0005	0.002	NE	J		086307-010	SW846 6020
	Potassium	2.07	0.080	0.300	NE			086307-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		086307-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086307-010	SW846 6020
	Sodium	23.3	0.080	0.250	NE			086307-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086307-010	SW846 6020
	Uranium	0.00306	0.00005	0.0002	0.030			086307-010	SW846 6020
	Uranium-235	0.000023	0.00001	0.00007	0.030	J		086307-010	SW846 6020
	Uranium-238	0.00303	0.00005	0.0002	0.030			086307-010	SW846 6020
	Vanadium	0.0032	0.003	0.010	NE	J		086307-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		086307-010	SW846 6020

Refer to footnotes on page 6A-42.

Table 6A-4
Summary of Total Metal Results
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October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-02	Aluminum	0.285	0.005	0.015	NE			086310-010	SW846 6020
10-Jul-08	Antimony	0.00132	0.0005	0.002	0.006	B, J	0.011U	086310-010	SW846 6020
	Arsenic	0.00202	0.0015	0.005	0.010	J		086310-010	SW846 6020
	Barium	0.048	0.0005	0.002	2.00			086310-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086310-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086310-010	SW846 6020
	Calcium	65.0	0.200	1.00	NE	B		086310-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086310-010	SW846 6020
	Cobalt	0.000141	0.0001	0.001	NE	J		086310-010	SW846 6020
	Copper	0.000797	0.0003	0.001	NE	J		086310-010	SW846 6020
	Iron	0.286	0.010	0.025	NE	B		086310-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086310-010	SW846 6020
	Magnesium	12.4	0.0052	0.015	NE			086310-010	SW846 6020
	Manganese	0.00256	0.001	0.005	NE	J		086310-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086310-010	SW846 7470
	Nickel	0.00129	0.0005	0.002	NE	J		086310-010	SW846 6020
	Potassium	2.27	0.080	0.300	NE			086310-010	SW846 6020
	Selenium	0.00104	0.001	0.005	0.050	J		086310-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086310-010	SW846 6020
	Sodium	20.4	0.080	0.250	NE		J	086310-010	SW846 6020
	Thallium	0.000525	0.0003	0.001	0.002	J		086310-010	SW846 6020
	Uranium	0.00338	0.00005	0.0002	0.030			086310-010	SW846 6020
	Uranium-235	0.000023	0.00001	0.00007	0.030	J		086310-010	SW846 6020
	Uranium-238	0.00336	0.00005	0.0002	0.030			086310-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086310-010	SW846 6020
	Zinc	0.00281	0.0026	0.010	NE	J		086310-010	SW846 6020

Refer to footnotes on page 6A-42.

Table 6A-4
Summary of Total Metal Results
Tijeras Arroyo Groundwater Investigation

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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-03	Aluminum	0.351	0.005	0.015	NE			086314-010	SW846 6020
11-Jul-08	Antimony	0.000978	0.0005	0.002	0.006	B, J	0.0062U	086314-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086314-010	SW846 6020
	Barium	0.0299	0.0005	0.002	2.00		J+	086314-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086314-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086314-010	SW846 6020
	Calcium	235	0.200	1.00	NE	B		086314-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086314-010	SW846 6020
	Cobalt	0.000432	0.0001	0.001	NE	J	J+	086314-010	SW846 6020
	Copper	0.00178	0.0003	0.001	NE		J+	086314-010	SW846 6020
	Iron	1.07	0.010	0.025	NE		J	086314-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086314-010	SW846 6020
	Magnesium	28.3	0.0052	0.015	NE		J	086314-010	SW846 6020
	Manganese	0.00643	0.001	0.005	NE		J+	086314-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U		086314-010	SW846 7470
	Nickel	0.00335	0.0005	0.002	NE			086314-010	SW846 6020
	Potassium	2.73	0.080	0.300	NE			086314-010	SW846 6020
	Selenium	0.0293	0.001	0.005	0.050			086314-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086314-010	SW846 6020
	Sodium	44.2	0.080	0.250	NE			086314-010	SW846 6020
	Thallium	0.000528	0.0003	0.001	0.002	J		086314-010	SW846 6020
	Uranium	0.00126	0.00005	0.0002	0.030			086314-010	SW846 6020
	Uranium-235	ND	0.00001	0.00007	0.030	U		086314-010	SW846 6020
	Uranium-238	0.00126	0.00005	0.0002	0.030			086314-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086314-010	SW846 6020
	Zinc	0.00353	0.0026	0.010	NE	J	J+	086314-010	SW846 6020

Refer to footnotes on page 6A-42.

Table 6A-4
Summary of Total Metal Results
Tijeras Arroyo Groundwater Investigation

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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	0.005	0.015	NE	U		086317-010	SW846 6020
21-Jul-08	Antimony	0.00103	0.0005	0.002	0.006	B, J	0.014U	086317-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086317-010	SW846 6020
	Barium	0.0493	0.0005	0.002	2.00			086317-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086317-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086317-010	SW846 6020
	Calcium	61.4	0.200	1.00	NE	B		086317-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086317-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		086317-010	SW846 6020
	Copper	0.000558	0.0003	0.001	NE	J		086317-010	SW846 6020
	Iron	0.152	0.010	0.025	NE			086317-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086317-010	SW846 6020
	Magnesium	11.1	0.0052	0.015	NE			086317-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		086317-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086317-010	SW846 7470
	Nickel	0.000811	0.0005	0.002	NE	J		086317-010	SW846 6020
	Potassium	2.02	0.080	0.300	NE			086317-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U	UJ	086317-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086317-010	SW846 6020
	Sodium	24.5	0.080	0.250	NE			086317-010	SW846 6020
	Thallium	0.000349	0.0003	0.001	0.002	J		086317-010	SW846 6020
	Uranium	0.00294	0.00005	0.0002	0.030			086317-010	SW846 6020
	Uranium-235	0.00002	0.00001	0.00007	0.030	J		086317-010	SW846 6020
	Uranium-238	0.00292	0.00005	0.0002	0.030			086317-010	SW846 6020
	Vanadium	0.00615	0.003	0.010	NE	J		086317-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		086317-010	SW846 6020

Refer to footnotes on page 6A-42.

Table 6A-4
Summary of Total Metal Results
Tijeras Arroyo Groundwater Investigation

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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	0.005	0.015	NE	U		086319-010	SW846 6020
22-Jul-08	Antimony	0.00132	0.0005	0.002	0.006	B, J	0.014U	086319-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086319-010	SW846 6020
	Barium	0.0368	0.0005	0.002	2.00			086319-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086319-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086319-010	SW846 6020
	Calcium	83.7	0.200	1.00	NE	B		086319-010	SW846 6020
	Chromium	ND	0.001	0.003	0.100	U		086319-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		086319-010	SW846 6020
	Copper	0.000523	0.0003	0.001	NE	J		086319-010	SW846 6020
	Iron	0.192	0.010	0.025	NE			086319-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086319-010	SW846 6020
	Magnesium	11.6	0.0052	0.015	NE			086319-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		086319-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086319-010	SW846 7470
	Nickel	0.000952	0.0005	0.002	NE	J		086319-010	SW846 6020
	Potassium	2.22	0.080	0.300	NE			086319-010	SW846 6020
	Selenium	0.00123	0.001	0.005	0.050	J	NJ-	086319-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086319-010	SW846 6020
	Sodium	32.7	0.080	0.250	NE			086319-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086319-010	SW846 6020
	Uranium	0.00346	0.00005	0.0002	0.030			086319-010	SW846 6020
	Uranium-235	0.000022	0.00001	0.00007	0.030	J		086319-010	SW846 6020
	Uranium-238	0.00344	0.00005	0.0002	0.030			086319-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086319-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		086319-010	SW846 6020

Refer to footnotes on page 6A-42.

Table 6A-4
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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-06	Aluminum	ND	0.005	0.015	NE	U		086322-010	SW846 6020
23-Jul-08	Antimony	0.000823	0.0005	0.002	0.006	B, J	0.0079U	086322-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086322-010	SW846 6020
	Barium	0.0258	0.0005	0.002	2.00		J+	086322-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086322-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086322-010	SW846 6020
	Calcium	120	0.200	1.00	NE	B		086322-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086322-010	SW846 6020
	Cobalt	0.000141	0.0001	0.001	NE	J	J+	086322-010	SW846 6020
	Copper	0.00088	0.0003	0.001	NE	J	J+	086322-010	SW846 6020
	Iron	0.311	0.010	0.025	NE			086322-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086322-010	SW846 6020
	Magnesium	14.6	0.0052	0.015	NE			086322-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		086322-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086322-010	SW846 7470
	Nickel	0.00144	0.0005	0.002	NE	J	J+	086322-010	SW846 6020
	Potassium	1.90	0.080	0.300	NE			086322-010	SW846 6020
	Selenium	0.00784	0.001	0.005	0.050		J-	086322-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086322-010	SW846 6020
	Sodium	29.6	0.080	0.250	NE			086322-010	SW846 6020
	Thallium	0.000303	0.0003	0.001	0.002	J		086322-010	SW846 6020
	Uranium	0.0011	0.00005	0.0002	0.030			086322-010	SW846 6020
	Uranium-235	ND	0.00001	0.00007	0.030	U		086322-010	SW846 6020
	Uranium-238	0.0011	0.00005	0.0002	0.030			086322-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086322-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		086322-010	SW846 6020

Refer to footnotes on page 6A-42.

Table 6A-4
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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	0.025	0.075	NE	B, U		086324-010	SW846 6020
24-Jul-08	Antimony	0.000805	0.0005	0.002	0.006	B, J	0.0079U	086324-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086324-010	SW846 6020
	Barium	0.0196	0.0005	0.002	2.00		J+	086324-010	SW846 6020
	Beryllium	ND	0.0005	0.0025	0.004	U		086324-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086324-010	SW846 6020
	Calcium	295	0.200	1.00	NE	B		086324-010	SW846 6020
	Chromium	ND	0.0075	0.015	0.100	U		086324-010	SW846 6020
	Cobalt	ND	0.0005	0.005	NE	U		086324-010	SW846 6020
	Copper	0.00247	0.0015	0.005	NE	J		086324-010	SW846 6020
	Iron	0.744	0.050	0.125	NE			086324-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086324-010	SW846 6020
	Magnesium	38.7	0.026	0.075	NE			086324-010	SW846 6020
	Manganese	ND	0.005	0.025	NE	U		086324-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086324-010	SW846 7470
	Nickel	0.0032	0.0025	0.010	NE	J		086324-010	SW846 6020
	Potassium	3.22	0.400	1.50	NE			086324-010	SW846 6020
	Selenium	0.0232	0.001	0.005	0.050		J-	086324-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086324-010	SW846 6020
	Sodium	70.6	0.800	2.50	NE			086324-010	SW846 6020
	Thallium	0.000339	0.0003	0.001	0.002	J		086324-010	SW846 6020
	Uranium	0.00183	0.00005	0.0002	0.030			086324-010	SW846 6020
	Uranium-235	0.000012	0.00001	0.00007	0.030	J		086324-010	SW846 6020
	Uranium-238	0.00182	0.00005	0.0002	0.030			086324-010	SW846 6020
	Vanadium	ND	0.015	0.050	NE	U		086324-010	SW846 6020
	Zinc	0.00275	0.0026	0.010	NE	J	J+	086324-010	SW846 6020

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Table 6A-4
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	0.005	0.015	NE	U		086326-010	SW846 6020
29-Jul-08	Antimony	0.000629	0.0005	0.002	0.006	B, J	0.011U	086326-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086326-010	SW846 6020
	Barium	0.045	0.0005	0.002	2.00			086326-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086326-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U	UJ	086326-010	SW846 6020
	Calcium	93.6	0.200	1.00	NE	B		086326-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086326-010	SW846 6020
	Cobalt	0.000102	0.0001	0.001	NE	J	J+	086326-010	SW846 6020
	Copper	0.000636	0.0003	0.001	NE	J	J+	086326-010	SW846 6020
	Iron	0.148	0.010	0.025	NE	B		086326-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086326-010	SW846 6020
	Magnesium	15.4	0.0052	0.015	NE			086326-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		086326-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086326-010	SW846 7470
	Nickel	0.00128	0.0005	0.002	NE	J	J+	086326-010	SW846 6020
	Potassium	2.51	0.080	0.300	NE			086326-010	SW846 6020
	Selenium	0.00743	0.001	0.005	0.050			086326-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086326-010	SW846 6020
	Sodium	30.0	0.080	0.250	NE			086326-010	SW846 6020
	Thallium	0.000408	0.0003	0.001	0.002	J		086326-010	SW846 6020
	Uranium	0.0123	0.00005	0.0002	0.030			086326-010	SW846 6020
	Uranium-235	0.000015	0.00001	0.00007	0.030	J		086326-010	SW846 6020
	Uranium-238	0.00227	0.00005	0.0002	0.030			086326-010	SW846 6020
	Vanadium	0.00583	0.003	0.010	NE	B, J	0.030U	086326-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	B, U		086326-010	SW846 6020

Refer to footnotes on page 6A-42.

Table 6A-4
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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	0.516	0.005	0.015	NE		J	086303-010	SW846 6020
04-Aug-08	Antimony	0.00093	0.0005	0.002	0.006	B, J	0.015U	086303-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086303-010	SW846 6020
	Barium	0.240	0.0005	0.002	2.00			086303-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086303-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086303-010	SW846 6020
	Calcium	65.2	0.200	1.00	NE	B		086303-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086303-010	SW846 6020
	Cobalt	0.000241	0.0001	0.001	NE	J		086303-010	SW846 6020
	Copper	0.00084	0.0003	0.001	NE	B, J	0.0034U	086303-010	SW846 6020
	Iron	0.493	0.010	0.025	NE	B		086303-010	SW846 6020
	Lead	0.000579	0.0005	0.002	NE	B, J	0.016U	086303-010	SW846 6020
	Magnesium	12.3	0.052	0.150	NE		J	086303-010	SW846 6020
	Manganese	0.0131	0.001	0.005	NE			086303-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086303-010	SW846 7470
	Nickel	0.00127	0.0005	0.002	NE	J		086303-010	SW846 6020
	Potassium	2.10	0.080	0.300	NE			086303-010	SW846 6020
	Selenium	0.00371	0.001	0.005	0.050	J		086303-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086303-010	SW846 6020
	Sodium	17.7	0.080	0.250	NE			086303-010	SW846 6020
	Thallium	0.000739	0.0003	0.001	0.002	J		086303-010	SW846 6020
	Uranium	0.00151	0.00005	0.0002	0.030			086303-010	SW846 6020
	Uranium-235	0.000011	0.00001	0.00007	0.030	J		086303-010	SW846 6020
	Uranium-238	0.0015	0.00005	0.0002	0.030			086303-010	SW846 6020
	Vanadium	0.00568	0.003	0.010	NE	J		086303-010	SW846 6020
	Zinc	0.00324	0.0026	0.010	NE	J		086303-010	SW846 6020

Refer to footnotes on page 6A-42.

Table 6A-4
Summary of Total Metal Results
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October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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	0.015	0.005	0.015	NE			086331-010	SW846 6020
30-Jul-08	Antimony	ND	0.0005	0.002	0.006	B, U		086331-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086331-010	SW846 6020
	Barium	0.130	0.0005	0.002	2.00			086331-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086331-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086331-010	SW846 6020
	Calcium	81.0	0.200	1.00	NE	B		086331-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086331-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		086331-010	SW846 6020
	Copper	0.00042	0.0003	0.001	NE	J		086331-010	SW846 6020
	Iron	0.187	0.010	0.025	NE			086331-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086331-010	SW846 6020
	Magnesium	10.6	0.0052	0.015	NE			086331-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		086331-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086331-010	SW846 7470
	Nickel	0.000806	0.0005	0.002	NE	J		086331-010	SW846 6020
	Potassium	1.71	0.080	0.300	NE			086331-010	SW846 6020
	Selenium	0.00653	0.001	0.005	0.050			086331-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086331-010	SW846 6020
	Sodium	17.4	0.080	0.250	NE		J	086331-010	SW846 6020
	Thallium	0.000393	0.0003	0.001	0.002	J	0.0016U	086331-010	SW846 6020
	Uranium	0.00104	0.00005	0.0002	0.030			086331-010	SW846 6020
	Uranium-235	ND	0.00001	0.00007	0.030	U		086331-010	SW846 6020
	Uranium-238	0.00104	0.00005	0.0002	0.030			086331-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086331-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		086331-010	SW846 6020

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Table 6A-4
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	0.005	0.015	NE	U		086351-010	SW846 6020
13-Aug-08	Antimony	ND	0.0005	0.002	0.006	U		086351-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086351-010	SW846 6020
	Barium	0.0485	0.0005	0.002	2.00			086351-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086351-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086351-010	SW846 6020
	Calcium	79.7	0.200	1.00	NE	B		086351-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086351-010	SW846 6020
	Cobalt	0.000123	0.0001	0.001	NE	J		086351-010	SW846 6020
	Copper	0.000639	0.0003	0.001	NE	J	J+	086351-010	SW846 6020
	Iron	0.121	0.010	0.025	NE			086351-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086351-010	SW846 6020
	Magnesium	11.2	0.0052	0.015	NE			086351-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		086351-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086351-010	SW846 7470
	Nickel	0.0012	0.0005	0.002	NE	J		086351-010	SW846 6020
	Potassium	1.92	0.080	0.300	NE			086351-010	SW846 6020
	Selenium	0.00356	0.001	0.005	0.050	J		086351-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086351-010	SW846 6020
	Sodium	21.1	0.080	0.250	NE			086351-010	SW846 6020
	Thallium	0.000538	0.0003	0.001	0.002	J	0.0039U	086351-010	SW846 6020
	Uranium	0.00125	0.00005	0.0002	0.030			086351-010	SW846 6020
	Uranium-235	ND	0.00001	0.00007	0.030	U		086351-010	SW846 6020
	Uranium-238	0.00125	0.00005	0.0002	0.030			086351-010	SW846 6020
	Vanadium	0.00541	0.003	0.010	NE	B, J	0.016U	086351-010	SW846 6020
	Zinc	0.00833	0.0026	0.010	NE	J		086351-010	SW846 6020

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Table 6A-4
Summary of Total Metal Results
Tijeras Arroyo Groundwater Investigation

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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	0.0111	0.005	0.015	NE	J		086342-010	SW846 6020
05-Aug-08	Antimony	0.000744	0.0005	0.002	0.006	B, J	0.0077U	086342-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086342-010	SW846 6020
	Barium	0.0682	0.0005	0.002	2.00			086342-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086342-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086342-010	SW846 6020
	Calcium	179	0.200	1.00	NE	B		086342-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086342-010	SW846 6020
	Cobalt	0.000188	0.0001	0.001	NE	J	J+	086342-010	SW846 6020
	Copper	0.000968	0.0003	0.001	NE	J	J+	086342-010	SW846 6020
	Iron	0.299	0.010	0.025	NE			086342-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	B, U		086342-010	SW846 6020
	Magnesium	23.9	0.052	0.150	NE			086342-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		086342-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086342-010	SW846 7470
	Nickel	0.00195	0.0005	0.002	NE	J	J+	086342-010	SW846 6020
	Potassium	2.54	0.080	0.300	NE			086342-010	SW846 6020
	Selenium	0.0131	0.001	0.005	0.050			086342-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086342-010	SW846 6020
	Sodium	29.0	0.080	0.250	NE		J	086342-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086342-010	SW846 6020
	Uranium	0.00133	0.00005	0.0002	0.030			086342-010	SW846 6020
	Uranium-235	ND	0.00001	0.00007	0.030	U		086342-010	SW846 6020
	Uranium-238	0.00133	0.00005	0.0002	0.030			086342-010	SW846 6020
	Vanadium	0.00366	0.003	0.010	NE	J		086342-010	SW846 6020
	Zinc	0.00465	0.0026	0.010	NE	J	J+	086342-010	SW846 6020

Refer to footnotes on page 6A-42.

Table 6A-4
Summary of Total Metal Results
Tijeras Arroyo Groundwater Investigation

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-W-27	Aluminum	0.00904	0.005	0.015	NE	J		086333-010	SW846 6020
06-Aug-08	Antimony	0.00142	0.0005	0.002	0.006	B, J	0.010U	086333-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086333-010	SW846 6020
	Barium	0.0643	0.0005	0.002	2.00			086333-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086333-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086333-010	SW846 6020
	Calcium	115	0.200	1.00	NE	B		086333-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086333-010	SW846 6020
	Cobalt	0.000115	0.0001	0.001	NE	J	0.0005U	086333-010	SW846 6020
	Copper	0.000618	0.0003	0.001	NE	J	J+	086333-010	SW846 6020
	Iron	0.187	0.010	0.025	NE			086333-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086333-010	SW846 6020
	Magnesium	14.6	0.0052	0.015	NE			086333-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		086333-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086333-010	SW846 7470
	Nickel	0.000675	0.0005	0.002	NE	J	J+	086333-010	SW846 6020
	Potassium	1.96	0.080	0.300	NE			086333-010	SW846 6020
	Selenium	0.00778	0.001	0.005	0.050		J-	086333-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086333-010	SW846 6020
	Sodium	24.9	0.800	2.50	NE			086333-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086333-010	SW846 6020
	Uranium	0.00116	0.00005	0.0002	0.030			086333-010	SW846 6020
	Uranium-235	ND	0.00001	0.00007	0.030	U		086333-010	SW846 6020
	Uranium-238	0.00116	0.00005	0.0002	0.030			086333-010	SW846 6020
	Vanadium	0.00318	0.003	0.010	NE	J		086333-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		086333-010	SW846 6020

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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	0.0135	0.005	0.015	NE	B, J	0.061U	086349-010	SW846 6020
07-Aug-08	Antimony	0.0016	0.0005	0.002	0.006	B, J	0.010U	086349-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086349-010	SW846 6020
	Barium	0.0465	0.0005	0.002	2.00			086349-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086349-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086349-010	SW846 6020
	Calcium	77.4	0.200	1.00	NE	B		086349-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086349-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		086349-010	SW846 6020
	Copper	0.000464	0.0003	0.001	NE	J		086349-010	SW846 6020
	Iron	0.123	0.010	0.025	NE			086349-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086349-010	SW846 6020
	Magnesium	11.0	0.0052	0.015	NE			086349-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		086349-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086349-010	SW846 7470
	Nickel	ND	0.0005	0.002	NE	U		086349-010	SW846 6020
	Potassium	2.01	0.080	0.300	NE			086349-010	SW846 6020
	Selenium	0.00346	0.001	0.005	0.050	J	NJ-	086349-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086349-010	SW846 6020
	Sodium	19.6	0.800	2.50	NE			086349-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086349-010	SW846 6020
	Uranium	0.0012	0.00005	0.0002	0.030			086349-010	SW846 6020
	Uranium-235	ND	0.00001	0.00007	0.030	U		086349-010	SW846 6020
	Uranium-238	0.0012	0.00005	0.0002	0.030			086349-010	SW846 6020
	Vanadium	0.00442	0.003	0.010	NE	J		086349-010	SW846 6020
	Zinc	0.00321	0.0026	0.010	NE	B, J	0.013U	086349-010	SW846 6020

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Table 6A-4
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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-3	Aluminum	ND	0.005	0.015	NE	U	UJ	086337-010	SW846 6020
01-Aug-08	Antimony	0.000901	0.0005	0.002	0.006	B, J	0.015U	086337-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086337-010	SW846 6020
	Barium	0.0514	0.0005	0.002	2.00			086337-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086337-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086337-010	SW846 6020
	Calcium	68.8	0.200	1.00	NE	B		086337-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086337-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		086337-010	SW846 6020
	Copper	0.000625	0.0003	0.001	NE	B, J	0.0034U	086337-010	SW846 6020
	Iron	0.144	0.010	0.025	NE	B		086337-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086337-010	SW846 6020
	Magnesium	10.6	0.052	0.150	NE		J	086337-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		086337-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086337-010	SW846 7470
	Nickel	0.00123	0.0005	0.002	NE	J		086337-010	SW846 6020
	Potassium	2.06	0.080	0.300	NE			086337-010	SW846 6020
	Selenium	0.00153	0.001	0.005	0.050	J		086337-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086337-010	SW846 6020
	Sodium	24.2	0.080	0.250	NE			086337-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086337-010	SW846 6020
	Uranium	0.00271	0.00005	0.0002	0.030			086337-010	SW846 6020
	Uranium-235	0.000018	0.00001	0.00007	0.030	J		086337-010	SW846 6020
	Uranium-238	0.00269	0.00005	0.0002	0.030			086337-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086337-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		086337-010	SW846 6020

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Table 6A-4
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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-4	Aluminum	ND	0.005	0.015	NE	U		086353-010	SW846 6020
14-Aug-08	Antimony	0.000697	0.0005	0.002	0.006	J	0.0025U	086353-010	SW846 6020
	Arsenic	ND	0.015	0.050	0.010	U		086353-010	SW846 6020
	Barium	0.189	0.0005	0.002	2.00			086353-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086353-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086353-010	SW846 6020
	Calcium	69.7	0.200	1.00	NE	B		086353-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086353-010	SW846 6020
	Cobalt	0.000115	0.0001	0.001	NE	J		086353-010	SW846 6020
	Copper	0.000887	0.0003	0.001	NE	J	J+	086353-010	SW846 6020
	Iron	0.0926	0.010	0.025	NE			086353-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086353-010	SW846 6020
	Magnesium	12.5	0.0052	0.015	NE			086353-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		086353-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086353-010	SW846 7470
	Nickel	0.00128	0.0005	0.002	NE	J		086353-010	SW846 6020
	Potassium	3.44	0.080	0.300	NE			086353-010	SW846 6020
	Selenium	0.00217	0.001	0.005	0.050	J		086353-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086353-010	SW846 6020
	Sodium	24.9	0.080	0.250	NE			086353-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086353-010	SW846 6020
	Uranium	0.00295	0.00005	0.0002	0.030			086353-010	SW846 6020
	Uranium-235	0.000023	0.00001	0.00007	0.030	J		086353-010	SW846 6020
	Uranium-238	0.00293	0.00005	0.0002	0.030			086353-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086353-010	SW846 6020
	Zinc	0.00293	0.0026	0.010	NE	J		086353-010	SW846 6020

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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-6	Aluminum	0.0808	0.005	0.015	NE	B		086340-010	SW846 6020
31-Jul-08	Antimony	0.000783	0.0005	0.002	0.006	B, J	0.0090U	086340-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086340-010	SW846 6020
	Barium	0.0682	0.0005	0.002	2.00			086340-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086340-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086340-010	SW846 6020
	Calcium	65.5	0.200	1.00	NE	B	J	086340-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086340-010	SW846 6020
	Cobalt	0.00015	0.0001	0.001	NE	J		086340-010	SW846 6020
	Copper	0.000738	0.0003	0.001	NE	J		086340-010	SW846 6020
	Iron	0.247	0.010	0.025	NE			086340-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086340-010	SW846 6020
	Magnesium	11.7	0.052	0.150	NE		J	086340-010	SW846 6020
	Manganese	0.00234	0.001	0.005	NE	J		086340-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086340-010	SW846 7470
	Nickel	0.00113	0.0005	0.002	NE	J		086340-010	SW846 6020
	Potassium	2.51	0.080	0.300	NE			086340-010	SW846 6020
	Selenium	ND	0.001	0.005	0.050	U		086340-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086340-010	SW846 6020
	Sodium	22.9	0.800	2.50	NE		J	086340-010	SW846 6020
	Thallium	0.000323	0.0003	0.001	0.002	J		086340-010	SW846 6020
	Uranium	0.00343	0.00005	0.0002	0.030			086340-010	SW846 6020
	Uranium-235	0.000022	0.00001	0.00007	0.030	J		086340-010	SW846 6020
	Uranium-238	0.00341	0.00005	0.0002	0.030			086340-010	SW846 6020
	Vanadium	0.00514	0.003	0.010	NE	J		086340-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		086340-010	SW846 6020

Refer to footnotes on page 6A-42.

Table 6A-4
Summary of Total Metal Results
Tijeras Arroyo Groundwater Investigation

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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	0.0243	0.005	0.015	NE	B	0.027U	086355-010	SW846 6020
15-Aug-08	Antimony	0.000631	0.0005	0.002	0.006	B, J	0.0041U	086355-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086355-010	SW846 6020
	Barium	0.228	0.0005	0.002	2.00			086355-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086355-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086355-010	SW846 6020
	Calcium	66.9	0.200	1.00	NE			086355-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086355-010	SW846 6020
	Cobalt	0.000405	0.0001	0.001	NE	J		086355-010	SW846 6020
	Copper	ND	0.0003	0.001	NE	U		086355-010	SW846 6020
	Iron	0.0982	0.010	0.025	NE			086355-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086355-010	SW846 6020
	Magnesium	12.4	0.0052	0.015	NE			086355-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		086355-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086355-010	SW846 7470
	Nickel	ND	0.0005	0.002	NE	U		086355-010	SW846 6020
	Potassium	2.08	0.080	0.300	NE			086355-010	SW846 6020
	Selenium	0.00562	0.001	0.005	0.050			086355-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086355-010	SW846 6020
	Sodium	18.5	0.080	0.250	NE			086355-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086355-010	SW846 6020
	Uranium	0.00202	0.00005	0.0002	0.030			086355-010	SW846 6020
	Uranium-235	0.000014	0.00001	0.00007	0.030	J		086355-010	SW846 6020
	Uranium-238	0.00201	0.00005	0.0002	0.030			086355-010	SW846 6020
	Vanadium	0.0054	0.003	0.010	NE	J		086355-010	SW846 6020
	Zinc	ND	0.0026	0.010	NE	U		086355-010	SW846 6020

Refer to footnotes on page 6A-42.

Table 6A-4
Summary of Total Metal Results
Tijeras Arroyo Groundwater Investigation

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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	0.339	0.005	0.015	NE	B		086328-010	SW846 6020
28-Jul-08	Antimony	0.000724	0.0005	0.002	0.006	B, J	0.011U	086328-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086328-010	SW846 6020
	Barium	0.0438	0.0005	0.002	2.00			086328-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086328-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086328-010	SW846 6020
	Calcium	56.5	0.200	1.00	NE	B		086328-010	SW846 6020
	Chromium	0.00544	0.0015	0.003	0.100			086328-010	SW846 6020
	Cobalt	0.000193	0.0001	0.001	NE	J		086328-010	SW846 6020
	Copper	0.00116	0.0003	0.001	NE			086328-010	SW846 6020
	Iron	0.379	0.010	0.025	NE			086328-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086328-010	SW846 6020
	Magnesium	10.6	0.0052	0.015	NE			086328-010	SW846 6020
	Manganese	0.008	0.001	0.005	NE			086328-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086328-010	SW846 7470
	Nickel	0.00339	0.0005	0.002	NE			086328-010	SW846 6020
	Potassium	2.43	0.080	0.300	NE			086328-010	SW846 6020
	Selenium	0.00152	0.001	0.005	0.050	J		086328-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086328-010	SW846 6020
	Sodium	22.0	0.080	0.250	NE		J	086328-010	SW846 6020
	Thallium	0.0004	0.0003	0.001	0.002	J	0.0016U	086328-010	SW846 6020
	Uranium	0.00238	0.00005	0.0002	0.030			086328-010	SW846 6020
	Uranium-235	0.000017	0.00001	0.00007	0.030	J		086328-010	SW846 6020
	Uranium-238	0.00236	0.00005	0.0002	0.030			086328-010	SW846 6020
	Vanadium	0.00682	0.003	0.010	NE	J		086328-010	SW846 6020
	Zinc	0.004	0.0026	0.010	NE	J		086328-010	SW846 6020

Refer to footnotes on page 6A-42.

