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Calendar Year 2013

# Annual Groundwater Monitoring Report

Prepared by
Sandia National Laboratories, Albuquerque, New Mexico

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# Annual Groundwater Monitoring Report
## Calendar Year 2013

# Long-Term Stewardship Consolidated Groundwater Monitoring Program
## Sandia National Laboratories, New Mexico
## June 2014

**Prepared by:**
**Long-Term Stewardship (4142) in coordination with**
**Environmental Restoration Operations (6234)**

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# Acknowledgments

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**Abstract**

Sandia National Laboratories, New Mexico (SNL/NM) is a government-owned/contractor-operated laboratory. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM for the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA). The DOE/NNSA Sandia Field Office administers the contract and oversees contractor operations at the site. Sandia conducts two types of groundwater surveillance monitoring at SNL/NM: (1) on a site-wide basis as part of the SNL/NM Long-Term Stewardship (LTS) Program's Groundwater Monitoring Program (GMP) Groundwater Surveillance Task and (2) as site-specific groundwater monitoring at LTS/Environmental Restoration (ER) Operations sites with ongoing groundwater investigations.

This Annual Groundwater Monitoring Report summarizes data collected during groundwater monitoring events conducted at GMP locations and at the following SNL/NM sites through December 31, 2013: Burn Site Groundwater Study Area; Chemical Waste Landfill; Mixed Waste Landfill; Solid Waste Management Units 8/58, 49, 68, 116, 149, and 154; Technical Area V Study Area; and the Tijeras Arroyo Groundwater Study Area. Environmental monitoring and surveillance programs are required by the New Mexico Environment Department (NMED) and DOE Order 436.1, *Departmental Sustainability,* and DOE Order 231.1B, *Environment, Safety, and Health Reporting*.

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***Abbreviations and Acronyms***

| | |
|---|---|
| ABCWUA | Albuquerque Bernalillo County Water Utility Authority |
| amsl | above mean sea level |
| AOC | area of concern |
| AOP | Administrative Operating Procedure |
| ARG | Ancestral Rio Grande |
| bgs | below ground surface |
| BSG | Burn Site Groundwater |
| CAC | Corrective Action Complete |
| CCBA | Coyote Canyon Blast Area |
| CFR | Code of Federal Regulations |
| CME | Corrective Measures Evaluation |
| CMI | Corrective Measures Implementation |
| CMIP | Corrective Measures Implementation Plan |
| CMS | Corrective Measures Study |
| COA | City of Albuquerque |
| COC | constituent of concern |
| CTF | Coyote Test Field |
| CWL | Chemical Waste Landfill |
| CY | Calendar Year |
| DO | dissolved oxygen |
| DOE | U.S. Department of Energy |
| DRO | diesel range organics |
| DSS | Drain and Septic System |
| EB | equipment blank |
| EDMS | Environmental Data Management System |
| EMS | Environmental Management System |
| EOD | Explosive Ordnance Disposal |
| EPA | U.S. Environmental Protection Agency |
| ER | Environmental Restoration |
| ET | evapotranspirative |
| FB | field blank |
| FOP | Field Operating Procedure |
| GEL | GEL Laboratories LLC |
| GMP | Groundwater Monitoring Program |
| GRO | gasoline range organics |
| GWPP | Groundwater Protection Program |
| HE | high explosive |
| HPT | High Performing Team |
| HSWA | Hazardous and Solid Waste Amendments |
| IMWP | Interim Measures Work Plan |
| IRP | Installation Restoration Program (U.S. Air Force) |
| JP-4 | jet propellant, fuel grade 4 |
| KAFB | Kirtland Air Force Base |
| LCS | laboratory control sample |
| LE | Landfill Excavation |

***Abbreviations and Acronyms (continued)***

| | |
|---|---|
| LRRI | Lovelace Respiratory Research Institute |
| LTMMP | Long-Term Monitoring and Maintenance Plan |
| LTS | Long-Term Stewardship |
| LWDS | Liquid Waste Disposal System |
| MAC | maximum allowable concentration (established by the NMED) |
| MCL | maximum contaminant level |
| MDA | minimum detectable activity |
| MDL | method detection limit |
| MWL | Mixed Waste Landfill |
| NFA | No Further Action |
| NMAC | New Mexico Administrative Code |
| NMED | New Mexico Environment Department |
| NMWQCC | New Mexico Water Quality Control Commission |
| NNSA | National Nuclear Security Administration |
| NOD | Notice of Disapproval |
| NPN | nitrate plus nitrite |
| OB | Oversight Bureau |
| ORP | oxidation-reduction potential |
| PCCP | Post-Closure Care Permit |
| PCE | tetrachloroethene |
| PGWS | perched groundwater system |
| PQL | practical quantitation limit |
| PVC | polyvinyl chloride |
| QC | quality control |
| QED™ | QED Environmental Systems MicroPurge® low-flow sampling method |
| RCRA | Resource Conservation and Recovery Act |
| RDX | hexahydro-trinitro-triazine |
| RFI | RCRA Facility Investigation |
| RPD | relative percent difference |
| RSI | Request for Supplemental Information |
| Sandia | Sandia Corporation |
| SAP | Sampling and Analysis Plan |
| SC | specific conductance |
| SDWA | Safe Drinking Water Act |
| SFO | Sandia Field Office |
| SMO | Sample Management Office |
| SNL/NM | Sandia National Laboratories, New Mexico |
| SVOC | semivolatile organic compound |
| SWMU | Solid Waste Management Unit |
| TA | Technical Area |
| TAG | Tijeras Arroyo Groundwater (Investigation) |
| TAL | Target Analyte List |
| TA-V study area | Technical Area-V Groundwater Investigation Study Area |
| TB | trip blank |
| TCE | trichloroethene (equivalent to trichlorethylene) |

***Abbreviations and Acronyms (concluded)***

| | |
|---|---|
| tetryl | methyl 2,4,6-trinitrophenylnitramine |
| the Order | Compliance Order on Consent |
| TOC | total organic carbon |
| TOX | total organic halogens |
| TPH | total petroleum hydrocarbons |
| UCS | Underground Conduit System |
| USAF | U.S. Air Force |
| USGS | U.S. Geological Survey |
| VA | Veterans Administration |
| VCM | voluntary corrective measure |
| VE | Vapor Extraction |
| VOC | volatile organic compound |

***Units***

| | |
|---|---|
| µg/L | microgram(s) per liter |
| ac-ft | acre feet |
| ft | foot (feet) |
| $ft^3/yr$ | cubic feet per year |
| ft/ft | feet per foot |
| ft/min | feet per minute |
| ft/yr | feet per year |
| gal. | gallon(s) |
| in/yr | inches per year |
| Ma | Mega Annum |
| mg/L | milligram(s) per liter |
| NTU | nephelometric turbidity units |
| pCi/g | picocuries per gram |
| pCi/L | picocuries per liter |
| pH | potential of hydrogen |
| ppbv | part(s) per billion by volume |
| sq mi | square mile(s) |
| yr | year(s) |

***Monitoring Well Location Descriptions***

| | |
|---|---|
| AVN-# | Area V (North) |
| CCBA-# | Coyote Canyon Blast Area |
| CTF-# | Coyote Test Field |
| CWL-# | Chemical Waste Landfill |
| CYN-# | Lurance Canyon |
| EOD | Explosive Ordnance Disposal |
| HERTF | High Energy Research Test Facility |
| IP | Isleta Pueblo |
| ITRI | Inhalation Toxicology Research Institute |
| LMF | Large Melt Facility |
| LWDS-# | Liquid Waste Disposal System |
| MP-# | Montessa Park |
| MRN-# | Magazine Road North |
| MVMW# | Mountain View Monitoring Well |
| MWL-# | Mixed Waste Landfill |
| NMED-# | New Mexico Environment Department |
| NWTA3-# | Northwest Technical Area III |
| OBS-# | Old Burn Site |
| PGS-# | Parade Ground South |
| PL-# | Power Line Road, west |
| SFR-# | South Fence Road |
| STW-# | Solar Tower (West) |
| SWTA-# | Southwest Technical Area III |
| TA1-W-# | Technical Area I (Well) |
| TA2-NW-# | Technical Area II (Northwest) |
| TA2-SW-# | Technical Area II (Southwest) |
| TA2-W-# | Technical Area II (Well) |
| TAV-# | Technical Area V |
| TJA-# | Tijeras Arroyo |
| TRE-# | Thunder Road East |
| TRN-# | Target Road North |
| TRS-# | Target Road South |
| TSA-# | Transportation Safeguards Academy |
| WYO-# | Wyoming |
| 12AUP-# | ER Site 12A Underflow Piezometer |

**** Meteorological Towers***

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

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# Annual Groundwater Monitoring Report

## Executive Summary

Sandia Corporation (Sandia) conducts groundwater surveillance monitoring for the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) at Sandia National Laboratories, New Mexico (SNL/NM) on a site-wide basis as part of the SNL/NM Long-Term Stewardship (LTS) Program's Groundwater Monitoring Program (GMP) Groundwater Surveillance Task, and on a site-specific basis at LTS/Environmental Restoration (ER) Operations (formerly ER Project) sites with ongoing groundwater investigations. The SNL/NM facility is located on Kirtland Air Force Base (KAFB) in central New Mexico.

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia, a wholly owned subsidiary of Lockheed Martin Corporation, for the DOE/NNSA under Contract DE-AC04-94AL85000.

This Annual Groundwater Monitoring Report documents the results of the groundwater monitoring activities at SNL/NM for Calendar Year (CY) 2013. This report has been prepared to meet the environmental reporting requirements for the CY 2013 Annual Site Environmental Report, providing an annual update of groundwater data to regulators, stakeholders, and outside agencies. In addition, it serves as a valuable tool to inform the public about the groundwater quality at SNL/NM. This report includes both water quality sampling results and water level measurements. Separate chapters focus on the investigation activities at each of the following monitoring networks maintained at SNL/NM: GMP site-wide surveillance (Chapter 2.0); Chemical Waste Landfill (CWL) (Chapter 3.0); Mixed Waste Landfill (MWL) (Chapter 4.0); Technical Area (TA)-V (Chapter 5.0); Tijeras Arroyo Groundwater (TAG) (Chapter 6.0); Burn Site Groundwater (BSG) (Chapter 7.0); Solid Waste Management Units (SWMUs) 8/58 (Chapter 8.0); SWMU 49 (Chapter 9.0); SWMU 68 (Chapter 10.0); SWMU 116 (Chapter 11.0); SWMU 149 (Chapter 12.0); and SWMU 154 (Chapter 13.0).

Chapter 1.0 provides the general site description for the SNL/NM facility and describes the regulatory criteria and sample collection methods for both SNL/NM site-specific and site-wide groundwater monitoring tasks. The regional aquifer supplying the Albuquerque Bernalillo County Water Utility Authority (ABCWUA), Veterans Administration, and KAFB production wells is located within the Albuquerque Basin. The regional aquifer is mostly contained within the upper unit and, to some extent, the middle unit of the Santa Fe Group. The edge of the basin on the east side is defined by the Sandia, Manzanita, and Manzano Mountains. KAFB straddles the east side of the basin and is divided approximately in half by basin-bounding faults. On KAFB, the basin is primarily defined by the north-south-trending Sandia fault and the Hubbell Springs fault. The Tijeras fault, a strike-slip fault that trends northeast-southwest, intersects the Sandia and Hubbell Springs faults forming a system of faults collectively referred to as the Tijeras fault complex. The faults form a distinct hydrogeological boundary between the regional aquifer within the basin (approximately 500 feet [ft] below ground surface [bgs]) and the more shallow bedrock aquifer systems within the uplifted areas (generally between 50 to 325 ft bgs).

The LTS Program monitors the GMP network to provide site-wide characterization data. In addition, SNL/NM LTS and ER Operations maintain 11 site-specific groundwater monitoring networks at the following locations:

- CWL
- MWL

- TA-V
- TAG
- BSG
- SWMUs 8/58
- SWMU 49
- SWMU 68
- SWMU 116
- SWMU 149
- SWMU 154

At SNL/NM, SWMUs are regulated under the Hazardous and Solid Waste Amendment (HSWA) module of the SNL/NM Resource Conservation and Recovery Permit. In the HSWA module, a SWMU is defined as "any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste." Monitoring and/or corrective action requirements generally are determined on a SWMU-specific basis following a site investigation. A Compliance Order on Consent (the Order) between the New Mexico Environment Department (NMED), the DOE, and Sandia governs corrective actions for these sites and, accordingly, monitoring performed at the MWL; the TA-V, TAG, BSG Study Areas; and SWMUs 8/58, 49, 68, 116, 149, and 154. The CWL is a closed, regulated unit undergoing post-closure care in accordance with the CWL Post-Closure Care Permit (PCCP) that became effective on June 2, 2011. Groundwater monitoring requirements, procedures, and protocols are detailed CWL PCCP Attachment 2, Groundwater Sampling and Analysis Plan.

**Groundwater Quality Monitoring Activities and Results**

During CY 2013, groundwater samples were collected from monitoring wells for the 12 investigations (GMP and 11 LTS/ER Operations sites). The analytical results for samples from all monitoring wells were compared with maximum contaminant levels (MCLs) established by the U.S. Environmental Protection Agency (EPA). The results for GMP monitoring wells were also compared with NMED maximum allowable concentrations (MACs) promulgated for groundwater by the State of New Mexico Water Quality Control Commission (NMWQCC). The activities and results are summarized for each location in the following sections, and the data are presented in the attachments following each chapter.

In this report, groundwater monitoring data are presented for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (gamma spectroscopy, gross alpha/beta activity, and tritium) are provided voluntarily by the DOE/NNSA and Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Order, as specified in Section III.A of the Order.

**Groundwater Monitoring Program**

Chapter 2.0 documents the results of the CY 2013 groundwater surveillance monitoring activities conducted as part of the SNL/NM GMP. Water levels were measured at 118 monitoring wells by SNL/NM personnel. Water level measurements were obtained either monthly or quarterly depending on the response characteristics of the groundwater system at each well location to pumping or other stresses. The surveillance activities include the annual collection and analysis of groundwater samples from 12 monitoring wells and 1 surface water sample from a spring. Annual sampling of groundwater was conducted during April/May 2013, with some well-specific resampling completed in August and September 2013. Samples collected from all locations were analyzed for Safe Drinking Water Act list volatile organic compounds (VOCs), total organic halogens, total phenols, total alkalinity, nitrate plus nitrite (NPN), total cyanide, major anions, Target Analyte List (TAL) metals plus uranium, mercury, radionuclides by gamma spectroscopy, gross alpha/beta activity, radium-226, and radium-228. Additional

samples were collected at selected monitoring wells for analysis of high explosive (HE) compounds and isotopic uranium.

No analytical parameters exceed established MCLs or MACs, except for beryllium and fluoride. The concentrations of these analytes that exceed MCLs or MACs in groundwater samples are similar to the results reported for previous years.

Fluoride was detected above the NMWQCC groundwater protection MAC of 1.6 milligrams per liter (mg/L) at four sampling locations (Coyote Springs and monitoring wells SFR-2S, SFR-4T, and TRE-1). The concentrations range from 1.74 to 2.87 mg/L. The EPA MCL for fluoride is 4.0 mg/L.

Beryllium was detected in the surface water sample from Coyote Springs at a concentration of 0.00754 mg/L. The MCL for beryllium is 0.004 mg/L. Beryllium has been consistently detected in the surface water samples from Coyote Springs and is considered to be of natural origin.

Groundwater elevation measurements were obtained throughout CY 2013 at 97 locations on a monthly or quarterly basis. Groundwater elevation measurements obtained from representative monitoring wells were used to construct contours of the potentiometric surface. The contours display a pattern that reflects the impact of the groundwater withdrawal by water supply wells located in the northwestern portion of KAFB and within the city.

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

**Chemical Waste Landfill**

Chapter 3.0 discusses the CWL semiannual groundwater monitoring activities performed during January and July 2013. Groundwater samples were collected from four monitoring wells (CWL-BW5, CWL-MW9, CWL-MW10, and CWL-MW11) and analyzed for trichloroethene (TCE), 1,1,2-trichloro-1,2,2-trifluoroethane, tetrachloroethene, 1,1-dichloroethene, chloroform, trichlorofluoromethane, nickel, and chromium (January); and for TCE, nickel, and chromium (July). No analytes were detected at concentrations exceeding the associated EPA MCLs in any of the CWL groundwater samples. The analytical results are comparable to historical values.

**Mixed Waste Landfill**

Chapter 4.0 discusses the MWL annual groundwater sampling activities conducted in January and February 2013. Groundwater samples were collected from seven monitoring wells (MWL-BW2, MWL-MW4, MWL-MW5, MWL-MW6, MWL-MW7, MWL-MW8, and MWL-MW9) and analyzed for VOCs, TAL metals plus uranium, anions (i.e., bromide, chloride, fluoride, and sulfate), total alkalinity, NPN, radionuclides by gamma spectroscopy, gross alpha/beta activity, and tritium as specified in the Order. No analytes were detected at concentrations exceeding the associated EPA MCLs, except for chromium in the unfiltered sample fraction from monitoring well MWL-MW4. This exceedance appears to be related to the corrosion of stainless steel components of the packer and dedicated sampling system in this well (no other wells at MWL have a dedicated sampling system). The analytical results for the other six monitoring wells are comparable to historical values.

**Technical Area V Groundwater Study Area**

Chapter 5.0 discusses the TA-V groundwater monitoring activities conducted during CY 2013. Both TCE and nitrate have been identified as constituents of concern (COCs) in groundwater at the TA-V

Groundwater Study Area (TA-V study area) based on detections above the EPA MCL in samples collected from monitoring wells. Currently 16 wells in the TA-V Study Area are monitored for water quality and water levels. Table XI-1 of the Order specifies that the sampling frequency for groundwater monitoring at TA-V is quarterly. Unique features of the TA-V Study Area include low concentrations of TCE and nitrate in the regional aquifer.

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

Only NPN and TCE were detected above the MCLs in groundwater samples from TA-V Study Area wells. NPN concentrations exceed the MCL of 10 mg/L in samples from monitoring wells LWDS-MW1, TAV-MW10, and AVN-1 with a maximum concentration of 13.0 mg/L in the sample collected from monitoring well LWDS-MW1 in November 2013.

During CY 2013, TCE exceeded the MCL of 5 micrograms per liter (μg/L) in samples from five monitoring wells (LWDS-MW1, TAV-MW6, TAV-MW10, TAV-MW12, and TAV-MW14). The maximum concentration of TCE detected during this reporting period is 18.4 μg/L found in the sample from monitoring well LWDS-MW1 collected in March 2013.

The analytical results for this reporting period are consistent with historical concentrations. The current conceptual site model for the TA-V Study Area does not require modification based on the sampling results for CY 2013.

The following activities took place for the TA-V Study Area during CY 2013:

- Monthly or quarterly water level measurements were obtained for all TA-V Study Area wells.
- Semiannual and quarterly groundwater sampling events were conducted at 16 wells in February/March, May/June, July/August, and October/November 2013.
- The final quarterly soil vapor sampling was conducted at monitoring wells TAV-SV01, TAV-SV02, and TAV-SV03 in February/March 2013.

**Tijeras Arroyo Groundwater Study Area**

Chapter 6.0 addresses groundwater monitoring activities conducted during CY 2013 at the TAG Study Area. Currently, 21 wells in the TAG Study Area are monitored for water quality, and 30 wells are monitored for water levels. Two groundwater systems are present in the TAG Study Area: the PGWS at approximately 220 to 330 ft bgs and the regional aquifer groundwater system at approximately 440 to 570 ft bgs. Groundwater monitoring wells are completed within either the PGWS or regional aquifer. Unique features of the TAG Study Area include concentrations of TCE below to just above the MCL at scattered locations in the PGWS and concentrations of nitrate above the MCL at scattered locations in the PGWS and regional aquifer.

For CY 2013, wells were sampled in March, June, August/September, and November. The samples were analyzed for VOCs, NPN, anions, TAL metals (plus uranium), gross alpha/beta activity, tritium, and

radionuclides by gamma spectroscopy. Depending on their locations and historical concentrations of COCs, wells were sampled quarterly, semiannually, or annually during this reporting period.

Both TCE and nitrate have been identified as COCs in groundwater at the TAG Study Area based on historical groundwater monitoring results. Only NPN and TCE were detected above MCLs in samples from TAG Study Area wells. In CY 2013, NPN concentrations exceeded the MCL of 10 mg/L in samples from monitoring wells TA2-SW1-320, TA2-W-19, TJA-2, TJA-4, and TJA-7, with a maximum concentration of 38.5 mg/L in the sample from monitoring well TJA-4 collected during the November 2013 sampling event. NPN concentrations in monitoring wells TA2-SW1-320, TJA-4, and TJA-7 have generally exceeded the MCL for the life of the wells, whereas NPN concentrations occasionally have exceeded the MCL in samples from monitoring wells TJA-2 and TA2-W-19.

During CY 2013, TCE exceeded the MCL of 5 µg/L in the groundwater sample from one PGWS well, WYO-4. The maximum concentration of TCE detected during this reporting period is 9.23 µg/L in the sample from monitoring well WYO-4 collected during the August 2013 sampling event. TCE concentrations in samples from monitoring well WYO-4 slightly exceed the MCL, and trends are level to slightly increasing over time.

The analytical results for this reporting period are consistent with historical concentrations. The current conceptual site model for the TAG Study Area does not require modification based on the sampling results for CY 2013.

The following activities took place for the TAG Study Area during CY 2013:

- Monthly, quarterly, or annual water level measurements were obtained from TAG monitoring wells.
- Quarterly groundwater sampling events were conducted at seven monitoring wells (TA2-SW1-320, TA2-W-19, TA2-W-26, TJA-2, TJA-4, TJA-7, and WYO-4) in March, June, August/September, and November 2013. The sampling frequency for monitoring well TJA-3 was modified to quarterly sampling in November 2013.
- Semiannual groundwater sampling was conducted at four monitoring wells (TA2-W-01, TA2-W-27, TJA-3, and TJA-6) in March and August/September 2013.
- Annual groundwater sampling was conducted at 10 monitoring wells (PGS-2, TA1-W-01, TA1-W-02, TA1-W-03, TA1-W-04, TA1-W-05, TA1-W-06, TA1-W-08, TA2-NW1-595, and WYO-3) in August/September 2013.

**Burn Site Groundwater Study Area**

Chapter 7.0 discusses the groundwater monitoring activities conducted during CY 2013 at the BSG Study Area, which is located around the active Lurance Canyon Burn Site facility. Groundwater investigations were initiated in 1997 at the request of the NMED after elevated nitrate levels were discovered in the Burn Site Well (a nonpotable production well used for fire suppression). The study area consists of 10 monitoring wells, and samples were collected and analyzed for VOCs, HE compounds, total petroleum hydrocarbons (TPH)-diesel range organics, TPH-gasoline range organics, anions, NPN, TAL metals (plus uranium), gross alpha/beta activity, isotopic uranium, tritium, and radionuclides by gamma spectroscopy. Additional samples for alkalinity and major cations (as calcium, magnesium, potassium, and sodium) were collected from monitoring well CYN-MW13 only.

Only NPN was detected above the MCL in samples from BSG Study Area wells. NPN results exceed the MCL of 10 mg/L in samples from monitoring wells CYN-MW9, CYN-MW11, CYN-MW12, and CYN-MW13 with a maximum concentration of 41.9 mg/L in the sample from monitoring well CYN-MW9 collected during the December 2013 sampling event.

The analytical results for this reporting period are consistent with historical concentrations. The current conceptual site model requires light modification based on the sampling results for CY 2013.

The following activities took place for the BSG Study Area during CY 2013:

- Semiannual groundwater sampling was conducted at eight monitoring wells (CYN-MW4, CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, and CYN-MW13) in April/May and December 2013.

**Solid Waste Management Units 8/58**

Chapter 8.0 discusses the groundwater monitoring activities conducted during CY 2013 at SWMUs 8/58, which are located in the Arroyo del Coyote watershed that captures runoff from the western flank of the Manzanita Mountains. Monitoring wells CCBA-MW1 and CCBA-MW2 were installed in August 2011, and these wells have been sampled quarterly since then. The groundwater samples from each well were analyzed for VOCs, SVOCs, HE compounds, NPN, major anions (i.e., bromide, chloride, fluoride, and sulfate), major cations (i.e., calcium, magnesium, potassium, and sodium), alkalinity, TAL metals plus uranium, perchlorate, total cyanide, radionuclides by gamma spectroscopy, gross alpha/beta activity, and isotopic uranium.

No parameters were detected above established MCLs, except for fluoride. Fluoride exceeds the established MCL of 4.0 mg/L in monitoring well CCBA-MW1 samples at concentrations ranging from 4.57 to 5.00 mg/L.

The following activities took place for SWMUs 8/58 during CY 2013:

- Quarterly groundwater sampling was conducted at monitoring wells CCBA-MW1 and CCBA-MW2 in January, April, July, and October 2013.

**Solid Waste Management Unit 49**

Chapter 9.0 discusses the SWMU 49 annual groundwater monitoring activities performed during CY 2013. SWMU 49 is located in Lurance Canyon and consists of a surface discharge area associated with a former trailer used as a darkroom and the area around a drainpipe outfall from Building 9820. The DOE/NNSA and Sandia received a letter from the NMED on April 14, 2010, that lists SWMU 49 under the heading of "SWMUs/AOCs to be Subject to Groundwater Monitoring Controls" and further states that SWMU 49 requires long-term monitoring of groundwater on an annual basis as a site control. Annual sampling was completed in 2013, and samples were analyzed for general chemistry, VOCs, HE compounds, perchlorate, metals, cyanide, NPN, gross alpha/beta activity, and radionuclides by gamma spectroscopy. No analytes were detected above their respective MCLs.

The following activities took place for SWMU 49 during CY 2013:

- Annual groundwater sampling was conducted at monitoring well CYN-MW5 in January 2013.

- Periodic groundwater elevation data were obtained from monitoring well CYN-MW5.

**Solid Waste Management Unit 68**
Chapter 10.0 discusses the quarterly groundwater monitoring activities performed during CY 2013 at SWMU 68, which is located in Coyote Test Field. Monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 were installed in August 2011, and these wells have been sampled quarterly since then. The groundwater samples from each well were analyzed for VOCs, SVOCs, HE compounds, NPN, major anions (i.e., bromide, chloride, fluoride, and sulfate), major cations (i.e., calcium, magnesium, potassium, and sodium), alkalinity, TAL metals plus uranium, perchlorate, total cyanide, hexavalent chromium, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium. No parameters were detected above established MCLs.

The following activities took place for SWMU 68 during CY 2013:

- Quarterly groundwater sampling was conducted at monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 in January, April, July, and October 2013.

**Solid Waste Management Unit 116**
Chapter 11.0 discusses the SWMU 116 annual groundwater monitoring activities performed during CY 2013. SWMU 116 is located on the western margin of the Manzanita Mountain foothills and includes the immediate area surrounding the five seepage pits and septic tank located south of Building 9990. The DOE/NNSA and Sandia received a letter from the NMED on April 14, 2010, that lists SWMU 116 under the heading of "SWMUs/AOCs to be Subject to Groundwater Monitoring Controls" and further states that SWMU 116 requires long-term monitoring of groundwater on an annual basis as a site control. Annual sampling was completed in 2013, and samples were analyzed for general chemistry, VOCs, HE compounds, perchlorate, TAL metals plus uranium, cyanide, NPN, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium. No analytes were detected above their respective MCLs.

The following activities took place for SWMU 116 during CY 2013:

- Annual groundwater sampling was conducted at monitoring well CTF-MW1 in January 2013.

- Periodic groundwater elevation data were obtained from monitoring well CTF-MW1.

**Solid Waste Management Unit 149**
Chapter 12.0 discusses the quarterly groundwater monitoring activities performed during CY 2013 at SWMU 149, which is located in the Coyote Test Field. Monitoring well CTF-MW3 was sampled quarterly and the samples were analyzed for VOCs, TAL metals, general chemistry parameters, perchlorate, and NPN. No analytical results for the monitoring well CTF-MW3 groundwater samples exceed the corresponding MCLs.

The following activities took place for monitoring well CTF-MW3 near SWMU 149 during CY 2013:

- Quarterly groundwater sampling was conducted at monitoring well CTF-MW3 in March, June, and December 2013. Groundwater samples were not collected in September 2013 because severe thunderstorms eroded both roads to monitoring well CTF-MW3.

- Quarterly reporting of analytical results for monitoring well CTF-MW3 was conducted.

**Solid Waste Management Unit 154**

Chapter 13.0 discusses the quarterly groundwater monitoring activities performed during CY 2013 at SWMU 154, which is located in Coyote Test Field. Monitoring well CTF-MW2 was sampled quarterly and the samples were analyzed for VOCs, SVOCs, HE compounds, NPN, major anions, alkalinity, TAL total metals plus uranium, perchlorate, radionuclides by gamma spectroscopy, gross alpha/beta activity, and isotopic uranium.

For all four quarters, arsenic was detected above the established MCL of 0.010 mg/L. Arsenic concentrations ranged from 0.0366 to 0.0496 mg/L, with the maximum concentration reported for the filtered sample collected in March 2013. No other analytical results for the monitoring well CTF-MW2 groundwater samples exceed the corresponding MCLs.

The following activities took place for monitoring well CTF-MW2 near SWMU 154 during CY 2013:

- Quarterly groundwater sampling was conducted at monitoring well CTF-MW2 in March, June, September, and December 2013.
- Quarterly reporting of analytical results for groundwater samples from monitoring well CTF-MW2 was conducted.

**Future Groundwater Monitoring Events**

The groundwater monitoring events conducted on a site-wide basis as part of the SNL/NM GMP and at site-specific LTS/ER Operations sites will continue on a quarterly, semiannual, annual, and biennial basis during CY 2014, as specified by regulatory guidance. The results for these monitoring events will be presented in the Annual Groundwater Monitoring Report for CY 2014.

# 1.0 Introduction

Sandia Corporation (Sandia) conducts general groundwater surveillance monitoring for the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) at Sandia National Laboratories, New Mexico (SNL/NM) on a site-wide basis as part of the SNL/NM Long-Term Stewardship (LTS) Program's Groundwater Monitoring Program (GMP) Groundwater Surveillance Task, and site-specific groundwater monitoring at LTS/Environmental Restoration (ER) Operations (formerly ER Project) sites with ongoing groundwater investigations. The purpose of this document is to report to regulators and other stakeholders the results of the consolidated groundwater monitoring activities at SNL/NM for Calendar Year (CY) 2013. Separate chapters focus on the investigation activities at each of the following monitoring networks maintained at SNL/NM: GMP site-wide surveillance (Chapter 2.0); Chemical Waste Landfill (CWL) (Chapter 3.0); Mixed Waste Landfill (MWL) (Chapter 4.0); Technical Area (TA)-V (Chapter 5.0); Tijeras Arroyo Groundwater (TAG) (Chapter 6.0); Burn Site Groundwater (BSG) (Chapter 7.0); Solid Waste Management Units (SWMUs) 8/58 (Chapter 8.0); SWMU 49 (Chapter 9.0); SWMU 68 (Chapter 10.0); SWMU 116 (Chapter 11.0); SWMU 149 (Chapter 12.0); and SWMU 154 (Chapter 13.0).

## 1.1 Site Description

The SNL/NM facility is located on Kirtland Air Force Base (KAFB), New Mexico. KAFB is a 51,559-acre (80.56 square miles [sq mi]) military installation that includes 20,486 acres withdrawn from the Cibola National Forest through an agreement with the U.S. Forest Service. Located at the foot of the Manzanita Mountains, KAFB has a mean elevation of 5,384 feet (ft) above mean sea level and a maximum elevation of 7,986 ft above mean sea level. KAFB and SNL/NM are located adjacent to the City of Albuquerque, which borders KAFB on its north, northeast, west, and southwest boundaries (Figure 1-1).

The SNL/NM facility is a government-owned, contractor-operated, multi-program laboratory overseen by the DOE/NNSA through the Sandia Field Office in Albuquerque, New Mexico. Sandia, a wholly-owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM under Contract DE-AC04-94AL85000.

### 1.1.1 Climate

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

### 1.1.2 Geologic Setting

SNL/NM is located near the east-central edge of the Albuquerque Basin. The Albuquerque Basin (also known as the Middle Rio Grande Basin) is one of a series of north-south–trending basins that was formed during the extension of the Rio Grande Rift. The basin is approximately 3,000 sq mi. Rift formation initiated in the late Oligocene and continued into the early Pleistocene, with the primary period of extension occurring between 30 and 5 Mega annum (Ma); or million years before present. Tectonic activity, which began uplifting the Sandia, Manzanita, and Manzano Mountains, was most prevalent from about 15 to 5 Ma (Thorn *et al.* 1993). The rift today extends from south central Colorado to northern Mexico. The vertical displacement between the rock units exposed at the top of Sandia Crest and the equivalent units located at the bottom of the basin is more than 3 miles.

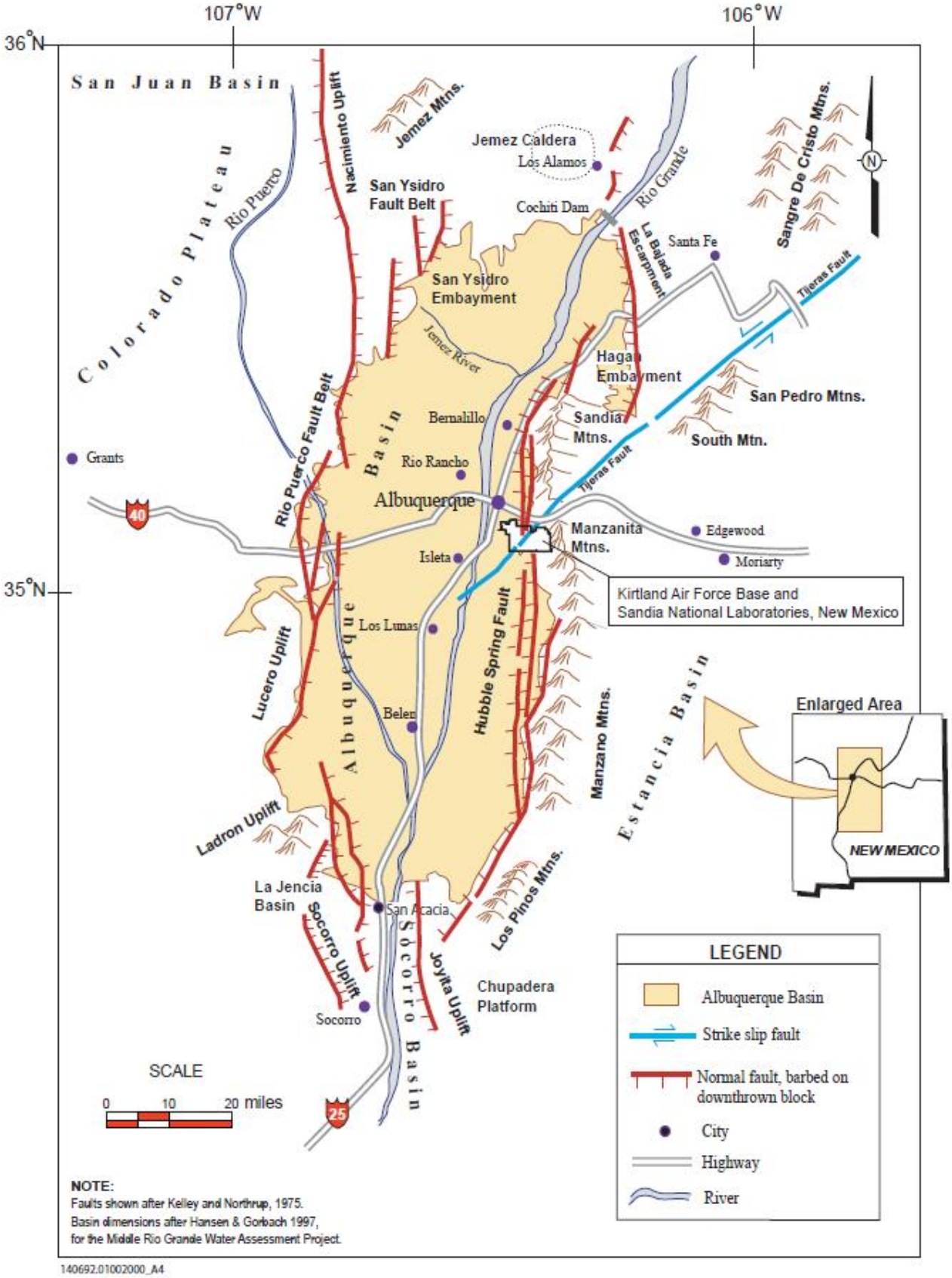


**Figure 1-1. Albuquerque Basin, North-Central New Mexico**

As shown on Figure 1-1, the structural boundaries of the Albuquerque Basin are as follows:

- Colorado Plateau on the west
- Nacimiento Uplift and the Jemez Mountains to the north
- La Bajada Escarpment to the northeast
- Sandia, Manzanita, Manzano, and Los Pinos mountains to the east
- Joyita and Socorro uplifts to the south
- Ladron and Lucero uplifts to the southwest

As the Rio Grande Rift continued to expand, the Albuquerque Basin subsided. Over the last 30 Ma, the Ancestral Rio Grande meandered across the valley formed by the subsidence and deposited sediments in broad stream channels and floodplains derived from sources to the north. The basin also filled with aeolian deposits and alluvial materials shed from surrounding uplifts (Hawley and Haase 1992). This sequence of sediments is called the Santa Fe Group. The thickness of the Santa Fe Group is up to 16,400 ft at the deepest part of the basin (Lozinsky 1994). The entire sequence consists of unconsolidated sediments, which thin toward the edge of the basin and are truncated by normal faults at the basin-bounding uplifts. Units overlying the Santa Fe Group include Pliocene Ortiz gravel and Rio Grande fluvial deposits, which are interbedded with Tertiary and Quaternary basaltic and pyroclastic materials. Based on recent geophysical models, the Albuquerque Basin has been further divided into three, 2-4 mile deep, interconnected structural depressions from north to south: the Santo Domingo, Calabacillas, and Belen subbasins. KAFB lies near the intersection of the Calabacillas and Belen subbasins along a broad, northwest elongate structural high called the Mountainview prong that separates the two subbasins (Grauch and Connell, 2013). These tectonic/sedimentation features contribute greatly to the complex structural setting described below.

As shown on Figures 1-2 and 1-3, the four primary faults on the east side of KAFB are (1) the Sandia fault, (2) the West Sandia fault, (3) the Hubbell Spring fault (West, Central, and East fault segments), and (4) the Tijeras fault. The Sandia fault is thought to be the primary boundary between the Sandia Mountains and the Albuquerque Basin. The Hubbell Spring fault extends northward from Socorro County and terminates on KAFB in the vicinity of the Tijeras fault. The Sandia and the Hubbell Spring faults are north-south-trending, down-to-the-west, en-echelon normal faults bounding the east side of the Albuquerque Basin.

The Tijeras fault is an ancient strike-slip fault that developed in the Precambrian or early Paleozoic (approximately 600 Ma) and was reactivated in association with the Laramide Orogeny during the Cretaceous period (Kelley 1977). The fault also demonstrates Quaternary movement (Kelson et al. 1999, GRAM 1995). This fault has been traced at least as far north as Madrid, New Mexico, and continues into the Sangre de Cristo Mountains as the Cañoncito fault. Preferential erosion along the fault formed Tijeras Canyon, which divides the Sandia and Manzanita Mountains. The fault trends southwest from Tijeras Canyon, intersects the northeast boundary of KAFB, and crosses KAFB east and south of Manzano Base. Manzano Base occupies an uplift of four peaks defined by the Tijeras fault on the east side and the Sandia fault on the west side. The Sandia, Hubbell Spring, and Tijeras faults converge near the southeast end of TA-III. This complicated system of faults, defining the east edge of the basin, is referred to collectively as the Tijeras fault complex.

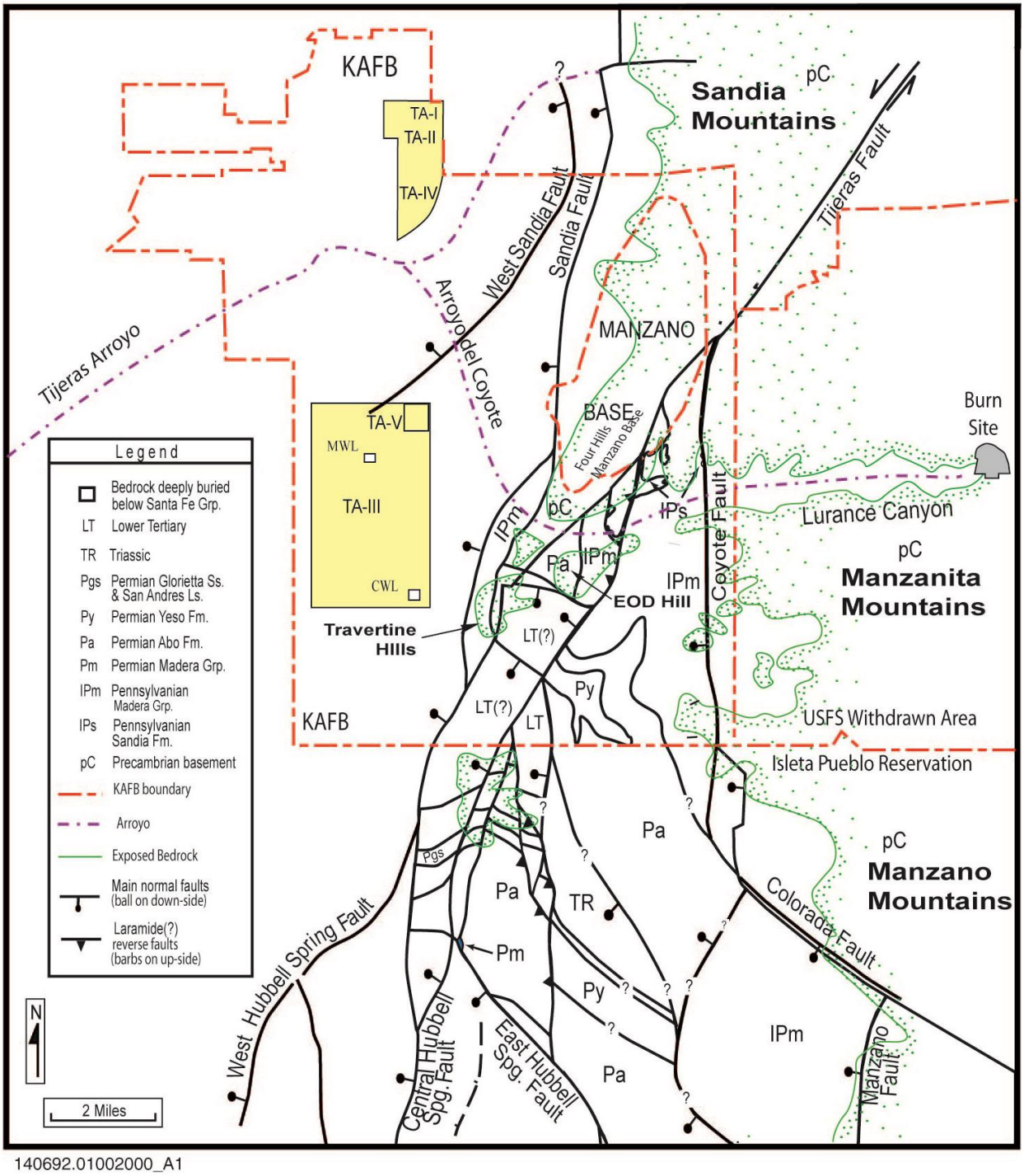


**Figure 1-2. Generalized Geology in the Vicinity of SNL/NM and KAFB (Van Hart 2003)**

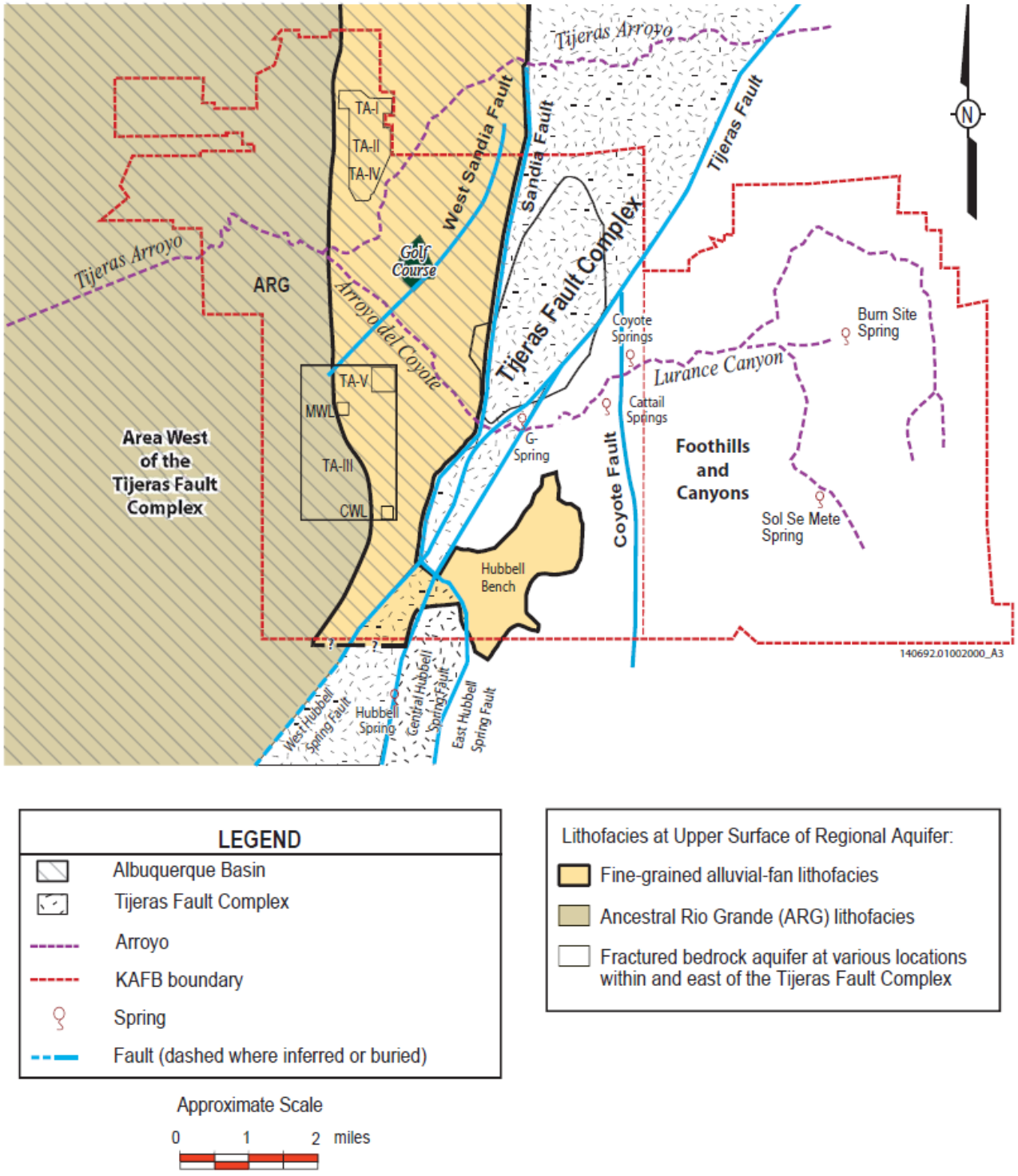


**Figure 1-3. Hydrogeologically Distinct Areas Primarily Controlled by Faults (Modified from SNL 1995)**

### 1.1.3 Hydrogeology

Figure 1-3 shows the three distinct hydrogeologic regions for the KAFB area: (1) the Albuquerque Basin, (2) the Tijeras fault complex, and (3) the foothills and canyons region. The primary division is between the east and west sides of the Tijeras fault complex, which is the transitional zone. This division marks the boundary between the two regional aquifer systems. It is important to note that the boundaries shown on Figure 1-3 identify the approximate hydrologic settings. A deep aquifer is present within the Albuquerque Basin where the regional aquifer lies at approximately 500 ft below ground surface. A perched groundwater system (PGWS) also lies above the regional aquifer in the vicinity of TA-I, TA-II, and TA-IV in the TAG Area of Concern (AOC). The PGWS is not shown on Figure 1-3, but is discussed in detail in Chapter 6.0. The PGWS extends south to the KAFB Golf Course area, north to portions of TA-I, west of TA-II, and along the west side of the KAFB Landfill. Possible explanations for the existence of a PGWS are arroyo recharge, irrigation of the golf course and other vegetated areas, water leakage from utility distribution lines, waste water discharges, and infiltration from a former unlined KAFB sewage lagoon system (SNL February 1998).

East of the Tijeras fault complex, a thin layer of alluvium covers the bedrock. The hydrogeology in this area is poorly understood due to the complex geology created by the fault systems. On the east side of the Tijeras fault complex the depth-to-groundwater ranges from about 45 to 325 ft below ground surface. Most of the nonpotable water supply and monitoring wells east of the faults are completed in fractured bedrock at relatively shallow depths and produce modest yields of groundwater.

Groundwater in the bedrock aquifers on the east side of KAFB generally flows west out of the canyons toward the Tijeras fault complex (Plate 1). The groundwater gradient is relatively steep, 0.03 feet per foot, in crossing the Tijeras fault complex from east to west. The change in the groundwater elevation is 350 ft over 15,840 ft. The steep gradient suggests that westward groundwater flow is retarded by the Tijeras fault complex. Within the sediments of the Albuquerque Basin, the gradient flattens out quickly to about 0.005 feet per foot (feet of vertical change per foot of horizontal distance). The historic direction of regional groundwater flow within the basin was westward from the mountains toward the Rio Grande. However, due to groundwater pumping at KAFB, Veterans Administration, and Albuquerque Bernalillo County Water Utility Authority (ABCWUA) production wells, a depression in the regional aquifer has created a broad trough originating at the well fields near the northwest corner of KAFB. The impact of the seasonal variation in water production by both KAFB and ABCWUA wells can be observed as fluctuations in the groundwater elevations of some SNL/NM and KAFB monitoring wells as far to the southeast as TA-III.

### 1.1.4 Surface Water Hydrology

The Rio Grande, located approximately 3 miles west of KAFB, is the major surface hydrologic feature in central New Mexico. The Rio Grande originates in the San Juan Mountains of Colorado and terminates at the Gulf of Mexico, near Brownsville, Texas. The Rio Grande has a total length of 1,760 miles and is the third longest river system in North America. Surface water (with the exception of several springs) within the boundaries of KAFB is found only as ephemeral streams (arroyos) that flow for short periods from runoff after storm events or during the spring melt of mountain snowpack. The primary surface water feature that drains the eastern foothills on KAFB is the Tijeras Arroyo. The Arroyo del Coyote joins Tijeras Arroyo just south of TA-IV (about 1 mile west of the golf course [Figure 1-3]). Both Tijeras Arroyo and Arroyo del Coyote carry significant runoff after heavy thunderstorms that usually occur from June through August. The Tijeras Arroyo, above the confluence with Arroyo del Coyote, drains about 80 sq mi, while Arroyo del Coyote drains about 39 sq mi (U.S. Army Corps of Engineers [USACE] 1979). The total watershed for Tijeras Arroyo, which includes the Sandia and Manzanita Mountains and portions of KAFB, is approximately 126 sq mi. All active SNL/NM facilities are located outside the 100-year floodplain of both Tijeras Arroyo and Arroyo del Coyote.

Several springs on KAFB are associated with the uplifts in the Tijeras Fault Complex and Foothills and Canyons hydrogeologic areas: (1) Coyote Springs, Cattail Springs, and G Spring within Arroyo del Coyote, (2) Burn Site Spring in Lurance Canyon, and (3) Sol se Mete Spring within the Manzanita Mountains. Coyote Springs and Sol se Mete are perennial springs (continuously flowing), while the others are ephemeral springs. Hubbell Spring (a perennial spring) is located just south of KAFB on Isleta Pueblo. The wetland areas created by these springs, though very limited in extent, provide a unique ecological niche in an otherwise arid habitat.

Groundwater recharge in the vicinity of KAFB is primarily derived from the eastern mountain front and along the major arroyos. However, the amount of recharge occurring in the foothills and canyons is not well characterized. The estimated recharge for that portion of Tijeras Arroyo on KAFB is estimated to be up to 2.2 million cubic feet per year (50 acre ft/year) (SNL 1998). The best estimate for the groundwater recharge associated with Arroyo del Coyote is 0.4 million cubic feet per year (9.2 acre feet/year). Infiltration studies conducted by the ER Site-Wide Hydrogeologic Characterization Project determined that recharge is negligible from direct precipitation due to the high rate of evapotranspiration for most other areas on KAFB, especially on alluvial-fan slopes and other relatively flat areas.

## 1.2 Groundwater Monitoring

Extensive groundwater monitoring is conducted at KAFB. The U.S. Air Force Installation Restoration Program has a large monitoring well network associated with several closed landfills and a closed sewage lagoon system. Additional KAFB wells are sited to monitor and characterize several nitrate plumes and an extensive KAFB jet fuel/aviation gasoline plume associated with the KAFB Bulk Fuels Facility. SNL/NM personnel monitor groundwater on KAFB at locations associated with DOE/NNSA-owned facilities and sites permitted by the U.S. Air Force for DOE/NNSA use. Groundwater monitoring is conducted by SNL/NM LTS/ER Operations on a site-wide and site-specific basis. Figure 1-4 illustrates the extensive monitoring well network at KAFB. Plate 1 more accurately portrays the monitoring well network and is presented at the end of this Annual Groundwater Monitoring Report along with Table 1, which provides construction details for the groundwater monitoring wells. Table 1-1 lists the CY 2013 sampling events conducted at the GMP and LTS/ER Operations monitoring networks maintained at SNL/NM.

Water quality and groundwater analytical results for the monitoring activities are summarized in Table 1-2. Detected analytes that exceed the U.S. Environmental Protection Agency (EPA) drinking water regulatory criteria (EPA May 2009) for samples collected by SNL/NM personnel during groundwater monitoring activities in CY 2013 are listed in Table 1-3.

In this report, groundwater monitoring data are presented for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (gamma spectroscopy and gross alpha/beta activity) are provided voluntarily by the DOE/NNSA and Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Compliance Order on Consent (the Order) between the New Mexico Environment Department (NMED), Sandia, and the DOE, as specified in Section III.A of the Order (NMED April 2004).

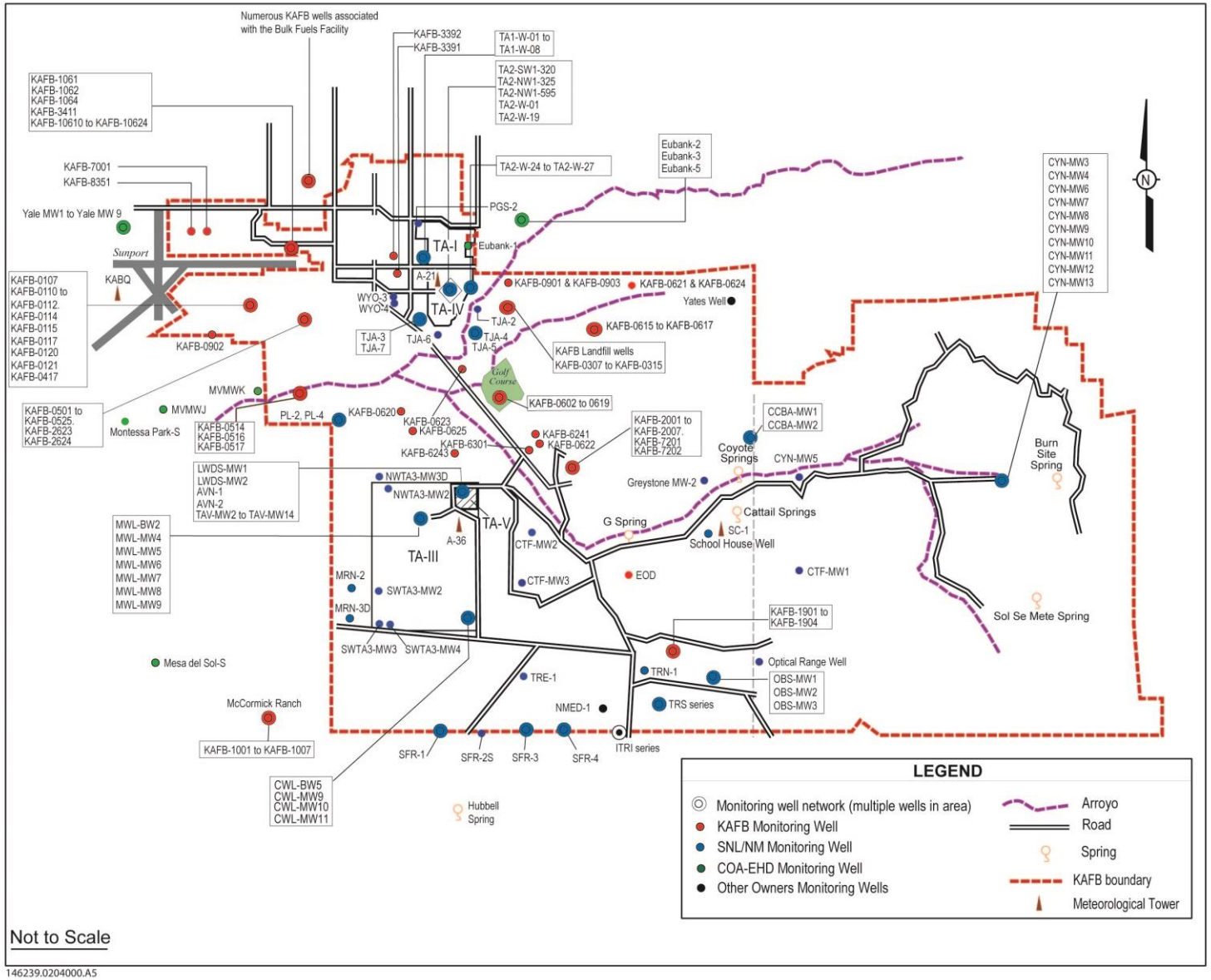


**Figure 1-4. Wells and Springs within SNL/NM and KAFB**

**Table 1-1. Sample Collection Events for Groundwater Quality Monitoring at SNL/NM from January through December 2013**

| Sampling Event | GMP | CWL | MWL | TA-V | TAG | BSG | SWMUs 8/58 | SWMU 49 | SWMU 68 | SWMU 116 | SWMU 149 | SWMU 154 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January 13 | | √ | √ | | | | √ | √ | √ | √ | | |
| February 13 | | | √ | √ | | | | | | | | |
| March 13 | | | | √ | √ | | | | | | √ | √ |
| April 13 | √ | | | | | √ | √ | | √ | | | |
| May 13 | √ | | | √ | | √ | | | | | | |
| June 13 | | | | √ | √ | | | | | | √ | √ |
| July 13 | | √ | | √ | | | √ | | √ | | | |
| August 13 | √ | | | | √ | | | | | | | |
| September 13 | √ | | | | √ | | | | | | | √ |
| October 13 | | | | √ | | | √ | | √ | | | |
| November 13 | | | | √ | √ | | | | | | | |
| December 13 | | | | | | √ | | | | | √ | √ |

**NOTES:**
BSG = Burn Site Groundwater.
CWL = Chemical Waste Landfill.
GMP = Groundwater Monitoring Program.
MWL = Mixed Waste Landfill.
SNL/NM = Sandia National Laboratories, New Mexico.
SWMU = Solid Waste Management Unit.
TA-V = Technical Area V.
TAG = Tijeras Area Groundwater.

## Table 1-2. Summary of SNL/NM Groundwater Monitoring Results for Calendar Year 2013

| | SNL/NM Groundwater Monitoring |
|---|---|
| Number of Active Wells Monitored | 79 |
| Number of Analyses Performed | 20,485 |
| Percent of Non-detected Results | 79 % |

| Analyte | Number of Detects | Number of Non-Detects | Minimum Detected Value | Maximum Detected Value | Mean Detected Value | Standard Deviation for Detected Values | MCL |
|---|---|---|---|---|---|---|---|
| **Summary of Field Water Quality Parameters (units as indicated below)** | | | | | | | |
| pH in SU | 179 | 0 | 5.71 | 7.95 | 7.21 | 0.3623 | NE |
| Specific Conductivity in μmhos/cm | 179 | 0 | 336.1 | 3907 | 747.8 | 552.1 | NE |
| Temperature in °C | 179 | 0 | 5.05 | 26.73 | 18.74 | 2.882 | NE |
| Turbidity in NTU | 179 | 0 | 0.19 | 20.6 | 1.49 | 2.412 | NE |
| **Detected Organic Compounds in μg/L** | | | | | | | |
| Benzo (a) pyrene | 1 | 32 | 0.640 | 0.640 | 0.640 | N/A | 0.200 |
| Benzo (b) fluoranthene | 2 | 31 | 0.442 | 0.640 | 0.541 | 0.140 | NE |
| Benzo (k) fluoranthene | 2 | 31 | 0.411 | 0.980 | 0.696 | 0.402 | NE |
| Bromodichloromethane | 3 | 198 | 0.580 | 0.760 | 0.6467 | 0.0987 | NE |
| Chloroform | 11 | 195 | 0.320 | 0.830 | 0.5709 | 0.1868 | NE |
| Dibromochloromethane | 2 | 199 | 0.380 | 0.450 | 0.415 | 0.0495 | NE |
| Dichloroethane, 1,1- | 13 | 188 | 0.330 | 1.27 | 0.6562 | 0.3261 | NE |
| Dichloroethene, 1,1- | 1 | 205 | 0.940 | 0.940 | 0.940 | N/A | 7.0 |
| Dichloroethene, cis-1,2- | 42 | 159 | 0.320 | 4.40 | 1.568 | 1.279 | 70 |
| Diesel Range Organics | 3 | 17 | 71.7 | 99.4 | 85.67 | 13.85 | NE |
| RDX | 5 | 46 | 0.248 | 0.357 | 0.3336 | 0.0479 | NE |
| Tetrachloroethene | 11 | 195 | 0.320 | 1.62 | 0.903 | 0.383 | 5.0 |
| Toluene | 4 | 197 | 0.320 | 0.490 | 0.405 | 0.0785 | 1,000 |
| Trichloro-1,2,2-trifluoroethane, 1,1,2- | 1 | 187 | 14.8 | 14.8 | 14.8 | N/A | NE |
| Trichloroethene | 80 | 131 | 0.330 | 18.4 | 5.289 | 5.477 | 5.0 |

**Table 1-2. Summary of SNL/NM Groundwater Monitoring Results for Calendar Year 2013** *(Continued)*

| Analyte | Number of Detects | Number of Non-Detects | Minimum Detected Value | Maximum Detected Value | Mean Detected Value | Standard Deviation for Detected Values | MCL |
|---|---|---|---|---|---|---|---|
| **Detected Metals in mg/L** | | | | | | | |
| Aluminum | 58 | 97 | 0.0154 | 0.304 | 0.07321 | 0.0687 | NE |
| Antimony | 1 | 154 | 0.00108 | 0.00108 | 0.00108 | N/A | 0.006 |
| Arsenic | 36 | 119 | 0.00175 | 0.0496 | 0.01427 | 0.01906 | 0.010 |
| Barium | 155 | 0 | 0.00253 | 0.228 | 0.06409 | 0.03856 | 2.0 |
| Beryllium | 19 | 136 | 0.000207 | 0.00754 | 0.001947 | 0.00177 | 0.004 |
| Cadmium | 13 | 142 | 0.000131 | 0.000548 | 0.000263 | 0.00015 | 0.005 |
| Calcium | 234 | 0 | 36.8 | 378 | 90.21 | 70.03 | NE |
| Chromium | 33 | 132 | 0.00209 | 0.112 | 0.00891 | 0.01992 | 0.100 |
| Cobalt | 111 | 44 | 0.0001 | 0.0108 | 0.001149 | 0.002786 | NE |
| Copper | 84 | 71 | 0.000369 | 0.0335 | 0.001936 | 0.004766 | NE |
| Iron | 199 | 3 | 0.0461 | 3.08 | 0.3143 | 0.5826 | NE |
| Lead | 3 | 152 | 0.00109 | 0.00153 | 0.001293 | 0.000222 | NE |
| Magnesium | 234 | 0 | 4.61 | 83.6 | 21.54 | 14.879 | NE |
| Manganese | 83 | 119 | 0.001 | 3.02 | 0.381 | 0.948 | NE |
| Mercury | 1 | 170 | 0.0003 | 0.0003 | 0.0003 | N/A | 0.002 |
| Nickel | 142 | 23 | 0.00057 | 0.417 | 0.00846 | 0.03828 | NE |
| Potassium | 234 | 0 | 1.16 | 47.4 | 5.392 | 8.752 | NE |
| Selenium | 125 | 30 | 0.00158 | 0.0335 | 0.005868 | 0.007547 | 0.050 |
| Silver | 2 | 153 | 0.00032 | 0.00236 | 0.00134 | 0.00144 | NE |
| Sodium | 234 | 0 | 13.6 | 1220 | 75.57 | 121.33 | NE |
| Thallium | 12 | 143 | 0.000468 | 0.00136 | 0.001117 | 0.000227 | 0.002 |
| Uranium | 146 | 1 | 0.000296 | 0.0298 | 0.00689 | 0.006392 | 0.030 |
| Vanadium | 110 | 45 | 0.001 | 0.0105 | 0.005334 | 0.002295 | NE |
| Zinc | 62 | 93 | 0.0035 | 0.422 | 0.0658 | 0.1171 | NE |

**Table 1-2. Summary of SNL/NM Groundwater Monitoring Results for Calendar Year 2013** *(Concluded)*

| Analyte | Number of Detects | Number of Non-Detects | Minimum Detected Value | Maximum Detected Value | Mean Detected Value | Standard Deviation for Detected Values | MCL |
|---|---|---|---|---|---|---|---|
| **Detected Inorganic Parameters in mg/L** | | | | | | | |
| Nitrate plus nitrite | 203 | 5 | 0.124 | 41.9 | 7.669 | 8.501 | 10 |
| Bromide | 116 | 3 | 0.125 | 3.23 | 0.5814 | 0.5392 | NE |
| Chloride | 167 | 0 | 9.25 | 503 | 59.45 | 82.93 | NE |
| Fluoride | 118 | 1 | 0.231 | 5.00 | 1.4258 | 1.0707 | 4.0 |
| Sulfate | 167 | 0 | 15.1 | 2010 | 97.8 | 179.1 | NE |
| Total Organic Halogens | 10 | 6 | 0.0028 | 0.055 | 0.01557 | 0.01514 | NE |
| Total Organic Carbon #1 | 49 | 17 | 0.402 | 1.58 | 0.6886 | 0.2065 | NE |
| Total Organic Carbon #2 | 47 | 19 | 0.572 | 1.94 | 0.8880 | 0.2296 | NE |
| Total Organic Carbon #3 | 49 | 17 | 0.459 | 1.88 | 0.7549 | 0.2298 | NE |
| Total Organic Carbon #4 | 49 | 17 | 0.471 | 1.84 | 0.7820 | 0.2198 | NE |
| Total Organic Carbon Average | 49 | 17 | 0.489 | 1.81 | 0.7762 | 0.2167 | NE |
| Total Phenols | 10 | 11 | 0.00181 | 0.0726 | 0.01654 | 0.0216 | NE |
| Alkalinity as $CaCO_3$ | 157 | 0 | 47.7 | 1580 | 241.6 | 254.7 | NE |
| **Detected Radiochemistry Activities in pCi/L (unless noted otherwise)** | | | | | | | |
| Alpha, gross (corrected) | 101 | 14 | -39.77 | 26.94 | 2.433 | 7.556 | 15.0[a] |
| Americium-241 | 1 | 110 | -28.0 | -28.0 | -28.0 | N/A | NE |
| Beta, gross | 108 | 7 | 0.87 | 76.5 | 9.18 | 14.28 | 4 mrem/yr |
| Potassium-40 | 5 | 99 | 62.10 | 83.8 | 69.60 | 8.52 | NE |
| Radium-226 | 11 | 5 | 0.331 | 1.92 | 0.701 | 0.431 | 5.0[b] |
| Radium-228 | 10 | 6 | 0.542 | 1.43 | 0.8814 | 0.2674 | 5.0[b] |
| Uranium-233/234 | 49 | 0 | 0.36 | 60.9 | 18.20 | 15.89 | NE |
| Uranium-235/236 | 42 | 7 | 0.0529 | 0.822 | 0.2681 | 0.1687 | NE |
| Uranium-238 | 49 | 0 | 0.077 | 10.9 | 3.302 | 2.330 | NE |

**NOTES:**

[a]The 15.0 pCi/L MCL is for corrected gross alpha activity.

[b]The 5.0 pCi/L MCL is for combined Ra-226 and Ra-228.

°C = Degree(s) Celsius.
µg/L = Microgram(s) per liter.
µmhos/cm = Micromhos per centimeter.
4 mrem/yr = Any combination of beta- and/or gamma-emitting radionuclides (as dose rate).
$CaCO_3$ = Calcium as carbon carbonate.
corrected = Gross alpha results reported as corrected values (uranium activities subtracted out).
MCL = Maximum contaminant level. Established by the U.S. Environmental Protection Agency Primary Drinking Water Regulations (40 CFR 141.11[b]), National Primary Drinking Water Standards (EPA May 2009).
mg/L = Milligram(s) per liter.
mrem/yr = Millirem per year.
N/A = Not applicable.
NE = Not established.
NTU = Nephelometric turbidity units.
pCi/L = Picocurie(s) per liter.
pH = Potential of hydrogen (negative logarithm of the hydrogen ion concentration).
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine
SNL/NM = Sandia National Laboratories, New Mexico.
SU = Standard Unit(s).

**Table 1-3. Summary of Exceedances for SNL/NM Groundwater Monitoring Wells Sampled During Calendar Year 2013**

| Analyte | Well (Relevant Chapter) | Exceedance | Date |
|---|---|---|---|
| **Arsenic** MCL = 0.010 mg/L | CTF-MW2 (Ch. 13) | 0.0456 mg/L | March 2013 |
| | | 0.0496 mg/L[a] | |
| | | 0.046 mg/L | June 2013 |
| | | 0.0477 mg/L[a] | |
| | | 0.0438 mg/L | September 2013 |
| | | 0.0448 mg/L[a] | |
| | | 0.039 mg/L | December 2013 |
| | | 0.0366 mg/L[a] | |
| | CTF-MW2 (Duplicate) (Ch. 13) | 0.0444 mg/L | March 2013 |
| | | 0.0463 mg/L[a] | |
| **Beryllium** MCL = 0.004 mg/L | Coyote Springs (Ch. 2) | 0.00754 mg/L | May 2013 |
| **Chromium** MCL = 0.10 mg/L | MWL-MW4 (Ch. 4) | 0.112 mg/L | February 2013 |
| **Fluoride** MCL = 4 mg/L | CCBA-MW1 (Ch. 8) | 4.97 mg/L | January 2013 |
| | | 4.57 mg/L | April 2013 |
| | | 4.78 mg/L | July 2013 |
| | | 4.93 mg/L | October 2013 |
| | CCBA-MW1 (Duplicate) (Ch. 8) | 5.00 mg/L | January 2013 |
| | | 4.82 mg/L | July 2013 |
| **Nitrate plus Nitrite (as Nitrogen)** MCL = 10.0 mg/L | AVN-1 (Ch. 5) | 10.1 mg/L | July 2013 |
| | CYN-MW9 (Ch. 7) | 33.7 mg/L | April 2013 |
| | | 41.9 mg/L | December 2013 |
| | CYN-MW11 (Ch. 7) | 12.3 mg/L | December 2013 |
| | CYN-MW11 (Duplicate) (Ch. 7) | 10.1 mg/L | December 2013 |
| | CYN-MW12 (Ch. 7) | 14.7 mg/L | April 2013 |
| | | 14.4 mg/L | December 2013 |
| | CYN-MW13 (Ch. 7) | 33.5 mg/L | April 2013 |
| | | 35.0 mg/L | May 2013 |
| | | 33.7 mg/L | December 2013 |
| | CYN-MW13 (Duplicate) (Ch. 7) | 32.6 mg/L | April 2013 |
| | | 32.3 mg/L | May 2013 |
| | LWDS-MW1 (Ch. 5) | 12.0 mg/L | March 2013 |
| | | 11.7 mg/L | June 2013 |
| | | 11.5 mg/L | July 2013 |
| | | 13.0 mg/L | November 2013 |
| | LWDS-MW1 (Duplicate) (Ch. 5) | 12.4 mg/L | March 2013 |
| | TA2-SW1-320 (Ch. 6) | 21.4 mg/L | March 2013 |
| | | 25.4 mg/L | June 2013 |
| | | 21.9 mg/L | September 2013 |
| | | 27.0 mg/L | November 2013 |
| | TA2-W-19 (Ch. 6) | 10.2 mg/L | March 2013 |
| | | 12.4 mg/L | June 2013 |
| | | 10.7 mg/L | September 2013 |
| | | 12.7 mg/L | November 2013 |
| | TJA-2 (Ch. 6) | 12.5 mg/L | March 2013 |
| | | 12.8 mg/L | June 2013 |
| | | 11.8 mg/L | September 2013 |
| | | 11.9 mg/L | November 2013 |
| | TJA-2 (Duplicate) (Ch. 6) | 11.4 mg/L | September 2013 |

**Table 1-3. Summary of Exceedances for SNL/NM Groundwater Monitoring Wells Sampled During Calendar Year 2013** *(Concluded)*

| Analyte | Well (Relevant Chapter) | Exceedance | Date |
|---|---|---|---|
| **Nitrate plus Nitrite (as Nitrogen)** MCL = 10.0 mg/L | TJA-4 (Ch. 6) | 29.6 mg/L | March 2013 |
| | | 33.2 mg/L | June 2013 |
| | | 29.2 mg/L | September 2013 |
| | | 36.9 mg/L | November 2013 |
| | TJA-4 (Duplicate) (Ch. 6) | 38.5 mg/L | November 2013 |
| | TJA-7 (Ch. 6) | 23.0 mg/L | March 2013 |
| | | 27.2 mg/L | June 2013 |
| | | 23.7 mg/L | September 2013 |
| | | 27.2 mg/L | November 2013 |
| | TJA-7 (Duplicate) (Ch. 6) | 22.1 mg/L | March 2013 |
| | TAV-MW10 (Ch. 5) | 12.4 mg/L | February 2013 |
| | | 12.2 mg/L | June 2013 |
| | | 11.2 mg/L | July 2013 |
| | | 12.9 mg/L | November 2013 |
| **Trichloroethene** MCL = 5.0 µg/L | LWDS-MW1 (Ch. 5) | 18.1 µg/L | March 2013 |
| | | 18.1 µg/L | June 2013 |
| | | 17.6 µg/L | July 2013 |
| | | 15.9 µg/L | November 2013 |
| | LWDS-MW1 (Duplicate) (Ch. 5) | 18.4 µg/L | March 2013 |
| | TAV-MW6 (Ch. 5) | 13.3 µg/L | February 2013 |
| | | 15.8 µg/L | June 2013 |
| | | 16.1 µg/L | July 2013 |
| | | 15.8 µg/L | November 2013 |
| | TAV-MW6 (Duplicate) (Ch. 5) | 15.2 µg/L | July 2013 |
| | TAV-MW10 (Ch. 5) | 13.6 µg/L | February 2013 |
| | | 15.8 µg/L | June 2013 |
| | | 16.4 µg/L | July 2013 |
| | | 16.9 µg/L | November 2013 |
| | TAV-MW12 (Ch. 5) | 7.85 µg/L | February 2013 |
| | | 7.14 µg/L | June 2013 |
| | | 8.36 µg/L | July 2013 |
| | | 9.35 µg/L | November 2013 |
| | TAV-MW12 (Duplicate) (Ch. 5) | 9.43 µg/L | November 2013 |
| | TAV-MW14 (Ch. 5) | 6.54 µg/L | February 2013 |
| | | 6.47 µg/L | June 2013 |
| | | 6.22 µg/L | July 2013 |
| | | 7.90 µg/L | November 2013 |
| | TAV-MW14 (Duplicate) (Ch. 5) | 6.65 µg/L | February 2013 |
| | WYO-4 (Ch. 6) | 8.40 µg/L | March 2013 |
| | | 8.40 µg/L | June 2013 |
| | | 9.23 µg/L | August 2013 |
| | | 8.49 µg/L | November 2013 |
| **Gross Alpha** 15 pCi/L | CTF-MW2 (Ch. 13) | 23.54 pCi/L | September 2013 |
| | | 21.25 pCi/L | December 2013 |
| | CTF-MW2 (Reanalysis) (Ch. 13) | 26.94 pCi/L | September 2013 |

**NOTES:**
[a]Analytical result for filtered groundwater sample. All other analytical results are for unfiltered groundwater samples.