Table 6A-4 *(Concluded)*
Summary of Total Metal Results
Tijeras Arroyo Groundwater Investigation

October 2007 through December 2008

Well ID	Analyte	Result[a] (mg/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	0.008	0.005	0.015	NE	J		086346-010	SW846 6020
11-Aug-08	Antimony	ND	0.0005	0.002	0.006	U		086346-010	SW846 6020
	Arsenic	0.00167	0.0015	0.005	0.010	J		086346-010	SW846 6020
	Barium	0.167	0.0005	0.002	2.00			086346-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086346-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086346-010	SW846 6020
	Calcium	83.5	0.100	0.500	NE	B		086346-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086346-010	SW846 6020
	Cobalt	0.000163	0.0001	0.001	NE	J		086346-010	SW846 6020
	Copper	0.00151	0.0003	0.001	NE	B	0.0027U	086346-010	SW846 6020
	Iron	0.243	0.010	0.025	NE			086346-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086346-010	SW846 6020
	Magnesium	13.4	0.0052	0.015	NE			086346-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		086346-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086346-010	SW846 7470
	Nickel	0.00223	0.0005	0.002	NE			086346-010	SW846 6020
	Potassium	1.58	0.080	0.300	NE			086346-010	SW846 6020
	Selenium	0.00436	0.001	0.005	0.050	J		086346-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086346-010	SW846 6020
	Sodium	19.4	0.080	0.250	NE			086346-010	SW846 6020
	Thallium	0.000489	0.0003	0.001	0.002	J		086346-010	SW846 6020
	Uranium	0.00141	0.00005	0.0002	0.030			086346-010	SW846 6020
	Uranium-235	ND	0.00001	0.00007	0.030	U		086346-010	SW846 6020
	Uranium-238	0.00141	0.00005	0.0002	0.030		0.0003U	086346-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086346-010	SW846 6020
	Zinc	0.00388	0.0026	0.010	NE	J		086346-010	SW846 6020

Refer to footnotes on page 6A-42.

Table 6A-5
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results
Tijeras Arroyo Groundwater Investigation
October 2007 through December 2008

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	Tritium	-23.9 ± 112	196	94.6	NE	U	BD	086305-036	EPA 906.0 M
09-Jul-08	Gross Alpha	0.775 ± 0.417	0.535	0.228	15		J	086305-034	EPA 900.0
	Gross Beta	1.58 ± 0.862	1.34	0.655	4mrem/yr		NJ+	086305-034	EPA 900.0
	Americium-241	3.87 ± 5.94	9.66	4.83	NE	U	BD	086305-033	EPA 901.1
	Cesium-137	0.137 ± 1.67	2.77	1.38	NE	U	BD	086305-033	EPA 901.1
	Cobalt-60	0.00534 ± 1.59	2.63	1.32	NE	U	BD	086305-033	EPA 901.1
	Potassium-40	23.0 ± 42.9	23.6	11.8	NE	U	BD	086305-033	EPA 901.1
TA1-W-01	Tritium	-28.3 ± 112	197	94.9	NE	U	BD	086307-036	EPA 906.0 M
09-Jul-08	Gross Alpha	2.17 ± 0.712	0.627	0.269	15			086307-034	EPA 900.0
	Gross Beta	3.17 ± 1.16	1.64	0.802	4mrem/yr		NJ+	086307-034	EPA 900.0
	Americium-241	-11.6 ± 11.2	17.7	8.87	NE	U	BD	086307-033	EPA 901.1
	Cesium-137	2.65 ± 2.03	3.64	1.82	NE	U	BD	086307-033	EPA 901.1
	Cobalt-60	0.507 ± 2.05	3.55	1.78	NE	U	BD	086307-033	EPA 901.1
	Potassium-40	11.5 ± 44.2	53.2	26.6	NE	U	BD	086307-033	EPA 901.1
TA1-W-02	Tritium	-4.35 ± 113	197	94.7	NE	U	BD	086310-036	EPA 906.0 M
10-Jul-08	Gross Alpha	2.04 ± 0.718	0.758	0.338	15		J	086310-034	EPA 900.0
	Gross Beta	2.32 ± 0.970	1.41	0.687	4mrem/yr		NJ+	086310-034	EPA 900.0
	Americium-241	-5.78 ± 11.2	19.0	9.48	NE	U	BD	086310-033	EPA 901.1
	Cesium-137	1.26 ± 2.01	3.49	1.74	NE	U	BD	086310-033	EPA 901.1
	Cobalt-60	-0.768 ± 3.65	3.61	1.81	NE	U	BD	086310-033	EPA 901.1
	Potassium-40	-22.3 ± 48.0	52.6	26.3	NE	U	BD	086310-033	EPA 901.1
TA1-W-03	Tritium	0.00 ± 68.3	128	57.3	NE	U	BD	086314-036	EPA 906.0 M
11-Jul-08	Gross Alpha	4.08 ± 2.42	3.38	1.49	15		J-	086314-034	EPA 900.0
	Gross Beta	2.42 ± 1.90	3.02	1.44	4mrem/yr	U	BD	086314-034	EPA 900.0
	Americium-241	12.8 ± 7.85	12.8	6.03	NE	U	BD	086314-033	EPA 901.1
	Cesium-137	0.245 ± 1.75	2.90	1.45	NE	U	BD	086314-033	EPA 901.1
	Cobalt-60	-1.13 ± 1.90	3.02	1.51	NE	U	BD	086314-033	EPA 901.1
	Potassium-40	-18.6 ± 34.4	41.4	20.7	NE	U	BD	086314-033	EPA 901.1
TA1-W-04	Tritium	90.8 ± 86.8	142	69.0	NE	U	BD	086317-036	EPA 906.0 M
21-Jul-08	Gross Alpha	5.20 ± 1.84	1.95	0.900	15		J	086317-034	EPA 900.0
	Gross Beta	3.69 ± 1.66	2.48	1.21	4mrem/yr		J	086317-034	EPA 900.0
	Americium-241	7.37 ± 8.06	12.1	6.07	NE	U	BD	086317-033	EPA 901.1
	Cesium-137	1.37 ± 1.85	3.16	1.58	NE	U	BD	086317-033	EPA 901.1
	Cobalt-60	-1.14 ± 1.93	3.07	1.54	NE	U	BD	086317-033	EPA 901.1
	Potassium-40	-20.6 ± 33.8	40.0	20.0	NE	U	BD	086317-033	EPA 901.1

Refer to footnotes on page 6A-42.

Table 6A-5
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results
Tijeras Arroyo Groundwater Investigation

October 2007 through December 2008

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-05	Tritium	11.9 ± 110	193	91.4	NE	U	BD	086319-036	EPA 906.0 M
22-Jul-08	Gross Alpha	3.20 ± 1.26	1.35	0.594	15		J	086319-034	EPA 900.0
	Gross Beta	1.32 ± 1.19	1.94	0.937	4mrem/yr	U	BD	086319-034	EPA 900.0
	Americium-241	-8.04 ± 10.5	17.5	8.73	NE	U	BD	086319-033	EPA 901.1
	Cesium-137	0.842 ± 2.07	3.57	1.79	NE	U	BD	086319-033	EPA 901.1
	Cobalt-60	-4.00 ± 3.79	3.64	1.82	NE	U	BD	086319-033	EPA 901.1
	Potassium-40	-21.6 ± 40.0	49.0	24.5	NE	U	BD	086319-033	EPA 901.1
TA1-W-06	Tritium	106 ± 115	189	89.5	NE	U	BD	086322-036	EPA 906.0 M
23-Jul-08	Gross Alpha	1.84 ± 1.19	1.66	0.715	15		J	086322-034	EPA 900.0
	Gross Beta	4.03 ± 2.00	3.05	1.48	4mrem/yr		J	086322-034	EPA 900.0
	Americium-241	-7.2 ± 10.8	18.2	9.09	NE	U	BD	086322-033	EPA 901.1
	Cesium-137	0.492 ± 2.06	3.53	1.77	NE	U	BD	086322-033	EPA 901.1
	Cobalt-60	-2.65 ± 3.83	3.93	1.97	NE	U	BD	086322-033	EPA 901.1
	Potassium-40	-17.0 ± 40.6	50.7	25.4	NE	U	BD	086322-033	EPA 901.1
TA1-W-08	Tritium	65.9 ± 114	194	91.9	NE	U	BD	086324-036	EPA 906.0 M
24-Jul-08	Gross Alpha	1.65 ± 1.54	2.44	1.05	15	U	BD	086324-034	EPA 900.0
	Gross Beta	7.40 ± 2.58	3.44	1.65	4mrem/yr		J	086324-034	EPA 900.0
	Americium-241	7.57 ± 7.19	11.1	5.53	NE	U	BD	086324-033	EPA 901.1
	Cesium-137	1.66 ± 1.98	3.43	1.72	NE	U	BD	086324-033	EPA 901.1
	Cobalt-60	0.745 ± 2.06	3.51	1.76	NE	U	BD	086324-033	EPA 901.1
	Potassium-40	-3.09 ± 39.0	48.1	24.0	NE	U	BD	086324-033	EPA 901.1
TA2-NW1-595	Tritium	-8.40 ± 110	190	92.3	NE	U	BD	086326-036	EPA 906.0 M
29-Jul-08	Gross Alpha	2.61 ± 1.22	1.63	0.740	15		J	086326-034	EPA 900.0
	Gross Beta	3.61 ± 1.59	2.37	1.16	4mrem/yr		J	086326-034	EPA 900.0
	Americium-241	-13.1 ± 11.6	19.3	9.66	NE	U	BD	086326-033	EPA 901.1
	Cesium-137	2.26 ± 2.06	3.65	1.82	NE	U	BD	086326-033	EPA 901.1
	Cobalt-60	-2.74 ± 3.31	3.27	1.64	NE	U	BD	086326-033	EPA 901.1
	Potassium-40	-11.7 ± 41.9	51.2	25.6	NE	U	BD	086326-033	EPA 901.1
TA2-SW1-320	Tritium	-52.6 ± 108	190	92.4	NE	U	BD	086303-036	EPA 906.0 M
04-Aug-08	Gross Alpha	4.25 ± 3.26	4.14	1.41	15		J	086303-034	EPA 900.0
	Gross Beta	4.84 ± 2.47	3.06	1.29	4mrem/yr		J	086303-034	EPA 900.0
	Americium-241	7.11 ± 4.83	8.45	4.23	NE	U	BD	086303-033	EPA 901.1
	Cesium-137	-0.384 ± 1.70	2.85	1.43	NE	U	BD	086303-033	EPA 901.1
	Cobalt-60	1.16 ± 1.86	3.27	1.64	NE	U	BD	086303-033	EPA 901.1
	Potassium-40	17.7 ± 43.1	26.9	13.5	NE	U	BD	086303-033	EPA 901.1

Refer to footnotes on page 6A-42.

Table 6A-5
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results
Tijeras Arroyo Groundwater Investigation
October 2007 through December 2008

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-01	Tritium	29.3 ± 111	189	92.1	NE	U	BD	086331-036	EPA 906.0 M
30-Jul-08	Gross Alpha	2.46 ± 1.02	0.998	0.403	15		J	086331-034	EPA 900.0
	Gross Beta	4.67 ± 1.06	0.955	0.456	4mrem/yr			086331-034	EPA 900.0
	Americium-241	-31.5 ± 11.4	17.4	8.70	NE	U	BD	086331-033	EPA 901.1
	Cesium-137	0.898 ± 2.08	3.56	1.78	NE	U	BD	086331-033	EPA 901.1
	Cobalt-60	1.25 ± 2.23	3.84	1.92	NE	U	BD	086331-033	EPA 901.1
	Potassium-40	24.5 ± 43.9	47.7	23.9	NE	U	BD	086331-033	EPA 901.1
TA2-W-19	Tritium	-31.5 ± 84.7	165	74.2	NE	U	BD	086351-036	EPA 906.0 M
13-Aug-08	Gross Alpha	4.60 ± 3.23	3.57	1.10	15		J	086351-034	EPA 900.0
	Gross Beta	3.47 ± 2.36	3.35	1.42	4mrem/yr		J	086351-034	EPA 900.0
	Americium-241	5.87 ± 6.30	9.56	4.78	NE	U	BD	086351-033	EPA 901.1
	Cesium-137	0.920 ± 1.55	2.65	1.33	NE	U	BD	086351-033	EPA 901.1
	Cobalt-60	2.13 ± 1.80	3.22	1.61	NE	U	BD	086351-033	EPA 901.1
	Potassium-40	-34.3 ± 31.3	38.1	19.1	NE	U	BD	086351-033	EPA 901.1
TA2-W-26	Tritium	16.6 ± 109	188	91.2	NE	U	BD	086342-036	EPA 906.0 M
05-Aug-08	Gross Alpha	2.64 ± 1.66	2.48	1.15	15		J	086342-034	EPA 900.0
	Gross Beta	13.5 ± 5.67	6.84	3.00	4mrem/yr		J	086342-034	EPA 900.0
	Americium-241	3.73 ± 9.08	14.8	7.38	NE	U	BD	086342-033	EPA 901.1
	Cesium-137	-2.29 ± 1.67	2.52	1.26	NE	U	BD	086342-033	EPA 901.1
	Cobalt-60	-1.13 ± 2.77	3.19	1.60	NE	U	BD	086342-033	EPA 901.1
	Potassium-40	-10.4 ± 41.2	40.9	20.5	NE	U	BD	086342-033	EPA 901.1
TA2-W-27	Tritium	-70.7 ± 103	182	88.7	NE	U	BD	086333-036	EPA 906.0 M
06-Aug-08	Gross Alpha	1.94 ± 0.897	1.05	0.447	15		J	086333-034	EPA 900.0
	Gross Beta	4.80 ± 3.02	4.20	1.79	4mrem/yr		J	086333-034	EPA 900.0
	Americium-241	-6.80 ± 13.4	22.4	11.2	NE	U	BD	086333-033	EPA 901.1
	Cesium-137	0.0531 ± 1.83	3.13	1.57	NE	U	BD	086333-033	EPA 901.1
	Cobalt-60	-4.97 ± 4.26	3.11	1.56	NE	U	BD	086333-033	EPA 901.1
	Potassium-40	1.37 ± 38.9	49.5	24.7	NE	U	BD	086333-033	EPA 901.1
TJA-2	Tritium	-74.3 ± 106	187	90.7	NE	U	BD	086349-036	EPA 906.0 M
07-Aug-08	Gross Alpha	1.80 ± 0.957	1.19	0.516	15		J	086349-034	EPA 900.0
	Gross Beta	14.7 ± 4.27	3.39	1.44	4mrem/yr			086349-034	EPA 900.0
	Americium-241	5.10 ± 5.94	9.71	4.86	NE	U	BD	086349-033	EPA 901.1
	Cesium-137	-1.70 ± 1.60	2.48	1.24	NE	U	BD	086349-033	EPA 901.1
	Cobalt-60	-0.194 ± 1.70	2.77	1.39	NE	U	BD	086349-033	EPA 901.1
	Potassium-40	8.44 ± 33.4	23.6	11.8	NE	U	BD	086349-033	EPA 901.1

Refer to footnotes on page 6A-42.

Table 6A-5
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results
Tijeras Arroyo Groundwater Investigation

October 2007 through December 2008

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-3	Tritium	-56.4 ± 112	198	95.9	NE	U	BD	086337-036	EPA 906.0 M
01-Aug-08	Gross Alpha	2.47 ± 1.26	1.56	0.698	15		J	086337-034	EPA 900.0
	Gross Beta	2.85 ± 1.92	2.62	1.06	4mrem/yr		J	086337-034	EPA 900.0
	Americium-241	-3.78 ± 9.44	15.5	7.76	NE	U	BD	086337-033	EPA 901.1
	Cesium-137	-0.0181 ± 1.89	3.21	1.61	NE	U	BD	086337-033	EPA 901.1
	Cobalt-60	-1.00 ± 2.03	3.32	1.66	NE	U	BD	086337-033	EPA 901.1
	Potassium-40	20.1 ± 44.0	31.1	15.5	NE	U	BD	086337-033	EPA 901.1
TJA-4	Tritium	-43.5 ± 82.9	164	73.9	NE	U	BD	086353-036	EPA 906.0 M
14-Aug-08	Gross Alpha	5.91 ± 3.59	3.81	1.27	15		J	086353-034	EPA 900.0
	Gross Beta	4.74 ± 2.71	3.71	1.61	4mrem/yr		J	086353-034	EPA 900.0
	Americium-241	3.33 ± 8.69	13.2	6.58	NE	U	BD	086353-033	EPA 901.1
	Cesium-137	2.04 ± 1.89	3.32	1.66	NE	U	BD	086353-033	EPA 901.1
	Cobalt-60	-0.716 ± 1.90	3.07	1.54	NE	U	BD	086353-033	EPA 901.1
	Potassium-40	11.7 ± 52.6	26.9	13.5	NE	U	BD	086353-033	EPA 901.1
TJA-6	Tritium	-58.7 ± 108	189	92.1	NE	U	BD	086340-036	EPA 906.0 M
31-Jul-08	Gross Alpha	5.03 ± 1.49	0.794	0.292	15			086340-034	EPA 900.0
	Gross Beta	3.80 ± 0.918	0.901	0.431	4mrem/yr			086340-034	EPA 900.0
	Americium-241	-5.86 ± 10.7	18.0	8.99	NE	U	BD	086340-033	EPA 901.1
	Cesium-137	1.76 ± 1.96	3.47	1.73	NE	U	BD	086340-033	EPA 901.1
	Cobalt-60	1.07 ± 2.21	3.83	1.92	NE	U	BD	086340-033	EPA 901.1
	Potassium-40	-14.6 ± 40.1	53.2	26.6	NE	U	BD	086340-033	EPA 901.1
TJA-7	Tritium	-70.8 ± 80.4	166	74.8	NE	U	BD	086355-036	EPA 906.0 M
15-Aug-08	Gross Alpha	3.95 ± 2.42	1.90	0.519	15		J	086355-034	EPA 900.0
	Gross Beta	2.93 ± 0.745	0.733	0.347	4mrem/yr			086355-034	EPA 900.0
	Americium-241	7.59 ± 9.62	14.6	7.32	NE	U	BD	086355-033	EPA 901.1
	Cesium-137	1.39 ± 1.66	2.86	1.43	NE	U	BD	086355-033	EPA 901.1
	Cobalt-60	-0.0886 ± 1.76	2.88	1.44	NE	U	BD	086355-033	EPA 901.1
	Potassium-40	81.3 ± 27.8	27.4	13.7	NE	X	R	086355-033	EPA 901.1
WYO-3	Tritium	51.2 ± 111	190	89.9	NE	U	BD	086328-036	EPA 906.0 M
28-Jul-08	Gross Alpha	2.32 ± 0.741	0.745	0.334	15			086328-034	EPA 900.0
	Gross Beta	2.13 ± 0.681	0.879	0.424	4mrem/yr		J	086328-034	EPA 900.0
	Americium-241	-2.27 ± 12.2	17.3	8.67	NE	U	BD	086328-033	EPA 901.1
	Cesium-137	1.53 ± 1.95	3.42	1.71	NE	U	BD	086328-033	EPA 901.1
	Cobalt-60	0.396 ± 2.08	3.58	1.79	NE	U	BD	086328-033	EPA 901.1
	Potassium-40	98.9 ± 42.9	32.7	16.4	NE			086328-033	EPA 901.1

Refer to footnotes on page 6A-42.

Table 6A-5 *(Concluded)*
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results
Tijeras Arroyo Groundwater Investigation

October 2007 through December 2008

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]
WYO-4	Tritium	38.3 ± 92.0	163	73.3	NE	U	BD	086346-036	EPA 906.0 M
11-Aug-08	Gross Alpha	2.23 ± 1.08	1.18	0.504	15		J	086346-034	EPA 900.0
	Gross Beta	3.58 ± 2.28	3.12	1.31	4mrem/yr		J	086346-034	EPA 900.0
	Americium-241	-0.852 ± 9.67	14.2	7.11	NE	U	BD	086346-033	EPA 901.1
	Cesium-137	-0.302 ± 1.61	2.62	1.31	NE	U	BD	086346-033	EPA 901.1
	Cobalt-60	0.616 ± 1.87	3.14	1.57	NE	U	BD	086346-033	EPA 901.1
	Potassium-40	8.22 ± 41.0	26.4	13.2	NE	U	BD	086346-033	EPA 901.1

Refer to footnotes on page 6A-42.

Table 6A-6
Summary of Field Water Quality Measurements[h]
Tijeras Arroyo Groundwater Investigation

October 2007 through December 2008

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	09-Jul-08	20.70	432	108.0	8.16	0.24	47.6	4.26
TA1-W-01	09-Jul-08	21.05	495	188.6	7.46	0.47	71.6	6.41
TA1-W-02	10-Jul-08	21.12	479	200.6	7.46	1.62	66.3	6.05
TA1-W-03	11-Jul-08	19.45	1,578	197.7	7.54	1.51	82.0	7.50
TA1-W-04	21-Jul-08	22.18	454	190.4	7.40	0.48	64.4	5.60
TA1-W-05	22-Jul-08	21.66	557	189.2	7.29	0.48	80.6	7.08
TA1-W-06	23-Jul-08	20.57	809	199.6	7.61	0.52	86.2	7.73
TA1-W-08	24-Jul-08	20.37	1,808	218.9	7.48	0.78	75.9	6.85
TA2-NW1-595	29-Jul-08	20.99	729	249.4	7.52	0.47	94.7	8.42
TA2-SW1-320	01-Oct-07	17.38	451	188.1	7.64	1.32	82.1	7.94
	07-Jan-08	13.99	469	299.8	7.60	4.31	82.0	8.46
	22-Apr-08	16.98	477	312.7	7.59	4.36	82.8	7.99
	04-Aug-08	20.65	479	367.9	7.70	10.6	87.5	7.84
	06-Nov-08	13.14	512	180.3	7.66	5.87	77.7	8.14
TA2-W-01	08-Jan-08	15.82	610	341.8	7.42	1.06	80.2	8.00
	30-Jul-08	23.10	609	206.8	7.64	0.55	55.7	4.75
TA2-W-19	08-Oct-07	19.64	550	218.2	7.56	0.13	87.2	7.97
	22-Jan-08	18.59	574	387.1	7.51	0.13	87.4	8.17
	02-May-08	18.18	570	342.9	7.54	0.26	90.0	8.48
	13-Aug-08	20.36	566	330.7	7.63	0.49	80.8	7.28
	10-Nov-08	15.01	616	192.4	7.55	0.19	82.1	8.37
TA2-W-26	04-Oct-07	22.14	1,041	203.7	7.42	0.48	80.8	7.00
	15-Jan-08	15.77	1,088	409.1	7.44	0.30	79.4	7.85
	29-Apr-08	19.21	1,091	302.6	7.48	0.35	86.0	7.90
	05-Aug-08	18.46	1,091	399.2	7.48	0.70	79.2	7.40
	07-Nov-08	16.36	1,199	185.1	7.42	0.36	78.4	7.66
TA2-W-27	09-Jan-08	15.99	801	356.8	7.42	0.99	88.8	8.72
	06-Aug-08	21.54	791	342.7	7.55	0.43	84.3	7.41
TJA-2	05-Oct-07	19.86	547	213.7	7.52	0.94	87.5	7.90
	21-Jan-08	14.90	574	387.4	7.50	0.28	87.6	8.84
	23-Apr-08	20.31	572	358.9	7.48	0.22	97.7	8.82
	07-Aug-08	20.93	567	367.9	7.60	0.37	82.7	7.41
	11-Nov-08	15.48	618	212.8	7.55	0.18	86.1	8.60

Refer to footnotes on page 6A-42.

Table 6A-6 *(Concluded)*
Summary of Field Water Quality Measurements[h]
Tijeras Arroyo Groundwater Investigation

October 2007 through December 2008

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)
TJA-3	10-Jan-08	16.22	477	366.9	7.31	0.18	71.8	7.05
	01-Aug-08	22.26	477	281.8	7.41	0.38	79.9	6.96
TJA-4	09-Oct-07	21.60	501	240.5	7.51	0.30	55.9	4.92
	23-Jan-08	18.08	529	392.9	7.44	0.43	53.3	5.02
	30-Apr-08	18.93	524	327.9	7.47	0.31	62.3	5.78
	14-Aug-08	19.73	524	356.9	7.56	0.44	53.4	4.88
	18-Nov-08	19.90	572	196.9	7.50	0.48	57.4	5.22
TJA-6	14-Jan-08	16.99	451	409.5	7.37	2.02	59.6	5.74
	31-Jul-08	23.27	450	315.4	7.48	5.11	58.8	5.00
TJA-7	10-Oct-07	18.40	485	230.6	7.56	0.93	86.5	8.07
	24-Jan-08	12.27	505	394.8	7.47	1.64	81.2	8.65
	01-May-08	18.36	505	320.1	7.49	1.15	89.4	8.39
	15-Aug-08	21.60	503	365.9	7.60	0.96	84.1	7.48
	19-Nov-08	18.83	546	200.9	7.56	2.11	86.2	8.01
WYO-3	28-Jul-08	21.73	442	355.3	7.72	8.92	88.2	7.75
WYO-4	03-Oct-07	17.69	582	156.3	7.62	0.34	78.1	7.42
	18-Jan-08	12.06	607	361.1	7.69	0.31	74.3	7.99
	28-Apr-08	15.62	596	244.7	7.83	0.42	79.4	7.89
	11-Aug-08	23.91	613	374.2	7.66	0.48	84.1	7.09
	13-Nov-08	15.81	664	186.4	7.63	0.39	77.7	7.68

Refer to footnotes on page 6A-42.

Footnotes for ***Tijeras Arroyo Groundwater Investigation***

[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.
- μg/L = micrograms per liter.
- mg/L = milligrams per liter.
- pCi/L = pico curies 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

[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

[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 (not including radon and total uranium).
  4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (as dose rate).

[e]Lab Qualifier

B = Analyte is detected in associated laboratory method blank.
J = Amount detected is below the practical quantitation limit (PQL).
H = Analytical holding time was exceeded.
U = Analyte is absent or below the method detection limit.
X = Data rejected due to low abundance.

[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.
NJ+ = Presumptive evidence of the presence of the material at an estimated quantity with a suspected positive bias.

*Footnotes for **Tijeras Arroyo Groundwater Investigation** (Concluded)*

[f]Validation Qualifier (continued)

NJ- = Presumptive evidence of the presence of the material at an estimated quantity with a suspected negative bias.

U = The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.

UJ = The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

R = The data are unusable (compound may or may not be present). Re-sampling and reanalysis are necessary for verification.

[g]Analytical Method

- U.S. Environmental Protection Agency, 1990, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.
- EPA 9310: U.S. Environmental Protection Agency, 1990, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.
- 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.

[h]Field Water Quality Measurements

- Field measurements collected prior to sampling.

^{O}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 6B
Tijeras Arroyo Groundwater
Plots

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Attachment 6B Plots

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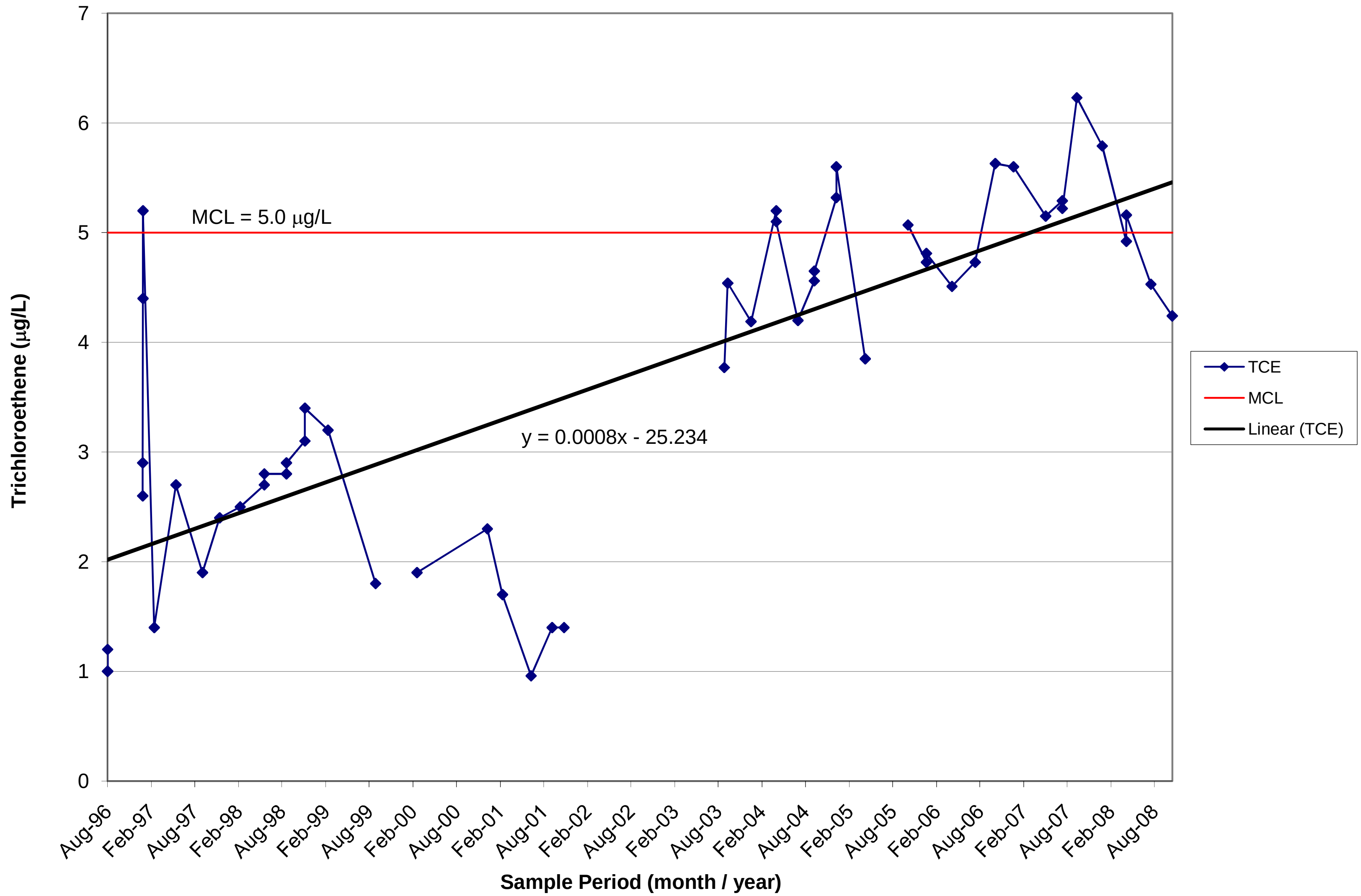

Figure 6B-1. Trichloroethene Concentrations, TA2-W-19

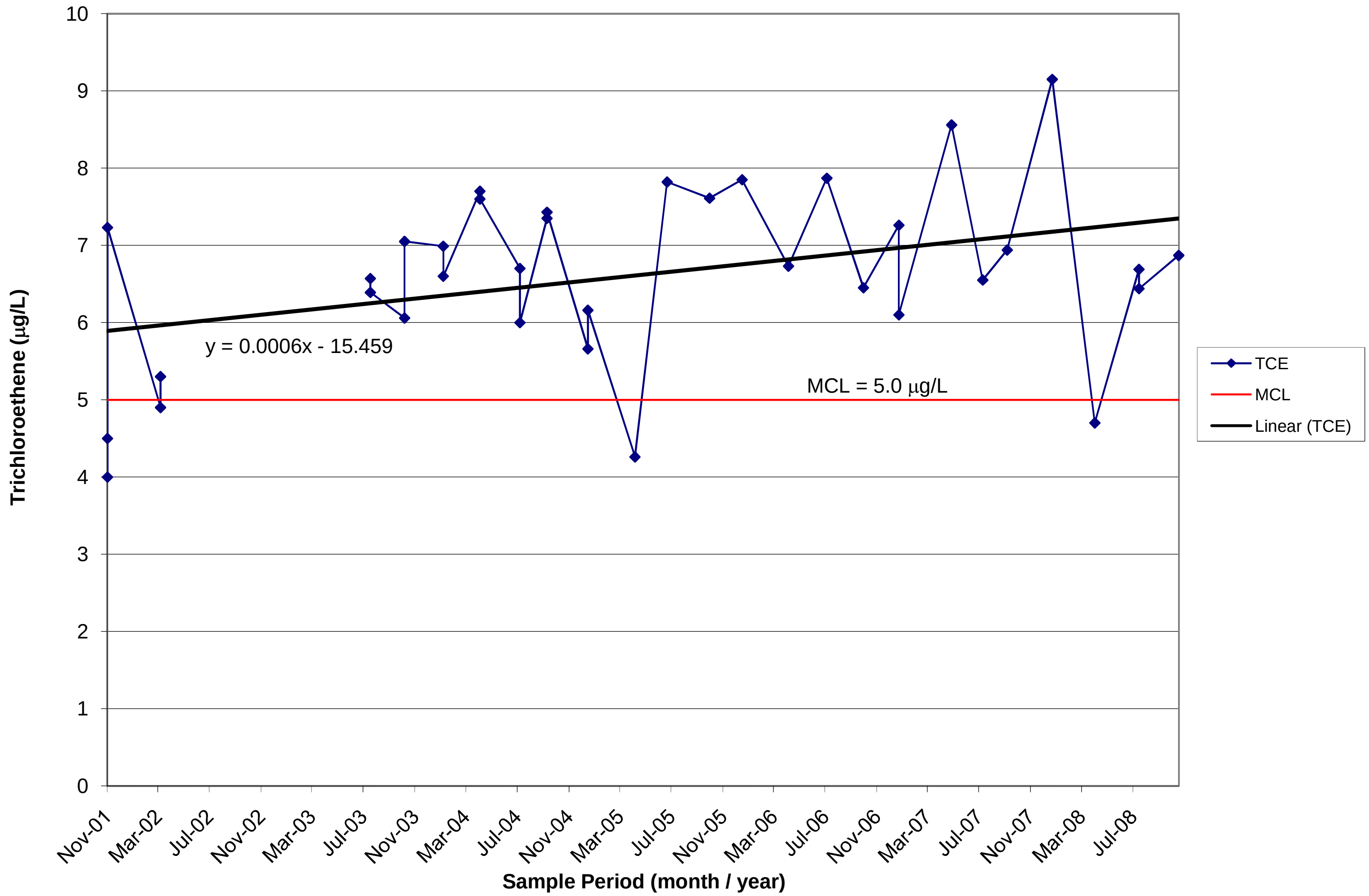

Figure 6B-2. Trichloroethene Concentrations, WYO-4

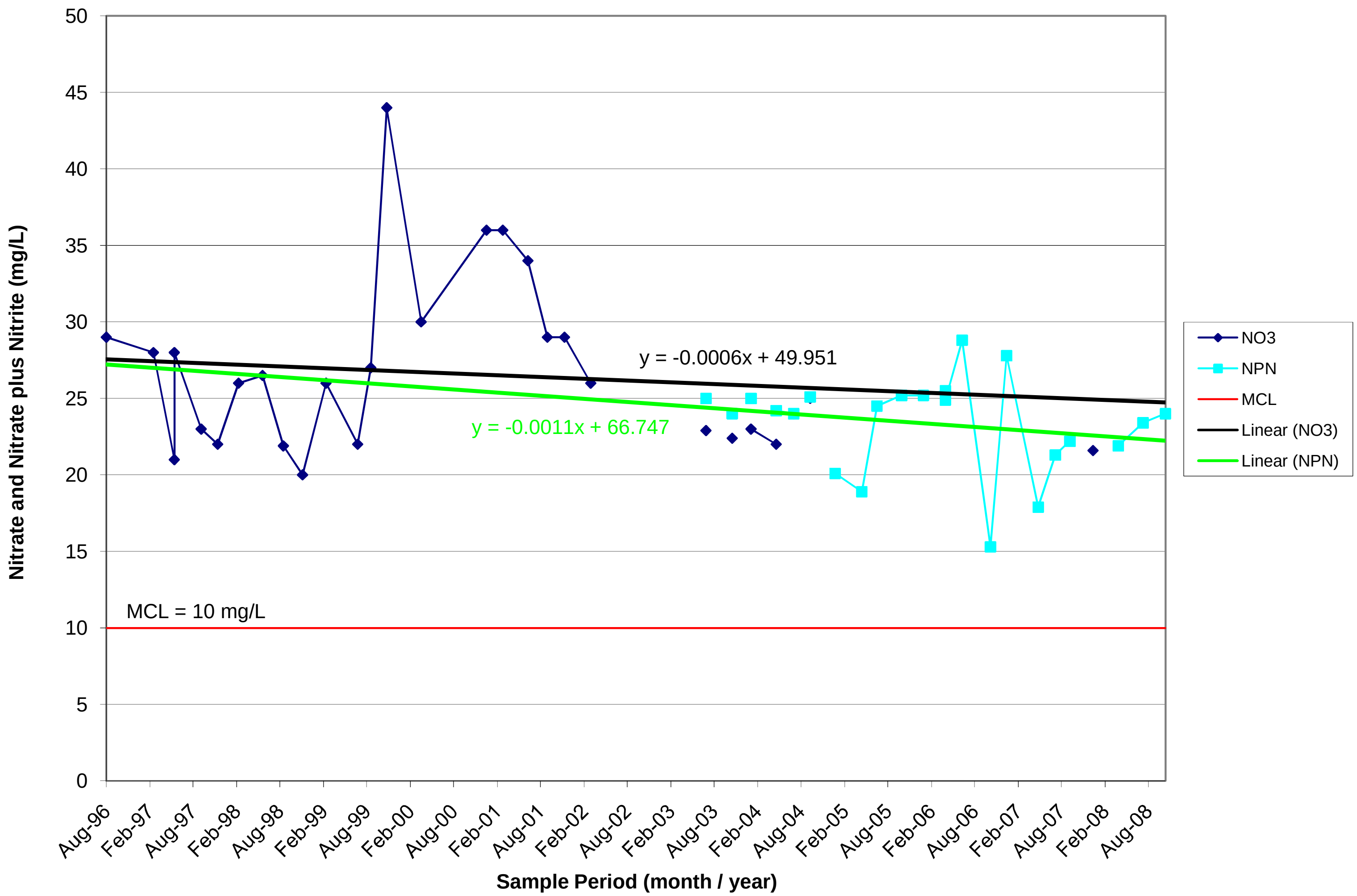

Figure 6B-3. Nitrate and Nitrate plus Nitrite Concentrations, TA2-SW1-320

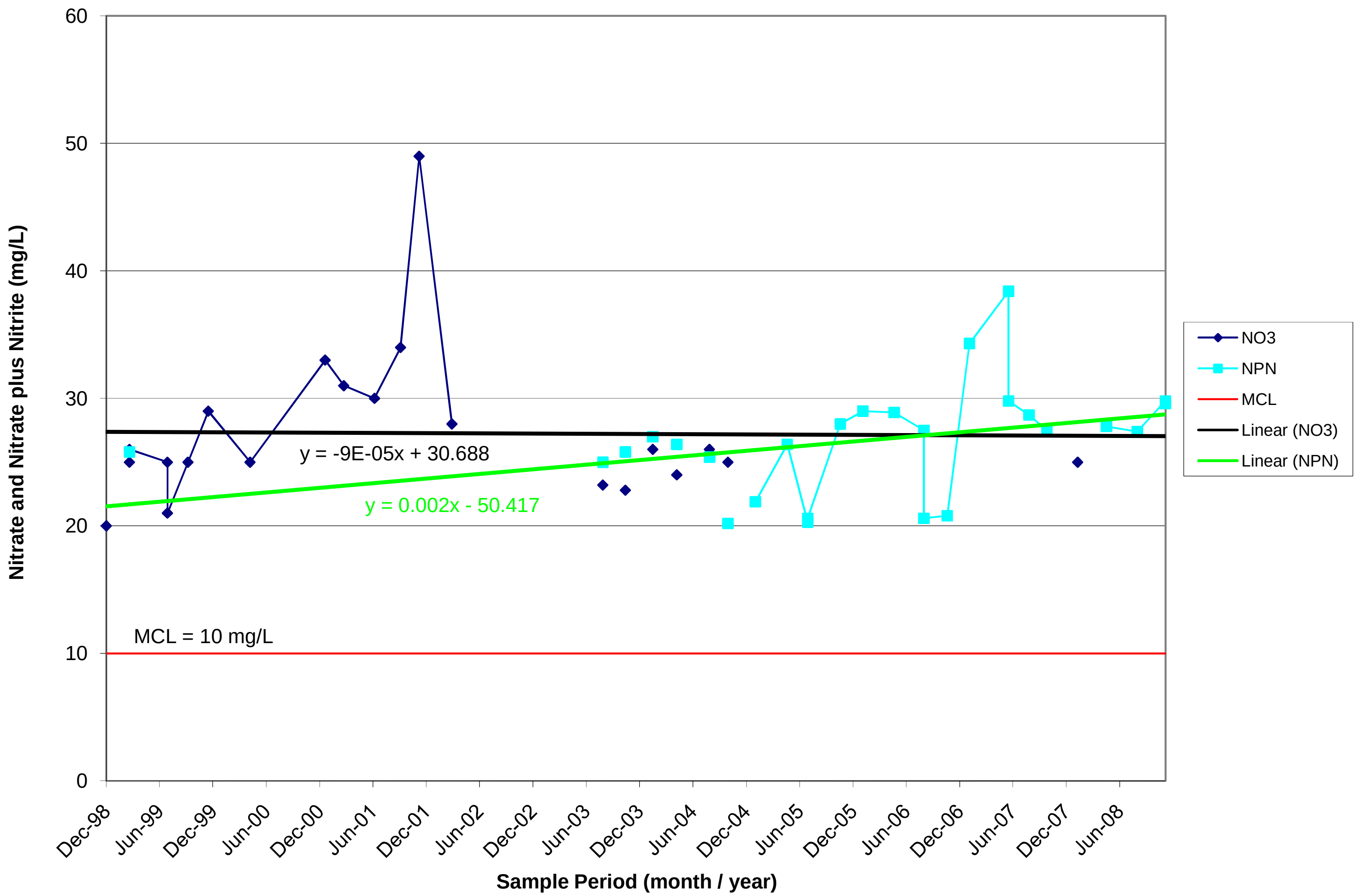

Figure 6B-4. Nitrate and Nitrate plus Nitrite Concentrations, TJA-4

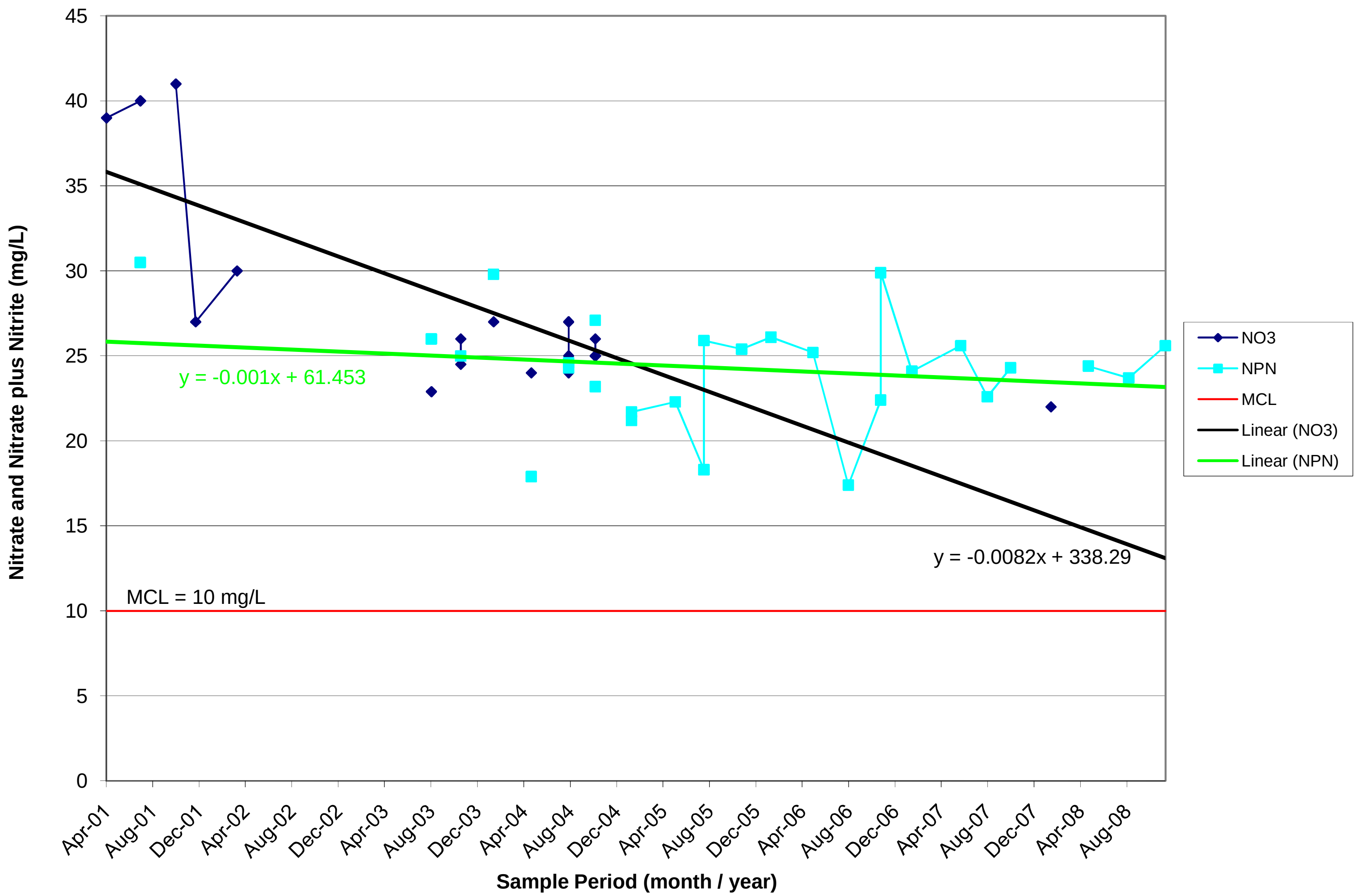

Figure 6B-5. Nitrate and Nitrate plus Nitrite Concentrations, TJA-7

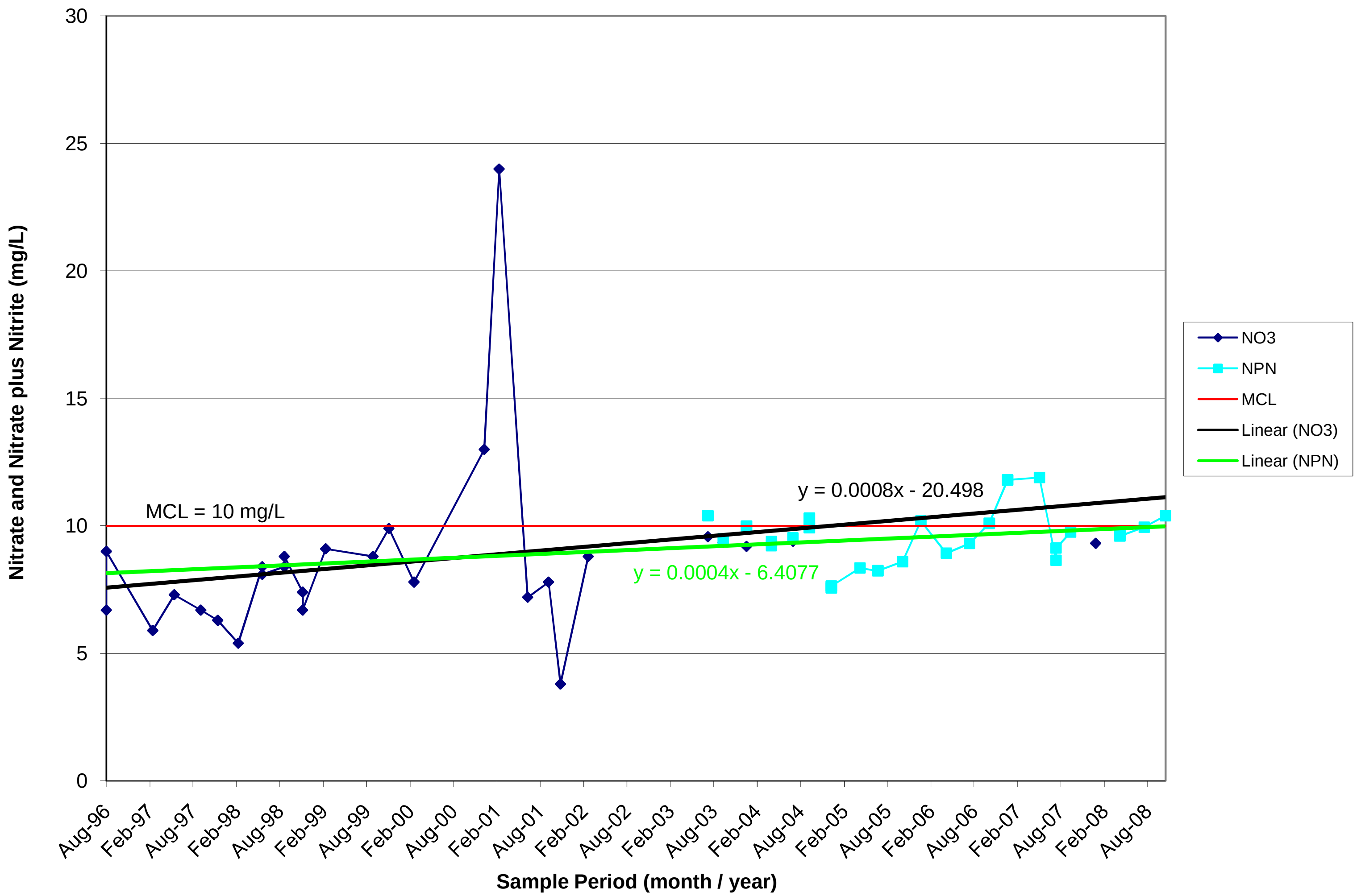

Figure 6B-6. Nitrate and Nitrate plus Nitrite Concentrations, TA2-W-19

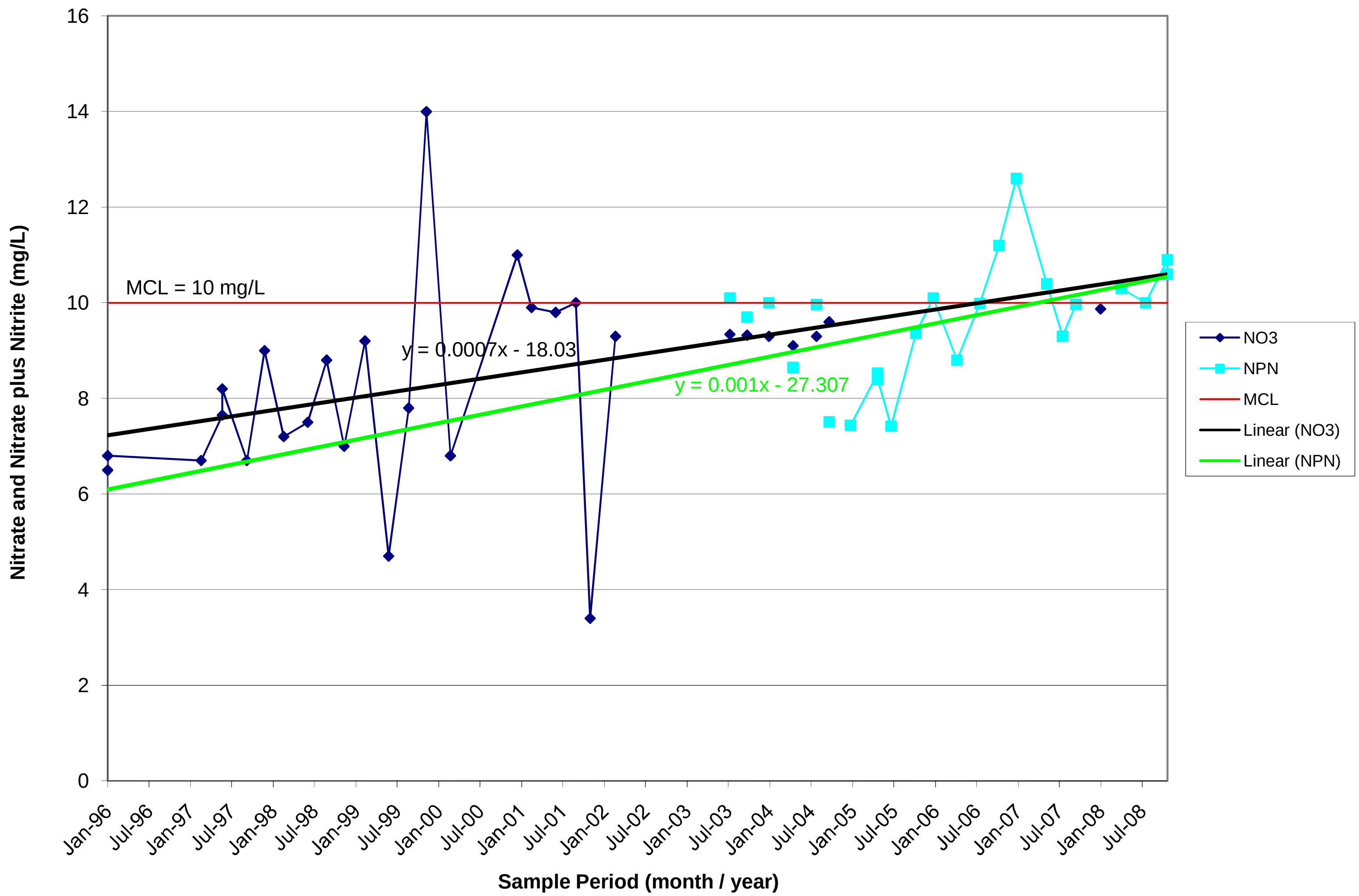

Figure 6B-7. Nitrate and Nitrate plus Nitrite Concentrations, TJA-2

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Attachment 6C
Tijeras Arroyo Groundwater
Hydrographs

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Attachment 6C Hydrographs

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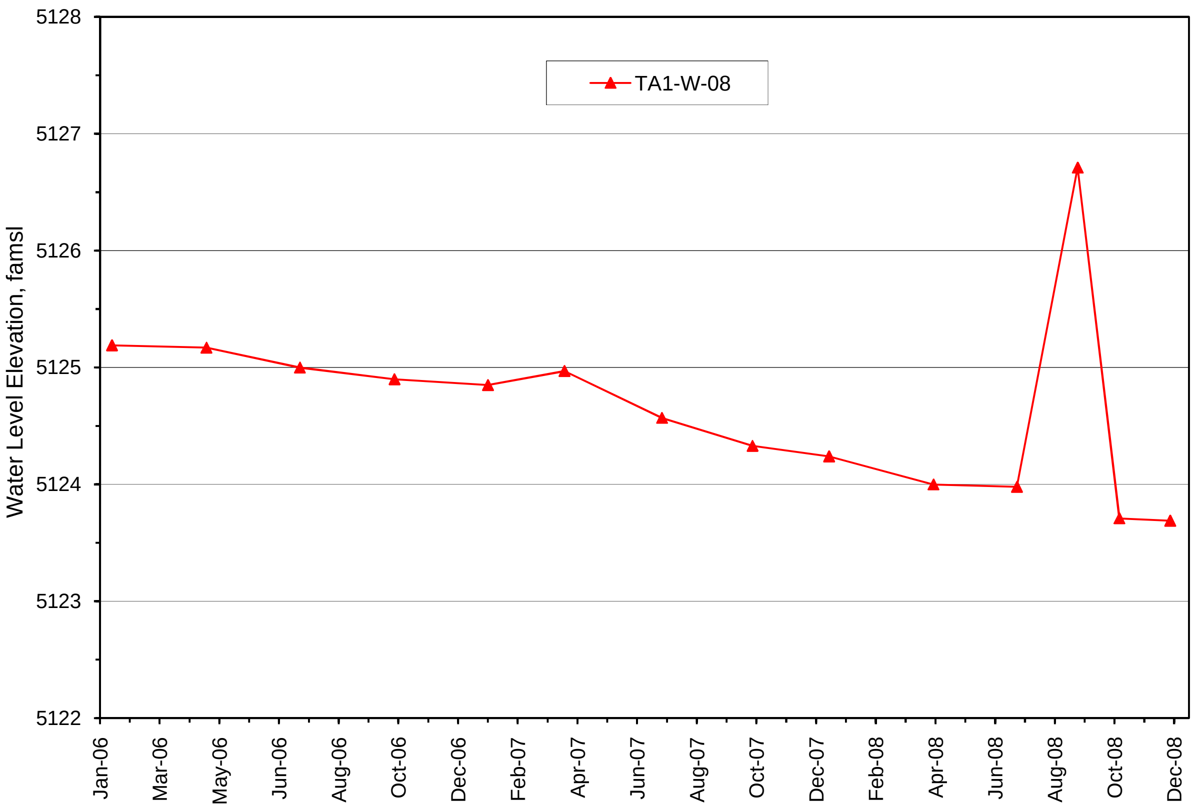

Figure 6C-1. TAG Study Area PGWS Wells (1 of 5)

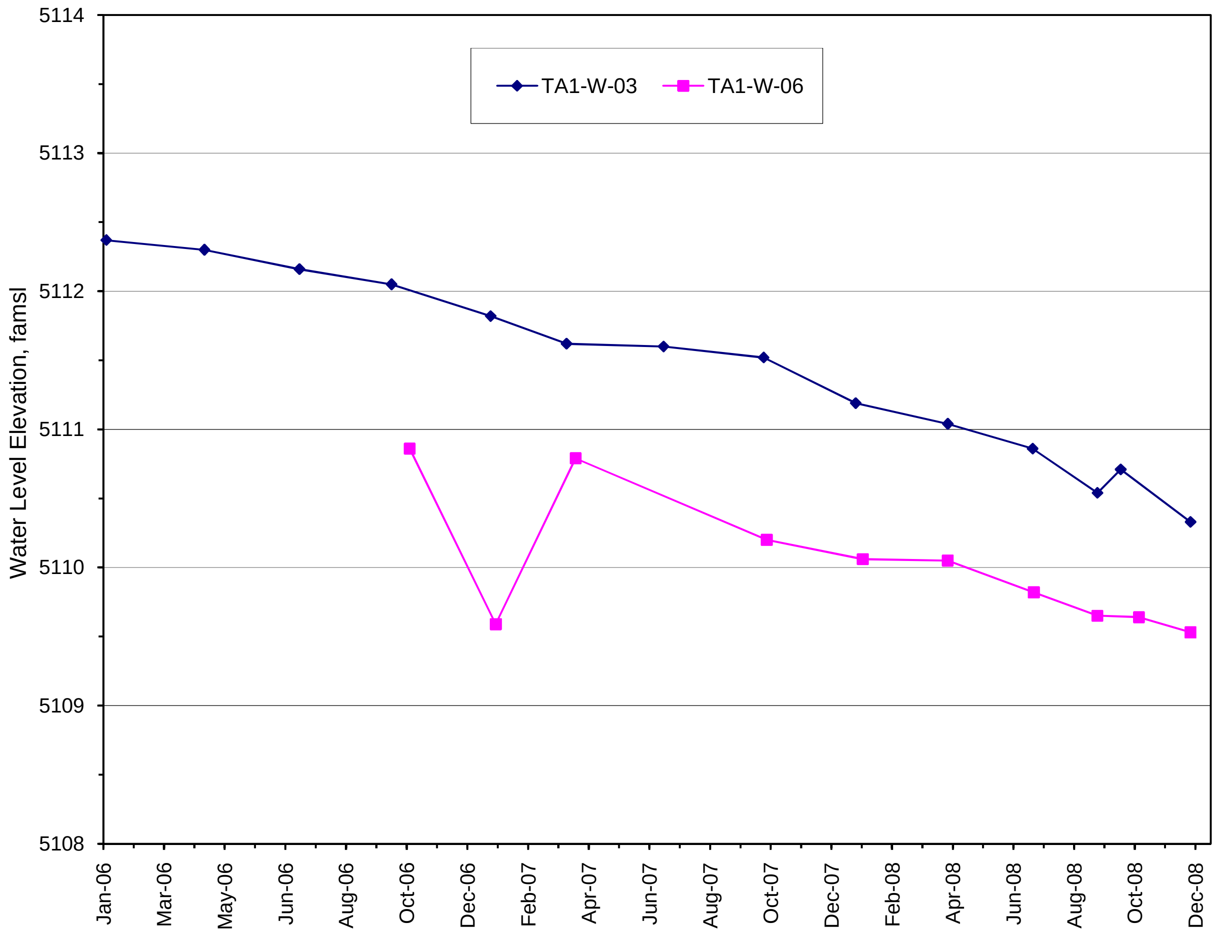

Figure 6C-2. TAG Study Area PGWS Wells (2 of 5)