µg/L = Microgram(s) per liter.
CCBA = Coyote Canyon Blas Area.
CTF = Coyote Test Field.
CYN = Canyons.
LWDS = Liquid Waste Disposal System.
MCL = Maximum contaminant level.
mg/L = Milligram(s) per liter.
MW = Monitoring well.
MWL = Mixed Waste Landfill.
pCi/L = Picocuries per liter.
SNL/NM = Sandia National Laboratories, New Mexico.
SW = Southwest.
TA = Technical Area.
TAV = Technical Area V (monitoring well designation only).
TJA = Tijeras Arroyo.
WYO = Wyoming.

### 1.2.1 Long-Term Stewardship and Environmental Restoration Operations Monitoring

SNL/NM LTS/ER Operations conducts groundwater monitoring where groundwater contamination is documented, or in areas where the potential exists for groundwater contamination from legacy surface or near-surface contamination. Currently there are 11 LTS/ER Operations groundwater monitoring networks: CWL, MWL, TA-V, TAG, BSG, SWMUs 8/58, SWMU 49, SWMU 68, SWMU 116, SWMU 149, and SWMU 154. The LTS/ER Operations groundwater monitoring wells are located upgradient and downgradient of known legacy surface contamination sites with associated groundwater investigations.

### 1.2.2 Long-Term Stewardship Groundwater Monitoring Program

The SNL/NM LTS Program's GMP conducts groundwater surveillance monitoring through a network of wells on KAFB, most of which are located in areas near SNL/NM operational test facilities. Groundwater surveillance monitoring allows the detection and evaluation of the impacts (if any) of current SNL/NM operations on groundwater.

### 1.2.3 Groundwater Monitoring Regulatory Criteria and DOE Orders

Groundwater monitoring performed by SNL/NM LTS Program's GMP and LTS/ER Operations are directed based on three different sets of regulations and requirements. Groundwater surveillance conducted at the GMP network is directed by DOE Order 436.1, *Departmental Sustainability* (DOE 2011a) and DOE Order 231.1B, *Environment, Safety, and Health Reporting* (DOE 2011b). Groundwater monitoring results at all sites are compared with federal and state water quality standards and DOE drinking water guidelines, where established.

In addition to the DOE Directives, ER sites at SNL/NM are identified, characterized, and remediated (if required) under the Resource Conservation and Recovery Act (RCRA) regulations. In 1984, RCRA was supplemented by the Hazardous and Solid Waste Amendments (HSWA), which specifically addressed remediation of legacy contamination including groundwater at SWMUs.

At SNL/NM, SWMUs are regulated under the HSWA module of the SNL/NM RCRA Permit. In the HSWA module, a SWMU is defined as "any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste." Monitoring and/or corrective action requirements generally are determined on a SWMU-specific basis following a site investigation. The Order became effective in 2004 and specified that corrective actions for releases of hazardous waste or hazardous constituents were to be conducted under the Order rather than under the RCRA Permit, with the exception of new releases from operating units; closure and post-closure at operating units; implementation of controls for any SWMU on the Permit's "Corrective Action Complete with Controls" list; and any releases of hazardous waste or hazardous constituents that occur after the Order is no longer effective.

The MWL, TA-V, TAG, and BSG are undergoing corrective action in accordance with the Order between the NMED, Sandia, and the DOE (NMED April 2004). Each of the TA-V, TAG, and BSG sites must comply with requirements set forth in the Order for site characterization and the development of a Corrective Measures Evaluation for each site. The NMED is the regulatory agency responsible for enforcing the requirements identified in the Order for each of the three Corrective Measures Evaluations (SNL 2004a, 2004b, and 2004c). The Order also extends NMED regulatory jurisdiction to the placement and installation of new groundwater monitoring wells and decommissioning at SNL/NM.

In addition, SWMUs 8/58, 49, 68, 116, 149, and 154 are undergoing corrective action in accordance with the Order and addressed in a letter received from the NMED by the DOE/NNSA and Sandia on April 14, 2010, entitled: *Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008),*

*Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001* (NMED April 2010). The NMED's letter lists these SWMUs under the heading of "SWMUs Requiring Additional Corrective Action" or "SWMUs/AOCs to be Subject to Groundwater Monitoring Controls," and further states that these SWMUs require long-term monitoring of groundwater on a quarterly or annual basis.

CWL closure was approved by the NMED and the CWL Post-Closure Care Permit (PCCP) became effective on June 2, 2011 (Kieling June 2011), transitioning monitoring activities from ER Operations to LTS. The CWL PCCP supersedes the CWL Closure Plan (SNL December 1992) as the enforceable regulatory document. Therefore, all groundwater monitoring at the CWL after June 2011 are performed by the LTS Program in accordance with requirements specified in the PCCP (Kieling June 2011). Required monitoring (groundwater and soil-gas), inspections, and maintenance activities are documented annually in Post-Closure Care Reports submitted to NMED by March 31 of each year and document all PCCP-required activities for the previous calendar. As required by the PCCP, the *CWL Annual Post-Closure Care Report for Calendar Year 2012* was submitted to the NMED in March 2013 (SNL March 2013). The CWL Annual Post-Closure Care Report for CY 2013 will be submitted to NMED in March 2014.

## 1.3 Field Methods, Analytical Methods, and Quality Control Procedures

The monitoring procedures, as conducted by LTS/ER Operations personnel, are consistent with procedures identified in the EPA technical enforcement guidance document (EPA 1986a). This section discusses procedures that apply to all groundwater investigations. Any site-specific differences from the procedures discussed in Section 1.3 are presented in Chapters 2.0 through 13.0.

### 1.3.1 Field Methods and Measurements

The following sections provide an overview of the sampling and data collection procedures.

#### 1.3.1.1 Groundwater Elevation

Throughout CY 2013, water level measurements were obtained to determine groundwater flow directions, hydraulic gradients, and changes in water table and potentiometric surface elevations. Water levels are periodically measured in SNL/NM monitoring wells according to the instructions and requirements specified in SNL/NM Field Operating Procedure (FOP) 03-02, *Groundwater Level Data Acquisition and Management* (SNL April 2013). The water level information was used to create the potentiometric surface maps and hydrographs presented in Chapters 2.0 through 13.0.

#### 1.3.1.2 Well Purging and Water Quality Measurements

A portable Bennett™ groundwater sampling system was used to collect the groundwater samples from all wells, except at wells with construction issues that require dedicated sampling system pumps. The minimum purge requirements for a portable piston pump is one saturated screen volume (including annulus) and two tubing volumes for a dedicated low-flow sampling system. Field water quality measurements for turbidity, potential of hydrogen (pH), temperature, specific conductance (SC), oxidation-reduction potential, and dissolved oxygen (DO) (Table 1-4) were recorded for the well prior to collecting groundwater samples, according to SNL/NM FOP 05-01 (SNL January 2012a). Groundwater temperature, SC, oxidation-reduction potential, dissolved oxygen, and pH were measured using a YSI™ Model 6920 water quality meter. Turbidity was measured with a HACH™ Model 2100P portable turbidity meter.

**Table 1-4. Field Water Quality Parameters Measured at Monitoring Wells**

| Field Parameter | Comments |
|---|---|
| pH | Stability measure: Four consecutive measures within 0.1 pH units. |
| Temperature (°C) | Stability measure: Four consecutive measures within 1°C. |
| Specific Conductance (µmhos/cm) | Stability measure: Four consecutive measurements within 5 percent. |
| Turbidity (NTU) | Stability measure: Four consecutive measurements within 10 percent or less than 5 NTU. |
| Sample Flow Rate | Measured in gpm. |
| Dissolved Oxygen | Percentage of saturation value and/or measured in mg/L. |
| Oxidation-Reduction Potential | Measured in mV. |

**NOTES:**

°C = Degree(s) Celsius.
µmhos/cm = Micromhos(s) per centimeter.
gpm = Gallon(s) per minute.
mg/L = Milligram(s) per liter.
mV = Millivolt(s).
NTU = Nephelometric turbidity units.
pH = Potential of hydrogen.

The amount of water required to achieve stability of field parameters is fairly consistent for a particular monitoring well. However, the ability of the aquifer to produce water varies greatly from well to well. In accordance with the site-specific Mini-Sampling and Analysis Plans (SAPs) (as identified in Chapter 2.0 through 13.0), purging continued until four stable measurements for temperature, SC, pH, and turbidity were obtained. Groundwater stability is considered acceptable when measurements are less than 5 nephelometric turbidity units (NTU) or within 10 percent for turbidity values greater than 5 NTU, 0.1 pH units, 1.0 degree Celsius, and SC is within 5 percent. Associated Field Measurement Logs documenting details of well purging and water quality measurements for each sampling event have been submitted to the SNL/NM Records Center.

#### 1.3.1.3 Pump Decontamination

The sampling pump and tubing bundle associated with the portable Bennett™ groundwater sampling system were decontaminated prior to installation into monitoring wells according to procedures described in SNL/NM FOP 05-03 (SNL January 2012b). An equipment blank (EB) is collected to verify the equipment decontamination process. For wells equipped with dedicated nitrogen gas-powered bladder pumps or piston pumps, pump decontamination is not required.

#### 1.3.1.4 Sample Collection Sampling Procedures

Groundwater samples are collected using a nitrogen gas-powered portable piston pump (Bennett™) and/or a low-flow system in accordance with SNL/NM FOP 05-01 (SNL January 2012a). Sample bottles are filled directly from the pump discharge line and water sampling manifold, with the volatile organic compound (VOC) samples collected at the lowest achievable discharge rate.

#### 1.3.1.5 Sample Handling and Shipment

The SNL/NM Sample Management Office (SMO) processes environmental samples collected by LTS/ER Operations personnel. The SMO staff reviews the Mini-SAPs (as identified in Chapters 2.0 through 13.0), obtains sampling kits, issues sample control and tracking numbers, tracks the chain-of-custody, and reviews analytical results to determine method, contract, and regulatory project-specific compliance (SNL November 2013). All groundwater samples are analyzed by off-site laboratories using EPA-specified protocols. Analytical laboratories report associated quality control (QC) data that are reviewed against quality assurance requirements specified in the *Procedure for Completing the Contract Verification*

*Review, SMO-05-03, Revision 05* (SNL November 2013) and Administrative Operating Procedure (AOP) 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL May 2011).

#### 1.3.1.6 Waste Management

Purge and decontamination wastewater generated from sampling activities were placed into 55-gallon polyethylene drums and stored at the Environmental Resources Field Office waste accumulation area. All waste was managed in accordance with SNL/NM FOP 05-04 (SNL January 2012c) All wastewater was discharged to the sanitary sewer in accordance with ABCWUA requirements after waste characterization data were compared to discharge limits.

### 1.3.2 Analytical Methods

All groundwater samples are analyzed by off-site laboratories using EPA-specified protocols. Groundwater samples were submitted to GEL Laboratories, LLC (GEL) for analysis. Samples were analyzed in accordance with applicable EPA and DOE methods (Tables 1-5 and 1-6).

**Table 1-5. Chemical Analytical Methods**

| Analyte | Analytical Method[a,b,c,d,e] |
|---|---|
| Alkalinity (total, bicarbonate, carbonate) | SM2320B |
| Anions | SW846-9056 |
| Filtered Metals (including Cations) | SW846-3005/6010/6020/7470 |
| HE compounds | SW846-8321A |
| NPN | EPA 353.2 |
| Hexavalent Chromium | SW846-7196A |
| Perchlorate | EPA 314.0 |
| Sulfide | SW846-9034/9034B |
| SVOCs | SW846-8270C |
| Metals | SW846-6010/6020/7470 |
| Total Cyanide | SW846-9012A |
| Total Organic Carbon | SW846-9060A |
| Total Organic Halogens | SW846-9020 |
| TPH Diesel Range Organics | SW846-3535A/8015D |
| TPH Gasoline Range Organics | SW846-8015B |
| Total Phenol | SW846-9066 |
| VOCs | SW846-8260B |

**NOTES:**

[a]Clesceri, L.S., A.E. Greenburg, and A.D. Eaton 1998 or EPA 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B.

[b]EPA 1999 (and updates), *Perchlorate in Drinking Water Using Ion Chromatography,* EPA 815/R-00-014.

[c]EPA 1986b (and updates), *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed., Rev. 1, U.S. Environmental Protection Agency, Washington, D.C.

[d]EPA 1984, *Methods for Chemical Analysis of Water and Wastes,* EPA 600-4-79-020.

[e]EPA 1983, *The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0*, EPA-600/4-84-017.

EPA = U.S. Environmental Protection Agency.
HE = High explosive(s).
NPN = Nitrate plus nitrite (reported as nitrogen).
SM = Standard Method.
SVOC = Semivolatile organic compound.
SW = Solid Waste.
TPH = Total petroleum hydrocarbons.
VOC = Volatile organic compound.

**Table 1-6. Radiochemical Analytical Methods**

| Analyte | Analytical Method[a,b] |
|---|---|
| Gamma Spectroscopy (short list) | EPA 901.0 |
| Gross Alpha/Beta Activity | EPA 900.0 |
| Isotopic Uranium | HASL-300 |
| Radium-226 | EPA 903.1 |
| Radium-228 | EPA 904.0 |
| Tritium | EPA 906.0 |

**NOTES:**
[a]EPA 1980. *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*, EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.
[b]U.S. Department of Energy, 1990, *EML Procedures Manual,* 27th ed., Vol. 1, Rev. 1992, HASL-300, Environmental Measurements Laboratory.
EPA = U.S. Environmental Protection Agency.
HASL = Health and Safety Laboratory.

### 1.3.3 Quality Control Samples

Field and laboratory QC samples were prepared and analyzed with the environmental samples to determine accuracy and precision of the methods, and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process. Table 1-7 shows the types of QC samples that accompany groundwater quality samples in the sampling and analysis process. All chemical data were reviewed and qualified in accordance with AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL May 2011). Although some analytical results were qualified during the data validation process, no significant data quality issues were noted for most studies. Data validation qualifiers are provided with the analytical results in the data tables attached to Chapters 2.0 through 13.0. The data validation report associated with each sampling event has been submitted to the SNL/NM Records Center.

**Table 1-7. Quality Control Sample Types for Groundwater Sampling and Analysis**

| QC Sample Type | Description |
|---|---|
| **Field QC** | |
| Equipment blanks[a] | Determine the effectiveness of the decontamination process of the portable sampling pump (Bennett™) to ensure that cross-contamination did not occur between wells. |
| Duplicate samples | Establish the precision of the sampling process. |
| Trip blanks | Determine whether contamination by VOCs occurred during sample handling, shipment, or storage by submitting deionized water samples with environmental samples for VOC analysis. |
| Field Blanks | Assess whether contamination of the VOC samples had resulted from ambient field conditions. |
| **Laboratory QC** | |
| Method blanks | Determine contaminants introduced during the sample preparation and handling process in the laboratory. |
| LCS | Monitor the accuracy and precision of the laboratory's analytical method using laboratory-prepared samples spiked with a known concentration of an analyte. These samples are analyzed in the same batch with the groundwater samples. LCS results are reported as a percent recovery. |
| Batch matrix spike and matrix spike duplicate samples | Measure the percent recovery and RPD of chemical spikes added to an existing sample to determine the sample matrix effect. (The matrix is groundwater.) |
| Sample replicate | Used to determine precision in the laboratory for non-organic analyses. |

**NOTES:**
[a]Equipment blanks are collected for selected wells only.
LCS = Laboratory control sample.
QC = Quality control.
RPD = Relative percent difference.
VOC = Volatile organic compound.

### 1.3.4 Field Quality Control Samples

Field QC samples included duplicate environmental, EB, and trip blank (TB) samples. The field QC samples were submitted for analysis along with the groundwater samples in accordance with QC procedures specified in site-specific Mini-SAPs (Chapters 2.0 through 13.0).

#### 1.3.4.1 Duplicate Environmental Samples

Duplicate environmental samples were analyzed to estimate the overall reproducibility of the sampling and analytical process. A duplicate environmental sample is collected immediately after the original environmental sample to reduce variability caused by time and/or sampling mechanics. The results for duplicate environmental sample analyses (concentrations above detection limits only) are used to calculate relative percent difference values.

#### 1.3.4.2 Equipment Blank Samples

The portable Bennett™ sampling pump and tubing bundle were decontaminated prior to installation into monitoring wells according to procedures described in SNL/NM FOP 05-03 (SNL January 2012b). An EB is collected to verify the effectiveness of the equipment decontamination process. The results for the EB analyses are discussed in Chapters 2.0 through 13.0.

#### 1.3.4.3 Trip Blank Samples

TB samples are submitted whenever samples are collected for VOC analysis. These samples are used to determine potential contamination during sampling, transportation, analysis, and storage. The TB samples consist of laboratory reagent-grade water with hydrochloric acid preservative contained in 40-milliliter glass vials. They are prepared by the analytical laboratory and are included in the sampling kits. TB samples accompanied each sample shipment. The results for the TB analyses are discussed in Chapters 2.0 through 13.0.

### 1.3.5 Laboratory Quality Control Samples

Laboratory and method-required batch QC samples are also prepared by the laboratory during sample preparation and analysis. These are used to assist with data validation and data defensibility. They include method blanks, laboratory control samples, matrix spike, matrix spike duplicates, sample replicates, and surrogate spike samples. Batch laboratory QC samples were analyzed concurrently with all groundwater samples to determine accuracy, precision, possible contamination, and matrix effects. All chemical data were reviewed and qualified in accordance with AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL May 2011). Laboratory data qualifiers are provided with the analytical results in the tables attached to Chapters 2.0 through 13.0.

## 1.4 References


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# 2.0 Long-Term Stewardship Consolidated Groundwater Monitoring Program

## 2.1 Introduction

This chapter documents the results for the Calendar Year (CY) 2013 groundwater surveillance monitoring activities conducted as part of the Sandia National Laboratories, New Mexico (SNL/NM) Long-Term Stewardship Consolidated Groundwater Monitoring Program (GMP) (formerly referred to as the Groundwater Protection Program). The surveillance activities include the annual collection and analysis of groundwater samples from 12 monitoring wells and one surface-water sample from a spring. As part of the activities, SNL/NM used groundwater elevation data from 126 monitoring wells. Groundwater elevation measurements were obtained either monthly or quarterly depending on the response characteristics of the groundwater system at each well location due to climate, aquifer properties, pumping, or other stresses.

The purpose of monitoring the GMP network is to protect groundwater resources at SNL/NM and the surrounding area by identifying potential sources of contamination, working with other SNL/NM organizations to prevent groundwater contamination, implementing effective groundwater surveillance to detect contamination if it should occur, and initiating abatement or remedial action where necessary. To accomplish this mission, Sandia personnel perform the following tasks:

- Evaluates the potential effects of SNL/NM operations on groundwater through groundwater quality sampling and analysis and groundwater elevation measurements.
- Records and maintains groundwater information in a database.
- Maintains documents and records and ensures that all necessary reports are submitted to the appropriate agencies in a timely manner.
- Prepares and maintains administrative and field operating procedures for groundwater monitoring activities.
- Provides assistance to well owners in the areas of well installation, well inspection and maintenance, and well plugging and abandonment.
- Establishes requirements for well registration and well construction data tracking.
- Coordinates with the Surface Water Discharge Program to prevent groundwater contamination.
- Develops groundwater education and community outreach programs.
- Provides stakeholders an annual update of SNL/NM groundwater data through this Annual Groundwater Monitoring Report.

The groundwater surveillance monitoring involves completing the following objectives:

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

The GMP is responsible for tracking information for all wells operated by SNL/NM personnel, including Long-Term Stewardship/Environmental Restoration (ER) Operations (formerly ER Project) monitoring wells and characterization boreholes. The GMP Well Registry and Oversight Task was established to ensure that all wells operated by SNL/NM personnel are properly constructed and maintained to protect groundwater resources in accordance with guidelines specified by the New Mexico Office of the State Engineer (NMOSE) in *Rules and Regulations Governing Well Driller Licensing; Construction, Repair and Plugging of Wells* (NMOSE 2005). The GMP lead works with SNL/NM personnel to review new monitoring well installation plans, record construction information, track well ownership and maintenance records, perform annual well inspections, and consult with owners when plugging and abandoning or replacing a monitoring well is required. The goal is to provide full life-cycle management of monitoring wells and boreholes. Additional information for the GMP is provided in the *SNL/NM Long-Term Stewardship Consolidated Groundwater Monitoring Program Plan* (SNL May 2013).

## 2.2 Regulatory Criteria

Sandia is in compliance with the requirement to have a site-wide Environmental Management System (EMS) in accordance with the U.S. Department of Energy (DOE) Order 436.1 (DOE 2011). The following actions ensure the implementation of a successful GMP that includes all relevant elements of an EMS at the facility:

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

In April 2004, the Compliance Order on Consent (the Order) (NMED 2004) became effective between the DOE, Sandia, and the New Mexico Environment Department (NMED). Among other sampling requirements primarily affecting ER sites for a variety of potential contaminants, the Order includes a requirement to conduct four continuous quarters of sampling and analysis for perchlorate for newly constructed monitoring wells. The protocol establishes a screening level/method detection limit (MDL) of 4 micrograms per liter (µg/L). If the sampling results indicate the presence of perchlorate either at or greater than 4 µg/L, then DOE/National Nuclear Security Administration (NNSA) and Sandia are required to assess the nature and extent of perchlorate contamination and incorporate the results of this assessment into a Corrective Measures Evaluation. Sampling and analysis at the noncompliant well will continue on a quarterly basis until at least four consecutive nondetections are obtained. Section VII.C of the Order clarifies that the Corrective Measures Evaluation process will be initiated where there is a documented release to the environment, and where corrective measures are necessary to protect human health and the environment.

The NMED DOE Oversight Bureau (OB) splits a percentage of groundwater samples collected by the GMP. The samples are analyzed by laboratories under contract to the NMED DOE OB. The NMED DOE OB provides independent verification of environmental monitoring results obtained by Sandia on behalf of the DOE/NNSA Sandia Field Office (SFO). Additional requirements associated with groundwater quality regulations are presented in Table 2-1.

**Table 2-1. Groundwater Quality Regulations**

| Regulation/Requirements | Standards and Guides | Regulating Agency |
|---|---|---|
| National Primary Drinking Water Regulations (40 CFR 141) | MCL | EPA (2001 and 2009) |
| NMWQCC[a] Standards for Groundwater (20 6.2.3103A NMAC Human Health Standards) (NMED 2001) | MAC | NMWQCC (NMED 2001) |
| DOE Drinking Water Guidelines for Radioisotopes[b] (DOE Order 5400.5) | DCG | DOE (1993) |

**NOTES:**

[a]MACs for human health and domestic water supply standards are identified in the analytical results tables in Attachment 2A. Domestic water supply standards are based on aesthetic considerations, not on the direct human health risks used for promulgating MCLs.

[b]DOE drinking water guidelines set allowable radionuclide levels in drinking water (DOE 1993, *Drinking Water Guidelines for Radioisotopes*). The levels are calculated based on published DCGs and correspond to a 4 mrem/yr dose from chronic exposures. This is equivalent to 4 percent of the DCG for ingestion, which is based on an exposure of 100 mrem/yr. These may be different from the EPA standards, where established.

CFR = Code of Federal Regulations.
DCG = Derived Concentration Guide.
DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
MAC = Maximum allowable concentration.
MCL = Maximum contaminant level.
mrem/yr = Millirem per year.
NMAC = New Mexico Administrative Code.
NMED = New Mexico Environment Department.
NMWQCC = New Mexico Water Quality Control Commission.

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

## 2.3 Scope of Activities

### 2.3.1 Groundwater Quality Surveillance Monitoring

Annual sampling of groundwater was conducted during the period from April 26 to May 14, 2013. Samples were collected from 12 wells and one spring. Groundwater surveillance samples were collected from the following monitoring wells: Greystone-MW2, MRN-2, MRN-3D, NWTA3-MW3D, PL-2, PL-4, SFR-2S, SFR-4T, SWTA3-MW2, SWTA3-MW3, SWTA3-MW4, and TRE-1. A water sample was collected from Coyote Springs. Sampling locations are shown on Figure 2-1. The analytical results for the groundwater samples are presented in Tables 2A-1 through 2A-7 in Attachment 2A.

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

- Safe Drinking Water Act list volatile organic compounds (VOCs)
- Total organic halogens (TOX)
- Total phenols
- Total alkalinity
- Nitrate plus nitrite (NPN)
- Total cyanide
- High explosives (HE), selected wells only
- Major anions (chloride, bromide, fluoride, and sulfate)
- Target Analyte List (TAL) metals plus total uranium
- Mercury
- Gamma spectroscopy (short list)
- Gross alpha and beta activity
- Radium-226 and radium-228
- Isotopic uranium (uranium-233/234, uranium-235/236, and uranium-238), selected wells only

All samples were filtered in the field using in-line filters of 0.45-micron pore size, except those for VOC, HE, and mercury fractions. Analysis for HE compounds was conducted on groundwater samples collected from monitoring wells SFR-2S, SWTA3-MW3, SWTA3-MW4, and TRE-1. These wells are located in or downgradient of the Coyote Canyon Test Field and are associated with the Dynamic Explosives Test Site located in the Coyote Canyon Test Field. Duplicate environmental samples from monitoring wells MRN-2, PL-4, and SWTA3-MW3 were submitted for all analyses.

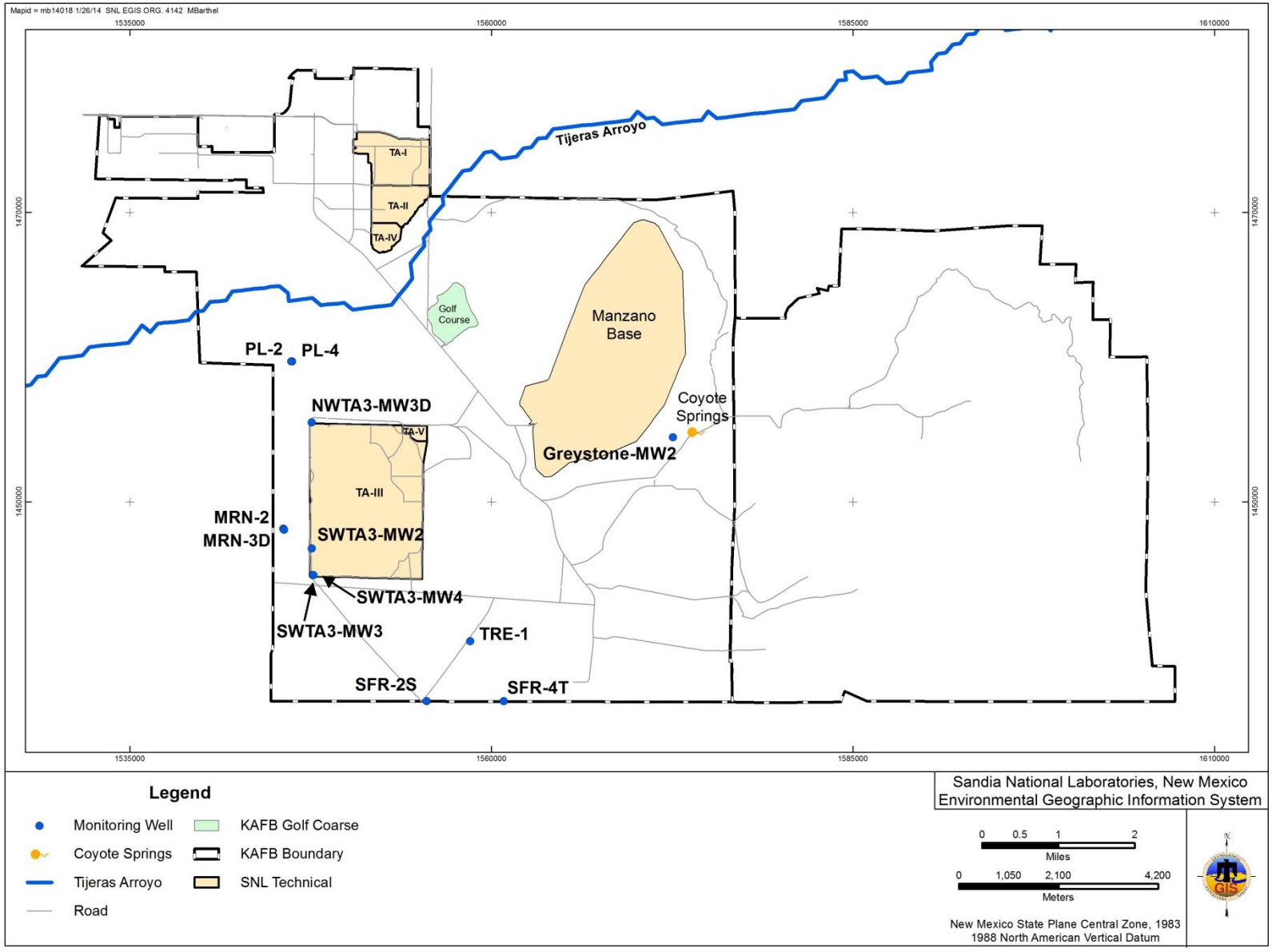


**Figure 2-1. Groundwater Monitoring Program Water Quality Monitoring Network**

Groundwater elevation monitoring is a means to assess the physical changes of the groundwater system over time. This includes changes in the potentiometric surface, gradients, the quantity of water available, as well as the direction and velocity of groundwater movement. The GMP gathers groundwater information from a large network of wells within and in the vicinity of Kirtland Air Force Base (KAFB). In addition to wells owned by the DOE/NNSA, data are solicited from the U.S. Air Force (USAF) ER Program, City of Albuquerque (COA) Environmental Health Department (EHD), the Lovelace Respiratory Research Institute (LRRI), and U.S. Geological Service (USGS) (Figure 1-4 and Plate 1). Groundwater elevations in wells were measured quarterly or monthly during CY 2013, depending on the owner's requirements and the well characteristics. Groundwater elevations at the wells are depicted on Plate 1 and were used for preparing a base-wide potentiometric surface map of the regional aquifer (see discussion in Section 2.6.2.2).

Groundwater pumped from KAFB, Albuquerque Bernalillo County Water Utility Authority (ABCWUA), and Veterans Administration water-supply wells represent the primary groundwater withdrawal from the regional aquifer. From the potentiometric surface map (Plate 1), groundwater flow directions can be identified and horizontal gradients can be determined. Specific results for annual precipitation, water production, and the impact on the groundwater elevations are discussed in Section 2.6.2. Precipitation measurements can be used as an indirect estimate of potential groundwater recharge. Available precipitation also impacts the demand on groundwater withdrawal.

### 2.3.2 Monitoring Well Installation

No new monitoring wells were installed by the GMP during CY 2013.

## 2.4 Field Methods and Measurements

The monitoring procedures conducted for GMP groundwater monitoring are described in detail in Section 1.3. The water level information obtained in 2013 was used to develop the potentiometric surface map presented in Plate 1 and the hydrographs presented on Figures 2B-6 through 2B-11 (Attachment 2B).

## 2.5 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using U.S. Environmental Protection Agency (EPA)-specified protocols as described in Section 1.3.2 (Tables 1-5 and 1-6).

## 2.6 Summary of Monitoring Results

### 2.6.1 Analytical Results

Groundwater and surface water samples were submitted to GEL Laboratories LLC (GEL) for both chemical and radiological analysis. Samples submitted to GEL were analyzed in accordance with applicable EPA analytical methods. Groundwater sampling results are compared with EPA maximum contaminant levels (MCLs) for drinking water supplies (EPA 2001 and 2009) and NMED maximum allowable concentrations (MACs) for human health standards of groundwater as promulgated by the New Mexico Water Quality Control Commission (NMWQCC) (NMED 2001). Analytical reports from GEL, including certificates of analyses, analytical methods, MDLs, practical quantitation limits (PQLs), minimum detectable activity (MDA) values and critical levels for radiochemistry analyses, dates of analyses, results of quality control (QC) analyses, and data validation findings are filed in the SNL/NM Records Center. Analytical results, laboratory QC qualifiers, and third-party validation qualifiers are archived in the Environmental Data Management System (EDMS) electronic database.

Table 2A-1 (Attachment 2A) summarizes detected VOC and HE compound results for groundwater samples collected in April and May 2013. No HE compounds were detected above laboratory MDLs. No VOCs were detected at concentrations above established MCLs or MACs from any groundwater sample. No VOCs were detected above laboratory MDLs, except chloroform and trichloroethene (TCE). Chloroform was detected below the MAC of 100 micrograms per liter (μg/L) in TRE-1 at a concentration of 0.630 μg/L. TCE was reported in SWTA3-MW4 at a concentration of 0.670 μg/L. This is the initial detection of TCE, and SNL/NM performed re-sampling to verify the initial detection. SWTA3-MW4 was resampled on August 1, 2013 and September 25, 2013. The August 2013 data were qualified as not detected during data validation because TCE was reported in the associated QC blank sample. No VOCs were reported above laboratory MDLs in the September 2013 samples. Table 2A-2 (Attachment 2A) lists the laboratory MDLs for VOC and HE compounds.

Table 2A-3 (Attachment 2A) summarizes NPN results. NPN was detected in all well samples above associated MDLs, and ranged from 0.235 to 4.81 milligrams per liter (mg/L). All NPN results are below the MCL/MAC of 10 mg/L.

Table 2A-4 (Attachment 2A) summarizes alkalinity, major anions (as bromide, chloride, fluoride, and sulfate), TOX, total phenols, and total cyanide results. None of the analytes listed were detected above established MCLs or MACs, except for fluoride. Fluoride was detected above the MAC of 1.6 mg/L in samples from Coyote Springs and monitoring wells SFR-2S, SFR-4T, and TRE-1 at concentrations ranging from 1.74 to 2.87 mg/L. The elevated fluoride concentrations routinely observed in Coyote Springs is in an area of shallow groundwater and exposed bedrock containing fluoride-bearing minerals. Fluoride in groundwater is suspected to be naturally occurring (geogenic). The time trend plots for Coyote Springs and for wells in which fluoride concentrations exceed the MCL are presented on Figures 2C-1 through 2C-4 (Attachment 2C).

Detections of TOX were reported in samples from all sampling locations. But TOX was qualified as not detected during data validation in six of the samples because TOX was reported at concentrations less than the values reported in associated blank samples. The detected TOX were all "J" values (estimated values), at concentrations ranging from 0.0028 to 0.055 mg/L.

Total phenol was not detected at five of the sample locations, but ranged from 0.00181 to 0.0204 mg/L at the other sample locations. SNL/NM personnel requested GEL reanalyze total phenol in samples from monitoring wells PL-4, SWTA3-MW3, and TRE-1 because the original results were not comparable to historical values or the associated environmental duplicate sample. Both original and reanalysis results are reported in Table 2A-4.

Total cyanide was not detected in any of the samples from Coyote Springs or the monitoring wells.

Mercury was analyzed using unfiltered samples and is reported as total mercury. Mercury was not detected above associated laboratory MDLs in any groundwater sample. Total mercury results are summarized in Table 2A-5 (Attachment 2A).

Samples from GMP monitoring wells were analyzed for TAL metals plus uranium. Dissolved TAL metal results are summarized in Table 2A-6 (Attachment 2A). No metal parameters, other than beryllium, were detected above established regulatory limits in any groundwater samples. Beryllium was detected above the MCL of 0.004 mg/L in the sample from Coyote Springs at a concentration of 0.00754 mg/L. The time trend plot for beryllium concentrations for Coyote Springs is shown on Figure 2C-5 (Attachment 2C). The beryllium result for Coyote Springs is consistent with prior years of monitoring data as is demonstrated in the trend plot (Figure 2C-5).

Results for radiological analyses are summarized in Table 2A-7 (Attachment 2A), and include analyses for alpha- and beta-emitting radioisotopes (gross alpha/beta activities), radium-226, radium-228, and gamma spectroscopy results for short-list gamma radiation-emitting radioisotopes (americium-241, cesium-137, cobalt-60, and potassium-40). All reported activities are below established MCLs or MACs. Potassium-40 results in NWTA3-MW3D and SWTA3-MW4, and the americium-241 result in SWTA3-MW2 were qualified as unusable during data validation because the laboratory did not meet minimum peak identification criteria.

Isotopic uranium (uranium-233/234, uranium-235/236, and uranium-238) analyses were conducted on those samples from wells that previously had high gross alpha activity or are located where groundwater is in contact with bedrock that contains minerals that are high in naturally occurring radioisotopes. Isotopic uranium was collected at Coyote Springs and monitoring wells Greystone-MW2, SFR-2S, SFR-4T, and TRE-1 because groundwater contacts bedrock, which contains minerals high in naturally occurring uranium.

Gross alpha activity is measured as a screening tool and in accordance with 40 Code of Federal Regulations, Parts 9, 141, and 142, Table I-4 does not include uranium, which is measured independently. Therefore, gross alpha activity measurements were corrected by subtracting the total uranium activity. Radiological results are further reviewed by an SNL/NM Certified Health Physicist to assure that the samples are nonradioactive. The corrected gross alpha activity results are all below the MCL of 15 pCi/L, with a maximum value of 4.18 pCi/L.

Table 2A-8 (Attachment 2A) summarizes field water quality measurements collected prior to sampling. Field water quality measurements are used to document water chemistry stability and include turbidity, potential of hydrogen (pH), temperature, specific conductance (SC), oxidation-reduction potential (ORP), and dissolved oxygen (DO).

### 2.6.2 Groundwater Elevation Measurements

Construction details for monitoring wells located on or near KAFB are listed in Table 1. During CY 2013, SNL/NM GMP personnel measured groundwater elevations in 96 SNL/NM monitoring wells (Table 2). The groundwater elevations were measured with an electric well sounder. Data were also available for 22 additional monitoring wells owned by KAFB, COA, NMOSE, and LRRI. The groundwater elevation data are maintained in the Sandia EDMS. Groundwater elevation data for CY 2013 are provided in Table 2. The total number of wells listed by the respective organization is provided in Table 2-2.

#### 2.6.2.1 Groundwater Recharge and Withdrawal

Factors influencing groundwater elevation fluctuations include groundwater withdrawals by production wells and potential recharge from precipitation.

**Annual Precipitation**

The regional climate for the Albuquerque Basin area is semiarid. Long-term average precipitation ranges from 9.45 inches per year (in/yr) (30-year norm based on 1981-2010 data) at Albuquerque International Sunport up to 35 in/yr at the crest of the Sandia Mountains. The normal seasonal distribution of precipitation in the Albuquerque area is for the majority to occur during the months of June through August when monsoonal thunderstorm activity is greatest. For CY 2013, the wettest months were July and September.

**Table 2-2. Groundwater Elevations Measured in Monitoring Wells by SNL/NM and Other Organizations**

| Total Wells | Measuring Agency | Well Owner | Location |
|---|---|---|---|
| 96 | SNL/NM GMP | DOE/NNSA | Site-wide surveillance network wells, CWL, MWL, TA-V, TAG Investigation, and Burn Site Groundwater Study Area |
| 22 | SNL/NM GMP | KAFB | ECP Long-term Monitoring Program |
| 4 | COA EHD | COA | Eubank Landfill north of KAFB and Yale Avenue Landfill west of KAFB |
| 1 | SNL/NM GMP | COA | Eubank-1, West of Eubank Landfill |
| 1 | USGS | NMOSE | Mesa Del Sol-S well |
| 1 | USGS | COA | Montessa Park-S well |
| 1 | LRRI | DOE/NNSA | Southern boundary of KAFB |

**NOTES:**
COA = City of Albuquerque.
CWL = Chemical Waste Landfill.
DOE = U.S. Department of Energy.
ECP = Environmental Compliance Program.
EHD = Environmental Health Department.
GMP = Groundwater Monitoring Program.
KAFB = Kirtland Air Force Base.
LRRI = Lovelace Respiratory Research Institute.
MWL = Mixed Waste Landfill.
NMOSE = New Mexico Office of the State Engineer.
NNSA = National Nuclear Security Administration.
SNL/NM = Sandia National Laboratories, New Mexico.
TA-V = Technical Area V.
TAG = Tijeras Arroyo Groundwater.
USGS = U.S. Geological Survey.

Precipitation data relevant to KAFB hydrogeology are available from four rain-gauge locations. Three on-site and one off-site meteorological towers are used to evaluate the precipitation pattern for KAFB:

- A21 tower located in Technical Area (TA)-II (Figure 1-4);
- A36 tower located in TA-III/V (Figure 1-4);
- SC1 tower located near Schoolhouse Well in the foothills of the Manzanita Mountains (Figure 1-4).
- National Weather Service meteorological station "KABQ" at the Albuquerque International Sunport located at the northwest corner of KAFB.

Annual precipitation during CY 2013 at the four locations is shown in Table 2-3. Data for CY 2012 are also presented for comparison. The differences in precipitation totals from the four locations show the isolated nature of rain showers in the Albuquerque area. The 9.32 inches of precipitation measured at the Albuquerque International Sunport (KABQ) during CY 2013 is 3.86 inches more than the corresponding period for the previous year; and it is 0.13 inches below the 30-year (1981-2010) norm of 9.45 inches. Monthly distribution of precipitation during CY 2013 at the four locations is shown on Figure 2B-1 (Attachment 2B). Figure 2B-2 shows the annual distribution of precipitation at these four locations for the period from January 2003 to December 2013.

**Table 2-3. Precipitation Data for Kirtland Air Force Base, Calendar Years 2012 and 2013**

| Year | Meteorological Station | | | |
|---|---|---|---|---|
| | A21 | A36 | SC1 | KABQ |
| CY 2012 | 3.98 | 4.51 | 6.51 | 5.46 |
| CY 2013 | 11.46 | 12.11 | 11.00 | 9.32 |

**NOTES:**
Data are in inches of rainfall.
A21 = SNL/NM meteorological station in TA-II.
A36 = SNL/NM meteorological station in TA-III/V.
CY = Calendar Year.
KABQ = National Weather Service meteorological station at the Albuquerque International Sunport.
SC1 = SNL/NM meteorological station in the foothills of the Manzanita Mountains.

**Groundwater Withdrawal**

The KAFB production wells are screened over a depth from about 500 to 2,000 feet (ft) below ground surface and extract groundwater from the upper and middle unit of the Santa Fe Group. During CY 2013, KAFB pumped groundwater primarily from seven water supply wells.

KAFB supplies all the water for SNL/NM and other DOE/NNSA facilities located on KAFB. Figure 2B-3 (Attachment 2B) shows the CY 2013 monthly production for KAFB water supply wells. The highest level of production was in June at 118,580,000 gallons (gal.); the lowest occurred in January at 33,290,000 gal. The variability in production in response to demand is reflected in the cyclic fluctuation of groundwater elevations in monitoring wells within the region of influence of these pumping wells and is evident when shown in hydrographs. Figure 2B-4 shows the CY 2013 monthly production for each KAFB water supply well. Figure 2B-5 shows the trend of total annual groundwater production at KAFB for all wells, beginning in 2001. Table 2-4 provides a comparison of water pumped during CY 2013 to the previous year.

**Table 2-4. Total Kirtland Air Force Base Groundwater Well Production**

| Units | CY 2012 | CY 2013 |
|---|---|---|
| Million gallons | 874 | 826 |
| Acre feet | 2,683 | 2,534 |

**NOTES:**
Acre feet = 325,851 gallons.
CY = Calendar Year.

### 2.6.2.2 Groundwater Elevations

Groundwater elevations were interpreted using potentiometric surface maps and hydrographs.

**Base-Wide Potentiometric Surface Map**

Groundwater elevation data for monitoring wells installed by Sandia, USAF ER Program, COA EHD, LRRI, USGS, and NMOSE were used to construct the base-wide CY 2013 potentiometric surface map of the regional aquifer as shown on Plate 1. A total of 126 monitoring wells with water levels for October/November 2013 were used for interpreting the groundwater elevation data and constructing the contours (Table 1). Even though various well owners measure water levels on differing schedules, the use of two months of data is considered temporally concordant because water levels are typically not seasonally affected across KAFB.

The base-wide map represents the potentiometric surface of the regional aquifer and incorporates wells completed at the water table west of the Tijeras Fault Zone and wells completed in bedrock east of the

fault zone (Figure 1-3). West of the Tijeras Fault Zone, the regional aquifer is under unconfined (water table) conditions and is present within the Santa Fe Group, which consists of a fine-grained alluvial-fan lithofacies and the coarser Ancestral Rio Grande lithofacies (Figure 1-3). Within and east of the Tijeras Fault Zone, the regional aquifer is typically under confined conditions (positive pressure head) and is primarily present within fractured Paleozoic bedrock (primarily limestone and sandstone) and Precambrian bedrock (primarily granite and metamorphic rocks). The fault zone partially restricts groundwater underflow from the bedrock recharging the unconsolidated basin-fill deposits (the Santa Fe Group) of the Albuquerque Basin.

In general, groundwater flows westward away from the Manzanita Mountains and toward the Rio Grande. An extensive trough in the water table along the western edge of KAFB is due to drawdowns created by KAFB and ABCWUA water-supply wells. As a result, water levels across much of KAFB are steadily declining. This trough extends as far south as the Isleta Pueblo Reservation. The KAFB and ABCWUA Ridgecrest production well fields are located near the northern boundary of KAFB. The flat gradient in the middle of the trough is indicative of flow through the highly permeable sediments of the Ancestral Rio Grande fluvial deposits, which are the most productive aquifer material in the area.

Relatively steeper gradients in the eastern portion of KAFB are due to less permeable materials, higher ground surface elevation along the eastern mountain front of the Albuquerque Basin, and the presence of various faults (Plate 1).

**Perched Groundwater System Potentiometric Surface Map**

During the installation of monitoring wells for groundwater characterization at TA-II in 1993, a shallow water-bearing zone was encountered at a depth of 300 ft below ground surface. This was 200 ft above the regional aquifer. The installation of additional wells completed in this PGWS defined the lateral extent of the system, which is approximately 3.5 square miles. The western edge of the PGWS trends along the eastern side of former KAFB sewage lagoons. The northern edge of the PGWS coincides with the northern boundary of TA-I. To the east, the PGWS is defined using USAF ER Program monitoring wells along the west side of the KAFB Landfill. The southern tip appears to be south of the Tijeras Arroyo Golf Course along the northeastern side of Pennsylvania Avenue. The area covered by the PGWS comprises much of the Tijeras Arroyo Groundwater study area, and the elevation data for wells completed in the PGWS were used to construct the potentiometric surface map that is presented and discussed in Chapter 6.0.

**Monitoring Well Hydrographs**

This section discusses historical and recent trends in groundwater elevations in the vicinity of SNL/NM, as demonstrated in the hydrographs for 12 GMP monitoring wells (Figures 2B-6 through 2B-11). The groundwater elevation data for these wells are considered to be representative of groundwater across KAFB. Historical data from quarterly and monthly groundwater elevation measurements through CY 2013 were used for plotting the hydrographs.

Since their construction, the 12 monitoring wells have had mostly declining water levels due to limited recharge from precipitation and groundwater withdrawals in the regional aquifer. Specific information gleaned from the hydrographs includes the following:

- **Greystone-MW2 (Figure 2B-6)**—Overall declining trend with superimposed seasonal effects of 1 to 2 ft that are mostly due to monsoonal thunderstorms; the well is located in Lurance Canyon and has a shallow screen set in alluvium.

- **MRN-2 and MRN-3D (Figure 2B-7)**—Declining trend up until early 2011; since then groundwater elevations have stabilized.

- **NWTA3-MW3D, PL-2, and PL-4 (Figure 2B-8)**—Declining trend up until late 2010/early 2011; since then, groundwater elevations have stabilized and show a slight increasing trend in NWTA3-MW3D and a slight to moderate increasing trend in monitoring wells PL-2 and PL-4.

- **SFR-2S and TRE-1 (Figure 2B-9)**—Slight to moderate declining trend since 2004.

- **SFR-4T (Figure 2B-10)**—Cyclical pattern with yearly fluctuations of 20 to 30 ft since 2001, but less pronounced cyclical pattern in 2011, 2012, and 2013.

- **SWTA3-MW2, SWTA3-MW3, and SWTA3-MW4 (Figure 2B-11)**—Moderate declining trend up until late 2011; since then, groundwater elevations continue to decline but appear to be stabilizing.

## 2.7 Quality Control Results

The QC samples are collected in the field at the time of environmental sample collection. Field QC samples are described in Section 1.3 and include duplicate environmental, equipment blank (EB), trip blank (TB), and field blank (FB) samples.

Duplicate environmental samples were collected from monitoring wells MRN-2, PL-4, SWTA3-MW3, and during both resampling events at SWTA3-MW4 and analyzed for all parameters to estimate the overall reproducibility of the sampling and analytical process. Relative percent difference (RPD) calculations of environmental samples and duplicate environmental samples were performed for detected chemical analytes only. The duplicate sample results show good agreement (RPD values less than 20 for organics and less than 35 for inorganic analyses) for all calculated parameters, except alkalinity, bromide, and total phenol. The RPD for alkalinity in MRN-2 was calculated at 103. The RPD for bromide on PL-4 was calculated at 74, but is considered an estimated value, because bromide was detected below the PQL. The RPD for total phenol (initial analysis) in SWTA3-MW3 was calculated at 94.

EB samples were collected prior to well purging and sampling at monitoring wells MRN-2, PL-4, SWTA3-MW3, and SWTA3-MW4 (resample) and submitted for all analyses.

Bromodichloromethane, bromoform, chloride, chloroform, chromium, copper, dibromochloromethane, sodium, TOX, total phenol, gross beta, radium-226, and radium-228 were detected in the EB samples. No corrective action was required for bromodichloromethane, bromoform, chloride, chloroform, dibromochloromethane, sodium, gross beta, radium-226, and radium-228 because these parameters were not detected in associated environmental samples, or were detected at concentrations greater than five times the blank result. Chromium, copper, and TOX were detected at concentrations less than five times the associated environmental sample results and were qualified as not detected during data validation. Total phenol was detected at a concentration less than five times in the PL-4 environmental samples, and these environmental sample results were qualified as not detected during data validation.

The TB samples were submitted whenever samples were collected for VOC analysis to assess whether contamination of the samples had occurred during shipment and storage. A total of 20 trip blanks were submitted with the CY 2013 samples. No VOCs were detected above associated laboratory MDLs.

Seven FB samples were collected for VOCs to assess whether contamination of the samples resulted from ambient conditions during sample collection. FB samples were prepared by pouring deionized water into sample containers at the monitoring wells PL-4, NWTA3-MW3D, and SWTA3-MW4 sampling points to simulate the transfer of environmental samples from the sampling system to the sample container. The VOC compounds bromodichloromethane, bromoform, chloroform, and dibromochloromethane were detected above laboratory MDLs. No corrective action was necessary, because these compounds were not detected in the associated environmental samples.

QC samples are also prepared at the laboratory to determine whether contaminant chemicals are introduced into laboratory processes and procedures. These include method blanks, laboratory control samples, matrix spike, matrix spike duplicate, and surrogate spike samples. Although some analytical results were qualified during the data validation process, and all data were determined as acceptable and reported QC measures to be adequate, except for the values listed below:

- The americium-241 activity in SWTA3-MW2 was qualified as unusable during data validation because the laboratory was unable to meet minimum peak identification criteria.

- The potassium-40 activity in NWTA3-MW3D and SWTA-MW4 were qualified as unusable during data validation because the laboratory was unable to meet minimum peak identification criteria.

## 2.8 Variances and Nonconformances

Project variances from requirements specified in the GMP Mini-Sampling and Analysis Plan (SAP) (SNL April 2013) identified during the CY 2013 sampling activities are identified below.

- TCE was detected in the May 2013 SWTA3-MW4 sample at a concentration of 0.670 μg/L; this is the initial detection of TCE. SNL/NM personnel resampled SWTA3-MW4 for VOCs on August 1, 2013 and September 25, 2013. The August 2013 results were qualified as not detected during data validation because TCE was reported in the associated QC blank sample. No VOCs were reported above laboratory MDLs in the September 2013 environmental samples.

- SNL/NM personnel requested GEL reanalyze total phenol in samples from PL-4, SWTA3-MW3, and TRE-1 because original results were not comparable to historical values or the associated environmental duplicate sample. Results from both original and reanalysis are reported in Table 2A-4.

## 2.9 Summary and Conclusions

The annual groundwater surveillance monitoring sampling event was conducted between April 26 and September 25, 2013. Groundwater samples were collected from 12 monitoring wells and one spring. The analytical results for the groundwater samples are similar to the results reported for previous years. No VOCs or HE compounds were detected at concentrations above established MCLs or MACs in any groundwater sample. The TCE originally detected in SWTA3-MW4 is thought to be an artifact of sampling or decontamination procedures and do not reflect actual groundwater concentrations. Subsequent sampling and analyses did not detect TCE, which is consistent with historical results.

NPN was detected in all well samples above associated MDLs, and ranged from 0.235 to 4.81 mg/L. All NPN results are below the MCL/MAC of 10 mg/L.

The elevated total phenol concentrations originally detected in samples from PL-4, SWTA3-MW3, and TRE-1 are thought to be an artifact of analytical laboratory issues and do not reflect actual groundwater concentrations. Subsequent re-analyses did not detect total phenol, or detected much lower concentrations of total phenol, which is consistent with historical results.

Fluoride was detected above the MAC of 1.6 mg/L (NMED 2001) in samples from Coyote Springs and monitoring wells SFR-2S, SFR-4T, and TRE-1 at concentrations ranging from 1.74 to 2.87 mg/L. The MCL for fluoride is 4.0 mg/L.

No metals, other than beryllium, were detected above established regulatory limits in any groundwater sample. Beryllium was detected above the MCL of 0.004 mg/L in the sample from Coyote Springs at a concentration of 0.00754 mg/L.

Groundwater elevations were obtained during CY 2013 at 96 SNL/NM monitoring wells on a monthly or quarterly basis. Groundwater elevations from the SNL/NM wells and wells owned by other agencies were used to construct a base-wide potentiometric surface map of the regional aquifer. The contours display a pattern that reflects the impact of the groundwater withdrawal by water supply wells located in the northwestern portion of KAFB and by ABCWUA production wells located north of the base.

## 2.10 References


**40 CFR 141** Code of Federal Regulations, Title 40—Protection of the Environment, Part 141--National Primary Drinking Water Regulations.

**DOE 2011** U.S. Department of Energy (DOE), 2011. *Departmental Sustainability*, DOE Order 436.1, U.S. Department of Energy, Washington, D.C., May 2.

**DOE 1993** U.S. Department of Energy (DOE), 1993. *Drinking Water Guidelines for Radioisotopes*, DOE Order 5400.5, U.S. Department of Energy, Washington, D.C.

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

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

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

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

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

**SNL April 2013** Sandia National Laboratories, New Mexico (SNL/NM), 2013. *Groundwater Protection Program Mini-SAP for FY13 Annual Groundwater Surveillance*, Sandia National Laboratories, Albuquerque, New Mexico, April.

**SNL May 2013** Sandia National Laboratories, New Mexico (SNL/NM), 2013. *SNL/NM Long-Term Stewardship Consolidated Groundwater Monitoring Program Plan*, Sandia National Laboratories, Albuquerque, New Mexico, May.

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# Attachment 2A
# Long-Term Stewardship
# Consolidated Groundwater Monitoring Program
# Analytical Results Tables

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# Attachment 2A Tables


2A-1 Summary of Detected Volatile Organic Compounds and High Explosive Compounds, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 2A-5

2A-2 Method Detection Limits for Volatile Organic Compounds and High Explosive Compounds, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 2A-6

2A-3 Summary of Nitrate plus Nitrite Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 2A-7

2A-4 Summary of Alkalinity, Anion, Total Organic Halogens, Total Phenol, and Total Cyanide Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 2A-8

2A-5 Summary of Mercury Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 2A-12

2A-6 Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 2A-13

2A-7 Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Radium, and Isotopic Uranium Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 2A-29

2A-8 Summary of Field Water Quality Measurements[h], Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 2A-34

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# Table 2A-1
## Summary of Detected Volatile Organic Compounds and High Explosive Compounds, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL/MAC[d] (µg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **SWTA3-MW4** 06-May-13 | Trichloroethene | 0.670 | 0.300 | 1.00 | 5.00 | 100 | J | | 093900-001 | SW846 8260 |
| **SWTA3-MW4** 01-Aug-13 | Trichloroethene | 0.380 | 0.300 | 1.00 | 5.00 | 100 | J | 1.0U | 094493-001 | SW846 8260 |
| **SWTA3-MW4** (Duplicate) 01-Aug-13 | Trichloroethene | 0.380 | 0.300 | 1.00 | 5.00 | 100 | J | 1.0U | 094494-001 | SW846 8260 |
| **TRE-1** 01-May-13 | Chloroform | 0.630 | 0.300 | 1.00 | NE | 100 | J | | 093894-001 | SW846 8260 |

Refer to footnotes on page 2A-35.

## Table 2A-2
## Method Detection Limits for Volatile Organic Compounds and High Explosive Compounds, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Analyte | MDL[b] (µg/L) | Analytical Method[g] | Analyte | MDL[b] (µg/L) | Analytical Method[g] |
|---|---|---|---|---|---|
| 1,1,1,2-Tetrachloroethane | 0.300 | SW846 8260 | Ethyl benzene | 0.300 | SW846 8260 |
| 1,1,1-Trichloroethane | 0.300 | SW846 8260 | Hexachlorobutadiene | 0.300 | SW846 8260 |
| 1,1,2,2-Tetrachloroethane | 0.300 | SW846 8260 | Isopropylbenzene | 0.300 | SW846 8260 |
| 1,1,2-Trichloroethane | 0.300 | SW846 8260 | Methylene chloride | 3.00 | SW846 8260 |
| 1,1-Dichloroethane | 0.300 | SW846 8260 | Naphthalene | 0.400 | SW846 8260 |
| 1,1-Dichloroethene | 0.300 | SW846 8260 | Styrene | 0.300 | SW846 8260 |
| 1,1-Dichloropropene | 0.300 | SW846 8260 | Tert-butyl methyl ether | 0.300 | SW846 8260 |
| 1,2,3-Trichlorobenzene | 0.300 | SW846 8260 | Tetrachloroethene | 0.300 | SW846 8260 |
| 1,2,3-Trichloropropane | 0.300 | SW846 8260 | Toluene | 0.300 | SW846 8260 |
| 1,2,4-Trichlorobenzene | 0.300 | SW846 8260 | Trichloroethene | 0.300 | SW846 8260 |
| 1,2,4-Trimethylbenzene | 0.300 | SW846 8260 | Trichlorofluoromethane | 0.300 | SW846 8260 |
| 1,2-Dibromo-3-chloropropane | 0.300 | SW846 8260 | Vinyl chloride | 0.300 | SW846 8260 |
| 1,2-Dibromoethane | 0.300 | SW846 8260 | cis-1,2-Dichloroethene | 0.300 | SW846 8260 |
| 1,2-Dichlorobenzene | 0.300 | SW846 8260 | cis-1,3-Dichloropropene | 0.300 | SW846 8260 |
| 1,2-Dichloroethane | 0.300 | SW846 8260 | m-, p-Xylene | 0.300 | SW846 8260 |
| 1,2-Dichloropropane | 0.300 | SW846 8260 | n-Butylbenzene | 0.300 | SW846 8260 |
| 1,3,5-Trimethylbenzene | 0.300 | SW846 8260 | n-Propylbenzene | 0.300 | SW846 8260 |
| 1,3-Dichlorobenzene | 0.300 | SW846 8260 | o-Xylene | 0.300 | SW846 8260 |
| 1,3-Dichloropropane | 0.300 | SW846 8260 | sec-Butylbenzene | 0.300 | SW846 8260 |
| 1,4-Dichlorobenzene | 0.300 | SW846 8260 | tert-Butylbenzene | 0.300 | SW846 8260 |
| 2,2-Dichloropropane | 0.300 | SW846 8260 | trans-1,2-Dichloroethene | 0.300 | SW846 8260 |
| 2-Chlorotoluene | 0.300 | SW846 8260 | trans-1,3-Dichloropropene | 0.300 | SW846 8260 |
| 4-Chlorotoluene | 0.300 | SW846 8260 | 1,3,5-Trinitrobenzene | 0.0847 – 0.0874 | SW846 8321A |
| 4-Isopropyltoluene | 0.300 | SW846 8260 | 1,3-Dinitrobenzene | 0.0847 – 0.0874 | SW846 8321A |
| Benzene | 0.300 | SW846 8260 | 2,4,6-Trinitrotoluene | 0.0847 – 0.0874 | SW846 8321A |
| Bromobenzene | 0.300 | SW846 8260 | 2,4-Dinitrotoluene | 0.0847 – 0.0874 | SW846 8321A |
| Bromochloromethane | 0.300 | SW846 8260 | 2,6-Dinitrotoluene | 0.0847 – 0.0874 | SW846 8321A |
| Bromodichloromethane | 0.300 | SW846 8260 | 2-Amino-4,6-dinitrotoluene | 0.0847 – 0.0874 | SW846 8321A |
| Bromoform | 0.300 | SW846 8260 | 2-Nitrotoluene | 0.0868 – 0.0896 | SW846 8321A |
| Carbon tetrachloride | 0.300 | SW846 8260 | 3-Nitrotoluene | 0.0847 – 0.0874 | SW846 8321A |
| Chlorobenzene | 0.300 | SW846 8260 | 4-Amino-2,6-dinitrotoluene | 0.0847 – 0.0874 | SW846 8321A |
| Chloroethane | 0.300 | SW846 8260 | 4-Nitrotoluene | 0.159 – 0.164 | SW846 8321A |
| Chloroform | 0.300 | SW846 8260 | HMX | 0.0847 – 0.0874 | SW846 8321A |
| Chloromethane | 0.300 | SW846 8260 | Nitro-benzene | 0.0847 – 0.0874 | SW846 8321A |
| Dibromochloromethane | 0.300 | SW846 8260 | Pentaerythritol tetranitrate | 0.106 – 0.109 | SW846 8321A |
| Dibromomethane | 0.300 | SW846 8260 | RDX | 0.0847 – 0.0874 | SW846 8321A |
| Dichlorodifluoromethane | 0.300 | SW846 8260 | Tetryl | 0.0847 – 0.0874 | SW846 8321A |

Refer to footnotes on page 2A-35.

# Table 2A-3
## Summary of Nitrate plus Nitrite Results,
## Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
## Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **Coyote Springs** 02-May-13 | Nitrate plus nitrite | 0.370 | 0.017 | 0.050 | 10.0 | | | 093896-018 | EPA 353.2 |
| **Greystone-MW2** 26-Apr-13 | Nitrate plus nitrite | 4.64 | 0.170 | 0.500 | 10.0 | | | 093888-018 | EPA 353.2 |
| **MRN-2** 14-May-13 | Nitrate plus nitrite | 4.49 | 0.085 | 0.250 | 10.0 | | | 093923-018 | EPA 353.2 |
| **MRN-2** (Duplicate) 14-May-13 | Nitrate plus nitrite | 4.52 | 0.085 | 0.250 | 10.0 | | | 093924-018 | EPA 353.2 |
| **MRN-3D** 13-May-13 | Nitrate plus nitrite | 2.33 | 0.085 | 0.250 | 10.0 | | | 093919-018 | EPA 353.2 |
| **NWTA3-MW3D** 10-May-13 | Nitrate plus nitrite | 1.02 | 0.017 | 0.050 | 10.0 | | | 093916-018 | EPA 353.2 |
| **PL-2** 08-May-13 | Nitrate plus nitrite | 2.62 | 0.085 | 0.250 | 10.0 | | | 093908-018 | EPA 353.2 |
| **PL-4** 09-May-13 | Nitrate plus nitrite | 4.77 | 0.170 | 0.500 | 10.0 | | | 093913-018 | EPA 353.2 |
| **PL-4** (Duplicate) 09-May-13 | Nitrate plus nitrite | 4.81 | 0.170 | 0.500 | 10.0 | | | 093914-018 | EPA 353.2 |
| **SFR-2S** 29-Apr-13 | Nitrate plus nitrite | 0.865 | 0.085 | 0.250 | 10.0 | | | 093890-018 | EPA 353.2 |
| **SFR-4T** 30-Apr-13 | Nitrate plus nitrite | 0.235 | 0.017 | 0.050 | 10.0 | | | 093892-018 | EPA 353.2 |
| **SWTA3-MW2** 03-May-13 | Nitrate plus nitrite | 0.770 | 0.017 | 0.050 | 10.0 | | | 093898-018 | EPA 353.2 |
| **SWTA3-MW3** 07-May-13 | Nitrate plus nitrite | 0.549 | 0.017 | 0.050 | 10.0 | | | 093905-018 | EPA 353.2 |
| **SWTA3-MW3** (Duplicate) 07-May-13 | Nitrate plus nitrite | 0.548 | 0.017 | 0.050 | 10.0 | | | 093906-018 | EPA 353.2 |
| **SWTA3-MW4** 06-May-13 | Nitrate plus nitrite | 0.907 | 0.017 | 0.050 | 10.0 | | | 093900-018 | EPA 353.2 |
| **TRE-1** 01-May-13 | Nitrate plus nitrite | 2.17 | 0.085 | 0.250 | 10.0 | | | 093894-018 | EPA 353.2 |

Refer to footnotes on page 2A-35.

## Table 2A-4
## Summary of Alkalinity, Anion, Total Organic Halogens, Total Phenol, and Total Cyanide Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **Coyote Springs** | Total Organic Halogens | 0.055 | 0.0018 | 0.005 | NE | NE | | J | 093896-003 | SW846 9020 |
| 02-May-13 | Bromide | ND | 0.067 | 0.200 | NE | NE | U | | 093896-016 | SW846 9056 |
| | Chloride | 503 | 6.70 | 20.0 | NE | NE | | | 093896-016 | SW846 9056 |
| | Fluoride | **1.77** | 0.033 | 0.100 | 4.0 | 1.60 | | | 093896-016 | SW846 9056 |
| | Sulfate | 133 | 13.3 | 40.0 | NE | NE | | | 093896-016 | SW846 9056 |
| | Alkalinity | 1060 | 0.725 | 1.00 | NE | NE | | | 093896-022 | SM2320B |
| | Total Phenol | ND | 0.00167 | 0.005 | NE | NE | U | | 093896-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | 0.200 | U | UJ | 093896-027 | SW846 9012 |
| **Greystone-MW2** | Total Organic Halogens | 0.014 | 0.0018 | 0.005 | NE | NE | | J | 093888-003 | SW846 9020 |
| 26-Apr-13 | Bromide | 0.617 | 0.067 | 0.200 | NE | NE | | | 093888-016 | SW846 9056 |
| | Chloride | 119 | 1.34 | 4.00 | NE | NE | | | 093888-016 | SW846 9056 |
| | Fluoride | 0.864 | 0.033 | 0.100 | 4.0 | 1.60 | | | 093888-016 | SW846 9056 |
| | Sulfate | 50.8 | 2.66 | 8.00 | NE | NE | | | 093888-016 | SW846 9056 |
| | Alkalinity | 481 | 0.725 | 1.00 | NE | NE | | | 093888-022 | SM2320B |
| | Total Phenol | 0.00197 | 0.00167 | 0.005 | NE | NE | J | | 093888-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | 0.200 | U | UJ | 093888-027 | SW846 9012 |
| **MRN-2** | Total Organic Halogens | 0.0078 | 0.0018 | 0.005 | NE | NE | | 0.060UJ | 093933-003 | SW846 9020 |
| 14-May-13 | Bromide | 0.242 | 0.067 | 0.200 | NE | NE | | | 093923-016 | SW846 9056 |
| | Chloride | 12.0 | 0.335 | 1.00 | NE | NE | | | 093923-016 | SW846 9056 |
| | Fluoride | 0.694 | 0.033 | 0.100 | 4.0 | 1.60 | | | 093923-016 | SW846 9056 |
| | Sulfate | 49.0 | 0.665 | 2.00 | NE | NE | | | 093923-016 | SW846 9056 |
| | Alkalinity | 150 | 0.725 | 1.00 | NE | NE | | | 093923-022 | SM2320B |
| | Total Phenol | 0.0204 | 0.00167 | 0.005 | NE | NE | | | 093923-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | 0.200 | U | UJ | 093923-027 | SW846 9012 |
| **MRN-2** (Duplicate) | Total Organic Halogens | 0.0062 | 0.0018 | 0.005 | NE | NE | | 0.060UJ | 093934-003 | SW846 9020 |
| 14-May-13 | Bromide | 0.241 | 0.067 | 0.200 | NE | NE | | | 093924-016 | SW846 9056 |
| | Chloride | 16.1 | 0.335 | 1.00 | NE | NE | | | 093924-016 | SW846 9056 |
| | Fluoride | 0.679 | 0.033 | 0.100 | 4.0 | 1.60 | | | 093924-016 | SW846 9056 |
| | Sulfate | 55.6 | 0.665 | 2.00 | NE | NE | | | 093924-016 | SW846 9056 |
| | Alkalinity | 47.7 | 0.725 | 1.00 | NE | NE | | | 093924-022 | SM2320B |
| | Total Phenol | ND | 0.00167 | 0.005 | NE | NE | U | | 093924-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | 0.200 | U | UJ | 093924-027 | SW846 9012 |

Refer to footnotes on page 2A-35.

**Table 2A-4** *(Continued)*
## Summary of Alkalinity, Anion, Total Organic Halogens, Total Phenol, and Total Cyanide Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **MRN-3D** | Total Organic Halogens | 0.0084 | 0.0018 | 0.005 | NE | NE | | J | 093931-003 | SW846 9020 |
| 13-May-13 | Bromide | 0.203 | 0.067 | 0.200 | NE | NE | | | 093919-016 | SW846 9056 |
| | Chloride | 13.9 | 0.670 | 2.00 | NE | NE | | | 093919-016 | SW846 9056 |
| | Fluoride | 0.537 | 0.033 | 0.100 | 4.0 | 1.60 | | | 093919-016 | SW846 9056 |
| | Sulfate | 70.8 | 1.33 | 4.00 | NE | NE | | | 093919-016 | SW846 9056 |
| | Alkalinity | 146 | 0.725 | 1.00 | NE | NE | | | 093919-022 | SM2320B |
| | Total Phenol | 0.00257 | 0.00167 | 0.005 | NE | NE | J | | 093919-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | 0.200 | U | UJ | 093919-027 | SW846 9012 |
| **NWTA3-MW3D** | Total Organic Halogens | 0.0058 | 0.0018 | 0.005 | NE | NE | | J | 093930-003 | SW846 9020 |
| 10-May-13 | Bromide | ND | 0.067 | 0.200 | NE | NE | U | | 093916-016 | SW846 9056 |
| | Chloride | 9.92 | 0.335 | 1.00 | NE | NE | | | 093916-016 | SW846 9056 |
| | Fluoride | 0.741 | 0.033 | 0.100 | 4.0 | 1.60 | | | 093916-016 | SW846 9056 |
| | Sulfate | 49.2 | 0.665 | 2.00 | NE | NE | | | 093916-016 | SW846 9056 |
| | Alkalinity | 134 | 0.725 | 1.00 | NE | NE | | | 093916-022 | SM2320B |
| | Total Phenol | ND | 0.00167 | 0.005 | NE | NE | U | | 093916-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | 0.200 | U | UJ | 093916-027 | SW846 9012 |
| **PL-2** | Total Organic Halogens | 0.0028 | 0.0018 | 0.005 | NE | NE | J | J | 093926-003 | SW846 9020 |
| 08-May-13 | Bromide | 0.191 | 0.067 | 0.200 | NE | NE | J | | 093908-016 | SW846 9056 |
| | Chloride | 13.8 | 0.335 | 1.00 | NE | NE | | | 093908-016 | SW846 9056 |
| | Fluoride | 0.476 | 0.033 | 0.100 | 4.0 | 1.60 | | | 093908-016 | SW846 9056 |
| | Sulfate | 71.5 | 0.665 | 2.00 | NE | NE | | | 093908-016 | SW846 9056 |
| | Alkalinity | 151 | 0.725 | 1.00 | NE | NE | | | 093908-022 | SM2320B |
| | Total Phenol | ND | 0.00167 | 0.005 | NE | NE | U | | 093908-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | 0.200 | U | UJ | 093908-027 | SW846 9012 |
| **PL-4** | Total Organic Halogens | 0.0022 | 0.0018 | 0.005 | NE | NE | J | 0.05UJ | 093928-003 | SW846 9020 |
| 09-May-13 | Bromide | 0.275 | 0.067 | 0.200 | NE | NE | | | 093913-016 | SW846 9056 |
| | Chloride | 15.0 | 0.335 | 1.00 | NE | NE | | | 093913-016 | SW846 9056 |
| | Fluoride | 0.344 | 0.033 | 0.100 | 4.0 | 1.60 | | | 093913-016 | SW846 9056 |
| | Sulfate | 66.4 | 0.665 | 2.00 | NE | NE | | | 093913-016 | SW846 9056 |
| | Alkalinity | 163 | 0.725 | 1.00 | NE | NE | | | 093913-022 | SM2320B |
| | Total Phenol | 0.020 | 0.00167 | 0.005 | NE | NE | | 0.0044UJ | 093913-026 | SW846 9066 |
| | Total Phenol | ND | 0.00167 | 0.005 | NE | NE | h, H, U | UJ | 093913-R26 | SW846 9066 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | 0.200 | U | UJ | 093913-027 | SW846 9012 |

Refer to footnotes on page 2A-35.