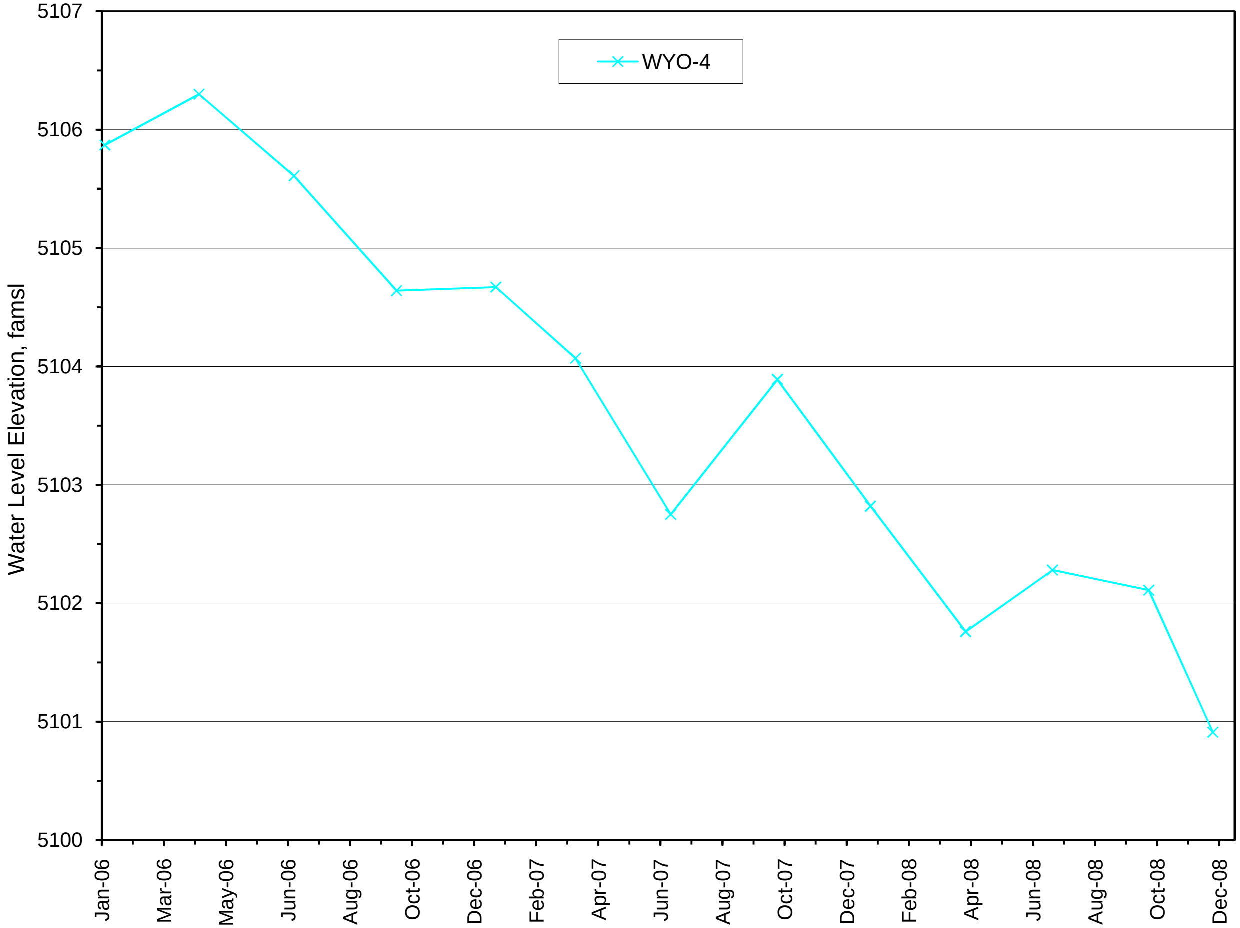

Figure 6C-3. TAG Study Area PGWS Wells (3 of 5)

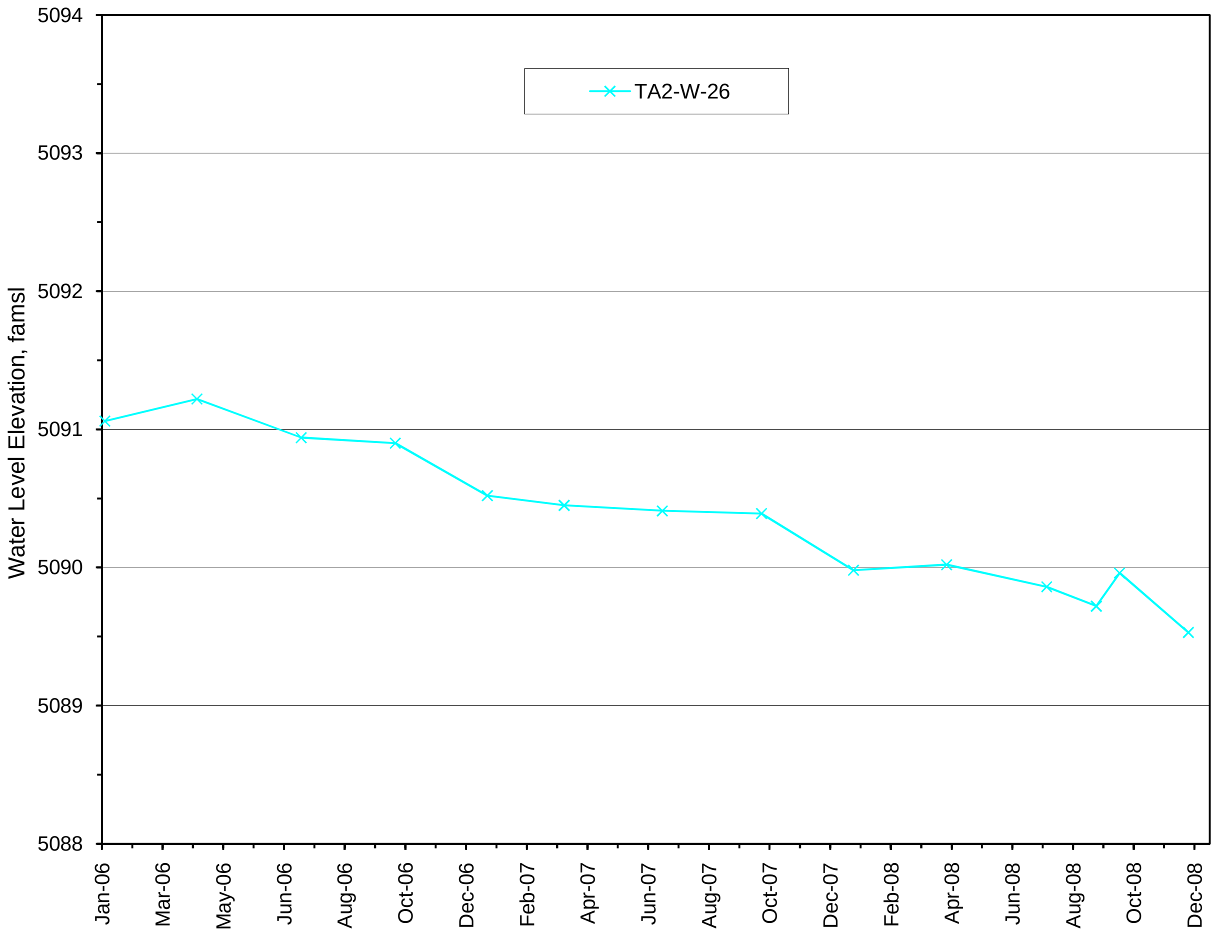

Figure 6C-4. TAG Study Area PGWS Wells (4 of 5)

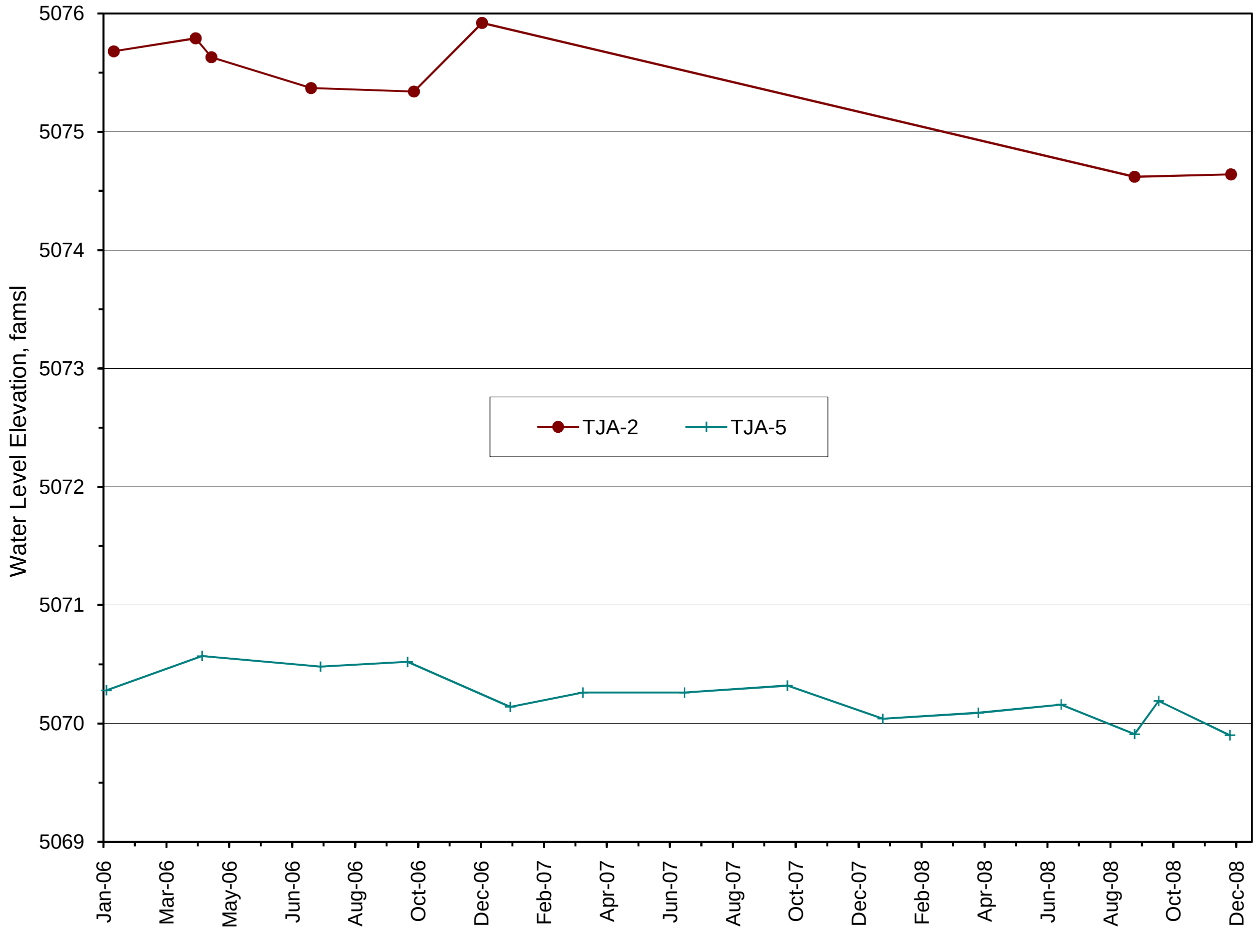

Figure 6C-5. TAG Study Area PGWS Wells (5 of 5)

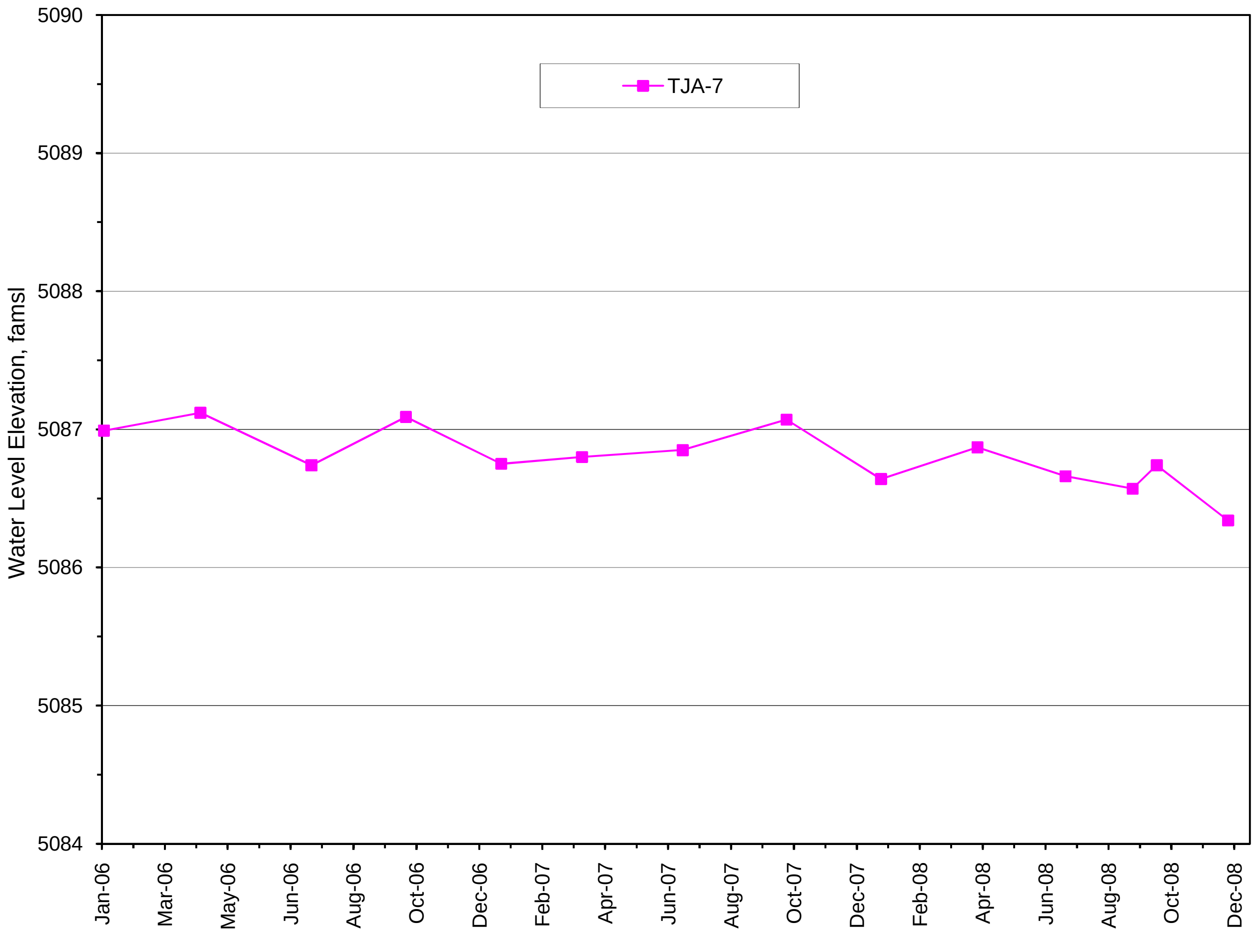

Figure 6C-6. TAG Study Area Regional Aquifer Wells (1 of 6)

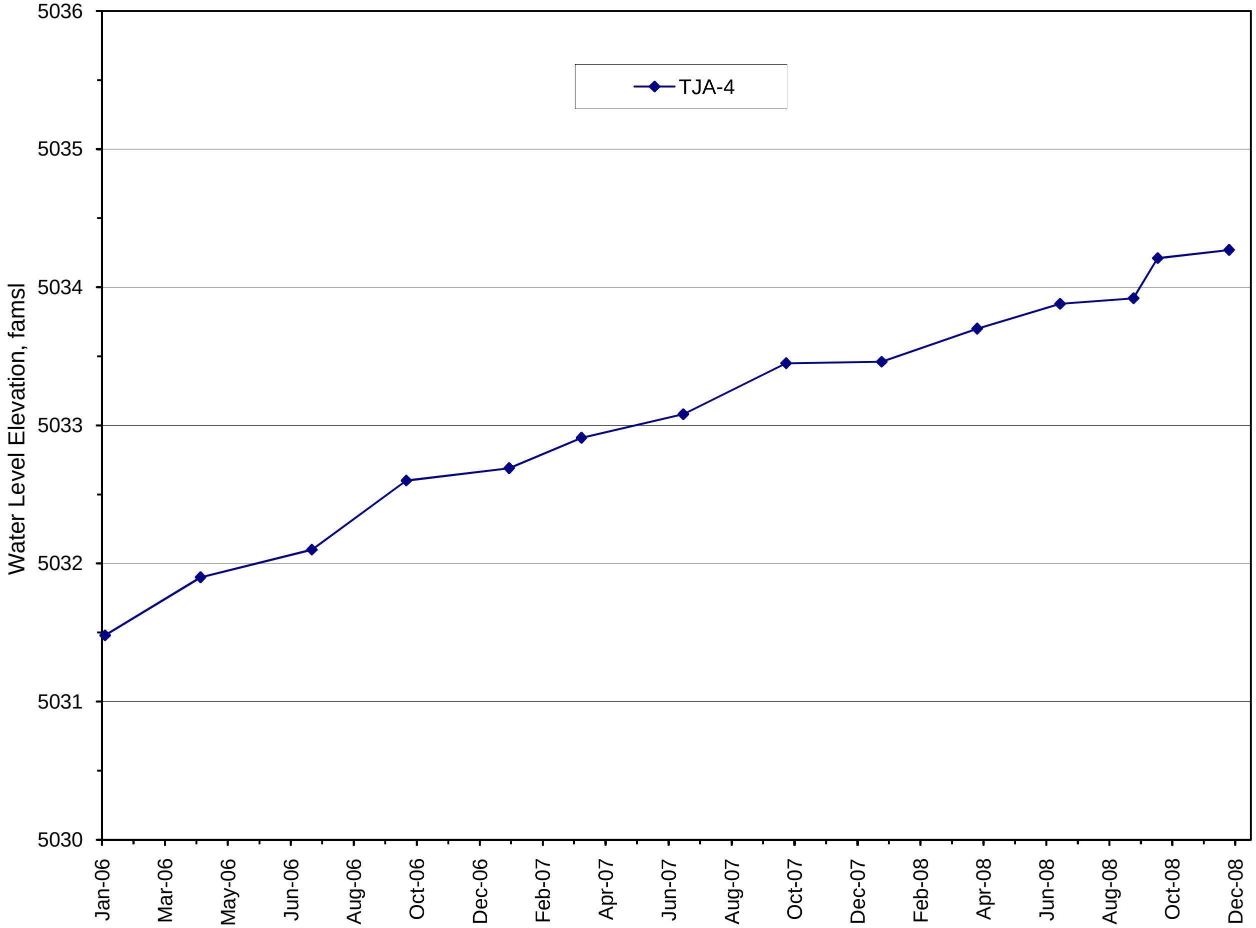

Figure 6C-7. TAG Study Area Regional Aquifer Wells (2 of 6)

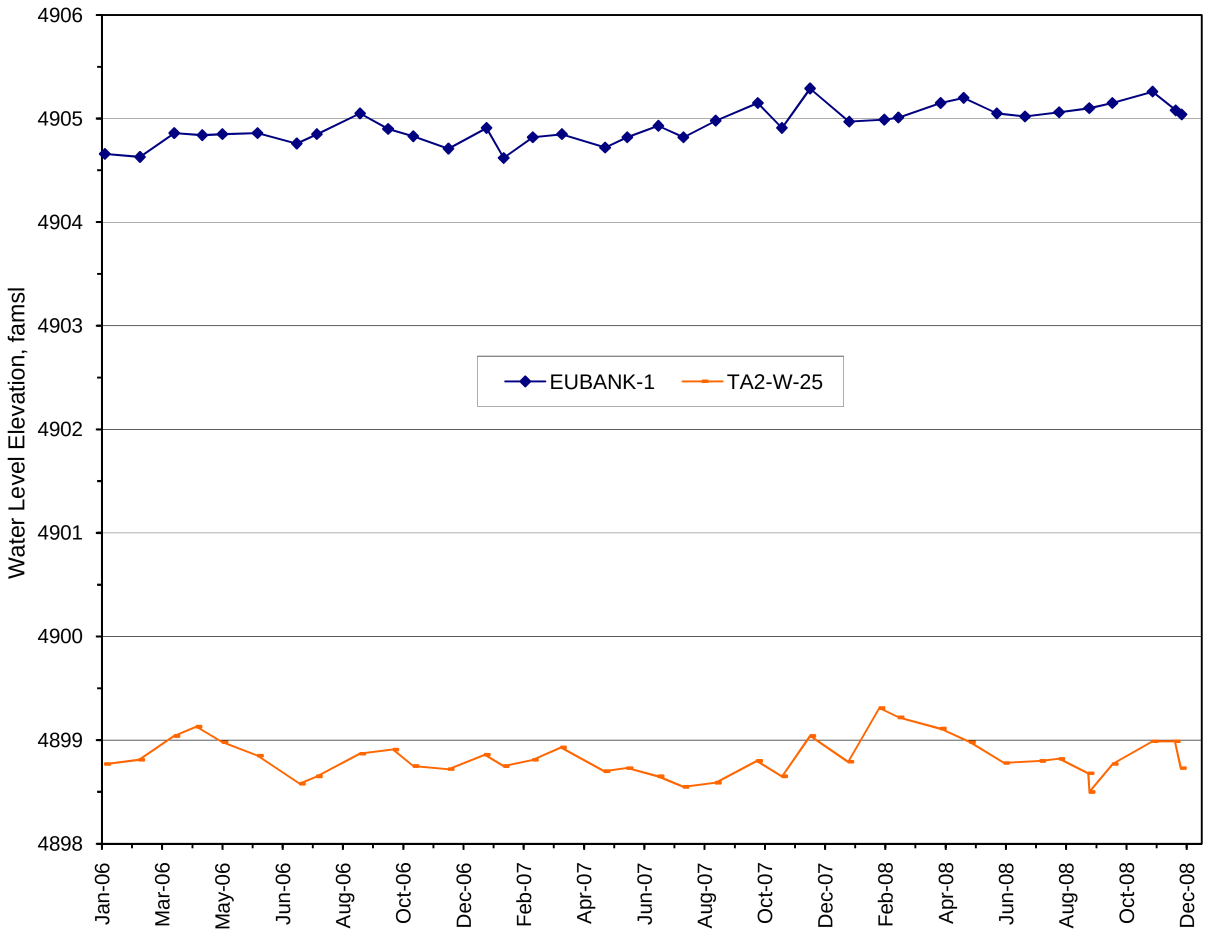

Figure 6C-8. TAG Study Area Regional Aquifer Wells (3 of 6)

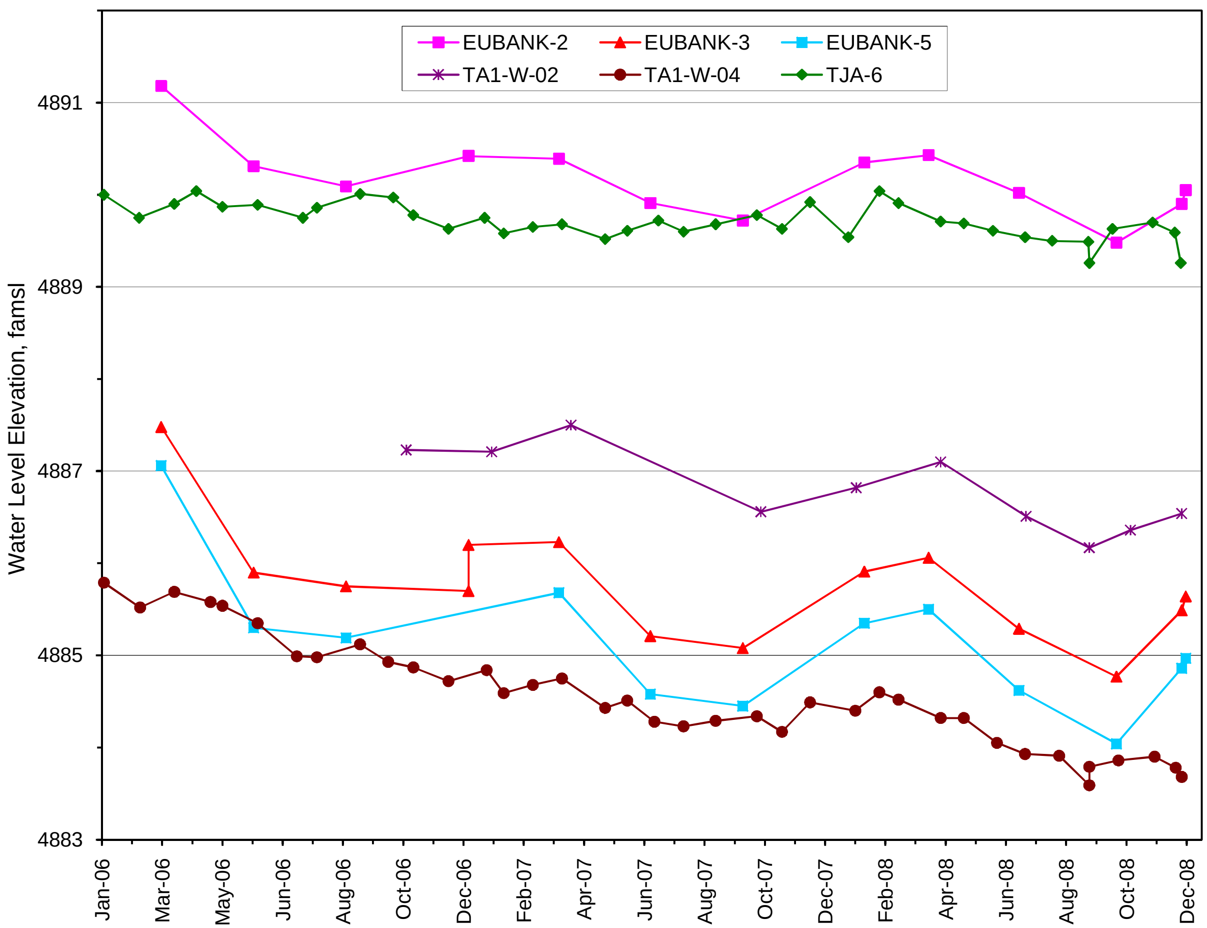

Figure 6C-9. TAG Study Area Regional Aquifer Wells (4 of 6)

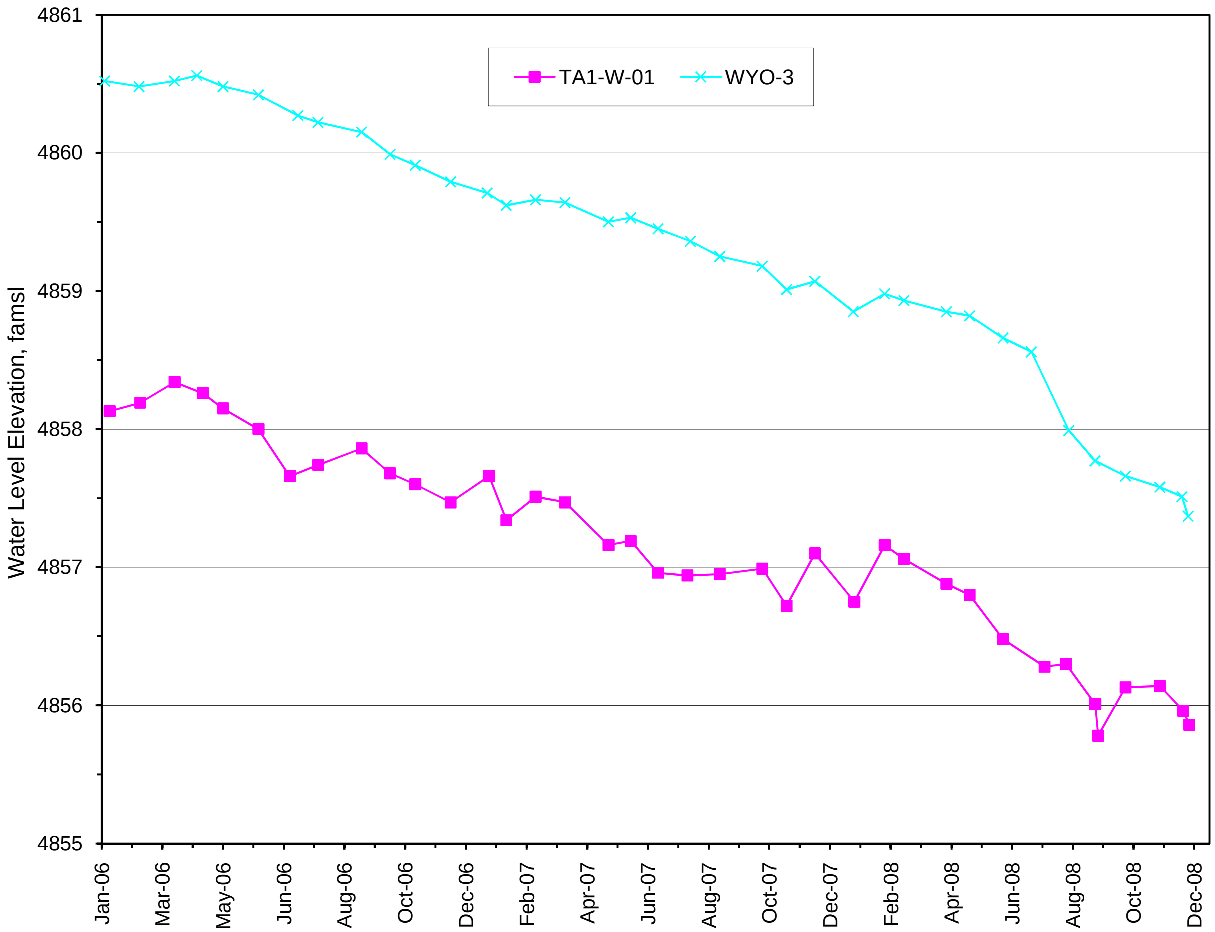

Figure 6C-10. TAG Study Area Regional Aquifer Wells (5 of 6)

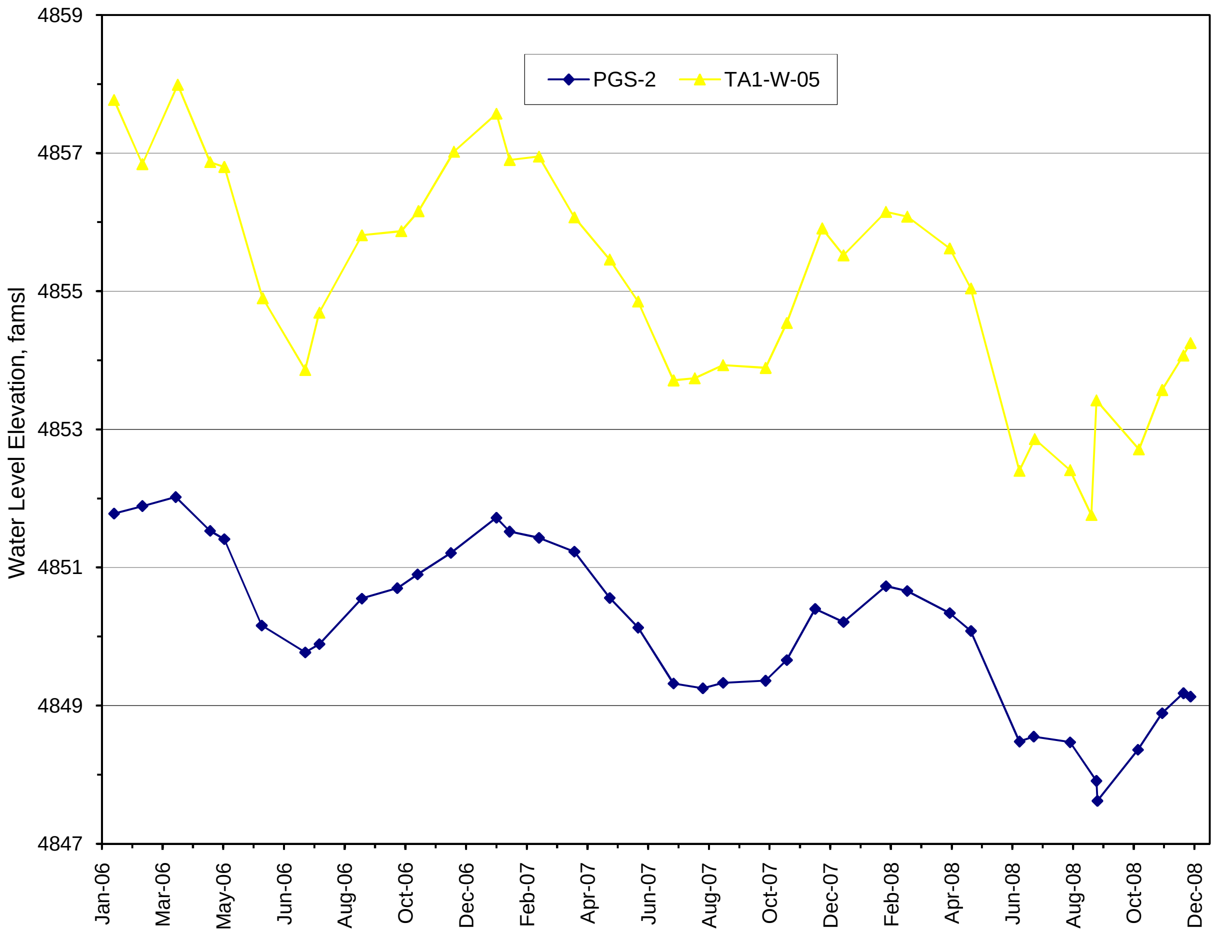

Figure 6C-11. TAG Study Area Regional Aquifer Wells (6 of 6)

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7.0 Burn Site Groundwater Study Area

7.1 Introduction

Nitrate has been identified as a constituent of concern (COC) in groundwater at the Burn Site Groundwater 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 at the site 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). Unique features of the Burn Site Groundwater Study Area include low concentrations of nitrate in a deep bedrock aquifer.