**Table 2A-4** *(Continued)*
**Summary of Alkalinity, Anion, Total Organic Halogens, Total Phenol, and Total Cyanide Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **PL-4** (Duplicate) | Total Organic Halogens | 0.0075 | 0.0018 | 0.005 | NE | NE | H | 0.05UJ | 093929-003 | SW846 9020 |
| 09-May-13 | Bromide | 0.126 | 0.067 | 0.200 | NE | NE | J | | 093914-016 | SW846 9056 |
| | Chloride | 14.9 | 0.335 | 1.00 | NE | NE | | | 093914-016 | SW846 9056 |
| | Fluoride | 0.358 | 0.033 | 0.100 | 4.0 | 1.60 | | | 093914-016 | SW846 9056 |
| | Sulfate | 65.2 | 0.665 | 2.00 | NE | NE | | | 093914-016 | SW846 9056 |
| | Alkalinity | 153 | 0.725 | 1.00 | NE | NE | | | 093914-022 | SM2320B |
| | Total Phenol | 0.014 | 0.00167 | 0.005 | NE | NE | | 0.0044UJ | 093914-026 | SW846 9066 |
| | Total Phenol | ND | 0.00167 | 0.005 | NE | NE | h, H, U | UJ | 093914-R26 | SW846 9066 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | 0.200 | U | UJ | 093914-027 | SW846 9012 |
| **SFR-2S** | Total Organic Halogens | 0.016 | 0.0018 | 0.005 | NE | NE | | J | 093890-003 | SW846 9020 |
| 29-Apr-13 | Bromide | 0.676 | 0.067 | 0.200 | NE | NE | | | 093890-016 | SW846 9056 |
| | Chloride | 134 | 1.34 | 4.00 | NE | NE | | | 093890-016 | SW846 9056 |
| | Fluoride | **1.74** | 0.033 | 0.100 | 4.0 | 1.60 | | | 093890-016 | SW846 9056 |
| | Sulfate | 75.2 | 2.66 | 8.00 | NE | NE | | | 093890-016 | SW846 9056 |
| | Alkalinity | 391 | 0.725 | 1.00 | NE | NE | | | 093890-022 | SM2320B |
| | Total Phenol | 0.00181 | 0.00167 | 0.005 | NE | NE | J | | 093890-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | 0.200 | U | UJ | 093890-027 | SW846 9012 |
| **SFR-4T** | Total Organic Halogens | 0.023 | 0.0018 | 0.005 | NE | NE | | J | 093892-003 | SW846 9020 |
| 30-Apr-13 | Bromide | 1.61 | 0.067 | 0.200 | NE | NE | | | 093892-016 | SW846 9056 |
| | Chloride | 194 | 13.4 | 40.0 | NE | NE | | | 093892-016 | SW846 9056 |
| | Fluoride | **2.87** | 0.033 | 0.100 | 4.0 | 1.60 | | | 093892-016 | SW846 9056 |
| | Sulfate | 2010 | 26.6 | 80.0 | NE | NE | | | 093892-016 | SW846 9056 |
| | Alkalinity | 104 | 0.725 | 1.00 | NE | NE | | | 093892-022 | SM2320B |
| | Total Phenol | 0.00838 | 0.00167 | 0.005 | NE | NE | | | 093892-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | 0.200 | U | UJ | 093892-027 | SW846 9012 |
| **SWTA3-MW2** | Total Organic Halogens | 0.0089 | 0.0018 | 0.005 | NE | NE | | J | 093898-003 | SW846 9020 |
| 03-May-13 | Bromide | 0.200 | 0.067 | 0.200 | NE | NE | | | 093898-016 | SW846 9056 |
| | Chloride | 15.7 | 0.335 | 1.00 | NE | NE | | | 093898-016 | SW846 9056 |
| | Fluoride | 1.08 | 0.033 | 0.100 | 4.0 | 1.60 | | | 093898-016 | SW846 9056 |
| | Sulfate | 60.9 | 0.665 | 2.00 | NE | NE | | | 093898-016 | SW846 9056 |
| | Alkalinity | 179 | 0.725 | 1.00 | NE | NE | | | 093898-022 | SM2320B |
| | Total Phenol | ND | 0.00167 | 0.005 | NE | NE | U | | 093898-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | 0.200 | U | UJ | 093898-027 | SW846 9012 |

Refer to footnotes on page 2A-35.

**Table 2A-4** *(Concluded)*
## Summary of Alkalinity, Anion, Total Organic Halogens, Total Phenol, and Total Cyanide Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **SWTA3-MW3** | Total Organic Halogens | 0.0084 | 0.0018 | 0.005 | NE | NE | | 0.065UJ | 093905-003 | SW846 9020 |
| 07-May-13 | Bromide | 0.125 | 0.067 | 0.200 | NE | NE | J | | 093905-016 | SW846 9056 |
| | Chloride | 13.2 | 0.335 | 1.00 | NE | NE | | | 093905-016 | SW846 9056 |
| | Fluoride | 1.37 | 0.033 | 0.100 | 4.0 | 1.60 | | | 093905-016 | SW846 9056 |
| | Sulfate | 63.2 | 0.665 | 2.00 | NE | NE | | | 093905-016 | SW846 9056 |
| | Alkalinity | 158 | 0.725 | 1.00 | NE | NE | | | 093905-022 | SM2320B |
| | Total Phenol | 0.00957 | 0.00167 | 0.005 | NE | NE | | | 093905-026 | SW846 9066 |
| | Total Phenol | ND | 0.00167 | 0.005 | NE | NE | h, H, U | UJ | 093905-R26 | SW846 9066 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | 0.200 | U | UJ | 093905-027 | SW846 9012 |
| **SWTA3-MW3** | Total Organic Halogens | 0.0072 | 0.0018 | 0.005 | NE | NE | | 0.065UJ | 093906-003 | SW846 9020 |
| (Duplicate) | Bromide | 0.161 | 0.067 | 0.200 | NE | NE | J | | 093906-016 | SW846 9056 |
| 07-May-13 | Chloride | 13.1 | 0.335 | 1.00 | NE | NE | | | 093906-016 | SW846 9056 |
| | Fluoride | 1.29 | 0.033 | 0.100 | 4.0 | 1.60 | | | 093906-016 | SW846 9056 |
| | Sulfate | 63.3 | 0.665 | 2.00 | NE | NE | | | 093906-016 | SW846 9056 |
| | Alkalinity | 158 | 0.725 | 1.00 | NE | NE | | | 093906-022 | SM2320B |
| | Total Phenol | 0.0264 | 0.00167 | 0.005 | NE | NE | | | 093906-026 | SW846 9066 |
| | Total Phenol | 0.00247 | 0.00167 | 0.005 | NE | NE | h, H, J | NJ- | 093906-R26 | SW846 9066 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | 0.200 | U | UJ | 093906-027 | SW846 9012 |
| **SWTA3-MW4** | Total Organic Halogens | 0.0058 | 0.0018 | 0.005 | NE | NE | | J | 093900-003 | SW846 9020 |
| 06-May-13 | Bromide | 0.200 | 0.067 | 0.200 | NE | NE | | | 093900-016 | SW846 9056 |
| | Chloride | 16.0 | 0.335 | 1.00 | NE | NE | | | 093900-016 | SW846 9056 |
| | Fluoride | 1.57 | 0.033 | 0.100 | 4.0 | 1.60 | | | 093900-016 | SW846 9056 |
| | Sulfate | 50.8 | 0.665 | 2.00 | NE | NE | | | 093900-016 | SW846 9056 |
| | Alkalinity | 179 | 0.725 | 1.00 | NE | NE | | | 093900-022 | SM2320B |
| | Total Phenol | ND | 0.00167 | 0.005 | NE | NE | U | | 093900-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | 0.200 | U | UJ | 093900-027 | SW846 9012 |
| **TRE-1** | Total Organic Halogens | 0.016 | 0.0018 | 0.005 | NE | NE | | J | 093894-003 | SW846 9020 |
| 01-May-13 | Bromide | 0.826 | 0.067 | 0.200 | NE | NE | | | 093894-016 | SW846 9056 |
| | Chloride | 135 | 3.35 | 10.0 | NE | NE | | | 093894-016 | SW846 9056 |
| | Fluoride | **1.77** | 0.033 | 0.100 | 4.0 | 1.60 | | | 093894-016 | SW846 9056 |
| | Sulfate | 105 | 6.65 | 20.0 | NE | NE | | | 093894-016 | SW846 9056 |
| | Alkalinity | 475 | 0.725 | 1.00 | NE | NE | | | 093894-022 | SM2320B |
| | Total Phenol | 0.0726 | 0.00167 | 0.005 | NE | NE | | | 093894-026 | SW846 9066 |
| | Total Phenol | 0.0192 | 0.00167 | 0.005 | NE | NE | h, H, N | J- | 093894-R26 | SW846 9066 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | 0.200 | U | UJ | 093894-027 | SW846 9012 |

Refer to footnotes on page 2A-35.

# Table 2A-5
# Summary of Mercury Results,
# Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
# Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Mercury Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|
| **Coyote Springs** 02-May-13 | ND | 0.000067 | 0.0002 | 0.002 | U | | 093896-010 | SW846 7470A |
| **Greystone-MW2** 26-Apr-13 | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093888-010 | SW846 7470A |
| **MRN-2** 14-May-13 | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093923-010 | SW846 7470A |
| **MRN-2** (Duplicate) 14-May-13 | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093924-010 | SW846 7470A |
| **MRN-3D** 13-May-13 | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093919-010 | SW846 7470A |
| **NWTA3-MW3D** 10-May-13 | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093916-010 | SW846 7470A |
| **PL-2** 08-May-13 | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093908-010 | SW846 7470A |
| **PL-4** 09-May-13 | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093913-010 | SW846 7470A |
| **PL-4** (Duplicate) 09-May-13 | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093914-010 | SW846 7470A |
| **SFR-2S** 29-Apr-13 | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093890-010 | SW846 7470A |
| **SFR-4T** 30-Apr-13 | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093892-010 | SW846 7470A |
| **SWTA3-MW2** 03-May-13 | ND | 0.000067 | 0.0002 | 0.002 | U | | 093898-010 | SW846 7470A |
| **SWTA3-MW3** 07-May-13 | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093905-010 | SW846 7470A |
| **SWTA3-MW3** (Duplicate) 07-May-13 | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093906-010 | SW846 7470A |
| **SWTA3-MW4** 06-May-13 | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093900-010 | SW846 7470A |
| **TRE-1** 01-May-13 | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093894-010 | SW846 7470A |

Refer to footnotes on page 2A-35.

# Table 2A-6
## Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **Coyote Springs** | Aluminum | 0.230 | 0.015 | 0.050 | NE | NE | | | 093896-009 | SW846 6020 |
| 02-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | NE | U | | 093896-009 | SW846 6020 |
| | Arsenic | 0.00463 | 0.0017 | 0.005 | 0.010 | 0.100 | J | | 093896-009 | SW846 6020 |
| | Barium | 0.0428 | 0.0006 | 0.002 | 2.00 | 1.00 | | | 093896-009 | SW846 6020 |
| | Beryllium | **0.00754** | 0.0002 | 0.0005 | 0.004 | NE | | | 093896-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 093896-009 | SW846 6020 |
| | Calcium | 304 | 0.600 | 2.00 | NE | NE | | | 093896-009 | SW846 6020 |
| | Chromium | 0.0026 | 0.002 | 0.010 | 0.100 | 0.050 | J | | 093896-009 | SW846 6020 |
| | Cobalt | 0.0108 | 0.0001 | 0.001 | NE | NE | | | 093896-009 | SW846 6020 |
| | Copper | 0.00171 | 0.00035 | 0.001 | NE | NE | | J- | 093896-009 | SW846 6020 |
| | Iron | 0.754 | 0.033 | 0.100 | NE | NE | | | 093896-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 093896-009 | SW846 6020 |
| | Magnesium | 72.4 | 0.100 | 0.300 | NE | NE | | | 093896-009 | SW846 6020 |
| | Manganese | 1.55 | 0.010 | 0.050 | NE | NE | | | 093896-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | 0.002 | U | | 093896-009 | SW846 7470 |
| | Nickel | 0.0323 | 0.0005 | 0.002 | NE | NE | | | 093896-009 | SW846 6020 |
| | Potassium | 33.9 | 0.080 | 0.300 | NE | NE | | | 093896-009 | SW846 6020 |
| | Selenium | 0.00291 | 0.0015 | 0.005 | 0.050 | 0.050 | J | J | 093896-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 093896-009 | SW846 6020 |
| | Sodium | 462 | 0.800 | 2.50 | NE | NE | | | 093896-009 | SW846 6020 |
| | Thallium | 0.00136 | 0.00045 | 0.002 | 0.002 | NE | J | | 093896-009 | SW846 6020 |
| | Uranium | 0.0075 | 0.000067 | 0.0002 | 0.03 | 0.03 | | | 093896-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | NE | U | | 093896-009 | SW846 6010 |
| | Zinc | 0.0466 | 0.0035 | 0.010 | NE | NE | | | 093896-009 | SW846 6020 |

Refer to footnotes on page 2A-35.

## Table 2A-6 *(Continued)*
## Summary of Target Analyte List Metals and Uranium Results,
## Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
## Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **Greystone-MW2** | Aluminum | ND | 0.015 | 0.050 | NE | NE | U | | 093888-009 | SW846 6020 |
| 26-Apr-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | NE | U | | 093888-009 | SW846 6020 |
| | Arsenic | 0.00284 | 0.0017 | 0.005 | 0.010 | 0.100 | J | | 093888-009 | SW846 6020 |
| | Barium | 0.145 | 0.0006 | 0.002 | 2.00 | 1.00 | | | 093888-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | NE | U | | 093888-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 093888-009 | SW846 6020 |
| | Calcium | 152 | 0.600 | 2.00 | NE | NE | | | 093888-009 | SW846 6020 |
| | Chromium | 0.00214 | 0.002 | 0.010 | 0.100 | 0.050 | J | | 093888-009 | SW846 6020 |
| | Cobalt | 0.000565 | 0.0001 | 0.001 | NE | NE | J | | 093888-009 | SW846 6020 |
| | Copper | 0.00233 | 0.00035 | 0.001 | NE | NE | | J- | 093888-009 | SW846 6020 |
| | Iron | 0.345 | 0.033 | 0.100 | NE | NE | | | 093888-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 093888-009 | SW846 6020 |
| | Magnesium | 31.4 | 0.010 | 0.030 | NE | NE | | | 093888-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | NE | U | | 093888-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | 0.002 | U | UJ | 093888-009 | SW846 7470 |
| | Nickel | 0.00333 | 0.0005 | 0.002 | NE | NE | | | 093888-009 | SW846 6020 |
| | Potassium | 5.57 | 0.080 | 0.300 | NE | NE | | | 093888-009 | SW846 6020 |
| | Selenium | 0.00158 | 0.0015 | 0.005 | 0.050 | 0.050 | J | J | 093888-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 093888-009 | SW846 6020 |
| | Sodium | 110 | 0.800 | 2.50 | NE | NE | | | 093888-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | NE | U | | 093888-009 | SW846 6020 |
| | Uranium | 0.00817 | 0.000067 | 0.0002 | 0.03 | 0.03 | | | 093888-009 | SW846 6020 |
| | Vanadium | 0.00294 | 0.001 | 0.005 | NE | NE | J | | 093888-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | NE | U | | 093888-009 | SW846 6020 |

Refer to footnotes on page 2A-35.

## Table 2A-6 *(Continued)*
## Summary of Target Analyte List Metals and Uranium Results,
## Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
## Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **MRN-2** | Aluminum | ND | 0.015 | 0.050 | NE | NE | U | | 093923-009 | SW846 6020 |
| 14-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | NE | U | | 093923-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | 0.100 | U | | 093923-009 | SW846 6020 |
| | Barium | 0.0562 | 0.0006 | 0.002 | 2.00 | 1.00 | | | 093923-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | NE | U | | 093923-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 093923-009 | SW846 6020 |
| | Calcium | 53.8 | 0.300 | 1.00 | NE | NE | N | | 093923-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | 0.050 | U | | 093923-009 | SW846 6020 |
| | Cobalt | 0.000109 | 0.0001 | 0.001 | NE | NE | J | | 093923-009 | SW846 6020 |
| | Copper | 0.0012 | 0.00035 | 0.001 | NE | NE | | 0.010UJ | 093923-009 | SW846 6020 |
| | Iron | 0.102 | 0.033 | 0.100 | NE | NE | | | 093923-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 093923-009 | SW846 6020 |
| | Magnesium | 15.7 | 0.010 | 0.030 | NE | NE | | | 093923-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | NE | U | | 093923-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | 0.002 | U | UJ | 093923-009 | SW846 7470 |
| | Nickel | 0.00138 | 0.0005 | 0.002 | NE | NE | J | | 093923-009 | SW846 6020 |
| | Potassium | 3.35 | 0.080 | 0.300 | NE | NE | | | 093923-009 | SW846 6020 |
| | Selenium | 0.00204 | 0.0015 | 0.005 | 0.050 | 0.050 | J | | 093923-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 093923-009 | SW846 6020 |
| | Sodium | 22.6 | 0.080 | 0.250 | NE | NE | N | | 093923-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | NE | U | | 093923-009 | SW846 6020 |
| | Uranium | 0.00327 | 0.000067 | 0.0002 | 0.03 | 0.03 | | | 093923-009 | SW846 6020 |
| | Vanadium | 0.00728 | 0.001 | 0.005 | NE | NE | | | 093923-009 | SW846 6010 |
| | Zinc | 0.00391 | 0.0035 | 0.010 | NE | NE | J | | 093923-009 | SW846 6020 |

Refer to footnotes on page 2A-35.

## Table 2A-6 *(Continued)*
## Summary of Target Analyte List Metals and Uranium Results,
## Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
## Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **MRN-2** (Duplicate) | Aluminum | ND | 0.015 | 0.050 | NE | NE | U | | 093924-009 | SW846 6020 |
| 14-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | NE | U | | 093924-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | 0.100 | U | | 093924-009 | SW846 6020 |
| | Barium | 0.0551 | 0.0006 | 0.002 | 2.00 | 1.00 | | | 093924-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | NE | U | | 093924-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 093924-009 | SW846 6020 |
| | Calcium | 52.7 | 0.300 | 1.00 | NE | NE | N | | 093924-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | 0.050 | U | | 093924-009 | SW846 6020 |
| | Cobalt | 0.000127 | 0.0001 | 0.001 | NE | NE | J | | 093924-009 | SW846 6020 |
| | Copper | 0.000697 | 0.00035 | 0.001 | NE | NE | J | 0.010UJ | 093924-009 | SW846 6020 |
| | Iron | 0.101 | 0.033 | 0.100 | NE | NE | | | 093924-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 093924-009 | SW846 6020 |
| | Magnesium | 15.7 | 0.010 | 0.030 | NE | NE | | | 093924-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | NE | U | | 093924-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | 0.002 | U | UJ | 093924-009 | SW846 7470 |
| | Nickel | 0.00132 | 0.0005 | 0.002 | NE | NE | J | | 093924-009 | SW846 6020 |
| | Potassium | 3.33 | 0.080 | 0.300 | NE | NE | | | 093924-009 | SW846 6020 |
| | Selenium | 0.00179 | 0.0015 | 0.005 | 0.050 | 0.050 | J | | 093924-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 093924-009 | SW846 6020 |
| | Sodium | 24.4 | 0.080 | 0.250 | NE | NE | N | | 093924-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | NE | U | | 093924-009 | SW846 6020 |
| | Uranium | 0.00319 | 0.000067 | 0.0002 | 0.03 | 0.03 | | | 093924-009 | SW846 6020 |
| | Vanadium | 0.00725 | 0.001 | 0.005 | NE | NE | | | 093924-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | NE | U | | 093924-009 | SW846 6020 |

Refer to footnotes on page 2A-35.

## Table 2A-6 *(Continued)*
## Summary of Target Analyte List Metals and Uranium Results,
## Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
## Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **MRN-3D** | Aluminum | ND | 0.015 | 0.050 | NE | NE | U | | 093919-009 | SW846 6020 |
| 13-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | NE | U | | 093919-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | 0.100 | U | | 093919-009 | SW846 6020 |
| | Barium | 0.117 | 0.0006 | 0.002 | 2.00 | 1.00 | | | 093919-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | NE | U | | 093919-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 093919-009 | SW846 6020 |
| | Calcium | 60.3 | 0.300 | 1.00 | NE | NE | N | | 093919-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | 0.050 | U | | 093919-009 | SW846 6020 |
| | Cobalt | 0.000157 | 0.0001 | 0.001 | NE | NE | J | | 093919-009 | SW846 6020 |
| | Copper | 0.00131 | 0.00035 | 0.001 | NE | NE | | | 093919-009 | SW846 6020 |
| | Iron | 0.111 | 0.033 | 0.100 | NE | NE | | | 093919-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 093919-009 | SW846 6020 |
| | Magnesium | 14.0 | 0.010 | 0.030 | NE | NE | | | 093919-009 | SW846 6020 |
| | Manganese | 0.0111 | 0.001 | 0.005 | NE | NE | | | 093919-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | 0.002 | U | UJ | 093919-009 | SW846 7470 |
| | Nickel | 0.00149 | 0.0005 | 0.002 | NE | NE | J | | 093919-009 | SW846 6020 |
| | Potassium | 4.25 | 0.080 | 0.300 | NE | NE | | | 093919-009 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | 0.050 | U | | 093919-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 093919-009 | SW846 6020 |
| | Sodium | 27.3 | 0.080 | 0.250 | NE | NE | N | | 093919-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | NE | U | | 093919-009 | SW846 6020 |
| | Uranium | 0.00357 | 0.000067 | 0.0002 | 0.03 | 0.03 | | | 093919-009 | SW846 6020 |
| | Vanadium | 0.00568 | 0.001 | 0.005 | NE | NE | | | 093919-009 | SW846 6010 |
| | Zinc | 0.0551 | 0.0035 | 0.010 | NE | NE | | | 093919-009 | SW846 6020 |

Refer to footnotes on page 2A-35.

## Table 2A-6 *(Continued)*
## Summary of Target Analyte List Metals and Uranium Results,
## Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
## Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **NWTA3-MW3D** | Aluminum | ND | 0.015 | 0.050 | NE | NE | U | | 093916-009 | SW846 6020 |
| 10-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | NE | U | | 093916-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | 0.100 | U | | 093916-009 | SW846 6020 |
| | Barium | 0.0862 | 0.0006 | 0.002 | 2.00 | 1.00 | | | 093916-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | NE | U | | 093916-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 093916-009 | SW846 6020 |
| | Calcium | 39.4 | 0.060 | 0.200 | NE | NE | N | | 093916-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | 0.050 | U | | 093916-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | NE | U | | 093916-009 | SW846 6020 |
| | Copper | 0.00111 | 0.00035 | 0.001 | NE | NE | | | 093916-009 | SW846 6020 |
| | Iron | 0.0786 | 0.033 | 0.100 | NE | NE | J | | 093916-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 093916-009 | SW846 6020 |
| | Magnesium | 7.75 | 0.010 | 0.030 | NE | NE | | | 093916-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | NE | U | | 093916-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | 0.002 | U | UJ | 093916-009 | SW846 7470 |
| | Nickel | 0.00115 | 0.0005 | 0.002 | NE | NE | J | | 093916-009 | SW846 6020 |
| | Potassium | 3.58 | 0.080 | 0.300 | NE | NE | | | 093916-009 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | 0.050 | U | | 093916-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 093916-009 | SW846 6020 |
| | Sodium | 35.4 | 0.080 | 0.250 | NE | NE | N | | 093916-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | NE | U | | 093916-009 | SW846 6020 |
| | Uranium | 0.00358 | 0.000067 | 0.0002 | 0.03 | 0.03 | | | 093916-009 | SW846 6020 |
| | Vanadium | 0.00804 | 0.001 | 0.005 | NE | NE | | | 093916-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | NE | U | | 093916-009 | SW846 6020 |

Refer to footnotes on page 2A-35.

## Table 2A-6 *(Continued)*
## Summary of Target Analyte List Metals and Uranium Results,
## Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
## Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **PL-2** | Aluminum | ND | 0.015 | 0.050 | NE | NE | U | | 093908-009 | SW846 6020 |
| 08-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | NE | U | | 093908-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | 0.100 | U | | 093908-009 | SW846 6020 |
| | Barium | 0.0757 | 0.0006 | 0.002 | 2.00 | 1.00 | | | 093908-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | NE | U | | 093908-009 | SW846 6020 |
| | Cadmium | 0.00016 | 0.00011 | 0.001 | 0.005 | 0.010 | J | | 093908-009 | SW846 6020 |
| | Calcium | 65.5 | 0.300 | 1.00 | NE | NE | | | 093908-009 | SW846 6020 |
| | Chromium | 0.00456 | 0.002 | 0.010 | 0.100 | 0.050 | J | | 093908-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | NE | U | | 093908-009 | SW846 6020 |
| | Copper | 0.000686 | 0.00035 | 0.001 | NE | NE | J | | 093908-009 | SW846 6020 |
| | Iron | 0.122 | 0.033 | 0.100 | NE | NE | | | 093908-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 093908-009 | SW846 6020 |
| | Magnesium | 10.5 | 0.010 | 0.030 | NE | NE | | | 093908-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | NE | U | | 093908-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | 0.002 | U | UJ | 093908-009 | SW846 7470 |
| | Nickel | 0.00477 | 0.0005 | 0.002 | NE | NE | | | 093908-009 | SW846 6020 |
| | Potassium | 3.73 | 0.080 | 0.300 | NE | NE | | | 093908-009 | SW846 6020 |
| | Selenium | 0.00164 | 0.0015 | 0.005 | 0.050 | 0.050 | J | J | 093908-009 | SW846 6020 |
| | Silver | 0.000321 | 0.0002 | 0.001 | NE | 0.050 | J | | 093908-009 | SW846 6020 |
| | Sodium | 29.8 | 0.080 | 0.250 | NE | NE | | | 093908-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | NE | U | | 093908-009 | SW846 6020 |
| | Uranium | 0.0041 | 0.000067 | 0.0002 | 0.03 | 0.03 | | | 093908-009 | SW846 6020 |
| | Vanadium | 0.00468 | 0.001 | 0.005 | NE | NE | J | | 093908-009 | SW846 6010 |
| | Zinc | 0.0117 | 0.0035 | 0.010 | NE | NE | | | 093908-009 | SW846 6020 |

Refer to footnotes on page 2A-35.

## Table 2A-6 *(Continued)*
## Summary of Target Analyte List Metals and Uranium Results,
## Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
## Sandia National Laboratories/New Mexico

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| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **PL-4** | Aluminum | ND | 0.015 | 0.050 | NE | NE | U | | 093913-009 | SW846 6020 |
| 09-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | NE | U | | 093913-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | 0.100 | U | | 093913-009 | SW846 6020 |
| | Barium | 0.0613 | 0.0006 | 0.002 | 2.00 | 1.00 | | | 093913-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | NE | U | | 093913-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 093913-009 | SW846 6020 |
| | Calcium | 72.7 | 0.300 | 1.00 | NE | NE | | | 093913-009 | SW846 6020 |
| | Chromium | 0.0037 | 0.002 | 0.010 | 0.100 | 0.050 | J | 0.014U | 093913-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | NE | U | | 093913-009 | SW846 6020 |
| | Copper | 0.000749 | 0.00035 | 0.001 | NE | NE | J | 0.0088U | 093913-009 | SW846 6020 |
| | Iron | 0.143 | 0.033 | 0.100 | NE | NE | | | 093913-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 093913-009 | SW846 6020 |
| | Magnesium | 13.3 | 0.010 | 0.030 | NE | NE | | | 093913-009 | SW846 6020 |
| | Manganese | 0.0109 | 0.001 | 0.005 | NE | NE | | | 093913-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | 0.002 | U | UJ | 093913-009 | SW846 7470 |
| | Nickel | 0.00178 | 0.0005 | 0.002 | NE | NE | J | | 093913-009 | SW846 6020 |
| | Potassium | 5.02 | 0.080 | 0.300 | NE | NE | | | 093913-009 | SW846 6020 |
| | Selenium | 0.00194 | 0.0015 | 0.005 | 0.050 | 0.050 | J | J | 093913-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 093913-009 | SW846 6020 |
| | Sodium | 27.4 | 0.080 | 0.250 | NE | NE | | | 093913-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | NE | U | | 093913-009 | SW846 6020 |
| | Uranium | 0.00385 | 0.000067 | 0.0002 | 0.03 | 0.03 | | | 093913-009 | SW846 6020 |
| | Vanadium | 0.00352 | 0.001 | 0.005 | NE | NE | J | | 093913-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | NE | U | | 093913-009 | SW846 6020 |

Refer to footnotes on page 2A-35.

## Table 2A-6 *(Continued)*
## Summary of Target Analyte List Metals and Uranium Results,
## Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
## Sandia National Laboratories/New Mexico

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| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **PL-4** (Duplicate) | Aluminum | ND | 0.015 | 0.050 | NE | NE | U | | 093914-009 | SW846 6020 |
| 09-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | NE | U | | 093914-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | 0.100 | U | | 093914-009 | SW846 6020 |
| | Barium | 0.0619 | 0.0006 | 0.002 | 2.00 | 1.00 | | | 093914-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | NE | U | | 093914-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 093914-009 | SW846 6020 |
| | Calcium | 73.8 | 0.300 | 1.00 | NE | NE | | | 093914-009 | SW846 6020 |
| | Chromium | 0.00374 | 0.002 | 0.010 | 0.100 | 0.050 | J | 0.014U | 093914-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | NE | U | | 093914-009 | SW846 6020 |
| | Copper | 0.000727 | 0.00035 | 0.001 | NE | NE | J | 0.0088U | 093914-009 | SW846 6020 |
| | Iron | 0.134 | 0.033 | 0.100 | NE | NE | | | 093914-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 093914-009 | SW846 6020 |
| | Magnesium | 13.0 | 0.010 | 0.030 | NE | NE | | | 093914-009 | SW846 6020 |
| | Manganese | 0.011 | 0.001 | 0.005 | NE | NE | | | 093914-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | 0.002 | U | UJ | 093914-009 | SW846 7470 |
| | Nickel | 0.00184 | 0.0005 | 0.002 | NE | NE | J | | 093914-009 | SW846 6020 |
| | Potassium | 5.19 | 0.080 | 0.300 | NE | NE | | | 093914-009 | SW846 6020 |
| | Selenium | 0.00178 | 0.0015 | 0.005 | 0.050 | 0.050 | J | J | 093914-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 093914-009 | SW846 6020 |
| | Sodium | 25.5 | 0.080 | 0.250 | NE | NE | | | 093914-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | NE | U | | 093914-009 | SW846 6020 |
| | Uranium | 0.0039 | 0.000067 | 0.0002 | 0.03 | 0.03 | | | 093914-009 | SW846 6020 |
| | Vanadium | 0.00294 | 0.001 | 0.005 | NE | NE | J | | 093914-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | NE | U | | 093914-009 | SW846 6020 |

Refer to footnotes on page 2A-35.

## Table 2A-6 *(Continued)*
## Summary of Target Analyte List Metals and Uranium Results,
## Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
## Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **SFR-2S** | Aluminum | ND | 0.015 | 0.050 | NE | NE | U | | 093890-009 | SW846 6020 |
| 29-Apr-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | NE | U | | 093890-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | 0.100 | U | | 093890-009 | SW846 6020 |
| | Barium | 0.059 | 0.0006 | 0.002 | 2.00 | 1.00 | | | 093890-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | NE | U | | 093890-009 | SW846 6020 |
| | Cadmium | 0.000548 | 0.00011 | 0.001 | 0.005 | 0.010 | J | J+ | 093890-009 | SW846 6020 |
| | Calcium | 133 | 0.600 | 2.00 | NE | NE | | | 093890-009 | SW846 6020 |
| | Chromium | 0.00352 | 0.002 | 0.010 | 0.100 | 0.050 | J | | 093890-009 | SW846 6020 |
| | Cobalt | 0.00042 | 0.0001 | 0.001 | NE | NE | J | | 093890-009 | SW846 6020 |
| | Copper | 0.00128 | 0.00035 | 0.001 | NE | NE | | J- | 093890-009 | SW846 6020 |
| | Iron | 0.301 | 0.033 | 0.100 | NE | NE | | | 093890-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 093890-009 | SW846 6020 |
| | Magnesium | 38.5 | 0.010 | 0.030 | NE | NE | | | 093890-009 | SW846 6020 |
| | Manganese | 0.00309 | 0.001 | 0.005 | NE | NE | J | | 093890-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | 0.002 | U | UJ | 093890-009 | SW846 7470 |
| | Nickel | 0.0197 | 0.0005 | 0.002 | NE | NE | | | 093890-009 | SW846 6020 |
| | Potassium | 7.63 | 0.080 | 0.300 | NE | NE | | | 093890-009 | SW846 6020 |
| | Selenium | 0.00217 | 0.0015 | 0.005 | 0.050 | 0.050 | J | J | 093890-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 093890-009 | SW846 6020 |
| | Sodium | 91.3 | 0.800 | 2.50 | NE | NE | | | 093890-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | NE | U | | 093890-009 | SW846 6020 |
| | Uranium | 0.0176 | 0.000067 | 0.0002 | 0.03 | 0.03 | | | 093890-009 | SW846 6020 |
| | Vanadium | 0.00292 | 0.001 | 0.005 | NE | NE | J | | 093890-009 | SW846 6010 |
| | Zinc | 0.00506 | 0.0035 | 0.010 | NE | NE | J | | 093890-009 | SW846 6020 |

Refer to footnotes on page 2A-35.

## Table 2A-6 *(Continued)*
## Summary of Target Analyte List Metals and Uranium Results,
## Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
## Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **SFR-4T** | Aluminum | ND | 0.015 | 0.050 | NE | NE | U | | 093892-009 | SW846 6020 |
| 30-Apr-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | NE | U | | 093892-009 | SW846 6020 |
| | Arsenic | 0.00286 | 0.0017 | 0.005 | 0.010 | 0.100 | J | | 093892-009 | SW846 6020 |
| | Barium | 0.00967 | 0.0006 | 0.002 | 2.00 | 1.00 | | | 093892-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | NE | U | | 093892-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 093892-009 | SW846 6020 |
| | Calcium | 64.7 | 0.300 | 1.00 | NE | NE | | | 093892-009 | SW846 6020 |
| | Chromium | 0.00275 | 0.002 | 0.010 | 0.100 | 0.050 | J | | 093892-009 | SW846 6020 |
| | Cobalt | 0.000181 | 0.0001 | 0.001 | NE | NE | J | | 093892-009 | SW846 6020 |
| | Copper | 0.00286 | 0.00035 | 0.001 | NE | NE | | | 093892-009 | SW846 6020 |
| | Iron | 0.314 | 0.033 | 0.100 | NE | NE | | | 093892-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 093892-009 | SW846 6020 |
| | Magnesium | 4.61 | 0.010 | 0.030 | NE | NE | | | 093892-009 | SW846 6020 |
| | Manganese | 0.00641 | 0.001 | 0.005 | NE | NE | | | 093892-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | 0.002 | U | UJ | 093892-009 | SW846 7470 |
| | Nickel | 0.00414 | 0.0005 | 0.002 | NE | NE | | | 093892-009 | SW846 6020 |
| | Potassium | 2.68 | 0.080 | 0.300 | NE | NE | | | 093892-009 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | 0.050 | U | UJ | 093892-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 093892-009 | SW846 6020 |
| | Sodium | 1220 | 4.00 | 12.5 | NE | NE | | | 093892-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | NE | U | | 093892-009 | SW846 6020 |
| | Uranium | 0.000296 | 0.000067 | 0.0002 | 0.03 | 0.03 | | | 093892-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | NE | U | | 093892-009 | SW846 6010 |
| | Zinc | 0.0383 | 0.0035 | 0.010 | NE | NE | | | 093892-009 | SW846 6020 |

Refer to footnotes on page 2A-35.

## Table 2A-6 *(Continued)*
## Summary of Target Analyte List Metals and Uranium Results,
## Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
## Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **SWTA3-MW2** | Aluminum | ND | 0.015 | 0.050 | NE | NE | U | | 093898-009 | SW846 6020 |
| 03-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | NE | U | | 093898-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | 0.100 | U | | 093898-009 | SW846 6020 |
| | Barium | 0.0745 | 0.0006 | 0.002 | 2.00 | 1.00 | | | 093898-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | NE | U | | 093898-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 093898-009 | SW846 6020 |
| | Calcium | 47.6 | 0.060 | 0.200 | NE | NE | | | 093898-009 | SW846 6020 |
| | Chromium | 0.00271 | 0.002 | 0.010 | 0.100 | 0.050 | J | | 093898-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | NE | U | | 093898-009 | SW846 6020 |
| | Copper | 0.000606 | 0.00035 | 0.001 | NE | NE | J | | 093898-009 | SW846 6020 |
| | Iron | 0.112 | 0.033 | 0.100 | NE | NE | | | 093898-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 093898-009 | SW846 6020 |
| | Magnesium | 14.8 | 0.010 | 0.030 | NE | NE | | | 093898-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | NE | U | | 093898-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | 0.002 | U | | 093898-009 | SW846 7470 |
| | Nickel | 0.00147 | 0.0005 | 0.002 | NE | NE | J | | 093898-009 | SW846 6020 |
| | Potassium | 4.63 | 0.080 | 0.300 | NE | NE | | | 093898-009 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | 0.050 | U | UJ | 093898-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 093898-009 | SW846 6020 |
| | Sodium | 39.4 | 0.080 | 0.250 | NE | NE | | | 093898-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | NE | U | | 093898-009 | SW846 6020 |
| | Uranium | 0.00352 | 0.000067 | 0.0002 | 0.03 | 0.03 | | | 093898-009 | SW846 6020 |
| | Vanadium | 0.0054 | 0.001 | 0.005 | NE | NE | | | 093898-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | NE | U | | 093898-009 | SW846 6020 |

Refer to footnotes on page 2A-35.

## Table 2A-6 *(Continued)*
## Summary of Target Analyte List Metals and Uranium Results,
## Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
## Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **SWTA3-MW3** | Aluminum | ND | 0.015 | 0.050 | NE | NE | U | | 093905-009 | SW846 6020 |
| 07-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | NE | U | | 093905-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | 0.100 | U | | 093905-009 | SW846 6020 |
| | Barium | 0.0568 | 0.0006 | 0.002 | 2.00 | 1.00 | | | 093905-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | NE | U | | 093905-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 093905-009 | SW846 6020 |
| | Calcium | 39.3 | 0.060 | 0.200 | NE | NE | | | 093905-009 | SW846 6020 |
| | Chromium | 0.00318 | 0.002 | 0.010 | 0.100 | 0.050 | J | 0.013U | 093905-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | NE | U | | 093905-009 | SW846 6020 |
| | Copper | 0.000546 | 0.00035 | 0.001 | NE | NE | J | 0.0062U | 093905-009 | SW846 6020 |
| | Iron | 0.0953 | 0.033 | 0.100 | NE | NE | J | | 093905-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 093905-009 | SW846 6020 |
| | Magnesium | 11.8 | 0.010 | 0.030 | NE | NE | | | 093905-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | NE | U | | 093905-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | 0.002 | U | UJ | 093905-009 | SW846 7470 |
| | Nickel | 0.00131 | 0.0005 | 0.002 | NE | NE | J | | 093905-009 | SW846 6020 |
| | Potassium | 4.83 | 0.080 | 0.300 | NE | NE | | | 093905-009 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | 0.050 | U | UJ | 093905-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 093905-009 | SW846 6020 |
| | Sodium | 52.4 | 0.400 | 1.25 | NE | NE | | | 093905-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | NE | U | | 093905-009 | SW846 6020 |
| | Uranium | 0.00268 | 0.000067 | 0.0002 | 0.03 | 0.03 | | | 093905-009 | SW846 6020 |
| | Vanadium | 0.00709 | 0.001 | 0.005 | NE | NE | | | 093905-009 | SW846 6010 |
| | Zinc | 0.00546 | 0.0035 | 0.010 | NE | NE | J | | 093905-009 | SW846 6020 |

Refer to footnotes on page 2A-35.

## Table 2A-6 *(Continued)*
## Summary of Target Analyte List Metals and Uranium Results,
## Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
## Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **SWTA3-MW3** | Aluminum | ND | 0.015 | 0.050 | NE | NE | U | | 093906-009 | SW846 6020 |
| (Duplicate) | Antimony | ND | 0.001 | 0.003 | 0.006 | NE | U | | 093906-009 | SW846 6020 |
| 07-May-13 | Arsenic | ND | 0.0017 | 0.005 | 0.010 | 0.100 | U | | 093906-009 | SW846 6020 |
| | Barium | 0.0561 | 0.0006 | 0.002 | 2.00 | 1.00 | | | 093906-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | NE | U | | 093906-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 093906-009 | SW846 6020 |
| | Calcium | 39.1 | 0.060 | 0.200 | NE | NE | | | 093906-009 | SW846 6020 |
| | Chromium | 0.00351 | 0.002 | 0.010 | 0.100 | 0.050 | J | 0.013U | 093906-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | NE | U | | 093906-009 | SW846 6020 |
| | Copper | 0.000566 | 0.00035 | 0.001 | NE | NE | J | 0.0062U | 093906-009 | SW846 6020 |
| | Iron | 0.0868 | 0.033 | 0.100 | NE | NE | J | | 093906-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 093906-009 | SW846 6020 |
| | Magnesium | 11.8 | 0.010 | 0.030 | NE | NE | | | 093906-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | NE | U | | 093906-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | 0.002 | U | UJ | 093906-009 | SW846 7470 |
| | Nickel | 0.00132 | 0.0005 | 0.002 | NE | NE | J | | 093906-009 | SW846 6020 |
| | Potassium | 5.18 | 0.080 | 0.300 | NE | NE | | | 093906-009 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | 0.050 | U | UJ | 093906-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 093906-009 | SW846 6020 |
| | Sodium | 54.5 | 0.400 | 1.25 | NE | NE | | | 093906-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | NE | U | | 093906-009 | SW846 6020 |
| | Uranium | 0.00267 | 0.000067 | 0.0002 | 0.03 | 0.03 | | | 093906-009 | SW846 6020 |
| | Vanadium | 0.00822 | 0.001 | 0.005 | NE | NE | | | 093906-009 | SW846 6010 |
| | Zinc | 0.0056 | 0.0035 | 0.010 | NE | NE | J | | 093906-009 | SW846 6020 |

Refer to footnotes on page 2A-35.

## Table 2A-6 *(Continued)*
## Summary of Target Analyte List Metals and Uranium Results,
## Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
## Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **SWTA3-MW4** | Aluminum | ND | 0.015 | 0.050 | NE | NE | U | | 093900-009 | SW846 6020 |
| 06-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | NE | U | | 093900-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | 0.100 | U | | 093900-009 | SW846 6020 |
| | Barium | 0.0501 | 0.0006 | 0.002 | 2.00 | 1.00 | | | 093900-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | NE | U | | 093900-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 093900-009 | SW846 6020 |
| | Calcium | 36.8 | 0.060 | 0.200 | NE | NE | | | 093900-009 | SW846 6020 |
| | Chromium | 0.0053 | 0.002 | 0.010 | 0.100 | 0.050 | J | | 093900-009 | SW846 6020 |
| | Cobalt | 0.000104 | 0.0001 | 0.001 | NE | NE | J | | 093900-009 | SW846 6020 |
| | Copper | 0.000565 | 0.00035 | 0.001 | NE | NE | J | | 093900-009 | SW846 6020 |
| | Iron | 0.0925 | 0.033 | 0.100 | NE | NE | J | | 093900-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 093900-009 | SW846 6020 |
| | Magnesium | 11.3 | 0.010 | 0.030 | NE | NE | | | 093900-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | NE | U | | 093900-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | 0.002 | U | UJ | 093900-009 | SW846 7470 |
| | Nickel | 0.000981 | 0.0005 | 0.002 | NE | NE | J | | 093900-009 | SW846 6020 |
| | Potassium | 4.58 | 0.080 | 0.300 | NE | NE | | | 093900-009 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | 0.050 | U | UJ | 093900-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 093900-009 | SW846 6020 |
| | Sodium | 60.8 | 0.400 | 1.25 | NE | NE | | | 093900-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | NE | U | | 093900-009 | SW846 6020 |
| | Uranium | 0.00254 | 0.000067 | 0.0002 | 0.03 | 0.03 | | | 093900-009 | SW846 6020 |
| | Vanadium | 0.00741 | 0.001 | 0.005 | NE | NE | | | 093900-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | NE | U | | 093900-009 | SW846 6020 |

Refer to footnotes on page 2A-35.

## Table 2A-6 *(Concluded)*
## Summary of Target Analyte List Metals and Uranium Results,
## Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
## Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **TRE-1** | Aluminum | ND | 0.015 | 0.050 | NE | NE | U | | 093894-009 | SW846 6020 |
| 01-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | NE | U | | 093894-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | 0.100 | U | | 093894-009 | SW846 6020 |
| | Barium | 0.0435 | 0.0006 | 0.002 | 2.00 | 1.00 | | | 093894-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | NE | U | | 093894-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 093894-009 | SW846 6020 |
| | Calcium | 172 | 0.600 | 2.00 | NE | NE | | | 093894-009 | SW846 6020 |
| | Chromium | 0.00238 | 0.002 | 0.010 | 0.100 | 0.050 | J | | 093894-009 | SW846 6020 |
| | Cobalt | 0.00028 | 0.0001 | 0.001 | NE | NE | J | | 093894-009 | SW846 6020 |
| | Copper | 0.000914 | 0.00035 | 0.001 | NE | NE | J | J- | 093894-009 | SW846 6020 |
| | Iron | 0.371 | 0.033 | 0.100 | NE | NE | | | 093894-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 093894-009 | SW846 6020 |
| | Magnesium | 38.7 | 0.010 | 0.030 | NE | NE | | | 093894-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | NE | U | | 093894-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | 0.002 | U | UJ | 093894-009 | SW846 7470 |
| | Nickel | 0.00344 | 0.0005 | 0.002 | NE | NE | | | 093894-009 | SW846 6020 |
| | Potassium | 7.63 | 0.080 | 0.300 | NE | NE | | | 093894-009 | SW846 6020 |
| | Selenium | 0.00257 | 0.0015 | 0.005 | 0.050 | 0.050 | J | J | 093894-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 093894-009 | SW846 6020 |
| | Sodium | 120 | 0.800 | 2.50 | NE | NE | | | 093894-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | NE | U | | 093894-009 | SW846 6020 |
| | Uranium | 0.019 | 0.000067 | 0.0002 | 0.03 | 0.03 | | | 093894-009 | SW846 6020 |
| | Vanadium | 0.00298 | 0.001 | 0.005 | NE | NE | J | | 093894-009 | SW846 6010 |
| | Zinc | 0.00368 | 0.0035 | 0.010 | NE | NE | J | | 093894-009 | SW846 6020 |

Refer to footnotes on page 2A-35.

## Table 2A-7
## Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Radium, and Isotopic Uranium Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL/MAC[d] | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **Coyote Springs** | Americium-241 | 4.32 ± 14.6 | 23.2 | 11.3 | NE | NE | U | BD | 093896-033 | EPA 901.1 |
| 02-May-13 | Cesium-137 | -0.818 ± 1.76 | 3.03 | 1.44 | NE | NE | U | BD | 093896-033 | EPA 901.1 |
| | Cobalt-60 | 0.207 ± 1.90 | 3.51 | 1.64 | NE | NE | U | BD | 093896-033 | EPA 901.1 |
| | Potassium-40 | 67.9 ± 51.6 | 30.8 | 14.2 | NE | NE | | J | 093896-033 | EPA 901.1 |
| | Gross Alpha | -5.85 | NA | NA | 15 pCi/L | NE | NA | None | 093896-034 | EPA 900.0 |
| | Gross Beta | 39.5 ± 8.84 | 8.46 | 4.10 | 4mrem/yr | NE | | | 093896-034 | EPA 900.0 |
| | Uranium-233/234 | 10.6 ± 1.68 | 0.204 | 0.0901 | NE | NE | | | 093896-035 | HASL-300 |
| | Uranium-235/236 | 0.154 ± 0.0944 | 0.0949 | 0.0325 | NE | NE | | J | 093896-035 | HASL-300 |
| | Uranium-238 | 2.64 ± 0.494 | 0.123 | 0.0497 | NE | NE | | | 093896-035 | HASL-300 |
| | Radium-226 | 1.92 ± 0.569 | 0.398 | 0.162 | 5 pCi/L | 30 pCi/L | | J | 093896-038 | EPA 903.1 |
| | Radium-228 | 0.982 ± 0.425 | 0.443 | 0.197 | 5 pCi/L | 30 pCi/L | | J | 093896-039 | EPA 904.0 |
| **Greystone-MW2** | Americium-241 | -4.2 ± 11.0 | 15.7 | 7.70 | NE | NE | U | BD | 093888-033 | EPA 901.1 |
| 26-Apr-13 | Cesium-137 | -0.306 ± 1.98 | 3.42 | 1.65 | NE | NE | U | BD | 093888-033 | EPA 901.1 |
| | Cobalt-60 | 2.25 ± 2.16 | 3.65 | 1.73 | NE | NE | U | BD | 093888-033 | EPA 901.1 |
| | Potassium-40 | 71.0 ± 37.8 | 71.0 | 13.7 | NE | NE | U | BD | 093888-033 | EPA 901.1 |
| | Gross Alpha | 0.14 | NA | NA | 15 pCi/L | NE | NA | None | 093888-034 | EPA 900.0 |
| | Gross Beta | 11.8 ± 3.27 | 3.89 | 1.89 | 4mrem/yr | NE | | J | 093888-034 | EPA 900.0 |
| | Uranium-233/234 | 10.2 ± 1.31 | 0.0694 | 0.0306 | NE | NE | | | 093888-035 | HASL-300 |
| | Uranium-235/236 | 0.195 ± 0.0591 | 0.0322 | 0.011 | NE | NE | | | 093888-035 | HASL-300 |
| | Uranium-238 | 2.27 ± 0.326 | 0.0419 | 0.0169 | NE | NE | | | 093888-035 | HASL-300 |
| | Radium-226 | 0.604 ± 0.313 | 0.289 | 0.0994 | 5 pCi/L | 30 pCi/L | | J | 093888-038 | EPA 903.1 |
| | Radium-228 | 0.250 ± 0.286 | 0.467 | 0.209 | 5 pCi/L | 30 pCi/L | U | BD | 093888-039 | EPA 904.0 |
| **MRN-2** | Americium-241 | -2.27 ± 9.26 | 15.1 | 7.35 | NE | NE | U | BD | 093923-033 | EPA 901.1 |
| 14-May-13 | Cesium-137 | 0.198 ± 3.41 | 2.77 | 1.33 | NE | NE | U | BD | 093923-033 | EPA 901.1 |
| | Cobalt-60 | 2.72 ± 2.00 | 3.13 | 1.48 | NE | NE | U | BD | 093923-033 | EPA 901.1 |
| | Potassium-40 | -4.06 ± 28.1 | 37.3 | 17.8 | NE | NE | U | BD | 093923-033 | EPA 901.1 |
| | Gross Alpha | 2.20 | NA | NA | 15 pCi/L | NE | NA | None | 093923-034 | EPA 900.0 |
| | Gross Beta | 2.52 ± 0.818 | 1.03 | 0.493 | 4mrem/yr | NE | | NJ+ | 093923-034 | EPA 900.0 |
| | Radium-226 | 0.331 ± 0.227 | 0.291 | 0.110 | 5 pCi/L | 30 pCi/L | | NJ+ | 093923-038 | EPA 903.1 |
| | Radium-228 | 0.272 ± 0.300 | 0.489 | 0.232 | 5 pCi/L | 30 pCi/L | U | BD | 093923-039 | EPA 904.0 |

Refer to footnotes on page 2A-35.

**Table 2A-7** *(Continued)*
**Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Radium, and Isotopic Uranium Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL/MAC[d] | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **MRN-2** (Duplicate) | Americium-241 | -2.38 ± 5.93 | 9.95 | 4.85 | NE | NE | U | BD | 093924-033 | EPA 901.1 |
| 14-May-13 | Cesium-137 | 0.568 ± 1.46 | 2.63 | 1.26 | NE | NE | U | BD | 093924-033 | EPA 901.1 |
| | Cobalt-60 | 1.56 ± 1.84 | 3.14 | 1.49 | NE | NE | U | BD | 093924-033 | EPA 901.1 |
| | Potassium-40 | 14.0 ± 36.3 | 25.5 | 11.9 | NE | NE | U | BD | 093924-033 | EPA 901.1 |
| | Gross Alpha | 1.60 | NA | NA | 15 pCi/L | NE | NA | None | 093924-034 | EPA 900.0 |
| | Gross Beta | 3.40 ± 0.897 | 0.947 | 0.452 | 4mrem/yr | NE | | NJ+ | 093924-034 | EPA 900.0 |
| | Radium-226 | -0.0295 ± 0.224 | 0.477 | 0.194 | 5 pCi/L | 30 pCi/L | U | BD | 093924-038 | EPA 903.1 |
| | Radium-228 | 0.836 ± 0.390 | 0.476 | 0.221 | 5 pCi/L | 30 pCi/L | | J | 093924-039 | EPA 904.0 |
| **MRN-3D** | Americium-241 | 1.51 ± 5.73 | 8.49 | 4.16 | NE | NE | U | BD | 093919-033 | EPA 901.1 |
| 13-May-13 | Cesium-137 | 0.718 ± 1.65 | 2.88 | 1.39 | NE | NE | U | BD | 093919-033 | EPA 901.1 |
| | Cobalt-60 | 2.20 ± 3.21 | 2.85 | 1.34 | NE | NE | U | BD | 093919-033 | EPA 901.1 |
| | Potassium-40 | -41.1 ± 37.9 | 38.3 | 18.4 | NE | NE | U | BD | 093919-033 | EPA 901.1 |
| | Gross Alpha | 3.22 | NA | NA | 15 pCi/L | NE | NA | None | 093919-034 | EPA 900.0 |
| | Gross Beta | 3.37 ± 0.960 | 1.12 | 0.537 | 4mrem/yr | NE | | J | 093919-034 | EPA 900.0 |
| | Radium-226 | 0.710 ± 0.394 | 0.499 | 0.203 | 5 pCi/L | 30 pCi/L | | J | 093919-038 | EPA 903.1 |
| | Radium-228 | 0.906 ± 0.395 | 0.479 | 0.227 | 5 pCi/L | 30 pCi/L | | J | 093919-039 | EPA 904.0 |
| **NWTA3-MW3D** | Americium-241 | 3.09 ± 9.89 | 17.5 | 8.52 | NE | NE | U | BD | 093916-033 | EPA 901.1 |
| 10-May-13 | Cesium-137 | 0.943 ± 1.75 | 2.97 | 1.42 | NE | NE | U | BD | 093916-033 | EPA 901.1 |
| | Cobalt-60 | 1.07 ± 1.77 | 3.24 | 1.52 | NE | NE | U | BD | 093916-033 | EPA 901.1 |
| | Potassium-40 | 32.0 ± 38.4 | 27.5 | 12.8 | NE | NE | X | R | 093916-033 | EPA 901.1 |
| | Gross Alpha | 2.06 | NA | NA | 15 pCi/L | NE | NA | None | 093916-034 | EPA 900.0 |
| | Gross Beta | 4.39 ± 1.16 | 1.30 | 0.625 | 4mrem/yr | NE | | J | 093916-034 | EPA 900.0 |
| | Radium-226 | 0.557 ± 0.342 | 0.429 | 0.175 | 5 pCi/L | 30 pCi/L | | J | 093916-038 | EPA 903.1 |
| | Radium-228 | 1.10 ± 0.446 | 0.478 | 0.221 | 5 pCi/L | 30 pCi/L | | J | 093916-039 | EPA 904.0 |
| **PL-2** | Americium-241 | 0.800 ± 6.16 | 9.51 | 4.66 | NE | NE | U | BD | 093908-033 | EPA 901.1 |
| 08-May-13 | Cesium-137 | 1.33 ± 2.05 | 3.46 | 1.67 | NE | NE | U | BD | 093908-033 | EPA 901.1 |
| | Cobalt-60 | 1.11 ± 2.00 | 3.53 | 1.67 | NE | NE | U | BD | 093908-033 | EPA 901.1 |
| | Potassium-40 | -40.4 ± 41.5 | 45.2 | 21.7 | NE | NE | U | BD | 093908-033 | EPA 901.1 |
| | Gross Alpha | 1.93 | NA | NA | 15 pCi/L | NE | NA | None | 093908-034 | EPA 900.0 |
| | Gross Beta | 6.56 ± 1.51 | 1.47 | 0.712 | 4mrem/yr | NE | | J | 093908-034 | EPA 900.0 |
| | Radium-226 | 0.537 ± 0.292 | 0.330 | 0.125 | 5 pCi/L | 30 pCi/L | | J | 093908-038 | EPA 903.1 |
| | Radium-228 | 0.677 ± 0.367 | 0.468 | 0.210 | 5 pCi/L | 30 pCi/L | | J | 093908-039 | EPA 904.0 |

Refer to footnotes on page 2A-35.

**Table 2A-7** *(Continued)*

## Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Radium, and Isotopic Uranium Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL/MAC[d] | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **PL-4** | Americium-241 | 5.89 ± 9.68 | 13.7 | 6.70 | NE | NE | U | BD | 093913-033 | EPA 901.1 |
| 09-May-13 | Cesium-137 | 2.84 ± 4.30 | 2.90 | 1.39 | NE | NE | U | BD | 093913-033 | EPA 901.1 |
| | Cobalt-60 | 0.616 ± 1.74 | 3.11 | 1.46 | NE | NE | U | BD | 093913-033 | EPA 901.1 |
| | Potassium-40 | -43.2 ± 41.7 | 40.8 | 19.5 | NE | NE | U | BD | 093913-033 | EPA 901.1 |
| | Gross Alpha | 4.18 | NA | NA | 15 pCi/L | NE | NA | None | 093913-034 | EPA 900.0 |
| | Gross Beta | 5.41 ± 1.30 | 1.31 | 0.633 | 4mrem/yr | NE | | J | 093913-034 | EPA 900.0 |
| | Radium-226 | 0.463 ± 0.298 | 0.394 | 0.160 | 5 pCi/L | 30 pCi/L | | J | 093913-038 | EPA 903.1 |
| | Radium-228 | 0.261 ± 0.291 | 0.471 | 0.204 | 5 pCi/L | 30 pCi/L | U | BD | 093913-039 | EPA 904.0 |
| **PL-4** (Duplicate) | Americium-241 | 2.68 ± 7.26 | 11.7 | 5.69 | NE | NE | U | BD | 093914-033 | EPA 901.1 |
| 09-May-13 | Cesium-137 | 0.372 ± 1.70 | 2.91 | 1.40 | NE | NE | U | BD | 093914-033 | EPA 901.1 |
| | Cobalt-60 | 0.926 ± 1.62 | 2.98 | 1.39 | NE | NE | U | BD | 093914-033 | EPA 901.1 |
| | Potassium-40 | 6.34 ± 33.1 | 41.1 | 19.6 | NE | NE | U | BD | 093914-033 | EPA 901.1 |
| | Gross Alpha | 2.63 | NA | NA | 15 pCi/L | NE | NA | None | 093914-034 | EPA 900.0 |
| | Gross Beta | 5.28 ± 1.39 | 1.56 | 0.755 | 4mrem/yr | NE | | J | 093914-034 | EPA 900.0 |
| | Radium-226 | 0.579 ± 0.301 | 0.360 | 0.146 | 5 pCi/L | 30 pCi/L | | J | 093914-038 | EPA 903.1 |
| | Radium-228 | 0.385 ± 0.295 | 0.428 | 0.184 | 5 pCi/L | 30 pCi/L | U | BD | 093914-039 | EPA 904.0 |
| **SFR-2S** | Americium-241 | 5.44 ± 6.61 | 9.41 | 4.60 | NE | NE | U | BD | 093890-033 | EPA 901.1 |
| 29-Apr-13 | Cesium-137 | -0.709 ± 3.57 | 2.91 | 1.40 | NE | NE | U | BD | 093890-033 | EPA 901.1 |
| | Cobalt-60 | 0.340 ± 1.72 | 3.12 | 1.47 | NE | NE | U | BD | 093890-033 | EPA 901.1 |
| | Potassium-40 | 1.50 ± 28.7 | 24.7 | 11.5 | NE | NE | U | BD | 093890-033 | EPA 901.1 |
| | Gross Alpha | 0.30 | NA | NA | 15 pCi/L | NE | NA | None | 093890-034 | EPA 900.0 |
| | Gross Beta | 13.0 ± 3.45 | 3.93 | 1.91 | 4mrem/yr | NE | | J | 093890-034 | EPA 900.0 |
| | Uranium-233/234 | 19.4 ± 2.48 | 0.0729 | 0.0321 | NE | NE | | | 093890-035 | HASL-300 |
| | Uranium-235/236 | 0.303 ± 0.0782 | 0.0338 | 0.0116 | NE | NE | | | 093890-035 | HASL-300 |
| | Uranium-238 | 5.30 ± 0.711 | 0.044 | 0.0177 | NE | NE | | | 093890-035 | HASL-300 |
| | Radium-226 | 0.318 ± 0.324 | 0.514 | 0.209 | 5 pCi/L | 30 pCi/L | U | BD | 093890-038 | EPA 903.1 |
| | Radium-228 | 0.637 ± 0.345 | 0.412 | 0.176 | 5 pCi/L | 30 pCi/L | | J | 093890-039 | EPA 904.0 |

Refer to footnotes on page 2A-35.

**Table 2A-7** *(Continued)*
**Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Radium, and Isotopic Uranium Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL/MAC[d] | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **SFR-4T** | Americium-241 | -2.26 ± 6.13 | 8.80 | 4.31 | NE | NE | U | BD | 093892-033 | EPA 901.1 |
| 30-Apr-13 | Cesium-137 | -0.36 ± 1.63 | 2.80 | 1.35 | NE | NE | U | BD | 093892-033 | EPA 901.1 |
| | Cobalt-60 | 2.92 ± 3.48 | 3.35 | 1.60 | NE | NE | U | BD | 093892-033 | EPA 901.1 |
| | Potassium-40 | -32.5 ± 36.9 | 41.2 | 19.8 | NE | NE | U | BD | 093892-033 | EPA 901.1 |
| | Gross Alpha | -16.44 | NA | NA | 15 pCi/L | NE | NA | None | 093892-034 | EPA 900.0 |
| | Gross Beta | 6.68 ± 7.12 | 11.8 | 5.73 | 4mrem/yr | NE | U | BD | 093892-034 | EPA 900.0 |
| | Uranium-233/234 | 0.361 ± 0.0981 | 0.118 | 0.0521 | NE | NE | | | 093892-035 | HASL-300 |
| | Uranium-235/236 | 0.00637 ± 0.0216 | 0.0548 | 0.0188 | NE | NE | U | BD | 093892-035 | HASL-300 |
| | Uranium-238 | 0.0773 ± 0.0451 | 0.0714 | 0.0287 | NE | NE | | J | 093892-035 | HASL-300 |
| | Radium-226 | 0.270 ± 0.215 | 0.298 | 0.109 | 5 pCi/L | 30 pCi/L | U | BD | 093892-038 | EPA 903.1 |
| | Radium-228 | 0.345 ± 0.298 | 0.449 | 0.192 | 5 pCi/L | 30 pCi/L | U | BD | 093892-039 | EPA 904.0 |
| **SWTA3-MW2** | Americium-241 | 12.0 ± 8.21 | 8.94 | 4.35 | NE | NE | X | R | 093898-033 | EPA 901.1 |
| 03-May-13 | Cesium-137 | -0.229 ± 1.52 | 2.70 | 1.29 | NE | NE | U | BD | 093898-033 | EPA 901.1 |
| | Cobalt-60 | 4.67 ± 3.15 | 4.67 | 1.64 | NE | NE | U | BD | 093898-033 | EPA 901.1 |
| | Potassium-40 | -20.1 ± 32.5 | 37.8 | 18.0 | NE | NE | U | BD | 093898-033 | EPA 901.1 |
| | Gross Alpha | 2.43 | NA | NA | 15 pCi/L | NE | NA | None | 093898-034 | EPA 900.0 |
| | Gross Beta | 6.30 ± 1.55 | 1.70 | 0.827 | 4mrem/yr | NE | | J | 093898-034 | EPA 900.0 |
| | Radium-226 | 0.0853 ± 0.243 | 0.459 | 0.187 | 5 pCi/L | 30 pCi/L | U | BD | 093898-038 | EPA 903.1 |
| | Radium-228 | 1.03 ± 0.423 | 0.475 | 0.223 | 5 pCi/L | 30 pCi/L | | J | 093898-039 | EPA 904.0 |
| **SWTA3-MW3** | Americium-241 | 5.52 ± 8.53 | 14.2 | 6.96 | NE | NE | U | BD | 093905-033 | EPA 901.1 |
| 07-May-13 | Cesium-137 | 1.04 ± 1.62 | 2.73 | 1.31 | NE | NE | U | BD | 093905-033 | EPA 901.1 |
| | Cobalt-60 | 2.18 ± 1.98 | 3.18 | 1.51 | NE | NE | U | BD | 093905-033 | EPA 901.1 |
| | Potassium-40 | -31.7 ± 30.9 | 39.8 | 19.1 | NE | NE | U | BD | 093905-033 | EPA 901.1 |
| | Gross Alpha | 2.58 | NA | NA | 15 pCi/L | NE | NA | None | 093905-034 | EPA 900.0 |
| | Gross Beta | 4.38 ± 1.05 | 1.00 | 0.479 | 4mrem/yr | NE | | J | 093905-034 | EPA 900.0 |
| | Radium-226 | 0.238 ± 0.208 | 0.320 | 0.130 | 5 pCi/L | 30 pCi/L | U | BD | 093905-038 | EPA 903.1 |
| | Radium-228 | 0.542 ± 0.329 | 0.441 | 0.195 | 5 pCi/L | 30 pCi/L | | J | 093905-039 | EPA 904.0 |
| **SWTA3-MW3** | Americium-241 | 0.968 ± 14.4 | 22.2 | 10.8 | NE | NE | U | BD | 093906-033 | EPA 901.1 |
| (Duplicate) | Cesium-137 | 0.290 ± 1.77 | 3.19 | 1.53 | NE | NE | U | BD | 093906-033 | EPA 901.1 |
| 07-May-13 | Cobalt-60 | 0.879 ± 1.87 | 3.45 | 1.62 | NE | NE | U | BD | 093906-033 | EPA 901.1 |
| | Potassium-40 | -33.1 ± 40.6 | 44.8 | 21.3 | NE | NE | U | BD | 093906-033 | EPA 901.1 |
| | Gross Alpha | 1.25 | NA | NA | 15 pCi/L | NE | NA | None | 093906-034 | EPA 900.0 |
| | Gross Beta | 5.26 ± 1.25 | 1.16 | 0.557 | 4mrem/yr | NE | | J | 093906-034 | EPA 900.0 |
| | Radium-226 | 0.671 ± 0.350 | 0.387 | 0.158 | 5 pCi/L | 30 pCi/L | | NJ+ | 093906-038 | EPA 903.1 |
| | Radium-228 | 0.446 ± 0.316 | 0.466 | 0.213 | 5 pCi/L | 30 pCi/L | U | BD | 093906-039 | EPA 904.0 |

Refer to footnotes on page 2A-35.

**Table 2A-7** *(Concluded)*

## Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Radium, and Isotopic Uranium Results, Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL/MAC[d] | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **SWTA3-MW4** | Americium-241 | 2.13 ± 15.3 | 23.5 | 11.5 | NE | NE | U | BD | 093900-033 | EPA 901.1 |
| 06-May-13 | Cesium-137 | 0.766 ± 1.69 | 3.02 | 1.45 | NE | NE | U | BD | 093900-033 | EPA 901.1 |
| | Cobalt-60 | 1.66 ± 1.79 | 3.10 | 1.45 | NE | NE | U | BD | 093900-033 | EPA 901.1 |
| | Potassium-40 | 90.1 ± 23.3 | 28.2 | 13.1 | NE | NE | X | R | 093900-033 | EPA 901.1 |
| | Gross Alpha | 3.39 | NA | NA | 15 pCi/L | NE | NA | None | 093900-034 | EPA 900.0 |
| | Gross Beta | 4.24 ± 1.07 | 1.09 | 0.524 | 4mrem/yr | NE | | J | 093900-034 | EPA 900.0 |
| | Radium-226 | 0.896 ± 0.358 | 0.371 | 0.151 | 5 pCi/L | 30 pCi/L | | J | 093900-038 | EPA 903.1 |
| | Radium-228 | 0.674 ± 0.365 | 0.464 | 0.207 | 5 pCi/L | 30 pCi/L | | J | 093900-039 | EPA 904.0 |
| **TRE-1** | Americium-241 | 1.71 ± 8.69 | 15.1 | 7.35 | NE | NE | U | BD | 093894-033 | EPA 901.1 |
| 01-May-13 | Cesium-137 | 0.880 ± 3.57 | 2.73 | 1.31 | NE | NE | U | BD | 093894-033 | EPA 901.1 |
| | Cobalt-60 | -0.494 ± 1.69 | 2.91 | 1.37 | NE | NE | U | BD | 093894-033 | EPA 901.1 |
| | Potassium-40 | 7.07 ± 28.3 | 38.6 | 18.5 | NE | NE | U | BD | 093894-033 | EPA 901.1 |
| | Gross Alpha | 0.28 | NA | NA | 15 pCi/L | NE | NA | None | 093894-034 | EPA 900.0 |
| | Gross Beta | 14.1 ± 4.10 | 5.06 | 2.47 | 4mrem/yr | NE | | J | 093894-034 | EPA 900.0 |
| | Uranium-233/234 | 23.2 ± 2.96 | 0.0742 | 0.0327 | NE | NE | | | 093894-035 | HASL-300 |
| | Uranium-235/236 | 0.304 ± 0.079 | 0.0344 | 0.0118 | NE | NE | | | 093894-035 | HASL-300 |
| | Uranium-238 | 5.62 ± 0.752 | 0.0448 | 0.018 | NE | NE | | | 093894-035 | HASL-300 |
| | Radium-226 | 0.440 ± 0.287 | 0.395 | 0.161 | 5 pCi/L | 30 pCi/L | | J | 093894-038 | EPA 903.1 |
| | Radium-228 | 1.43 ± 0.524 | 0.454 | 0.205 | 5 pCi/L | 30 pCi/L | | J | 093894-039 | EPA 904.0 |

Refer to footnotes on page 2A-35.

## Table 2A-8
## Summary of Field Water Quality Measurements[h],
## Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task,
## Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Sample Date | Temperature ($^0$C) | Specific Conductivity (µmhos/cm) | Oxidation Reduction Potential (mV) | pH | Turbidity (NTU) | Dissolved Oxygen (% Sat) | Dissolved Oxygen (mg/L) |
|---|---|---|---|---|---|---|---|---|
| **Coyote Springs** | 02-May-13 | 13.46 | 2900 | 203.5 | 6.02 | 1.48 | 19.8 | 2.05 |
| **Greystone-MW2** | 26-Apr-13 | 16.64 | 1076 | 255.5 | 6.87 | 0.28 | 72.4 | 7.01 |
| **MRN-2** | 14-May-13 | 20.34 | 397 | 159.1 | 7.40 | 1.55 | 70.5 | 6.37 |
| **MRN-3D** | 13-May-13 | 20.41 | 434 | 73.5 | 7.31 | 1.38 | 58.7 | 5.29 |
| **NWTA3-MW3D** | 10-May-13 | 19.75 | 350 | 126.0 | 7.46 | 1.95 | 50.5 | 4.61 |
| **PL-2** | 08-May-13 | 19.30 | 422 | 167.6 | 7.43 | 0.65 | 66.6 | 6.13 |
| **PL-4** | 09-May-13 | 19.94 | 452 | 167.4 | 7.15 | 1.86 | 70.3 | 6.41 |
| **SFR-2S** | 29-Apr-13 | 18.49 | 1037 | 140.5 | 6.73 | 20.6 | 79.0 | 7.38 |
| **SFR-4T** | 30-Apr-13 | 19.58 | 3907 | -47.0 | 7.95 | 1.79 | 9.4 | 0.85 |
| **SWTA3-MW2** | 03-May-13 | 18.24 | 410 | 145.4 | 7.38 | 1.05 | 47.9 | 4.51 |
| **SWTA3-MW3** | 07-May-13 | 20.81 | 416 | 113.7 | 7.39 | 1.95 | 49.6 | 4.42 |
| **SWTA3-MW4** | 06-May-13 | 18.66 | 426 | 146.8 | 7.45 | 0.80 | 51.5 | 4.80 |
| | 01-Aug-13 | 21.59 | 498 | 145.6 | 7.61 | 2.09 | 58.3 | 5.23 |
| | 25-Sep-13 | 20.48 | 501 | 183.5 | 7.30 | 2.68 | 55.5 | 4.98 |
| **TRE-1** | 01-May-13 | 18.89 | 1241 | 192.4 | 6.59 | 0.27 | 75.2 | 6.96 |

Refer to footnotes on page 2A-35.

## *Footnotes for Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task Analytical Results Tables*

| | |
|---|---|
| % | = percent. |
| µg/L | = micrograms per liter. |
| CFR | = Code of Federal Regulations. |
| EPA | = U.S. Environmental Protection Agency. |
| HMX | = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine. |
| ID | = Identifier. |
| mg/L | = milligrams per liter. |
| mrem/yr | = millirem per year. |
| No. | = Number. |
| pCi/L | = picocuries per liter. |
| RDX | = hexahydro-1,3,5-trinitro-1,3,5-triazine. |
| Tetryl | = methyl-2,4,6-trinitrophenylnitramine. |

**[a]Result**

Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 2A- 1-4).

**Bold** = Indicates the value exceed the established MCL and/or MAC.

ND = not detected (at method detection limit). Activities of zero or less are considered to be not detected.

**[b]MDL or MDA**

MDL applies to the data listed in Tables 2A-1 through 2A-6. MDA applies to radiological data in Table 2A-7.

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

MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

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

**[c]PQL or Critical Level**

The PQL applies to Tables 2A-1 through 2A-6. Critical Level applies to Table 2A-7.

Critical level = The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

NA = Not Applicable (for gross alpha activities). The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

**[d]MCL or MAC**

Regulatory limits: the MCL is listed first, followed by the MAC. A single value is listed when the MCL and MAC are equal (for example, Nitrate plus nitrate). If no value exists, NE is used.

MAC = Maximum Allowable Concentration. MAC in groundwater is specified for the contaminants listed in 20.6.2.3103A New Mexico Administrative Code, New Mexico Water Quality Control Commission Regulations: Environmental Protection, Water Quality, Groundwater and Surface Water Protection, Human Health Standards, New Mexico Environment Department, 2001.

MCL = Maximum contaminant level. MCLs were established by the EPA Office of Water, National Primary Water Regulations (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- Gross alpha particle activity, excluding total uranium = 15 pCi/L (40 CFR Parts 9, 141, and 142,
- Table 2A-1-4).
- Beta and/or Gamma-emitting radionuclides (any combination) = 4 mrem/yr (as dose rate).
- Combined radium-226 and radium-228 MAC = 30 pCi/L.
- Combined radium-226 and radium-228 MCL = 5 pCi/L.

NE = Not Established.

## *Footnotes for Long-Term Stewardship Consolidated Groundwater Monitoring Program Groundwater Surveillance Task Analytical Results Tables (Concluded)*

**[e]Lab Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

h = Prep holding time exceeded.
H = Analytical holding time exceeded.
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
N = Results associated with a spike analysis that was outside control limits.
NA = Not applicable.
U = Analyte is absent or below the method detection limit.
X = Data rejected due to peak not meeting identification criteria.

**[f]Validation Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = The associated value is an estimated quantity.
J+ = The associated numerical value is an estimated quantity with a suspected positive bias.
J- = The associated numerical value is an estimated quantity with a suspected negative bias.
None = No data validation for corrected gross alpha activity.
NJ+ = Presumptive evidence of the presence of the material at an estimated quantity with a suspected positive bias.
NJ- = Presumptive evidence of the presence of the material at an estimated quantity with a suspected negative bias.
U = The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
UJ = The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R = The data are unusable, and resampling or reanalysis are necessary for verification.

**[g]Analytical Method**

Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.
DOE, 1990, "EML [Environmental Measurements Laboratory] Procedures Manual," 27th ed., Vol. 1, Rev. 1992, HASL-300.
EPA, 1980, "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio
EPA, 1984, "Methods for Chemical Analysis of Water and Wastes." EPA 600-4-79-020.
EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.

DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
HASL = Health and Safety Laboratory.
SM = Standard Method.

**[h]Field Water Quality Measurements**

Field measurements were collected prior to sampling.

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

# Attachment 2B
# Long-Term Stewardship
# Consolidated Groundwater Monitoring Program
# Plots

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# Attachment 2B Plots


2B-1 Fluoride Concentrations, Coyote Springs ..... 2B-5

2B-2 Fluoride Concentrations, SFR-2S ..... 2B-6

2B-3 Fluoride Concentrations, SFR-4T ..... 2B-7

2B-4 Fluoride Concentrations, TRE-1 ..... 2B-8

2B-5 Beryllium Concentrations, Coyote Springs ..... 2B-9

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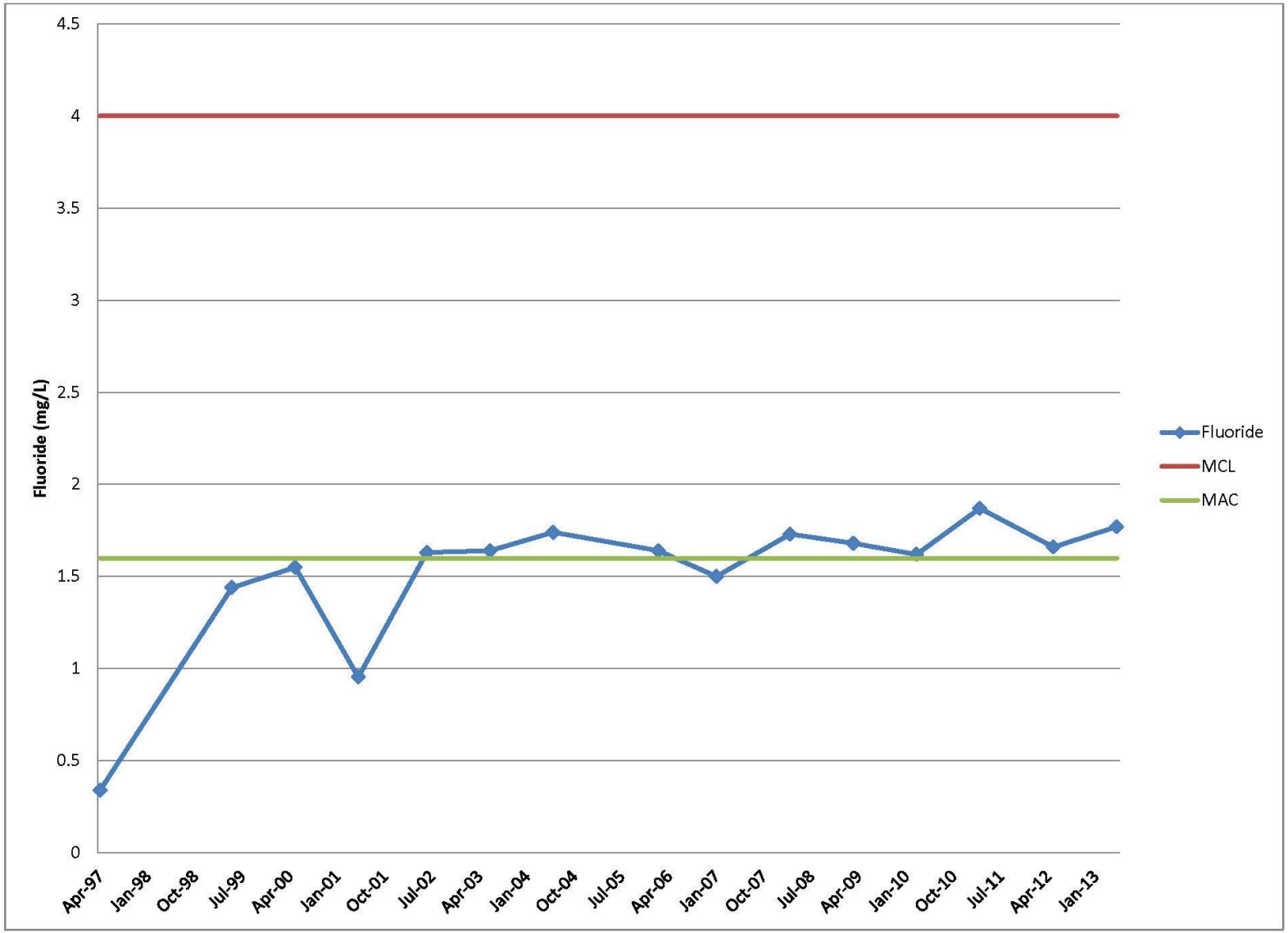


**Figure 2B-1. Fluoride Concentrations, Coyote Springs**

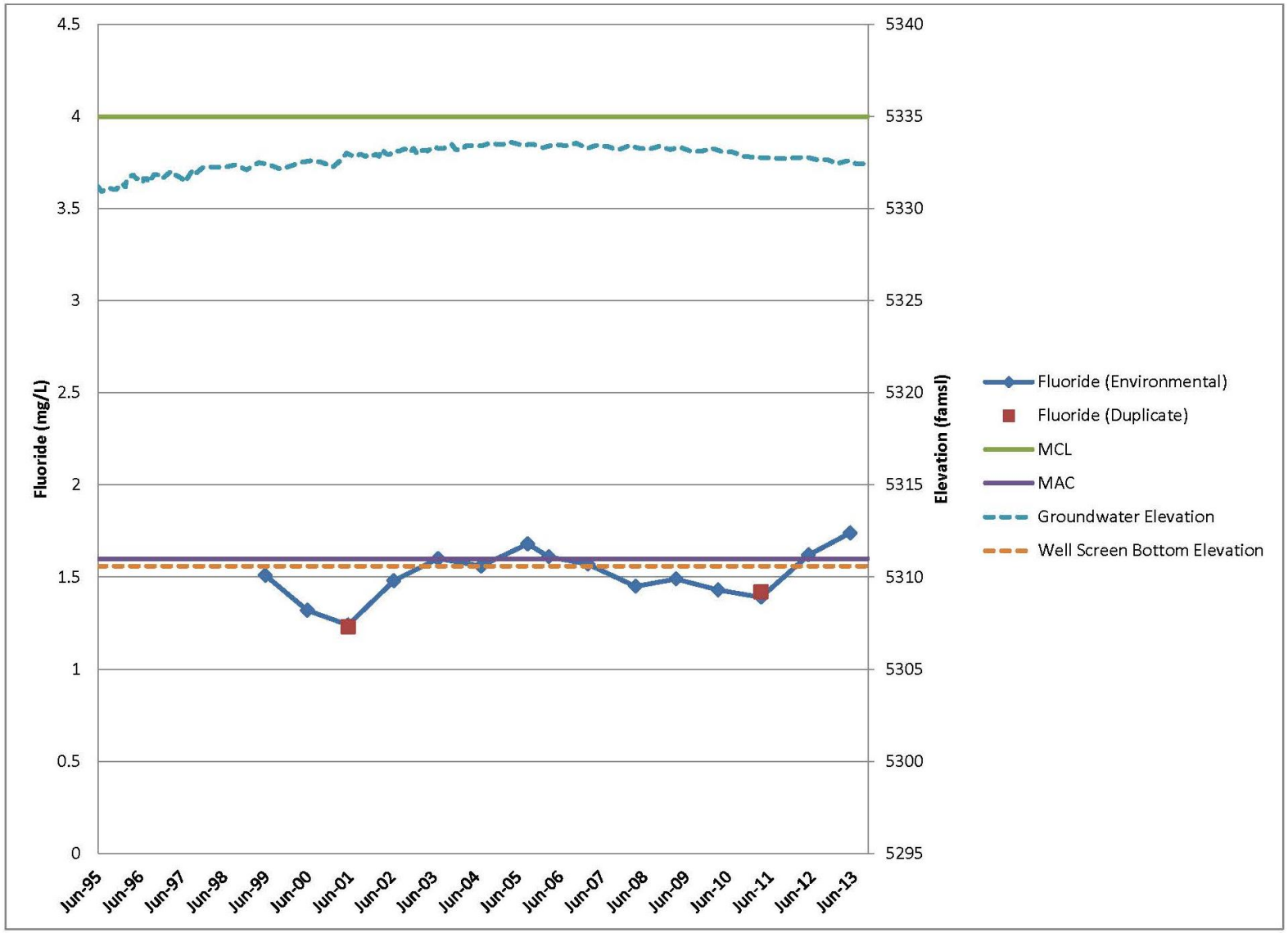


**Figure 2B-2. Fluoride Concentrations, SFR-2S**

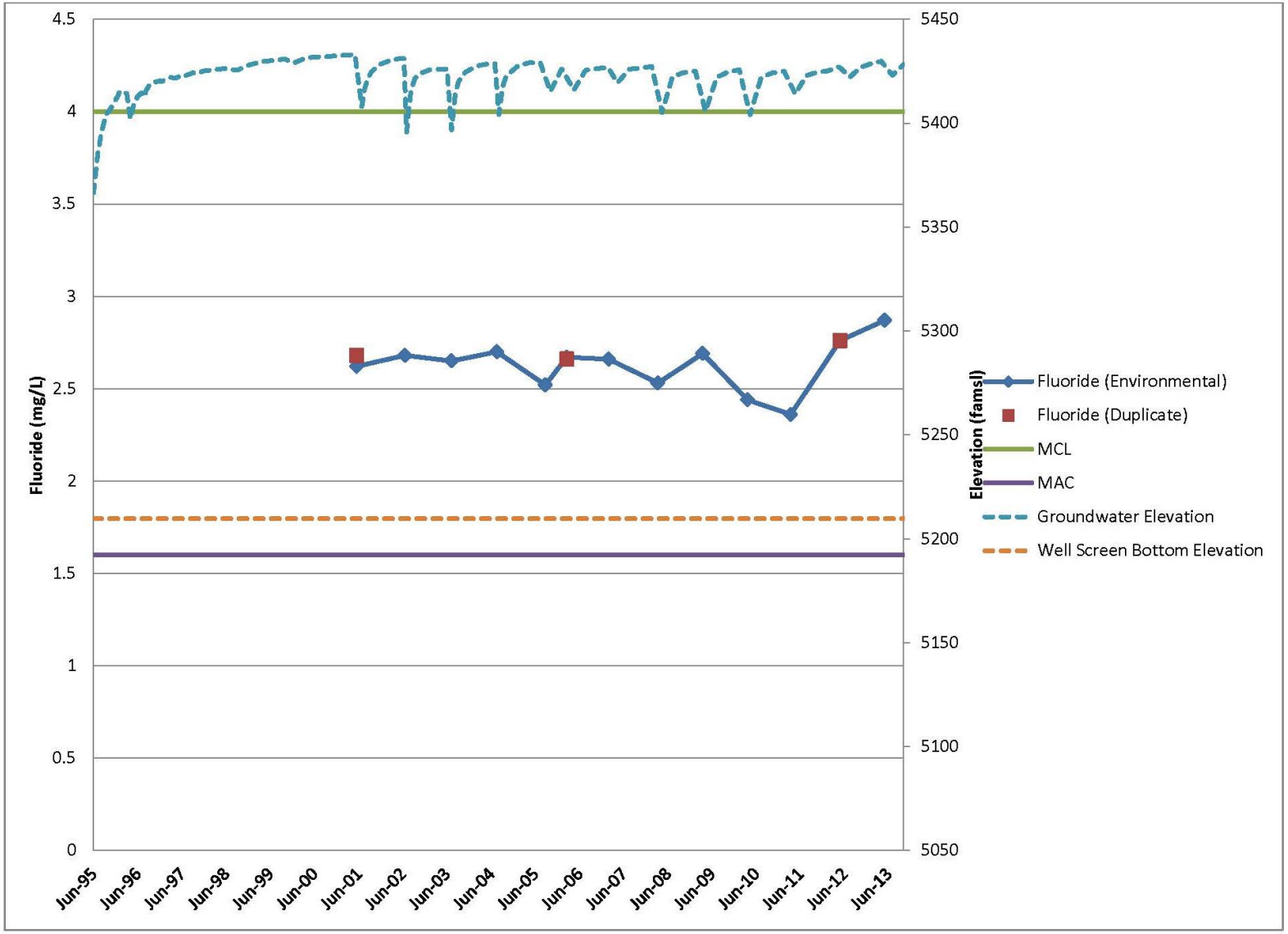


**Figure 2B-3. Fluoride Concentrations, SFR-4T**

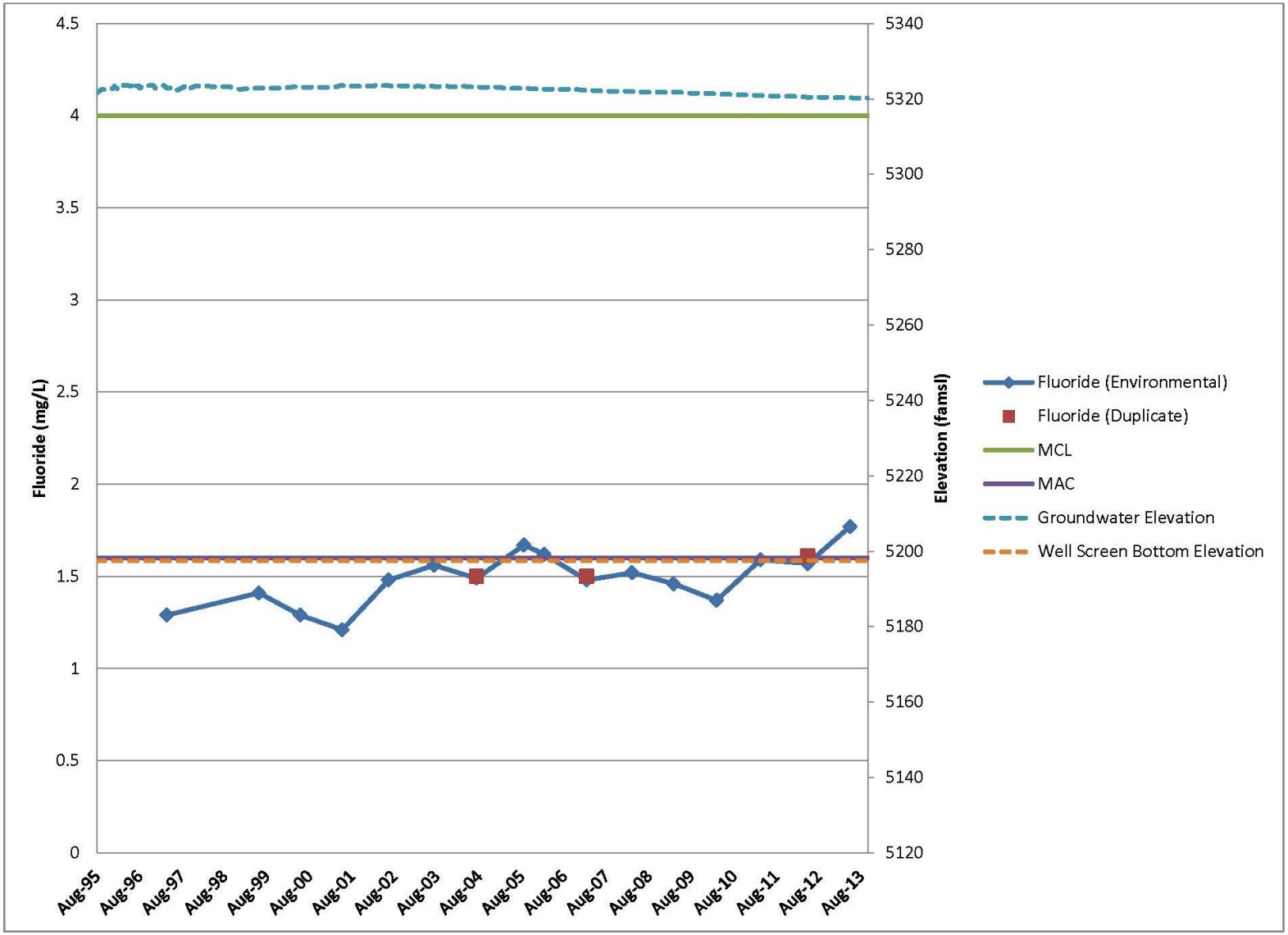


**Figure 2B-4. Fluoride Concentrations, TRE-1**

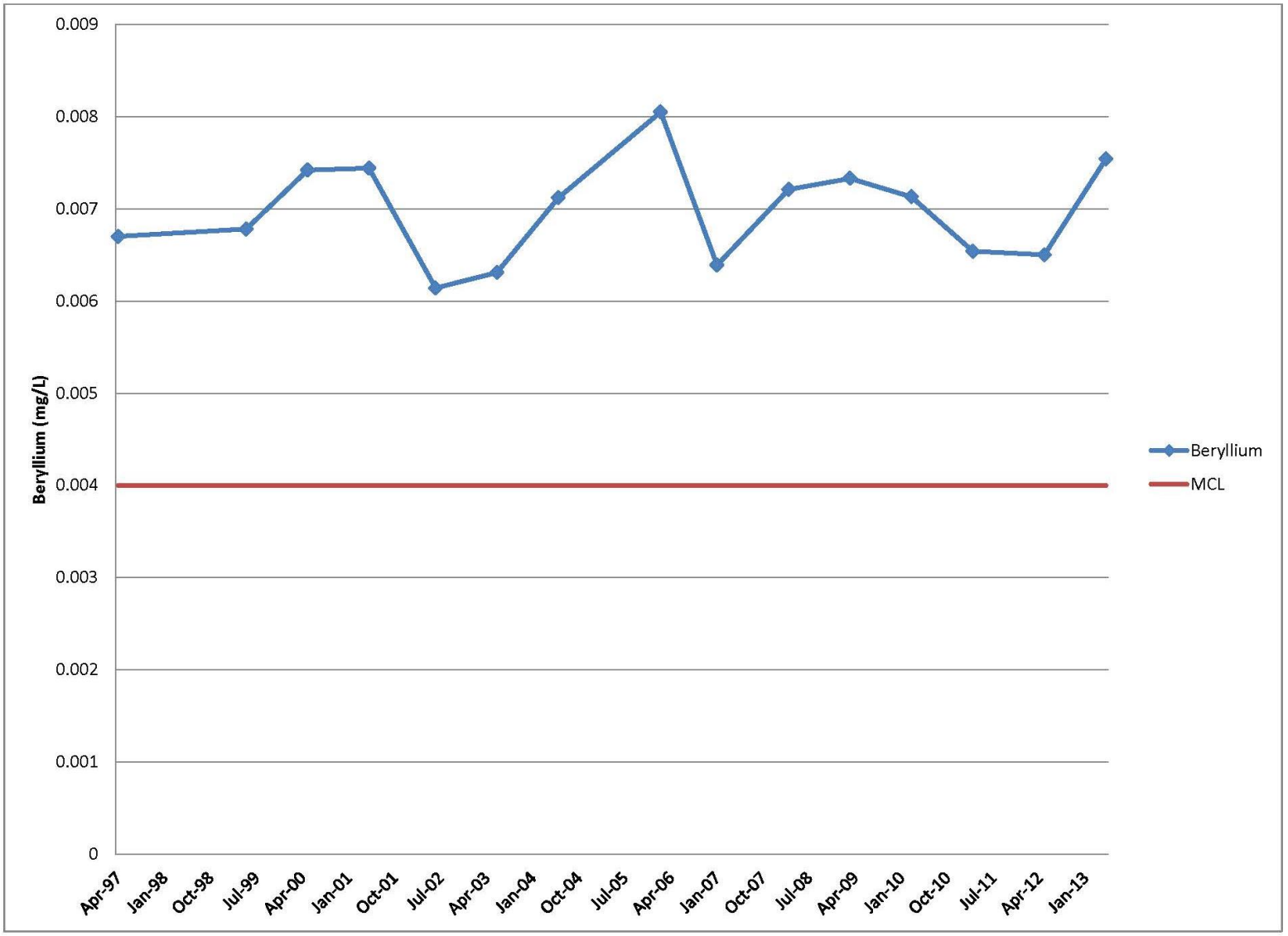


**Figure 2B-5. Beryllium Concentrations, Coyote Springs**

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# Attachment 2C
# Long-Term Stewardship
# Consolidated Groundwater Monitoring Program
# Charts and Hydrographs

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# Attachment 2C Charts and Hydrographs


2C-1 Precipitation Data for SNL/NM, CY2013 ..... 2C-5

2C-2 Annual Precipitation Data for SNL/NM, January 2002 to December 2013 ..... 2C-6

2C-3 Monthly Groundwater Pumped by KAFB Water Supply Wells, CY2013 ..... 2C-7

2C-4 Groundwater Pumped by KAFB Water Supply Wells, CY2013 ..... 2C-8

2C-5 Annual Groundwater Pumped by KAFB Water Supply Wells, 2001 to 2013 ..... 2C-9

2C-6 GMP Study Wells (1 of 6) ..... 2C-10

2C-7 GMP Study Wells (2 of 6) ..... 2C-11

2C-8 GMP Study Wells (3 of 6) ..... 2C-12

2C-9 GMP Study Wells (4 of 6) ..... 2C-13

2C-10 GMP Study Wells (5 of 6) ..... 2C-14

2C-11 GMP Study Wells (6 of 6) ..... 2C-15

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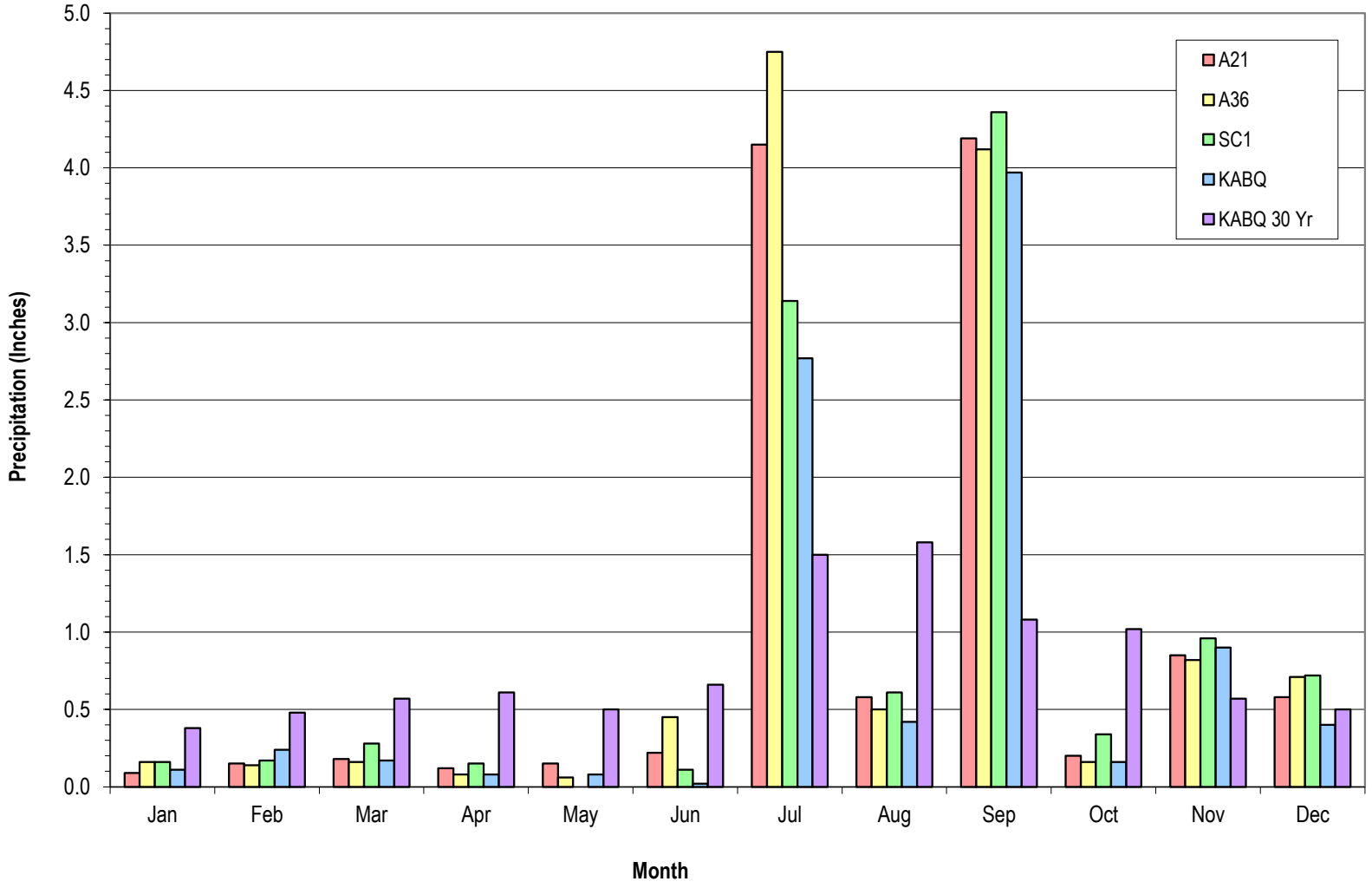


**Figure 2C-1. Precipitation Data for SNL/NM, CY2013**

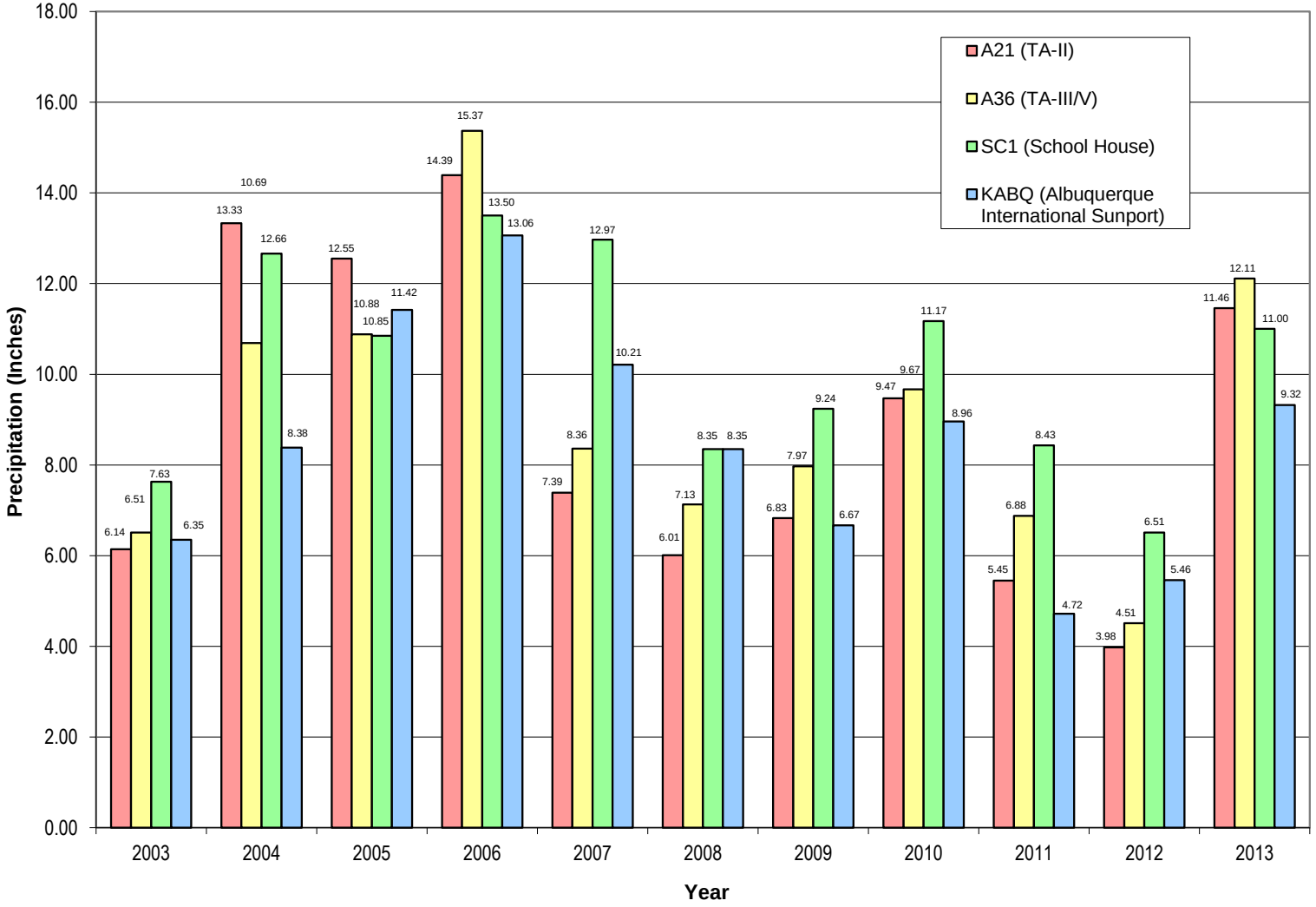


**Figure 2C-2. Annual Precipitation Data for SNL/NM, January 2002 to December 2013**

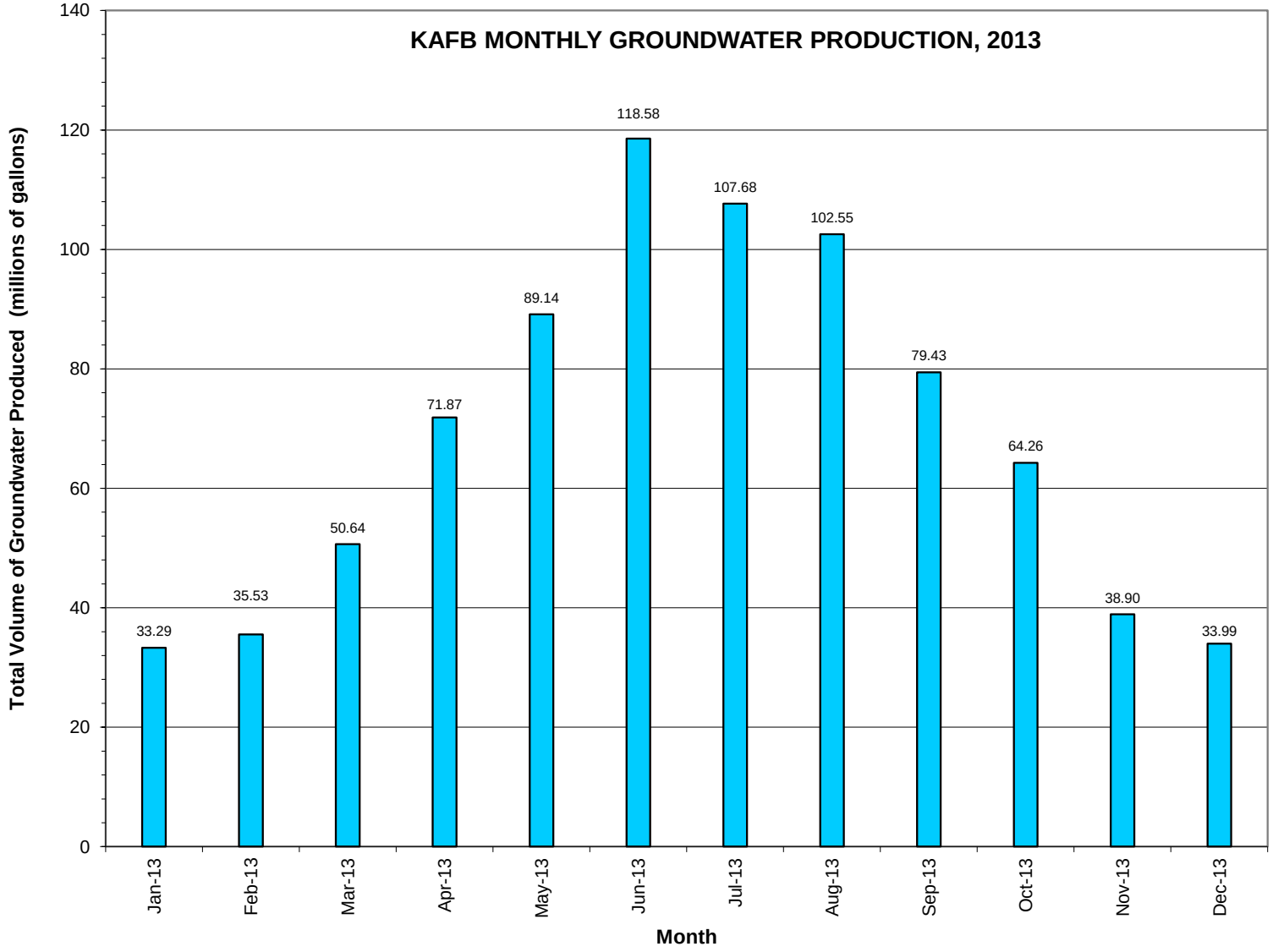


**Figure 2C-3. Monthly Groundwater Pumped by KAFB Water Supply Wells, CY2013**

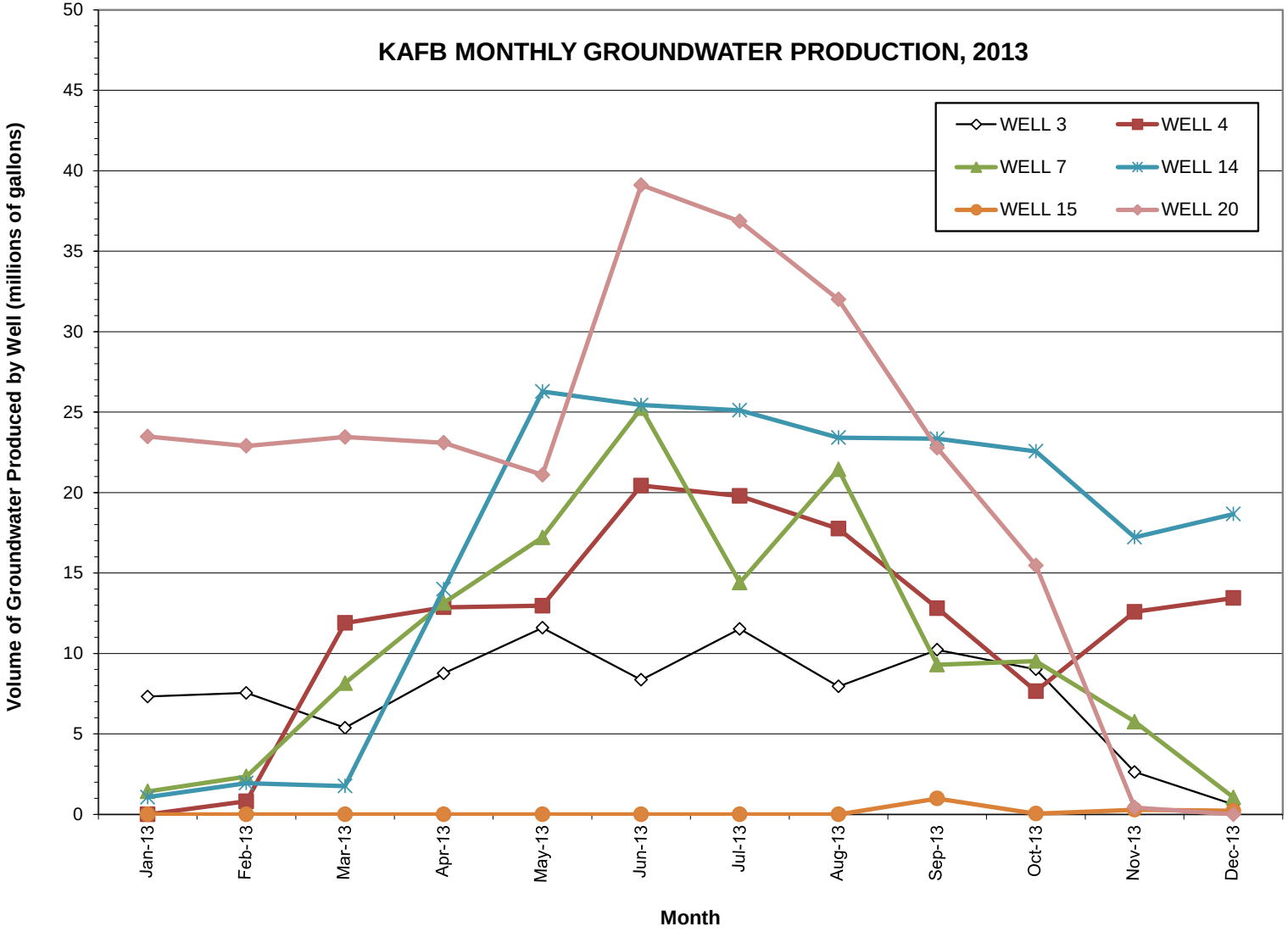


**Figure 2C-4. Groundwater Pumped by KAFB Water Supply Wells, CY2013**

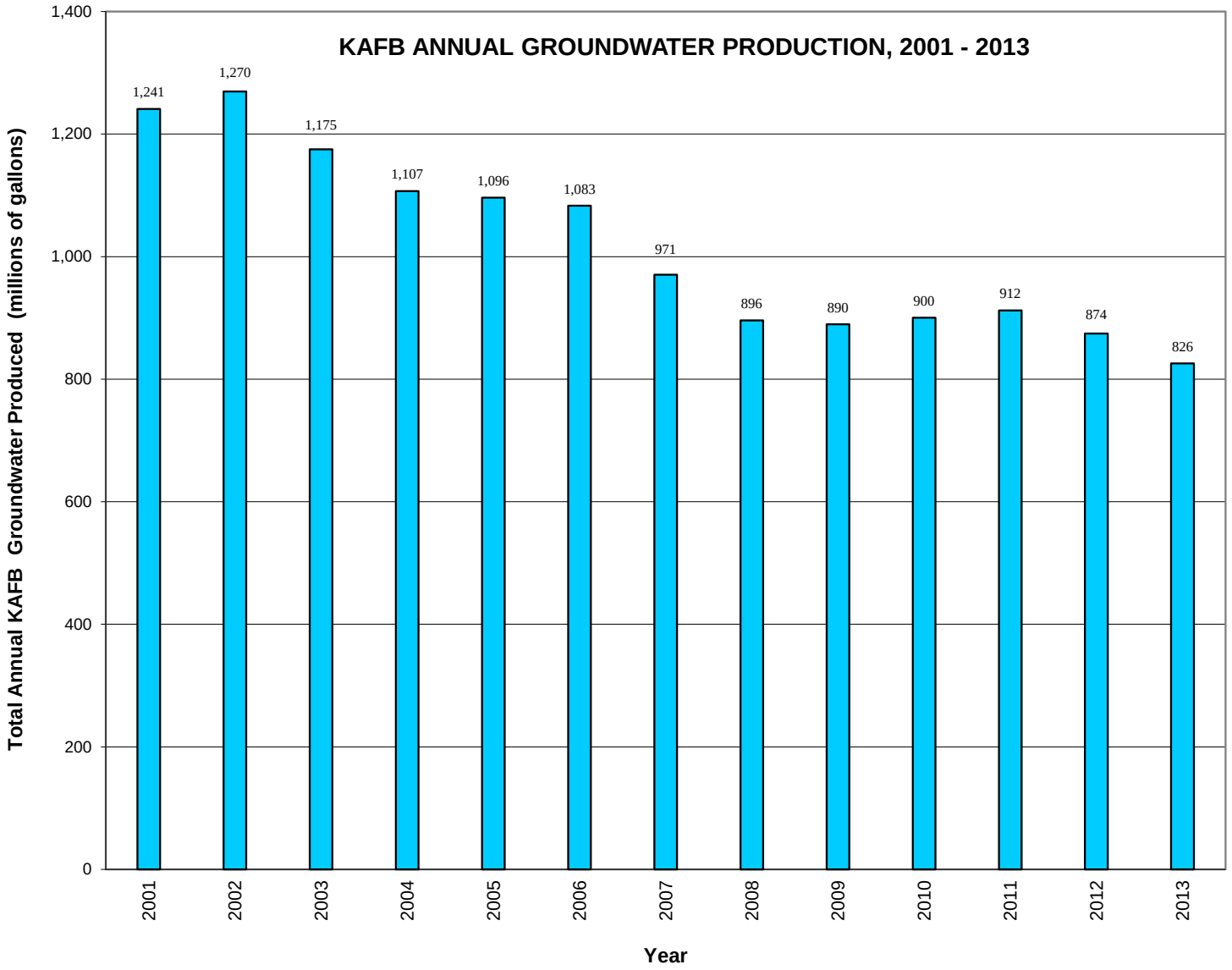


**Figure 2C-5. Annual Groundwater Pumped by KAFB Water Supply Wells, 2001 to 2013**

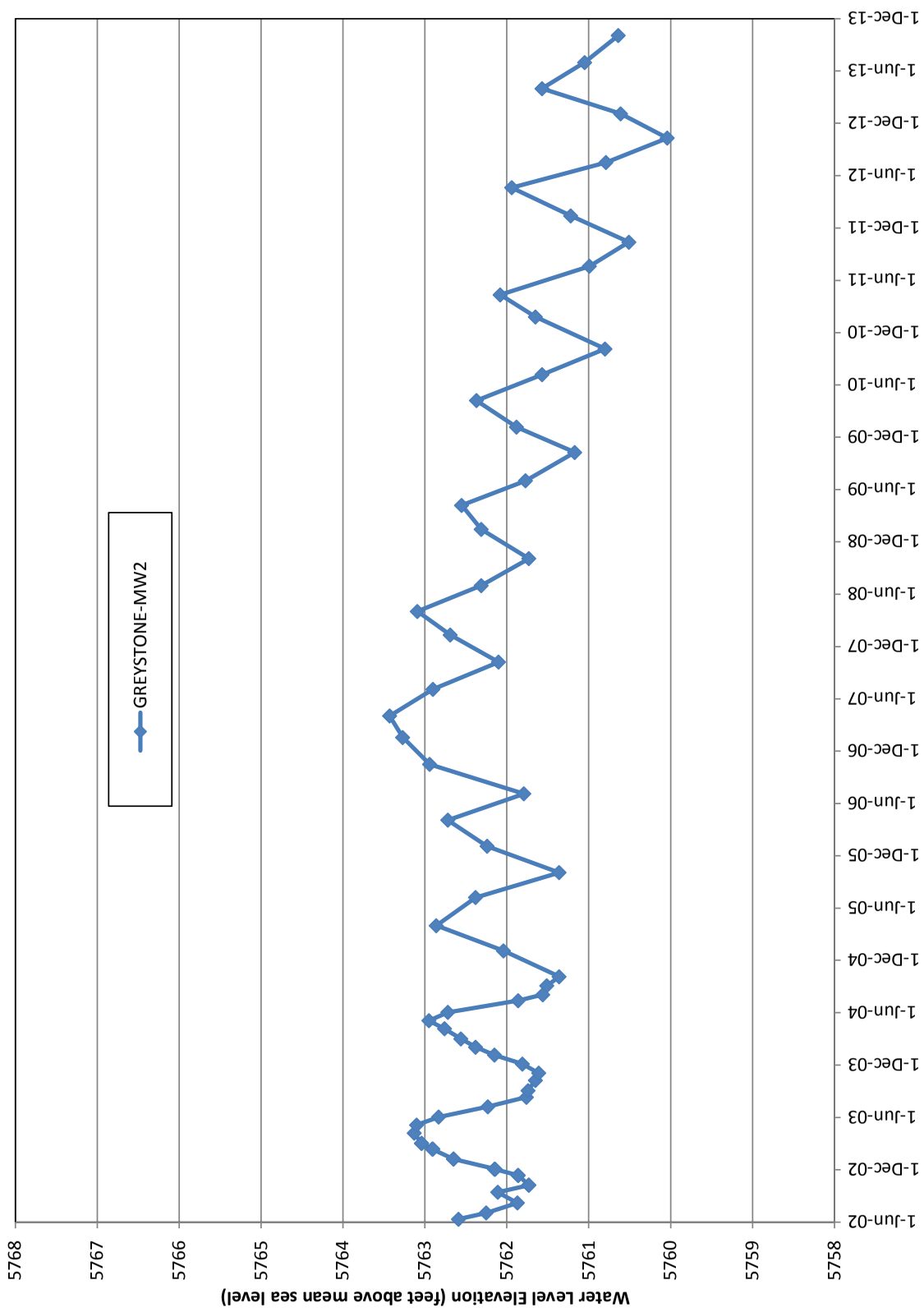


**Figure 2C-6. GMP Study Wells (1 of 6)**

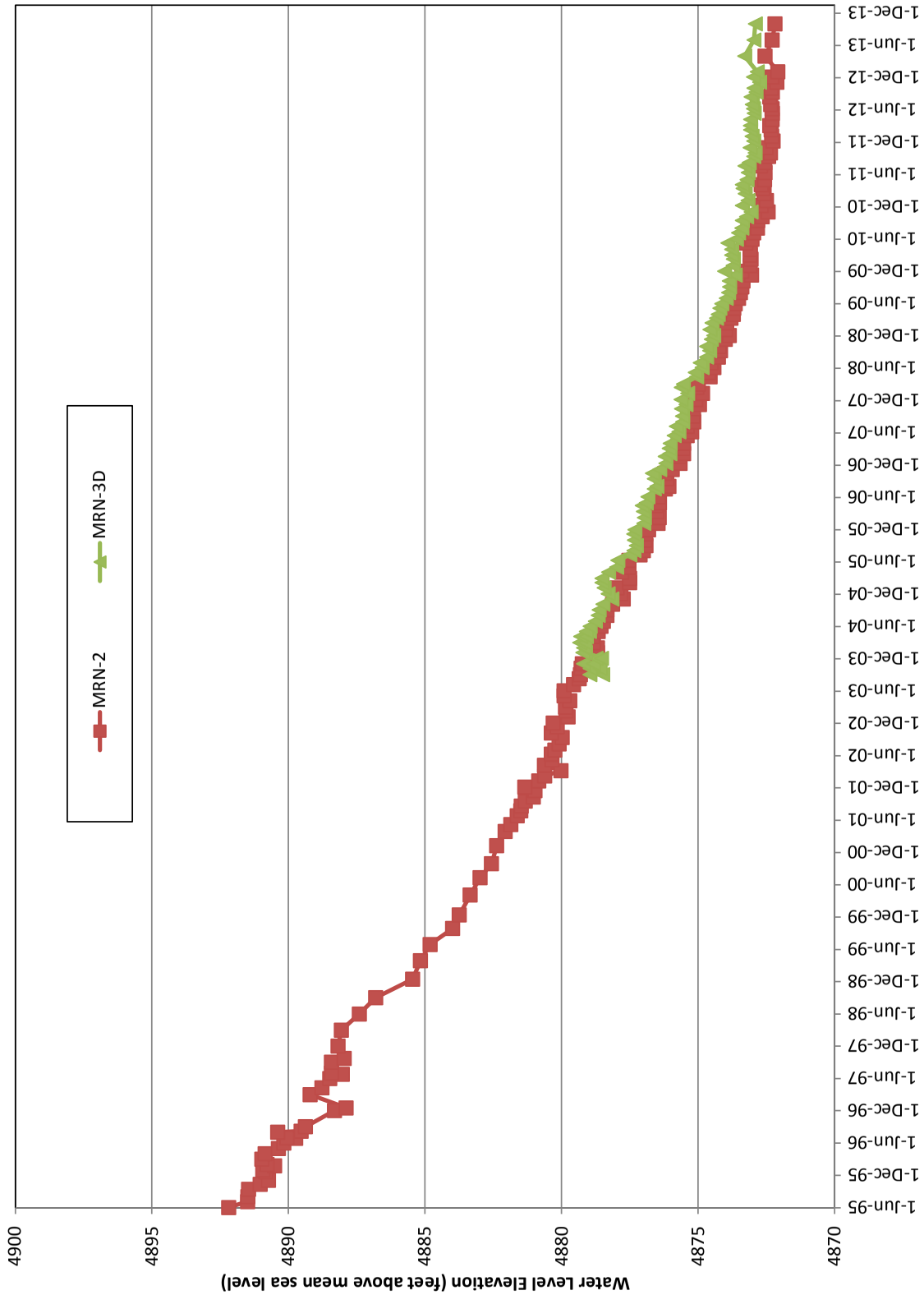


**Figure 2C-7. GMP Study Wells (2 of 6)**

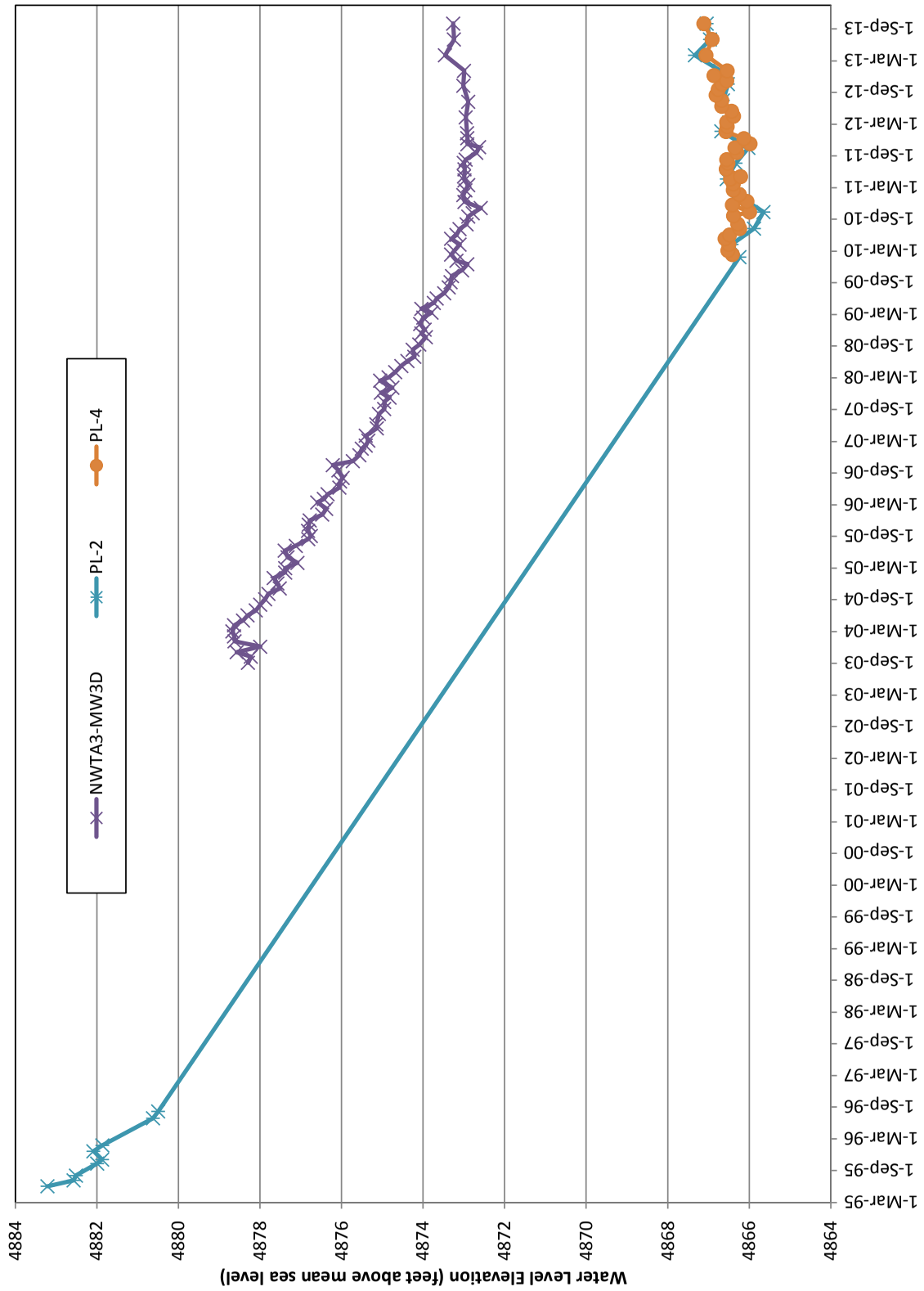


**Figure 2C-8. GMP Study Wells (3 of 6)**

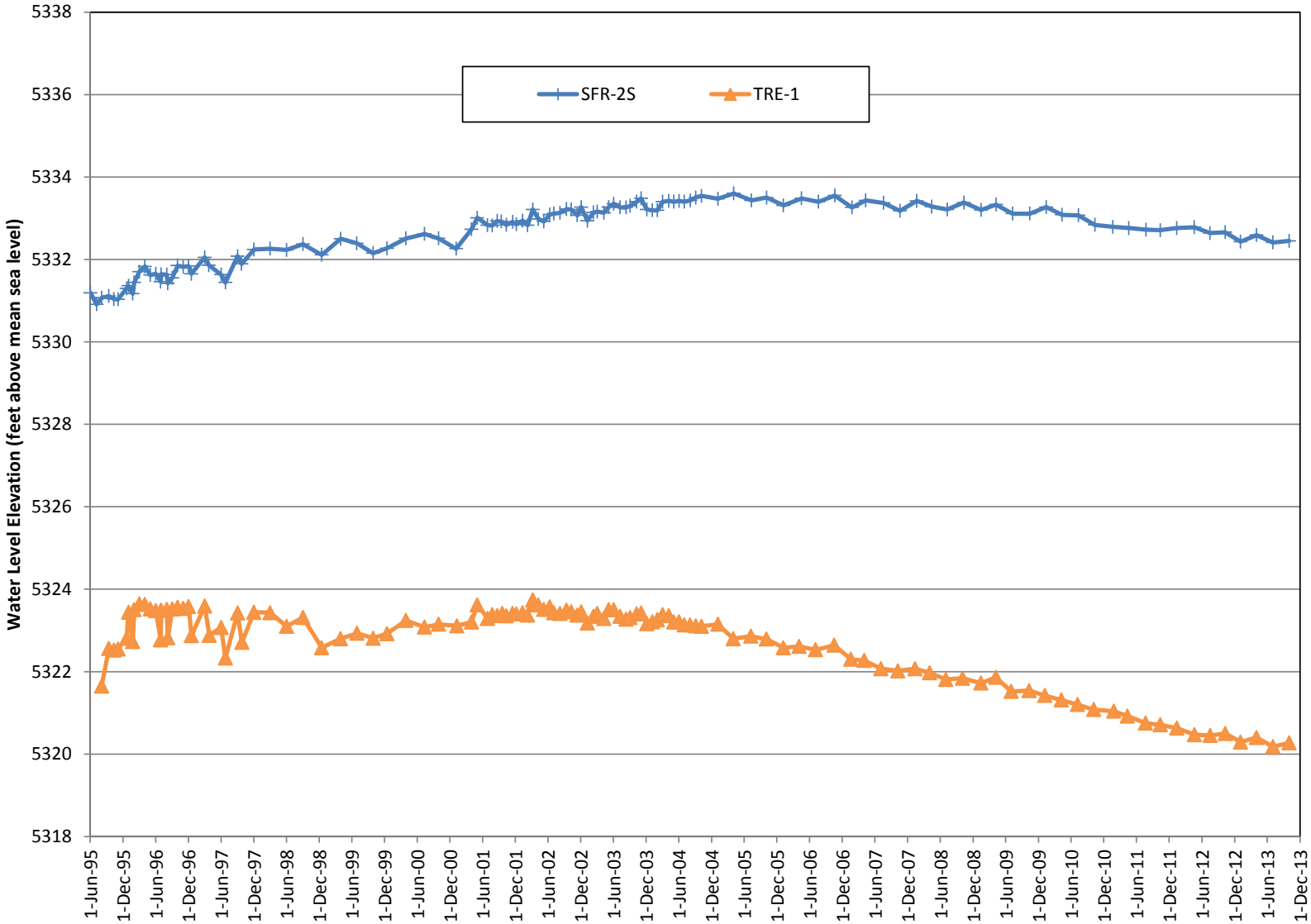


**Figure 2C-9. GMP Study Wells (4 of 6)**

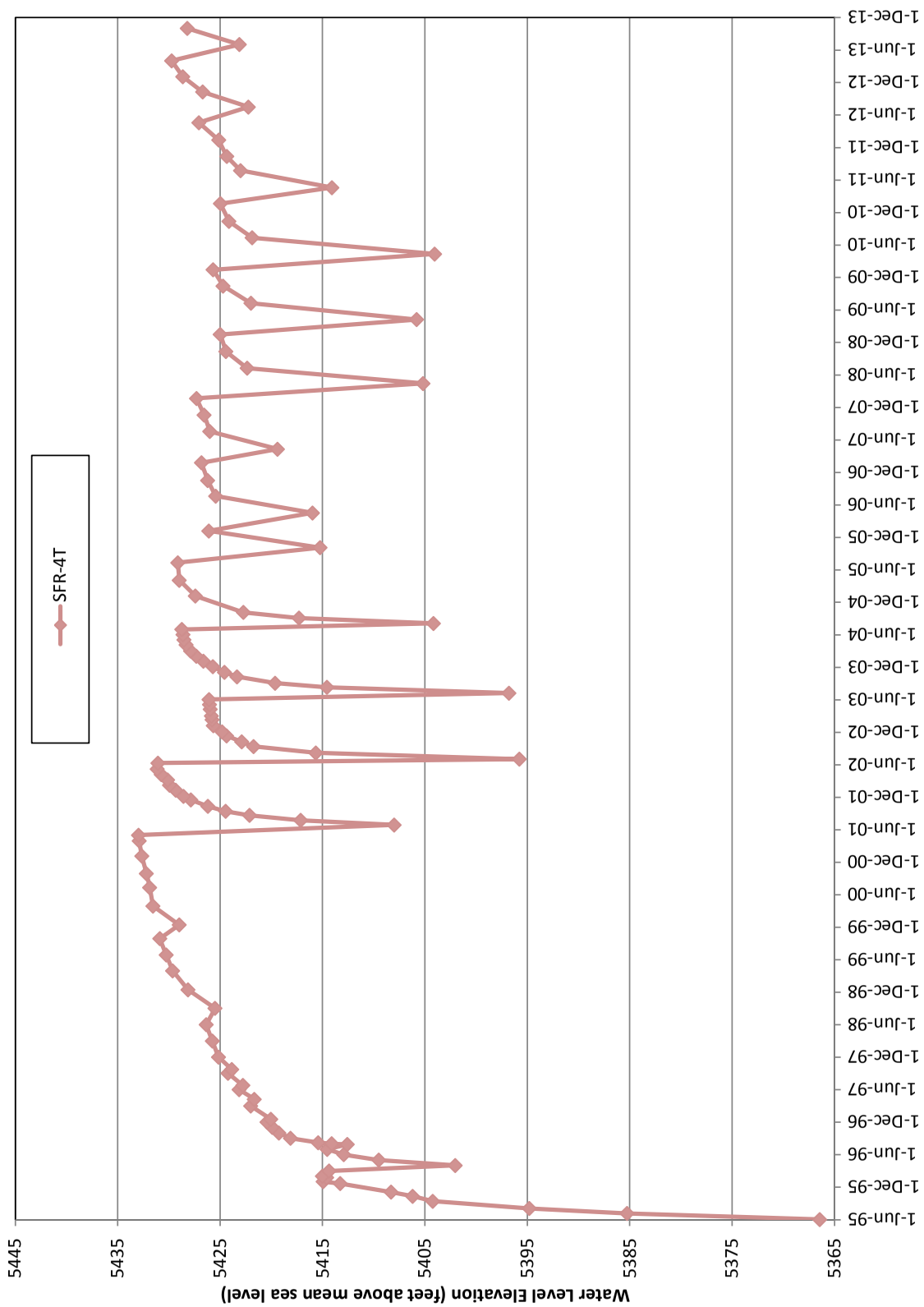


**Figure 2C-10. GMP Study Wells (5 of 6)**

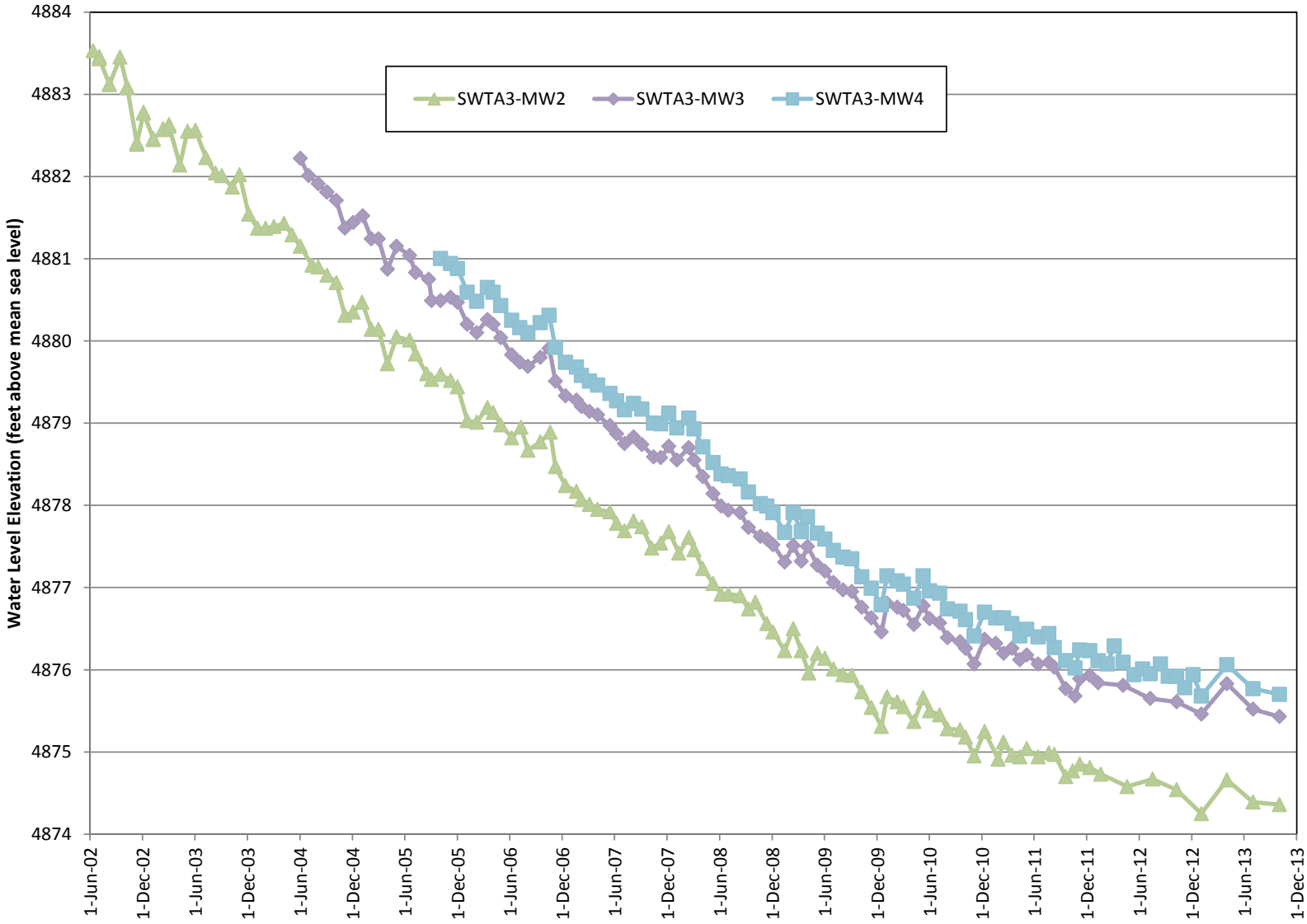


**Figure 2C-11. GMP Study Wells (6 of 6)**

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# 3.0 Chemical Waste Landfill

## 3.1 Introduction

The Chemical Waste Landfill (CWL) is a 1.9-acre former disposal site located in the southeastern corner of Technical Area III at Sandia National Laboratories, New Mexico (SNL/NM) (Figure 3-1). From 1962 until 1981, the CWL was used for the disposal of chemical, radioactive, and solid waste generated by SNL/NM research activities. From 1982 through 1985, only solid waste was disposed of at the CWL. In addition, the CWL was used as a hazardous waste drum storage facility from 1981 to 1989.

In 1990, trichloroethene (TCE) was identified in groundwater at a concentration exceeding the regulatory limit of 5 micrograms per liter (µg/L). This finding led to the development and incorporation of a corrective action program into the *Chemical Waste Landfill Final Closure Plan and Postclosure Permit Application* (Final Closure Plan; SNL December 1992). The SNL/NM Environmental Restoration Project implemented two voluntary corrective measures (VCMs), the Vapor Extraction and Landfill Excavation VCMs. As part of the Vapor Extraction VCM that was conducted from 1996 through 1998, the volatile organic compound (VOC) soil-gas plume was reduced and controlled, further degradation of groundwater beneath the CWL was prevented, and TCE concentrations in groundwater were reduced to levels below the regulatory limit. As part of the Landfill Excavation VCM, the CWL was excavated from September 1998 through February 2002. The removal of all former disposal areas was confirmed by geophysical surveys and the results of final verification soil samples demonstrated that end-state conditions meet industrial risk-based standards (SNL September 2010) approved by New Mexico Environment Department (NMED). More than 52,000 cubic yards of contaminated soil and debris were removed from this former disposal area (SNL April 2003).

In April 2004 after completion of backfilling activities to a depth of four feet below ground surface, the U.S. Department of Energy/National Nuclear Security Administration and Sandia Corporation requested approval to install an at-grade vegetative soil cover as an interim measure (Wagner April 2004) while NMED comments on the April 2003 CWL Corrective Measures Study (CMS) Report were being resolved. On September 22, 2004, the NMED approved this request with conditions (Kieling September 2004). The conditions of approval were addressed in the subsequent revised Remedial Action Proposal that was submitted as Annex I of the revised CWL CMS Report (SNL December 2004). Construction of the at-grade evapotranspirative cover began in March 2005 and was completed in September 2005.

On May 21, 2007, the NMED issued a Notice of Public Comment Period (Kieling May 2007) with regard to three documents: the CWL CMS Report (SNL December 2004), Draft Post-Closure Care Permit (PCCP) (NMED May 2007), and a Final Closure Plan Amendment (SNL February 2006). The 60-day public comment period began on May 21, 2007 and was completed on August 20, 2007. Informal negotiations were initiated by the NMED in August 2008 with all parties that requested a public hearing, and final changes to the Closure Plan Amendment and Draft PCCP were resolved without a public hearing. In October 2009 the NMED issued the final CWL PCCP, and approved the CWL CMS Report and Closure Plan Amendment as changed (NMED October 2009a and October 2009b).

From April through August 2010, monitoring wells CWL-MW4, CWL-MW5L, CWL-MW5U, CWL-MW6L, CWL-MW6U, and CWL-BW4A were decommissioned, and new monitoring wells CWL-MW9, CWL-MW10, CWL-MW11, and CWL-BW5 were installed. The new monitoring wells became the exclusive groundwater monitoring network for the CWL in accordance with the approved Closure Plan amendment. The Final Resource Conservation and Recovery Act (RCRA) Closure Report documenting closure in accordance with all CWL Closure Plan requirements was submitted to the

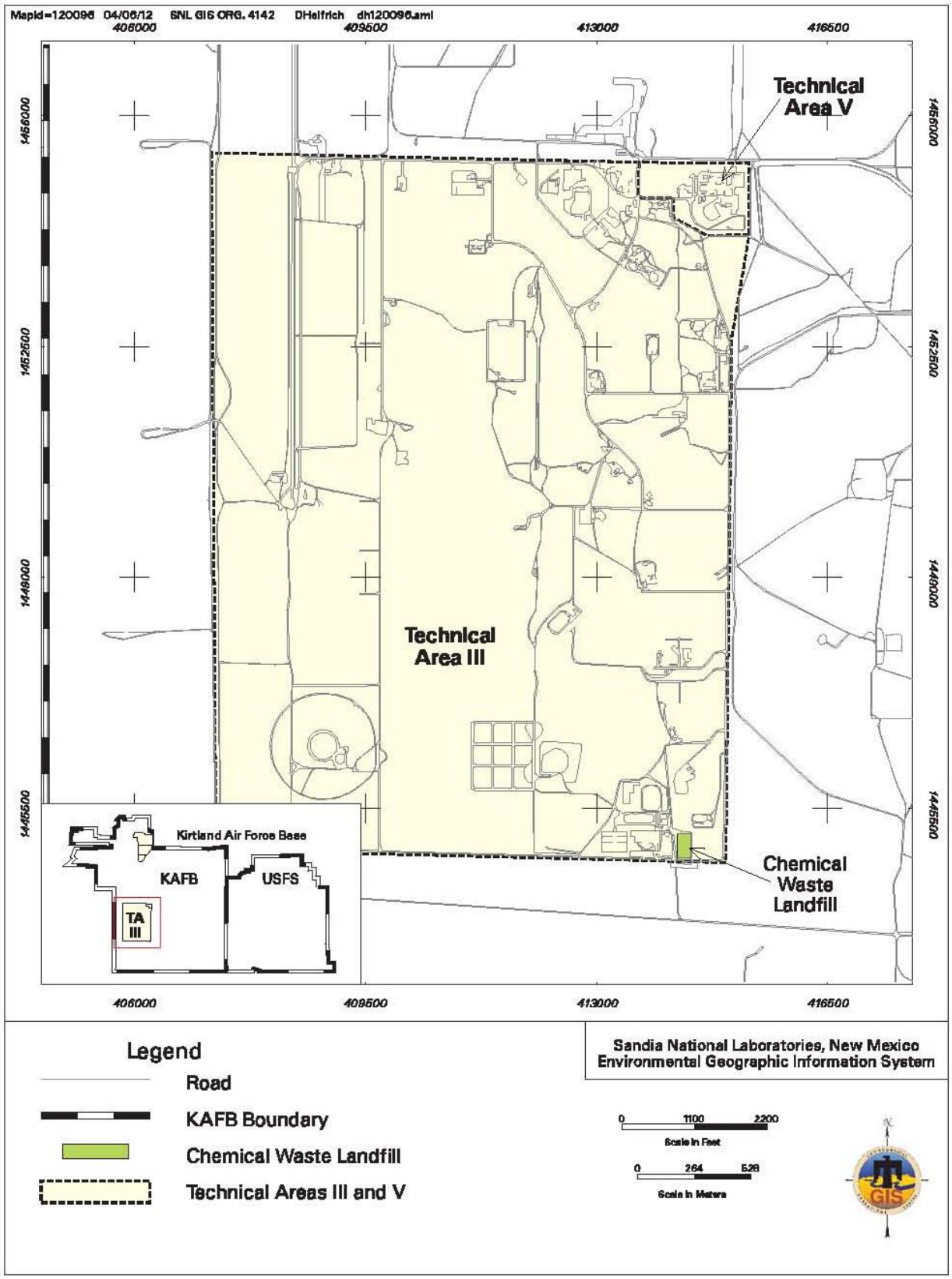


**Figure 3-1. Location of the Chemical Waste Landfill within Technical Area III**

NMED on September 27, 2010 (SNL September 2010). The Well Installation and Decommissioning Report was included as an Appendix to the CWL Final RCRA Closure Report.

CWL closure was approved by the NMED and the CWL PCCP (NMED October 2009a) became effective on June 2, 2011 (Kieling June 2011). The CWL PCCP supersedes the Final Closure Plan (SNL December 1992) as the enforceable regulatory document. Therefore, all groundwater monitoring activities at the CWL after June 2011 are performed by the Long-Term Stewardship Program in accordance with requirements specified in the CWL PCCP (NMED October 2009a). Required monitoring (groundwater and soil-gas), inspections, and maintenance activities are documented annually in Post-Closure Care Reports submitted to NMED by March 31 of each year and document all PCCP-required activities for the previous calendar year (CY). As required by the PCCP, the CWL Annual Post-Closure Care Report for CY 2012 (SNL March 2013) was submitted to the NMED in March 2013 and was approved in October 2013 (Kieling October 2013). The *Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2013* will be submitted to NMED in March 2014.

### 3.1.1 Monitoring History

Groundwater monitoring began in 1985 at the CWL (IT December 1985) as required by Section 20.4.1.600 of the New Mexico Administrative Code (NMAC), incorporating Title 40, Code of Federal Regulations (CFR), Part 265, Subpart F. Monitoring under the Final Closure Plan (SNL December 1992 and subsequent revisions) was conducted until June 2, 2011 when the CWL PCCP became effective. Since this time groundwater monitoring has been performed at the CWL in accordance with the CWL PCCP (NMED October 2009a).

### 3.1.2 Monitoring Network

The CWL compliance groundwater monitoring network includes monitoring wells CWL-BW5, CWL-MW9, CWL-MW10, and CWL-MW11. These four wells are shown on Figure 3-2 and listed in Table 3-1.

### 3.1.3 Summary of Activities

The CY 2013 semiannual groundwater monitoring activities for the CWL were performed during January and July 2013 in accordance with Attachment 2 of the CWL PCCP, (NMED October 2009a). In January, groundwater samples were analyzed for the enhanced list of VOCs, chromium, and nickel. The enhanced list of VOCs includes 1,1-dichloroethene, 1,1,2-trichloro-1,2,2-trifluoroethane, chloroform, tetrachloroethene, TCE, and trichlorofluoromethane. In July, groundwater samples were analyzed for TCE, chromium, and nickel. Attachment 3A presents tables showing the analytical results for the CWL monitoring wells sampled during CY 2013.

A comprehensive presentation of all required monitoring, inspections, maintenance, and repair activities will be presented in the *Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2013* that will be submitted to the NMED in March 2014.

### 3.1.4 Summary of Future Activities

As defined in the CWL PCCP (NMED October 2009a), the post-closure care period for the CWL is 30 years and the compliance period for which the groundwater protection standard applies is 47 years; both periods began on June 2, 2011 when NMED approved closure (Kieling June 2011). The NMED may shorten or extend the post-closure care period under 20.4.1.500 NMAC, incorporating 40 CFR 264.117(a)(2).