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, multiprogram 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 Coyote Canyon Test Area consists of three large canyons in the Manzanita Mountains (Madera Canyon from the north, Sol se Mete Canyon from the south, and Lurance Canyon from the east). These canyons are the headwaters of the Arroyo del Coyote. The Lurance Canyon Burn Facility, located within Lurance Canyon, is a test site in the Coyote Canyon Test Area (Figure 7-1) that has operated since 1967.

The Burn Site Groundwater Study Area is located immediately east 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 surface flows to Arroyo del Coyote.

7.1.2 Site History

The Burn Site has been used since 1967 to test the effects of impact, burning, and explosion. Historical operations included open detonation of high explosives (HE) (Table 7-1). Most HE testing occurred 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 burn pans were used for open burning using jet 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 as fuels for burn tests.

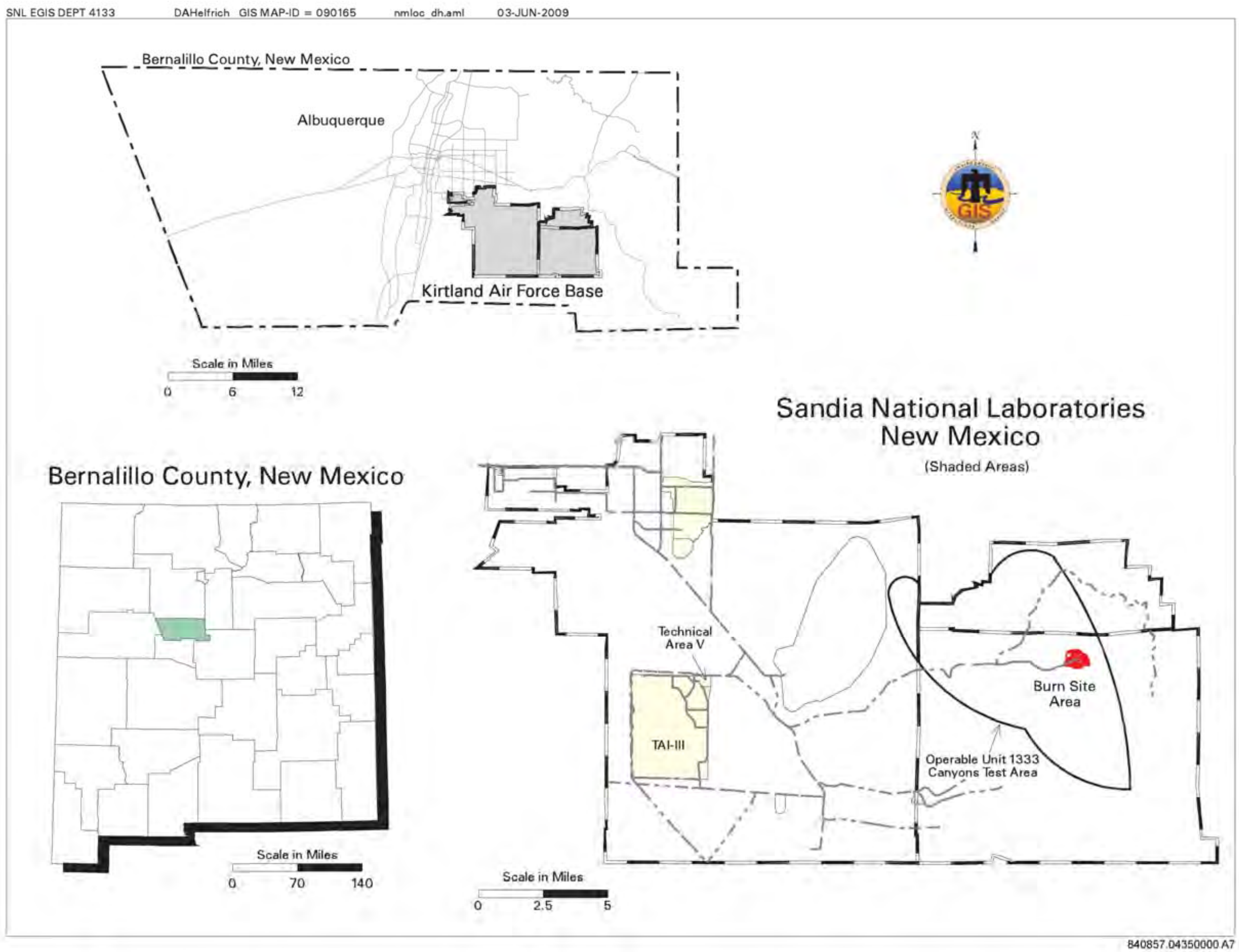

Figure 7-1. Location of the Burn Site Groundwater Study Area

Table 7-1. Historical Timeline of the Burn Site Groundwater Study Area

Date	Event	Reference
1967-early 1980s	HE testing at 18 SWMUs 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
September-1999	Site-Wide Hydrogeologic Characterization Project CY95 Annual Report containing description of BSG hydrogeology submitted.	SNL September 1999
1996	Burn Site production well showed elevated nitrate levels (25 mg/L).	SNL January 2005
July-1997	NMED/OB and SNL/NM agree on installation of deep and shallow monitoring wells 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 FY98 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	BSG study area SWMUs 94 and 65 proposed and approved for NFA/CAC.	Numerous references, for example: SNL/NM February 2004
March-2000	GWPP FY99 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL March 2000
April-2001	GWPP FY00 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 FY01 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL March 2002
March-2003	GWPP FY02 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 FY03 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 model of the BSG study area was prepared.	SNL June 2004a
June-2004	A CME work plan for the BSG study area was prepared.	SNL June 2004b
January-2005	Nitrate source evaluation of deep soils in the BSG study area was 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 responds to RSI.	SNL August 2005
October-2005	GWPP FY04 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)*

Date	Event	Reference
March-2007	GWPP FY06 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL March 2007
April-2008	BSG Current Conceptual Model resubmitted.	SNL April 2008a
April-2008	BSG CME Work Plan resubmitted	SNL April 2008b

Notes:
BSG = Burn Site Groundwater.
CME = Corrective Measures Evaluation.
COC = Constituent of Concern.
CY = Calendar Year.
FY = Fiscal Year.
GWPP = Groundwater Protection Program.
HE = High Explosives.
JP-4 = Jet fuel composition 4.
mg/L = Milligram(s) per liter.
NFA/CAC = No Further Action/Corrective Action Complete.
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.

7.1.3 Monitoring History

Groundwater samples collected during 1996 from the Burn Site well (a nonpotable production well) contained elevated concentrations of nitrate (24.3 mg/L in November 1996). In 1997, the New Mexico Environment Department (NMED), DOE, and Sandia agreed to investigate the source of this contamination. Later in 1997, monitoring well CYN-MW1D was installed downgradient of the Burn Site well (Table 7-2). Samples from this well contained nitrate concentrations above the MCL. Two more wells, CYN-MW3 and CYN-MW4 were installed during 1999-2001 to continue the investigation. 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 (dry)
Burn Site Well	1986			Utility water supply well
CYN-MW1D	1997	√	√	Bedrock groundwater well
CYN-MW2S	1997		√	Underflow piezometer (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

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

Since the initial discovery of nitrate at the Burn Site 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 Burn Site conceptual model provide a comprehensive list of groundwater monitoring data sources used to support the summary of investigations.

The Compliance Order on Consent (the Order), issued by the NMED, 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, Burn Site Groundwater* 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 Burn Site Interim Measures Work Plan (IMWP) (SNL May 2005) on May 30, 2005. As detailed in the IMWP, three new monitoring wells (CYN-MW6, CYN-MW7, and CYN-MW8) were installed near the Burn Site from December 2005 to January 2006 at locations shown in Figure 7-2. Quarterly sampling for eight quarters began for the three new monitoring wells in March 2006 and was completed in December 2007. Samples from the newly installed wells downgradient of CYN-MW1D (CYN-MW7 and CYN-MW8) were sampled and analyzed for nitrate. Samples from the newly installed well adjacent to Solid Waste Management Unit (SWMU) 94F (CYN-MW6) were analyzed for gasoline and diesel range organics, nitrate, and other parameters. Groundwater-monitoring programs continued as outlined in the IMWP (SNL May 2005).

7.1.4 Current Monitoring Network

Currently six wells in the Burn Site Groundwater Study Area are being monitored for water quality: CYN-MW1D, CYN-MW3, CYN-MW4, CYN-MW6, CYN-MW7, and CYN-MW8 (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 they were installed.

Previous monitoring reports included analytical results for CYN-MW5. Groundwater monitoring well CYN-MW5 was installed in 2001 as part of the investigation of Drain and Septic Systems (DSS). This well was sampled for eight quarters as part of the DSS investigation and was then incorporated into the Burn Site Groundwater Study Area investigation as a downgradient well. 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's determination, CYN-MW5 has not been sampled since the third quarter of Fiscal Year (FY) 2005.

7.1.5 Summary of Fiscal Year Activities.

The following activities took place for the Burn Site Groundwater Study Area investigation from October 2007 through December 2008:

- Quarterly groundwater sampling was conducted at three wells (CYN-MW6, CYN-MW7, and CYN-MW8) in December 2007 and at one well (CYN-MW6) in June 2008.

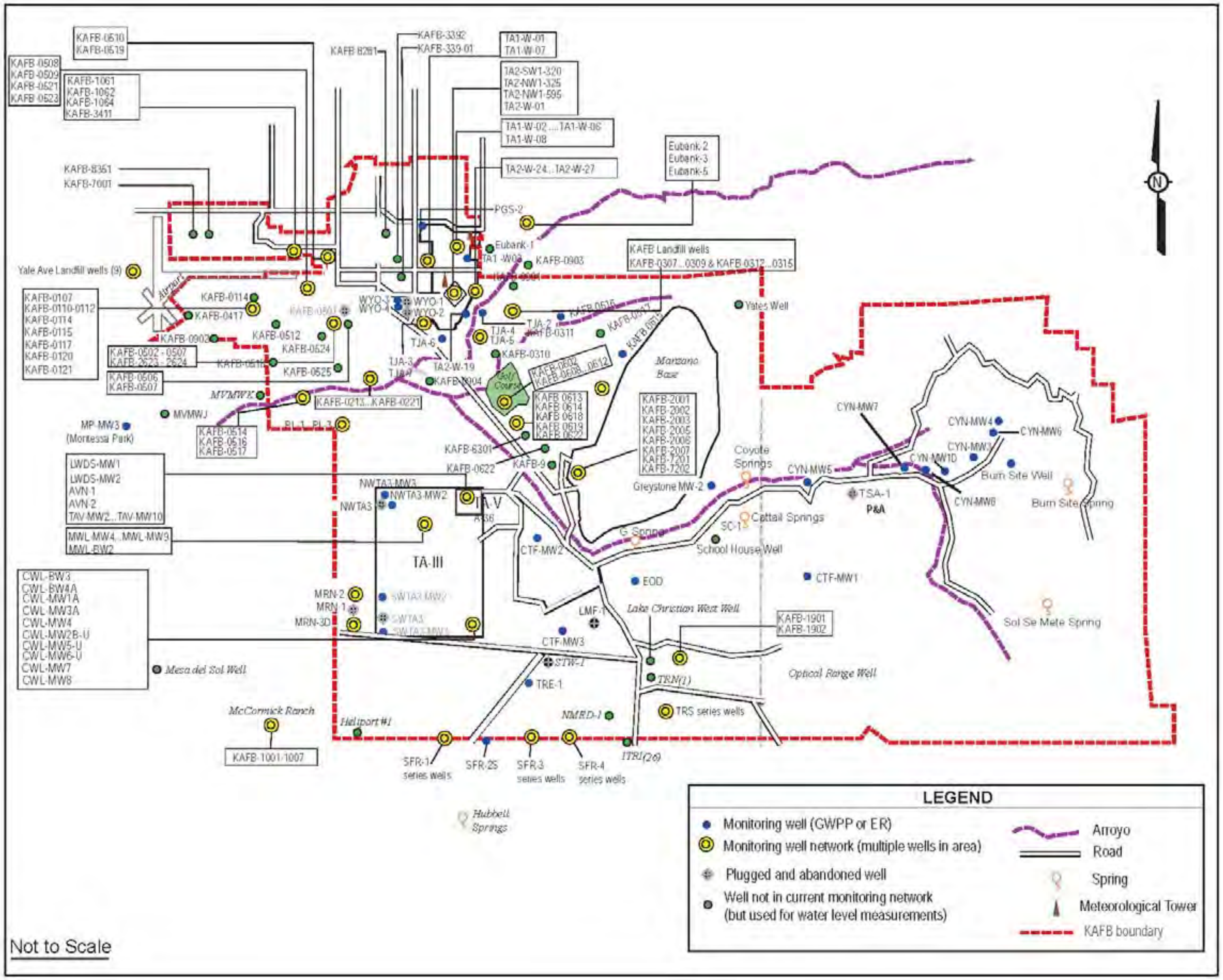

Figure 7-2. Wells and Piezometers in the Canyons Area (6 Active Wells)

- Semiannual groundwater sampling was conducted at six wells (CYN-MW1D, CYN-MW3, CYN-MW4, CYN-MW6, CYN-MW7, and CYN-MW8) in March 2008 and September 2008.

- The *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Burn Site* (SNL April 2008a) was prepared and submitted to the NMED.

- The *Corrective Measures Evaluation Work Plan, Burn Site Groundwater* (SNL April 2008b) was prepared and submitted to the NMED.

- Quarterly reporting of perchlorate analyses for CYN-MW6 was conducted.

- Negotiations with the NMED began to resolve perchlorate characterization requirements at CYN-MW6.

- Tables of analytical results (Attachment 7A), concentration versus time graphs (Attachment 7B), and hydrographs (Attachment 7C) were prepared in support of this report.

7.1.6 Summary of Future Activities

The following activities are anticipated for the Burn Site Groundwater Study Area investigation in FY09:

- Semiannual groundwater sampling at six wells (CYN-MW1D, CYN-MW3, CYN-MW4, CYN-MW6, CYN-MW7, and CYN-MW8) during the second and fourth quarters of FY09.

- Upon NMED approval of the *Corrective Measures Evaluation Work Plan, Burn Site Groundwater* (SNL April 2008b), corrective measures studies will be initiated and a CME Report prepared.

- Semiannual reporting of perchlorate analyses for CYN-MW6.

- Based on NMED availability, meeting will be held to resolve perchlorate characterization requirements for CYN-MW6.

7.1.7 Current Conceptual Model

Groundwater flow in the Burn Site Groundwater Study Area is controlled by the local geologic framework and structural features.

7.1.7.1 Regional Geohydrologic Conditions

The Manzanita Mountains include a complex sequence of uplifted Precambrian metamorphic and granitic rocks that were subjected to significant deformation throughout geologic history. These rocks 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 geologic history is also summarized in the 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).

Groundwater in the Manzanita Mountains largely occurs in the fractured metamorphic and intrusive rocks. These rocks include metavolcanics, quartzite, metasediments, and the Manzanita Granite. Groundwater in these rocks moves as flow through fractures. The permeability of these fractured metamorphic rocks characteristically is low, and well yields are small. Groundwater moving westward through these rocks discharges to small springs at the base of the Manzanita Mountains approximately 3 miles west of the Burn Site area. 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. Core data and exposures indicate that fractures are filled with chemical precipitates in the upper portions of these rocks. These fracture fillings likely occurred when the water table was elevated prior to the development of the Rio Grande. As chemical precipitates filled fractures, permeability was effectively reduced, creating a semiconfined unit above underlying rocks with open fractures.

The Burn Site is cut by a north-trending system of faults, consisting locally of several high-angle normal fault zones that are downfaulted to the east. Faults (where exposed) are characterized by zones of crushing and brecciation. The Burn Site fault extends north in the vicinity of the Burn Site well and well CYN-MW4. The estimated displacement of this fault locally is as much as 160 ft based on exposed contacts.

The canyon floor at the Burn Site consists of unconsolidated alluvial fill deposits over bedrock. These deposits typically are sand and gravel derived from erosion of the upstream drainage basin. These alluvial deposits range in thickness from 21 to 55 ft in borings drilled at the Burn Site.

7.1.7.2 Hydrologic Conditions at the Burn Site

The fractured rocks of the Manzanita Mountains are recharged by infiltration of precipitation, largely occurring in summer thundershowers and, to a lesser degree, from limited winter snowfall on the higher elevations. Recharge is restricted by high evapotranspiration rates (losses to the atmosphere by evaporation and plant transpiration) and low permeability of the metamorphic rocks.

Regionally, groundwater in the western Manzanita Mountains moves generally to the west from a groundwater flow divide located east of the Burn Site (SNL November 2001). On the eastern side of that divide, water likely moves to the east. Westward groundwater flow across the Lurance Canyon Test Facility discharges primarily as direct underflow to the unconsolidated basin-fill deposits of the Albuquerque Basin. Based on field observations, some discharge occurs at springs along the mountain front. Much of the flow that discharges from these springs probably is lost to the atmosphere through evapotranspiration. Some flow from the springs probably infiltrates alluvial deposits. The generally westward flow direction locally may be modified by topographic features. Deeply incised canyons may provide local points of discharge through fault zones where the potentiometric surface intersects the canyon floor.

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 (in.) (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 hot summer months, losses to evapotranspiration are high. A small percentage may infiltrate into the exposed bedrock or into alluvial deposits in the canyon.

Stream flow occurs episodically in the Arroyo del Coyote channel 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 in. 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 moisture is present in the vadose zone 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 recharge through 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 Burn Site monitoring network wells (October 2008). The general direction of groundwater flow beneath the Burn Site is to the west as indicated by the potentiometric surface. No water supply wells are located near the Burn Site, except for the Burn Site well that is used only occasionally for nonpotable applications. Groundwater levels in the Paleozoic rocks near the Burn Site are not influenced by regional water supply well pumping from the basin-fill deposits of the Albuquerque basin.

The apparent horizontal hydraulic gradient based on Burn Site wells, piezometers, and springs varies from approximately 0.004 to 0.14 (SNL April 2008a). The hydraulic gradient west of the Burn Site flattens substantially. The wide range of hydraulic gradients in Lurance Canyon indicate that local groundwater systems associated with brecciated fault zones in the low-permeability fractured rock at the Burn Site are poorly connected. Therefore, at the scale of the Burn Site, brecciated fault zones have compartmentalized the aquifer.

Limited flow velocity information includes contaminant 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 (SNL April 2008a). No information is available about vertical flow velocity within the fractured rocks at the Burn Site. 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 probably act as a semiconfined unit restricting vertical flow.

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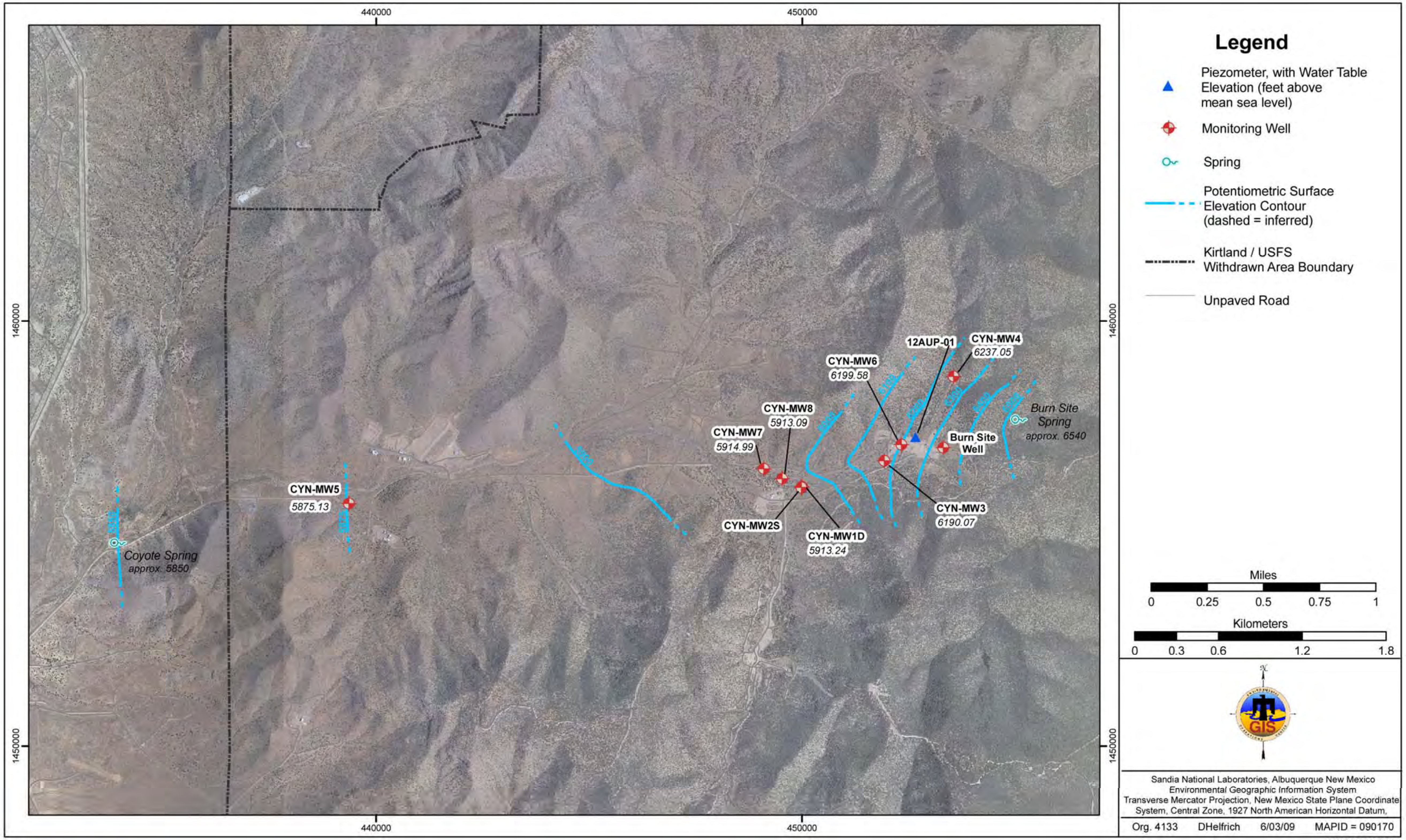

Figure 7-3. Burn Site Groundwater Potentiometric Surface Map (October 2008)

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Water levels have been routinely monitored in Burn Site wells since 1999. Figures 7C-1 through 7C-4 (Attachment 7C) show water level fluctuations in all Burn Site wells. 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 Burn Site is poorly connected. Water level fluctuations may be a result of local heterogeneities in hydraulic properties related to the fractured system.

7.1.7.4 Contaminant Sources

Nitrate in the Burn Site groundwater (BSG) may be derived from both natural and anthropogenic sources. Potential natural sources include concentration of nitrate by evaporation and transpiration of rainwater that has infiltrated canyon alluvial sediments. Potential anthropogenic nitrate sources include the detonation of HE.

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 that groundwater that is similar to the chloride to nitrate ratio in summer rainfall.

SWMU 65 in the center of the Burn Site area contains open detonation areas where nitrate-based explosives were used. Under these conditions, nitrate compounds may have been ejected at the explosive site and disseminated over the adjacent land surface. Subsequent rainfall may have mobilized these soluble compounds. In addition to nitrate in BSG, petroleum products were detected in area soil, and therefore, the potential for petroleum products in groundwater required evaluation.

7.1.7.5 Contaminant Distribution and Transport in Groundwater

Nitrate was first detected above the MCL of 10 mg/L in groundwater from the Burn Site well. Since the completion of wells CYN-MW1D (December 1997), CYN-MW3 (June 1999) and CYN-MW6 (February 2006), nitrate concentrations above the MCL have been consistently detected in samples from these wells. Nitrate concentrations in groundwater from wells CYN-MW4, CYN-MW7, and CYN-MW8 have not exceeded the MCL.

Nitrate concentrations in groundwater from the Burn Site well have decreased from 24.3 mg/L in 1996 to 5.5 mg/L in 2001. Concentrations in water from well CYN-MW3, approximately 1,400 ft downgradient of the Burn Site well, have ranged from less than 5 to 22 mg/L since 1999. Concentrations in groundwater from well CYN-MW6, approximately 1,000 ft downgradient of the Burn Site well, have ranged from 22.9 to 33.0 mg/L since 2006. Nitrate concentrations have increased from approximately 10 mg/L to more than 25 mg/L from 1998 to 2008 in water from well CYN-MW1D, located approximately 3,400 ft downgradient of the Burn Site well.

Potential downgradient receptors for the BSG 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 detection limits 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 the Environmental Restoration (ER) Project as well as implements and enforces federal regulations mandated by the Resource Conservation and Recovery Act (RCRA). All ER Project 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 finalization of the Order in April 2004, groundwater investigations at the Burn Site had been conducted voluntarily by the ER Project.

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 the investigation of SWMUs and areas with groundwater contamination from the HWSA 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 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 (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 Burn Site. 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 they are not satisfied with the existing characterization of nitrate-contaminated groundwater near the Burn Site.

- The NMED also required 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 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 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 model (SNL April 2008a). The updated conceptual 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 includes information and data gathered during interim measures and performance and compliance goals and objectives for the remediation of the BSG.

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 Consent

Order. Additional information on radionuclides and the scope of the Consent Order is available in Section III.A of the Consent Order (NMED April 2004).

7.3 Scope of Activities

During this reporting period, the activities for the BSG investigation, including plans and reports, are listed in Section 7.1.5. However, the only field activities completed in the study area during this reporting period were groundwater monitoring sampling and analysis. The October 2007 through September 2008 sampling events are summarized in Table 7-3.

Table 7-3. Groundwater Monitoring Well Network and Sampling Dates for the Burn Site Groundwater Study Area, December 2007 through September 2008

Date of Sampling Event	Wells Sampled[1]	SAP
December 2007	CYN-MW6 CYN-MW7 CYN-MW8	*Burn Site Groundwater Monitoring, Mini-SAP for First Quarter Fiscal Year 2008* (SNL November 2007)
March 2008	CYN-MW1D CYN-MW3 CYN-MW4 CYN-MW6 CYN-MW7 CYN-MW8	*Burn Site Groundwater Monitoring, Mini-SAP for Second Quarter Fiscal Year 2008* (SNL January 2008)
June 2008	CYN-MW6	*Burn Site Groundwater Monitoring, Mini-SAP for Third Quarter Fiscal Year 2008* (SNL June 2008)
September 2008	CYN-MW1D CYN-MW3 CYN-MW4 CYN-MW6 CYN-MW7 CYN-MW8	*Burn Site Groundwater Monitoring, Mini-SAP for Fourth Quarter Fiscal Year 2008* (SNL August 2008)

Note: [1] Refer to page xi of this report for well descriptions.
SAP = Sampling and analysis Plan.

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 equipment blanks, duplicate samples, split samples, and trip blanks. Field QC samples are used to monitor the sampling process. Equipment blanks 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. Trip blanks are used to determine whether volatile organic compounds (VOCs) contaminated the sample during preparation, transportation, and handling prior to receipt by the analytical laboratory.

7.4 Field Methods and Measurements

The monitoring procedures, as conducted by the ER Project, 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.

Table 7-4. Parameters Sampled at Burn Site Groundwater Wells[1] for Each Sampling Event

Parameter	December 2007	Parameter	March 2008
Nitrate plus Nitrite TPH-DRO TPH-GRO	CYN-MW6 CYN-MW6 (dup) CYN-MW7 CYN-MW8	Nitrate plus Nitrite TPH-DRO TPH-GRO	CYN-MW1D CYN-MW1D (dup) CYN-MW3 CYN-MW4 CYN-MW6 CYN-MW7 CYN-MW8
Major Anions Major Cations Perchlorate SVOCs VOCs	CYN-MW6 CYN-MW6 (dup)	Major Anions Major Cations Perchlorate SVOCs VOCs	CYN-MW6
Parameter	**June 2008**	**Parameter**	**September 2008**
Major Anions Major Cations Nitrate plus Nitrite Perchlorate SVOCs TPH—DRO TPH—GRO VOCs	CYN-MW6	Gamma Spectroscopy Gross Alpha/Beta Activity Nitrate plus Nitrite TAL Metals, plus Total Uranium TPH-DRO TPH-GRO Tritium VOCs	CYN-MW1D CYN-MW3 CYN-MW4 CYN-MW6 CYN-MW7 CYN-MW8
		Nitrate plus Nitrite TPH-DRO TPH-GRO	CYN-MW1D (dup) CYN-MW3 (dup)
		Major Anions Major Cations Perchlorate SVOCs	CYN-MW6

NOTE: [1] Refer to page xi of this report for well descriptions.
DRO = Diesel range organics.
dup = duplicate sample.
GRO = Gasoline range organics.
SVOC = Semivolatile organic compound.
TAL = Target analyte list.
TPH = Total petroleum hydrocarbons.
VOC = Volatile organic compound.