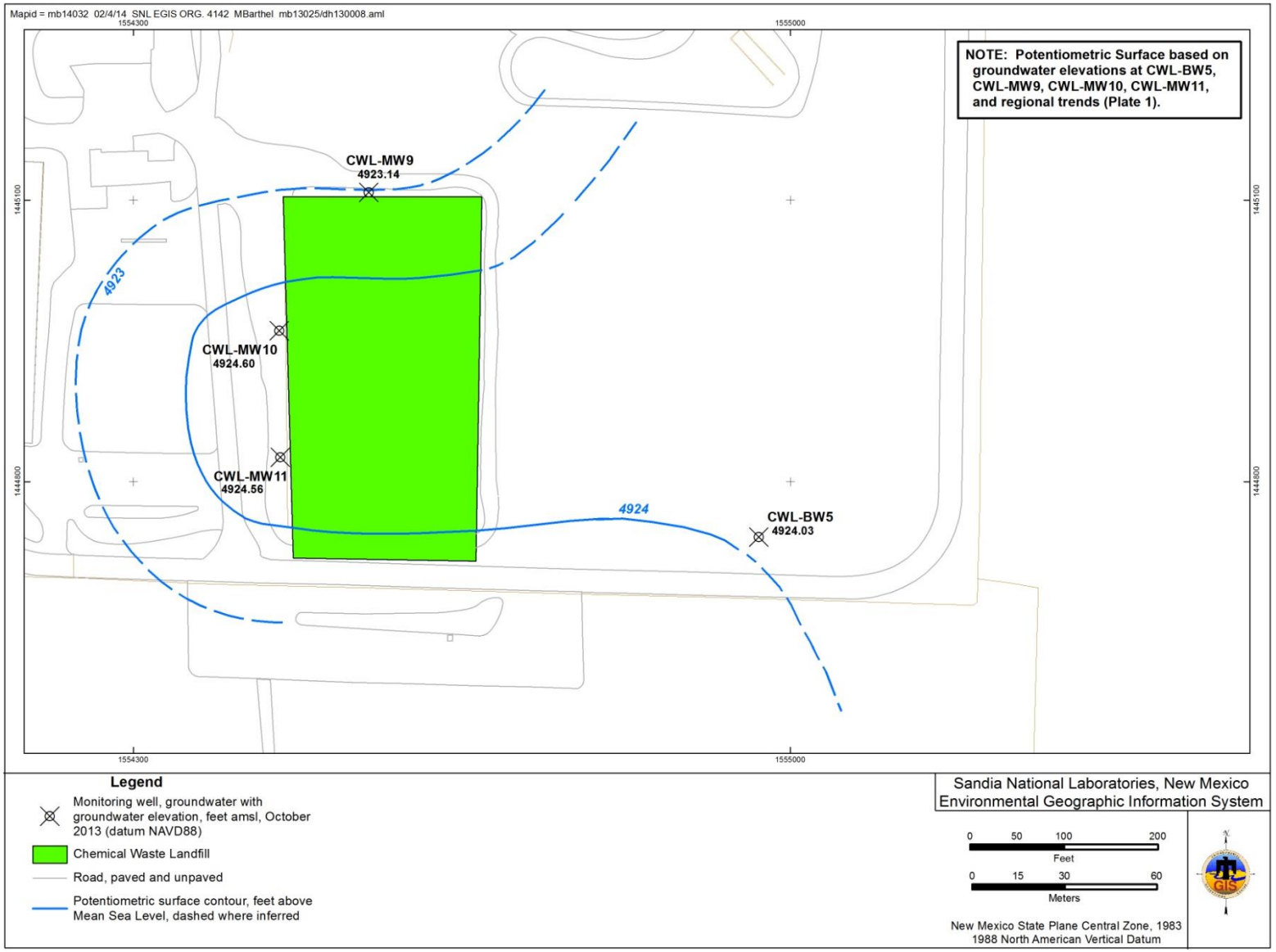


**Figure 3-2. Chemical Waste Landfill Monitoring Well Locations and Potentiometric Surface Map, October 2013**

**Table 3-1. CWL Post-Closure Care Permit Monitoring Well Network and Calendar Year 2013 Compliance Activities**

| Well ID | WQ | WL | Comment |
|---|---|---|---|
| CWL-BW5 | ✓ | ✓ | Upgradient well |
| CWL-MW9 | ✓ | ✓ | Downgradient well |
| CWL-MW10 | ✓ | ✓ | Downgradient well |
| CWL-MW11 | ✓ | ✓ | Downgradient well |

**NOTES:**
Check marks in the WQ and WL columns indicate the WQ sampling and WL measurements that were conducted during January and July 2013 Sampling Events.
BW = Background Well.
CWL = Chemical Waste Landfill.
ID = Identification.
MW = Monitoring Well.
WL = Water level.
WQ = Water quality.

In accordance with the CWL PCCP (NMED October 2009a), groundwater monitoring is required on a semi-annual basis. One of the two semi-annual events must include analyses for the enhanced list of VOCs, chromium, and nickel. The other semi-annual event must include TCE, chromium, and nickel.

### 3.1.5 Conceptual Site Model

The constituents of concern in groundwater are TCE, chromium, and nickel (NMED October 2009a). A detailed conceptual site model is provided in Annex E of the CWL CMS Report (SNL December 2004). The model is summarized as follows.

Groundwater at the CWL is contained within the regional aquifer, which consists of unconsolidated Santa Fe Group deposits (i.e., fine-grained alluvial-fan deposits). The depth to water is approximately 500 feet (ft) below ground surface. Groundwater flows generally westward away from the Manzanita Mountains and toward the Rio Grande. Several water-supply wells operated by Kirtland Air Force Base (KAFB) and the Albuquerque Bernalillo County Water Utility Authority (ABCWUA) have profoundly modified the natural groundwater flow regime to the west and north of the CWL by creating a trough in the water table in the western and northern portions of KAFB. As a result, water levels at the CWL have been steadily declining since monitoring began in 1985.

Since monitoring began at the CWL in 1985, the average rate of decline has been somewhat variable, but typically in the range of 0.4 to 0.8 feet per year (ft/yr). The groundwater elevation decline between October 2012 and October 2013 at the CWL wells ranged from 0.22 (CWL-MW11) to 0.92 (CWL-BW5) feet (Figure 3B-1 in Attachment 3B). Recharge from the infiltration of direct precipitation at the CWL is negligible due to high evapotranspiration, low precipitation, the thick sequence of unsaturated Santa Fe Group deposits above the water table, and the evapotranspirative cover that was installed in 2005. Groundwater recharge of the regional aquifer primarily occurs by the infiltration of precipitation in the Manzanita Mountains located approximately 5 miles to the east.

The CWL potentiometric surface map for October 2013 is presented on Figure 3-2. The map is consistent with the conceptual site model and the base-wide potentiometric surface map presented on Plate 1. As shown on Plate 1, the potentiometric surface contours beneath Technical Area III generally trend north to south with the inferred groundwater flow direction being generally westward. The apparent localized deflection in the potentiometric surface immediately beneath the CWL (Figure 3-2) probably reflects site-specific geologic controls (i.e., lateral and vertical changes in the hydraulic conductivity of the saturated,

anisotropic, alluvial-fan sediments that were deposited in an east to west direction). Slug testing of the four groundwater monitoring wells completed in 2012 indicates CWL-MW10 has the lowest average hydraulic conductivity (5 ft/yr) relative to the other wells. CWL-MW9 has the highest average hydraulic conductivity at 16 ft/yr, and both CWL-MW11 and CWL-BW5 tested at 12 ft/yr. While actual flow paths in laterally discontinuous alluvial sediments are complex and highly dependent upon horizontal permeability, hydraulic conductivity testing indicates CWL-MW10 is installed within tighter, slower sediments than CWL-MW9 to the north and CWL-BW5/CWL-MW11 to the south. This information is consistent with groundwater purging data; CWL-MW10 is the only well that purges dry during routine sampling. As the regional aquifer surface declines and groundwater flows from the east to the west, the central part of the site reacts more slowly, creating a localized salient in the potentiometric surface (i.e., a very gentle ridge or localized high). Previous groundwater monitoring wells installed in this area (west of the central part of the CWL) have also exhibited these characteristics (low yield, purge dry, low hydraulic conductivity; CWL-MW2A and CWL-MW2BU/L).

Based on the potentiometric surface map, the horizontal gradient at the CWL was approximately 0.011 ft/ft in October 2013. Groundwater velocities were calculated using:

- The current potentiometric surface gradient,
- The hydraulic conductivity range (i.e., high and low values) from the four groundwater monitoring wells, and
- A porosity of 29 percent as determined from the laboratory analyses of CWL soil samples (SNL October 1995).

The calculated velocities range from approximately $1.8 \times 10^{-4}$ to $2.8 \times 10^{-3}$ feet per day (equivalent to $6.3 \times 10^{-8}$ to $1.0 \times 10^{-6}$ centimeters per second). This is equivalent to approximately 0.07 to 1.02 ft/yr. These very low values are consistent with previous estimates for horizontal groundwater flow at the water table in the CWL vicinity. Groundwater travel times from the CWL to the KAFB and ABCWUA water supply wells are on the order of hundreds to thousands of years (SNL February 2001).

### 3.2 Regulatory Criteria

The CWL is a remediated, closed, regulated unit undergoing post-closure care in accordance with the CWL PCCP (NMED October 2009a) that became effective on June 2, 2011. Groundwater monitoring requirements, procedures, and protocols are detailed in the CWL PCCP, Attachment 2, Groundwater Sampling and Analysis Plan (NMED October 2009a).

### 3.3 Scope of Activities

The groundwater monitoring performed at the CWL during CY 2013 is summarized in Section 3.1.3. Table 3-2 lists the parameters and CWL monitoring wells sampled.

Groundwater samples collected for chemical analyses were submitted to GEL Laboratories LLC (GEL) in Charleston, South Carolina. All chemical analytical results are compared with EPA maximum contaminant levels (MCLs) for drinking water (EPA 2009). The analytical results are summarized in Attachment 3A, Tables 3A-1 and 3A-2.

**Table 3-2. Analytical Parameters for the CWL Monitoring Wells, Calendar Year 2013**

| Parameters | CY 2013 Semiannual Event | CWL Monitoring Wells |
|---|---|---|
| TCE; 1,1,2-Trichloro-1,2,2-trifluoroethane; Tetrachloroethene; 1,1-Dichloroethene; Chloroform; Trichlorofluoromethane; Chromium; and Nickel | January | CWL-BW5, CWL-MW9, CWL-MW9 dup, CWL-MW10, and CWL-MW11 |
| TCE, Chromium, and Nickel | July | CWL-BW5, CWL-MW9, CWL-MW10, CWL-MW10 dup, and CWL-MW11 |

**NOTES:**
BW = Background Well.
CWL = Chemical Waste Landfill.
CY = Calendar Year.
dup = Duplicate.
MW = Monitoring Well.
TCE = Trichloroethene.

Field and laboratory quality control (QC) samples were used to determine the accuracy of the methods used and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process as discussed in Section 1.3.3. Field QC samples included duplicate environmental, equipment blank (EB), field blank (FB), and trip blank (TB) samples. Laboratory QC samples included method blank, laboratory control, matrix spike, matrix spike duplicate, and surrogate spike samples.

## 3.4 Field Methods and Measurements

Groundwater sampling and depth-to-groundwater measurements were conducted in conformance with procedures specified in the CWL PCCP (NMED October 2009a), which are consistent with the methods described in Section 1.3. Purging requirements at the CWL include specifications for making a "best faith effort" to decrease flow rates, such that low yield wells do not purge dry. These efforts include equipping the existing sampling system with small diameter tubing and a flow meter valve located along the discharge line. In addition, during the purging process at wells prone to purging dry, the flow rate is continually adjusted to achieve as low a flow rate as possible without causing the pump to be damaged or fail. This represents a "best faith effort" to purge the wells at the slowest rate possible given equipment limitations as specified in CWL PCCP Attachment 2, Section 2.12.

Field water quality parameters were measured in the field for temperature, specific conductance, oxidation-reduction potential, pH, and dissolved oxygen using an YSI™ Model 6920 Water Quality Meter during the purging process. Turbidity was measured with a Hach™ Model 2100P turbidity meter. Field water quality parameters are presented in Table 3A-3 (Attachment 3A) and groundwater elevation measurements at the CWL monitoring wells from CY 2010 through CY 2013 are presented in Attachment 3B, Figure 3B-1.

The minimum purging volume requirement was satisfied at three of the four monitoring wells. Monitoring well CWL-MW10 purged dry prior to removal of the minimum volume. This well was purged to dryness during both the January and July monitoring events, allowed to recover, and then sampled to collect the most representative groundwater sample possible given the low yield of this well. During January, approximately 19 gallons were purged from CWL-MW10 prior to the well going dry. The average flow rate was 0.17 gallons per minute (gpm), and the estimated flow rate was 0.13 gpm during the final four gallons (equivalent to 0.64 and 0.49 liters per minute, respectively). During July, approximately 16 gallons were purged from CWL-MW10 prior to the well going dry. The average flow rate was 0.15 gpm, and the estimated flow rate was 0.10 gpm during the final four gallons (equivalent to 0.57 and 0.38 liters per minute, respectively).

Groundwater samples were submitted to the off-site laboratory (GEL) following analysis request/chain of custody protocol.

## 3.5 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using EPA-specified protocols described in Section 1.3.2 (Tables 1-5 and 1-6).

## 3.6 Summary of Analytical Results

The analytical results and water quality parameters are presented in Attachment 3A, Tables 3A-1 through 3A-3. Analytical results that are above the analytical laboratory method detection limit (MDL), but below the practical quantitation limit are qualified as estimated values and designated with a "J" qualifier in Tables 3A-1 and 3A-2. Analytical laboratory reports, including certificates of analyses, analytical methods, MDLs, practical quantitation limits, dates of analyses, results of QC analyses, and data validation findings are filed in the SNL/NM Customer Funded Records Center. Data qualifiers based on the data validation process are presented with the associated results in the tables in Attachment 3A. Data validation and QC sample results are discussed in Section 3.7.

For the purposes of this report, all CY 2013 analytical results were compared with established EPA MCLs where applicable. However, as stipulated in the CWL PCCP (SNL October 2009a), the only regulatory standards that apply to CWL groundwater monitoring results are PCCP-defined concentration limits. These NMED-defined regulatory standards apply only to a statistical evaluation of the constituent data set from a given monitoring well (i.e., the 95$^{th}$ percent lower confidence limit of the mean for a particular constituent); not to individual results. The full statistical evaluation of CWL CY 2013 groundwater monitoring results will be presented in the CWL Annual Post-Closure Care Report for CY 2013 (to be submitted to NMED in March 2014). None of the detected constituents exceed the respective MCLs. The analytical results are discussed in greater detail in the following sections.

### 3.6.1 Volatile Organic Compounds

The analytical results for the enhanced list of VOCs (January) and TCE (July) are summarized in Attachment 3A, Table 3A-1. TCE was the only VOC detected above the laboratory MDL; it was detected in all samples from monitoring well CWL-MW10. TCE was detected in the environmental samples at concentrations of 4.63 and 3.13 µg/L. TCE was also detected at a concentration of 2.89 µg/L in the July duplicate sample from monitoring well CWL-MW10. All of these results are below the MCL of 5.0 µg/L.

### 3.6.2 Metals

The analytical results for nickel and chromium are summarized in Attachment 3A, Table 3A-2. Chromium was detected above the laboratory MDL of 0.002 milligrams per liter (mg/L) in the January environmental samples from monitoring wells CWL-MW10 and CWL-MW11 at estimated concentrations of 0.00321 and 0.00304 mg/L, respectively (note the CWL-MW10 chromium detection was qualified as a non-detect during data validation – see Section 3.7.2). Chromium was not detected above the laboratory MDL of 0.002 mg/L in the July samples and was not detected above the MCL of 0.10 mg/L in any of the samples. Nickel was detected in each sample at concentrations ranging from 0.00172 mg/L to 0.00637 mg/L, although all but one of the January detections were qualified as non-detects during data validation (see Section 3.7.2). All nickel detections were low concentrations; no MCL has been established for nickel.

### 3.6.3 Water Quality Parameters

The water quality parameters measured immediately prior to sample collection are listed in Attachment 3A, Table 3A-3. These field parameters consist of temperature, specific conductance, oxidation-reduction potential, pH, turbidity, and dissolved oxygen.

## 3.7 Quality Control Results

Field and laboratory QC samples were prepared to determine the accuracy of the methods used and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process. All data were reviewed in accordance with Administrative Operating Procedure (AOP) 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL May 2011). The results for each QC analysis and the impact on data quality are discussed in the following sections.

### 3.7.1 Field Quality Control Samples

Field QC samples included duplicate environmental samples, FBs, TBs, and EBs. The purpose of each field QC sample type is presented in Section 1.3.3. The following sections discuss the analytical results for each QC sample type.

#### 3.7.1.1 Duplicate Environmental Samples

One duplicate sample was collected from monitoring well CWL-MW9 in January and one duplicate sample was collected from monitoring well CWL-MW10 in July, and the results were compared to the results for the corresponding environmental sample. Relative percent difference (RPD) values were calculated for the detected parameters. For the environmental duplicate sample pair collected at CWL-MW9 in January, no VOCs or chromium were detected and the nickel results were qualified during data validation as non-detections. Therefore, RPD values were not calculated. The RPD values for the environmental duplicate sample pair collected at CWL-MW10 in July show good correlation with RPD values of 8 for TCE and 2 for nickel. The agreement between duplicate environmental and environmental sample results are within the acceptable range for RPD values of less than 20 for organic compounds and less than 35 for metals (NMED October 2009a).

#### 3.7.1.2 Field Blank Samples

Two FB samples were collected in January and analyzed for the enhanced list of VOCs. Two FB samples were collected in July and analyzed for TCE only. The only detections were chloroform in the two January FB samples. No corrective action was required because chloroform was not detected in any of the environmental samples.

#### 3.7.1.3 Trip Blank Samples

Five TB samples were submitted with the January samples and analyzed for the enhanced list of VOCs, and five TB samples were submitted with July samples and analyzed for TCE. VOCs were not detected in these samples.

#### 3.7.1.4 Equipment Blank Samples

One EB sample was collected in January and analyzed for the enhanced list of VOCs, chromium, and nickel. One EB sample was collected in July and analyzed for TCE, chromium, and nickel. Chloroform and chromium were detected in the January EB sample. No corrective action was necessary because chloroform and chromium were not detected in the environmental sample associated with the EB sample (i.e., CWL-MW9 samples).

### 3.7.2 Laboratory Quality Control Samples

Internal laboratory QC samples, including method blanks, duplicate laboratory control samples, batch matrix spike, matrix spike duplicate, and surrogate spike samples, were analyzed concurrently with the groundwater samples. All laboratory data were reviewed and qualified in accordance with AOP 00-03, Revision 3, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL May 2011). All data were in compliance with analytical methods and laboratory procedures (i.e., technically defensible). The

data validation reports are filed in the SNL/NM Customer Funded Records Center. Minor issues documented during the data validation process are summarized below.

For the January 2013 sampling event, the chromium result in the CWL-MW10 sample and the nickel results in CWL-BW5, CWL-MW9 (including the duplicate sample), and CWL-MW11 samples were qualified as not detected during data validation. The results are very low concentrations that are less than five times the concentration detected in the associated laboratory method blank samples; therefore, they were qualified as not detected.

For the July 2013 sampling event, the nickel results in CWL-BW5, CWL-MW9, and CWL-MW11 environmental samples were qualified as estimated values with a negative bias during data validation based on the associated laboratory QC sample (interference check sample) results.

## 3.8 Variances and Nonconformances

No variances or nonconformances from specified sampling and analysis requirements or project-specific issues were identified during the January and July 2013 sampling activities at the CWL.

## 3.9 Summary and Conclusions

During CY 2013, groundwater samples were collected from four CWL PCCP monitoring wells (CWL-BW5, CWL-MW9, CWL-MW10, and CWL-MW11) in January and July and analyzed for TCE, 1,1,2-trichloro-1,2,2-trifluoroethane, tetrachloroethene, 1,1-dichloroethene, chloroform, trichlorofluoromethane, nickel, and chromium (January); and TCE, nickel, and chromium (July). No analytes were detected at concentrations exceeding the EPA MCLs.

Based on the field and laboratory QC sample and data validation results, the CY 2013 groundwater monitoring data meet data quality objectives and are in compliance with analytical methods and laboratory procedures (i.e., representative and technically defensible).

## 3.10 References


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**Wagner April 2004** Wagner, P. (U.S. Department of Energy), April 2004. Letter to J. Kieling (New Mexico Environment Department), *Request for Approval of an Interim Measure (Cover) at the Chemical Waste Landfill*, April 19, 2004.

# Attachment 3A
# Chemical Waste Landfill
# Analytical Results Tables

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# Attachment 3A Tables


3A-1 Summary of Volatile Organic Compound Results, Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 3A-5

3A-2 Summary of Chromium and Nickel Results, Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 3A-7

3A-3 Summary of Field Water Quality Measurements[h], Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 3A-8

Footnotes for Chemical Waste Landfill Groundwater Monitoring Tables ..... 3A-9

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

## Calendar Year 2013

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CWL-BW5** | 1,1-Dichloroethene | ND | 0.300 | 1.00 | 7.00 | U | | 093275-001 | SW846 8260B |
| 08-Jan-13 | Chloroform | ND | 0.300 | 1.00 | NE | U | | 093275-001 | SW846 8260B |
| | Tetrachloroethene | ND | 0.300 | 1.00 | 5.00 | U | | 093275-001 | SW846 8260B |
| | Trichloroethene | ND | 0.300 | 1.00 | 5.00 | U | | 093275-001 | SW846 8260B |
| | Trichlorofluoromethane | ND | 0.300 | 1.00 | NE | U | | 093275-001 | SW846 8260B |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | 1.50 | 5.00 | NE | U | | 093275-001 | SW846 8260B |
| **CWL-MW9** | 1,1-Dichloroethene | ND | 0.300 | 1.00 | 7.00 | U | | 093282-001 | SW846 8260B |
| 09-Jan-13 | Chloroform | ND | 0.300 | 1.00 | NE | U | | 093282-001 | SW846 8260B |
| | Tetrachloroethene | ND | 0.300 | 1.00 | 5.00 | U | | 093282-001 | SW846 8260B |
| | Trichloroethene | ND | 0.300 | 1.00 | 5.00 | U | | 093282-001 | SW846 8260B |
| | Trichlorofluoromethane | ND | 0.300 | 1.00 | NE | U | | 093282-001 | SW846 8260B |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | 1.50 | 5.00 | NE | U | | 093282-001 | SW846 8260B |
| **CWL-MW9** | 1,1-Dichloroethene | ND | 0.300 | 1.00 | 7.00 | U | | 093283-001 | SW846 8260B |
| (Duplicate) | Chloroform | ND | 0.300 | 1.00 | NE | U | | 093283-001 | SW846 8260B |
| 09-Jan-13 | Tetrachloroethene | ND | 0.300 | 1.00 | 5.00 | U | | 093283-001 | SW846 8260B |
| | Trichloroethene | ND | 0.300 | 1.00 | 5.00 | U | | 093283-001 | SW846 8260B |
| | Trichlorofluoromethane | ND | 0.300 | 1.00 | NE | U | | 093283-001 | SW846 8260B |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | 1.50 | 5.00 | NE | U | | 093283-001 | SW846 8260B |
| **CWL-MW10** | 1,1-Dichloroethene | ND | 0.300 | 1.00 | 7.00 | U | | 093287-001 | SW846 8260B |
| 14-Jan-13 | Chloroform | ND | 0.300 | 1.00 | NE | U | | 093287-001 | SW846 8260B |
| | Tetrachloroethene | ND | 0.300 | 1.00 | 5.00 | U | | 093287-001 | SW846 8260B |
| | Trichloroethene | 4.63 | 0.300 | 1.00 | 5.00 | | | 093287-001 | SW846 8260B |
| | Trichlorofluoromethane | ND | 0.300 | 1.00 | NE | U | | 093287-001 | SW846 8260B |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | 1.50 | 5.00 | NE | U | | 093287-001 | SW846 8260B |
| **CWL-MW11** | 1,1-Dichloroethene | ND | 0.300 | 1.00 | 7.00 | U | | 093292-001 | SW846 8260B |
| 10-Jan-13 | Chloroform | ND | 0.300 | 1.00 | NE | U | | 093292-001 | SW846 8260B |
| | Tetrachloroethene | ND | 0.300 | 1.00 | 5.00 | U | | 093292-001 | SW846 8260B |
| | Trichloroethene | ND | 0.300 | 1.00 | 5.00 | U | | 093292-001 | SW846 8260B |
| | Trichlorofluoromethane | ND | 0.300 | 1.00 | NE | U | | 093292-001 | SW846 8260B |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | ND | 1.50 | 5.00 | NE | U | | 093292-001 | SW846 8260B |

Refer to footnotes on page 3A-9.

**Table 3A-1** *(Concluded)*
**Summary of Volatile Organic Compound Results,**
**Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CWL-BW5** 08-Jul-13 | Trichloroethene | ND | 0.300 | 1.00 | 5.00 | U | | 094278-001 | SW846 8260B |
| **CWL-MW9** 09-Jul-13 | Trichloroethene | ND | 0.300 | 1.00 | 5.00 | U | | 094282-001 | SW846 8260B |
| **CWL-MW10** 12-Jul-13 | Trichloroethene | 3.13 | 0.300 | 1.00 | 5.00 | | | 094294-001 | SW846 8260B |
| **CWL-MW10** (Duplicate) 12-Jul-13 | Trichloroethene | 2.89 | 0.300 | 1.00 | 5.00 | | | 094295-001 | SW846 8260B |
| **CWL-MW11** 10-Jul-13 | Trichloroethene | ND | 0.300 | 1.00 | 5.00 | U | | 094287-001 | SW846 8260B |

Refer to footnotes on page 3A-9.

## Table 3A-2
## Summary of Chromium and Nickel Results,
## Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CWL-BW5** | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093275-015 | SW846 6020 |
| 08-Jan-13 | Nickel | 0.0036 | 0.0005 | 0.002 | NE | B | 0.0048U | 093275-015 | SW846 6020 |
| **CWL-MW9** | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093282-015 | SW846 6020 |
| 09-Jan-13 | Nickel | 0.00399 | 0.0005 | 0.002 | NE | B | 0.0048U | 093282-015 | SW846 6020 |
| **CWL-MW9** (Duplicate) | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093283-015 | SW846 6020 |
| 09-Jan-13 | Nickel | 0.00344 | 0.0005 | 0.002 | NE | B | 0.0048U | 093283-015 | SW846 6020 |
| **CWL-MW10** | Chromium | 0.00321 | 0.002 | 0.010 | 0.100 | B, J | 0.018U | 093287-015 | SW846 6020 |
| 14-Jan-13 | Nickel | 0.00404 | 0.0005 | 0.002 | NE | B | | 093287-015 | SW846 6020 |
| **CWL-MW11** | Chromium | 0.00304 | 0.002 | 0.010 | 0.100 | J | | 093292-015 | SW846 6020 |
| 10-Jan-13 | Nickel | 0.00333 | 0.0005 | 0.002 | NE | B | 0.0048U | 093292-015 | SW846 6020 |
| | | | | | | | | | |
| **CWL-BW5** | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094278-015 | SW846 6020 |
| 08-Jul-13 | Nickel | 0.00637 | 0.0005 | 0.002 | NE | | J- | 094278-015 | SW846 6020 |
| **CWL-MW9** | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094282-015 | SW846 6020 |
| 09-Jul-13 | Nickel | 0.00198 | 0.0005 | 0.002 | NE | J | J- | 094282-015 | SW846 6020 |
| **CWL-MW10** | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094294-015 | SW846 6020 |
| 12-Jul-13 | Nickel | 0.00234 | 0.0005 | 0.002 | NE | | | 094294-015 | SW846 6020 |
| **CWL-MW10** (Duplicate) | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094295-015 | SW846 6020 |
| 12-Jul-13 | Nickel | 0.00238 | 0.0005 | 0.002 | NE | | | 094295-015 | SW846 6020 |
| **CWL-MW11** | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094287-015 | SW846 6020 |
| 10-Jul-13 | Nickel | 0.00172 | 0.0005 | 0.002 | NE | J | J- | 094287-015 | SW846 6020 |

Refer to footnotes on page 3A-9.

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

## Calendar Year 2013

| Well ID | Sample Date | Temperature (°C) | Specific Conductivity (µmhos/cm) | Oxidation Reduction Potential (mV) | pH | Turbidity (NTU) | Dissolved Oxygen (% Sat) | Dissolved Oxygen (mg/L) |
|---|---|---|---|---|---|---|---|---|
| **CWL-BW5** | 08-Jan-13 | 16.78 | 1024 | 226.5 | 6.64 | 0.68 | 77.6 | 7.44 |
| **CWL-MW9** | 09-Jan-13 | 18.22 | 906 | 44.1 | 6.68 | 0.68 | 21.4 | 2.00 |
| **CWL-MW10** | 14-Jan-13 | 9.10 | 797 | 156.9 | 6.98 | 2.67 | 26.1 | 3.00 |
| **CWL-MW11** | 10-Jan-13 | 14.44 | 929 | 198.0 | 6.68 | 0.67 | 50.1 | 5.10 |
| | | | | | | | | |
| **CWL-BW5** | 08-Jul-13 | 22.62 | 1200 | 104.1 | 6.85 | 0.78 | 77.6 | 6.61 |
| **CWL-MW9** | 09-Jul-13 | 21.64 | 1066 | 14.5 | 6.91 | 0.71 | 26.4 | 2.32 |
| **CWL-MW10** | 12-Jul-13 | 22.04 | 966 | 60.8 | 7.16 | 2.70 | 21.1 | 1.84 |
| **CWL-MW11** | 10-Jul-13 | 26.73 | 1119 | 120.4 | 6.88 | 1.25 | 55.6 | 4.96 |

Refer to footnotes on page 3A-9.

## *Footnotes for Chemical Waste Landfill Groundwater Monitoring Tables*

% = percent.
µg/L = micrograms per liter.
BW = background well.
CWL = Chemical Waste Landfill.
EPA = U.S. Environmental Protection Agency.
ID = Identifier.
mg/L = milligrams per liter.
MW = monitoring well.
No. = Number.

**[a]Result**
**Bold** = Indicates the value exceeds the established MCL.
ND = not detected (at MDL).

**[b]MDL**
MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

**[c]PQL**
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

**[d]MCL**
MCL = Maximum contaminant level. MCLs were established by the EPA Office of Water, National Primary Water Regulations (EPA May 2009).
NE = not established.

**[e]Laboratory Qualifier**
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
B = Analyte is detected in associated laboratory method blank.
J = Estimated value, the analyte concentration fell above the effective MDL and below the PQL.
U = Analyte is absent or below the MDL.

**[f]Validation Qualifier**
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
J- = The associated numerical value is an estimated quantity with a suspected negative bias.
U = The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.

**[g]Analytical Method**
EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.

**[h]Field Water Quality Measurements**
Field measurements were collected prior to sampling.
°C = degrees Celsius.
% Sat = percent saturation.
µmhos/cm = micromhos per centimeter.
mg/L = milligrams per liter.
mV = millivolts.
NTU = nephelometric turbidity units.
pH = potential of hydrogen (negative logarithm of the hydrogen ion concentration).

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# Attachment 3B
# Chemical Waste Landfill
# Hydrographs

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# Attachment 3B Hydrographs

3B-1 CWL Study Area Wells ..... 3B-5

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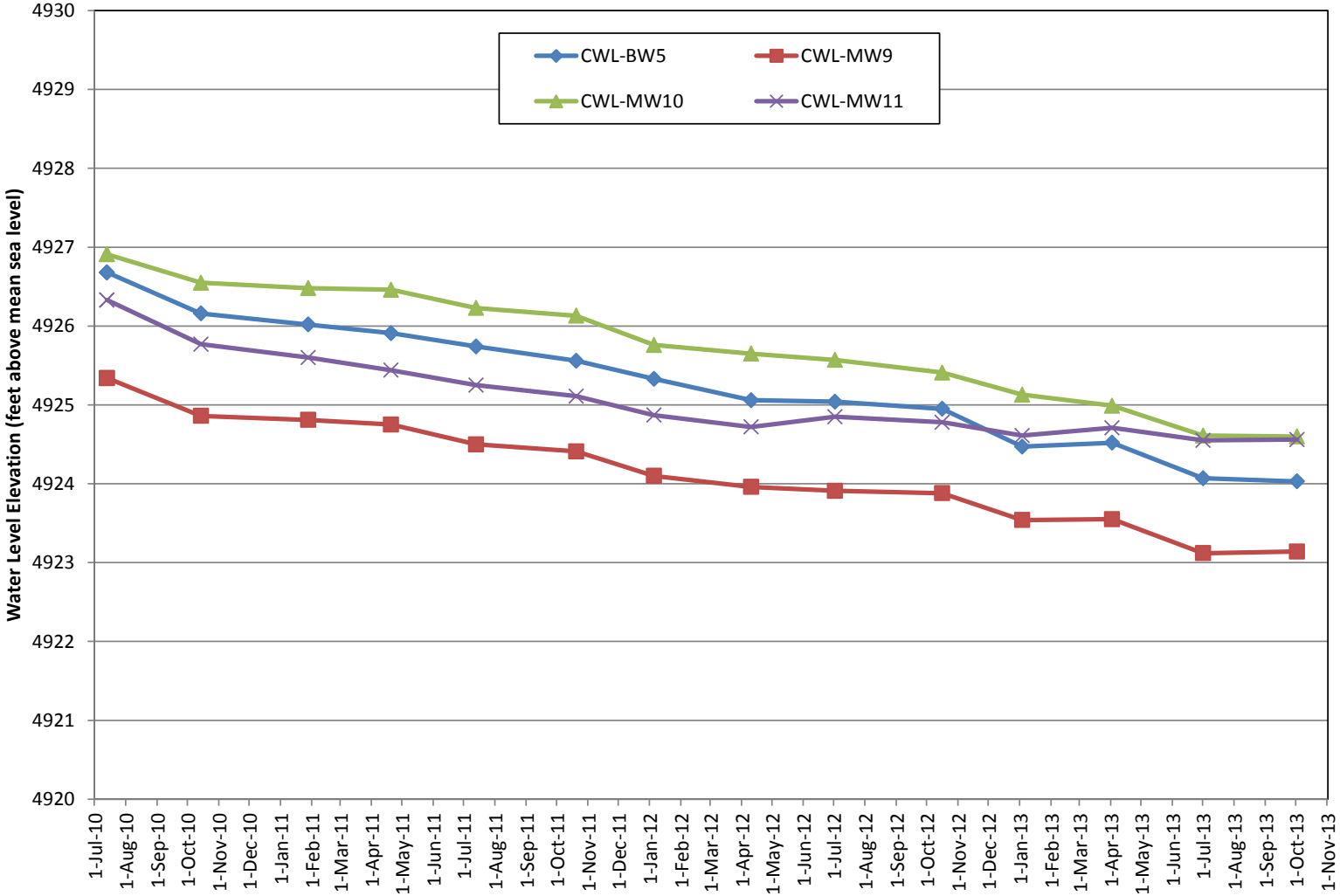


**Figure 3B-1. CWL Study Area Wells**

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# 4.0 Mixed Waste Landfill

## 4.1 Introduction

The Mixed Waste Landfill (MWL) is a 2.6-acre site in the north-central portion of Technical Area III at Sandia National Laboratories, New Mexico (SNL/NM) (Figure 4-1). The MWL consists of two distinct disposal areas: the classified area (occupying 0.6 acres) and the unclassified area (occupying 2.0 acres). Approximately 100,000 cubic feet of low-level radioactive and mixed waste containing approximately 6,300 curies of activity (at the time of disposal) were disposed of in the MWL from March 1959 through December 1988. Classified wastes were buried in cylindrical pits in the classified area and unclassified wastes were buried in shallow trenches in the unclassified area.

The Phase 1 Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) was conducted in 1989 and 1990 (SNL September 1990) and the Phase 2 RFI was conducted from 1992 to 1995. The Phase 2 RFI confirmed tritium as the constituent of concern in soil at the MWL (Peace et al. 2002). As directed by the New Mexico Environment Department (NMED), the MWL Corrective Measures Study (SNL May 2003) was submitted to the NMED in May 2003. The NMED held a public comment period on the MWL Corrective Measures Study from August 11 to December 9, 2004, and a public hearing was held from December 2 to December 3 and December 8 to December 9, 2004. On May 26, 2005, the Secretary of the NMED selected a vegetative cover with a biointrusion barrier (i.e., evapotranspirative [ET] cover) as the final remedy for the MWL and required a Corrective Measures Implementation (CMI) Plan within 180 days that included fate and transport modeling (NMED May 2005). The MWL CMI Plan (SNL November 2005) was submitted in November 2005 and conditionally approved by the NMED in December 2008 (Bearzi December 2008). The MWL ET cover construction was completed from May through September 2009. The MWL CMI Report documenting cover construction in accordance with the CMI Plan was submitted to NMED in January 2010 (SNL January 2010). The CMI Report was approved by NMED on October 14, 2011 (Bearzi October 2011) after a 90-day NMED public comment period (November 29, 2010 through February 28, 2011) that included a public meeting on December 14, 2010. The MWL Long-Term Monitoring and Maintenance Plan (LTMMP) previously submitted in September 2007 was revised (SNL March 2012) and submitted to the NMED in March 2012 within 180 days of CMI Report approval as required by the NMED Final Order on the MWL (NMED May 2005). As part of the regulatory review and approval process for the MWL LTMMP, NMED completed a 150-day public comment period from September 14, 2012 through February 11, 2013 that included a public meeting on October 16, 2012. The revised MWL LTMMP is pending NMED approval. Implementation of the monitoring, inspection, and reporting requirements of the LTMMP will begin immediately upon NMED approval and the first five-year reevaluation report specified in the Final Order (NMED May 2005) will be submitted five years after the date of LTMMP approval.

### 4.1.1 Monitoring History

Groundwater monitoring has been conducted at the MWL since 1990. The original groundwater monitoring well network at the MWL (monitoring wells MWL-BW1, MWL-MW1, MWL-MW2, and MWL-MW3) was installed in 1988 and 1989. In 1993, monitoring well MWL-MW4 was completed at an angle of 6 degrees from vertical and was screened at two discrete intervals, 20 feet (ft) apart, to evaluate vertical potentiometric gradients and changes in aquifer parameters with depth. An inflatable packer separates the screened intervals, and nitrogen-gas pressure is maintained in the packer to prevent commingling of water from the two screened sections of the aquifer. Monitoring wells MWL-MW5 and MWL-MW6 were installed in 2000 at a distance of approximately 200 and 500 ft west of the MWL, respectively, with the screened intervals placed below the top of the regional water table in the coarse-grained Ancestral Rio Grande (ARG) deposits.

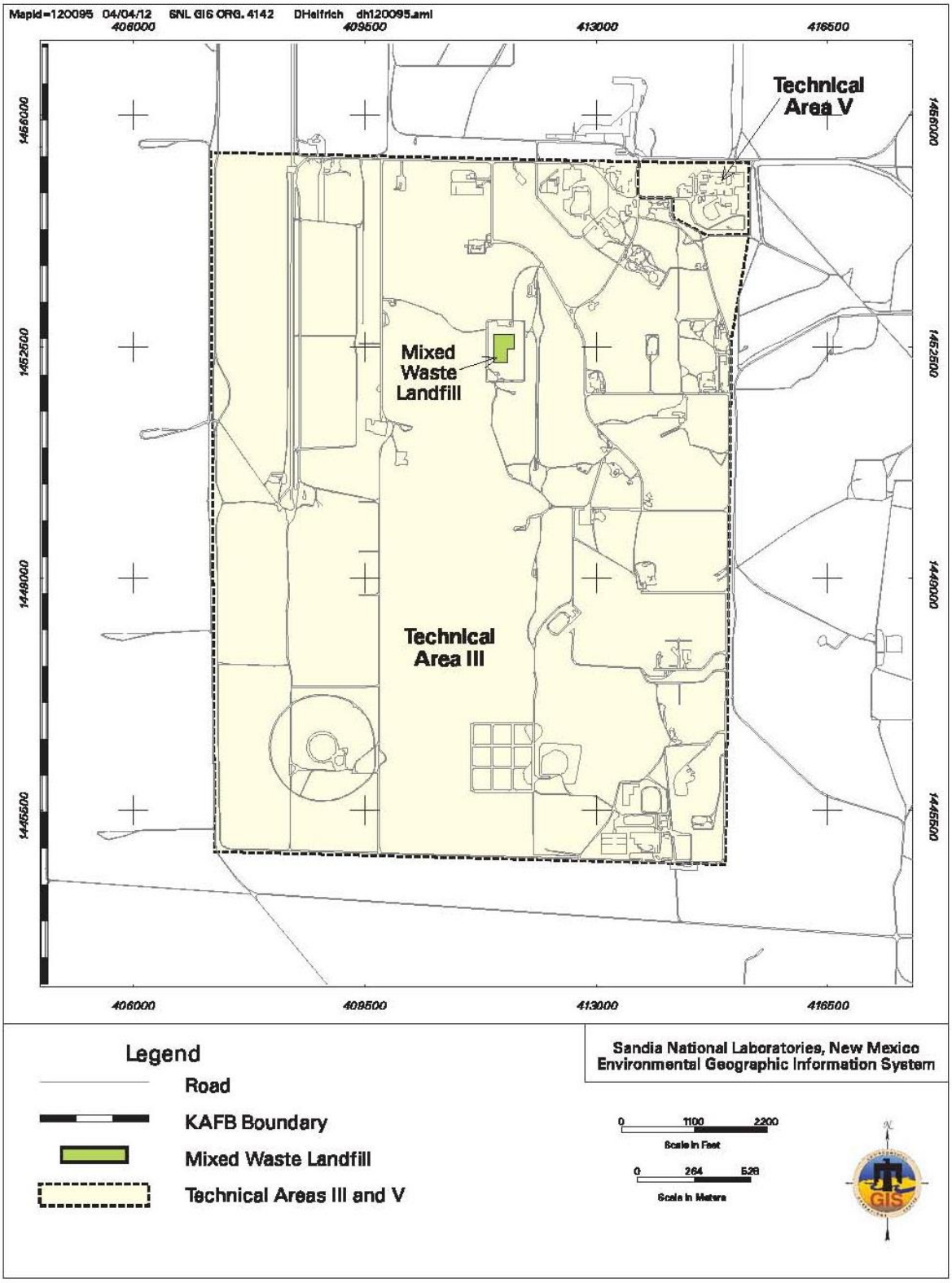


**Figure 4-1. Location of the Mixed Waste Landfill within Technical Area III**

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

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

In April 2010, the U.S. Department of Energy (DOE)/National Nuclear Security Administration (NNSA) and Sandia Corporation (Sandia) received a letter from the NMED, which required further investigation to determine the source of very low toluene concentrations in some groundwater samples collected from the MWL in 2008 through early 2010 (Bearzi April 2010). The very low concentrations of toluene detected in samples from the MWL groundwater monitoring wells are consistent with detections in samples from other SNL/NM monitoring wells and do not represent a release to the environment or widespread low-concentration toluene contamination in the regional aquifer. They appear to be related to a laboratory and/or ambient environmental source(s) and reflect the ubiquitous nature of toluene and the very low analytical detection limit. The DOE/NNSA and Sandia submitted a report in August 2010 that was subsequently revised to address two NMED comments (Bearzi September 2010). The revised version of the report (SNL October 2010) was approved by NMED in January 2011 (Bearzi January 2011).

Groundwater at the MWL has been extensively characterized and monitored since 1990 for major ion chemistry, volatile organic compounds (VOCs), semivolatile organic compounds, nitrate, metals, radionuclides, and perchlorate. More than twenty years of data indicate that groundwater has not been contaminated by the MWL (Goering et al. 2002; SNL December 2001, January 2002, July 2002, October 2002, June 2003, September 2003, July 2004; Lyon and Goering 2006; SNL November 2006, January 2008, May 2009, June 2010, October 2010, September 2011, June 2012, and June 2013).

### 4.1.2 Monitoring Network

The current groundwater monitoring network at the MWL consists of seven wells, as shown on Figure 4-2 and listed in Table 4-1. Of the seven wells, four have screen intervals across the upper surface of the regional aquifer (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) and are considered compliance wells that monitor the top of the regional water table. These four wells are completed within the interfingering, fine-grained, Santa Fe Group alluvial-fan deposits. Wells MWL-MW5 and MWL-MW6 are installed with their screen intervals below the upper surface of the regional aquifer; at least part of their screen intervals are within the coarse-grained ARG deposits that underlie the Santa Fe Group alluvial sediments. Monitoring well MWL-MW4 has two screen intervals separated by an inflatable packer; the upper interval is completed across the regional aquifer water table. References in this report to groundwater samples and water levels from monitoring well MWL-MW4 refer to groundwater withdrawn or measured from the upper screened interval, and references made to the bottom of this well refer to the depth to the top of the packer. The lower screen interval of MWL-MW4 is completed within the coarse-grained ARG deposits, but is not part of the current monitoring network (i.e., not sampled or used to measure groundwater elevation).

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

**Table 4-1. MWL Monitoring Well Network and Calendar Year 2013 Compliance Activities**

| Well ID | Installation Year | WQ [a] | WL [a] | Comment [b] |
|---|---|---|---|---|
| **MWL-BW2** | 2008 | ✓ | ✓ | Annual |
| **MWL-MW4** [c] | 1993 | ✓ | ✓ | Annual |
| **MWL-MW5** | 2000 | ✓ | ✓ | Annual |
| **MWL-MW6** | 2000 | ✓ | ✓ | Annual |
| **MWL-MW7** | 2008 | ✓ | ✓ | Annual |
| **MWL-MW8** | 2008 | ✓ | ✓ | Annual |
| **MWL-MW9** | 2008 | ✓ | ✓ | Annual |

**NOTES:**
[a]Check marks in the WQ and WL columns indicate WQ sampling and WL measurements were completed.
[b]Annual groundwater monitoring of all wells was conducted in January and February.
[c]Upper screen of monitoring well MWL-MW4 is monitored and represents uppermost portion of regional aquifer.
BW = Background Well.
ID = Identification.
MW = Monitoring Well.
MWL = Mixed Waste Landfill.
WL = Water level.
WQ = Water quality.

### 4.1.3 Summary of Activities

Annual groundwater sampling was conducted in January and February 2013 at the MWL as summarized in Table 4-1. Groundwater samples were collected from the seven monitoring wells (MWL-BW2, MWL-MW4, MWL-MW5, MWL-MW6, MWL-MW7, MWL-MW8, and MWL-MW9) and analyzed for VOCs, Target Analyte List (TAL) metals plus uranium, anions (as bromide, chloride, fluoride, and sulfate), alkalinity, nitrate plus nitrite (NPN), gamma spectroscopy, gross alpha/beta activity, and tritium. Duplicate environmental samples were collected at monitoring wells MWL-MW5, MWL-MW8, and MWL-MW9. Attachment 4A provides summary tables for the CY 2013 analytical results.

### 4.1.4 Summary of Future Activities

The revised MWL LTMMP (SNL March 2012) was submitted to NMED in March 2012. The LTMMP defines the long-term monitoring, maintenance, inspection, and repair requirements for the MWL, including semiannual groundwater monitoring. All LTMMP monitoring, inspection, and maintenance requirements will be implemented upon NMED approval and reported to NMED annually in a separate MWL report. Groundwater monitoring activities and results will also continue to be provided in this Annual Groundwater Monitoring Report.

### 4.1.5 Conceptual Site Model

A detailed conceptual site model is provided in the MWL Phase 2 RFI Report (Peace et al. 2002) and the *Mixed Waste Landfill Groundwater Report, 1990 through 2001, Sandia National Laboratories, Albuquerque, New Mexico* (Goering et al. 2002). An update to the conceptual site model integrating the findings from the four monitoring wells installed in 2008 is presented in the *Mixed Waste Landfill Annual Groundwater Monitoring Report, Calendar Year 2009* (SNL June 2010) and the *Annual Groundwater Monitoring Report, Calendar Year 2012* (SNL June 2013).

The upper surface of the regional aquifer at the MWL is contained within the unconsolidated, fine-grained alluvial-fan deposits of the Santa Fe Group. The more transmissive, coarser-grained ARG sediments underlie the fine-grained alluvial deposits beneath the MWL. The depth to water is approximately 500 ft below ground surface and groundwater flows generally westward away from the Manzanita Mountains and towards the Rio Grande. Several water-supply wells operated by Kirtland Air Force Base

(KAFB) and the Albuquerque Bernalillo County Water Utility Authority have profoundly modified the natural groundwater flow regime near the MWL by creating a trough in the water table in the western and northern portions of KAFB (Plate 1). As a result, water levels at the MWL have continued to decline since monitoring began in 1990.

Figure 4-3 shows the October 2013 potentiometric surface of the regional aquifer beneath the MWL. Groundwater flows towards the west and northwest. Based on the contours, the horizontal gradient varies from approximately 0.02 to 0.08 ft per foot. The map is consistent with the conceptual site model and the base-wide potentiometric surface map presented on Plate 1. As shown on Plate 1, the potentiometric surface contours beneath Technical Area III generally trend north to south with the inferred groundwater flow direction being generally westward.

The rate of groundwater elevation decline at the existing MWL monitoring wells is shown in Attachment 4B, Figures 4B-1 and 4B-2. For the five-year period from October 2008 to October 2013, the rate of groundwater elevation decline in all wells except MWL-MW4 has been very low, and less than 2 ft overall (Figures 4B-1 and 4B-2 of Attachment 4B). Recharge from infiltration of direct precipitation at the MWL is negligible due to high evapotranspiration, low precipitation, the thick sequence of unsaturated Santa Fe Group deposits above the water table, and the presence of the MWL ET Cover. Groundwater recharge of the regional aquifer occurs by the infiltration of precipitation in the Manzanita Mountains located approximately 5 miles to the east.

## 4.2 Regulatory Criteria

The MWL is regulated as Solid Waste Management Unit 76 under the Hazardous and Solid Waste Amendments module of the SNL/NM RCRA Permit. The NMED issued the Order in April 2004, which transferred the regulatory authority for corrective action at the MWL to the Order (NMED April 2004). This report has been formatted to address the content criteria set forth in the Order for Periodic Monitoring Reports.

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

## 4.3 Scope of Activities

The CY 2013 annual groundwater sampling is summarized in Section 4.1.3. Table 4-2 lists the analytical parameters and MWL wells sampled. SNL/NM field personnel conducted the sampling from January 29 to February 11, 2013. Groundwater sampling activities were conducted in conformance with the Order (NMED April 2004) and procedures outlined in the *Mixed Waste Landfill Groundwater Monitoring, Mini-Sampling and Analysis Plan for Fiscal Year 2013 Annual Sampling* (SNL January 2013).

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

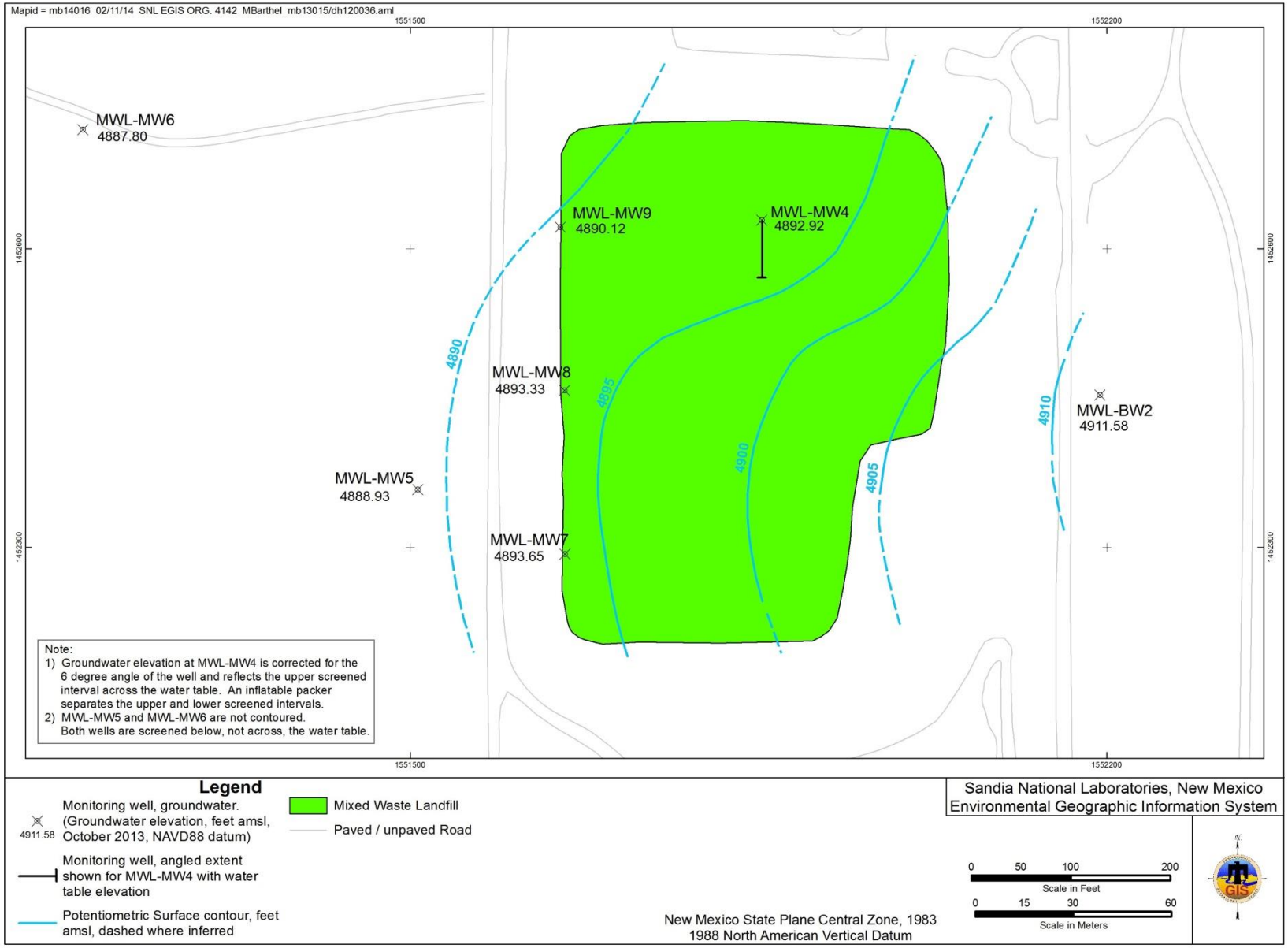


**Figure 4-3. Localized Potentiometric Surface of the Basin Fill Aquifer at the Mixed Waste Landfill, October 2013**

**Table 4-2. Analytical Parameters for the MWL Monitoring Wells, Calendar Year 2013**

| Analytical Parameter | Calendar Year 2013[a] |
|---|---|
| Volatile Organic Compounds | MWL-BW2<br>MWL-MW4<br>MWL-MW5<br>MWL-MW5 (dup)<br>MWL-MW6<br>MWL-MW7<br>MWL-MW8<br>MWL-MW8 (dup)<br>MWL-MW9<br>MWL-MW9 (dup-VOCs only) |
| TAL metals plus Uranium | |
| Nitrate plus Nitrite (as nitrogen) | |
| Major Anions (Bromide, Fluoride, Chloride, and Sulfate) | |
| Total Alkalinity as Bicarbonate and Calcium Carbonate | |
| Radionuclides:<br>Gamma-Emitting Radionuclides<br>Gross Alpha Activity<br>Gross Beta Activity<br>Tritium | |

**NOTES:**
[a]Annual groundwater sampling was conducted in February, with resampling of MWL-MW8 for VOCs only in March.
BW = Background Well.
dup = Duplicate.
MW = Monitoring Well.
MWL = Mixed Waste Landfill.
TAL = Target Analyte List.
VOC = Volatile Organic Compound.

Field and laboratory quality control (QC) samples were prepared to determine the accuracy of the methods used and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process as discussed in Section 1.3.3. Field QC samples included duplicate environmental, equipment blank (EB), field blank (FB), and trip blank (TB) samples. Laboratory QC analyses performed included method blank, laboratory control sample, matrix spike, matrix spike duplicate, and surrogate spike analyses.

Water quality parameters were measured in the field for temperature, specific conductance, oxidation-reduction potential, pH, and dissolved oxygen using an YSI™ Model 6920 Water Quality Meter during the purging process. Turbidity was measured with a Hach™ Model 2100P turbidity meter.

## 4.4 Field Methods and Measurements

Groundwater sampling and depth-to-groundwater measurements were conducted in conformance with procedures specified in the *Mixed Waste Landfill Groundwater Monitoring, Mini-Sampling and Analysis Plan for Fiscal Year 2013 Annual Sampling* (SNL January 2013), which are consistent with the methods described in Section 1.3. Field water quality parameters are presented in Table 4A-7 (Attachment 4A) and current CY 2013 and historical groundwater elevation measurements at the MWL monitoring wells are presented in Attachment 4B, Figures 4B-1 and 4B-2.

A portable Bennett™ groundwater sampling system was used to collect groundwater samples from all wells, except MWL-MW4. Monitoring well MWL-MW4 is equipped with a dedicated Bennett™ sampling system. The purging volume requirement was achieved for four of the seven monitoring wells (MWL-BW2, MWL-MW5, MWL-MW6, and MWL-MW7). The minimum purge requirements were not met at monitoring wells MWL-MW4, MWL-MW8, and MWL-MW9. These three monitoring wells were purged to dryness, allowed to recover, and then sampled to collect the most representative groundwater sample possible given the low yield of these wells.

Groundwater samples were submitted to the off-site laboratory (GEL) following analysis request/chain-of-custody protocol.

## 4.5 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using EPA-specified protocols described in Section 1.3.2 (Tables 1-5 and 1-6).

## 4.6 Summary of Analytical Results

The analytical results for chemical, general chemistry, and radiological constituents are presented in Attachment 4A, Tables 4A-1 through 4A-6. Field water quality measurements are presented in Attachment 4A, Table 4A-7. Analytical results that are above the analytical laboratory method detection limit (MDL), but below the practical quantitation limit (PQL) are qualified as estimated values and designated with a "J" qualifier in Tables 4A-1 through 4A-6. Data qualifiers based on the data validation process are presented with the associated results in the Attachment 4A tables. Data validation and QC sample results associated with each sampling event are discussed in Section 4.7.

All the CY 2013 analytical results were compared with established EPA MCLs where applicable. None of the detected constituents exceed the respective MCLs, except for chromium in the unfiltered sample from monitoring well MWL-MW4. The analytical results are discussed in greater detail in the following sections.

### 4.6.1 Volatile Organic Compounds

No VOCs were detected at concentrations above the laboratory MDLs in any groundwater samples. The laboratory MDLs for VOCs are presented in Attachment 4A, Table 4A-1.

### 4.6.2 General Chemistry Parameters

The general chemistry analytical results are presented in Attachment 4A, Tables 4A-2 and 4A-3. NPN was not detected above the nitrate MCL of 10 milligrams per liter (mg/L) in any groundwater sample. NPN was detected at concentrations ranging from 1.26 mg/L in the field duplicate sample from monitoring well MWL-MW5 to 3.23 mg/L in the environmental sample from monitoring well MWL-MW7. The NPN results are summarized in Table 4A-2. Table 4A-3 summarizes the alkalinity and major anions (bromide, chloride, fluoride, and sulfate) results. No parameters were detected above established MCLs.

### 4.6.3 Metals

Metal analysis includes two sets of analyses and results, filtered and unfiltered fractions. Groundwater samples obtained for total metal analyses are collected without filtering. Dissolved metal samples are collected after groundwater is passed through in-line filters of 0.45 micron pore size. The difference in concentrations between the total and dissolved fraction may be attributed to the original metallic ion content of the particles and any sorption of ions to the suspended particles.

Table 4A-4 (Attachment 4A) summarizes the metal results, including total uranium, for the unfiltered groundwater samples and Table 4A-5 (Attachment 4A) summarizes the metal results, including total uranium, for the filtered samples collected during the CY 2013 annual monitoring event at the MWL. Samples were analyzed for TAL metals according to EPA Methods 6010, 6020, and 7470 (EPA 1986).

No metal parameters were detected above established MCLs in any groundwater sample, except chromium. Chromium was detected above the MCL of 0.10 mg/L in the unfiltered sample from monitoring well MWL-MW4 at a concentration of 0.112 mg/L, which is the maximum concentration for the MWL-MW4 historic monitoring data set. In the filtered sample from monitoring well MWL-MW4, chromium was not detected above the laboratory MDL of 0.002 mg/L.

A trend plot showing unfiltered chromium results for samples from monitoring well MWL-MW4 is provided in Attachment 4B, Figure 4B-3. This plot includes groundwater elevation data and unfiltered sample results from a total of 19 sampling events conducted from April 1997 through February 2013. The MWL-MW4 unfiltered data set is dominated by very low detections and non-detections. Prior to CY 2013, the maximum unfiltered chromium concentration was 0.00599 mg/L (April 2001 sample), and from 2008 through 2012 chromium was detected only once in unfiltered samples at a concentration of 0.00259 mg/L (February 2012 sample). The February 2013 unfiltered sample result of 0.112 mg/L represents an unusual increase in chromium concentration (i.e., approximately 2 orders of magnitude), which is 18.7 times higher than the February 2012 result. In contrast, the February 2013 filtered sample result was a non-detection, with a laboratory method detection limit of 0.002 mg/L.

Other metals results for the February 2013 MWL-MW4 unfiltered sample were reported at concentrations significantly higher than previous maximum concentrations. As summarized in Table 4-3, cobalt, copper, iron, and nickel were all reported at new maximum concentrations in the February 2013 unfiltered sample. Cobalt, copper, and iron display a similar pattern to the unfiltered chromium results depicted in Figure 4B-3 (Attachment 4B), characterized by a narrow concentration range through 2012, followed by a sharp increase in 2013 concentrations. Similar to the chromium filtered versus unfiltered results, the filtered sample concentrations for cobalt, copper, and iron are much lower and consistent with historical results.

**Table 4-3. MWL-MW4 Unfiltered Metals Results Summary, Calendar Year 2013**

| Metal | Maximum Concentration 1997–2012 | February 2013 Concentration |
|---|---|---|
| Chromium | 0.00559 mg/L (April 2001 sample) | 0.112 mg/L |
| Cobalt | 0.000888 mg/L (June 2007 sample) | 0.00229 mg/L |
| Copper | 0.00326 mg/L (June 2011 sample) | 0.0335 mg/L |
| Iron | 0.569 mg/L (April 2008 sample) | 2.92 mg/L |
| Nickel | 0.194 mg/L (February 2013 sample) | 0.417 mg/L |

**NOTES:**
mg/L = Milligrams per liter.

A trend plot showing unfiltered nickel results for monitoring well MWL-MW4 is provided in Attachment 4B, Figure 4B-4. All unfiltered results through 2010 are below or near the NMED-approved background concentration of 0.28 mg/L. Results from 2011, 2012, and 2013 show an increase in concentration by an order of magnitude, as well as an increasing trend (0.13, 0.194, and 0.417 mg/L, respectively). Although generally similar, there are two differences when comparing the MWL-MW4 nickel results to the MWL-MW4 chromium, cobalt, copper, and iron results. First, the substantial increase in the concentration of nickel occurred two years before the increase was observed for chromium, cobalt, copper, and iron (2011 versus 2013). Second, unfiltered and filtered nickel results are similar and do not show substantial differences in concentration (i.e., order of magnitude difference) observed in the 2013 results for chromium, cobalt, copper, and iron. However, the overall trend for unfiltered nickel results is similar to the trend of unfiltered chromium results, as shown in Figures 4B-3 and 4B-4 (Attachment B).

The sharp increases in unfiltered concentrations of chromium, cobalt, copper, iron, and nickel in recent samples from monitoring well MWL-MW4 are indicative of a source within the well and consistent with unfiltered metals results from previous MWL monitoring wells that had stainless steel well screens. The source is most likely corrosion by-products from the dedicated stainless steel sampling pump in monitoring well MWL-MW4. Because of the two screen intervals and orientation (six degree angle from vertical), MWL-MW4 is equipped with both an inflatable packer (separating the two screen intervals) and a dedicated sampling system (sampling pump, connecting rods, mounting bracket, lifting cable, and tubing). Machined stainless steel pipe connects the packer to the bottom of the sampling pump, and the entire assembly is held in the well by one-inch diameter metal rods. The packer and sampling system were removed in May 2009 prior to construction of the MWL ET Cover to allow the inner and outer well

casing to be extended to accommodate the additional height of the ET Cover. Figure 4-4 was taken in May 2009 after the packer and pump were removed from the well. The pump is largely comprised of stainless steel, and the pump intake (to right of technician's hand) shows visible oxide staining indicative of corrosion. The packer contains less overall metal and based on a visual inspection appeared to be in relatively good shape. The pump and packer were sent the manufacturer for routine maintenance and cleaning prior to the March 2010 re-installation. Monitoring well MWL-MW4 is the only MWL monitoring well equipped with dedicated equipment, and evidence of corrosion has been observed every time the equipment has been removed for routine maintenance. This equipment has not been removed since March 2010 and MWL-MW4 is not included in the groundwater monitoring network defined in the MWL LTMMP (SNL March 2012). The well is 20 years old and the water level is declining towards the bottom of the upper well screen (Figures 4B-3 and 4B-4, Attachment B).

**Figure 4-4. May 2009 Photograph of the MWL-MW4 Sampling Pump and Inflatable Packer**

Table 4-4 summarizes the maximum filtered and unfiltered metals concentrations from previous MWL groundwater monitoring wells with stainless steel screens, including background monitoring well MWL-BW1. These wells were decommissioned in 2008 due to declining water levels and evidence of stainless steel well screen corrosion (Bearzi March 2007 and July 2007). This table compares unfiltered and filtered maximum concentrations, and demonstrates three relevant points. First, elevated results for chromium, cobalt, copper, iron, and nickel were observed in all four of these wells. Second, maximum unfiltered sample concentrations for chromium, cobalt, copper, iron, and nickel are all similar to (but generally higher than) the February 2013 MWL-MW4 sample results. Third, unfiltered samples show maximum concentrations one or more orders of magnitude higher than the filtered results. However, consistent with MWL-MW4 nickel sample results, filtered and unfiltered nickel concentrations are similar (i.e., not substantially different) for samples from MWL-MW1 and MWL-MW3.

**Table 4-4. Summary of Maximum Filtered and Unfiltered Metals Results from MWL Monitoring Wells with Stainless Steel Screens**

| MWL Monitoring Well | Metal | Maximum Filtered Concentration in Milligrams per Liter (mg/L) | Maximum Unfiltered Concentration in Milligrams per Liter (mg/L) |
|---|---|---|---|
| MWL-BW1 | Chromium | 0.002280 | 0.09420 |
| | Cobalt | 0.000220 | 0.004520 |
| | Copper | 0.001940 | 0.00807 |
| | Iron | 0.070900 | 1.820 |
| | Nickel | 0.01280 | 0.1910 |
| MWL-MW1 | Chromium | 0.004220 | 1.1000 |
| | Cobalt | 0.000590 | 0.004040 |
| | Copper | 0.003720 | 0.02440 |
| | Iron | 0.2600 | 6.100 |
| | Nickel | 0.4050 | 0.5380 |
| MWL-MW2 | Chromium | 0.005530 | 0.16200 |
| | Cobalt | 0.000148 | 0.000790 |
| | Copper | 0.00737 | 0.01040 |
| | Iron | 0.2390 | 0.3990 |
| | Nickel | 0.007110 | 0.1240 |
| MWL-MW3 | Chromium | 0.004520 | 0.1690 |
| | Cobalt | 0.000770 | 0.003310 |
| | Copper | 0.00556 | 0.01360 |
| | Iron | 0.1370 | 4.220 |
| | Nickel | 0.1200 | 0.1570 |

**NOTES:**
BW = Background well.
mg/L = Milligram(s) per liter.
MW = Monitoring well.
MWL = Mixed Waste Landfill.

In summary, the February 2013 unfiltered metals results for chromium, cobalt, copper, iron, and nickel, as well as the 2011 through 2013 unfiltered and filtered nickel results, are anomalous and appear to be related to the corrosion of the stainless steel dedicated sampling pump and possibly other metal components associated with the dedicated sampling system in the well. Evidence of corrosion was observed when the equipment was removed from the well in May 2009 during ET Cover construction. MWL-MW4 is the only groundwater monitoring well at the MWL with dedicated sampling equipment installed in the well, and is the only well showing any indication of elevated metals concentrations. Filtered and unfiltered metals results are consistent with metals results from previous MWL monitoring wells with stainless steel screen sections that were decommissioned in 2008 due to evidence of well screen corrosion and declining water levels.

### 4.6.4 Radiological Parameters

Groundwater samples from the MWL monitoring wells were screened for gamma-emitting radionuclides, gross alpha/beta activity, and tritium (Table 4A-6, Attachment 4A) and the analytical results are compared with the established EPA MCLs (no MCL has been established for tritium).

Gross alpha activity is measured as a screening tool and in accordance with 40 Code of Federal Regulations, Parts 9, 141, and 142, Table I-4 does not include uranium, which is measured independently. Therefore, gross alpha activity measurements were corrected by subtracting the total uranium activity. Radiological results are further reviewed by an SNL/NM Certified Health Physicist to assure that the samples are nonradioactive. Corrected gross alpha activity results are all below the MCL of 15 picocuries per liter and range from 2.78 to 9.02 picocuries per liter. Gross beta results do not exceed established

MCLs. Tritium and short-list gamma spectroscopy radionuclides activities were below the laboratory minimum detectable activity levels in all groundwater samples. The potassium-40 results for the duplicate samples from monitoring wells MWL-MW5 and MWL-MW8 and the cobalt-60 result for the sample from MWL-MW9 were "X" flagged by the laboratory and rejected during data validation due to the analytical instrument peak not meeting identification criteria. These results are "false positives" for radionuclides that are typically not detected. Potassium-40 was not detected in the corresponding environmental samples from monitoring wells MWL-MW5 and MWL-MW8. All radiological parameter results are summarized in Table 4A-6 (Attachment 4A).

### 4.6.5 Water Quality Parameters

The field water quality parameters measured immediately before sampling are presented in Attachment 4A, Table 4A-7. These field parameters consist of temperature, specific conductance, oxidation-reduction potential, pH, turbidity, and dissolved oxygen.

## 4.7 Quality Control Results

Field and laboratory QC samples were used to determine the accuracy of the methods used and to monitor for inadvertent sample contamination that can occur during the sampling and analysis process. All data were reviewed in accordance with Administrative Operating Procedure (AOP) 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL May 2011). The results for each QC analysis and the impact on data quality are discussed in the following sections.

### 4.7.1 Field Quality Control Samples

The QC samples collected in the field included duplicate environmental, EB, FB, and TB samples. The purpose of each field QC sample type is presented in Section 1.3.3. The following sections discuss the analytical results for each QC sample type.

#### 4.7.1.1 Duplicate Environmental Samples

Duplicate environmental samples were collected from monitoring wells MWL-MW5 and MWL-MW8 and analyzed for all constituents. The results were compared to the results for the corresponding environmental sample. The duplicate sample collected from monitoring well MWL-MW9 was analyzed for VOCs only. Relative percent difference values were calculated for constituents that were detected above the laboratory MDL in both samples.

CY 2013 duplicate environmental sample results show good correlation. All calculated relative percent difference values are less than 20 for organic compounds and less than or equal to 35 for metals for all calculated parameters.

#### 4.7.1.2 Equipment Blank Samples

Two EB samples (also referred to as a rinsate blanks) associated with monitoring wells MWL-MW5 and MWL-MW8 were collected during the CY 2013 sampling event and submitted for all analyses. One EB sample associated with MWL-MW9 was collected and analyzed for VOCs only.

Various constituents detected in EB samples at low concentrations included bromodichloromethane, bromoform, chloroform, chloride, cobalt, copper, dibromochloromethane, magnesium, manganese, nickel, and sodium. For all but three of these constituents, no corrective action was required because these analytes were not detected in associated environmental samples, or were detected in environmental samples at concentrations greater than five times the EB result. Cobalt, copper, and nickel were detected in the EB samples; associated environmental and duplicate sample concentrations were less than five times the reported concentrations in the EB samples, and therefore, were qualified during data validation as not detected (i.e., "U" qualified). For the unfiltered sample fractions, low concentration detections of

copper (MWL-MW5 and MWL-MW8 environmental and duplicate pairs) and nickel (MWL-MW5 environmental and duplicate pair) were qualified as not detected during data validation. For the filtered sample fractions, low concentration detections of cobalt (MWL-MW5 environmental and duplicate pair) and copper (MWL-MW5 and MWL-MW8 environmental and duplicate pairs) were qualified as not detected during data validation.

#### 4.7.1.3 Field Blank Samples

A total of seven FB samples were collected during the CY 2013 sampling and submitted for VOC analysis. Bromodichloromethane, bromoform, chloroform, and dibromochloromethane were detected in the FB samples. No corrective action was required because these compounds were not detected in associated environmental samples.

#### 4.7.1.4 Trip Blank Samples

A total of 10 TB samples were submitted with the February and March 2013 samples for analysis of VOCs. No VOCs were detected in these samples.

### 4.7.2 Laboratory Quality Control Samples

Internal laboratory QC samples, including method blanks and duplicate laboratory control samples, were analyzed concurrently with the groundwater samples. Additionally, batch matrix spike, matrix spike duplicate, and surrogate spike samples were analyzed. All environmental sample, field QC sample, and laboratory QC sample results were reviewed and qualified in accordance with AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL May 2011).

Although some analytical results were qualified during the data validation, no significant data quality problems were noted for any CY 2013 MWL groundwater monitoring samples. Data validation reports are filed in the SNL/NM Customer Funded Records Center.

## 4.8 Variances and Nonconformances

All analytical and field methods were performed according to the requirements specified in the MWL groundwater monitoring Mini-Sampling and Analysis Plan for FY 2011 (SNL January 2013). No variances and/or nonconformances from requirements in the MWL Mini-Sampling and Analysis Plan were identified during CY 2013 sampling activities and there were no variances from the plans.

## 4.9 Summary and Conclusions

During CY 2013 environmental groundwater samples were collected from seven MWL groundwater monitoring wells. Sample parameters included VOCs, unfiltered and filtered fractions for TAL metals plus uranium, anions (as bromide, chloride, fluoride, and sulfate), alkalinity, NPN, gamma spectroscopy, gross alpha/beta activity, and tritium analyses. Groundwater monitoring results were compared with established EPA MCLs for drinking water (EPA 2009). No parameters were detected above established MCLs, except for chromium in the unfiltered sample fraction from monitoring well MWL-MW4. This exceedance and elevated results for unfiltered cobalt, copper, iron, and nickel appear to be related to the corrosion of stainless steel dedicated sampling pump and possibly other metal components associated with the dedicated sampling system (no other wells at MWL have dedicated equipment).

Based on the field and laboratory QC sample and data validation results, the CY 2013 groundwater monitoring data meet data quality objectives and are in compliance with analytical methods and laboratory procedures (i.e., representative and technically defensible).

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# Attachment 4A
# Mixed Waste Landfill
# Analytical Results Tables

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# Attachment 4A Tables


4A-1 Method Detection Limits for Volatile Organic Compounds (Method[g] SW846-8260B), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 4A-5

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## Table 4A-1
## Method Detection Limits for Volatile Organic Compounds (Method[g] SW846 8260B), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Analyte | MDL[b] (µg/L) | Analyte | MDL[b] (µg/L) |
|---|---|---|---|
| 1,1,1-Trichloroethane | 0.300 | Chlorobenzene | 0.300 |
| 1,1,2,2-Tetrachloroethane | 0.300 | Chloroethane | 0.300 |
| 1,1,2-Trichloroethane | 0.300 | Chloroform | 0.300 |
| 1,1-Dichloroethane | 0.300 | Chloromethane | 0.300 |
| 1,1-Dichloroethene | 0.300 | Cyclohexane | 0.300 |
| 1,2,3-Trichlorobenzene | 0.300 | Dibromochloromethane | 0.300 |
| 1,2,4-Trichlorobenzene | 0.300 | Dichlorodifluoromethane | 0.300 |
| 1,2-Dibromo-3-chloropropane | 0.300 | Ethyl benzene | 0.300 |
| 1,2-Dibromoethane | 0.300 | Isopropylbenzene | 0.300 |
| 1,2-Dichlorobenzene | 0.300 | Methyl acetate | 1.50 |
| 1,2-Dichloroethane | 0.300 | Methylcyclohexane | 3.00 |
| 1,2-Dichloropropane | 0.300 | Methylene chloride | 3.00 |
| 1,3-Dichlorobenzene | 0.300 | Styrene | 0.300 |
| 1,4-Dichlorobenzene | 0.300 | Tert-butyl methyl ether | 0.300 |
| 2,2-trifluoroethane, 1,1,2-Trichloro-1 | 1.50 | Tetrachloroethene | 0.300 |
| 2-Butanone | 2.00 | Toluene | 0.300 |
| 2-Hexanone | 2.20 | Trichloroethene | 0.300 |
| 4-methyl-, 2-Pentanone | 1.50 | Trichlorofluoromethane | 0.300 |
| Acetone | 3.00 | Vinyl chloride | 0.300 |
| Benzene | 0.300 | Xylene | 0.300 |
| Bromochloromethane | 0.300 | cis-1,2-Dichloroethene | 0.300 |
| Bromodichloromethane | 0.300 | cis-1,3-Dichloropropene | 0.300 |
| Bromoform | 0.300 | m-, p-Xylene | 0.300 |
| Bromomethane | 0.300 | o-Xylene | 0.300 |
| Carbon disulfide | 1.50 | trans-1,2-Dichloroethene | 0.300 |
| Carbon tetrachloride | 0.300 | trans-1,3-Dichloropropene | 0.300 |

Refer to footnotes on page 4A-31.

## Table 4A-2
## Summary of Nitrate plus Nitrite Results,
## Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-BW2** 29-Jan-13 | Nitrate plus nitrite | 2.18 | 0.085 | 0.250 | 10.0 | | | 093409-018 | EPA 353.2 |
| **MWL-MW4** 11-Feb-13 | Nitrate plus nitrite | 2.43 | 0.170 | 0.500 | 10.0 | | | 093441-018 | EPA 353.2 |
| **MWL-MW5** 30-Jan-13 | Nitrate plus nitrite | 1.28 | 0.085 | 0.250 | 10.0 | | | 093414-018 | EPA 353.2 |
| **MWL-MW5** (Duplicate) 30-Jan-13 | Nitrate plus nitrite | 1.26 | 0.085 | 0.250 | 10.0 | | | 093415-018 | EPA 353.2 |
| **MWL-MW6** 31-Jan-13 | Nitrate plus nitrite | 1.66 | 0.085 | 0.250 | 10.0 | | | 093418-018 | EPA 353.2 |
| **MWL-MW7** 07-Feb-13 | Nitrate plus nitrite | 3.23 | 0.085 | 0.250 | 10.0 | | | 093438-018 | EPA 353.2 |
| **MWL-MW8** 06-Feb-13 | Nitrate plus nitrite | 1.40 | 0.085 | 0.250 | 10.0 | | | 093429-018 | EPA 353.2 |
| **MWL-MW8** (Duplicate) 06-Feb-13 | Nitrate plus nitrite | 1.41 | 0.085 | 0.250 | 10.0 | | | 093430-018 | EPA 353.2 |
| **MWL-MW9** 04-Feb-13 | Nitrate plus nitrite | 2.20 | 0.085 | 0.250 | 10.0 | | | 093423-018 | EPA 353.2 |

Refer to footnotes on page 4A-31.

# Table 4A-3
## Summary of Alkalinity and Anion Results,
## Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-BW2** | Bicarbonate alkalinity | 244 | 0.725 | 1.00 | NE | | | 093409-022 | SM 2320B |
| 29-Jan-13 | Carbonate alkalinity | ND | 0.725 | 1.00 | NE | U | | 093409-022 | SM 2320B |
| | Bromide | 0.359 | 0.067 | 0.200 | NE | | | 093409-016 | SW846 9056 |
| | Chloride | 66.1 | 0.335 | 1.00 | NE | | | 093409-016 | SW846 9056 |
| | Fluoride | 0.741 | 0.033 | 0.100 | 4.0 | | | 093409-016 | SW846 9056 |
| | Sulfate | 44.6 | 0.665 | 2.00 | NE | | | 093409-016 | SW846 9056 |
| **MWL-MW4** | Bicarbonate alkalinity | 191 | 0.725 | 1.00 | NE | | | 093441-022 | SM 2320B |
| 11-Feb-13 | Carbonate alkalinity | ND | 0.725 | 1.00 | NE | U | | 093441-022 | SM 2320B |
| | Bromide | 0.479 | 0.067 | 0.200 | NE | | | 093441-016 | SW846 9056 |
| | Chloride | 48.3 | 0.670 | 2.00 | NE | | | 093441-016 | SW846 9056 |
| | Fluoride | 0.931 | 0.033 | 0.100 | 4.0 | | | 093441-016 | SW846 9056 |
| | Sulfate | 38.4 | 1.33 | 4.00 | NE | | | 093441-016 | SW846 9056 |
| **MWL-MW5** | Bicarbonate alkalinity | 332 | 0.725 | 1.00 | NE | | | 093414-022 | SM 2320B |
| 30-Jan-13 | Carbonate alkalinity | ND | 0.725 | 1.00 | NE | U | | 093414-022 | SM 2320B |
| | Bromide | 0.501 | 0.067 | 0.200 | NE | | | 093414-016 | SW846 9056 |
| | Chloride | 84.1 | 0.670 | 2.00 | NE | | | 093414-016 | SW846 9056 |
| | Fluoride | 0.789 | 0.033 | 0.100 | 4.0 | | | 093414-016 | SW846 9056 |
| | Sulfate | 54.0 | 1.33 | 4.00 | NE | | | 093414-016 | SW846 9056 |
| **MWL-MW5** (Duplicate) | Bicarbonate alkalinity | 333 | 0.725 | 1.00 | NE | | | 093415-022 | SM 2320B |
| 30-Jan-13 | Carbonate alkalinity | ND | 0.725 | 1.00 | NE | U | | 093415-022 | SM 2320B |
| | Bromide | 0.426 | 0.067 | 0.200 | NE | | | 093415-016 | SW846 9056 |
| | Chloride | 84.3 | 0.670 | 2.00 | NE | | | 093415-016 | SW846 9056 |
| | Fluoride | 0.790 | 0.033 | 0.100 | 4.0 | | | 093415-016 | SW846 9056 |
| | Sulfate | 53.9 | 1.33 | 4.00 | NE | | | 093415-016 | SW846 9056 |
| **MWL-MW6** | Bicarbonate alkalinity | 314 | 0.725 | 1.00 | NE | | | 093418-022 | SM 2320B |
| 31-Jan-13 | Carbonate alkalinity | ND | 0.725 | 1.00 | NE | U | | 093418-022 | SM 2320B |
| | Bromide | 0.457 | 0.067 | 0.200 | NE | | | 093418-016 | SW846 9056 |
| | Chloride | 78.5 | 0.670 | 2.00 | NE | | | 093418-016 | SW846 9056 |
| | Fluoride | 0.760 | 0.033 | 0.100 | 4.0 | | | 093418-016 | SW846 9056 |
| | Sulfate | 51.8 | 1.33 | 4.00 | NE | | | 093418-016 | SW846 9056 |
| **MWL-MW7** | Bicarbonate alkalinity | 217 | 0.725 | 1.00 | NE | | | 093438-022 | SM 2320B |
| 07-Feb-13 | Carbonate alkalinity | ND | 0.725 | 1.00 | NE | U | | 093438-022 | SM 2320B |
| | Bromide | 0.277 | 0.067 | 0.200 | NE | | | 093438-016 | SW846 9056 |
| | Chloride | 47.6 | 0.335 | 1.00 | NE | | | 093438-016 | SW846 9056 |
| | Fluoride | 1.09 | 0.033 | 0.100 | 4.0 | | | 093438-016 | SW846 9056 |
| | Sulfate | 37.8 | 0.133 | 0.400 | NE | | | 093438-016 | SW846 9056 |

Refer to footnotes on page 4A-31.

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

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| MWL-MW8 | Bicarbonate alkalinity | 223 | 0.725 | 1.00 | NE | | | 093429-022 | SM 2320B |
| 06-Feb-13 | Carbonate alkalinity | ND | 0.725 | 1.00 | NE | U | | 093429-022 | SM 2320B |
| | Bromide | 0.300 | 0.067 | 0.200 | NE | | | 093429-016 | SW846 9056 |
| | Chloride | 49.2 | 0.335 | 1.00 | NE | | | 093429-016 | SW846 9056 |
| | Fluoride | 0.990 | 0.033 | 0.100 | 4.0 | | | 093429-016 | SW846 9056 |
| | Sulfate | 38.1 | 0.133 | 0.400 | NE | | | 093429-016 | SW846 9056 |
| MWL-MW8 (Duplicate) | Bicarbonate alkalinity | 224 | 0.725 | 1.00 | NE | | | 093430-022 | SM 2320B |
| 06-Feb-13 | Carbonate alkalinity | ND | 0.725 | 1.00 | NE | U | | 093430-022 | SM 2320B |
| | Bromide | 0.346 | 0.067 | 0.200 | NE | | | 093430-016 | SW846 9056 |
| | Chloride | 41.2 | 0.335 | 1.00 | NE | | | 093430-016 | SW846 9056 |
| | Fluoride | 1.03 | 0.033 | 0.100 | 4.0 | | | 093430-016 | SW846 9056 |
| | Sulfate | 38.0 | 0.133 | 0.400 | NE | | | 093430-016 | SW846 9056 |
| MWL-MW9 | Bicarbonate alkalinity | 227 | 0.725 | 1.00 | NE | | | 093423-022 | SM 2320B |
| 04-Feb-13 | Carbonate alkalinity | ND | 0.725 | 1.00 | NE | U | | 093423-022 | SM 2320B |
| | Bromide | 0.272 | 0.067 | 0.200 | NE | | | 093423-016 | SW846 9056 |
| | Chloride | 41.0 | 0.335 | 1.00 | NE | | | 093423-016 | SW846 9056 |
| | Fluoride | 1.03 | 0.033 | 0.100 | 4.0 | | | 093423-016 | SW846 9056 |
| | Sulfate | 38.7 | 0.133 | 0.400 | NE | | | 093423-016 | SW846 9056 |

Refer to footnotes on page 4A-31.

## Table 4A-4
## Summary of Unfiltered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-BW2** | Aluminum | 0.173 | 0.015 | 0.050 | NE | | | 093409-009 | SW846 6020 |
| 29-Jan-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093409-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093409-009 | SW846 6020 |
| | Barium | 0.0988 | 0.0006 | 0.002 | 2.00 | | J- | 093409-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093409-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093409-009 | SW846 6020 |
| | Calcium | 74.3 | 1.20 | 4.00 | NE | B | | 093409-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093409-009 | SW846 6020 |
| | Cobalt | 0.000213 | 0.0001 | 0.001 | NE | J | | 093409-009 | SW846 6020 |
| | Copper | 0.00114 | 0.00035 | 0.001 | NE | | | 093409-009 | SW846 6020 |
| | Iron | 0.382 | 0.033 | 0.100 | NE | | | 093409-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093409-009 | SW846 6020 |
| | Magnesium | 24.7 | 0.010 | 0.030 | NE | | | 093409-009 | SW846 6020 |
| | Manganese | 0.0138 | 0.001 | 0.005 | NE | | | 093409-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093409-009 | SW846 7470 |
| | Nickel | 0.00257 | 0.0005 | 0.002 | NE | | | 093409-009 | SW846 6020 |
| | Potassium | 4.10 | 0.080 | 0.300 | NE | | | 093409-009 | SW846 6020 |
| | Selenium | 0.00256 | 0.0015 | 0.005 | 0.050 | J | | 093409-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093409-009 | SW846 6020 |
| | Sodium | 62.4 | 1.60 | 5.00 | NE | | | 093409-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093409-009 | SW846 6020 |
| | Uranium | 0.00686 | 0.000067 | 0.0002 | 0.030 | | | 093409-009 | SW846 6020 |
| | Vanadium | 0.00616 | 0.001 | 0.005 | NE | | | 093409-009 | SW846 6010 |
| | Zinc | 0.0102 | 0.0035 | 0.010 | NE | | | 093409-009 | SW846 6020 |

Refer to footnotes on page 4A-31.

## Table 4A-4 *(Continued)*
## Summary of Unfiltered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW4** | Aluminum | 0.0284 | 0.015 | 0.050 | NE | J | | 093441-009 | SW846 6020 |
| 11-Feb-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093441-009 | SW846 6020 |
| | Arsenic | 0.00426 | 0.0017 | 0.005 | 0.010 | J | | 093441-009 | SW846 6020 |
| | Barium | 0.0861 | 0.0006 | 0.002 | 2.00 | | | 093441-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093441-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093441-009 | SW846 6020 |
| | Calcium | 58.9 | 0.300 | 1.00 | NE | | | 093441-009 | SW846 6020 |
| | Chromium | **0.112** | 0.002 | 0.010 | 0.100 | | | 093441-009 | SW846 6020 |
| | Cobalt | 0.00229 | 0.0001 | 0.001 | NE | | | 093441-009 | SW846 6020 |
| | Copper | 0.0335 | 0.00035 | 0.001 | NE | | | 093441-009 | SW846 6020 |
| | Iron | 2.92 | 0.033 | 0.100 | NE | | | 093441-009 | SW846 6020 |
| | Lead | 0.00126 | 0.0005 | 0.002 | NE | J | | 093441-009 | SW846 6020 |
| | Magnesium | 18.5 | 0.010 | 0.030 | NE | | J | 093441-009 | SW846 6020 |
| | Manganese | 0.0503 | 0.001 | 0.005 | NE | | | 093441-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093441-009 | SW846 7470 |
| | Nickel | 0.417 | 0.0005 | 0.002 | NE | | | 093441-009 | SW846 6020 |
| | Potassium | 5.10 | 0.080 | 0.300 | NE | | J | 093441-009 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | U | | 093441-009 | SW846 6020 |
| | Silver | 0.00236 | 0.0002 | 0.001 | NE | | | 093441-009 | SW846 6020 |
| | Sodium | 56.7 | 0.400 | 1.25 | NE | | | 093441-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093441-009 | SW846 6020 |
| | Uranium | 0.00455 | 0.000067 | 0.0002 | 0.030 | | | 093441-009 | SW846 6020 |
| | Vanadium | 0.0105 | 0.001 | 0.005 | NE | | | 093441-009 | SW846 6010 |
| | Zinc | 0.144 | 0.0035 | 0.010 | NE | | | 093441-009 | SW846 6020 |

Refer to footnotes on page 4A-31.

## Table 4A-4 *(Continued)*
## Summary of Unfiltered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW5** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093414-009 | SW846 6020 |
| 30-Jan-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093414-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093414-009 | SW846 6020 |
| | Barium | 0.116 | 0.0006 | 0.002 | 2.00 | | J- | 093414-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093414-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093414-009 | SW846 6020 |
| | Calcium | 99.9 | 1.20 | 4.00 | NE | B | | 093414-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093414-009 | SW846 6020 |
| | Cobalt | 0.000142 | 0.0001 | 0.001 | NE | J | | 093414-009 | SW846 6020 |
| | Copper | 0.000817 | 0.00035 | 0.001 | NE | J | 0.012UJ | 093414-009 | SW846 6020 |
| | Iron | 0.185 | 0.033 | 0.100 | NE | | | 093414-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093414-009 | SW846 6020 |
| | Magnesium | 33.8 | 0.010 | 0.030 | NE | | | 093414-009 | SW846 6020 |
| | Manganese | 0.0085 | 0.001 | 0.005 | NE | | | 093414-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093414-009 | SW846 7470 |
| | Nickel | 0.00201 | 0.0005 | 0.002 | NE | | 0.0026U | 093414-009 | SW846 6020 |
| | Potassium | 5.71 | 0.080 | 0.300 | NE | | | 093414-009 | SW846 6020 |
| | Selenium | 0.00193 | 0.0015 | 0.005 | 0.050 | J | | 093414-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093414-009 | SW846 6020 |
| | Sodium | 74.9 | 1.60 | 5.00 | NE | | | 093414-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093414-009 | SW846 6020 |
| | Uranium | 0.00908 | 0.000067 | 0.0002 | 0.030 | | | 093414-009 | SW846 6020 |
| | Vanadium | 0.00548 | 0.001 | 0.005 | NE | | | 093414-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093414-009 | SW846 6020 |

Refer to footnotes on page 4A-31.

## Table 4A-4 *(Continued)*
## Summary of Unfiltered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW5** (Duplicate) | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093415-009 | SW846 6020 |
| 30-Jan-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093415-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093415-009 | SW846 6020 |
| | Barium | 0.114 | 0.0006 | 0.002 | 2.00 | | J- | 093415-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093415-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093415-009 | SW846 6020 |
| | Calcium | 98.3 | 1.20 | 4.00 | NE | B | | 093415-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093415-009 | SW846 6020 |
| | Cobalt | 0.000139 | 0.0001 | 0.001 | NE | J | | 093415-009 | SW846 6020 |
| | Copper | 0.000619 | 0.00035 | 0.001 | NE | J | 0.012UJ | 093415-009 | SW846 6020 |
| | Iron | 0.182 | 0.033 | 0.100 | NE | | | 093415-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093415-009 | SW846 6020 |
| | Magnesium | 33.9 | 0.010 | 0.030 | NE | | | 093415-009 | SW846 6020 |
| | Manganese | 0.0086 | 0.001 | 0.005 | NE | | | 093415-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093415-009 | SW846 7470 |
| | Nickel | 0.00208 | 0.0005 | 0.002 | NE | | 0.0026U | 093415-009 | SW846 6020 |
| | Potassium | 5.71 | 0.080 | 0.300 | NE | | | 093415-009 | SW846 6020 |
| | Selenium | 0.00201 | 0.0015 | 0.005 | 0.050 | J | | 093415-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093415-009 | SW846 6020 |
| | Sodium | 74.3 | 1.60 | 5.00 | NE | | | 093415-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093415-009 | SW846 6020 |
| | Uranium | 0.0093 | 0.000067 | 0.0002 | 0.030 | | | 093415-009 | SW846 6020 |
| | Vanadium | 0.00521 | 0.001 | 0.005 | NE | | | 093415-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093415-009 | SW846 6020 |

Refer to footnotes on page 4A-31.

## Table 4A-4 *(Continued)*
## Summary of Unfiltered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW6** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093418-009 | SW846 6020 |
| 31-Jan-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093418-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093418-009 | SW846 6020 |
| | Barium | 0.117 | 0.0006 | 0.002 | 2.00 | | | 093418-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093418-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093418-009 | SW846 6020 |
| | Calcium | 92.4 | 1.20 | 4.00 | NE | | | 093418-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093418-009 | SW846 6020 |
| | Cobalt | 0.000115 | 0.0001 | 0.001 | NE | J | | 093418-009 | SW846 6020 |
| | Copper | 0.000849 | 0.00035 | 0.001 | NE | J | | 093418-009 | SW846 6020 |
| | Iron | 0.183 | 0.033 | 0.100 | NE | | | 093418-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093418-009 | SW846 6020 |
| | Magnesium | 30.8 | 0.010 | 0.030 | NE | | | 093418-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093418-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093418-009 | SW846 7470 |
| | Nickel | 0.00228 | 0.0005 | 0.002 | NE | | | 093418-009 | SW846 6020 |
| | Potassium | 5.80 | 0.080 | 0.300 | NE | | | 093418-009 | SW846 6020 |
| | Selenium | 0.00224 | 0.0015 | 0.005 | 0.050 | J | | 093418-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093418-009 | SW846 6020 |
| | Sodium | 70.8 | 1.60 | 5.00 | NE | | | 093418-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093418-009 | SW846 6020 |
| | Uranium | 0.0102 | 0.000067 | 0.0002 | 0.030 | | | 093418-009 | SW846 6020 |
| | Vanadium | 0.0064 | 0.001 | 0.005 | NE | | | 093418-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093418-009 | SW846 6020 |

Refer to footnotes on page 4A-31.

## Table 4A-4 *(Continued)*
## Summary of Unfiltered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW7** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093438-009 | SW846 6020 |
| 07-Feb-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093438-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093438-009 | SW846 6020 |
| | Barium | 0.093 | 0.0006 | 0.002 | 2.00 | | | 093438-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093438-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093438-009 | SW846 6020 |
| | Calcium | 58.3 | 0.600 | 2.00 | NE | B | | 093438-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093438-009 | SW846 6020 |
| | Cobalt | 0.000105 | 0.0001 | 0.001 | NE | J | | 093438-009 | SW846 6020 |
| | Copper | 0.000927 | 0.00035 | 0.001 | NE | J | J | 093438-009 | SW846 6020 |
| | Iron | 0.115 | 0.033 | 0.100 | NE | | | 093438-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093438-009 | SW846 6020 |
| | Magnesium | 18.3 | 0.010 | 0.030 | NE | | | 093438-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093438-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093438-009 | SW846 7470 |
| | Nickel | 0.00152 | 0.0005 | 0.002 | NE | J | | 093438-009 | SW846 6020 |
| | Potassium | 4.66 | 0.080 | 0.300 | NE | | | 093438-009 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | U | | 093438-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093438-009 | SW846 6020 |
| | Sodium | 41.0 | 0.080 | 0.250 | NE | | | 093438-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093438-009 | SW846 6020 |
| | Uranium | 0.00747 | 0.000067 | 0.0002 | 0.030 | | | 093438-009 | SW846 6020 |
| | Vanadium | 0.0076 | 0.001 | 0.005 | NE | | | 093438-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093438-009 | SW846 6020 |

Refer to footnotes on page 4A-31.

## Table 4A-4 *(Continued)*
## Summary of Unfiltered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW8** | Aluminum | 0.0265 | 0.015 | 0.050 | NE | J | | 093429-009 | SW846 6020 |
| 06-Feb-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093429-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093429-009 | SW846 6020 |
| | Barium | 0.122 | 0.006 | 0.020 | 2.00 | | | 093429-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093429-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093429-009 | SW846 6020 |
| | Calcium | 60.8 | 0.600 | 2.00 | NE | B | | 093429-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093429-009 | SW846 6020 |
| | Cobalt | 0.000135 | 0.0001 | 0.001 | NE | J | | 093429-009 | SW846 6020 |
| | Copper | 0.00182 | 0.00035 | 0.001 | NE | | 0.015UJ | 093429-009 | SW846 6020 |
| | Iron | 0.150 | 0.033 | 0.100 | NE | | | 093429-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093429-009 | SW846 6020 |
| | Magnesium | 19.1 | 0.010 | 0.030 | NE | | | 093429-009 | SW846 6020 |
| | Manganese | 0.0223 | 0.001 | 0.005 | NE | | | 093429-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093429-009 | SW846 7470 |
| | Nickel | 0.00215 | 0.0005 | 0.002 | NE | | | 093429-009 | SW846 6020 |
| | Potassium | 5.06 | 0.080 | 0.300 | NE | | | 093429-009 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | U | | 093429-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093429-009 | SW846 6020 |
| | Sodium | 42.3 | 0.080 | 0.250 | NE | | | 093429-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093429-009 | SW846 6020 |
| | Uranium | 0.00755 | 0.000067 | 0.0002 | 0.030 | | | 093429-009 | SW846 6020 |
| | Vanadium | 0.00242 | 0.001 | 0.005 | NE | J | | 093429-009 | SW846 6010 |
| | Zinc | 0.00515 | 0.0035 | 0.010 | NE | J | | 093429-009 | SW846 6020 |

Refer to footnotes on page 4A-31.

## Table 4A-4 *(Continued)*
## Summary of Unfiltered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW8** (Duplicate) | Aluminum | 0.0378 | 0.015 | 0.050 | NE | J | | 093430-009 | SW846 6020 |
| 06-Feb-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093430-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093430-009 | SW846 6020 |
| | Barium | 0.120 | 0.0006 | 0.002 | 2.00 | | | 093430-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093430-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093430-009 | SW846 6020 |
| | Calcium | 59.1 | 0.600 | 2.00 | NE | B | | 093430-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093430-009 | SW846 6020 |
| | Cobalt | 0.000144 | 0.0001 | 0.001 | NE | J | | 093430-009 | SW846 6020 |
| | Copper | 0.00195 | 0.00035 | 0.001 | NE | | 0.015UJ | 093430-009 | SW846 6020 |
| | Iron | 0.162 | 0.033 | 0.100 | NE | | | 093430-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093430-009 | SW846 6020 |
| | Magnesium | 19.2 | 0.010 | 0.030 | NE | | | 093430-009 | SW846 6020 |
| | Manganese | 0.0227 | 0.001 | 0.005 | NE | | | 093430-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093430-009 | SW846 7470 |
| | Nickel | 0.00218 | 0.0005 | 0.002 | NE | | | 093430-009 | SW846 6020 |
| | Potassium | 5.10 | 0.080 | 0.300 | NE | | | 093430-009 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | U | | 093430-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093430-009 | SW846 6020 |
| | Sodium | 43.2 | 0.080 | 0.250 | NE | | | 093430-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093430-009 | SW846 6020 |
| | Uranium | 0.00726 | 0.000067 | 0.0002 | 0.030 | | | 093430-009 | SW846 6020 |
| | Vanadium | 0.00174 | 0.001 | 0.005 | NE | J | | 093430-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093430-009 | SW846 6020 |

Refer to footnotes on page 4A-31.

## Table 4A-4 *(Concluded)*
## Summary of Unfiltered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW9** | Aluminum | 0.0358 | 0.015 | 0.050 | NE | J | | 093423-009 | SW846 6020 |
| 04-Feb-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093423-009 | SW846 6020 |
| | Arsenic | 0.00185 | 0.0017 | 0.005 | 0.010 | J | | 093423-009 | SW846 6020 |
| | Barium | 0.0897 | 0.0006 | 0.002 | 2.00 | | | 093423-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093423-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093423-009 | SW846 6020 |
| | Calcium | 58.9 | 0.600 | 2.00 | NE | B | | 093423-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093423-009 | SW846 6020 |
| | Cobalt | 0.000168 | 0.0001 | 0.001 | NE | J | | 093423-009 | SW846 6020 |
| | Copper | 0.00108 | 0.00035 | 0.001 | NE | | J | 093423-009 | SW846 6020 |
| | Iron | 0.172 | 0.033 | 0.100 | NE | | | 093423-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093423-009 | SW846 6020 |
| | Magnesium | 18.6 | 0.010 | 0.030 | NE | | | 093423-009 | SW846 6020 |
| | Manganese | 0.00862 | 0.001 | 0.005 | NE | | | 093423-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093423-009 | SW846 7470 |
| | Nickel | 0.00208 | 0.0005 | 0.002 | NE | | | 093423-009 | SW846 6020 |
| | Potassium | 4.73 | 0.080 | 0.300 | NE | | | 093423-009 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | U | | 093423-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093423-009 | SW846 6020 |
| | Sodium | 40.7 | 0.080 | 0.250 | NE | | | 093423-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093423-009 | SW846 6020 |
| | Uranium | 0.00923 | 0.000067 | 0.0002 | 0.030 | | | 093423-009 | SW846 6020 |
| | Vanadium | 0.00921 | 0.001 | 0.005 | NE | | | 093423-009 | SW846 6010 |
| | Zinc | 0.00376 | 0.0035 | 0.010 | NE | J | | 093423-009 | SW846 6020 |

Refer to footnotes on page 4A-31.

## Table 4A-5
## Summary of Filtered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-BW2** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093409-010 | SW846 6020 |
| 29-Jan-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093409-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093409-010 | SW846 6020 |
| | Barium | 0.0929 | 0.0006 | 0.002 | 2.00 | | J- | 093409-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093409-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093409-010 | SW846 6020 |
| | Calcium | 72.7 | 1.20 | 4.00 | NE | B | | 093409-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093409-010 | SW846 6020 |
| | Cobalt | 0.000313 | 0.0001 | 0.001 | NE | J | | 093409-010 | SW846 6020 |
| | Copper | 0.000649 | 0.00035 | 0.001 | NE | J | | 093409-010 | SW846 6020 |
| | Iron | 0.135 | 0.033 | 0.100 | NE | | | 093409-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093409-010 | SW846 6020 |
| | Magnesium | 24.6 | 0.010 | 0.030 | NE | | | 093409-010 | SW846 6020 |
| | Manganese | 0.0093 | 0.001 | 0.005 | NE | | | 093409-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093409-010 | SW846 7470 |
| | Nickel | 0.00218 | 0.0005 | 0.002 | NE | | | 093409-010 | SW846 6020 |
| | Potassium | 3.98 | 0.080 | 0.300 | NE | | | 093409-010 | SW846 6020 |
| | Selenium | 0.00265 | 0.0015 | 0.005 | 0.050 | J | | 093409-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093409-010 | SW846 6020 |
| | Sodium | 61.3 | 1.60 | 5.00 | NE | | | 093409-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093409-010 | SW846 6020 |
| | Uranium | 0.00679 | 0.000067 | 0.0002 | 0.030 | | | 093409-010 | SW846 6020 |
| | Vanadium | 0.00567 | 0.001 | 0.005 | NE | | | 093409-010 | SW846 6010 |
| | Zinc | 0.00979 | 0.0035 | 0.010 | NE | J | | 093409-010 | SW846 6020 |

Refer to footnotes on page 4A-31.

## Table 4A-5 *(Continued)*
## Summary of Filtered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW4** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093441-010 | SW846 6020 |
| 11-Feb-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093441-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093441-010 | SW846 6020 |
| | Barium | 0.0864 | 0.0006 | 0.002 | 2.00 | | | 093441-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093441-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093441-010 | SW846 6020 |
| | Calcium | 62.1 | 0.300 | 1.00 | NE | | | 093441-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093441-010 | SW846 6020 |
| | Cobalt | 0.000296 | 0.0001 | 0.001 | NE | J | | 093441-010 | SW846 6020 |
| | Copper | 0.00213 | 0.00035 | 0.001 | NE | | | 093441-010 | SW846 6020 |
| | Iron | 0.137 | 0.033 | 0.100 | NE | | | 093441-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093441-010 | SW846 6020 |
| | Magnesium | 18.9 | 0.010 | 0.030 | NE | | J | 093441-010 | SW846 6020 |
| | Manganese | 0.00414 | 0.001 | 0.005 | NE | J | | 093441-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093441-010 | SW846 7470 |
| | Nickel | 0.179 | 0.0005 | 0.002 | NE | | | 093441-010 | SW846 6020 |
| | Potassium | 4.48 | 0.080 | 0.300 | NE | | J | 093441-010 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | U | | 093441-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093441-010 | SW846 6020 |
| | Sodium | 48.6 | 0.080 | 0.250 | NE | | | 093441-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093441-010 | SW846 6020 |
| | Uranium | 0.00549 | 0.000067 | 0.0002 | 0.030 | | | 093441-010 | SW846 6020 |
| | Vanadium | 0.00821 | 0.001 | 0.005 | NE | | | 093441-010 | SW846 6010 |
| | Zinc | 0.0462 | 0.0035 | 0.010 | NE | | | 093441-010 | SW846 6020 |

Refer to footnotes on page 4A-31.

**Table 4A-5** *(Continued)*
**Summary of Filtered Target Analyte List Metals plus Uranium Results,**
**Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW5** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093414-010 | SW846 6020 |
| 30-Jan-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093414-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093414-010 | SW846 6020 |
| | Barium | 0.113 | 0.0006 | 0.002 | 2.00 | | J- | 093414-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093414-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093414-010 | SW846 6020 |
| | Calcium | 96.0 | 1.20 | 4.00 | NE | B | | 093414-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093414-010 | SW846 6020 |
| | Cobalt | 0.000126 | 0.0001 | 0.001 | NE | J | 0.00064U | 093414-010 | SW846 6020 |
| | Copper | 0.000995 | 0.00035 | 0.001 | NE | J | 0.011UJ | 093414-010 | SW846 6020 |
| | Iron | 0.179 | 0.033 | 0.100 | NE | | | 093414-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093414-010 | SW846 6020 |
| | Magnesium | 32.5 | 0.010 | 0.030 | NE | | | 093414-010 | SW846 6020 |
| | Manganese | 0.00226 | 0.001 | 0.005 | NE | J | | 093414-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093414-010 | SW846 7470 |
| | Nickel | 0.00199 | 0.0005 | 0.002 | NE | J | | 093414-010 | SW846 6020 |
| | Potassium | 5.47 | 0.080 | 0.300 | NE | | | 093414-010 | SW846 6020 |
| | Selenium | 0.00225 | 0.0015 | 0.005 | 0.050 | J | | 093414-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093414-010 | SW846 6020 |
| | Sodium | 72.8 | 1.60 | 5.00 | NE | | | 093414-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093414-010 | SW846 6020 |
| | Uranium | 0.00914 | 0.000067 | 0.0002 | 0.030 | | | 093414-010 | SW846 6020 |
| | Vanadium | 0.00559 | 0.001 | 0.005 | NE | | | 093414-010 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093414-010 | SW846 6020 |

Refer to footnotes on page 4A-31.

## Table 4A-5 *(Continued)*
## Summary of Filtered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW5** (Duplicate) | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093415-010 | SW846 6020 |
| 30-Jan-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093415-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093415-010 | SW846 6020 |
| | Barium | 0.107 | 0.0006 | 0.002 | 2.00 | | J- | 093415-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093415-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093415-010 | SW846 6020 |
| | Calcium | 94.0 | 1.20 | 4.00 | NE | B | | 093415-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093415-010 | SW846 6020 |
| | Cobalt | 0.000128 | 0.0001 | 0.001 | NE | J | 0.00064U | 093415-010 | SW846 6020 |
| | Copper | 0.000713 | 0.00035 | 0.001 | NE | J | 0.011UJ | 093415-010 | SW846 6020 |
| | Iron | 0.178 | 0.033 | 0.100 | NE | | | 093415-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093415-010 | SW846 6020 |
| | Magnesium | 31.9 | 0.010 | 0.030 | NE | | | 093415-010 | SW846 6020 |
| | Manganese | 0.00217 | 0.001 | 0.005 | NE | J | | 093415-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093415-010 | SW846 7470 |
| | Nickel | 0.00199 | 0.0005 | 0.002 | NE | J | | 093415-010 | SW846 6020 |
| | Potassium | 5.25 | 0.080 | 0.300 | NE | | | 093415-010 | SW846 6020 |
| | Selenium | 0.00236 | 0.0015 | 0.005 | 0.050 | J | | 093415-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093415-010 | SW846 6020 |
| | Sodium | 70.2 | 1.60 | 5.00 | NE | | | 093415-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093415-010 | SW846 6020 |
| | Uranium | 0.00876 | 0.000067 | 0.0002 | 0.030 | | | 093415-010 | SW846 6020 |
| | Vanadium | 0.00481 | 0.001 | 0.005 | NE | J | | 093415-010 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093415-010 | SW846 6020 |

Refer to footnotes on page 4A-31.

## Table 4A-5 *(Continued)*
## Summary of Filtered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW6** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093418-010 | SW846 6020 |
| 31-Jan-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093418-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093418-010 | SW846 6020 |
| | Barium | 0.114 | 0.0006 | 0.002 | 2.00 | | | 093418-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093418-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093418-010 | SW846 6020 |
| | Calcium | 97.6 | 1.20 | 4.00 | NE | | | 093418-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093418-010 | SW846 6020 |
| | Cobalt | 0.000124 | 0.0001 | 0.001 | NE | J | | 093418-010 | SW846 6020 |
| | Copper | 0.000678 | 0.00035 | 0.001 | NE | J | | 093418-010 | SW846 6020 |
| | Iron | 0.178 | 0.033 | 0.100 | NE | | | 093418-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093418-010 | SW846 6020 |
| | Magnesium | 30.8 | 0.010 | 0.030 | NE | | | 093418-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093418-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093418-010 | SW846 7470 |
| | Nickel | 0.00191 | 0.0005 | 0.002 | NE | J | | 093418-010 | SW846 6020 |
| | Potassium | 5.68 | 0.080 | 0.300 | NE | | | 093418-010 | SW846 6020 |
| | Selenium | 0.00202 | 0.0015 | 0.005 | 0.050 | J | | 093418-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093418-010 | SW846 6020 |
| | Sodium | 72.6 | 1.60 | 5.00 | NE | | | 093418-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093418-010 | SW846 6020 |
| | Uranium | 0.0101 | 0.000067 | 0.0002 | 0.030 | | | 093418-010 | SW846 6020 |
| | Vanadium | 0.00713 | 0.001 | 0.005 | NE | | | 093418-010 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093418-010 | SW846 6020 |

Refer to footnotes on page 4A-31.

## Table 4A-5 *(Continued)*
## Summary of Filtered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW7** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093438-010 | SW846 6020 |
| 07-Feb-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093438-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093438-010 | SW846 6020 |
| | Barium | 0.0929 | 0.0006 | 0.002 | 2.00 | | | 093438-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093438-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093438-010 | SW846 6020 |
| | Calcium | 56.3 | 0.600 | 2.00 | NE | B | | 093438-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093438-010 | SW846 6020 |
| | Cobalt | 0.000135 | 0.0001 | 0.001 | NE | J | | 093438-010 | SW846 6020 |
| | Copper | 0.00107 | 0.00035 | 0.001 | NE | | J | 093438-010 | SW846 6020 |
| | Iron | 0.105 | 0.033 | 0.100 | NE | | | 093438-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093438-010 | SW846 6020 |
| | Magnesium | 18.4 | 0.010 | 0.030 | NE | | | 093438-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093438-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093438-010 | SW846 7470 |
| | Nickel | 0.00156 | 0.0005 | 0.002 | NE | J | | 093438-010 | SW846 6020 |
| | Potassium | 4.65 | 0.080 | 0.300 | NE | | | 093438-010 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | U | | 093438-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093438-010 | SW846 6020 |
| | Sodium | 42.0 | 0.080 | 0.250 | NE | | | 093438-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093438-010 | SW846 6020 |
| | Uranium | 0.00761 | 0.000067 | 0.0002 | 0.030 | | | 093438-010 | SW846 6020 |
| | Vanadium | 0.00776 | 0.001 | 0.005 | NE | | | 093438-010 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093438-010 | SW846 6020 |

Refer to footnotes on page 4A-31.

## Table 4A-5 *(Continued)*
## Summary of Filtered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW8** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093429-010 | SW846 6020 |
| 06-Feb-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093429-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093429-010 | SW846 6020 |
| | Barium | 0.120 | 0.0006 | 0.002 | 2.00 | | | 093429-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093429-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093429-010 | SW846 6020 |
| | Calcium | 62.4 | 0.600 | 2.00 | NE | B | | 093429-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093429-010 | SW846 6020 |
| | Cobalt | 0.000114 | 0.0001 | 0.001 | NE | J | | 093429-010 | SW846 6020 |
| | Copper | 0.00151 | 0.00035 | 0.001 | NE | | 0.008UJ | 093429-010 | SW846 6020 |
| | Iron | 0.107 | 0.033 | 0.100 | NE | | | 093429-010 | SW846 6020 |
| | Lead | 0.00109 | 0.0005 | 0.002 | NE | J | | 093429-010 | SW846 6020 |
| | Magnesium | 19.3 | 0.010 | 0.030 | NE | | | 093429-010 | SW846 6020 |
| | Manganese | 0.0131 | 0.001 | 0.005 | NE | | | 093429-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093429-010 | SW846 7470 |
| | Nickel | 0.00196 | 0.0005 | 0.002 | NE | J | | 093429-010 | SW846 6020 |
| | Potassium | 5.11 | 0.080 | 0.300 | NE | | | 093429-010 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | U | | 093429-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093429-010 | SW846 6020 |
| | Sodium | 43.0 | 0.080 | 0.250 | NE | | | 093429-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093429-010 | SW846 6020 |
| | Uranium | 0.00742 | 0.000067 | 0.0002 | 0.030 | | | 093429-010 | SW846 6020 |
| | Vanadium | 0.00191 | 0.001 | 0.005 | NE | J | | 093429-010 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093429-010 | SW846 6020 |

Refer to footnotes on page 4A-31.

## Table 4A-5 *(Continued)*
## Summary of Filtered Target Analyte List Metals plus Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW8** (Duplicate) | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093430-010 | SW846 6020 |
| 06-Feb-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093430-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093430-010 | SW846 6020 |
| | Barium | 0.118 | 0.0006 | 0.002 | 2.00 | | | 093430-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093430-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093430-010 | SW846 6020 |
| | Calcium | 60.3 | 0.600 | 2.00 | NE | B | | 093430-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093430-010 | SW846 6020 |
| | Cobalt | 0.000116 | 0.0001 | 0.001 | NE | J | | 093430-010 | SW846 6020 |
| | Copper | 0.00154 | 0.00035 | 0.001 | NE | | 0.008UJ | 093430-010 | SW846 6020 |
| | Iron | 0.109 | 0.033 | 0.100 | NE | | | 093430-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093430-010 | SW846 6020 |
| | Magnesium | 18.8 | 0.010 | 0.030 | NE | | | 093430-010 | SW846 6020 |
| | Manganese | 0.0128 | 0.001 | 0.005 | NE | | | 093430-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093430-010 | SW846 7470 |
| | Nickel | 0.00186 | 0.0005 | 0.002 | NE | J | | 093430-010 | SW846 6020 |
| | Potassium | 4.98 | 0.080 | 0.300 | NE | | | 093430-010 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | U | | 093430-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093430-010 | SW846 6020 |
| | Sodium | 42.4 | 0.080 | 0.250 | NE | | | 093430-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093430-010 | SW846 6020 |
| | Uranium | 0.00737 | 0.000067 | 0.0002 | 0.030 | | | 093430-010 | SW846 6020 |
| | Vanadium | 0.00178 | 0.001 | 0.005 | NE | J | | 093430-010 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093430-010 | SW846 6020 |

Refer to footnotes on page 4A-31.

**Table 4A-5** *(Concluded)*
**Summary of Filtered Target Analyte List Metals plus Uranium Results,**
**Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW9** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093423-010 | SW846 6020 |
| 04-Feb-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093423-010 | SW846 6020 |
| | Arsenic | 0.00307 | 0.0017 | 0.005 | 0.010 | J | | 093423-010 | SW846 6020 |
| | Barium | 0.0896 | 0.0006 | 0.002 | 2.00 | | | 093423-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093423-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093423-010 | SW846 6020 |
| | Calcium | 59.1 | 0.600 | 2.00 | NE | B | | 093423-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093423-010 | SW846 6020 |
| | Cobalt | 0.00018 | 0.0001 | 0.001 | NE | J | | 093423-010 | SW846 6020 |
| | Copper | 0.00134 | 0.00035 | 0.001 | NE | | J | 093423-010 | SW846 6020 |
| | Iron | 0.108 | 0.033 | 0.100 | NE | | | 093423-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093423-010 | SW846 6020 |
| | Magnesium | 18.7 | 0.010 | 0.030 | NE | | | 093423-010 | SW846 6020 |
| | Manganese | 0.00225 | 0.001 | 0.005 | NE | J | | 093423-010 | SW846 6020 |
| | Mercury | 0.0003 | 0.000067 | 0.0002 | 0.002 | | NJ- | 093423-010 | SW846 7470 |
| | Nickel | 0.00174 | 0.0005 | 0.002 | NE | J | | 093423-010 | SW846 6020 |
| | Potassium | 4.73 | 0.080 | 0.300 | NE | | | 093423-010 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | U | | 093423-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093423-010 | SW846 6020 |
| | Sodium | 40.6 | 0.080 | 0.250 | NE | | | 093423-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093423-010 | SW846 6020 |
| | Uranium | 0.00911 | 0.000067 | 0.0002 | 0.030 | | | 093423-010 | SW846 6020 |
| | Vanadium | 0.00975 | 0.001 | 0.005 | NE | | | 093423-010 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093423-010 | SW846 6020 |

Refer to footnotes on page 4A-31.

## Table 4A-6
## Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-BW2** | Americium-241 | 6.54 ± 7.97 | 12.0 | 5.88 | NE | U | BD | 093409-033 | EPA 901.1 |
| 29-Jan-13 | Cesium-137 | -0.843 ± 3.15 | 3.66 | 1.77 | NE | U | BD | 093409-033 | EPA 901.1 |
| | Cobalt-60 | 1.38 ± 1.81 | 3.22 | 1.52 | NE | U | BD | 093409-033 | EPA 901.1 |
| | Potassium-40 | 12.0 ± 41.7 | 28.2 | 13.2 | NE | U | BD | 093409-033 | EPA 901.1 |
| | Gross Alpha | 5.80 | NA | NA | 15 pCi/L | NA | None | 093409-034 | EPA 900.0 |
| | Gross Beta | 7.55 ± 1.79 | 1.83 | 0.890 | 4mrem/yr | | J | 093409-034 | EPA 900.0 |
| | Tritium | 10.2 ± 65.4 | 118 | 54.0 | NE | U | BD | 093409-036 | EPA 906.0 M |
| **MWL-MW4** | Americium-241 | 0.304 ± 9.59 | 16.0 | 7.83 | NE | U | BD | 093441-033 | EPA 901.1 |
| 11-Feb-13 | Cesium-137 | 0.367 ± 2.54 | 3.38 | 1.63 | NE | U | BD | 093441-033 | EPA 901.1 |
| | Cobalt-60 | 1.20 ± 1.83 | 2.88 | 1.35 | NE | U | BD | 093441-033 | EPA 901.1 |
| | Potassium-40 | -4.41 ± 34.9 | 43.4 | 20.8 | NE | U | BD | 093441-033 | EPA 901.1 |
| | Gross Alpha | 6.60 | NA | NA | 15 pCi/L | NA | None | 093441-034 | EPA 900.0 |
| | Gross Beta | 7.38 ± 1.51 | 1.04 | 0.497 | 4mrem/yr | | J | 093441-034 | EPA 900.0 |
| | Tritium | -29.5 ± 78.3 | 152 | 68.7 | NE | U | BD | 093441-036 | EPA 906.0 M |
| **MWL-MW5** | Americium-241 | 0.840 ± 7.72 | 12.5 | 6.09 | NE | U | BD | 093414-033 | EPA 901.1 |
| 30-Jan-13 | Cesium-137 | -0.757 ± 1.73 | 2.82 | 1.35 | NE | U | BD | 093414-033 | EPA 901.1 |
| | Cobalt-60 | -0.77 ± 1.85 | 3.20 | 1.51 | NE | U | BD | 093414-033 | EPA 901.1 |
| | Potassium-40 | 62.6 ± 25.6 | 62.6 | 15.5 | NE | U | BD | 093414-033 | EPA 901.1 |
| | Gross Alpha | 9.02 | NA | NA | 15 pCi/L | NA | None | 093414-034 | EPA 900.0 |
| | Gross Beta | 8.21 ± 2.31 | 2.88 | 1.41 | 4mrem/yr | | J | 093414-034 | EPA 900.0 |
| | Tritium | 17.1 ± 66.7 | 119 | 54.5 | NE | U | BD | 093414-036 | EPA 906.0 M |
| **MWL-MW5** (Duplicate) | Americium-241 | 8.97 ± 11.5 | 16.3 | 7.97 | NE | U | BD | 093415-033 | EPA 901.1 |
| 30-Jan-13 | Cesium-137 | -0.257 ± 2.07 | 3.58 | 1.73 | NE | U | BD | 093415-033 | EPA 901.1 |
| | Cobalt-60 | 0.164 ± 1.83 | 3.28 | 1.55 | NE | U | BD | 093415-033 | EPA 901.1 |
| | Potassium-40 | 81.1 ± 39.4 | 33.0 | 15.6 | NE | X | R | 093415-033 | EPA 901.1 |
| | Gross Alpha | 4.27 | NA | NA | 15 pCi/L | NA | None | 093415-034 | EPA 900.0 |
| | Gross Beta | 8.35 ± 2.27 | 2.70 | 1.31 | 4mrem/yr | | | 093415-034 | EPA 900.0 |
| | Tritium | -43.9 ± 62.1 | 122 | 55.9 | NE | U | BD | 093415-036 | EPA 906.0 M |
| **MWL-MW6** | Americium-241 | 7.48 ± 8.39 | 12.8 | 6.23 | NE | U | BD | 093418-033 | EPA 901.1 |
| 31-Jan-13 | Cesium-137 | 0.721 ± 1.67 | 2.86 | 1.37 | NE | U | BD | 093418-033 | EPA 901.1 |
| | Cobalt-60 | -0.264 ± 1.63 | 2.92 | 1.37 | NE | U | BD | 093418-033 | EPA 901.1 |
| | Potassium-40 | 1.24 ± 42.2 | 31.8 | 15.0 | NE | U | BD | 093418-033 | EPA 901.1 |
| | Gross Alpha | 5.17 | NA | NA | 15 pCi/L | NA | None | 093418-034 | EPA 900.0 |
| | Gross Beta | 7.33 ± 2.11 | 2.60 | 1.27 | 4mrem/yr | | J | 093418-034 | EPA 900.0 |
| | Tritium | 34.5 ± 91.8 | 164 | 73.2 | NE | U | BD | 093418-036 | EPA 906.0 M |

Refer to footnotes on page 4A-31.

## Table 4A-6 *(Concluded)*
## Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW7** | Americium-241 | -1.07 ± 6.40 | 11.0 | 5.35 | NE | U | BD | 093438-033 | EPA 901.1 |
| 07-Feb-13 | Cesium-137 | -2.27 ± 2.80 | 2.78 | 1.33 | NE | U | BD | 093438-033 | EPA 901.1 |
| | Cobalt-60 | -4.75 ± 3.70 | 3.17 | 1.50 | NE | U | BD | 093438-033 | EPA 901.1 |
| | Potassium-40 | -26.8 ± 33.9 | 39.7 | 19.0 | NE | U | BD | 093438-033 | EPA 901.1 |
| | Gross Alpha | 5.50 | NA | NA | 15 pCi/L | NA | None | 093438-034 | EPA 900.0 |
| | Gross Beta | 6.59 ± 1.41 | 0.993 | 0.469 | 4mrem/yr | | J | 093438-034 | EPA 900.0 |
| | Tritium | 4.17 ± 106 | 182 | 88.5 | NE | U | BD | 093438-036 | EPA 906.0 M |
| **MWL-MW8** | Americium-241 | -7.92 ± 7.42 | 10.4 | 5.10 | NE | U | BD | 093429-033 | EPA 901.1 |
| 06-Feb-13 | Cesium-137 | -0.448 ± 2.60 | 2.95 | 1.42 | NE | U | BD | 093429-033 | EPA 901.1 |
| | Cobalt-60 | 1.20 ± 2.08 | 3.07 | 1.45 | NE | U | BD | 093429-033 | EPA 901.1 |
| | Potassium-40 | 12.2 ± 33.1 | 23.8 | 11.0 | NE | U | BD | 093429-033 | EPA 901.1 |
| | Gross Alpha | 5.24 | NA | NA | 15 pCi/L | NA | None | 093429-034 | EPA 900.0 |
| | Gross Beta | 76.5 ± 12.7 | 1.02 | 0.488 | 4mrem/yr | | J | 093429-034 | EPA 900.0 |
| | Tritium | -2.1 ± 106 | 184 | 89.2 | NE | U | BD | 093429-036 | EPA 906.0 M |
| **MWL-MW8** (Duplicate) | Americium-241 | 0.622 ± 7.05 | 10.3 | 5.06 | NE | U | BD | 093430-033 | EPA 901.1 |
| 06-Feb-13 | Cesium-137 | -1.68 ± 2.09 | 3.18 | 1.54 | NE | U | BD | 093430-033 | EPA 901.1 |
| | Cobalt-60 | 1.38 ± 1.89 | 3.34 | 1.59 | NE | U | BD | 093430-033 | EPA 901.1 |
| | Potassium-40 | 35.7 ± 45.5 | 30.5 | 14.4 | NE | X | R | 093430-033 | EPA 901.1 |
| | Gross Alpha | 6.84 | NA | NA | 15 pCi/L | NA | None | 093430-034 | EPA 900.0 |
| | Gross Beta | 7.32 ± 1.50 | 0.994 | 0.474 | 4mrem/yr | | J | 093430-034 | EPA 900.0 |
| | Tritium | -114 ± 101 | 181 | 87.9 | NE | U | BD | 093430-036 | EPA 906.0 M |
| **MWL-MW9** | Americium-241 | 2.53 ± 11.2 | 16.6 | 8.12 | NE | U | BD | 093423-033 | EPA 901.1 |
| 04-Feb-13 | Cesium-137 | 1.27 ± 2.11 | 3.61 | 1.75 | NE | U | BD | 093423-033 | EPA 901.1 |
| | Cobalt-60 | 5.69 ± 2.86 | 3.31 | 1.56 | NE | X | R | 093423-033 | EPA 901.1 |
| | Potassium-40 | -24.2 ± 36.5 | 42.5 | 20.3 | NE | U | BD | 093423-033 | EPA 901.1 |
| | Gross Alpha | 2.78 | NA | NA | 15 pCi/L | NA | None | 093423-034 | EPA 900.0 |
| | Gross Beta | 7.90 ± 1.62 | 1.18 | 0.568 | 4mrem/yr | | J | 093423-034 | EPA 900.0 |
| | Tritium | 80.9 ± 108 | 181 | 88.0 | NE | U | BD | 093423-036 | EPA 906.0 M |

Refer to footnotes on page 4A-31.

## Table 4A-7
## Summary of Field Water Quality Measurements[h],
## Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Sample Date | Temperature (°C) | Specific Conductivity (µmhos/cm) | Oxidation Reduction Potential (mV) | pH | Turbidity (NTU) | Dissolved Oxygen (% Sat) | Dissolved Oxygen (mg/L) |
|---|---|---|---|---|---|---|---|---|
| **MWL-BW2** | 29-Jan-13 | 15.29 | 646 | 95.8 | 7.01 | 2.23 | 20.3 | 1.89 |
| **MWL-MW4** | 11-Feb-13 | 17.12 | 531 | 229.5 | 7.71 | 1.75 | 74.3 | 7.19 |
| **MWL-MW5** | 30-Jan-13 | 18.37 | 825 | 170.3 | 6.90 | 0.64 | 30.1 | 2.82 |
| **MWL-MW6** | 31-Jan-13 | 18.93 | 792 | 174.6 | 6.99 | 0.47 | 32.6 | 3.02 |
| **MWL-MW7** | 07-Feb-13 | 18.27 | 538 | 228.6 | 7.24 | 0.59 | 64.2 | 6.04 |
| **MWL-MW8** | 06-Feb-13 | 16.26 | 551 | 218.6 | 7.27 | 1.60 | 58.4 | 5.71 |
| **MWL-MW9** | 04-Feb-13 | 15.01 | 540 | 218.2 | 7.21 | 1.45 | 49.3 | 4.89 |

Refer to footnotes on page 4A-31.

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## *Footnotes for Mixed Waste Landfill Groundwater Analytical Results Tables*

| | |
|---|---|
| % | = percent. |
| µg/L | = micrograms per liter. |
| CFR | = Code of Federal Regulations. |
| EPA | = U.S. Environmental Protection Agency. |
| ID | = Identifier. |
| No. | = Number. |
| mg/L | = milligrams per liter. |
| mrem/yr | = millirem per year. |

**[a]Result**

Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 1-4).

| | |
|---|---|
| Bold | = Indicates the value bold exceeds the established MCL. |
| ND | = not detected (at method detection limit). Activities of zero or less are considered to be not detected. |

**[b]MDL or MDA**

MDL applies to the data listed in Tables 4A-1 through 4A-5. MDA applies to radiological data in Table 4A-6.

| | |
|---|---|
| MDL | = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific. |
| MDA | = Minimum detectable activity. The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level. |
| NA | = Not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity. |

**[c]PQL or Critical Level**

The PQL applies to Tables 4A-1 through 4A-5. Critical Level applies to Table 4A-6.

| | |
|---|---|
| NA | = Not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity. |
| Critical level | = The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific. |
| PQL | = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions. |

**[d]MCL**

MCL = Maximum contaminant level. MCLs were established by the EPA Office of Water, National Primary Water Regulations (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- Gross alpha particle activity, excluding total uranium = 15 pCi/L (40 CFR Parts 9, 141, and 142, Table 1-4).
- Beta and/or Gamma-emitting radionuclides (any combination) = 4 mrem/yr (as dose rate).

NE = Not established.

**[e]Lab Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

| | |
|---|---|
| B | = Analyte is detected in associated laboratory method blank. |
| J | = Estimated value, the analyte concentration is below the PQL. |
| NA | = Not applicable. |
| U | = Analyte is absent or below the method detection limit. |
| X | = Data rejected due to high counting uncertainty. |

## *Footnotes for Mixed Waste Landfill Groundwater Analytical Results Tables (Concluded)*

**[f]Validation Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = The associated value is an estimated quantity.
J- = The associated numerical value is an estimated quantity with a suspected negative bias.
None = No data validation for corrected gross alpha activity.
NJ- = Presumptive evidence of the presence of the material at an estimated quantity with a suspected negative bias.
R = The data are unusable (compound may or may not be present). Resampling or reanalysis are necessary for verification.
U = The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
UJ = The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

**[g]Analytical Method**

Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.
EPA, 1980, "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.
EPA, 1984, "Methods for Chemical Analysis of Water and Wastes." EPA 600-4-79-020.
EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.

**[h]Field Water Quality Measurements**

Field measurements collected prior to sampling.

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

# Attachment 4B
# Mixed Waste Landfill
# Hydrographs

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# Attachment 4B Hydrographs


4B-1 MWL Study Area Wells (1 of 2) ..... 4B-5

4B-2 MWL Study Area Wells (2 of 2) ..... 4B-6

4B-3 Unfiltered Chromium Concentrations, MWL-MW4 ..... 4B-7

4B-4 Unfiltered Nickel Concentrations, MWL-MW4 ..... 4B-8

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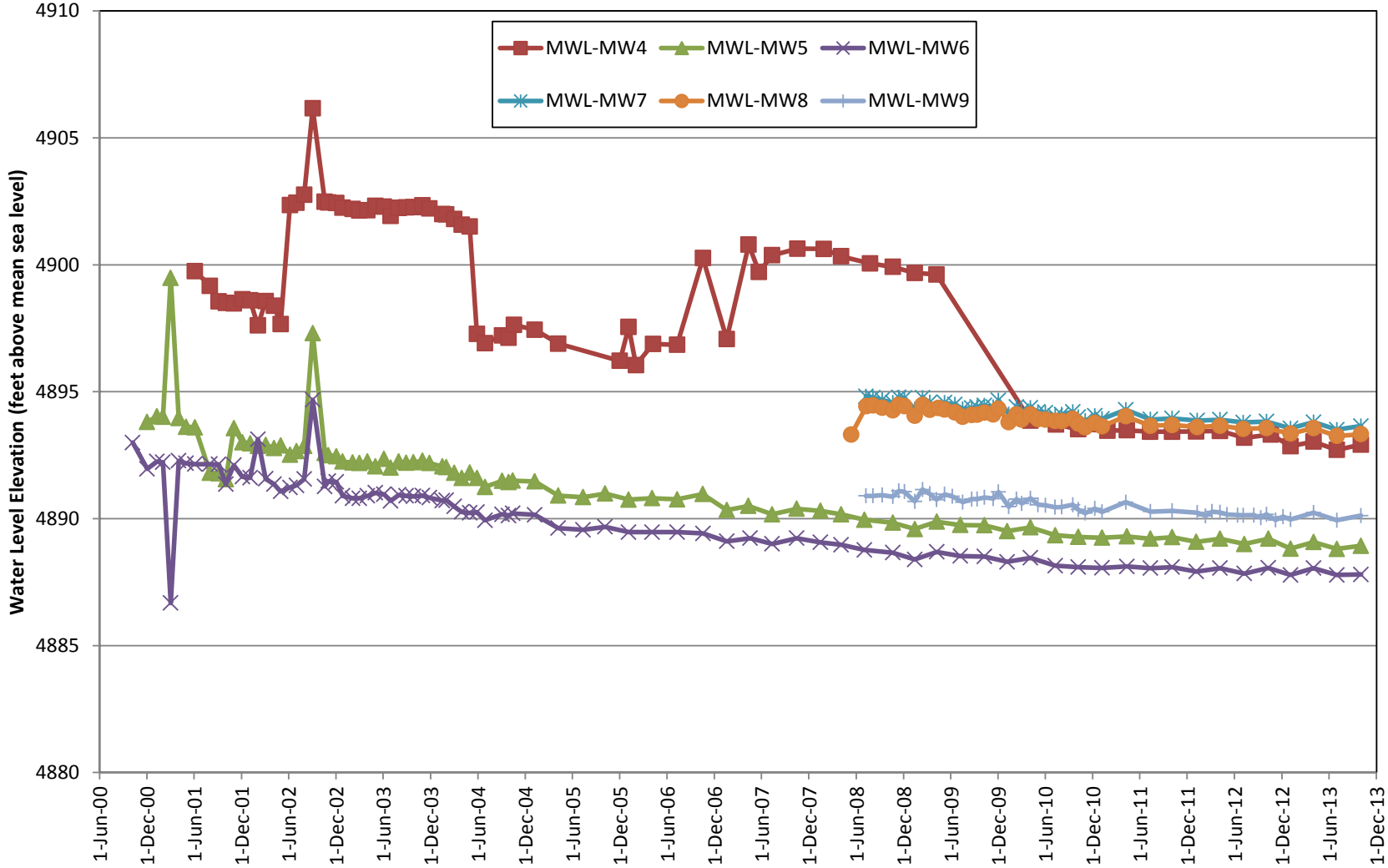


**Figure 4B-1. MWL Study Area Wells (1 of 2)**

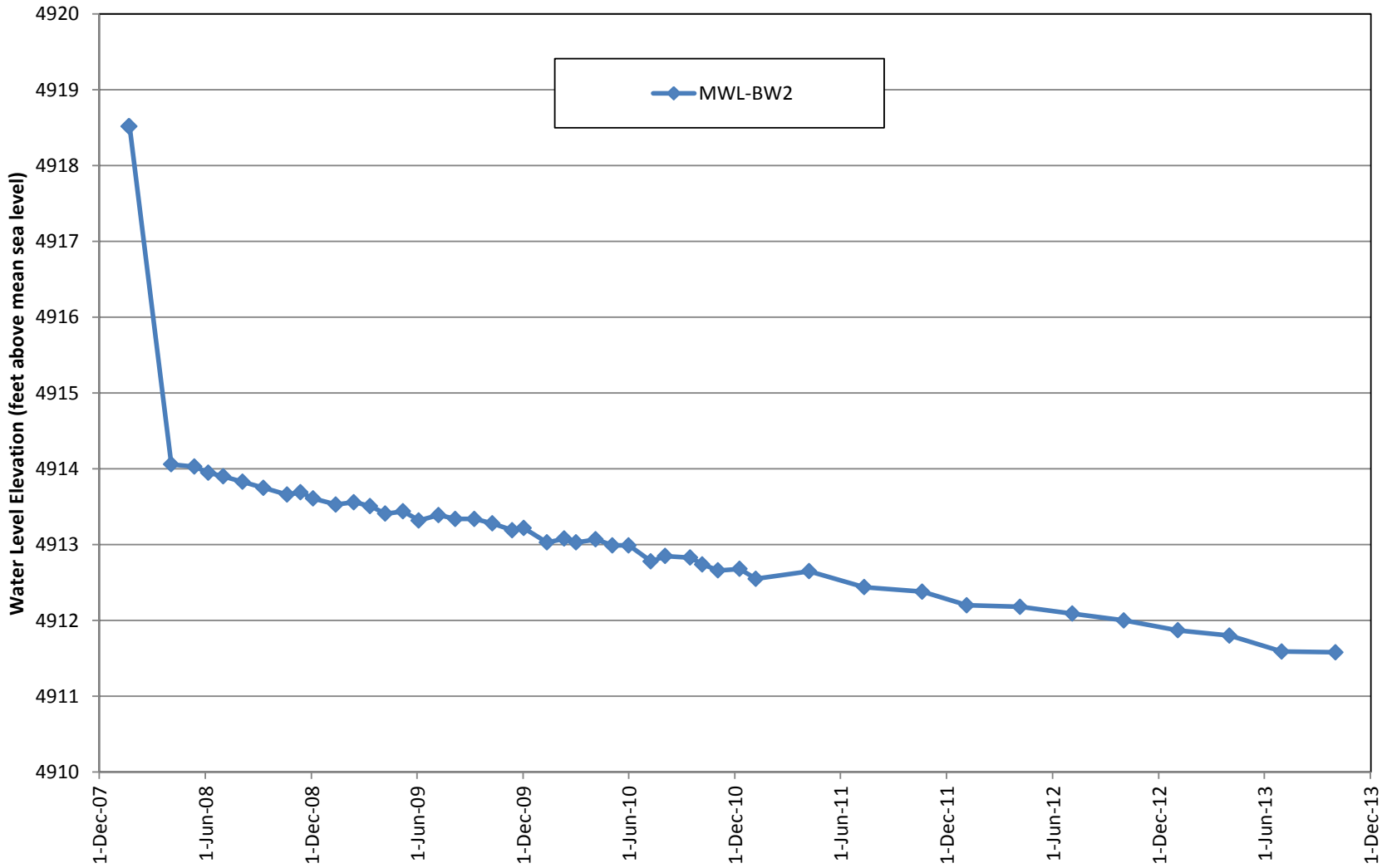


**Figure 4B-2. MWL Study Area Wells (2 of 2)**

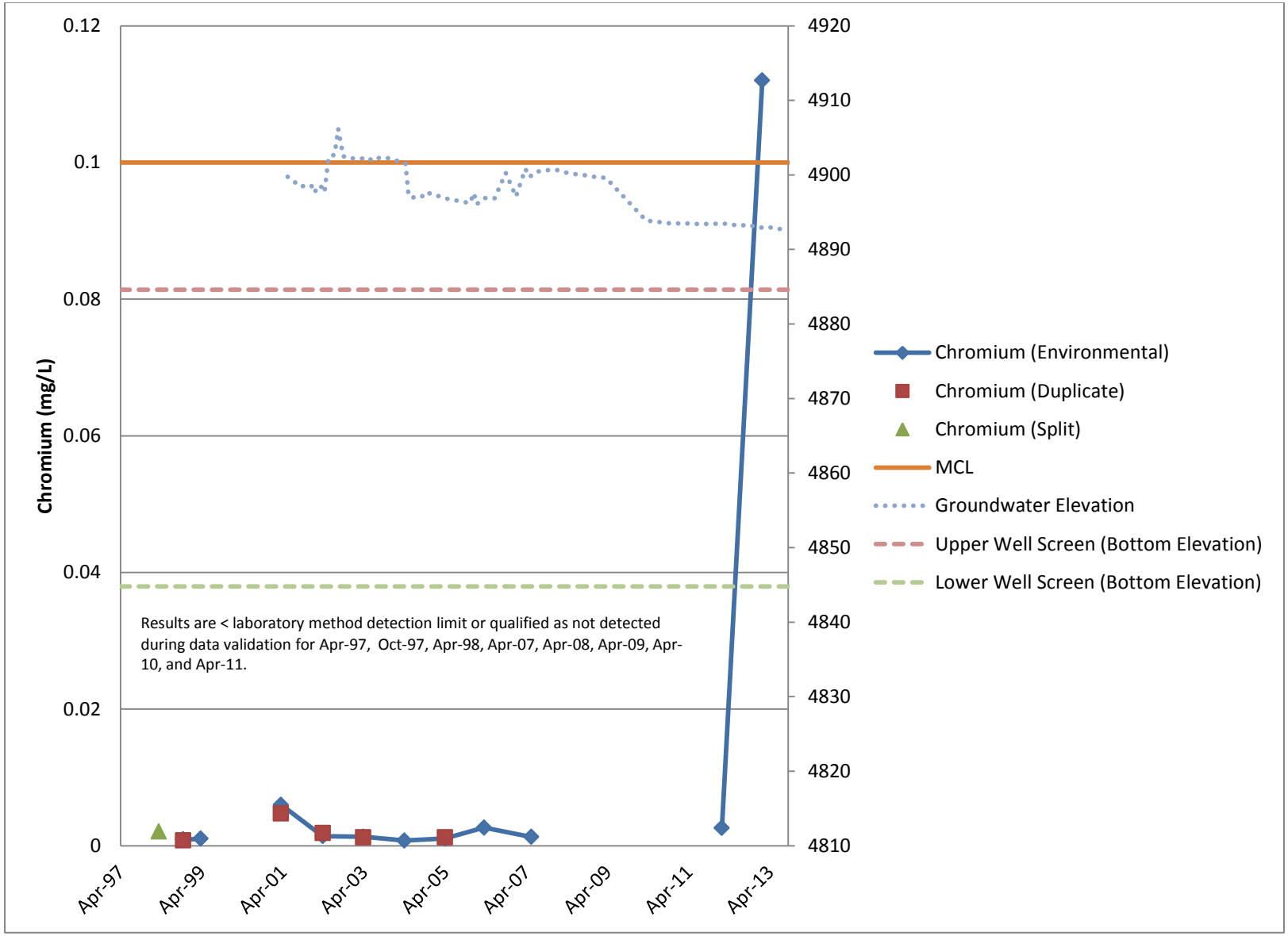


**Figure 4B-3. Unfiltered Chromium Concentrations, MWL-MW4**

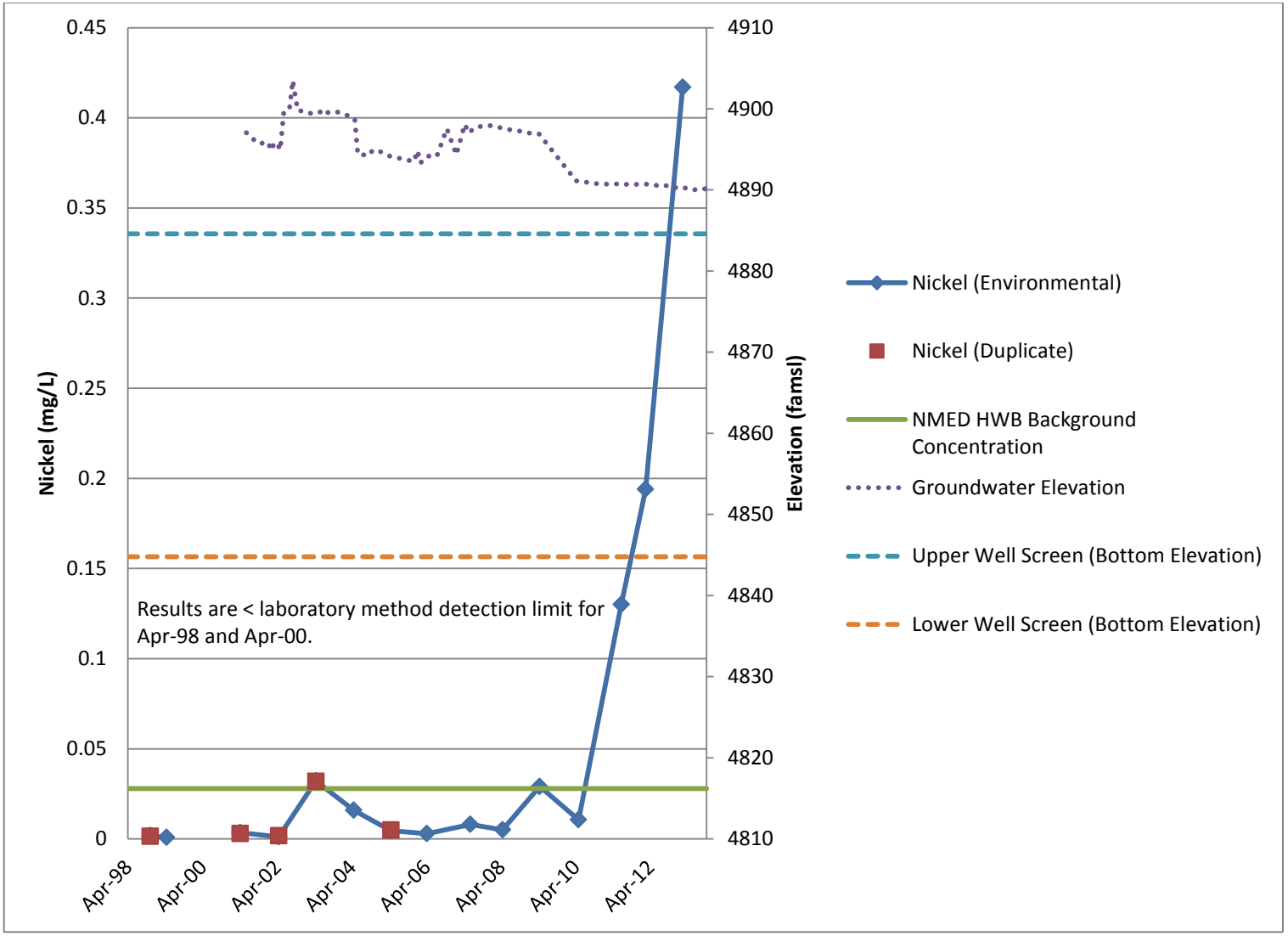


**Figure 4B-4. Unfiltered Nickel Concentrations, MWL-MW4**

# 5.0 Technical Area V Groundwater

## 5.1 Introduction

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

### 5.1.1 Location

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

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

### 5.1.2 Site History

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

### 5.1.3 Monitoring History

Investigations of groundwater quality in the TA-V Study Area have been conducted by SNL/NM over the past 20 years (Table 5-1). Groundwater monitoring at TA-V began in October 1992. TCE was first detected in monitoring well LWDS-MW1 in October 1993 and was later detected in monitoring well TAV-MW1 in September 1995. Since then, low concentrations of TCE have been consistently detected during quarterly sampling events. Potential sources for TCE in groundwater include the Liquid Waste Disposal System (LWDS) drain field and surface impoundments and the TA-V seepage pits (Section 5.1.7).