7.4.1 Groundwater Elevation

During the December 2007 through September 2008 sampling events, quarterly water level measurements were obtained to determine groundwater flow directions, hydraulic gradients, and changes in water table elevations. Water levels are measured by ER Field Office (ERFO) crew immediately before presampling purging at each well being sampled. The water level information was used to create the potentiometric surface 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 Burn Site 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 Field Operating Procedure

(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), 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 degrees Celsius, and SC 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 equipment blank 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 or a nitrogen gas-powered bladder pump (QED™). 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 the ER Project. The SMO reviews the mini-SAPs (Table 7-3), orders sample containers, issues sample control and tracking numbers, tracks the chain-of-custody, and reviews analytical results returned from the labs 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 (QA) requirements specified in the *Procedure for Completing the Contract Verification Review (CVR), 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 ERFO waste accumulation area. All waste was managed in accordance with FOP 05-04 (SNL August 2007c) as nonregulated waste, based on historical sample results and process knowledge of the monitoring well location. Associated environmental sample results provide supplemental data for approval to discharge water to the sanitary sewer. All data were compared with COA discharge limits.

7.5 Analytical Methods

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

- *The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0* (EPA 1983).
- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (EPA 1990).
- *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]
VOCs	SW846-8260
SVOCs	SW846-8270
NPN	EPA 353.2
TAL Metals plus total-uranium	SW846-6020/7470
TPH Diesel Range Organics	SW846-8015
TPH Gasoline Range Organics	SW846-8015
Major Anions	SW846-9056
Major Cations (filtered in field)	SW846-6020
Perchlorate	EPA 314.0

Notes: [a]U.S. Environmental Protection Agency (EPA), 1990, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed., U.S. Environmental Protection Agency, Washington, D.C.
[b]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.
[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).
SVOC = Semivolatile organic compound.
SW = Solid Waste.
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
Tritium	EPA 906.0

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

7.6 Summary of Analytical Results

The following section includes a discussion of monitoring results, exceedances of standards, and pertinent trends in concentrations for COCs that exceed standards.

The analytical results and field measurements for all BSG sampling events are presented in Tables 7A-1 through 7A-9 (Attachment 7A). A summary of detected VOC and semivolatile organic compound (SVOC) results is presented in Table 7A-1. The method detection limits (MDLs) for all analyzed VOCs and SVOCs are listed in Table 7A-2. The only VOCs detected were acetone, methylene chloride, and chloromethane (Table 7A-1). These three compounds were detected above the MDL but were all qualified during data validation as nondetections. No levels of SVOCs were present in any samples collected during this reporting period.

The analytical results for nitrate plus nitrite (NPN) (reported as nitrogen) are presented in Table 7A-3. NPN results exceed the MCL of 10 mg/L in samples from CYN-MW1D, CYN-MW3, and CYN-MW6. Figures 7B-1 through 7B-3 (Attachment 7B) show that the NPN concentrations in these wells have generally exceeded the MCL for the life of the wells. Beginning in March 2005, NPN concentrations in CYN-MW1D are below the MCL; however, in March 2008, the NPN concentrations once again exceed the MCL. NPN concentrations in CYN-MW3 are consistently between 10 and 15 mg/L, and NPN concentrations in CYN-MW6 are consistently between 22 and 33 mg/L. Only low levels of NPN were detected in the other wells (Table 7A-3).

The results for total petroleum hydrocarbons (TPH) are listed for Diesel Range Organics (DRO) and Gasoline Range Organics (GRO) in Table 7A-4. A one-time detection of TPH-GRO of 37.6 micrograms per liter (µg/L) was reported for CYN-MW6, and a one-time detection of TPH-DRO of 50.8 µg/L was reported for a sample from CYN-MW7. Both TPH-GRO and TPH-DRO results are qualified as estimated concentrations with "J" by the laboratory. No MCLs have been established for TPH-DRO or TPH-GRO.

The analytical results for major ions and perchlorate are presented in Tables 7A-5 and 7A-6. None of the major anions exceed MCLs, where established. Perchlorate was detected above the MDL of 0.004 mg/L only in samples collected from CYN-MW6. Perchlorate concentrations range from 6.20 to 7.25 mg/L, with all results qualified as estimated concentrations with "J" by the laboratory. Currently, no MCL is established for perchlorate.

Total metal results are presented in Table 7A-7. 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-8. Gross alpha activity exceeds the MCL (15 picocuries per liter [pCi/L]) in samples collected from CYN-MW4, CYN-MW6, CYN-MW7, and CYN-MW8, with activities ranging from 18.2 $\pm$ 4.16 to 40.5 $\pm$ 8.22 pCi/L. In the study area, groundwater contacts Precambrian bedrock that contains materials high in naturally occurring uranium. The results for gross alpha activity over time (reported as uncorrected gross alpha activity, i.e., not corrected by subtracting naturally occurring uranium activity) are shown in Figures 7B-4 through 7B-7 (Attachment 7B), and are consistent with historical activity levels. All other 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 presample purging of each well and include temperature, SC, ORP, pH, turbidity, and DO. The parameter measurements obtained immediately before collecting the sample are presented in Table 7A-9.

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. The following sections discuss site-specific QA/QC results for the BSG quarterly sampling events.

7.7.1 Field Quality Control Samples

Field QC samples included an environmental duplicate sample and an equipment blank sample. The field QC samples were submitted for analysis along with the groundwater samples in accordance with QC procedures specified in the mini-SAPs (SNL November 2007, January 2008, June 2008, and August 2008).

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. Generally, duplicate sample results show good correlation (RPD values less than 20) for all calculated parameters, with the following exceptions:

- **December 2007 Sampling Event at CYN-MW6**—The RPD calculated for duplicate bromide analyses was 34.

- **March 2008 Sampling Event at CYN-MW1D**—The RPD calculated for duplicate NPN analyses for the original sample was 34; however, the RPD for the associated reanalysis was 1.

7.7.1.2 Equipment Decontamination 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 equipment blank or rinsate sample was collected to verify the effectiveness of the equipment decontamination process. The results of the rinsate sample analyses are as follows:

- **December 2007 Sampling Event at CYN-MW6**—The equipment decontamination sample was collected prior to sampling and analyzed for VOCs, SVOCs, NPN, anions, cations, perchlorate, TPH-DRO, and TPH-GRO. Detected parameters from the equipment blank sample included: acetone, bromodichloromethane, calcium, chlorine, sodium, and sulfate. Acetone was qualified as not detected during data validation due to associated trip blank contamination. No corrective action is required for bromodichloromethane, calcium, chlorine, sodium, or sulfate, as these analytes were either not detected in CYN-MW6 samples or reported at concentrations less than 5 times the CYN-MW6 concentrations.

- **March 2008 Sampling Event at CYN-MW1D**—The equipment decontamination sample was collected prior to sampling and analyzed for NPN, TPH-DRO, and TPH-GRO. NPN was detected in the equipment blank sample at a concentration of 0.017 mg/L. No corrective action is required as NPN was reported at a concentration less than 5 times the concentrations in the CYN-MW1D environmental sample.

- **June 2008 Sampling Event at CYN-MW6**—The equipment decontamination sample was collected prior to sampling and analyzed for VOCs, SVOCs, major anions, major cations, perchlorate, NPN, TPH-DRO, and TPH-GRO. Calcium, chloride, sulfate, and NPN were detected above the MDL. No corrective action is required as these parameters were reported at concentrations less than 5 times the environmental sample or were qualified during data validation as not detected due to associated laboratory contamination.

- **September 2008 Sampling Events at CYN-MW1D and CYN-MW3**—The equipment decontamination sample was collected prior to sampling CYN-MW1D and CYN-MW3 and analyzed for TPH-DRO, TPH-GRO, and NPN. NPN was detected at a concentration of 0.0565 mg/L in the equipment blank sample associated with CYN-MW1D samples. No corrective action is required, as the NPN result was reported in samples from CYN-MW1D at concentrations greater than 5 times the rinsate contamination.

7.7.1.3 Trip Blank Samples

Trip blank samples are submitted whenever samples were collected for VOC analysis to assess whether contamination of the samples had occurred during shipment and storage. Trip blanks consist of laboratory reagent grade water with hydrochloric acid preservative contained in 40-milliliter VOC vials prepared by the analytical laboratory, which accompany the empty sample containers supplied by the laboratory. Trip blanks were brought to the field and accompanied each sample shipment.

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-8 (Attachment 7A).

7.8 Variances and Nonconformances

The following sections describe differences between planned work and actual work, findings of the data validation process, and any impacts to schedule.

7.8.1 Variances and Nonconformances

No variances or nonconformances from field or sampling requirements in the BSG Monitoring mini-SAPs (SNL November 2007, January 2008, June 2008, and August 2008) occurred during sampling activities. Project-specific issues associated with these sampling events are noted as follows:

- **March 2008 Sampling Event—**NPN concentrations greater than the MDL in CYN-MW1D were not expected. NPN results between March 2005 and September 2007 have been detected at values below the MCL of 10 mg/L. SNL/NM requested that GEL reanalyze initial samples based on the current trend. The results for the reanalysis confirmed the original values.

- **September 2008 Sampling Event**—The NMED DOE Oversight Bureau was on site to collect samples at CYN-MW6 for various parameters, including VOCs, TPH-DRO, TPH-GRO, anions, cations, NPN, perchlorate, total metals, gamma spectroscopy, and gross alpha/beta activity. The results for these samples are not included in this report.

7.8.2 Data Validation

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-8 (Attachment 7A). The data validation report associated with each sampling event has been submitted to the SNL/NM Customer Funded Records Center.

Specific data validation issues associated with these sampling events are noted below.

- **March 2008 Sampling Event**—The VOCs acetone and carbon disulfide were qualified as unusable in the sample from CYN-MW6 because the initial calibration did not meet acceptance criteria.

- **September 2008 Sampling Event**—The analytical results for 2-nitrophenol were qualified as unusable.

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 model, and plans for studies to be completed during the next Fiscal Year at the Burn Site Groundwater Study Area.

The Burn Site Groundwater Study Area 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 water well. The study area consists of six monitoring wells. Wells were sampled at various times in December 2007, March 2008, June 2008, and September 2008. The samples were analyzed for VOCs, SVOCs, TPH-DRO, TPH-GRO, major ions, NPN, TAL metals (plus uranium), gross alpha/beta activity, tritium, and radionuclides by gamma spectroscopy. As required by the Consent Order, quarterly sampling for perchlorate was conducted at CYN-MW6.

Only NPN and gross alpha activity were detected above MCLs in study area wells. NPN results exceeded the MCL of 10 mg/L in samples from CYN-MW6 during all sampling events, with a maximum concentration of 33.0 mg/L during the September 2008 sampling event. Nitrate concentrations in this well have consistently exceeded the MCL. NPN concentrations in CYN-MW3 exceeded the MCL in two sampling events, with a maximum concentration of 13.8 mg/L during the September 2008 sampling event. Nitrate concentrations are relatively stable over time in CYN-MW3. NPN results from CYN-MW1D exceeded the MCL in two sampling events with a maximum concentration of 21.3 mg/L during the March 2008 sampling event.

Uncorrected gross alpha activity values from CYN-MW4, CYN-MW6, CYN-MW7, and CYN-MW8 exceeded the MCL of 15 pCi/L at activities ranging from 18.2 ± 4.16 to 40.5 ± 8.22 pCi/L. In this region, groundwater contacts Precambrian bedrock that contains materials high in naturally occurring uranium. Gross alpha activity results are consistent with historical activities in Burn Site monitoring wells and are reported as uncorrected gross alpha activity (i.e., not corrected by subtracting naturally occurring uranium or radium activity).

The analytical results from 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 from this reporting period.

During FY09, semiannual groundwater sampling will continue at the six Burn Site Groundwater Study Area wells (CYN-MW1D, CYN-MW3, CYN-MW4, CYN-MW6, CYN-MW7, and CYN-MW8) in the second and fourth quarters of FY09. Upon NMED approval of the Burn Site Groundwater CME Work Plan (SNL April 2008b), a CME will be performed and a CME Report will be prepared.

7.10 References

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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 and Semivolatile Organic Compounds
Burn Site Groundwater Monitoring

October 2007 through September 2008

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-MW6 (Duplicate) 18-Dec-07	Acetone	6.66	1.25	5.00	NE		6.66UJ	085446-001	SW846-8260B
CYN-MW6 18-Dec-07	Acetone	6.71	1.25	5.00	NE		6.71UJ	085447-001	SW846-8260B
CYN-MW3 16-Sep-08	Methylene chloride	5.27	2.00	5.00	5.00	B	5.27U	086779-001	SW846-8260B
CYN-MW4	Chloromethane	0.711	0.500	1.00		J		086776-001	SW846-8260B
15-Sep-08	Methylene chloride	4.86	2.00	5.00	5.00	B, J	5.00U	086776-001	SW846-8260B
CYN-MW6 17-Sep-08	Methylene chloride	4.68	2.00	5.00	5.00	B, J	5.00U	086782-001	SW846-8260B
CYN-MW7 18-Sep-08	Methylene chloride	5.88	2.00	5.00	5.00	B	5.88U	086784-001	SW846-8260B

Refer to footnotes on page 7A-23.

Table 7A-2
Method Detection Limits for Volatile and Semivolatile Organic Compounds
Burn Site Groundwater Monitoring

October 2007 through September 2008

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	0.300	8260	1,2,4-Trichlorobenzene	1.98 - 2.27	8270	Di-n-butyl phthalate	1.98 - 2.27	8270
1,1,2,2-Tetrachloroethane	0.250	8260	1,2-Dichlorobenzene	1.98 - 2.27	8270	Di-n-octyl phthalate	2.97 - 3.41	8270
1,1,2-Trichloroethane	0.250	8260	1,3-Dichlorobenzene	1.98 - 2.27	8270	Dibenz[a,h]anthracene	0.198 - 0.227	8270
1,1-Dichloroethane	0.300	8260	1,4-Dichlorobenzene	1.98 - 2.27	8270	Dibenzofuran	1.98 - 2.27	8270
1,1-Dichloroethene	0.300	8260	2,4,5-Trichlorophenol	0.990 - 1.14	8270	Diethylphthalate	1.98 - 2.27	8270
1,2-Dichloroethane	0.250	8260	2,4,6-Trichlorophenol	1.98 - 2.27	8270	Dimethylphthalate	1.98 - 2.27	8270
1,2-Dichloropropane	0.250	8260	2,4-Dichlorophenol	1.98 - 2.27	8270	Dinitro-o-cresol	2.97 - 3.41	8270
2-Butanone	1.25	8260	2,4-Dimethylphenol	1.98 - 2.27	8270	Diphenyl amine	2.97 - 3.41	8270
2-Hexanone	1.25	8260	2,4-Dinitrophenol	9.90 - 11.4	8270	Fluoranthene	0.198 - 0.227	8270
4-methyl-, 2-Pentanone	1.25	8260	2,4-Dinitrotoluene	1.98 - 2.27	8270	Fluorene	0.198 - 0.227	8270
Acetone	1.25 - 15.0	8260	2,6-Dinitrotoluene	1.98 - 2.27	8270	Hexachlorobenzene	1.98 - 2.27	8270
Benzene	0.300 - 1.00	8260	2-Chloronaphthalene	0.347 - 0.398	8270	Hexachlorobutadiene	1.98 - 2.27	8270
Bromodichloromethane	0.250	8260	2-Chlorophenol	1.98 - 2.27	8270	Hexachlorocyclopentadiene	1.98 - 2.27	8270
Bromoform	0.250	8260	2-Methylnaphthalene	0.297 - 0.341	8270	Hexachloroethane	1.98 - 2.27	8270
Bromomethane	0.500	8260	2-Nitroaniline	1.98 - 2.27	8270	Indeno(1,2,3-c,d)pyrene	0.198 - 0.227	8270
Carbon disulfide	1.25	8260	2-Nitrophenol	1.98 - 2.27	8270	Isophorone	1.98 - 2.27	8270
Carbon tetrachloride	0.250	8260	3,3'-Dichlorobenzidine	0.990 - 1.14	8270	Naphthalene	0.297 - 0.341	8270
Chlorobenzene	0.250	8260	3-Nitroaniline	1.98 - 2.27	8270	Nitro-benzene	2.97 - 3.41	8270
Chloroethane	0.500	8260	4-Bromophenyl phenyl ether	1.98 - 2.27	8270	Pentachlorophenol	1.98 - 2.27	8270
Chloroform	0.250	8260	4-Chloro-3-methylphenol	1.98 - 2.27	8270	Phenanthrene	0.198 - 0.227	8270
Chloromethane	0.500	8260	4-Chlorobenzenamine	1.98 - 2.27	8270	Phenol	0.990 - 1.14	8270
Dibromochloromethane	0.250	8260	4-Chlorophenyl phenyl ether	1.98 - 2.27	8270	Pyrene	0.297 - 0.341	8270
Ethyl benzene	0.250	8260	4-Nitroaniline	2.97 - 3.41	8270	bis(2-Chloroethoxy) methane	2.97 - 3.41	8270
Methylene chloride	2.00 – 5.00	8260	4-Nitrophenol	1.98 - 2.27	8270	bis(2-Chloroethyl)ether	1.98 - 2.27	8270
Styrene	0.250	8260	Acenaphthene	0.307 - 0.352	8270	bis(2-Ethylhexyl)phthalate	1.98 - 2.27	8270
Tetrachloroethene	0.250	8260	Acenaphthylene	0.198 - 0.227	8270	bis-Chloroisopropyl ether	1.98 - 2.27	8270
Toluene	0.250	8260	Anthracene	0.198 - 0.227	8270	m,p-Cresol	2.97 - 3.41	8270
Trichloroethene	0.250	8260	Benzo(a)anthracene	0.198 - 0.227	8270	n-Nitrosodipropylamine	1.98 - 2.27	8270
Vinyl acetate	1.50	8260	Benzo(a)pyrene	0.198 - 0.227	8270	o-Cresol	1.98 - 2.27	8270
Vinyl chloride	0.500	8260	Benzo(b)fluoranthene	0.198 - 0.227	8270			
Xylene	0.250	8260	Benzo(ghi)perylene	0.198 - 0.227	8270			
cis-1,2-Dichloroethene	0.300	8260	Benzo(k)fluoranthene	0.198 - 0.227	8270			
cis-1,3-Dichloropropene	0.250	8260	Butylbenzyl phthalate	1.98 - 2.27	8270			
trans-1,2-Dichloroethene	0.300	8260	Carbazole	0.198 - 0.227	8270			
trans-1,3-Dichloropropene	0.250	8260	Chrysene	0.198 - 0.227	8270			

Refer to footnotes on page 7A-23.

Table 7A-3
Summary of Nitrate plus Nitrite Results
Burn Site Groundwater Monitoring

October 2007 through September 2008

Well ID	Analyte	Result[a] (mg/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 **18-Dec-07**	Nitrate plus nitrite as N	**27.7**	0.500	2.50	10			085446-018	EPA 353.2
CYN-MW6 **(Duplicate) 18-Dec-07**	Nitrate plus nitrite as N	**29.3**	0.500	2.50	10			085447-018	EPA 353.2
CYN-MW7 **10-Dec-07**	Nitrate plus nitrite as N	1.84	0.050	0.250	10	B		085442-018	EPA 353.2
CYN-MW8 **17-Dec-07**	Nitrate plus nitrite as N	5.27	0.100	0.500	10			085443-018	EPA 353.2
CYN-MW1D **05-Mar-08**	Nitrate plus nitrite as N	**21.3**	0.250	1.25	10		J-	085657-018	EPA 353.2
CYN-MW1D **(Re-analysis) 05-Mar-08**	Nitrate plus nitrite as N	**15.5**	0.250	1.25	10	H	J	085657-R18	EPA 353.2
CYN-MW1D **(Duplicate) 05-Mar-08**	Nitrate plus nitrite as N	**15.1**	0.250	1.25	10		J-	085658-018	EPA 353.2
CYN-MW1D **(Duplicate Re-analysis) 05-Mar-08**	Nitrate plus nitrite as N	**15.6**	0.250	1.25	10	H	J	085658-R18	EPA 353.2
CYN-MW3 **05-Mar-08**	Nitrate plus nitrite as N	**10.9**	0.250	1.25	10		J-	085659-018	EPA 353.2
CYN-MW4 **10-Mar-08**	Nitrate plus nitrite as N	0.071	0.050	0.250	10	B, J	0.067U	085660-018	EPA 353.2
CYN-MW6 **10-Mar-08**	Nitrate plus nitrite as N	**27.0**	0.250	1.25	10	B		085661-018	EPA 353.2
CYN-MW7 **04-Mar-08**	Nitrate plus nitrite as N	1.99	0.050	0.250	10			085663-018	EPA 353.2
CYN-MW8 **03-Mar-08**	Nitrate plus nitrite as N	5.56	0.100	0.500	10			085664-018	EPA 353.2
CYN-MW6 **23-Jun-08**	Nitrate plus nitrite as N	**27.9**	0.500	2.50	10	B		086280-018	EPA 353.2
CYN-MW1D **23-Sep-08**	Nitrate plus nitrite as N	**10.9**	0.250	1.25	10			086789-018	EPA 353.2
CYN-MW1D **(Duplicate) 23-Sep-08**	Nitrate plus nitrite as N	**11.3**	0.250	1.25	10			086790-018	EPA 353.2

Refer to footnotes on page 7A-23.

Table 7A-3 *(Concluded)*
Summary of Nitrate plus Nitrite Results
Burn Site Groundwater Monitoring

October 2007 through September 2008

Well ID	Analyte	Result[a] (mg/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 **16-Sep-08**	Nitrate plus nitrite as N	**13.8**	0.100	0.500	10			086779-018	EPA 353.2
CYN-MW3 **(Duplicate) 16-Sep-08**	Nitrate plus nitrite as N	**12.9**	0.100	0.500	10			086780-018	EPA 353.2
CYN-MW4 **15-Sep-08**	Nitrate plus nitrite as N	ND	0.100	0.500	10	U	UJ	086776-018	EPA 353.2
CYN-MW6 **17-Sep-08**	Nitrate plus nitrite as N	**33.0**	0.500	2.50	10			086782-018	EPA 353.2
CYN-MW7 **18-Sep-08**	Nitrate plus nitrite as N	1.60	0.250	1.25	10			086784-018	EPA 353.2
CYN-MW8 **22-Sep-08**	Nitrate plus nitrite as N	4.81	0.100	0.500	10			086786-018	EPA 353.2

Refer to footnotes on page 7A-23.

Table 7A-4
Summary of Diesel Range Organics and Gasoline Range Organics Results
Burn Site Groundwater Monitoring

October 2007 through September 2008

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-MW6	Diesel Range Organics	ND	48.5	103	NE	U	UJ	085446-005	SW846 8015A/B
18-Dec-07	Gasoline Range Organics	37.6	18.0	50.0	NE	J		085446-006	SW846 8015B
CYN-MW6 (Duplicate)	Diesel Range Organics	ND	48.0	102	NE	U	UJ	085447-005	SW846 8015A/B
18-Dec-07	Gasoline Range Organics	ND	18.0	50.0	NE	U		085447-006	SW846 8015B
CYN-MW7	Diesel Range Organics	ND	56.6	120	NE	U		085442-005	SW846 8015A/B
10-Dec-07	Gasoline Range Organics	ND	18.0	50.0	NE	U		085442-006	SW846 8015B
CYN-MW8	Diesel Range Organics	ND	53.4	114	NE	U	UJ	085443-005	SW846 8015A/B
17-Dec-07	Gasoline Range Organics	ND	18.0	50.0	NE	U		085443-006	SW846 8015B
CYN-MW1D	Diesel Range Organics	ND	52.8	112	NE	U		085657-005	SW846 8015A/B
05-Mar-08	Gasoline Range Organics	ND	18.0	50.0	NE	U		085657-006	SW846 8015B
CYN-MW1D (Duplicate)	Diesel Range Organics	ND	47.5	101	NE	U		085658-005	SW846 8015A/B
05-Mar-08	Gasoline Range Organics	ND	18.0	50.0	NE	U		085658-006	SW846 8015B
CYN-MW3	Diesel Range Organics	ND	48.0	102	NE	U		085659-005	SW846 8015A/B
05-Mar-08	Gasoline Range Organics	ND	18.0	50.0	NE	U		085659-006	SW846 8015B
CYN-MW4	Diesel Range Organics	ND	49.5	105	NE	U		085660-005	SW846 8015A/B
10-Mar-08	Gasoline Range Organics	ND	18.0	50.0	NE	U		085660-006	SW846 8015B
CYN-MW6	Diesel Range Organics	ND	52.2	111	NE	U		085661-005	SW846 8015A/B
10-Mar-08	Gasoline Range Organics	ND	18.0	50.0	NE	U		085661-006	SW846 8015B
CYN-MW7	Diesel Range Organics	50.8	47.0	100	NE	J		085663-005	SW846 8015A/B
04-Mar-08	Gasoline Range Organics	ND	18.0	50.0	NE	U		085663-006	SW846 8015B
CYN-MW8	Diesel Range Organics	ND	46.5	99.0	NE	U		085664-005	SW846 8015A/B
03-Mar-08	Gasoline Range Organics	ND	18.0	50.0	NE	U		085664-006	SW846 8015B
CYN-MW6	Diesel Range Organics	ND	57.3	122	NE	U	UJ	086280-005	SW846 8015A/B
23-Jun-08	Gasoline Range Organics	ND	18.0	50.0	NE	U		086280-006	SW846 8015B
CYN-MW1D	Diesel Range Organics	ND	51.1	109	NE	U		086789-005	SW846 8015A/B
23-Sep-08	Gasoline Range Organics	ND	18.0	50.0	NE	U		086789-006	SW846 8015B
CYN-MW1D (Duplicate)	Diesel Range Organics	ND	51.1	109	NE	U		086790-005	SW846 8015A/B
23-Sep-08	Gasoline Range Organics	ND	18.0	50.0	NE	U		086790-006	SW846 8015B
CYN-MW3	Diesel Range Organics	ND	47.5	101	NE	U		086779-005	SW846 8015A/B
16-Sep-08	Gasoline Range Organics	ND	18.0	50.0	NE	U		086779-006	SW846 8015B
CYN-MW3 (Duplicate)	Diesel Range Organics	ND	47.0	100	NE	U		086780-005	SW846 8015A/B
16-Sep-08	Gasoline Range Organics	ND	18.0	50.0	NE	U		086780-006	SW846 8015B

Refer to footnotes on page 7A-23.

Table 7A-4 *(Concluded)*
Summary of Diesel Range Organics and Gasoline Range Organics Results
Burn Site Groundwater Monitoring

October 2007 through September 2008

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	47.0	100	NE	U		086776-005	SW846 8015A/B
15-Sep-08	Gasoline Range Organics	ND	18.0	50.0	NE	U	UJ	086776-006	SW846 8015B
CYN-MW6	Diesel Range Organics	ND	48.0	102	NE	U		086782-005	SW846 8015A/B
17-Sep-08	Gasoline Range Organics	ND	18.0	50.0	NE	U		086782-006	SW846 8015B
CYN-MW7	Diesel Range Organics	ND	48.0	102	NE	U		086784-005	SW846 8015A/B
18-Sep-08	Gasoline Range Organics	ND	18.0	50.0	NE	U		086784-006	SW846 8015B
CYN-MW8	Diesel Range Organics	ND	56.0	119	NE	U		086786-005	SW846 8015A/B
22-Sep-08	Gasoline Range Organics	ND	18.0	50.0	NE	U		086786-006	SW846 8015B

Refer to footnotes on page 7A-23.

Table 7A-5
Summary of Anion and Cation Results
Burn Site Groundwater Monitoring

October 2007 through September 2008

Well ID	Analyte	Result[a] (mg/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	Bromide	0.815	0.066	0.200	NE			085446-016	SW846 9056
18-Dec-07	Chloride	55.6	0.660	2.00	NE			085446-016	SW846 9056
	Fluoride	0.674	0.033	0.100	4.0			085446-016	SW846 9056
	Sulfate	129	1.00	4.00	NE			085446-016	SW846 9056
	Calcium	149	0.100	0.500	NE			085446-017	SW846 6020
	Magnesium	39.5	0.005	0.015	NE		J	085446-017	SW846 6020
	Potassium	2.29	0.080	0.300	NE			085446-017	SW846 6020
	Sodium	36.7	0.080	0.250	NE		J	085446-017	SW846 6020
CYN-MW6 (Duplicate)	Bromide	1.15	0.066	0.200	NE			085447-016	SW846 9056
18-Dec-07	Chloride	55.4	0.660	2.00	NE			085447-016	SW846 9056
	Fluoride	0.678	0.033	0.100	4.0			085447-016	SW846 9056
	Sulfate	127	1.00	4.00	NE			085447-016	SW846 9056
	Calcium	157	0.100	0.500	NE			085447-017	SW846 6020
	Magnesium	39.9	0.005	0.015	NE		J	085447-017	SW846 6020
	Potassium	2.30	0.080	0.300	NE			085447-017	SW846 6020
	Sodium	41.7	0.080	0.250	NE		J	085447-017	SW846 6020
CYN-MW6	Bromide	0.926	0.067	0.200	NE			085661-016	SW846 9056
10-Mar-08	Chloride	58.4	0.660	2.00	NE			085661-016	SW846 9056
	Fluoride	0.674	0.033	0.100	4.0			085661-016	SW846 9056
	Sulfate	132	1.00	4.00	NE			085661-016	SW846 9056
	Calcium	154	0.200	1.00	NE	B		085661-017	SW846 6020
	Magnesium	46.1	0.005	0.015	NE		J	085661-017	SW846 6020
	Potassium	2.17	0.080	0.300	NE			085661-017	SW846 6020
	Sodium	39.5	0.800	0.250	NE			085661-017	SW846 6020
CYN-MW6	Bromide	0.870	0.067	0.200	NE			086280-016	SW846 9056
23-Jun-08	Chloride	67.8	0.660	2.00	NE			086280-016	SW846 9056
	Fluoride	0.590	0.033	0.100	4.0			086280-016	SW846 9056
	Sulfate	151	1.00	4.00	NE			086280-016	SW846 9056
	Calcium	184	0.100	0.500	NE	B		086280-017	SW846 6020
	Magnesium	46.7	0.005	0.015	NE			086280-017	SW846 6020
	Potassium	2.29	0.080	0.300	NE			086280-017	SW846 6020
	Sodium	43.7	0.080	0.250	NE			086280-017	SW846 6020

Refer to footnotes on page 7A-23.

Table 7A-5 *(Concluded)*
Summary of Anion and Cation Results
Burn Site Groundwater Monitoring

October 2007 through September 2008

Well ID	Analyte	Result[a] (mg/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	Bromide	1.12	0.067	0.200	NE			086782-016	SW846 9056
17-Sep-08	Chloride	69.7	3.30	10.0	NE			086782-016	SW846 9056
	Fluoride	0.453	0.033	0.100	4.0			086782-016	SW846 9056
	Sulfate	174	5.00	20.0	NE			086782-016	SW846 9056
	Calcium	178	0.200	1.00	NE			086782-017	SW846 6020
	Magnesium	47.7	0.0052	0.015	NE			086782-017	SW846 6020
	Potassium	2.54	0.080	0.300	NE			086782-017	SW846 6020
	Sodium	47.8	0.080	0.250	NE			086782-017	SW846 6020

Refer to footnotes on page 7A-23.