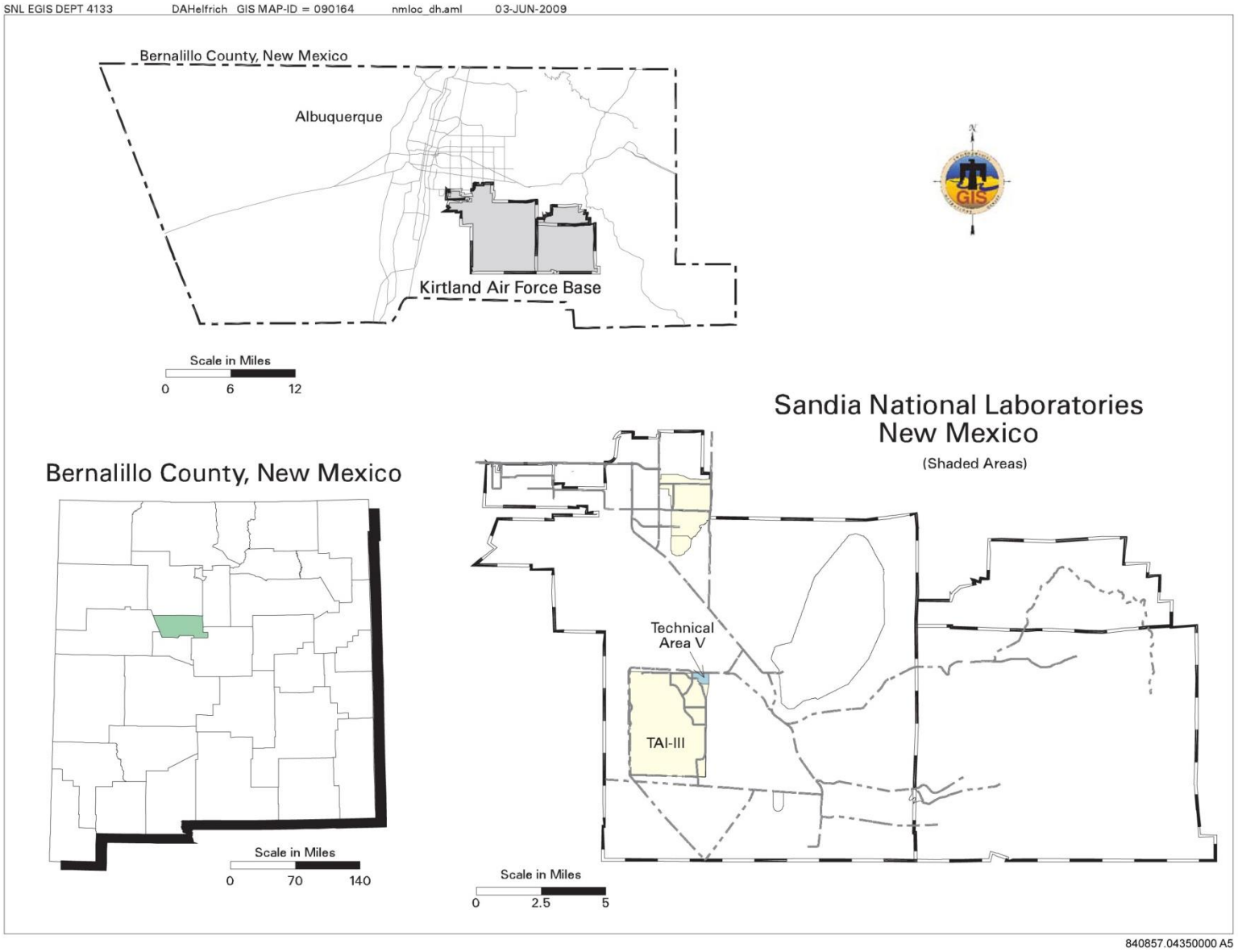


**Figure 5-1. Location of the TA-V Study Area**

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

| Month | Year | Event | Reference |
|---|---|---|---|
| May | 1959 | KAFB water supply well KAFB-10 is installed west of TA-V. Water from the well was used as auxiliary water for fire protection. | NMOSE May 1959 |
| April | 1992 | The LWDS RFI Work Plan is submitted. The investigation will examine SWMUs 4, 5, and 52. | SNL March 1993 |
| | 1992–1993 | Two groundwater monitoring wells are installed as part of the LWDS investigation. LWDS-MW2 installed October 1992, and LWDS-MW1 installed May 1993. | SNL September 1995 |
| November | 1993 | LWDS-MW1 and LWDS-MW2 are sampled. The first sampling event of LWDS-MW1 in November 1993 reveals TCE near the then method detection limit of 5 μg/L, and the detection is confirmed during a later sampling event at values exceeding the MCL of 5 μg/L. | SNL March 1995 |
| June | 1994 | Submit notification letter from DOE to EPA regarding TCE detection in LWDS-MW1. | DOE June 1994 |
| March | 1995 | Groundwater sample analytical results for TA-V wells LWDS-MW1 and LWDS-MW2 reported in the Calendar Year (CY) 1994 SNL/NM Annual Groundwater Monitoring Report. | SNL March 1995 |
| June | 1995 | Report submitted discussing water quality issues reported in the CY 1994 SNL/NM Annual Groundwater Monitoring Report. TCE was consistently detected during 1994 in LWDS-MW1. | IT June 1995 |
| January–June | 1995 | Wells AVN-1 and AVN-2 installed. | SNL 1995 |
| April | 1995 | Wells TAV-MW1 and TAV-MW2 installed. | SNL March 1996 |
| | 1995 | The LWDS RFI is performed and completed. | SNL September 1995 |
| March | 1996 | Groundwater sampling analytical results for TA-V wells reported in the CY 1995 SNL/NM Annual Groundwater Monitoring Report. | SNL March 1996 |
| March | 1996 | Submit a letter to the NMED with notification of a single elevated nitrate detection for groundwater monitoring well LWDS-MW1. The result is 10.1 mg/L, exceeding the MCL of 10 mg/L. | DOE March 1996 |
| April | 1996 | KAFB-10 was plugged and abandoned as there was a potential for the ungrouted annulus for this production well to act as a conduit. | SNL April 1996 |
| March | 1997 | Groundwater sampling analytical results for TA-V wells reported in the CY 1996 SNL/NM Annual Groundwater Monitoring Report. | SNL March 1997 |
| April | 1997 | Wells TAV-MW3, TAV-MW4, and TAV-MW5 installed. | SNL March 1999a |
| September | 1997 | NMED issues an RSI stating that additional characterization at TA-V is needed. Numerous other issues are discussed pertaining to each of the LWDS sites (SWMUs 4, 5, and 52). | NMED September 1997 |
| January | 1998 | Provide responses to the NMED September 1997 RSI. | SNL January 1998 |
| March | 1998 | Groundwater sampling analytical results for TA-V wells reported in the CY 1997 SNL/NM Annual Groundwater Monitoring Report. | SNL March 1998 |

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

| Month | Year | Event | Reference |
|---|---|---|---|
| October | 1998 | Provide cross sections to NMED for the LWDS as required in the September 1997 RSI from NMED. | DOE October 1998 |
| March | 1999 | Groundwater sampling analytical results for TA-V wells reported in the Fiscal Year (FY) 1998 SNL/NM Annual Groundwater Monitoring Report. | SNL March 1999b |
| March | 1999 | Submit a summary report detailing groundwater conditions for the TA-III/V area that includes sites from OU 1306 (TA-III) and OU 1307 (LWDS). | SNL March 1999a |
| March | 2000 | Groundwater sampling analytical results for TA-V wells reported in the FY 1999 SNL/NM Annual Groundwater Monitoring Report | SNL March 2000 |
| April | 2001 | Groundwater sampling analytical results for TA-V wells reported in the FY 2000 SNL/NM Annual Groundwater Monitoring Report. | SNL April 2001 |
| March - May | 2001 | Wells TAV-MW6, TAV-MW7, TAV-MW8, and TAV-MW9 installed. | SNL October 2001 |
| November | 2001 | A summary of groundwater sampling results from TA-V wells for FYs 1999 and 2000 are compiled into a report. This is an update of the March 1999 summary report. | SNL November 2001 |
| March | 2002 | Groundwater sampling analytical results for TA-V wells reported in the FY 2001 SNL/NM Annual Groundwater Monitoring Report. | SNL March 2002 |
| March | 2003 | Groundwater sampling analytical results for TA-V wells reported in the FY 2002 SNL/NM Annual Groundwater Monitoring Report. | SNL March 2003 |
| June | 2003 | Subsurface geology at KAFB, including the TA-V area, is updated. | Van Hart June 2003 |
| March | 2004 | Groundwater sampling analytical results for TA-V wells reported in the FY 2003 SNL/NM Annual Groundwater Monitoring Report. | SNL March 2004 |
| April | 2004 | The NMED issues the Compliance Order on Consent (the Order) to the DOE/Sandia, which identified TA-V as an area with groundwater contamination requiring a CME. | NMED April 2004 |
| May | 2004 | Submit the *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Technical Area-V*. This document was required by the Order. | SNL April 2004a |
| May | 2004 | Submit the *Corrective Measures Evaluation Work Plan, Technical Area V Groundwate*r. This document was required by the Order. | SNL April 2004b |
| October | 2004 | The NMED issues an approval with modifications to the TA-V CME Work Plan and the Current Conceptual Model of Groundwater Flow and Contaminant Transport. | NMED October 2004 |

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

| Month | Year | Event | Reference |
|---|---|---|---|
| December | 2004 | Submit responses to the NMED approval with modifications of October 2004. The responses are included in the revised *Corrective Measures Evaluation Work Plan, Technical Area V Groundwater, Revision 0*. | SNL December 2004 |
| July | 2005 | Submit the *Corrective Measures Evaluation Report for Technical Area V Groundwater*. The report details the selection of a preferred remedial alternative, cleanup goals, and the corrective measures implementation plan. | SNL July 2005 |
| October | 2005 | Submit request to NMED for change in sampling frequency for TA-V wells. | DOE October 2005 |
| October | 2005 | Groundwater sampling analytical results for TA-V wells reported in the FY 2004 SNL/NM Annual Groundwater Monitoring Report. | SNL October 2005 |
| March | 2006 | Request the removal of well AVN-2 from the TA-V monitoring network due to insufficient water for sampling caused by declining water levels. The well would be returned to service if water levels in the well recover. | DOE March 2006 |
| November | 2006 | Groundwater sampling analytical results for TA-V wells reported in the FY 2005 SNL/NM Annual Groundwater Monitoring Report. | SNL November 2006 |
| March | 2007 | Groundwater sampling analytical results for TA-V wells reported in the FY 2006 SNL/NM Annual Groundwater Monitoring Report. | SNL March 2007 |
| January–March | 2008 | Well TAV-MW1 plugged and abandoned, and well TAV-MW10 installed as replacement for TAV-MW1. | SNL June 2008 |
| March | 2008 | Groundwater sampling analytical results for TA-V wells reported in the FY 2007 SNL/NM Annual Groundwater Monitoring Report. | SNL March 2008 |
| July | 2008 | NMED issues a NOD on the July 2005 CME Report for TA-V Groundwater. | NMED July 2008 |
| September | 2008 | The 13 TA-V monitoring wells are resurveyed to establish new northing and easting coordinates and elevations for each well. | SNL October 2008 |
| December | 2008 | Sandia, DOE/NNSA, and NMED personnel attend an MNA seminar presented by Savannah River National Laboratory personnel and also discuss technical issues and the need for additional characterization work at TA-V. | SRNL December 2008 |
| April | 2009 | NMED requires characterization of perchlorate in groundwater in one well in the TA-V Study Area. | NMED April 2009 |
| April | 2009 | Submit a response to the NOD on the July 2005 CME Report for TA-V Groundwater. | SNL April 2009 |
| June | 2009 | Groundwater sampling analytical results for TA-V wells reported in the CY 2008 SNL/NM Annual Groundwater Monitoring Report. | SNL June 2009 |
| August | 2009 | NMED issues a second NOD on the July 2005 CME Report for TA-V Groundwater. | NMED August 2009 |

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

| Month | Year | Event | Reference |
|---|---|---|---|
| November | 2009 | Submit a response to the second NOD on the July 2005 CME Report for TA-V Groundwater. | SNL November 2009 |
| December | 2009 | NMED issues a third NOD on the July 2005 CME Report for TA-V Groundwater. | NMED December 2009 |
| February | 2010 | Submit a response to the third NOD on the July 2005 CME Report for TA-V Groundwater. | SNL February 2010 |
| May | 2010 | NMED issues a notice of conditional approval for the TA-V Groundwater Investigation Work Plan associated with July 2005 TA-V Groundwater CME Report. | NMED May 2010 |
| October | 2010 | Begin installation of groundwater monitoring wells TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14. | SNL February 2010 |
| November | 2010 | Complete installation of groundwater monitoring wells TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14. | SNL June 2011 |
| October | 2010 | Groundwater sampling analytical results for TA-V wells reported in the CY 2009 SNL/NM Annual Groundwater Monitoring Report. | SNL October 2010 |
| November | 2010 | Submit a report on the geophysical log and slug test results for the new TA-V wells. | SNL November 2010 |
| December | 2010 | NMED issues approval for the modification of soil-vapor monitoring well design. | NMED December 2010 |
| March | 2011 | Complete installation of soil-vapor monitoring wells TAV-SV01, TAV-SV02, and TAV-SV03. | SNL June 2011 |
| June | 2011 | Submit a Summary Report for TA-V Groundwater and Soil-Vapor Monitoring Well Installation. | SNL June 2011 |
| July | 2011 | DOE/NNSA and Sandia meet with NMED to discuss the results from the first quarter of groundwater and soil-vapor monitoring. | SNL July 2011 |
| September | 2011 | Groundwater sampling analytical results for TA-V wells reported in the CY 2010 SNL/NM Annual Groundwater Monitoring Report. | SNL September 2011 |
| September | 2012 | Groundwater sampling analytical results for TA-V wells reported in the CY 2011 SNL/NM Annual Groundwater Monitoring Report. | SNL September 2012 |
| June | 2013 | Groundwater sampling analytical results for TA-V wells reported in the CY 2012 SNL/NM Annual Groundwater Monitoring Report. | SNL June 2013 |

**NOTES:**

AVN = Area V (North).
CME = Corrective Measures Evaluation.
CY = Calendar Year.
DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
FY = Fiscal Year.
IT = IT Corporation.
KAFB = Kirtland Air Force Base.
LWDS = Liquid Waste Disposal System.
MCL = Maximum Contaminant Level.
µg/L = Microgram(s) per liter.
mg/L = Milligram(s) per liter.
MNA = Monitored Natural Attenuation.
MW = Monitoring well.
NMED = New Mexico Environment Department.
NMOSE = New Mexico Office of the State Engineer.
NNSA = National Nuclear Security Administration.
NOD = Notice of Disapproval.
OU = Operable Unit.
RCRA = Resource Conservation and Recovery Act.
RFI = RCRA Facility Investigation.
RSI = Request for Supplemental Information.
Sandia = Sandia Corporation.
SNL = Sandia National Laboratories.
SNL/NM = Sandia National Laboratories/New Mexico.
SRNL = Savannah River National Laboratory.
SWMU = Solid Waste Management Unit.
TA = Technical Area.
TCE = Trichloroethene.
The Order = The Compliance Order on Consent.

In April 2004, the Compliance Order on Consent (the Order) became effective between the New Mexico Environment Department (NMED), DOE, and Sandia. The Order specifies TA-V as an area of groundwater contamination (NMED April 2004). Since the initial discoveries of TCE and nitrate at the TA-V Study Area, numerous characterization activities have been conducted (Table 5-1), which are summarized in the *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Technical Area-V* (SNL April 2004a). In response to the Order, this document was submitted to the NMED along with the *Corrective Measures Evaluation Work Plan, Technical Area V Groundwater* (SNL April 2004b) by DOE/NNSA and Sandia in April 2004. After fulfilling the requirements of the Corrective Measures Evaluation (CME) Work Plan, DOE/NNSA and Sandia submitted the CME Report to the NMED in July 2005 (SNL July 2005). In May 2010, NMED issued a notice of conditional approval for the TA-V Groundwater Investigation Work Plan associated with July 2005 TA-V Groundwater CME Report (NMED May 2010), and additional groundwater monitoring wells were installed subsequently. Groundwater monitoring results for TA-V wells have been summarized in the annual groundwater monitoring reports.

### 5.1.4 Current Monitoring Network

In Calendar Year (CY) 2013, 16 wells in the TA-V Study Area were being monitored for water quality and water levels (Figure 5-2; Table 5-2). Table XI-1 of the Order (NMED April 2004) specifies that the sampling frequency for groundwater monitoring at TA-V is quarterly.

### 5.1.5 Summary of Calendar Year 2013 Activities

The following activities took place for the TA-V Study Area during CY 2013:

- Obtained monthly or quarterly water level measurements for all TA-V Study Area wells.
- Prepared sampling and analysis plans (SAPs) and conducted semiannual and quarterly groundwater sampling events at 16 wells (Table 5-2) in February/March, May/June, July/August, and October/November 2013 (SNL January 2013, April 2013, July 2013, and September 2013).
- Prepared tables of analytical results (Attachment 5A), concentration versus time plots (Attachment 5B), and hydrographs (Attachment 5C) in support of this report.
- Conducted the final quarterly soil-vapor sampling event at the three soil-vapor monitoring wells in February/March 2013. The analytical results for these three sampling events are presented in the report entitled *Technical Area V Soil-Vapor Monitoring, Calendar Year 2013 Activities* (Attachment 5D), which includes analytical tables and figures.

### 5.1.6 Summary of Future Activities

The following activities are anticipated for the TA-V Study Area during CY 2014:

- Obtain periodic water level measurements for TA-V Study Area wells.
- Conduct quarterly or semiannual groundwater sampling at 16 TA-V Study Area wells.
- Update the Current Conceptual Model (SNL April 2004a) and the CME Report (SNL July 2005).

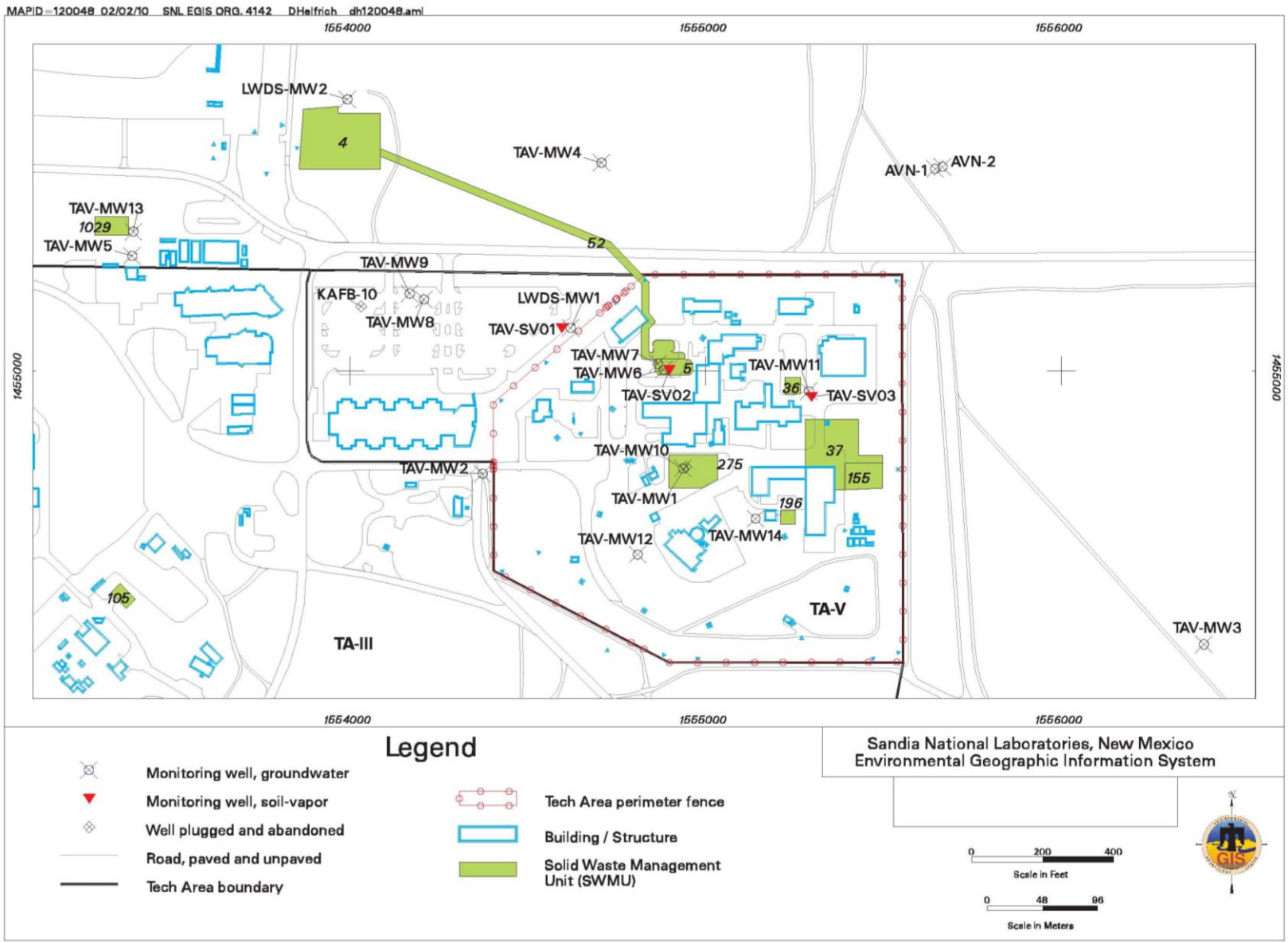


**Figure 5-2. TA-V Monitoring Well Locations (16 Active Groundwater Monitoring Wells)**

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

| Well | Installation Year | WQ | WL | Comments |
|---|---|---|---|---|
| LWDS-MW1 | 1993 | √ | √ | Regional aquifer, water table completion |
| LWDS-MW2 | 1992 | √ | √ | Regional aquifer, water table completion |
| AVN-1 | 1995 | √ | √ | Regional aquifer, deep completion (570–590 ft bgs) |
| AVN-2 | 1995 | | | Regional aquifer; water table completion (currently dry) |
| TAV-MW1 | 1995 | | | Regional aquifer, plugged and abandoned February 2008 |
| TAV-MW2 | 1995 | √ | √ | Regional aquifer, water table completion |
| TAV-MW3 | 1997 | √ | √ | Regional aquifer, water table completion |
| TAV-MW4 | 1997 | √ | √ | Regional aquifer, water table completion |
| TAV-MW5 | 1997 | √ | √ | Regional aquifer, water table completion |
| TAV-MW6 | 2001 | √ | √ | Regional aquifer, water table completion |
| TAV-MW7 | 2001 | √ | √ | Regional aquifer, deep completion (597–617 ft bgs) |
| TAV-MW8 | 2001 | √ | √ | Regional aquifer, water table completion |
| TAV-MW9 | 2001 | √ | √ | Regional aquifer, deep completion (582–602 ft bgs) |
| TAV-MW10 | 2008 | √ | √ | Regional aquifer, replaced TAV-MW1 |
| TAV-MW11 | 2010 | √ | √ | Regional aquifer, water table completion |
| TAV-MW12 | 2010 | √ | √ | Regional aquifer, water table completion |
| TAV-MW13 | 2010 | √ | √ | Regional aquifer, deep completion (525–545 ft bgs) |
| TAV-MW14 | 2010 | √ | √ | Regional aquifer, water table completion |

**NOTES:** Check marks in the WQ and WL columns indicate WQ sampling and WL measurements were obtained during this reporting period.
AVN = Area V (North).
bgs = Below ground surface.
ft = Foot (feet).
LWDS = Liquid Waste Disposal System.
MW = Monitoring well.
TAV = Technical Area V (monitoring well designation only).
TA-V = Technical Area V.
WL = Water level.
WQ = Water quality.

### 5.1.7 Current Conceptual Model

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

TCE and other organic chemicals were presumably present in wastewater that was discharged to the LWDS drain field from 1962 to 1967 and to the TA-V seepage pits from the 1960s until the early 1980s, when disposal practices were modified to protect the environment. Wastewater was disposed of at the surface impoundments from 1967 to 1972. Wastewater continued to be discharged to the seepage pits from the early 1980s until 1992, but it contained no TCE.

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

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

Nitrate concentrations in groundwater at TA-V, which are presumably derived from unknown upgradient sources, have exceeded the MCL in the two upgradient AVN wells (AVN-1 and AVN-2 [now dry]) that are currently being studied by KAFB. Concentrations have also exceeded the MCL in samples from wells located in TA-V (LWDS-MW1 and TAV-MW10), suggesting an additional local source of nitrate. However, septic waste was not discharged or disposed of to the three SWMUs (4, 5, and 275) at TA-V.

#### 5.1.7.1 Regional Hydrogeologic Conditions

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

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

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

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

The alluvial-fan lithofacies is further subdivided into lower and upper sections. The lower section consists of a fine-grained, clay-rich unit. This unit has been identified as low-energy piedmont deposits derived from upland soil that developed during a preglacial humid climate. The upper section consists of relatively coarse-grained sediments deposited in a higher-energy environment. The water table of the Santa Fe Group aquifer at TA-V is located in the fine-grained lower unit of alluvial-fan deposits. The post-Santa Fe Group alluvial-fan deposits blanket the area around TA-V and compose the upper few tens of feet of the vadose zone. These deposits were derived primarily from alluvial fans that developed from Coyote Canyon to the east.

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

#### 5.1.7.2 Hydrologic Conditions at the TA-V Study Area

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

The Tijeras Arroyo and Arroyo del Coyote are located north and northeast of TA-V, respectively. The flow of surface water in the arroyo consists of brief ephemeral flows from mountainous drainages located to the east. Part of the recharge derived from infiltration of these flows is returned to the atmosphere through evapotranspiration. Some water that infiltrates the arroyo channels may move past the root zone and provide some local recharge. The distances between these ephemeral channels and TA-V precludes a significant effect on local groundwater flow and potential contaminant transport.

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

The unsaturated and saturated hydraulic properties of the vadose zone at TA-V are highly variable and anisotropic because of the heterogeneous textures, lenticularity, layering, and variations in carbonate cementation. Disposal of large volumes of wastewater from the LWDS drain field, the LWDS surface impoundments, and the TA-V seepage pits may occur along preferential pathways of saturated or nearly saturated flow through the thick vadose zone to the aquifer. Vertical flow through the discontinuous, layered, lenticular sediments in the vadose zone may be attenuated or diverted at horizons of contrasting hydraulic properties. Discharge of wastewater to the drain field was discontinued in 1967. Discharge to the surface impoundments and seepage pits was discontinued in 1972 and 1992, respectively.

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

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

#### 5.1.7.3 Local Direction of Flow

Water levels measured in 16 monitoring wells were used to construct a map of the regional aquifer potentiometric surface at TA-V (Figure 5-3). The potentiometric surface indicates that the regional groundwater flow beneath TA-V is generally to the northwest, with localized flow paths to the west and southwest. The horizontal gradient ranges from approximately 0.0007 to 0.002 feet per foot. Calculated groundwater flow velocities based on aquifer testing range from 4 to 10 ft/yr (SNL March 1999a). Water-table contours for October 2013 suggest that a subtle groundwater mound is present at TA-V (Figure 5-3). This apparent groundwater mound is considered to be an artifact of regional water level declines within a heterogeneous aquifer and does not likely represent residual mounding from wastewater disposal that was discontinued in the early 1990s (SNL March 1999a).

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

Vertical flow gradients in the regional aquifer within the TA-V Study Area are strongly downward. Upon visual inspection of the hydrographs, water levels in the TA-V monitoring wells have been declining at a rate of approximately 1 ft/yr (Attachment 5C, Figures 5C-1 through 5C-3).

#### 5.1.7.4 Contaminant Sources

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

The majority of wastewater discharged at TA-V occurred at SWMUs 4, 5, and 275. Table 5-3 identifies the dates of disposal and estimated disposal volumes. After 1992, wastewater was diverted to the Albuquerque Bernalillo County Water Utility Authority sanitary sewer system.

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

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

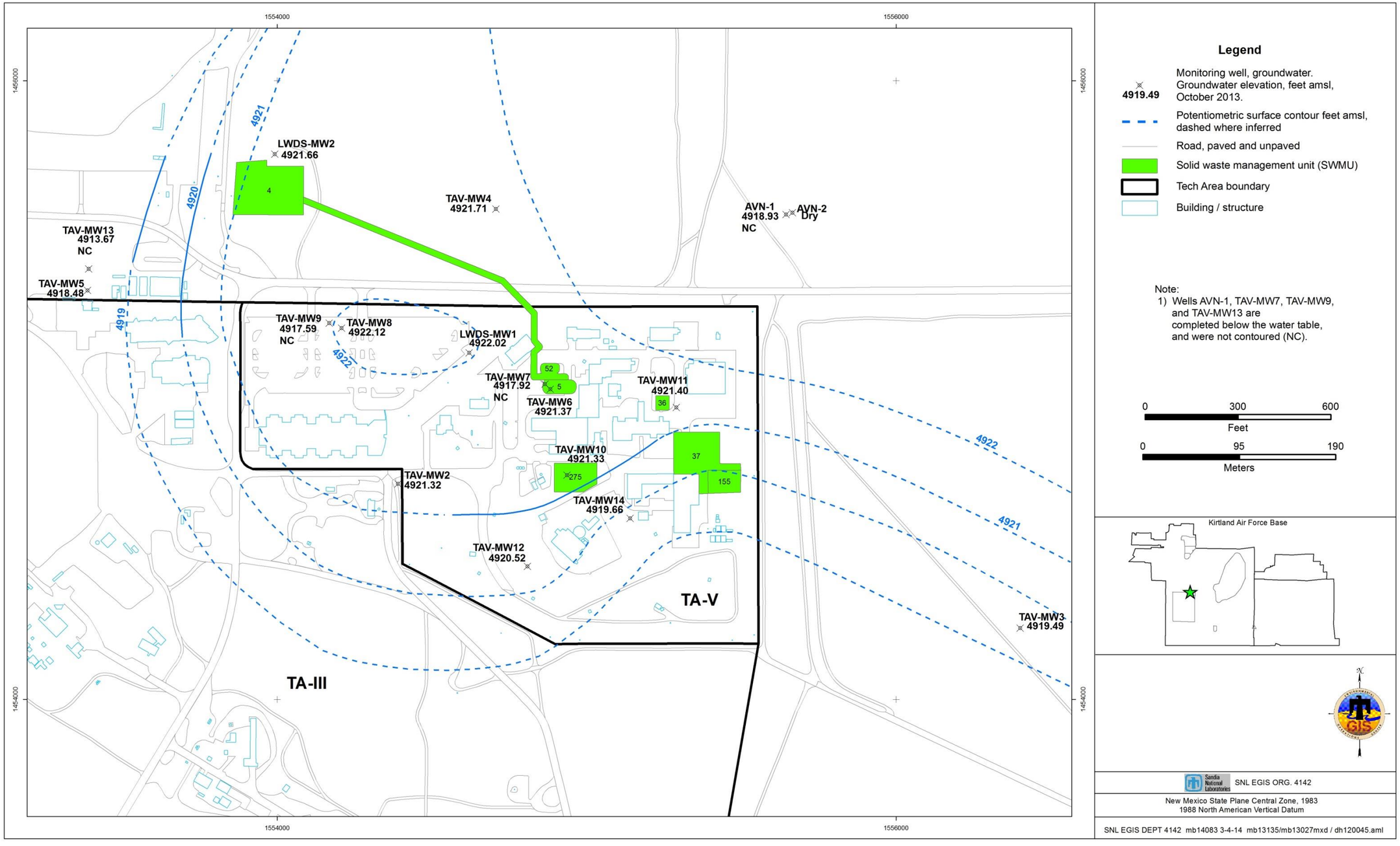


**Figure 5-3. TA-V Study Area Potentiometric Surface Map (October 2013)**

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

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

**NOTES:**
LWDS = Liquid Waste Disposal System.
SWMU = Solid Waste Management Unit.
TA-V = Technical Area V.

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

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

Because TCE is a volatile organic compound, vapor transport of TCE in the vadose zone is a possible mechanism. TCE is a hydrophobic compound with water solubility of 1,100 mg/L at 20 degrees Celsius (ºC). Some TCE will be retained in the vadose zone due to sorption onto fine-grained materials and dissolution into soil water.

Nitrate is present primarily in the aqueous phase in both the vadose zone and the aquifer. It is typically nonsorptive and, for the most part, does not sorb onto matrix surfaces in the vadose zone or groundwater. Therefore, any locally derived nitrate most likely was transported through the vadose zone with the initial discharges of wastewater.

#### 5.1.7.5 Contaminant Distribution and Transport in Groundwater

Distribution and transport of COCs are discussed in this section. TCE is present in low concentrations in the Santa Fe Group aquifer beneath TA-V. The highest TCE concentrations are located at three groundwater monitoring wells, LWDS-MW1, TAV-MW6, and TAV-MW10 (Figure 5-4), with TAV-MW6 and TAV-MW10 located at the SWMU 5 drain field and the SWMU 275 seepage pits, respectively. Even though LWDS-MW1 is not located at a potential source, maximum concentrations of TCE have occurred in LWDS-MW1, suggesting TCE contamination has migrated in the localized direction of groundwater flow.

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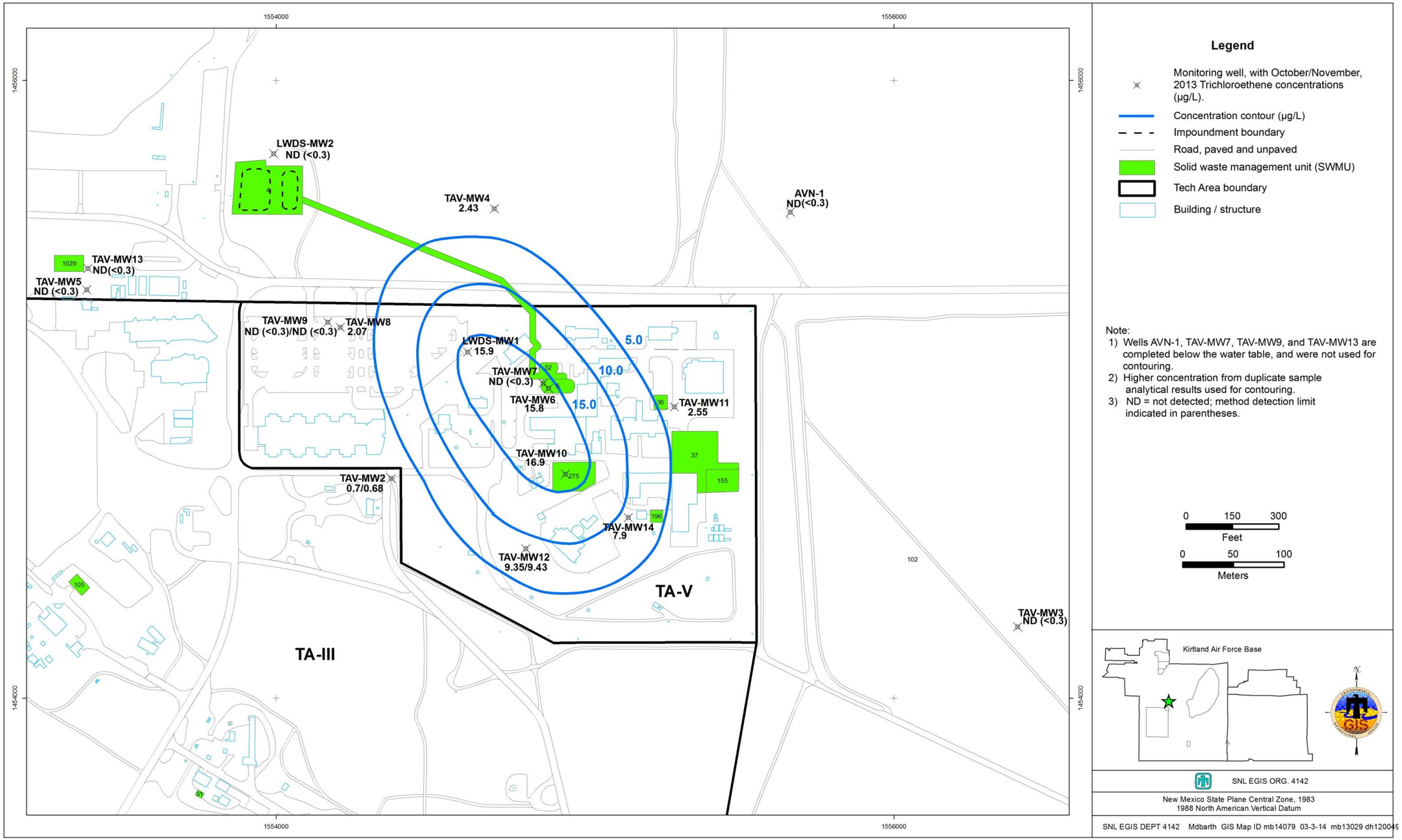


**Figure 5-4. Distribution of TCE in Groundwater at SNL/NM TA-V, October/November 2013**

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Maximum historical TCE concentrations reported at TA-V was 21.2 µg/L in the environmental sample for monitoring well LWDS-MW1 in May 2003. TCE has consistently exceeded the MCL at monitoring well LWDS-MW1 since 1993, and concentrations at monitoring wells TAV-MW6, TAV-MW10, TAV-MW12, and TAV-MW14 have exceeded the MCL during recent sampling events (Section 5.6). TCE has been found only in water table completion wells and has not been detected 90 ft below the water table based on data collected from deep monitoring wells TAV-MW7, TAV-MW9, and TAV-MW13.

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

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

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

The source of nitrate in water from TA-V wells is unknown. Some nitrate may have been disposed of to the subsurface in TA-V sanitary wastes; however, nitrate concentrations exceeding the MCL in the AVN wells suggests that the source of nitrate is regionally upgradient and to the northeast of TA-V. The NMED-specified background concentration for nitrate in groundwater is 4 mg/L (Dinwiddie 1997).

## 5.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM ER Operations, as well as implements and enforces federal regulations mandated by the Resource Conservation and Recovery Act (RCRA). All ER SWMUs and Areas of Concern are listed in *Module IV: Hazardous and Solid Waste Amendment (HSWA) Portion for Solid Waste Management Units (Module IV to the RCRA Part B Permit, NM5890110518)* (NMED 1993).

Groundwater characterization for TA-V was initiated to satisfy the requirements of the SNL/NM RCRA Permit for characterization of SWMUs (NMED 1993). The groundwater monitoring activities for the TA-V Study Area are not associated with a single SWMU, but are more regional in nature and have historically been voluntarily conducted by SNL/NM ER Operations.

The Order, which became effective in April 2004, transferred regulatory authority for corrective action requirements from the HSWA Module of the SNL/NM RCRA permit to the Order (NMED April 2004). All corrective action requirements pertaining to the TA-V Study Area are contained in the Order (NMED April 2004). The TA-V investigations must comply with requirements set forth in the Order for site characterization and development of a CME. The Order also contains schedules that define dates for the delivery of plans and reports related to TA-V.

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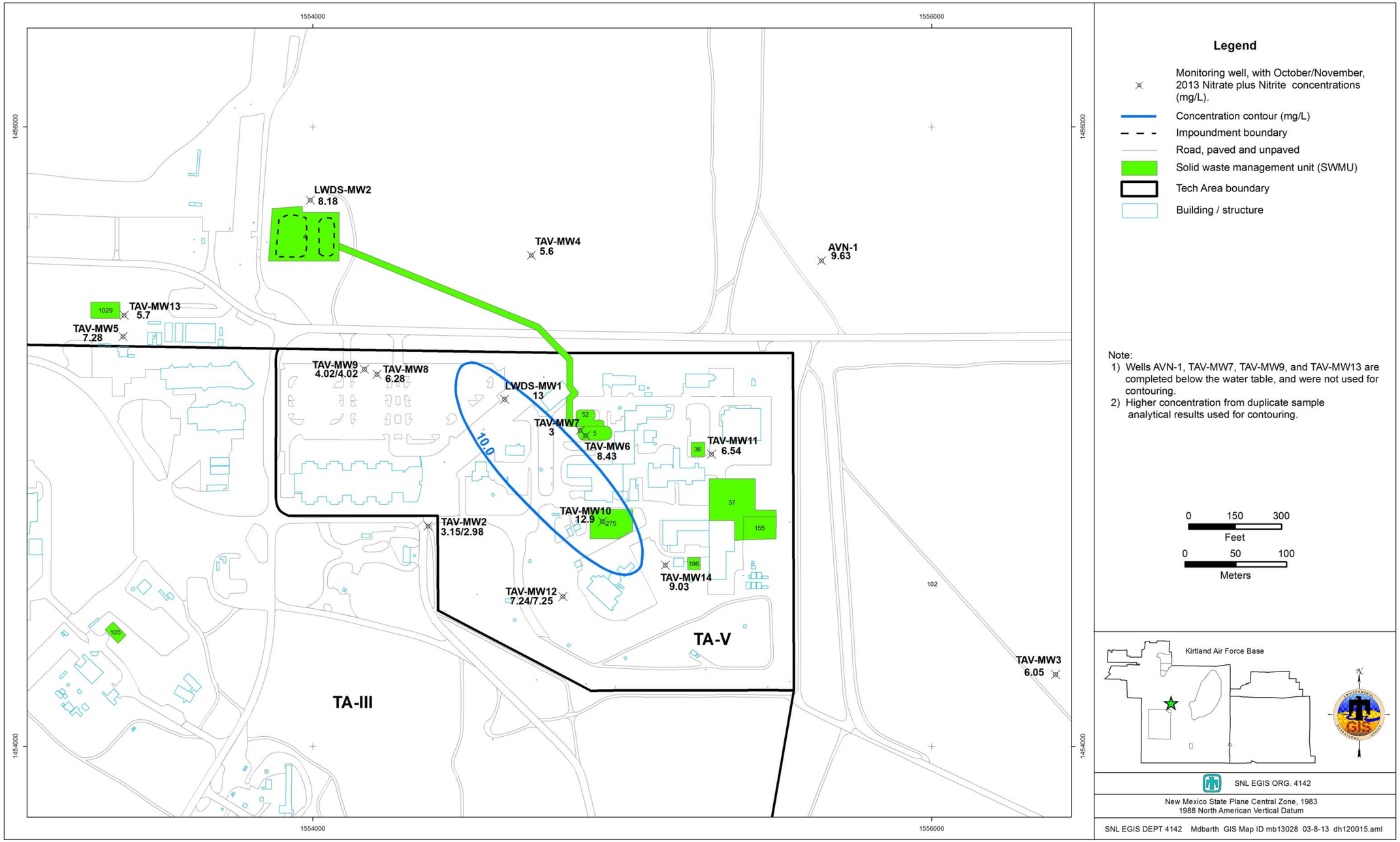


**Figure 5-5. Distribution of Nitrate plus Nitrite in Groundwater at SNL/NM TA-V, October/November 2013**

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Although the Order requires that the DOE/NNSA and Sandia evaluate the nature and extent of contamination in the TA-V Study Area in general terms, no specific reporting requirements are prescribed in the Order (NMED April 2004). DOE/NNSA and Sandia continue to present the TA-V data, along with the data from other groundwater sites, in this SNL/NM Annual Groundwater Monitoring Report. The outline of this report is based on the required elements of a "Periodic Monitoring Report" described in Section X.D. of the Order.

In this report TA-V groundwater monitoring data are presented for both hazardous and radioactive constituents; however, the analytical data for radionuclides (gamma spectroscopy, gross alpha/beta activity, and tritium) are provided voluntarily by the DOE/NNSA and Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Order. Additional information on radionuclides and the scope of the Order is available in Section III.A of the Order (NMED April 2004).

### 5.3 Scope of Activities

The activities for the TA-V investigation for CY 2013, including plans and reports, are listed in Section 5.1.5. The field activities completed in the study area include groundwater level measurements, soil-vapor monitoring, and groundwater monitoring. The CY 2013 groundwater sampling events (four quarterly events) are summarized in Table 5-4, and the analytical parameters for each well for each sampling event are listed in Table 5-5.

**Table 5-4. Groundwater Monitoring Well Network and Sampling Dates for the TA-V Study Area, Calendar Year 2013**

| Date of Sampling Event | Wells Sampled | SAP |
|---|---|---|
| February/March 2013 | AVN-1, LWDS-MW1, LWDS-MW2, TAV-MW2, TAV-MW4, TAV-MW6, TAV-MW8, TAV-MW10, TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14 | *TA-V Groundwater Monitoring Mini-SAP for Second Quarter, Fiscal Year 2013* (SNL January 2013) |
| May/June 2013 | AVN-1, LWDS-MW1, LWDS-MW2, TAV-MW2, TAV-MW3, TAV-MW4, TAV-MW5, TAV-MW6, TAV-MW7, TAV-MW8, TAV-MW9, TAV-MW10, TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14 | *TA-V Groundwater Monitoring Mini-SAP for Third Quarter, Fiscal Year 2013* (SNL April 2013) |
| July/August 2013 | AVN-1, LWDS-MW1, LWDS-MW2, TAV-MW2, TAV-MW4, TAV-MW6, TAV-MW8, TAV-MW10, TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14 | *TA-V Groundwater Monitoring Mini-SAP for Fourth Quarter, Fiscal Year 2013* (SNL July 2013) |
| October/November 2013 | AVN-1, LWDS-MW1, LWDS-MW2, TAV-MW2, TAV-MW3, TAV-MW4, TAV-MW5, TAV-MW6, TAV-MW7, TAV-MW8, TAV-MW9, TAV-MW10, TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14 | *TA-V Groundwater Monitoring Mini-SAP for First Quarter, Fiscal Year 2014* (SNL September 2013) |

**NOTES:**
AVN = Area V (North).
LWDS = Liquid Waste Disposal System.
MW = monitoring well.
SAP = Sampling and Analysis Plan.
TAV = Technical Area V (monitoring well designation only)
TA-V = Technical Area V.

## Table 5-5. Parameters Sampled at TA-V Wells for Each Sampling Event, Calendar Year 2013

| Parameter | February/March 2013 | Parameter | May/June 2013 |
|---|---|---|---|
| Alkalinity<br>Calcium, total<br>Chloride<br>Iron, dissolved<br>Magnesium, total<br>Manganese, dissolved<br>NPN<br>Potassium, total<br>Sodium, total<br>Sulfate<br>Sulfides<br>Total Organic Carbon<br>VOCs | AVN-1<br>LWDS-MW1<br>LWDS-MW1 (dup)<br>LWDS-MW2<br>TAV-MW2<br>TAV-MW4<br>TAV-MW6<br>TAV-MW8<br>TAV-MW8<br>TAV-MW10<br>TAV-MW11<br>TAV-MW12<br>TAV-MW13<br>TAV-MW14<br>TAV-MW14 (dup) | Alkalinity<br>Calcium, total<br>Chloride<br>Iron, dissolved<br>Magnesium, total<br>Manganese, dissolved<br>NPN<br>Potassium, total<br>Sodium, total<br>Sulfate<br>Sulfides<br>Total Organic Carbon<br>VOCs | AVN-1<br>LWDS-MW1<br>LWDS-MW2<br>LWDS-MW2 (dup)<br>TAV-MW2<br>TAV-MW3<br>TAV-MW4<br>TAV-MW5<br>TAV-MW6<br>TAV-MW7<br>TAV-MW7 (dup)<br>TAV-MW8<br>TAV-MW9<br>TAV-MW10<br>TAV-MW11<br>TAV-MW12<br>TAV-MW13<br>TAV-MW13 (dup)<br>TAV-MW14 |
| **Parameter** | **July/August 2013** | **Parameter** | **October/November 2013** |
| Alkalinity<br>Anions<br>Gamma Spec*<br>Gross Alpha<br>Gross Beta<br>NPN<br>Sulfides<br>TAL Metals, plus Total Uranium<br>Total Organic Carbon<br>Tritium<br>VOCs | AVN-1<br>LWDS-MW1<br>LWDS-MW2<br>TAV-MW2<br>TAV-MW4<br>TAV-MW6<br>TAV-MW6 (dup)<br>TAV-MW8<br>TAV-MW10<br>TAV-MW11<br>TAV-MW11 (dup)<br>TAV-MW12<br>TAV-MW13<br>TAV-MW14 | Alkalinity<br>Calcium, total<br>Chloride<br>Iron, dissolved<br>Magnesium, total<br>Manganese, dissolved<br>NPN<br>Potassium, total<br>Sodium, total<br>Sulfate<br>Total Organic Carbon<br>VOCs | AVN-1<br>LWDS-MW1<br>LWDS-MW2<br>TAV-MW2<br>TAV-MW2 (dup)<br>TAV-MW3<br>TAV-MW4<br>TAV-MW5<br>TAV-MW6<br>TAV-MW7<br>TAV-MW8<br>TAV-MW9<br>TAV-MW9 (dup)<br>TAV-MW10<br>TAV-MW11<br>TAV-MW12<br>TAV-MW12 (dup)<br>TAV-MW13<br>TAV-MW14 |

**NOTES:**

AVN = Area V (North).
dup = Duplicate sample.
Gamma Spec* = Gamma spectroscopy short list (Americium-241, Cesium-137, Cobalt-60, and Potassium-40).
LWDS = Liquid Waste Disposal System.
MW = monitoring well.
NPN = Nitrate plus nitrite (reported as nitrogen).
TAL = Target Analyte List.
TAV = Technical Area V (monitoring well designation only)
TA-V = Technical Area V.
VOC = Volatile organic compound.

Quality control (QC) samples are collected in the field at the time of environmental sample collection. Field QC samples include duplicate environmental, equipment blank (EB), field blank (FB), and trip blank (TB) samples. Field QC samples are used to monitor the sampling process. Duplicate environmental samples are used to measure the precision of the sampling process. EB samples are used to verify the effectiveness of sampling equipment decontamination procedures. FB samples are collected for VOCs to assess whether contamination of the samples had resulted from ambient field conditions. The FB sample was prepared by pouring deionized water into sample containers at the sample point to simulate the transfer of environmental samples from the sampling system to the sample container. TB samples are used to determine whether VOCs contaminated the sample during preparation, transportation, or handling prior to receipt by the analytical laboratory. In addition, split samples are used to verify the performance of the analytical laboratory.

## 5.4 Field Methods and Measurements

The monitoring procedures conducted for TA-V groundwater monitoring are described in detail in Section 1.3. The water level information obtained in 2013 was used to develop the potentiometric surface map presented in Figure 5-3 and the hydrographs presented in Figures 5C-1 through 5C-3 (Attachment 5C).

## 5.5 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using EPA-specified protocols described in Section 1.3.2 (Tables 1-5 and 1-6).

## 5.6 Summary of Analytical Results

This section discusses monitoring results, exceedances of standards, and pertinent trends in concentrations for COCs in the TA-V Study Area that exceed regulatory standards. The analytical results and field measurements for all TA-V sampling events are presented in Attachment 5A, Tables 5A-1 through 5A-9; concentration trend plots for COCs that exceed the MCLs are presented in Attachment 5B, Figures 5B-1 through 5B-8. A summary of detected VOC results are presented in Table 5A-1. The method detection limits (MDLs) for all analyzed VOCs are listed in Table 5A-2.

The VOCs detected at concentrations above the MDL in groundwater samples from TA-V Study Area monitoring wells include the following:

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

Four VOCs were detected during CY 2013. Three of these VOCs have promulgated MCLs. Only TCE exceeds its corresponding MCL, which is 5 μg/L (Table 5A-1). TCE was detected above the MCL in samples from five monitoring wells: LWDS-MW1, TAV-MW6, TAV-MW10, TAV-MW12, and TAV-MW14. The maximum concentration of TCE detected during this reporting period is 18.4 μg/L in the sample collected from monitoring well LWDS-MW1 in March 2013. Figures 5B-1, 5B-2, 5B-3, 5B-4, and 5B-5 (Attachment 5B) demonstrate that, over the lifetime of the wells, the TCE concentrations are decreasing over time in monitoring well LWDS-MW1, increasing over time in monitoring wells TAV-MW6, TAV-MW10, and TAV-MW12, and remain relatively steady in TAV-MW14. Concentrations in TAV-MW6 have become relatively steady since 2011.

The analytical results for nitrate plus nitrite (NPN) (reported as nitrogen) are presented in Table 5A-3 (Attachment 5A). During this reporting period, NPN results exceed the MCL of 10 mg/L in samples from monitoring wells LWDS-MW1, TAV-MW10, and AVN-1. The maximum concentration of NPN detected during this reporting period is 13.0 mg/L in the sample collected from monitoring well LWDS-MW1 in November 2013. SNL/NM personnel requested a reanalysis of the TAV-MW6 environmental sample and environmental duplicate from the July/August sampling event because initial results were much greater than historical values. The initial analysis reported NPN at 79.6 mg/L in the environmental sample and 76.7 mg/L in the environmental duplicate sample. The reanalysis reported respective values at 8.48 mg/L and 8.65 mg/L. The original results were qualified as unusable during data validation because results were inconsistent with reanalysis and a dilution recording error was suspected.

Figure 5B-6 (Attachment 5B) demonstrates that the NPN concentrations in monitoring well LWDS-MW1 typically have exceeded the MCL and remained relatively stable over time. Figure 5B-7 (Attachment 5B) demonstrates that NPN concentrations in monitoring well TAV-MW10 have slightly exceeded the MCL with the trend increasing over time. Figure 5B-8 demonstrates that the NPN concentration in monitoring well AVN-1 occasionally exceeds the MCL.

The analytical results for anions (bromide, chloride, fluoride, and sulfate), alkalinity, and sulfides are presented in Table 5A-4 (Attachment 5A). Only fluoride has a promulgated MCL, and none of the results exceed the MCL.

Total organic carbon (TOC) results are presented in Table 5A-5 (Attachment 5A); no MCL is established for TOC.

Total metal results are presented in Table 5A-6, and filtered total metal results are presented in Table 5A-7; no metal results exceed established MCLs (Attachment 5A).

Gross alpha activity is measured as a screening tool and in accordance with 40 Code of Federal Regulations, Parts 9, 141, and 142, Table I-4 does not include uranium, which is measured independently. Therefore, gross alpha activity measurements were corrected by subtracting the total uranium activity. Radiological results are further reviewed by an SNL/NM Certified Health Physicist to assure that the samples are nonradioactive. Tritium, gross alpha/beta activity, and gamma spectroscopy results are presented in Table 5A-8; all radionuclide results are below established MCLs (Attachment 5A).

Field water quality parameters were measured during purging of each well prior to sampling and included temperature, specific conductivity, oxidation-reduction potential, potential of hydrogen (pH), turbidity, and dissolved oxygen. The parameter measurements obtained immediately before sample collection are presented in Table 5A-9 (Attachment 5A).

## 5.7 Quality Control Results

Field and laboratory QC samples were collected and prepared as described in Section 1.3. Data validation qualifiers are presented with the analytical results in Tables 5A-1 through 5A-8 (Attachment 5A). The results of QC samples and the impact on data quality for the TA-V quarterly sampling events are discussed in the following sections.

Duplicate sampling results for all wells and all sampling periods show good correlation (relative percent difference [RPD] values of less than 20 for VOCs and less than 35 for inorganic constituents) for all calculated parameters except for aluminum in monitoring well LWDS-MW2 sample and manganese in monitoring sample TAV-MW13 during the May/June 2013 sampling event. The RPD for aluminum was calculated at 37, but is considered an estimated value because the result for the environmental sample is below the practical quantitation limit. The RPD for manganese was calculated at 61.

The results for the EB analyses are as follows:

- **February/March 2013 Sampling Event—**EB samples were collected prior to sampling monitoring wells LWDS-MW1 and TAV-MW14 and submitted for all analyses. Alkalinity, bromodichloromethane, bromoform, calcium, chloride, chloroform, dibromochloromethane, sodium, sulfate, and TCE were detected in EB samples. No correction was required, because these parameters were not detected in environmental samples nor were reported values in environmental samples greater than five times the EB concentration.

- **May/June 2013 Sampling Event—**EB samples were collected prior to sampling monitoring wells LWDS-MW2, TAV-MW7, and TAV-MW13 and submitted for all analyses. Various VOCs, metals, chloride, and TOC were detected in EB samples. No correction was necessary for analytes not detected in environmental samples, or parameters detected in environmental samples at concentrations greater than five times the EB result. Copper and TOC in LWDS-MW2, TAV-MW7, and TAV-MW13 samples were qualified as not detected during data validation, because detected values were less than five times the EB concentrations. Iron in TAV-MW13 samples was qualified as not detected during data validation, because detected values are less than five times the EB concentration. Cobalt and zinc in LWDS-MW2 samples were qualified as not detected during data validation, because detected values are less than five times the EB concentration.

- **July/August 2013 Sampling Event**— EB samples were collected prior to sampling monitoring wells TAV-MW6 and TAV-MW11 and submitted for all analyses. Alkalinity, calcium, chloroform, methylene chloride, and TOC were detected in EB samples. No correction was required for alkalinity, calcium, and chloroform, because these parameters were not detected in environmental samples, nor were reported values in environmental samples greater than five times the equipment blank concentration. The EB sample associated with TAV-MW11 detected methylene chloride and TOC #2 at concentrations less than five times the environmental samples. Both methylene chloride and TOC #2 were qualified as not detected during data validation due to blank contamination.

- **October/November 2013 Sampling Event—**EB samples were collected prior to sampling monitoring wells TAV-MW2, TAV-MW9, and TAV-MW12 and submitted for all analyses. Acetone, alkalinity, bromodichloromethane, bromoform, calcium, chloride, chloroform, dibromochloromethane, and TOC were detected in EB samples. No correction was required for acetone, bromodichloromethane, bromoform, chloride, calcium, chloroform, dibromochloromethane, because these parameters were not detected in environmental samples, nor were reported values in environmental samples greater than five times the equipment blank concentration. The EB sample associated with TAV-MW2 detected acetone at a concentration less than ten times the environmental sample. TOC was detected in all EB samples at concentrations less than five times the associated environmental samples. Acetone in TAV-MW2 and TOC in TAV-MW2, TAV-MW9, and TAV-MW12 were qualified as not detected during data validation due to blank contamination.

The results for the FB analyses are as follows:

- **February/March 2013 Sampling Event—**FB samples were collected at monitoring wells TAV-MW2 and TAV-MW6. The compounds detected in FB samples included bromodichloromethane, bromoform, chloroform, and dibromochloromethane. No correction was required because these compounds were not detected in associated environmental samples, except for bromodichloromethane. Bromodichloromethane was detected in the field blank sample at a concentration greater than the environmental sample result from TAV-MW6. As a result, this compound was qualified as not detected during data validation for the TAV-MW6 environmental sample.

- **May/June 2013 Sampling Event—**FB samples were collected at monitoring wells LWDS-MW1, TAV-MW8, TAV-MW9, and TAV-MW14. The compounds detected in FB samples included acetone, bromodichloromethane, bromoform, chloroform, and dibromochloromethane. No correction was required because these compounds were not detected in associated environmental samples.

- **July/August 2013 Sampling Event—**FB samples were collected at monitoring wells AVN-1, LWDS-MW2, and TAV-MW10. The compounds detected in FB samples included bromodichloromethane, chloroform, dibromochloromethane, methylene chloride, and TCE. No correction was required because these compounds were not detected in associated environmental samples, except for methylene chloride and TCE. Both methylene chloride and TCE were detected in the FB sample at concentrations less than five times the environmental sample result from TAV-MW10. These compounds were qualified as not detected during data validation for the TAV-MW10 environmental sample, although the TCE concentration (16.4 µg/L) is similar to historical values.

- **October/November 2013 Sampling Event—**FB samples were collected at AVN-1, TAV-MW6, TAV-MW8, and TAV-MW10. The compounds detected in FB samples included acetone, bromodichloromethane, bromoform, chloroform, dibromochloromethane, and TCE. No correction was required because these compounds were not detected in associated environmental samples, except for TCE. TCE was reported in the FB sample associated with TAV-MW8, at a concentration less than five times the environmental sample. This result should be qualified as not detected; however, historical data reviewed during data validation indicates evidence of TCE in the environmental sample. The TCE result in the environmental sample is retained based on historical concentrations.

The results for the TB analyses are as follows:

- **February/March 2013 Sampling Event—** TBs were brought to the field and accompanied each sample shipment. A total of 14 VOC TB samples were submitted with February and March 2013 samples. No VOCs were detected above associated laboratory MDLs.

- **May/June 2013 Sampling Event—** TBs were brought to the field and accompanied each sample shipment. A total of 19 VOC TB samples were submitted with May and June 2013 samples. No VOCs were detected above associated laboratory MDLs.

- **July/August 2013 Sampling Event—** TBs were brought to the field and accompanied each sample shipment. A total of 14 VOC TB samples were submitted with July and August 2013 samples. No VOCs were detected above associated laboratory MDLs, except

methylene chloride. Methylene chloride was detected in TB samples associated with LWDS-MW2, TAV-MW2, TAV-MW11, and TAV-MW13 samples. Methylene chloride is reported at similar concentrations as the associated environmental samples. As a result, the affected environmental samples were qualified as not detected during data validation.

- **October/November 2013 Sampling Event—**TBs were brought to the field and accompanied each sample shipment. A total of 19 VOC TB samples were submitted with October and November 2013 samples. No VOCs were detected above associated laboratory MDLs.

## 5.8 Variances and Nonconformances

No variances or nonconformances from requirements specified in the TA-V Mini- SAPs (SNL January 2013, SNL April 2013, SNL July 2013, and SNL September 2013) were identified during CY 2013 sampling activities. However, the following project-specific issues associated with these sampling events were noted:

- **All Sampling Events—**Monitoring well LWDS-MW1 was purged dry prior to minimum volume and stability requirements. Given the low yield of this well, it was allowed to recover and then sampled to collect a representative groundwater sample.

- **February/March 2013 Sampling Event—**The TA-V parking lot was repaved during TA-V monitoring activities. Sampling at monitoring wells TAV-MW8 and LWDS-MW1 were performed upon completion of the parking lot.

- **May/June 2013 Sampling Event—**A new groundwater sample truck was operated from May 26 to June 12, 2013. On June 6, 2013 field team personnel indicated heavy exhaust fumes inside the sample truck. As a result, an extra FB sample was collected on June 10, 2013. No abnormal samples results were discovered from environmental or field QC samples. Field team personnel have requested repairs or modifications to the exhaust system.

- **July/August 2013 Sampling Event—**There was limited access to monitoring wells TAV-MW6, TAV-MW10, and LWDS-MW1 due to field activities associated with SWMU 52. The sampling schedule was adjusted around the SWMU 52 activities. Heavy vehicle traffic from SWMU 52 activities, such as cement trucks and heavy equipment, occurred during the July 2013 sampling event.

- **October/November 2013 Sampling Event—**The color of groundwater from TAV-MW9 had a yellow tint, and groundwater odor was sulfur-like. All analytical results from TAV-MW9 are comparable to historical values. TCE was detected in the FB sample associated with TAV-MW8. SNL/NM personnel are collecting additional field QC samples to evaluate these anomalies. The NMED DOE Oversight Bureau (OB) collected split samples with DOE/NNSA and Sandia during the October/November 2013 sampling event at monitoring wells TAV-MW3, TAV-MW4, TAV-MW7, TAV-MW9, TAV-MW10, and TAV-MW12. The NMED DOE OB analytical results are not reported in this document, but are available through DOE/NNSA Sandia Field Office.

## 5.9 Summary and Conclusions

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

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

TCE results exceed the MCL of 5 μg/L in samples from monitoring wells LWDS-MW1, TAV-MW6, TAV-MW10, TAV-MW12, and TAV-MW14. The maximum concentration of TCE detected during this reporting period is 18.4 μg/L in the sample collected from monitoring well LWDS-MW1 in March 2013.

Nitrate concentrations in groundwater at TA-V are primarily derived from unknown upgradient sources. During this reporting period, NPN results exceed the MCL of 10 mg/L in samples from monitoring wells LWDS-MW1, TAV-MW10, and AVN-1. The maximum concentration of NPN detected during this reporting period is 13.0 mg/L in the sample collected from monitoring well LWDS-MW1 in November 2013.

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

- The primary COCs for the TA-V Study Area are TCE and nitrate.
- The primary sources of TCE and possibly nitrate in the TA-V Study Area consist of two wastewater disposal systems (SWMUs 5 and 275). An upgradient source of nitrate may be present.
- Based on the historical use and disposal of chlorinated solvents, the extent of TCE in groundwater is associated with multiple TA-V wastewater releases containing VOCs and the subsequent transport of these VOCs through the vadose zone to the water table.
- The distribution of low concentrations of TCE in the regional aquifer is principally attributed to the combined effect of low groundwater velocities, dispersion, and dilution.
- The distribution of nitrate above the background level is laterally widespread in the study area, but the lateral extent of nitrate above the MCL is limited. The extent of the 10 mg/L concentration contour in 2013, which accounts for the nitrate contamination in the center of TA-V, has remained relatively stable. An unknown upgradient source probably contributes to the nitrate in the two AVN wells.

Ongoing environmental studies of the TA-V Study Area include the following:

- Continue obtaining periodic measurements of groundwater elevations in all TA-V monitoring wells.
- Continue collecting groundwater samples at the 16 TA-V groundwater monitoring wells. At a minimum, the analytes for groundwater sampling will consist of VOCs and NPN.
- Continue reporting TA-V monitoring results in future SNL/NM Annual Groundwater Monitoring Reports.
- Update the Current Conceptual Model (SNL April 2004a) and the CME Report (SNL July 2005).

## 5.10 References


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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 Organic Compounds,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **AVN-1** 18-Feb-13 | 1,2,3-Trichlorobenzene | 0.380 | 0.300 | 1.00 | NE | B, J | 1.00U | 093517-001 | SW846 8260B |
| **LWDS-MW1** 11-Mar-13 | Toluene | 0.320 | 0.300 | 1.00 | 1000 | J | | 093525-001 | SW846 8260B |
| | Trichloroethene | **18.1** | 0.300 | 1.00 | 5.00 | | | 093525-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 3.52 | 0.300 | 1.00 | 70.0 | | | 093525-001 | SW846 8260B |
| **LWDS-MW1** (Duplicate) 11-Mar-13 | Toluene | 0.360 | 0.300 | 1.00 | 1000 | J | | 093526-001 | SW846 8260B |
| | Trichloroethene | **18.4** | 0.300 | 1.00 | 5.00 | | | 093526-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 3.54 | 0.300 | 1.00 | 70.0 | | | 093526-001 | SW846 8260B |
| **TAV-MW2** 12-Feb-13 | Trichloroethene | 0.740 | 0.300 | 1.00 | 5.00 | J | | 093508-001 | SW846 8260B |
| **TAV-MW4** 20-Feb-13 | Chloroform | 0.720 | 0.300 | 1.00 | NE | J | | 093521-001 | SW846 8260B |
| | Trichloroethene | 2.77 | 0.300 | 1.00 | 5.00 | | | 093521-001 | SW846 8260B |
| **TAV-MW6** 25-Feb-13 | Bromodichloromethane | 0.730 | 0.300 | 1.00 | NE | J | 1.00UJ | 093533-001 | SW846 8260B |
| | Trichloroethene | **13.3** | 0.300 | 1.00 | 5.00 | | | 093533-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 2.28 | 0.300 | 1.00 | 70.0 | | | 093533-001 | SW846 8260B |
| **TAV-MW8** 15-Feb-13 | Trichloroethene | 2.15 | 0.300 | 1.00 | 5.00 | | | 093511-001 | SW846 8260B |
| **TAV-MW10** 27-Feb-13 | Trichloroethene | **13.6** | 0.300 | 1.00 | 5.00 | | | 093536-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 2.45 | 0.300 | 1.00 | 70.0 | | | 093536-001 | SW846 8260B |
| **TAV-MW11** 14-Feb-13 | Trichloroethene | 2.75 | 0.300 | 1.00 | 5.00 | | | 093515-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 0.340 | 0.300 | 1.00 | 70.0 | J | | 093515-001 | SW846 8260B |
| **TAV-MW12** 19-Feb-13 | Trichloroethene | **7.85** | 0.300 | 1.00 | 5.00 | | | 093519-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 0.450 | 0.300 | 1.00 | 70.0 | J | | 093519-001 | SW846 8260B |
| **TAV-MW14** 21-Feb-13 | Trichloroethene | **6.54** | 0.300 | 1.00 | 5.00 | | | 093530-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 0.820 | 0.300 | 1.00 | 70.0 | J | | 093530-001 | SW846 8260B |
| **TAV-MW14** (Duplicate) 21-Feb-13 | Trichloroethene | **6.65** | 0.300 | 1.00 | 5.00 | | | 093531-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 0.840 | 0.300 | 1.00 | 70.0 | J | | 093531-001 | SW846 8260B |
| | | | | | | | | | |
| **LWDS-MW1** 10-Jun-13 | Trichloroethene | **18.1** | 0.300 | 1.00 | 5.00 | | | 093986-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 2.99 | 0.300 | 1.00 | 70.0 | | | 093986-001 | SW846 8260B |
| **TAV-MW2** 28-May-13 | Trichloroethene | 0.760 | 0.300 | 1.00 | 5.00 | J | | 093950-001 | SW846 8260B |
| **TAV-MW4** 05-Jun-13 | Chloroform | 0.670 | 0.300 | 1.00 | NE | J | | 093976-001 | SW846 8260B |
| | Trichloroethene | 2.82 | 0.300 | 1.00 | 5.00 | | | 093976-001 | SW846 8260B |
| **TAV-MW6** 11-Jun-13 | Trichloroethene | **15.8** | 0.300 | 1.00 | 5.00 | | | 093990-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 2.45 | 0.300 | 1.00 | 70.0 | | | 093990-001 | SW846 8260B |

Refer to footnotes on page 5A-89.

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

## Calendar Year 2013

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW6** | Trichloroethene | **15.8** | 0.300 | 1.00 | 5.00 | | | 093990-001 | SW846 8260B |
| 11-Jun-13 | cis-1,2-Dichloroethene | 2.45 | 0.300 | 1.00 | 70.0 | | | 093990-001 | SW846 8260B |
| **TAV-MW8** 23-May-13 | Trichloroethene | 1.86 | 0.300 | 1.00 | 5.00 | | | 093983-001 | SW846 8260B |
| **TAV-MW10** | Trichloroethene | **15.8** | 0.300 | 1.00 | 5.00 | | | 093994-001 | SW846 8260B |
| 12-Jun-13 | cis-1,2-Dichloroethene | 2.65 | 0.300 | 1.00 | 70.0 | | | 093994-001 | SW846 8260B |
| **TAV-MW11** 03-Jun-13 | Trichloroethene | 2.70 | 0.300 | 1.00 | 5.00 | | | 093968-001 | SW846 8260B |
| **TAV-MW12** | Trichloroethene | **7.14** | 0.300 | 1.00 | 5.00 | | | 093972-001 | SW846 8260B |
| 04-Jun-13 | cis-1,2-Dichloroethene | 0.390 | 0.300 | 1.00 | 70.0 | J | | 093972-001 | SW846 8260B |
| **TAV-MW14** | Trichloroethene | **6.47** | 0.300 | 1.00 | 5.00 | | | 093980-001 | SW846 8260B |
| 06-Jun-13 | cis-1,2-Dichloroethene | 0.770 | 0.300 | 1.00 | 70.0 | J | | 093980-001 | SW846 8260B |
| | | | | | | | | | |
| **LWDS-MW1** | Trichloroethene | **17.6** | 0.300 | 1.00 | 5.00 | | | 094420-001 | SW846 8260B |
| 29-Jul-13 | cis-1,2-Dichloroethene | 4.40 | 0.300 | 1.00 | 70.0 | | | 094420-001 | SW846 8260B |
| **LWDS-MW2** 17-Jul-13 | Methylene chloride | **10.9** | 3.00 | 10.0 | 5.00 | | 11U | 094396-001 | SW846 8260B |
| **TAV-MW2** | Methylene chloride | **10.7** | 3.00 | 10.0 | 5.00 | | 11U | 094394-001 | SW846 8260B |
| 16-Jul-13 | Trichloroethene | 0.600 | 0.300 | 1.00 | 5.00 | J | | 094394-001 | SW846 8260B |
| **TAV-MW4** | Chloroform | 0.710 | 0.300 | 1.00 | NE | J | | 094413-001 | SW846 8260B |
| 24-Jul-13 | Trichloroethene | 2.40 | 0.300 | 1.00 | 5.00 | | | 094413-001 | SW846 8260B |
| **TAV-MW6** | Trichloroethene | **16.1** | 0.300 | 1.00 | 5.00 | | | 094417-001 | SW846 8260B |
| 31-Jul-13 | cis-1,2-Dichloroethene | 3.29 | 0.300 | 1.00 | 70.0 | | | 094417-001 | SW846 8260B |
| **TAV-MW6** (Duplicate) | Trichloroethene | **15.2** | 0.300 | 1.00 | 5.00 | | | 094418-001 | SW846 8260B |
| 31-Jul-13 | cis-1,2-Dichloroethene | 3.05 | 0.300 | 1.00 | 70.0 | | | 094418-001 | SW846 8260B |
| **TAV-MW8** 22-Jul-13 | Trichloroethene | 2.04 | 0.300 | 1.00 | 5.00 | | | 094404-001 | SW846 8260B |
| **TAV-MW10** | Trichloroethene | **16.4** | 0.300 | 1.00 | 5.00 | | 16.4U | 094422-001 | SW846 8260B |
| 30-Jul-13 | cis-1,2-Dichloroethene | 3.62 | 0.300 | 1.00 | 70.0 | | | 094422-001 | SW846 8260B |
| **TAV-MW11** | Methylene chloride | **11.2** | 3.00 | 10.0 | 5.00 | | 11U | 094401-001 | SW846 8260B |
| 18-Jul-13 | Trichloroethene | 2.43 | 0.300 | 1.00 | 5.00 | | | 094401-001 | SW846 8260B |
| **TAV-MW11** (Duplicate) | Methylene chloride | **11.1** | 3.00 | 10.0 | 5.00 | | 11U | 094402-001 | SW846 8260B |
| 18-Jul-13 | Trichloroethene | 2.53 | 0.300 | 1.00 | 5.00 | | | 094402-001 | SW846 8260B |
| **TAV-MW12** | Trichloroethene | **8.36** | 0.300 | 1.00 | 5.00 | | | 094406-001 | SW846 8260B |
| 23-Jul-13 | cis-1,2-Dichloroethene | 0.490 | 0.300 | 1.00 | 70.0 | J | | 094406-001 | SW846 8260B |
| **TAV-MW13** 15-Jul-13 | Methylene chloride | **7.60** | 3.00 | 10.0 | 5.00 | J | 10U | 094392-001 | SW846 8260B |

Refer to footnotes on page 5A-89.

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

## Calendar Year 2013

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW14** | Trichloroethene | **6.22** | 0.300 | 1.00 | 5.00 | | | 094411-001 | SW846 8260B |
| 24-Jul-13 | cis-1,2-Dichloroethene | 0.870 | 0.300 | 1.00 | 70.0 | J | | 094411-001 | SW846 8260B |
| | | | | | | | | | |
| **LWDS-MW1** | Trichloroethene | **15.9** | 0.300 | 1.00 | 5.00 | | | 094838-001 | SW846 8260B |
| 11-Nov-13 | cis-1,2-Dichloroethene | 3.53 | 0.300 | 1.00 | 70.0 | | | 094838-001 | SW846 8260B |
| **TAV-MW2** 28-Oct-13 | Trichloroethene | 0.700 | 0.300 | 1.00 | 5.00 | J | | 094815-001 | SW846 8260B |
| **TAV-MW2** (Duplicate) | Acetone | 6.32 | 3.00 | 10.0 | NE | J | 10UJ | 094816-001 | SW846 8260B |
| 28-Oct-13 | Trichloroethene | 0.680 | 0.300 | 1.00 | 5.00 | J | | 094816-001 | SW846 8260B |
| **TAV-MW4** | Chloroform | 0.660 | 0.300 | 1.00 | NE | J | | 094821-001 | SW846 8260B |
| 30-Oct-13 | Trichloroethene | 2.43 | 0.300 | 1.00 | 5.00 | | | 094821-001 | SW846 8260B |
| **TAV-MW6** | Trichloroethene | **15.8** | 0.300 | 1.00 | 5.00 | | | 094834-001 | SW846 8260B |
| 06-Nov-13 | cis-1,2-Dichloroethene | 2.98 | 0.300 | 1.00 | 70.0 | | | 094834-001 | SW846 8260B |
| **TAV-MW8** 29-Oct-13 | Trichloroethene | 2.07 | 0.300 | 1.00 | 5.00 | | NJ | 094819-001 | SW846 8260B |
| **TAV-MW10** | Trichloroethene | **16.9** | 0.300 | 1.00 | 5.00 | | | 094836-001 | SW846 8260B |
| 07-Nov-13 | cis-1,2-Dichloroethene | 3.28 | 0.300 | 1.00 | 70.0 | | | 094836-001 | SW846 8260B |
| **TAV-MW11** 31-Oct-13 | Trichloroethene | 2.55 | 0.300 | 1.00 | 5.00 | | | 094823-001 | SW846 8260B |
| **TAV-MW12** | Trichloroethene | **9.35** | 0.300 | 1.00 | 5.00 | | | 094830-001 | SW846 8260B |
| 05-Nov-13 | cis-1,2-Dichloroethene | 0.620 | 0.300 | 1.00 | 70.0 | J | | 094830-001 | SW846 8260B |
| **TAV-MW12** (Duplicate) | Trichloroethene | **9.43** | 0.300 | 1.00 | 5.00 | | | 094831-001 | SW846 8260B |
| 05-Nov-13 | cis-1,2-Dichloroethene | 0.620 | 0.300 | 1.00 | 70.0 | J | | 094831-001 | SW846 8260B |
| **TAV-MW14** | Trichloroethene | **7.90** | 0.300 | 1.00 | 5.00 | | | 094825-001 | SW846 8260B |
| 04-Nov-13 | cis-1,2-Dichloroethene | 1.11 | 0.300 | 1.00 | 70.0 | | | 094825-001 | SW846 8260B |

Refer to footnotes on page 5A-89.