Table 7A-6
Summary of Perchlorate Results
Burn Site Groundwater Monitoring

October 2007 through September 2008

Well ID	Perchlorate Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW6 18-Dec-07	0.00620	0.004	0.012	NE	J		085446-020	EPA 314.0
CYN-MW6 (Duplicate) 18-Dec-07	0.00656	0.004	0.012	NE	J		085447-020	EPA 314.0
CYN-MW6 10-Mar-08	0.00725	0.004	0.012	NE	J		085661-020	EPA 314.0
CYN-MW6 23-Jun-08	0.00667	0.004	0.012	NE	J		086280-020	EPA 314.0
CYN-MW6 17-Sep-08	0.00685	0.004	0.012	NE	J		086782-020	EPA 314.0

Refer to footnotes on page 7A-23.

Table 7A-7
Summary of Total Metal Results
Burn Site Groundwater Monitoring

October 2007 through September 2008

Well ID	Analyte	Result[a] (mg/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	0.00821	0.005	0.015	NE	J		086789-010	SW846 6020
23-Sep-08	Antimony	0.000648	0.0005	0.002	0.006	B, J	0.0093U	086789-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086789-010	SW846 6020
	Barium	0.0552	0.0005	0.002	2.00			086789-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086789-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086789-010	SW846 6020
	Calcium	73.0	0.500	2.50	NE	B		086789-010	SW846 6020
	Chromium	0.00308	0.0015	0.003	0.100			086789-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U	UJ	086789-010	SW846 6020
	Copper	0.000806	0.0003	0.001	NE	J		086789-010	SW846 6020
	Iron	3.51	0.010	0.025	NE			086789-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086789-010	SW846 6020
	Magnesium	13.9	0.130	0.375	NE			086789-010	SW846 6020
	Manganese	0.0897	0.001	0.005	NE			086789-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086789-010	SW846 7470
	Nickel	0.00112	0.0005	0.002	NE	J		086789-010	SW846 6020
	Potassium	2.35	0.080	0.300	NE			086789-010	SW846 6020
	Selenium	0.00277	0.001	0.005	0.050	J	NJ-	086789-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086789-010	SW846 6020
	Sodium	33.6	2.00	6.25	NE			086789-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086789-010	SW846 6020
	Uranium	0.00143	0.00005	0.0002	0.030			086789-010	SW846 6020
	Vanadium	0.00952	0.003	0.010	NE	B, J	0.017U	086789-010	SW846 6020
	Zinc	0.00375	0.0026	0.010	NE	J		086789-010	SW846 6020

Refer to footnotes on page 7A-23.

Table 7A-7
Summary of Total Metal Results
Burn Site Groundwater Monitoring

October 2007 through September 2008

Well ID	Analyte	Result[a] (mg/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	0.00585	0.005	0.015	NE	J		086779-010	SW846 6020
16-Sep-08	Antimony	0.00111	0.0005	0.002	0.006	J	0.011U	086779-010	SW846 6020
	Arsenic	0.00202	0.0015	0.005	0.010	J		086779-010	SW846 6020
	Barium	0.0564	0.0005	0.002	2.00			086779-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086779-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086779-010	SW846 6020
	Calcium	133	0.200	1.00	NE			086779-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086779-010	SW846 6020
	Cobalt	0.000251	0.0001	0.001	NE	J	J+	086779-010	SW846 6020
	Copper	0.00137	0.0003	0.001	NE			086779-010	SW846 6020
	Iron	0.557	0.010	0.025	NE			086779-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086779-010	SW846 6020
	Magnesium	34.0	0.0052	0.015	NE			086779-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		086779-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086779-010	SW846 7470
	Nickel	0.00206	0.0005	0.002	NE		J+	086779-010	SW846 6020
	Potassium	2.11	0.080	0.300	NE			086779-010	SW846 6020
	Selenium	0.00883	0.001	0.005	0.050	B	0.069U	086779-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086779-010	SW846 6020
	Sodium	44.5	0.080	0.250	NE			086779-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086779-010	SW846 6020
	Uranium	0.00669	0.00005	0.0002	0.030			086779-010	SW846 6020
	Vanadium	0.0041	0.003	0.010	NE	J		086779-010	SW846 6020
	Zinc	0.00383	0.0026	0.010	NE	J	J+	086779-010	SW846 6020

Refer to footnotes on page 7A-23.

Table 7A-7
Summary of Total Metal Results
Burn Site Groundwater Monitoring

October 2007 through September 2008

Well ID	Analyte	Result[a] (mg/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	0.00755	0.005	0.015	NE	J		086776-010	SW846 6020
15-Sep-08	Antimony	0.00109	0.0005	0.002	0.006	J	0.011U	086776-010	SW846 6020
	Arsenic	0.00152	0.0015	0.005	0.010	J		086776-010	SW846 6020
	Barium	0.0546	0.0005	0.002	2.00			086776-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086776-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086776-010	SW846 6020
	Calcium	68.1	0.200	1.00	NE			086776-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086776-010	SW846 6020
	Cobalt	0.000166	0.0001	0.001	NE	J	J+	086776-010	SW846 6020
	Copper	0.0006	0.0003	0.001	NE	J		086776-010	SW846 6020
	Iron	0.271	0.010	0.025	NE			086776-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086776-010	SW846 6020
	Magnesium	30.9	0.0052	0.015	NE			086776-010	SW846 6020
	Manganese	0.0011	0.001	0.005	NE	J		086776-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086776-010	SW846 7470
	Nickel	0.00123	0.0005	0.002	NE	J	J+	086776-010	SW846 6020
	Potassium	6.35	0.080	0.300	NE			086776-010	SW846 6020
	Selenium	0.0104	0.001	0.005	0.050	B	0.069U	086776-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086776-010	SW846 6020
	Sodium	49.4	0.080	0.250	NE			086776-010	SW846 6020
	Thallium	0.00042	0.0003	0.001	0.002	J		086776-010	SW846 6020
	Uranium	0.0132	0.00005	0.0002	0.030			086776-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086776-010	SW846 6020
	Zinc	0.00919	0.0026	0.010	NE	J	J+	086776-010	SW846 6020

Refer to footnotes on page 7A-23.

Table 7A-7
Summary of Total Metal Results
Burn Site Groundwater Monitoring

October 2007 through September 2008

Well ID	Analyte	Result[a] (mg/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	0.140	0.005	0.015	NE			086782-010	SW846 6020
17-Sep-08	Antimony	0.000596	0.0005	0.002	0.006	J	0.011U	086782-010	SW846 6020
	Arsenic	ND	0.0015	0.005	0.010	U		086782-010	SW846 6020
	Barium	0.0834	0.0005	0.002	2.00			086782-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086782-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086782-010	SW846 6020
	Calcium	181	0.200	1.00	NE			086782-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086782-010	SW846 6020
	Cobalt	0.000492	0.0001	0.001	NE	J	J+	086782-010	SW846 6020
	Copper	0.00363	0.0003	0.001	NE			086782-010	SW846 6020
	Iron	0.922	0.010	0.025	NE			086782-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086782-010	SW846 6020
	Magnesium	48.2	0.0052	0.015	NE			086782-010	SW846 6020
	Manganese	0.00799	0.001	0.005	NE			086782-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086782-010	SW846 7470
	Nickel	0.0029	0.0005	0.002	NE		J+	086782-010	SW846 6020
	Potassium	2.37	0.080	0.300	NE			086782-010	SW846 6020
	Selenium	0.0101	0.001	0.005	0.050	B	0.069U	086782-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086782-010	SW846 6020
	Sodium	45.0	0.080	0.250	NE			086782-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086782-010	SW846 6020
	Uranium	0.0109	0.00005	0.0002	0.030			086782-010	SW846 6020
	Vanadium	0.0036	0.003	0.010	NE	J		086782-010	SW846 6020
	Zinc	0.00517	0.0026	0.010	NE	J	J+	086782-010	SW846 6020

Refer to footnotes on page 7A-23.

Table 7A-7
Summary of Total Metal Results
Burn Site Groundwater Monitoring

October 2007 through September 2008

Well ID	Analyte	Result[a] (mg/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	0.0383	0.005	0.015	NE			086784-010	SW846 6020
18-Sep-08	Antimony	ND	0.0005	0.002	0.006	U		086784-010	SW846 6020
	Arsenic	0.00222	0.0015	0.005	0.010	J		086784-010	SW846 6020
	Barium	0.114	0.005	0.020	2.00		J+	086784-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086784-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		086784-010	SW846 6020
	Calcium	97.7	0.200	1.00	NE			086784-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086784-010	SW846 6020
	Cobalt	0.000194	0.0001	0.001	NE	J	J+	086784-010	SW846 6020
	Copper	0.000498	0.0003	0.001	NE	J		086784-010	SW846 6020
	Iron	0.400	0.010	0.025	NE			086784-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086784-010	SW846 6020
	Magnesium	21.0	0.0052	0.015	NE			086784-010	SW846 6020
	Manganese	0.00459	0.001	0.005	NE	J		086784-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086784-010	SW846 7470
	Nickel	0.00194	0.0005	0.002	NE	J	J+	086784-010	SW846 6020
	Potassium	2.55	0.080	0.300	NE			086784-010	SW846 6020
	Selenium	0.00405	0.001	0.005	0.050	B, J	0.069U	086784-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086784-010	SW846 6020
	Sodium	40.2	0.080	0.250	NE			086784-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086784-010	SW846 6020
	Uranium	0.00663	0.00005	0.0002	0.030			086784-010	SW846 6020
	Vanadium	ND	0.003	0.010	NE	U		086784-010	SW846 6020
	Zinc	0.00394	0.0026	0.010	NE	J	J+	086784-010	SW846 6020

Refer to footnotes on page 7A-23.

Table 7A-7 *(Concluded)*
Summary of Total Metal Results
Burn Site Groundwater Monitoring

October 2007 through September 2008

Well ID	Analyte	Result[a] (mg/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	0.00812	0.005	0.015	NE	J		086786-010	SW846 6020
22-Sep-08	Antimony	0.00097	0.0005	0.002	0.006	B, J	0.0093U	086786-010	SW846 6020
	Arsenic	0.00157	0.0015	0.005	0.010	J		086786-010	SW846 6020
	Barium	0.0647	0.0005	0.002	2.00			086786-010	SW846 6020
	Beryllium	ND	0.0001	0.0005	0.004	U		086786-010	SW846 6020
	Cadmium	0.000177	0.00011	0.001	0.005	J		086786-010	SW846 6020
	Calcium	116	0.500	2.50	NE	B		086786-010	SW846 6020
	Chromium	ND	0.0015	0.003	0.100	U		086786-010	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U	UJ	086786-010	SW846 6020
	Copper	0.00126	0.0003	0.001	NE			086786-010	SW846 6020
	Iron	0.396	0.010	0.025	NE			086786-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		086786-010	SW846 6020
	Magnesium	25.6	0.130	0.375	NE			086786-010	SW846 6020
	Manganese	0.0137	0.001	0.005	NE			086786-010	SW846 6020
	Mercury	ND	0.00003	0.0002	0.002	U	UJ	086786-010	SW846 7470
	Nickel	0.00169	0.0005	0.002	NE	J		086786-010	SW846 6020
	Potassium	2.43	0.080	0.300	NE			086786-010	SW846 6020
	Selenium	0.00449	0.001	0.005	0.050	J	NJ-	086786-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		086786-010	SW846 6020
	Sodium	46.4	2.00	6.25	NE			086786-010	SW846 6020
	Thallium	ND	0.0003	0.001	0.002	U		086786-010	SW846 6020
	Uranium	0.00876	0.00005	0.0002	0.030			086786-010	SW846 6020
	Vanadium	0.0092	0.003	0.010	NE	B, J	0.017U	086786-010	SW846 6020
	Zinc	0.00609	0.0026	0.010	NE	J		086786-010	SW846 6020

Refer to footnotes on page 7A-23.

Table 7A-8
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results
Burn Site Groundwater Monitoring

October 2007 through September 2008

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	Tritium	123 ± 118	193	92.1	NE	U	BD	086789-036	EPA 906.0 M
23-Sep-08	Gross Alpha	3.58 ± 1.05	0.726	0.301	15		J-	086789-034	EPA 900.0
	Gross Beta	7.33 ± 1.83	2.04	0.994	4mrem/yr			086789-034	EPA 900.0
	Americium-241	-36.5 ± 11.9	17.7	8.85	NE	U	BD	086789-033	EPA 901.1
	Cesium-137	0.137 ± 2.10	3.54	1.77	NE	U	BD	086789-033	EPA 901.1
	Cobalt-60	0.316 ± 2.45	4.10	2.05	NE	U	BD	086789-033	EPA 901.1
	Potassium-40	4.23 ± 46.2	48.5	24.3	NE	U	BD	086789-033	EPA 901.1
CYN-MW3	Tritium	150 ± 97.6	140	61.8	NE		J	086779-036	EPA 906.0 M
16-Sep-08	Tritium (re-analysis)	-83.9 ± 93.5	168	81.2	NE	U	BD	086779-R36	EPA 906.0 M
	Gross Alpha	8.07 ± 2.38	1.81	0.781	15			086779-034	EPA 900.0
	Gross Beta	1.74 ± 2.49	4.16	2.04	4mrem/yr	U	BD	086779-034	EPA 900.0
	Americium-241	1.34 ± 10.8	18.5	9.28	NE	U	BD	086779-033	EPA 901.1
	Cesium-137	0.00144 ± 2.08	3.52	1.76	NE	U	BD	086779-033	EPA 901.1
	Cobalt-60	1.87 ± 2.29	4.06	2.03	NE	U	BD	086779-033	EPA 901.1
	Potassium-40	-10.2 ± 45.9	51.3	25.7	NE	U	BD	086779-033	EPA 901.1
CYN-MW4	Tritium	16.6 ± 74.3	137	60.3	NE	U	BD	086776-036	EPA 906.0 M
15-Sep-08	Gross Alpha	**40.5 ± 8.22**	0.838	0.334	15			086776-034	EPA 900.0
	Gross Beta	7.70 ± 2.11	2.53	1.23	4mrem/yr			086776-034	EPA 900.0
	Americium-241	2.84 ± 4.81	8.27	4.14	NE	U	BD	086776-033	EPA 901.1
	Cesium-137	0.901 ± 1.70	2.96	1.48	NE	U	BD	086776-033	EPA 901.1
	Cobalt-60	1.44 ± 1.87	3.32	1.66	NE	U	BD	086776-033	EPA 901.1
	Potassium-40	26.1 ± 42.0	28.4	14.2	NE	U	BD	086776-033	EPA 901.1
CYN-MW6	Tritium	77.1 ± 83.5	137	60.0	NE	U	BD	086782-036	EPA 906.0 M
17-Sep-08	Gross Alpha	**21.3 ± 4.95**	1.82	0.752	15			086782-034	EPA 900.0
	Gross Alpha (re-analysis)	**18.6 ± 4.33**	2.00	0.876	15			086782-R34	EPA 900.0
	Gross Beta	0.000194 ± 3.06	5.26	2.57	4mrem/yr	U	BD	086782-034	EPA 900.0
	Americium-241	-21.0 ± 7.80	11.8	5.91	NE	U	BD	086782-033	EPA 901.1
	Cesium-137	1.48 ± 1.81	3.10	1.55	NE	U	BD	086782-033	EPA 901.1
	Cobalt-60	0.767 ± 1.95	3.35	1.67	NE	U	BD	086782-033	EPA 901.1
	Potassium-40	15.8 ± 34.6	41.6	20.8	NE	U	BD	086782-033	EPA 901.1

Refer to footnotes on page 7A-23.

Table 7A-8 *(Concluded)*
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results
Burn Site Groundwater Monitoring

October 2007 through September 2008

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-MW7	Tritium	101 ± 88.7	139	61.2	NE	U	BD	086784-036	EPA 906.0 M
18-Sep-08	Gross Alpha	**18.2 ± 4.16**	1.47	0.650	15			086784-034	EPA 900.0
	Gross Beta	15.9 ± 3.13	2.23	1.08	4mrem/yr			086784-034	EPA 900.0
	Americium-241	1.27 ± 8.33	12.0	6.01	NE	U	BD	086784-033	EPA 901.1
	Cesium-137	1.27 ± 1.62	2.82	1.41	NE	U	BD	086784-033	EPA 901.1
	Cobalt-60	3.06 ± 1.85	3.45	1.73	NE	U	BD	086784-033	EPA 901.1
	Potassium-40	-36.5 ± 34.6	36.7	18.4	NE	U	BD	086784-033	EPA 901.1
CYN-MW8	Tritium	79.7 ± 116	194	92.8	NE	U	BD	086786-036	EPA 906.0 M
22-Sep-08	Gross Alpha	**33.1 ± 7.08**	2.19	1.01	15		J-	086786-034	EPA 900.0
	Gross Beta	5.15 ± 1.85	2.57	1.25	4mrem/yr		J	086786-034	EPA 900.0
	Americium-241	-7.02 ± 11.3	19.1	9.55	NE	U	BD	086786-033	EPA 901.1
	Cesium-137	1.65 ± 2.03	3.55	1.77	NE	U	BD	086786-033	EPA 901.1
	Cobalt-60	1.84 ± 2.10	3.72	1.86	NE	U	BD	086786-033	EPA 901.1
	Potassium-40	41.1 ± 64.7	33.3	16.7	NE	X	BD	086786-033	EPA 901.1

Refer to footnotes on page 7A-23.

Table 7A-9
Summary of Field Water Quality Measurements[h]
Burn Site Groundwater Monitoring

October 2007 through September 2008

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	05-Mar-08	17.38	601	14.5	7.50	23.7	18.4	1.76
	23-Sep-08	20.80	563	-78.1	7.64	24.2	13.9	1.24
CYN-MW3	05-Mar-08	15.10	1,019	248.5	7.25	0.36	61.2	6.13
	16-Sep-08	17.60	980	154.4	7.17	0.40	62.1	5.91
CYN-MW4	10-Mar-08	16.68	699	254.6	7.29	0.61	23.9	2.41
	15-Sep-08	18.76	750	146.2	7.20	0.46	24.5	2.28
CYN-MW6	18-Dec-07	13.49	1,040	387.4	6.97	0.35	20.2	2.10
	10-Mar-08	17.24	1,094	289.7	7.02	0.67	20.0	1.91
	23-Jun-08	21.01	1,139	171.7	7.05	0.69	18.5	1.64
	17-Sep-08	18.59	1,122	151.7	6.92	1.12	22.8	2.12
CYN-MW7	10-Dec-07	14.78	718	400.3	6.99	0.80	27.4	2.69
	04-Mar-08	16.19	718	330.1	7.07	0.52	29.4	2.88
	18-Sep-08	20.54	623	155.4	7.02	0.71	33.8	3.04
CYN-MW8	17-Dec-07	16.78	845	406.3	7.04	0.34	43.1	4.19
	03-Mar-08	13.92	838	380.5	7.08	0.59	36.1	3.68
	22-Sep-08	19.51	846	157.6	7.06	0.54	36.7	3.36

Refer to footnotes on page 7A-23.

Footnotes for ***Burn Site Groundwater***

[a]Result and/or Activity

- 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.
- μg/L = micrograms per liter.
- mg/L = milligrams per liter.
- pCi/L = pico curies 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

[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

[d]MCL

- Maximum contaminant level. Established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11(b)), and subsequent amendments.
- NE = not established.
- 15 pCi/L = the maximum gross alpha activity, not including radon and total uranium.
- 4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (as dose rate).

[e]Lab Qualifier

B = Analyte is detected in associated laboratory method blank.
J = Amount detected is below the practical quantitation limit (PQL).
H = Analytical holding time was exceeded.
U = Analyte is absent or below the method detection limit.
X = Data rejected due to low abundance.

[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.
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.

*Footnotes for **Burn Site Groundwater** (Concluded)*

[g]Analytical Method

- U.S. Environmental Protection Agency, 1990, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.
- EPA 9310: U.S. Environmental Protection Agency, 1990, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.
- U.S. Environmental Protection Agency, 1983, "The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0," EPA-600/4-84-017.
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[h]Field Water Quality Measurements

- Field measurements collected prior to sampling.

^{O}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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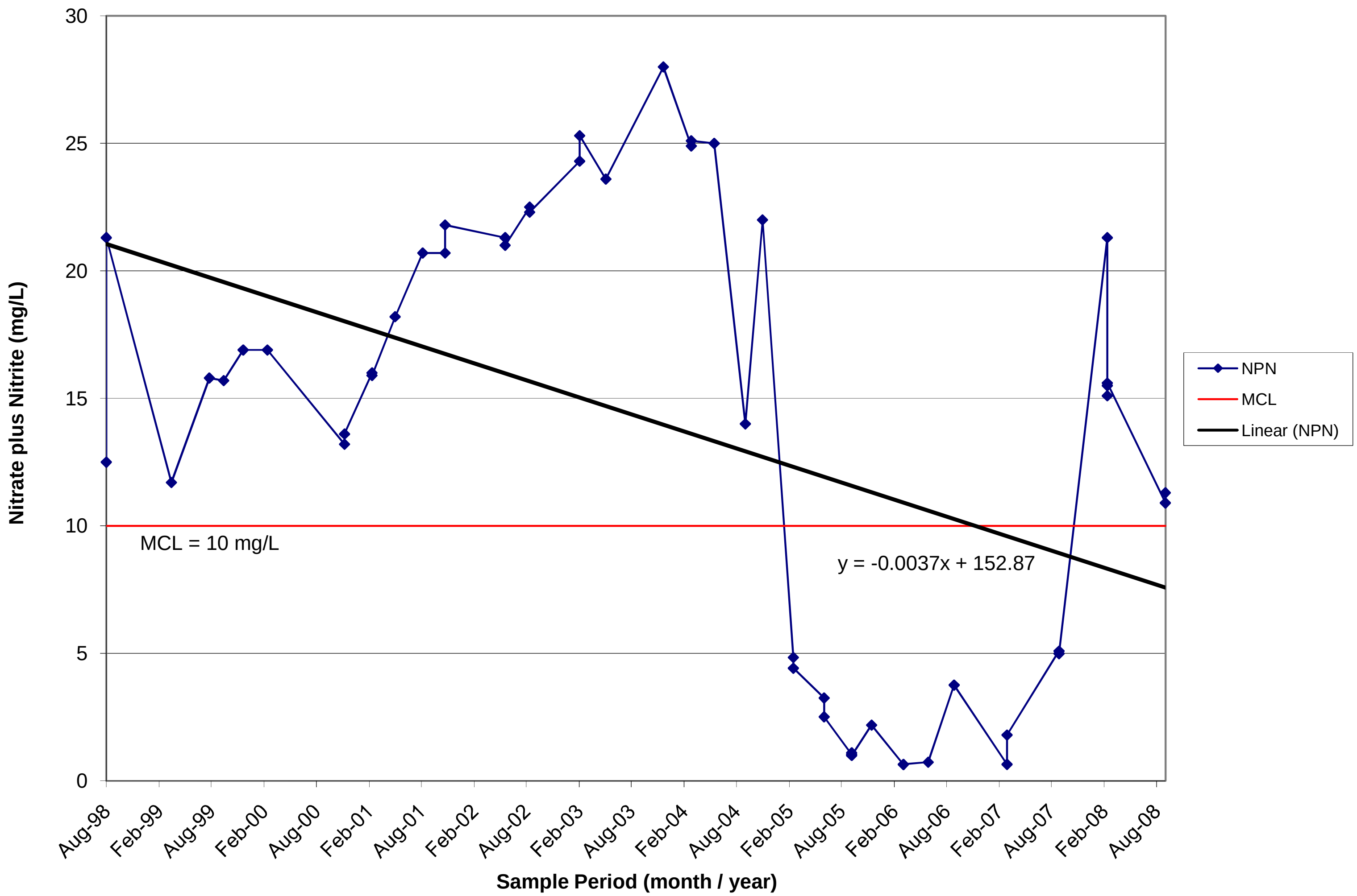

Figure 7B-1. Nitrate plus Nitrite Concentrations, CYN-MW1D

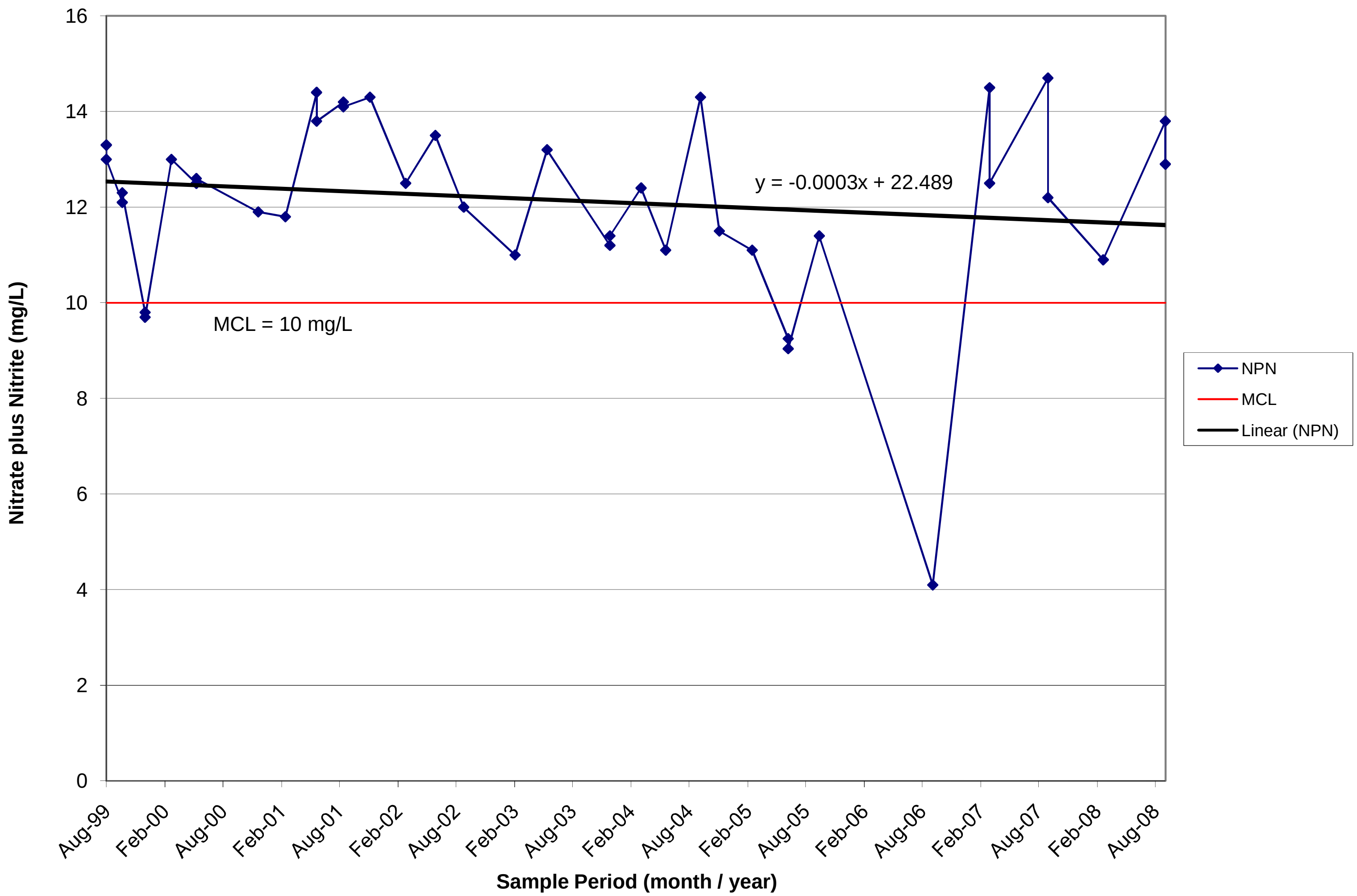

Figure 7B-2. Nitrate plus Nitrite Concentrations, CYN-MW3

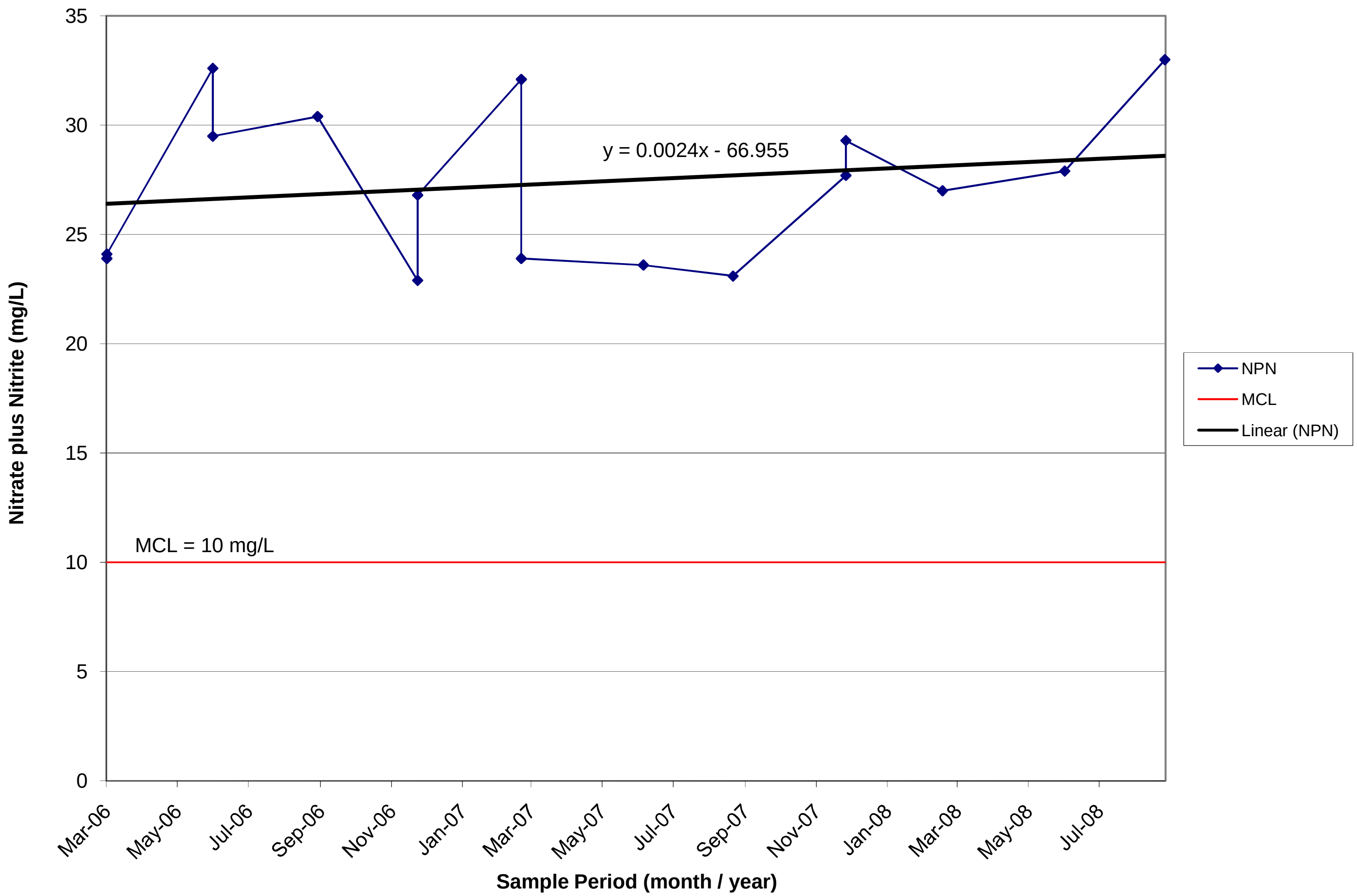

Figure 7B-3. Nitrate plus Nitrite Concentrations, CYN-MW6

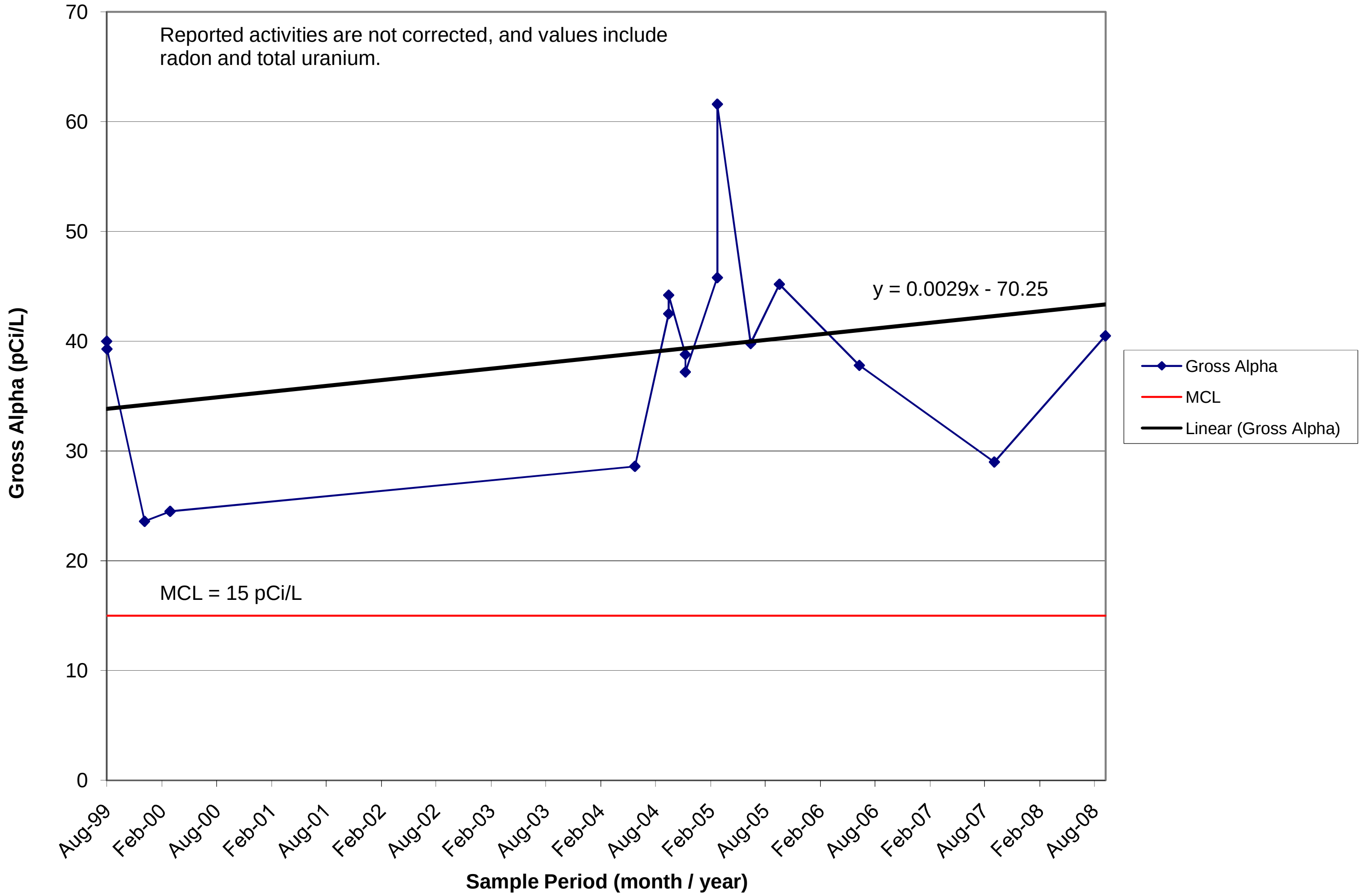

Figure 7B-4. Gross Alpha Activities, CYN-MW4

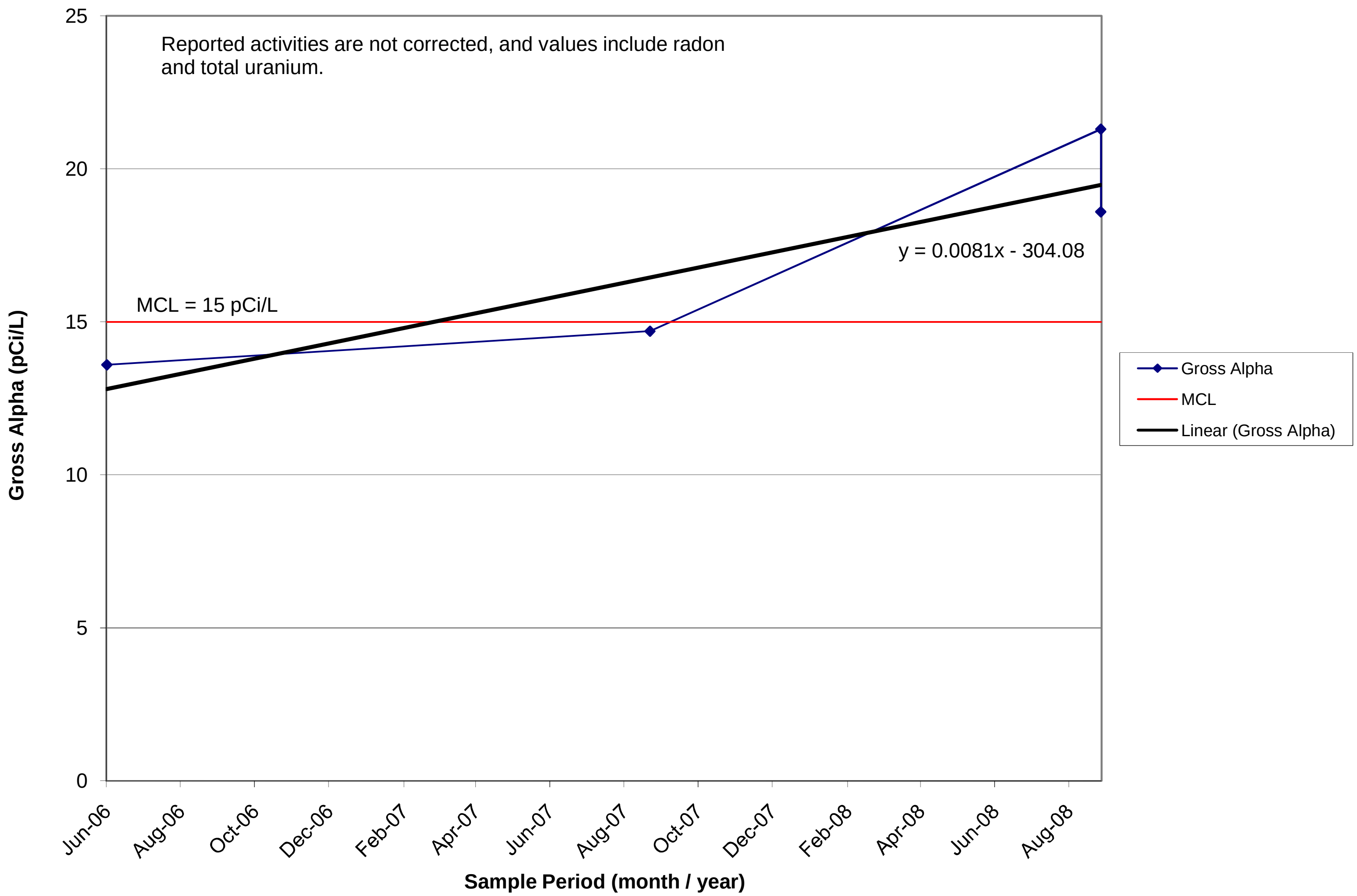

Figure 7B-5. Gross Alpha Activities, CYN-MW6

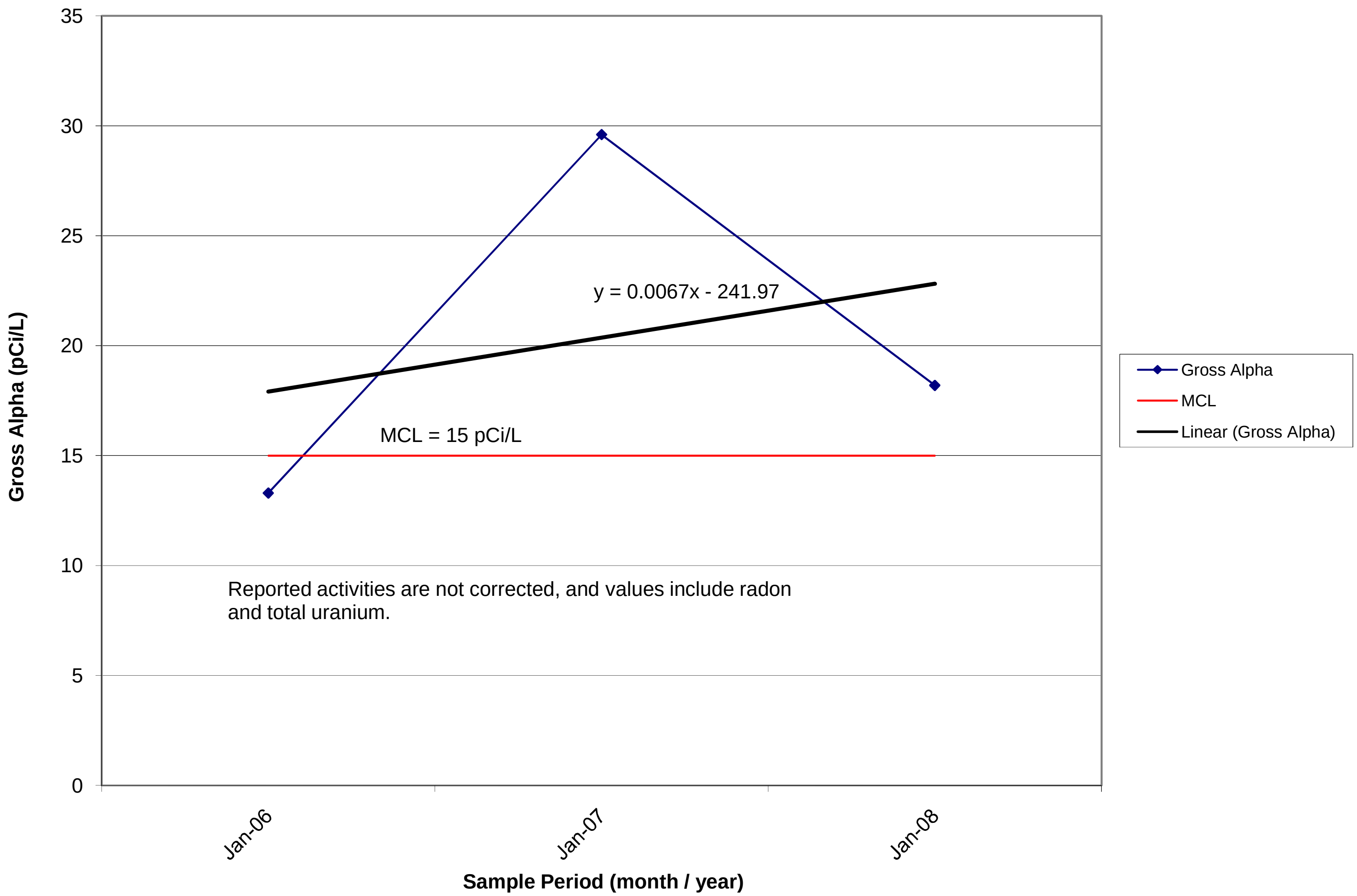

Figure 7B-6. Gross Alpha Activities, CYN-MW7

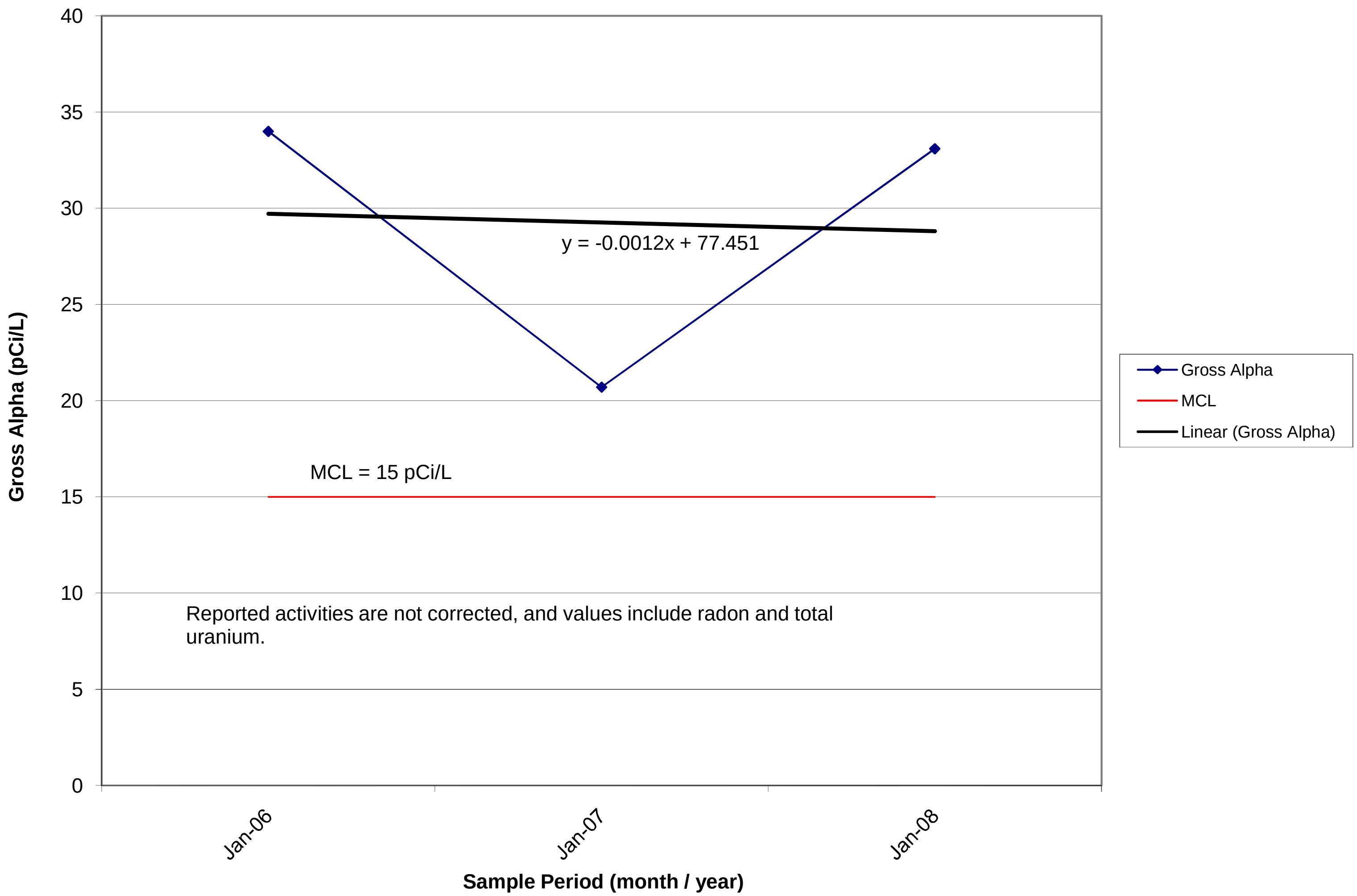

Figure 7B-7. Gross Alpha Activities, CYN-MW8

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Attachment 7C
Burn Site Groundwater
Hydrographs

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Attachment 7C Hydrographs

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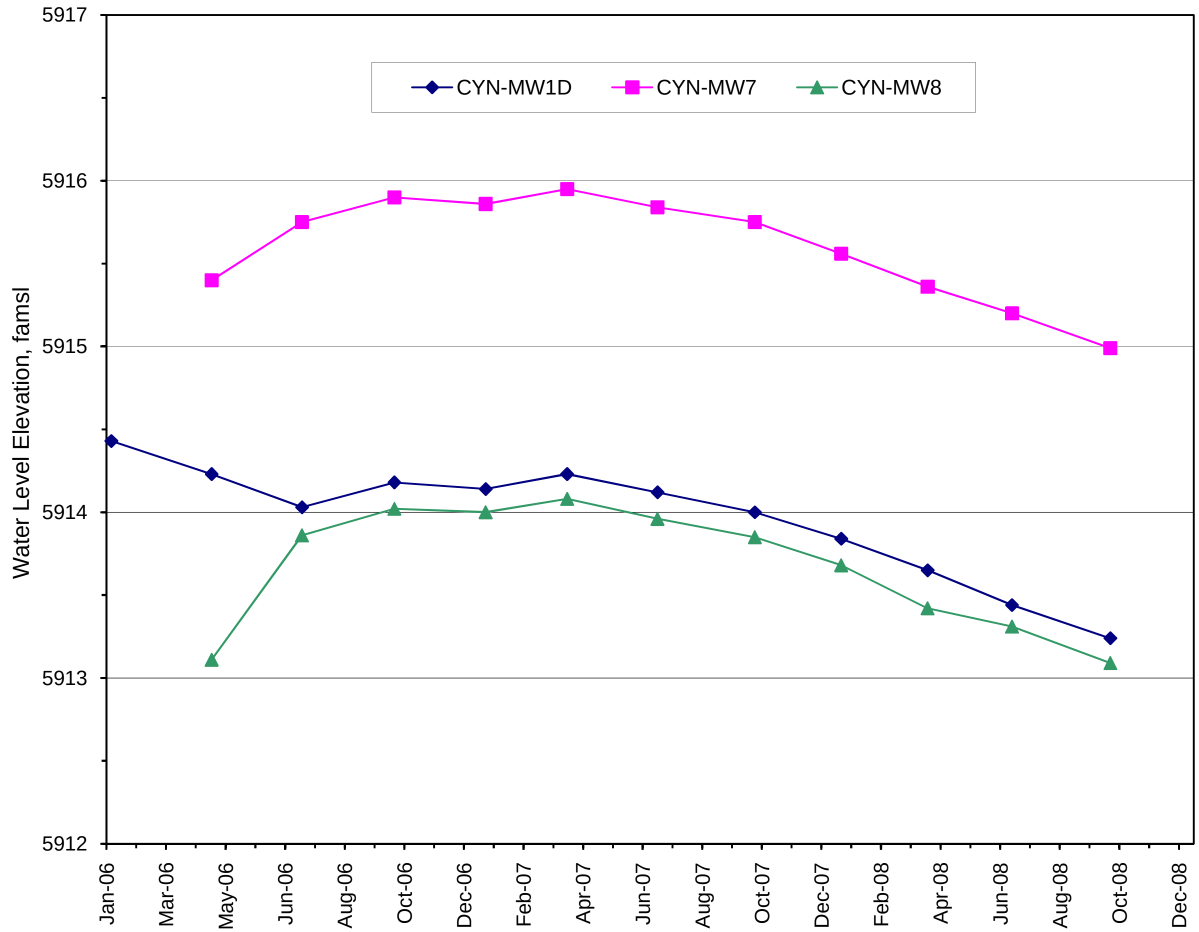

Figure 7C-1. Burn Site Groundwater Wells (1 of 4)

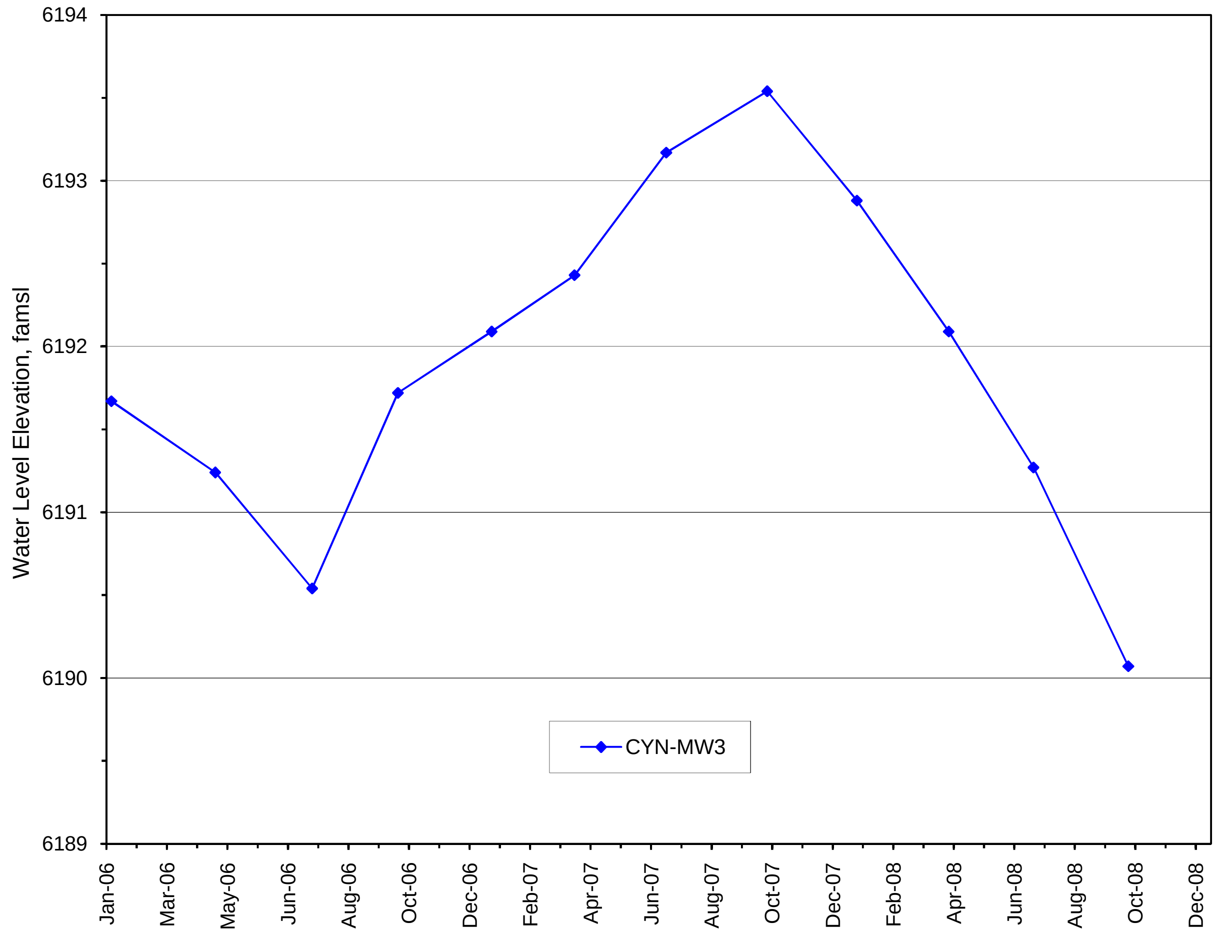

Figure 7C-2. Burn Site Groundwater Wells (2 of 4)

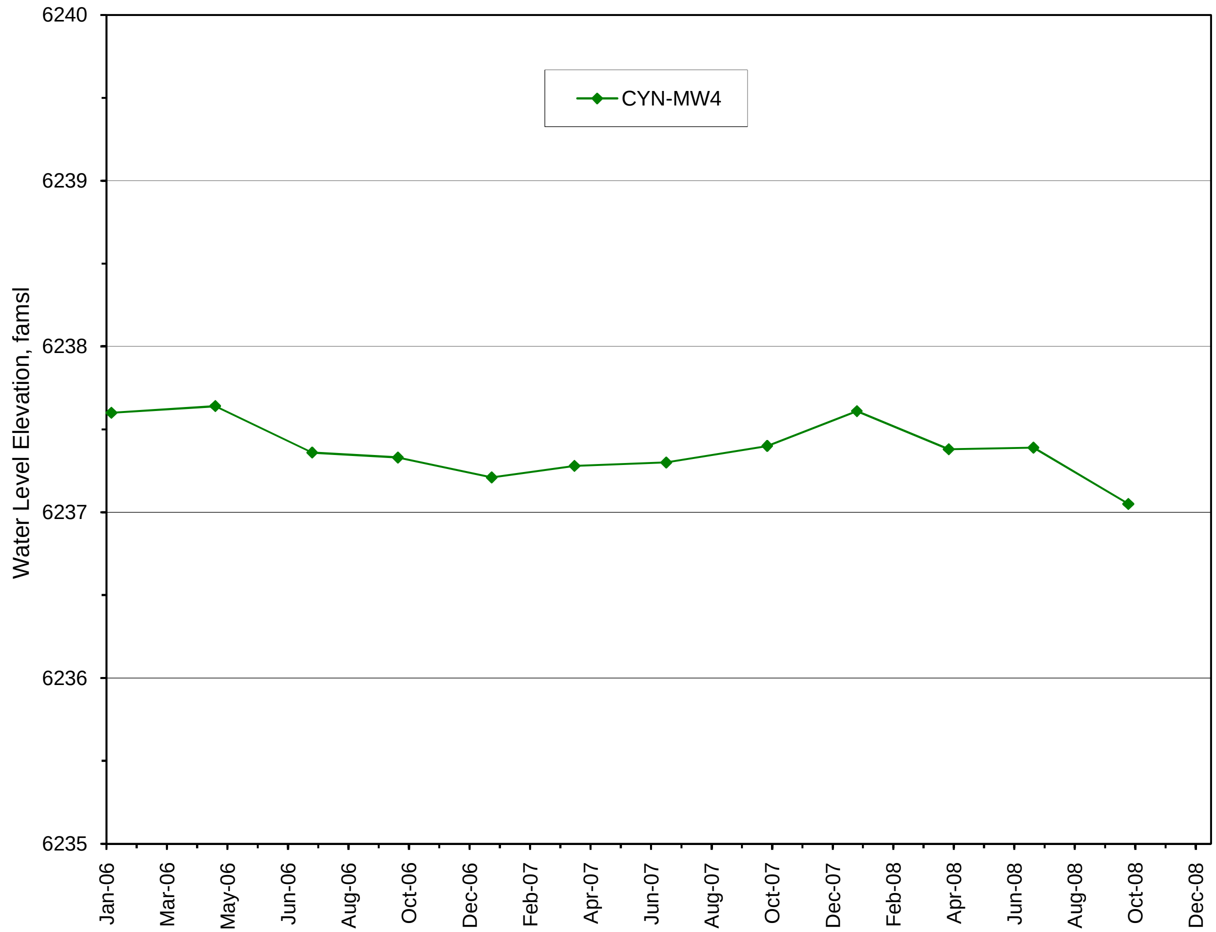

Figure 7C-3. Burn Site Groundwater Wells (3 of 4)

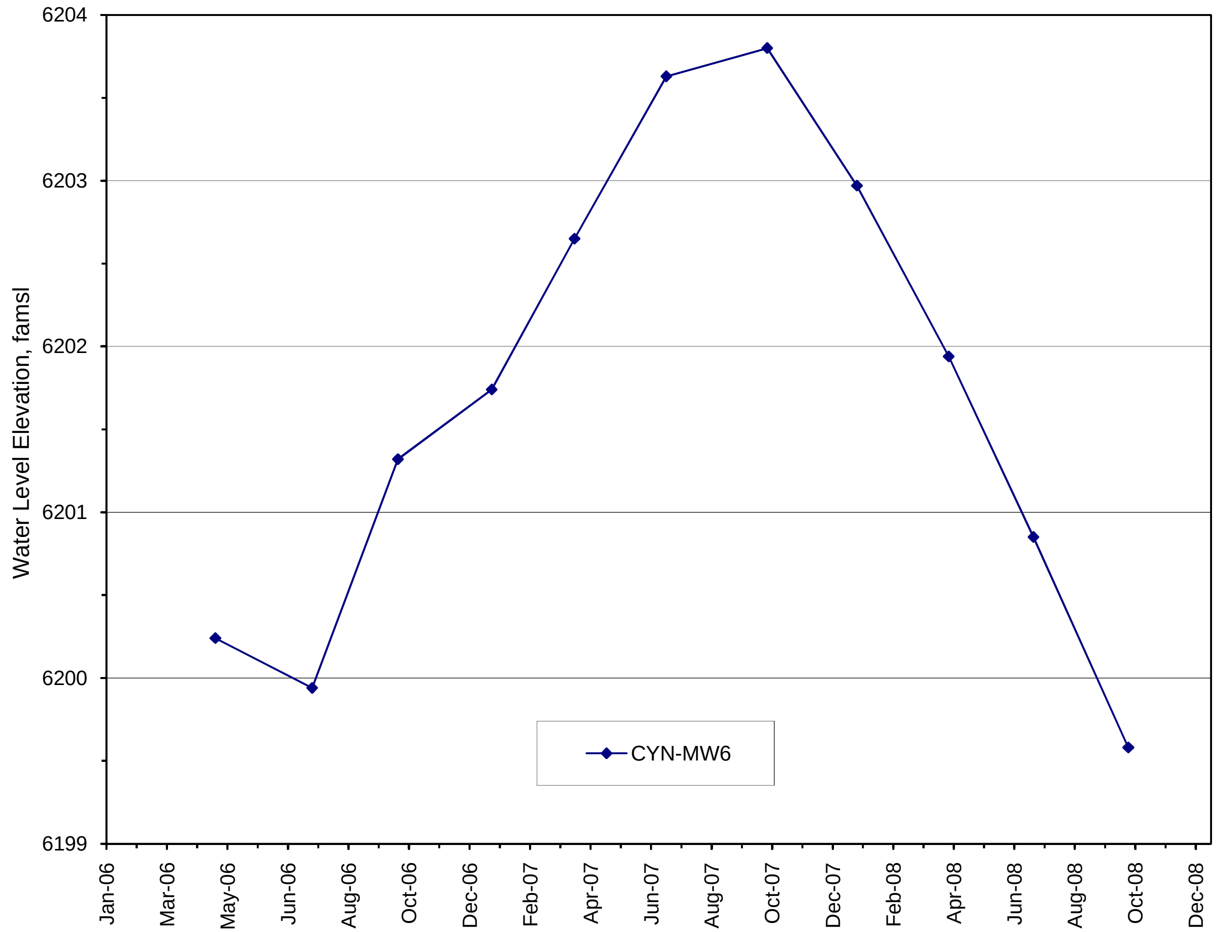

Figure 7C-4. Burn Site Groundwater Wells (4 of 4)

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