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

## Calendar Year 2013

| Analyte | MDL[b] (µg/L) | Analyte | MDL[b] (µg/L) |
|---|---|---|---|
| 1,1,1-Trichloroethane | 0.300 | Chlorobenzene | 0.300 |
| 1,1,2,2-Tetrachloroethane | 0.300 | Chloroethane | 0.300 |
| 1,1,2-Trichloroethane | 0.300 | Chloroform | 0.300 |
| 1,1-Dichloroethane | 0.300 | Chloromethane | 0.300 |
| 1,1-Dichloroethene | 0.300 | Cyclohexane | 0.300 |
| 1,2,3-Trichlorobenzene | 0.300 | Dibromochloromethane | 0.300 |
| 1,2,4-Trichlorobenzene | 0.300 | Dichlorodifluoromethane | 0.300 |
| 1,2-Dibromo-3-chloropropane | 0.300 | Ethyl benzene | 0.300 |
| 1,2-Dibromoethane | 0.300 | Isopropylbenzene | 0.300 |
| 1,2-Dichlorobenzene | 0.300 | Methyl acetate | 1.50 |
| 1,2-Dichloroethane | 0.300 | Methylcyclohexane | 3.00 |
| 1,2-Dichloropropane | 0.300 | Methylene chloride | 3.00 |
| 1,3-Dichlorobenzene | 0.300 | Styrene | 0.300 |
| 1,4-Dichlorobenzene | 0.300 | Tert-butyl methyl ether | 0.300 |
| 2,2-trifluoroethane, 1,1,2-Trichloro-1 | 1.50 | Tetrachloroethene | 0.300 |
| 2-Butanone | 2.00 | Toluene | 0.300 |
| 2-Hexanone | 2.20 | Trichloroethene | 0.300 |
| 4-methyl-, 2-Pentanone | 1.50 | Trichlorofluoromethane | 0.300 |
| Acetone | 3.00 | Vinyl chloride | 0.300 |
| Benzene | 0.300 | Xylene | 0.300 |
| Bromochloromethane | 0.300 | cis-1,2-Dichloroethene | 0.300 |
| Bromodichloromethane | 0.300 | cis-1,3-Dichloropropene | 0.300 |
| Bromoform | 0.300 | m-, p-Xylene | 0.300 |
| Bromomethane | 0.300 | o-Xylene | 0.300 |
| Carbon disulfide | 1.50 | trans-1,2-Dichloroethene | 0.300 |
| Carbon tetrachloride | 0.300 | trans-1,3-Dichloropropene | 0.300 |

Refer to footnotes on page 5A-89.

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

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **AVN-1** 18-Feb-13 | Nitrate plus nitrite | 9.14 | 0.170 | 0.500 | 10.0 | | | 093517-018 | EPA 353.2 |
| **LWDS-MW1** 11-Mar-13 | Nitrate plus nitrite | **12.0** | 0.170 | 0.500 | 10.0 | | | 093525-018 | EPA 353.2 |
| **LWDS-MW1** (Duplicate) 11-Mar-13 | Nitrate plus nitrite | **12.4** | 0.170 | 0.500 | 10.0 | | | 093526-018 | EPA 353.2 |
| **LWDS-MW2** 13-Feb-13 | Nitrate plus nitrite | 7.75 | 0.170 | 0.500 | 10.0 | | | 093513-018 | EPA 353.2 |
| **TAV-MW2** 12-Feb-13 | Nitrate plus nitrite | 2.91 | 0.085 | 0.250 | 10.0 | | | 093508-018 | EPA 353.2 |
| **TAV-MW4** 20-Feb-13 | Nitrate plus nitrite | 5.54 | 0.170 | 0.500 | 10.0 | | | 093521-018 | EPA 353.2 |
| **TAV-MW6** 25-Feb-13 | Nitrate plus nitrite | 8.40 | 0.170 | 0.500 | 10.0 | | | 093533-018 | EPA 353.2 |
| **TAV-MW8** 15-Feb-13 | Nitrate plus nitrite | 5.74 | 0.170 | 0.500 | 10.0 | | | 093511-018 | EPA 353.2 |
| **TAV-MW10** 27-Feb-13 | Nitrate plus nitrite | **12.4** | 0.850 | 2.50 | 10.0 | | | 093536-018 | EPA 353.2 |
| **TAV-MW11** 14-Feb-13 | Nitrate plus nitrite | 6.62 | 0.170 | 0.500 | 10.0 | | | 093515-018 | EPA 353.2 |
| **TAV-MW12** 19-Feb-13 | Nitrate plus nitrite | 5.97 | 0.170 | 0.500 | 10.0 | | | 093519-018 | EPA 353.2 |
| **TAV-MW13** 26-Feb-13 | Nitrate plus nitrite | 5.49 | 0.170 | 0.500 | 10.0 | | | 093574-018 | EPA 353.2 |
| **TAV-MW14** 21-Feb-13 | Nitrate plus nitrite | 8.71 | 0.170 | 0.500 | 10.0 | | | 093530-018 | EPA 353.2 |
| **TAV-MW14** (Duplicate) 21-Feb-13 | Nitrate plus nitrite | 8.30 | 0.170 | 0.500 | 10.0 | | | 093531-018 | EPA 353.2 |
| | | | | | | | | | |
| **AVN-1** 30-May-13 | Nitrate plus nitrite | 7.75 | 0.170 | 0.500 | 10.0 | | | 093964-018 | EPA 353.2 |
| **LWDS-MW1** 10-Jun-13 | Nitrate plus nitrite | **11.7** | 0.170 | 0.500 | 10.0 | | | 093986-018 | EPA 353.2 |
| **LWDS-MW2** 29-May-13 | Nitrate plus nitrite | 7.03 | 0.170 | 0.500 | 10.0 | | | 093958-018 | EPA 353.2 |
| **LWDS-MW2** (Duplicate) 29-May-13 | Nitrate plus nitrite | 6.87 | 0.170 | 0.500 | 10.0 | | | 093960-018 | EPA 353.2 |

Refer to footnotes on page 5A-89.

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

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW2** 28-May-13 | Nitrate plus nitrite | 2.69 | 0.085 | 0.250 | 10.0 | | | 093950-018 | EPA 353.2 |
| **TAV-MW3** 21-May-13 | Nitrate plus nitrite | 4.79 | 0.085 | 0.250 | 10.0 | | | 093969-018 | EPA 353.2 |
| **TAV-MW4** 05-Jun-13 | Nitrate plus nitrite | 5.39 | 0.170 | 0.500 | 10.0 | | | 093976-018 | EPA 353.2 |
| **TAV-MW5** 15-May-13 | Nitrate plus nitrite | 7.20 | 0.170 | 0.500 | 10.0 | | | 093949-018 | EPA 353.2 |
| **TAV-MW6** 11-Jun-13 | Nitrate plus nitrite | 8.01 | 0.170 | 0.500 | 10.0 | | | 093990-018 | EPA 353.2 |
| **TAV-MW7** 22-May-13 | Nitrate plus nitrite | 3.62 | 0.085 | 0.250 | 10.0 | | | 093977-018 | EPA 353.2 |
| **TAV-MW7** (Duplicate) 22-May-13 | Nitrate plus nitrite | 3.63 | 0.085 | 0.250 | 10.0 | | | 093979-018 | EPA 353.2 |
| **TAV-MW8** 23-May-13 | Nitrate plus nitrite | 5.50 | 0.085 | 0.250 | 10.0 | | | 093983-018 | EPA 353.2 |
| **TAV-MW9** 20-May-13 | Nitrate plus nitrite | 3.17 | 0.085 | 0.250 | 10.0 | | | 093963-018 | EPA 353.2 |
| **TAV-MW10** 12-Jun-13 | Nitrate plus nitrite | **12.2** | 0.170 | 0.500 | 10.0 | | | 093994-018 | EPA 353.2 |
| **TAV-MW11** 03-Jun-13 | Nitrate plus nitrite | 5.73 | 0.170 | 0.500 | 10.0 | | | 093968-018 | EPA 353.2 |
| **TAV-MW12** 04-Jun-13 | Nitrate plus nitrite | 6.54 | 0.170 | 0.500 | 10.0 | | | 093972-018 | EPA 353.2 |
| **TAV-MW13** 16-May-13 | Nitrate plus nitrite | 5.71 | 0.170 | 0.500 | 10.0 | | | 093957-018 | EPA 353.2 |
| **TAV-MW13** (Duplicate) 16-May-13 | Nitrate plus nitrite | 5.58 | 0.170 | 0.500 | 10.0 | | | 093959-018 | EPA 353.2 |
| **TAV-MW14** 06-Jun-13 | Nitrate plus nitrite | 8.40 | 0.170 | 0.500 | 10.0 | | | 093980-018 | EPA 353.2 |
| | | | | | | | | | |
| **AVN-1** 23-Jul-13 | Nitrate plus nitrite | **10.1** | 0.425 | 1.25 | 10.0 | | | 094408-018 | EPA 353.2 |
| **LWDS-MW1** 29-Jul-13 | Nitrate plus nitrite | **11.5** | 0.170 | 0.500 | 10.0 | | | 094420-018 | EPA 353.2 |
| **LWDS-MW2** 17-Jul-13 | Nitrate plus nitrite | 7.36 | 0.170 | 0.500 | 10.0 | | | 094396-018 | EPA 353.2 |

Refer to footnotes on page 5A-89.

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

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW2** 16-Jul-13 | Nitrate plus nitrite | 2.84 | 0.170 | 0.500 | 10.0 | | | 094394-018 | EPA 353.2 |
| **TAV-MW4** 24-Jul-13 | Nitrate plus nitrite | 6.05 | 0.085 | 0.250 | 10.0 | | | 094413-018 | EPA 353.2 |
| **TAV-MW6** 31-Jul-13 | Nitrate plus nitrite | **79.6** | 1.70 | 5.00 | 10.0 | | R | 094417-018 | EPA 353.2 |
| **TAV-MW6** (Reanalysis) 31-Jul-13 | Nitrate plus nitrite | 8.48 | 0.170 | 0.500 | 10.0 | H | J | 094417-R18 | EPA 353.2 |
| **TAV-MW6** (Duplicate) **3**1-Jul-13 | Nitrate plus nitrite | **76.7** | 1.70 | 5.00 | 10.0 | | R | 094418-018 | EPA 353.2 |
| **TAV-MW6** (Duplicate Reanalysis) 31-Jul-13 | Nitrate plus nitrite | 8.65 | 0.170 | 0.500 | 10.0 | H | J | 094418-R18 | EPA 353.2 |
| **TAV-MW8** 22-Jul-13 | Nitrate plus nitrite | 6.10 | 0.085 | 0.250 | 10.0 | | | 094404-018 | EPA 353.2 |
| **TAV-MW10** 30-Jul-13 | Nitrate plus nitrite | **11.2** | 0.170 | 0.500 | 10.0 | | | 094422-018 | EPA 353.2 |
| **TAV-MW11** 18-Jul-13 | Nitrate plus nitrite | 6.03 | 0.170 | 0.500 | 10.0 | | | 094401-018 | EPA 353.2 |
| **TAV-MW11** (Duplicate) 18-Jul-13 | Nitrate plus nitrite | 6.15 | 0.170 | 0.500 | 10.0 | | | 094402-018 | EPA 353.2 |
| **TAV-MW12** 23-Jul-13 | Nitrate plus nitrite | 6.95 | 0.085 | 0.250 | 10.0 | | | 094406-018 | EPA 353.2 |
| **TAV-MW13** 15-Jul-13 | Nitrate plus nitrite | 5.24 | 0.170 | 0.500 | 10.0 | | | 094392-018 | EPA 353.2 |
| **TAV-MW14** 24-Jul-13 | Nitrate plus nitrite | 8.90 | 0.425 | 1.25 | 10.0 | | | 094411-018 | EPA 353.2 |
| | | | | | | | | | |
| **AVN-1** 23-Oct-13 | Nitrate plus nitrite | 9.63 | 0.170 | 0.500 | 10.0 | | | 094808-018 | EPA 353.2 |
| **LWDS-MW1** 11-Nov-13 | Nitrate plus nitrite | **13.0** | 0.170 | 0.500 | 10.0 | | | 094838-018 | EPA 353.2 |
| **LWDS-MW2** 24-Oct-13 | Nitrate plus nitrite | 8.18 | 0.170 | 0.500 | 10.0 | | | 094810-018 | EPA 353.2 |
| **TAV-MW2** 28-Oct-13 | Nitrate plus nitrite | 3.15 | 0.170 | 0.500 | 10.0 | | | 094815-018 | EPA 353.2 |
| **TAV-MW2** (Duplicate) 28-Oct-13 | Nitrate plus nitrite | 2.98 | 0.170 | 0.500 | 10.0 | | | 094816-018 | EPA 353.2 |

Refer to footnotes on page 5A-89.

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

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW3** 17-Oct-13 | Nitrate plus nitrite | 6.05 | 0.170 | 0.500 | 10.0 | | | 094797-018 | EPA 353.2 |
| **TAV-MW4** 30-Oct-13 | Nitrate plus nitrite | 5.60 | 0.170 | 0.500 | 10.0 | | | 094821-018 | EPA 353.2 |
| **TAV-MW5** 15-Oct-13 | Nitrate plus nitrite | 7.28 | 0.170 | 0.500 | 10.0 | | | 094793-018 | EPA 353.2 |
| **TAV-MW6** 06-Nov-13 | Nitrate plus nitrite | 8.43 | 0.170 | 0.500 | 10.0 | | | 094834-018 | EPA 353.2 |
| **TAV-MW7** 21-Oct-13 | Nitrate plus nitrite | 3.00 | 0.170 | 0.500 | 10.0 | | | 094799-018 | EPA 353.2 |
| **TAV-MW8** 29-Oct-13 | Nitrate plus nitrite | 6.28 | 0.170 | 0.500 | 10.0 | | | 094819-018 | EPA 353.2 |
| **TAV-MW9** 22-Oct-13 | Nitrate plus nitrite | 4.02 | 0.170 | 0.500 | 10.0 | | | 094804-018 | EPA 353.2 |
| **TAV-MW9** (Duplicate) 22-Oct-13 | Nitrate plus nitrite | 4.02 | 0.170 | 0.500 | 10.0 | | | 094805-018 | EPA 353.2 |
| **TAV-MW10 07**-Nov-13 | Nitrate plus nitrite | **12.9** | 0.170 | 0.500 | 10.0 | | | 094836-018 | EPA 353.2 |
| **TAV-MW11** 31-Oct-13 | Nitrate plus nitrite | 6.54 | 0.170 | 0.500 | 10.0 | | | 094823-018 | EPA 353.2 |
| **TAV-MW12** 05-Nov-13 | Nitrate plus nitrite | 7.24 | 0.170 | 0.500 | 10.0 | | | 094830-018 | EPA 353.2 |
| **TAV-MW12** (Duplicate) 05-Nov-13 | Nitrate plus nitrite | 7.25 | 0.170 | 0.500 | 10.0 | | | 094831-018 | EPA 353.2 |
| **TAV-MW13** 16-Oct-13 | Nitrate plus nitrite | 5.70 | 0.170 | 0.500 | 10.0 | | | 094795-018 | EPA 353.2 |
| **TAV-MW14** 04-Nov-13 | Nitrate plus nitrite | 9.03 | 0.170 | 0.500 | 10.0 | | | 094825-018 | EPA 353.2 |

Refer to footnotes on page 5A-89.

## Table 5A-4
## Summary of Anions, Alkalinity, and Sulfide Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **AVN-1** | Chloride | 9.28 | 0.067 | 0.200 | NE | | | 093517-016 | SW846 9056 |
| 18-Feb-13 | Sulfate | 31.5 | 0.133 | 0.400 | NE | | | 093517-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093517-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 157 | 0.725 | 1.00 | NE | | | 093517-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093517-022 | SM 2320B |
| **LWDS-MW1** | Chloride | 68.7 | 0.670 | 2.00 | NE | | | 093525-016 | SW846 9056 |
| 11-Mar-13 | Sulfate | 38.3 | 1.33 | 4.00 | NE | | | 093525-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093525-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 196 | 0.725 | 1.00 | NE | | | 093525-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093525-022 | SM 2320B |
| **LWDS-MW1** (Duplicate) | Chloride | 72.1 | 0.670 | 2.00 | NE | | | 093526-016 | SW846 9056 |
| 11-Mar-13 | Sulfate | 40.9 | 1.33 | 4.00 | NE | | | 093526-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093526-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 196 | 0.725 | 1.00 | NE | | | 093526-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093526-022 | SM 2320B |
| **LWDS-MW2** | Chloride | 13.1 | 0.067 | 0.200 | NE | | | 093513-016 | SW846 9056 |
| 13-Feb-13 | Sulfate | 39.4 | 0.266 | 0.800 | NE | | | 093513-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093513-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 179 | 0.725 | 1.00 | NE | | | 093513-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093513-022 | SM 2320B |
| **TAV-MW2** | Chloride | 56.1 | 0.670 | 2.00 | NE | | | 093508-016 | SW846 9056 |
| 12-Feb-13 | Sulfate | 52.4 | 1.33 | 4.00 | NE | | | 093508-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093508-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 256 | 0.725 | 1.00 | NE | | | 093508-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093508-022 | SM 2320B |
| **TAV-MW4** | Chloride | 36.5 | 0.335 | 1.00 | NE | | | 093521-016 | SW846 9056 |
| 20-Feb-13 | Sulfate | 35.5 | 1.33 | 4.00 | NE | | | 093521-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093521-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 179 | 0.725 | 1.00 | NE | | | 093521-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093521-022 | SM 2320B |
| **TAV-MW6** | Chloride | 59.8 | 0.670 | 2.00 | NE | | | 093533-016 | SW846 9056 |
| 25-Feb-13 | Sulfate | 37.5 | 1.33 | 4.00 | NE | | | 093533-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093533-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 195 | 0.725 | 1.00 | NE | B | | 093533-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093533-022 | SM 2320B |

Refer to footnotes on page 5A-89.

**Table 5A-4** *(Continued)*
**Summary of Anions, Alkalinity, and Sulfide Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW8** | Chloride | 34.8 | 0.670 | 2.00 | NE | | | 093511-016 | SW846 9056 |
| 15-Feb-13 | Sulfate | 50.8 | 1.33 | 4.00 | NE | | | 093511-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093511-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 198 | 0.725 | 1.00 | NE | | | 093511-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093511-022 | SM 2320B |
| **TAV-MW10** | Chloride | 43.9 | 0.670 | 2.00 | NE | | | 093536-016 | SW846 9056 |
| 27-Feb-13 | Sulfate | 44.5 | 1.33 | 4.00 | NE | | | 093536-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093536-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 192 | 0.725 | 1.00 | NE | B | | 093536-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093536-022 | SM 2320B |
| **TAV-MW11** | Chloride | 37.0 | 0.670 | 2.00 | NE | | | 093515-016 | SW846 9056 |
| 14-Feb-13 | Sulfate | 39.8 | 1.33 | 4.00 | NE | | | 093515-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093515-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 187 | 0.725 | 1.00 | NE | | | 093515-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093515-022 | SM 2320B |
| **TAV-MW12** | Chloride | 37.2 | 0.335 | 1.00 | NE | | | 093519-016 | SW846 9056 |
| 19-Feb-13 | Sulfate | 44.2 | 0.665 | 2.00 | NE | | | 093519-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093519-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 221 | 0.725 | 1.00 | NE | | | 093519-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093519-022 | SM 2320B |
| **TAV-MW13** | Chloride | 16.8 | 0.335 | 1.00 | NE | | | 093574-016 | SW846 9056 |
| 26-Feb-13 | Sulfate | 43.2 | 0.665 | 2.00 | NE | | | 093574-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093574-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 202 | 0.725 | 1.00 | NE | B | | 093574-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093574-022 | SM 2320B |
| **TAV-MW14** | Chloride | 49.6 | 0.335 | 1.00 | NE | | | 093530-016 | SW846 9056 |
| 21-Feb-13 | Sulfate | 51.7 | 0.665 | 2.00 | NE | | | 093530-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093530-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 210 | 0.725 | 1.00 | NE | | | 093530-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093530-022 | SM 2320B |
| **TAV-MW14** (Duplicate) | Chloride | 38.8 | 0.335 | 1.00 | NE | | | 093531-016 | SW846 9056 |
| 21-Feb-13 | Sulfate | 41.0 | 0.665 | 2.00 | NE | | | 093531-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093531-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 213 | 0.725 | 1.00 | NE | | | 093531-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093531-022 | SM 2320B |

Refer to footnotes on page 5A-89.

## Table 5A-4 *(Continued)*
## Summary of Anions, Alkalinity, and Sulfide Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **AVN-1** | Bromide | 0.136 | 0.067 | 0.200 | NE | J | | 093964-016 | SW846 9056 |
| 30-May-13 | Chloride | 9.91 | 0.134 | 0.400 | NE | | | 093964-016 | SW846 9056 |
| | Fluoride | 1.32 | 0.033 | 0.100 | 4.0 | | | 093964-016 | SW846 9056 |
| | Sulfate | 33.4 | 0.266 | 0.800 | NE | N | | 093964-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 153 | 0.725 | 1.00 | NE | | | 093964-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093964-022 | SM 2320B |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093964-029 | SW846 9034 |
| **LWDS-MW1** | Bromide | 0.821 | 0.067 | 0.200 | NE | | | 093986-016 | SW846 9056 |
| 10-Jun-13 | Chloride | 75.1 | 1.34 | 4.00 | NE | | | 093986-016 | SW846 9056 |
| | Fluoride | 0.618 | 0.033 | 0.100 | 4.0 | | | 093986-016 | SW846 9056 |
| | Sulfate | 38.3 | 2.66 | 8.00 | NE | | | 093986-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 201 | 0.725 | 1.00 | NE | | | 093986-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093986-022 | SM 2320B |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093986-029 | SW846 9034 |
| **LWDS-MW2** | Bromide | 0.172 | 0.067 | 0.200 | NE | J | | 093958-016 | SW846 9056 |
| 29-May-13 | Chloride | 12.9 | 0.335 | 0.100 | NE | | | 093958-016 | SW846 9056 |
| | Fluoride | 1.36 | 0.033 | 0.100 | 4.0 | | | 093958-016 | SW846 9056 |
| | Sulfate | 42.0 | 0.665 | 2.00 | NE | N | | 093958-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 174 | 0.725 | 1.00 | NE | | | 093958-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093958-022 | SM 2320B |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093958-029 | SW846 9034 |
| **LWDS-MW2** (Duplicate) | Bromide | 0.137 | 0.067 | 0.200 | NE | J | | 093960-016 | SW846 9056 |
| 29-May-13 | Chloride | 12.7 | 0.335 | 1.00 | NE | | | 093960-016 | SW846 9056 |
| | Fluoride | 1.32 | 0.033 | 0.100 | 4.0 | | | 093960-016 | SW846 9056 |
| | Sulfate | 41.5 | 0.665 | 2.00 | NE | N | | 093960-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 180 | 0.725 | 1.00 | NE | | | 093960-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093960-022 | SM 2320B |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093960-029 | SW846 9034 |
| **TAV-MW2** | Bromide | 0.415 | 0.067 | 0.200 | NE | | | 093950-016 | SW846 9056 |
| 28-May-13 | Chloride | 66.8 | 0.670 | 2.00 | NE | | | 093950-016 | SW846 9056 |
| | Fluoride | 1.03 | 0.033 | 0.100 | 4.0 | | | 093950-016 | SW846 9056 |
| | Sulfate | 61.8 | 1.33 | 4.00 | NE | N | | 093950-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 247 | 0.725 | 1.00 | NE | | | 093950-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093950-022 | SM 2320B |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093950-029 | SW846 9034 |

Refer to footnotes on page 5A-89.

**Table 5A-4** *(Continued)*
**Summary of Anions, Alkalinity, and Sulfide Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW3** | Bromide | 0.204 | 0.067 | 0.200 | NE | | | 093969-016 | SW846 9056 |
| 21-May-13 | Chloride | 19.0 | 0.670 | 2.00 | NE | | | 093969-016 | SW846 9056 |
| | Fluoride | 1.60 | 0.033 | 0.100 | 4.0 | | | 093969-016 | SW846 9056 |
| | Sulfate | 60.2 | 1.33 | 4.00 | NE | | | 093969-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 193 | 0.725 | 1.00 | NE | | | 093969-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093969-022 | SM 2320B |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093969-029 | SW846 9034 |
| **TAV-MW4** | Bromide | 0.448 | 0.067 | 0.200 | NE | | | 093976-016 | SW846 9056 |
| 05-Jun-13 | Chloride | 39.0 | 0.670 | 2.00 | NE | | | 093976-016 | SW846 9056 |
| | Fluoride | 1.17 | 0.033 | 0.100 | 4.0 | | | 093976-016 | SW846 9056 |
| | Sulfate | 33.9 | 0.133 | 0.400 | NE | | | 093976-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 175 | 0.725 | 1.00 | NE | | | 093976-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093976-022 | SM 2320B |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093976-029 | SW846 9034 |
| **TAV-MW5** | Bromide | 0.165 | 0.067 | 0.200 | NE | J | | 093949-016 | SW846 9056 |
| 15-May-13 | Chloride | 17.8 | 0.335 | 1.00 | NE | | | 093949-016 | SW846 9056 |
| | Fluoride | 1.35 | 0.033 | 0.100 | 4.0 | | | 093949-016 | SW846 9056 |
| | Sulfate | 43.7 | 0.665 | 2.00 | NE | N | | 093949-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 185 | 0.725 | 1.00 | NE | | | 093949-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093949-022 | SM 2320B |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093949-029 | SW846 9034 |
| **TAV-MW6** | Bromide | 0.906 | 0.067 | 0.200 | NE | | | 093990-016 | SW846 9056 |
| 11-Jun-13 | Chloride | 71.5 | 1.34 | 4.00 | NE | | | 093990-016 | SW846 9056 |
| | Fluoride | 1.17 | 0.033 | 0.100 | 4.0 | | | 093990-016 | SW846 9056 |
| | Sulfate | 43.0 | 2.66 | 8.00 | NE | | | 093990-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 202 | 0.725 | 1.00 | NE | | | 093990-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093990-022 | SM 2320B |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093990-029 | SW846 9034 |
| **TAV-MW7** | Bromide | 0.253 | 0.067 | 0.200 | NE | | | 093977-016 | SW846 9056 |
| 22-May-13 | Chloride | 25.4 | 0.670 | 2.00 | NE | | | 093977-016 | SW846 9056 |
| | Fluoride | 1.12 | 0.033 | 0.100 | 4.0 | | | 093977-016 | SW846 9056 |
| | Sulfate | 60.2 | 1.33 | 4.00 | NE | | | 093977-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 223 | 0.725 | 1.00 | NE | | | 093977-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093977-022 | SM 2320B |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093977-029 | SW846 9034 |

Refer to footnotes on page 5A-89.

## Table 5A-4 *(Continued)*
## Summary of Anions, Alkalinity, and Sulfide Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW7** (Duplicate) | Bromide | 0.252 | 0.067 | 0.200 | NE | | | 093979-016 | SW846 9056 |
| 22-May-13 | Chloride | 25.5 | 0.670 | 2.00 | NE | | | 093979-016 | SW846 9056 |
| | Fluoride | 1.10 | 0.033 | 0.100 | 4.0 | | | 093979-016 | SW846 9056 |
| | Sulfate | 60.7 | 1.33 | 4.00 | NE | | | 093979-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 220 | 0.725 | 1.00 | NE | | | 093979-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093979-022 | SM 2320B |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093979-029 | SW846 9034 |
| **TAV-MW8** | Bromide | 0.318 | 0.067 | 0.200 | NE | | | 093983-016 | SW846 9056 |
| 23-May-13 | Chloride | 40.6 | 0.670 | 2.00 | NE | | | 093983-016 | SW846 9056 |
| | Fluoride | 1.44 | 0.033 | 0.100 | 4.0 | | | 093983-016 | SW846 9056 |
| | Sulfate | 64.0 | 1.33 | 4.00 | NE | | | 093983-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 201 | 0.725 | 1.00 | NE | | | 093983-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093983-022 | SM 2320B |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093983-029 | SW846 9034 |
| **TAV-MW9** | Bromide | 0.246 | 0.067 | 0.200 | NE | | | 092663-016 | SW846 9056 |
| 20-May-13 | Chloride | 31.4 | 0.670 | 2.00 | NE | | | 092663-016 | SW846 9056 |
| | Fluoride | 0.945 | 0.033 | 0.100 | 4.0 | | | 092663-016 | SW846 9056 |
| | Sulfate | 56.9 | 1.33 | 4.00 | NE | | | 092663-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 223 | 0.725 | 1.00 | NE | | | 092663-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 092663-022 | SM 2320B |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093963-029 | SW846 9034 |
| T**AV-MW10** | Bromide | 0.322 | 0.067 | 0.200 | NE | | | 093994-016 | SW846 9056 |
| 12-Jun-13 | Chloride | 47.8 | 0.670 | 2.00 | NE | | | 093994-016 | SW846 9056 |
| | Fluoride | 1.45 | 0.033 | 0.100 | 4.0 | | | 093994-016 | SW846 9056 |
| | Sulfate | 45.4 | 1.33 | 4.00 | NE | | | 093994-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 196 | 0.725 | 1.00 | NE | B | | 093994-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093994-022 | SM 2320B |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093994-029 | SW846 9034 |
| **TAV-MW11** | Bromide | 0.476 | 0.067 | 0.200 | NE | | | 093968-016 | SW846 9056 |
| 03-Jun-13 | Chloride | 42.5 | 0.670 | 2.00 | NE | | | 093968-016 | SW846 9056 |
| | Fluoride | 1.30 | 0.033 | 0.100 | 4.0 | | | 093968-016 | SW846 9056 |
| | Sulfate | 43.5 | 1.33 | 4.00 | NE | | | 093968-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 184 | 0.725 | 1.00 | NE | | | 093968-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093968-022 | SM 2320B |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093968-029 | SW846 9034 |

Refer to footnotes on page 5A-89.

## Table 5A-4 *(Continued)*
## Summary of Anions, Alkalinity, and Sulfide Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW12** | Bromide | 0.342 | 0.067 | 0.200 | NE | | | 093972-016 | SW846 9056 |
| 04-Jun-13 | Chloride | 38.8 | 0.670 | 2.00 | NE | | | 093972-016 | SW846 9056 |
| | Fluoride | 1.26 | 0.033 | 0.100 | 4.0 | | | 093972-016 | SW846 9056 |
| | Sulfate | 45.9 | 1.33 | 4.00 | NE | | | 093972-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 212 | 0.725 | 1.00 | NE | | | 093972-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093972-022 | SM 2320B |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093972-029 | SW846 9034 |
| **TAV-MW13** | Bromide | 0.234 | 0.067 | 0.200 | NE | | | 093957-016 | SW846 9056 |
| 16-May-13 | Chloride | 20.0 | 0.335 | 1.00 | NE | | | 093957-016 | SW846 9056 |
| | Fluoride | 1.20 | 0.033 | 0.100 | 4.0 | | | 093957-016 | SW846 9056 |
| | Sulfate | 63.3 | 0.665 | 2.00 | NE | N | | 093957-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 199 | 0.725 | 1.00 | NE | | | 093957-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093957-022 | SM 2320B |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093957-029 | SW846 9034 |
| **TAV-MW13** (Duplicate) | Bromide | 0.194 | 0.067 | 0.200 | NE | J | | 093959-016 | SW846 9056 |
| 16-May-13 | Chloride | 20.0 | 0.335 | 1.00 | NE | | | 093959-016 | SW846 9056 |
| | Fluoride | 1.23 | 0.033 | 0.100 | 4.0 | | | 093959-016 | SW846 9056 |
| | Sulfate | 56.7 | 0.665 | 2.00 | NE | N | | 093959-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 199 | 0.725 | 1.00 | NE | | | 093959-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093959-022 | SM 2320B |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093959-029 | SW846 9034 |
| **TAV-MW14** | Bromide | 0.377 | 0.067 | 0.200 | NE | | | 093980-016 | SW846 9056 |
| 06-Jun-13 | Chloride | 52.6 | 0.670 | 2.00 | NE | | | 093980-016 | SW846 9056 |
| | Fluoride | 1.35 | 0.033 | 0.100 | 4.0 | | | 093980-016 | SW846 9056 |
| | Sulfate | 53.9 | 1.33 | 4.00 | NE | | | 093980-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 205 | 0.725 | 1.00 | NE | | | 093980-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093980-022 | SM 2320B |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 093980-029 | SW846 9034 |

Refer to footnotes on page 5A-89.

## Table 5A-4 *(Continued)*
## Summary of Anions, Alkalinity, and Sulfide Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **AVN-1** | Chloride | 9.25 | 0.335 | 1.00 | NE | | | 094408-016 | SW846 9056 |
| 23-Jul-13 | Sulfate | 31.6 | 0.665 | 2.00 | NE | | | 094408-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094408-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 155 | 0.725 | 1.00 | NE | | | 094408-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094408-022 | SM 2320B |
| **LWDS-MW1** | Chloride | 75.6 | 1.34 | 4.00 | NE | | | 094420-016 | SW846 9056 |
| 29-Jul-13 | Sulfate | 38.9 | 2.66 | 8.00 | NE | | | 094420-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094420-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 196 | 0.725 | 1.00 | NE | | | 094420-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094420-022 | SM 2320B |
| **LWDS-MW2** | Chloride | 10.9 | 0.335 | 1.00 | NE | | | 094396-016 | SW846 9056 |
| 17-Jul-13 | Sulfate | 34.8 | 0.665 | 2.00 | NE | | | 094396-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094396-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 180 | 0.725 | 1.00 | NE | | | 094396-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094396-022 | SM 2320B |
| **TAV-MW2** | Chloride | 63.7 | 0.670 | 2.00 | NE | | | 094394-016 | SW846 9056 |
| 16-Jul-13 | Sulfate | 56.0 | 1.33 | 4.00 | NE | | | 094394-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094394-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 253 | 0.725 | 1.00 | NE | | | 094394-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094394-022 | SM 2320B |
| **TAV-MW4** | Chloride | 33.6 | 0.670 | 2.00 | NE | | | 094413-016 | SW846 9056 |
| 24-Jul-13 | Sulfate | 31.1 | 1.33 | 4.00 | NE | | | 094413-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094413-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 171 | 0.725 | 1.00 | NE | | | 094413-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094413-022 | SM 2320B |
| **TAV-MW6** | Chloride | 72.0 | 1.34 | 4.00 | NE | | | 094417-016 | SW846 9056 |
| 31-Jul-13 | Sulfate | 42.5 | 2.66 | 8.00 | NE | | | 094417-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094417-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 203 | 0.725 | 1.00 | NE | | | 094417-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094417-022 | SM 2320B |
| **TAV-MW6** (Duplicate) | Chloride | 71.5 | 1.34 | 4.00 | NE | | | 094418-016 | SW846 9056 |
| 31-Jul-13 | Sulfate | 42.2 | 2.66 | 8.00 | NE | | | 094418-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094418-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 203 | 0.725 | 1.00 | NE | | | 094418-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094418-022 | SM 2320B |

Refer to footnotes on page 5A-89.

## Table 5A-4 *(Continued)*
## Summary of Anions, Alkalinity, and Sulfide Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW8** | Chloride | 28.6 | 0.670 | 2.00 | NE | | R | 094404-016 | SW846 9056 |
| 22-Jul-13 | Chloride (Reanalysis) | 39.3 | 0.670 | 2.00 | NE | H | J | 094404-R16 | SW846 9056 |
| | Sulfate | 39.9 | 1.33 | 4.00 | NE | | R | 094404-016 | SW846 9056 |
| | Sulfate (Reanalysis) | 52.6 | 1.33 | 4.00 | NE | H | J | 094404-R16 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094404-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 190 | 0.725 | 1.00 | NE | | | 094404-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094404-022 | SM 2320B |
| **TAV-MW10** | Chloride | 48.9 | 0.670 | 2.00 | NE | | | 094422-016 | SW846 9056 |
| 30-Jul-13 | Sulfate | 45.1 | 1.33 | 4.00 | NE | | | 094422-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094422-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 200 | 0.725 | 1.00 | NE | | | 094422-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094422-022 | SM 2320B |
| **TAV-MW11** | Chloride | 43.2 | 0.670 | 2.00 | NE | | | 094401-016 | SW846 9056 |
| 18-Jul-13 | Sulfate | 43.1 | 1.33 | 4.00 | NE | | | 094401-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094401-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 186 | 0.725 | 1.00 | NE | | | 094401-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094401-022 | SM 2320B |
| **TAV-MW11** (Duplicate) | Chloride | 41.4 | 0.670 | 2.00 | NE | | | 094402-016 | SW846 9056 |
| 18-Jul-13 | Sulfate | 41.3 | 1.33 | 4.00 | NE | | | 094402-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094402-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 187 | 0.725 | 1.00 | NE | | | 094402-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094402-022 | SM 2320B |
| **TAV-MW12** | Chloride | 39.7 | 0.670 | 2.00 | NE | | | 094406-016 | SW846 9056 |
| 23-Jul-13 | Sulfate | 46.4 | 1.33 | 4.00 | NE | | | 094406-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094406-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 218 | 0.725 | 1.00 | NE | | | 094406-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094406-022 | SM 2320B |
| **TAV-MW13** | Chloride | 19.0 | 0.335 | 1.00 | NE | | | 094392-016 | SW846 9056 |
| 15-Jul-13 | Sulfate | 51.9 | 0.665 | 2.00 | NE | | | 094392-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094392-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 204 | 0.725 | 1.00 | NE | | | 094392-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094392-022 | SM 2320B |
| **TAV-MW14** | Chloride | 49.5 | 0.670 | 2.00 | NE | | | 094411-016 | SW846 9056 |
| 24-Jul-13 | Sulfate | 51.8 | 1.33 | 4.00 | NE | | | 094411-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094411-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 203 | 0.725 | 1.00 | NE | | | 094411-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094411-022 | SM 2320B |

Refer to footnotes on page 5A-89.

## Table 5A-4 *(Continued)*
## Summary of Anions, Alkalinity, and Sulfide Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **AVN-1** | Chloride | 9.61 | 0.134 | 0.400 | NE | | | 094808-016 | SW846 9056 |
| 23-Oct-13 | Sulfate | 32.1 | 0.266 | 0.800 | NE | | | 094808-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094808-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 117 | 0.725 | 1.00 | NE | B | R | 094808-022 | SM 2320B |
| | Bicarbonate Alkalinity (reanalysis) | 148 | 0.725 | 1.00 | NE | H | J | 094808-R22 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094808-022 | SM 2320B |
| **LWDS-MW1** | Chloride | 77.0 | 1.34 | 4.00 | NE | | | 094838-016 | SW846 9056 |
| 11-Nov-13 | Sulfate | 39.7 | 2.66 | 8.00 | NE | | | 094838-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094838-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 202 | 0.725 | 1.00 | NE | | | 094838-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094838-022 | SM 2320B |
| **LWDS-MW2** | Chloride | 12.4 | 0.335 | 1.00 | NE | | | 094810-016 | SW846 9056 |
| 24-Oct-13 | Sulfate | 40.1 | 0.665 | 2.00 | NE | | | 094810-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094810-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 47.1 | 0.725 | 1.00 | NE | B | R | 094810-022 | SM 2320B |
| | Bicarbonate Alkalinity (reanalysis) | 174 | 0.725 | 1.00 | NE | H | J | 094810-R22 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094810-022 | SM 2320B |
| **TAV-MW2** | Chloride | 65.6 | 0.670 | 2.00 | NE | | | 094815-016 | SW846 9056 |
| 28-Oct-13 | Sulfate | 58.6 | 1.33 | 4.00 | NE | | | 094815-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094815-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 247 | 0.725 | 1.00 | NE | | | 094815-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094815-022 | SM 2320B |
| **TAV-MW2** (Duplicate) | Chloride | 66.0 | 0.670 | 2.00 | NE | | | 094816-016 | SW846 9056 |
| 28-Oct-13 | Sulfate | 59.4 | 1.33 | 4.00 | NE | | | 094816-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094816-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 250 | 0.725 | 1.00 | NE | | | 094816-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094816-022 | SM 2320B |
| **TAV-MW3** | Chloride | 21.5 | 0.335 | 1.00 | NE | | | 094797-016 | SW846 9056 |
| 17-Oct-13 | Sulfate | 68.1 | 0.665 | 2.00 | NE | | | 094797-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094797-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 194 | 0.725 | 1.00 | NE | B | | 094797-022 | SM 2320B |
| | Carbonate Alkalinity | U | 0.725 | 1.00 | NE | U | | 094797-022 | SM 2320B |

Refer to footnotes on page 5A-89.

## Table 5A-4 *(Continued)*
## Summary of Anions, Alkalinity, and Sulfide Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW4** | Chloride | 40.3 | 0.670 | 2.00 | NE | | | 094821-016 | SW846 9056 |
| 30-Oct-13 | Sulfate | 35.3 | 1.33 | 4.00 | NE | | | 094821-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094821-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 177 | 0.725 | 1.00 | NE | | | 094821-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094821-022 | SM 2320B |
| **TAV-MW5** | Chloride | 18.2 | 0.335 | 1.00 | NE | | | 094793-016 | SW846 9056 |
| 15-Oct-13 | Sulfate | 43.7 | 0.665 | 2.00 | NE | | | 094793-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094793-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 188 | 0.725 | 1.00 | NE | B | | 094793-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094793-022 | SM 2320B |
| **TAV-MW6** | Chloride | 74.5 | 1.34 | 4.00 | NE | | | 094834-016 | SW846 9056 |
| 06-Nov-13 | Sulfate | 44.2 | 2.66 | 8.00 | NE | | | 094834-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094834-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 198 | 0.725 | 1.00 | NE | | | 094834-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094834-022 | SM 2320B |
| **TAV-MW7** | Chloride | 27.7 | 0.670 | 2.00 | NE | | | 094799-016 | SW846 9056 |
| 21-Oct-13 | Sulfate | 65.8 | 1.33 | 4.00 | NE | | | 094799-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094799-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 227 | 0.725 | 1.00 | NE | B | | 094799-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094799-022 | SM 2320B |
| **TAV-MW8** | Chloride | 42.2 | 0.670 | 2.00 | NE | | | 094819-016 | SW846 9056 |
| 29-Oct-13 | Sulfate | 55.5 | 1.33 | 4.00 | NE | | | 094819-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094819-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 188 | 0.725 | 1.00 | NE | | | 094819-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094819-022 | SM 2320B |
| **TAV-MW9** | Chloride | 35.2 | 0.670 | 2.00 | NE | | | 094804-016 | SW846 9056 |
| 22-Oct-13 | Sulfate | 64.6 | 1.33 | 4.00 | NE | | | 094804-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094804-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 246 | 0.725 | 1.00 | NE | B | | 094804-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094804-022 | SM 2320B |
| **TAV-MW9** (Duplicate) | Chloride | 35.0 | 0.670 | 2.00 | NE | | | 094805-016 | SW846 9056 |
| 22-Oct-13 | Sulfate | 64.4 | 1.33 | 4.00 | NE | | | 094805-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094805-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 244 | 0.725 | 1.00 | NE | B | | 094805-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094805-022 | SM 2320B |

Refer to footnotes on page 5A-89.

## Table 5A-4 *(Concluded)*
## Summary of Anions, Alkalinity, and Sulfide Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW10** | Chloride | 49.4 | 0.670 | 2.00 | NE | | | 094836-016 | SW846 9056 |
| 07-Nov-13 | Sulfate | 45.8 | 1.33 | 4.00 | NE | | | 094836-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094836-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 196 | 0.725 | 1.00 | NE | | | 094836-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094836-022 | SM 2320B |
| **TAV-MW11** | Chloride | 45.5 | 0.670 | 2.00 | NE | | | 094823-016 | SW846 9056 |
| 31-Oct-13 | Sulfate | 44.8 | 1.33 | 4.00 | NE | | | 094823-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094823-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 184 | 0.725 | 1.00 | NE | | | 094823-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094823-022 | SM 2320B |
| **TAV-MW12** | Chloride | 41.0 | 0.670 | 2.00 | NE | | | 094830-016 | SW846 9056 |
| 05-Nov-13 | Sulfate | 47.1 | 1.33 | 4.00 | NE | | | 094830-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094830-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 219 | 0.725 | 1.00 | NE | | | 094830-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094830-022 | SM 2320B |
| **TAV-MW12** (Duplicate) | Chloride | 41.0 | 0.670 | 2.00 | NE | | | 094831-016 | SW846 9056 |
| 05-Nov-13 | Sulfate | 47.0 | 1.33 | 4.00 | NE | | | 094831-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094831-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 218 | 0.725 | 1.00 | NE | | | 094831-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094831-022 | SM 2320B |
| **TAV-MW13** | Chloride | 19.6 | 0.335 | 1.00 | NE | | | 094795-016 | SW846 9056 |
| 16-Oct-13 | Sulfate | 53.1 | 0.665 | 2.00 | NE | | | 094795-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094795-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 202 | 0.725 | 1.00 | NE | B | | 094795-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094795-022 | SM 2320B |
| **TAV-MW14** | Chloride | 51.7 | 0.670 | 2.00 | NE | | | 094825-016 | SW846 9056 |
| 04-Nov-13 | Sulfate | 53.3 | 1.33 | 4.00 | NE | | | 094825-016 | SW846 9056 |
| | Acid Soluble Sulfides | ND | 0.835 | 2.50 | NE | U | | 094825-029 | SW846 9034 |
| | Bicarbonate Alkalinity | 207 | 0.725 | 1.00 | NE | | | 094825-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094825-022 | SM 2320B |

Refer to footnotes on page 5A-89.

## Table 5A-5
## Summary of Total Organic Carbon Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **AVN-1** | Total Organic Carbon #1 | 0.524 | 0.330 | 1.00 | NE | J | 1.79U | 093517-004 | SW846 9060 |
| 18-Feb-13 | Total Organic Carbon #2 | 0.589 | 0.330 | 1.00 | NE | J | 1.79U | 093517-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.485 | 0.330 | 1.00 | NE | J | 1.79U | 093517-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.519 | 0.330 | 1.00 | NE | J | 1.79U | 093517-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.529 | 0.330 | 1.00 | NE | J | 1.79U | 093517-004 | SW846 9060 |
| **LWDS-MW1** | Total Organic Carbon #1 | 0.724 | 0.330 | 1.00 | NE | J | | 093525-004 | SW846 9060 |
| 11-Mar-13 | Total Organic Carbon #2 | 0.937 | 0.330 | 1.00 | NE | J | | 093525-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.819 | 0.330 | 1.00 | NE | J | | 093525-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.891 | 0.330 | 1.00 | NE | J | | 093525-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.843 | 0.330 | 1.00 | NE | J | | 093525-004 | SW846 9060 |
| **LWDS-MW1** | Total Organic Carbon #1 | 0.729 | 0.330 | 1.00 | NE | J | | 093526-004 | SW846 9060 |
| (Duplicate) | Total Organic Carbon #2 | 0.879 | 0.330 | 1.00 | NE | J | | 093526-004 | SW846 9060 |
| 11-Mar-13 | Total Organic Carbon #3 | 0.766 | 0.330 | 1.00 | NE | J | | 093526-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.715 | 0.330 | 1.00 | NE | J | | 093526-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.772 | 0.330 | 1.00 | NE | J | | 093526-004 | SW846 9060 |
| **LWDS-MW2** | Total Organic Carbon #1 | 0.892 | 0.330 | 1.00 | NE | J | | 093513-004 | SW846 9060 |
| 13-Feb-13 | Total Organic Carbon #2 | 1.02 | 0.330 | 1.00 | NE | | | 093513-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.939 | 0.330 | 1.00 | NE | J | | 093513-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.899 | 0.330 | 1.00 | NE | J | | 093513-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.938 | 0.330 | 1.00 | NE | J | | 093513-004 | SW846 9060 |
| **TAV-MW2** | Total Organic Carbon #1 | 1.08 | 0.330 | 1.00 | NE | | | 093508-004 | SW846 9060 |
| 12-Feb-13 | Total Organic Carbon #2 | 1.26 | 0.330 | 1.00 | NE | | | 093508-004 | SW846 9060 |
| | Total Organic Carbon #3 | 1.11 | 0.330 | 1.00 | NE | | | 093508-004 | SW846 9060 |
| | Total Organic Carbon #4 | 1.09 | 0.330 | 1.00 | NE | | | 093508-004 | SW846 9060 |
| | Total Organic Carbon Average | 1.14 | 0.330 | 1.00 | NE | | | 093508-004 | SW846 9060 |
| **TAV-MW4** | Total Organic Carbon #1 | 0.646 | 0.330 | 1.00 | NE | J | 1.79U | 093521-004 | SW846 9060 |
| 20-Feb-13 | Total Organic Carbon #2 | 0.663 | 0.330 | 1.00 | NE | J | 1.79U | 093521-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.613 | 0.330 | 1.00 | NE | J | 1.79U | 093521-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.689 | 0.330 | 1.00 | NE | J | 1.79U | 093521-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.653 | 0.330 | 1.00 | NE | J | 1.79U | 093521-004 | SW846 9060 |
| **TAV-MW6** | Total Organic Carbon #1 | 0.542 | 0.330 | 1.00 | NE | J | | 093533-004 | SW846 9060 |
| 25-Feb-13 | Total Organic Carbon #2 | 0.669 | 0.330 | 1.00 | NE | J | | 093533-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.542 | 0.330 | 1.00 | NE | J | | 093533-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.589 | 0.330 | 1.00 | NE | J | | 093533-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.586 | 0.330 | 1.00 | NE | J | | 093533-004 | SW846 9060 |

Refer to footnotes on page 5A-89.

## Table 5A-5 *(Continued)*
## Summary of Total Organic Carbon Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW8** | Total Organic Carbon #1 | 0.874 | 0.330 | 1.00 | NE | J | | 093511-004 | SW846 9060 |
| 15-Feb-13 | Total Organic Carbon #2 | 0.971 | 0.330 | 1.00 | NE | J | | 093511-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.890 | 0.330 | 1.00 | NE | J | | 093511-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.952 | 0.330 | 1.00 | NE | J | | 093511-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.922 | 0.330 | 1.00 | NE | J | | 093511-004 | SW846 9060 |
| **TAV-MW10** | Total Organic Carbon #1 | 0.720 | 0.330 | 1.00 | NE | J | | 093536-004 | SW846 9060 |
| 27-Feb-13 | Total Organic Carbon #2 | 0.804 | 0.330 | 1.00 | NE | J | | 093536-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.763 | 0.330 | 1.00 | NE | J | | 093536-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.749 | 0.330 | 1.00 | NE | J | | 093536-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.759 | 0.330 | 1.00 | NE | J | | 093536-004 | SW846 9060 |
| **TAV-MW11** | Total Organic Carbon #1 | 0.774 | 0.330 | 1.00 | NE | J | | 093515-004 | SW846 9060 |
| 14-Feb-13 | Total Organic Carbon #2 | 0.762 | 0.330 | 1.00 | NE | J | | 093515-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.804 | 0.330 | 1.00 | NE | J | | 093515-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.805 | 0.330 | 1.00 | NE | J | | 093515-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.786 | 0.330 | 1.00 | NE | J | | 093515-004 | SW846 9060 |
| **TAV-MW12** | Total Organic Carbon #1 | 0.725 | 0.330 | 1.00 | NE | J | 1.79U | 093519-004 | SW846 9060 |
| 19-Feb-13 | Total Organic Carbon #2 | 0.966 | 0.330 | 1.00 | NE | J | 1.79U | 093519-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.799 | 0.330 | 1.00 | NE | J | 1.79U | 093519-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.771 | 0.330 | 1.00 | NE | J | 1.79U | 093519-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.815 | 0.330 | 1.00 | NE | J | 1.79U | 093519-004 | SW846 9060 |
| **TAV-MW13** | Total Organic Carbon #1 | 0.700 | 0.330 | 1.00 | NE | J | | 093574-004 | SW846 9060 |
| 26-Feb-13 | Total Organic Carbon #2 | 0.870 | 0.330 | 1.00 | NE | J | | 093574-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.771 | 0.330 | 1.00 | NE | J | | 093574-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.844 | 0.330 | 1.00 | NE | J | | 093574-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.796 | 0.330 | 1.00 | NE | J | | 093574-004 | SW846 9060 |
| **TAV-MW14** | Total Organic Carbon #1 | 0.684 | 0.330 | 1.00 | NE | J | 1.79U | 093530-004 | SW846 9060 |
| 21-Feb-13 | Total Organic Carbon #2 | 0.726 | 0.330 | 1.00 | NE | J | 1.79U | 093530-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.745 | 0.330 | 1.00 | NE | J | 1.79U | 093530-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.682 | 0.330 | 1.00 | NE | J | 1.79U | 093530-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.709 | 0.330 | 1.00 | NE | J | 1.79U | 093530-004 | SW846 9060 |
| **TAV-MW14** | Total Organic Carbon #1 | 0.665 | 0.330 | 1.00 | NE | J | 1.79U | 093531-004 | SW846 9060 |
| (Duplicate) | Total Organic Carbon #2 | 0.839 | 0.330 | 1.00 | NE | J | 1.79U | 093531-004 | SW846 9060 |
| 21-Feb-13 | Total Organic Carbon #3 | 0.706 | 0.330 | 1.00 | NE | J | 1.79U | 093531-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.806 | 0.330 | 1.00 | NE | J | 1.79U | 093531-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.754 | 0.330 | 1.00 | NE | J | 1.79U | 093531-004 | SW846 9060 |

Refer to footnotes on page 5A-89.

## Table 5A-5 *(Continued)*
## Summary of Total Organic Carbon Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **AVN-1** | Total Organic Carbon #1 | 0.582 | 0.330 | 1.00 | NE | J | | 093964-004 | SW846 9060 |
| 30-May-13 | Total Organic Carbon #2 | 0.754 | 0.330 | 1.00 | NE | J | | 093964-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.681 | 0.330 | 1.00 | NE | J | | 093964-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.644 | 0.330 | 1.00 | NE | J | | 093964-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.665 | 0.330 | 1.00 | NE | J | | 093964-004 | SW846 9060 |
| **LWDS-MW1** | Total Organic Carbon #1 | 1.06 | 0.330 | 1.00 | NE | | | 093986-004 | SW846 9060 |
| 10-Jun-13 | Total Organic Carbon #2 | 1.20 | 0.330 | 1.00 | NE | | | 093986-004 | SW846 9060 |
| | Total Organic Carbon #3 | 1.12 | 0.330 | 1.00 | NE | | | 093986-004 | SW846 9060 |
| | Total Organic Carbon #4 | 1.10 | 0.330 | 1.00 | NE | | | 093986-004 | SW846 9060 |
| | Total Organic Carbon Average | 1.12 | 0.330 | 1.00 | NE | | | 093986-004 | SW846 9060 |
| **LWDS-MW2** | Total Organic Carbon #1 | 0.643 | 0.330 | 1.00 | NE | J | 2.6U | 093958-004 | SW846 9060 |
| 29-May-13 | Total Organic Carbon #2 | 0.774 | 0.330 | 1.00 | NE | J | 2.5U | 093958-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.728 | 0.330 | 1.00 | NE | J | 2.7U | 093958-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.701 | 0.330 | 1.00 | NE | J | 2.6U | 093958-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.712 | 0.330 | 1.00 | NE | J | 2.6U | 093958-004 | SW846 9060 |
| **LWDS-MW2** | Total Organic Carbon #1 | 0.620 | 0.330 | 1.00 | NE | J | 2.6U | 093960-004 | SW846 9060 |
| (Duplicate) | Total Organic Carbon #2 | 0.885 | 0.330 | 1.00 | NE | J | 2.5U | 093960-004 | SW846 9060 |
| 29-May-13 | Total Organic Carbon #3 | 0.680 | 0.330 | 1.00 | NE | J | 2.7U | 093960-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.750 | 0.330 | 1.00 | NE | J | 2.6U | 093960-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.734 | 0.330 | 1.00 | NE | J | 2.6U | 093960-004 | SW846 9060 |
| **TAV-MW2** | Total Organic Carbon #1 | 0.637 | 0.330 | 1.00 | NE | J | | 093950-004 | SW846 9060 |
| 28-May-13 | Total Organic Carbon #2 | 1.02 | 0.330 | 1.00 | NE | | | 093950-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.720 | 0.330 | 1.00 | NE | J | | 093950-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.846 | 0.330 | 1.00 | NE | J | | 093950-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.807 | 0.330 | 1.00 | NE | J | | 093950-004 | SW846 9060 |
| **TAV-MW3** | Total Organic Carbon #1 | 0.650 | 0.330 | 1.00 | NE | J | J- | 093969-004 | SW846 9060 |
| 21-May-13 | Total Organic Carbon #2 | 0.732 | 0.330 | 1.00 | NE | J | J- | 093969-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.664 | 0.330 | 1.00 | NE | J | J- | 093969-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.618 | 0.330 | 1.00 | NE | J | J- | 093969-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.666 | 0.330 | 1.00 | NE | J | J- | 093969-004 | SW846 9060 |
| **TAV-MW4** | Total Organic Carbon #1 | 0.632 | 0.330 | 1.00 | NE | J | J- | 093976-004 | SW846 9060 |
| 05-Jun-13 | Total Organic Carbon #2 | 0.766 | 0.330 | 1.00 | NE | J | J- | 093976-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.632 | 0.330 | 1.00 | NE | J | J- | 093976-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.715 | 0.330 | 1.00 | NE | J | J- | 093976-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.686 | 0.330 | 1.00 | NE | J | J- | 093976-004 | SW846 9060 |

Refer to footnotes on page 5A-89.

## Table 5A-5 *(Continued)*
## Summary of Total Organic Carbon Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW5** | Total Organic Carbon #1 | 0.579 | 0.330 | 1.00 | NE | J | | 093949-004 | SW846 9060 |
| 15-May-13 | Total Organic Carbon #2 | 0.831 | 0.330 | 1.00 | NE | J | | 093949-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.643 | 0.330 | 1.00 | NE | J | | 093949-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.717 | 0.330 | 1.00 | NE | J | | 093949-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.693 | 0.330 | 1.00 | NE | J | | 093949-004 | SW846 9060 |
| **TAV-MW6** | Total Organic Carbon #1 | 0.937 | 0.330 | 1.00 | NE | J | | 093990-004 | SW846 9060 |
| 11-Jun-13 | Total Organic Carbon #2 | 1.05 | 0.330 | 1.00 | NE | | | 093990-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.914 | 0.330 | 1.00 | NE | J | | 093990-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.976 | 0.330 | 1.00 | NE | J | | 093990-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.968 | 0.330 | 1.00 | NE | J | | 093990-004 | SW846 9060 |
| **TAV-MW7** | Total Organic Carbon #1 | 0.654 | 0.330 | 1.00 | NE | J | 2.5UJ | 093977-004 | SW846 9060 |
| 22-May-13 | Total Organic Carbon #2 | 0.887 | 0.330 | 1.00 | NE | J | 2.4UJ | 093977-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.811 | 0.330 | 1.00 | NE | J | 2.3UJ | 093977-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.787 | 0.330 | 1.00 | NE | J | 2.3UJ | 093977-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.785 | 0.330 | 1.00 | NE | J | 2.4UJ | 093977-004 | SW846 9060 |
| **TAV-MW7** | Total Organic Carbon #1 | 0.696 | 0.330 | 1.00 | NE | J | 2.5UJ | 093979-004 | SW846 9060 |
| (Duplicate) | Total Organic Carbon #2 | 0.910 | 0.330 | 1.00 | NE | J | 2.4UJ | 093979-004 | SW846 9060 |
| 22-May-13 | Total Organic Carbon #3 | 0.776 | 0.330 | 1.00 | NE | J | 2.3UJ | 093979-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.824 | 0.330 | 1.00 | NE | J | 2.3UJ | 093979-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.802 | 0.330 | 1.00 | NE | J | 2.4UJ | 093979-004 | SW846 9060 |
| **TAV-MW8** | Total Organic Carbon #1 | 0.593 | 0.330 | 1.00 | NE | J | J- | 093983-004 | SW846 9060 |
| 23-May-13 | Total Organic Carbon #2 | 0.772 | 0.330 | 1.00 | NE | J | J- | 093983-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.680 | 0.330 | 1.00 | NE | J | J- | 093983-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.660 | 0.330 | 1.00 | NE | J | J- | 093983-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.676 | 0.330 | 1.00 | NE | J | J- | 093983-004 | SW846 9060 |
| **TAV-MW9** | Total Organic Carbon #1 | 1.58 | 0.330 | 1.00 | NE | | | 093963-004 | SW846 9060 |
| 20-May-13 | Total Organic Carbon #2 | 1.94 | 0.330 | 1.00 | NE | | | 093963-004 | SW846 9060 |
| | Total Organic Carbon #3 | 1.88 | 0.330 | 1.00 | NE | | | 093963-004 | SW846 9060 |
| | Total Organic Carbon #4 | 1.84 | 0.330 | 1.00 | NE | | | 093963-004 | SW846 9060 |
| | Total Organic Carbon Average | 1.81 | 0.330 | 1.00 | NE | | | 093963-004 | SW846 9060 |
| **TAV-MW10** | Total Organic Carbon #1 | 0.976 | 0.330 | 1.00 | NE | J | | 093994-004 | SW846 9060 |
| 12-Jun-13 | Total Organic Carbon #2 | 1.08 | 0.330 | 1.00 | NE | | | 093994-004 | SW846 9060 |
| | Total Organic Carbon #3 | 1.05 | 0.330 | 1.00 | NE | | | 093994-004 | SW846 9060 |
| | Total Organic Carbon #4 | 1.01 | 0.330 | 1.00 | NE | | | 093994-004 | SW846 9060 |
| | Total Organic Carbon Average | 1.03 | 0.330 | 1.00 | NE | | | 093994-004 | SW846 9060 |

Refer to footnotes on page 5A-89.

## Table 5A-5 *(Continued)*
## Summary of Total Organic Carbon Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW11** | Total Organic Carbon #1 | 0.520 | 0.330 | 1.00 | NE | J | J- | 093968-004 | SW846 9060 |
| 03-Jun-13 | Total Organic Carbon #2 | 0.691 | 0.330 | 1.00 | NE | J | J- | 093968-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.551 | 0.330 | 1.00 | NE | J | J- | 093968-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.616 | 0.330 | 1.00 | NE | J | J- | 093968-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.594 | 0.330 | 1.00 | NE | J | J- | 093968-004 | SW846 9060 |
| **TAV-MW12** | Total Organic Carbon #1 | 0.561 | 0.330 | 1.00 | NE | J | J- | 093972-004 | SW846 9060 |
| 04-Jun-13 | Total Organic Carbon #2 | 0.759 | 0.330 | 1.00 | NE | J | J- | 093972-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.713 | 0.330 | 1.00 | NE | J | J- | 093972-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.755 | 0.330 | 1.00 | NE | J | J- | 093972-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.697 | 0.330 | 1.00 | NE | J | J- | 093972-004 | SW846 9060 |
| **TAV-MW13** | Total Organic Carbon #1 | 0.581 | 0.330 | 1.00 | NE | J | 2.9U | 093957-004 | SW846 9060 |
| 16-May-13 | Total Organic Carbon #2 | 0.979 | 0.330 | 1.00 | NE | J | 3.1U | 093957-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.734 | 0.330 | 1.00 | NE | J | 2.9U | 093957-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.822 | 0.330 | 1.00 | NE | J | 3.1U | 093957-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.779 | 0.330 | 1.00 | NE | J | 3.0U | 093957-004 | SW846 9060 |
| **TAV-MW13** | Total Organic Carbon #1 | 0.768 | 0.330 | 1.00 | NE | J | 2.9U | 093959-004 | SW846 9060 |
| (Duplicate) | Total Organic Carbon #2 | 1.03 | 0.330 | 1.00 | NE | | 3.1U | 093959-004 | SW846 9060 |
| 16-May-13 | Total Organic Carbon #3 | 0.795 | 0.330 | 1.00 | NE | J | 2.9U | 093959-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.951 | 0.330 | 1.00 | NE | J | 3.1U | 093959-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.886 | 0.330 | 1.00 | NE | J | 3.0U | 093959-004 | SW846 9060 |
| **TAV-MW14** | Total Organic Carbon #1 | 0.685 | 0.330 | 1.00 | NE | J | J- | 093980-004 | SW846 9060 |
| 06-Jun-13 | Total Organic Carbon #2 | 0.804 | 0.330 | 1.00 | NE | J | J- | 093980-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.752 | 0.330 | 1.00 | NE | J | J- | 093980-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.850 | 0.330 | 1.00 | NE | J | J- | 093980-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.773 | 0.330 | 1.00 | NE | J | J- | 093980-004 | SW846 9060 |

Refer to footnotes on page 5A-89.

## Table 5A-5 *(Continued)*
## Summary of Total Organic Carbon Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **AVN-1** | Total Organic Carbon #1 | 0.418 | 0.330 | 1.00 | NE | J | | 094408-004 | SW846 9060 |
| 23-Jul-13 | Total Organic Carbon #2 | 0.572 | 0.330 | 1.00 | NE | J | | 094408-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.475 | 0.330 | 1.00 | NE | J | | 094408-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.489 | 0.330 | 1.00 | NE | J | | 094408-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.489 | 0.330 | 1.00 | NE | J | | 094408-004 | SW846 9060 |
| **LWDS-MW1** | Total Organic Carbon #1 | 0.746 | 0.330 | 1.00 | NE | J | | 094420-004 | SW846 9060 |
| 29-Jul-13 | Total Organic Carbon #2 | 0.840 | 0.330 | 1.00 | NE | J | | 094420-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.832 | 0.330 | 1.00 | NE | J | | 094420-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.803 | 0.330 | 1.00 | NE | J | | 094420-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.805 | 0.330 | 1.00 | NE | J | | 094420-004 | SW846 9060 |
| **LWDS-MW2** | Total Organic Carbon #1 | 0.490 | 0.330 | 1.00 | NE | J | | 094396-004 | SW846 9060 |
| 17-Jul-13 | Total Organic Carbon #2 | 0.601 | 0.330 | 1.00 | NE | J | | 094396-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.467 | 0.330 | 1.00 | NE | J | | 094396-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.471 | 0.330 | 1.00 | NE | J | | 094396-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.508 | 0.330 | 1.00 | NE | J | | 094396-004 | SW846 9060 |
| **TAV-MW2** | Total Organic Carbon #1 | 0.499 | 0.330 | 1.00 | NE | J | | 094394-004 | SW846 9060 |
| 16-Jul-13 | Total Organic Carbon #2 | 0.748 | 0.330 | 1.00 | NE | J | | 094394-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.584 | 0.330 | 1.00 | NE | J | | 094394-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.637 | 0.330 | 1.00 | NE | J | | 094394-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.617 | 0.330 | 1.00 | NE | J | | 094394-004 | SW846 9060 |
| **TAV-MW4** | Total Organic Carbon #1 | 0.474 | 0.330 | 1.00 | NE | J | | 094413-004 | SW846 9060 |
| 24-Jul-13 | Total Organic Carbon #2 | 0.642 | 0.330 | 1.00 | NE | J | | 094413-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.471 | 0.330 | 1.00 | NE | J | | 094413-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.545 | 0.330 | 1.00 | NE | J | | 094413-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.533 | 0.330 | 1.00 | NE | J | | 094413-004 | SW846 9060 |
| **TAV-MW6** | Total Organic Carbon #1 | 0.647 | 0.330 | 1.00 | NE | J | | 094417-004 | SW846 9060 |
| 31-Jul-13 | Total Organic Carbon #2 | 0.982 | 0.330 | 1.00 | NE | J | | 094417-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.796 | 0.330 | 1.00 | NE | J | | 094417-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.912 | 0.330 | 1.00 | NE | J | | 094417-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.834 | 0.330 | 1.00 | NE | J | | 094417-004 | SW846 9060 |
| **TAV-MW6** | Total Organic Carbon #1 | 0.634 | 0.330 | 1.00 | NE | J | | 094418-004 | SW846 9060 |
| (Duplicate) | Total Organic Carbon #2 | 0.914 | 0.330 | 1.00 | NE | J | | 094418-004 | SW846 9060 |
| 31-Jul-13 | Total Organic Carbon #3 | 0.709 | 0.330 | 1.00 | NE | J | | 094418-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.842 | 0.330 | 1.00 | NE | J | | 094418-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.775 | 0.330 | 1.00 | NE | J | | 094418-004 | SW846 9060 |

Refer to footnotes on page 5A-89.

**Table 5A-5** *(Continued)*
**Summary of Total Organic Carbon Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW8** | Total Organic Carbon #1 | 0.416 | 0.330 | 1.00 | NE | J | | 094404-004 | SW846 9060 |
| 22-Jul-13 | Total Organic Carbon #2 | 0.700 | 0.330 | 1.00 | NE | J | | 094404-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.500 | 0.330 | 1.00 | NE | J | | 094404-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.599 | 0.330 | 1.00 | NE | J | | 094404-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.554 | 0.330 | 1.00 | NE | J | | 094404-004 | SW846 9060 |
| **TAV-MW10** | Total Organic Carbon #1 | 0.584 | 0.330 | 1.00 | NE | J | | 094422-004 | SW846 9060 |
| 30-Jul-13 | Total Organic Carbon #2 | 0.654 | 0.330 | 1.00 | NE | J | | 094422-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.611 | 0.330 | 1.00 | NE | J | | 094422-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.627 | 0.330 | 1.00 | NE | J | | 094422-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.619 | 0.330 | 1.00 | NE | J | | 094422-004 | SW846 9060 |
| **TAV-MW11** | Total Organic Carbon #1 | 0.438 | 0.330 | 1.00 | NE | J | | 094401-004 | SW846 9060 |
| 18-Jul-13 | Total Organic Carbon #2 | 0.685 | 0.330 | 1.00 | NE | J | 1.8U | 094401-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.495 | 0.330 | 1.00 | NE | J | | 094401-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.596 | 0.330 | 1.00 | NE | J | | 094401-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.554 | 0.330 | 1.00 | NE | J | | 094401-004 | SW846 9060 |
| **TAV-MW11** | Total Organic Carbon #1 | 0.528 | 0.330 | 1.00 | NE | J | | 094402-004 | SW846 9060 |
| (Duplicate) | Total Organic Carbon #2 | 0.641 | 0.330 | 1.00 | NE | J | 1.8U | 094402-004 | SW846 9060 |
| 18-Jul-13 | Total Organic Carbon #3 | 0.564 | 0.330 | 1.00 | NE | J | | 094402-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.574 | 0.330 | 1.00 | NE | J | | 094402-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.577 | 0.330 | 1.00 | NE | J | | 094402-004 | SW846 9060 |
| **TAV-MW12** | Total Organic Carbon #1 | 0.402 | 0.330 | 1.00 | NE | J | | 094406-004 | SW846 9060 |
| 23-Jul-13 | Total Organic Carbon #2 | 0.725 | 0.330 | 1.00 | NE | J | | 094406-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.459 | 0.330 | 1.00 | NE | J | | 094406-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.575 | 0.330 | 1.00 | NE | J | | 094406-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.540 | 0.330 | 1.00 | NE | J | | 094406-004 | SW846 9060 |
| **TAV-MW13** | Total Organic Carbon #1 | 0.527 | 0.330 | 1.00 | NE | J | | 094392-004 | SW846 9060 |
| 15-Jul-13 | Total Organic Carbon #2 | 0.660 | 0.330 | 1.00 | NE | J | | 094392-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.616 | 0.330 | 1.00 | NE | J | | 094392-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.574 | 0.330 | 1.00 | NE | J | | 094392-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.594 | 0.330 | 1.00 | NE | J | | 094392-004 | SW846 9060 |
| **TAV-MW14** | Total Organic Carbon #1 | 0.621 | 0.330 | 1.00 | NE | J | | 094411-004 | SW846 9060 |
| 24-Jul-13 | Total Organic Carbon #2 | 0.831 | 0.330 | 1.00 | NE | J | | 094411-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.697 | 0.330 | 1.00 | NE | J | | 094411-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.699 | 0.330 | 1.00 | NE | J | | 094411-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.712 | 0.330 | 1.00 | NE | J | | 094411-004 | SW846 9060 |

Refer to footnotes on page 5A-89.

## Table 5A-5 *(Continued)*
## Summary of Total Organic Carbon Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **AVN-1** | Total Organic Carbon #1 | 0.562 | 0.330 | 1.00 | NE | J | | 094808-004 | SW846 9060 |
| 23-Oct-13 | Total Organic Carbon #2 | 0.705 | 0.330 | 1.00 | NE | J | | 094808-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.752 | 0.330 | 1.00 | NE | J | | 094808-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.810 | 0.330 | 1.00 | NE | J | | 094808-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.707 | 0.330 | 1.00 | NE | J | | 094808-004 | SW846 9060 |
| **LWDS-MW1** | Total Organic Carbon #1 | 0.764 | 0.330 | 1.00 | NE | J | | 094838-004 | SW846 9060 |
| 11-Nov-13 | Total Organic Carbon #2 | 0.913 | 0.330 | 1.00 | NE | J | | 094838-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.813 | 0.330 | 1.00 | NE | J | | 094838-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.841 | 0.330 | 1.00 | NE | J | | 094838-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.833 | 0.330 | 1.00 | NE | J | | 094838-004 | SW846 9060 |
| **LWDS-MW2** | Total Organic Carbon #1 | 0.669 | 0.330 | 1.00 | NE | J | | 094810-004 | SW846 9060 |
| 24-Oct-13 | Total Organic Carbon #2 | 0.931 | 0.330 | 1.00 | NE | J | | 094810-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.747 | 0.330 | 1.00 | NE | J | | 094810-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.778 | 0.330 | 1.00 | NE | J | | 094810-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.781 | 0.330 | 1.00 | NE | J | | 094810-004 | SW846 9060 |
| **TAV-MW2** | Total Organic Carbon #1 | 0.735 | 0.330 | 1.00 | NE | J | 3.0UJ | 094815-004 | SW846 9060 |
| 28-Oct-13 | Total Organic Carbon #2 | 1.07 | 0.330 | 1.00 | NE | | 3.2UJ | 094815-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.933 | 0.330 | 1.00 | NE | J | 3.4UJ | 094815-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.887 | 0.330 | 1.00 | NE | J | 3.2UJ | 094815-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.906 | 0.330 | 1.00 | NE | J | 3.2UJ | 094815-004 | SW846 9060 |
| **TAV-MW2** | Total Organic Carbon #1 | 0.785 | 0.330 | 1.00 | NE | J | 3.0UJ | 094816-004 | SW846 9060 |
| (Duplicate) | Total Organic Carbon #2 | 1.10 | 0.330 | 1.00 | NE | | 3.2UJ | 094816-004 | SW846 9060 |
| 28-Oct-13 | Total Organic Carbon #3 | 0.780 | 0.330 | 1.00 | NE | J | 3.4UJ | 094816-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.944 | 0.330 | 1.00 | NE | J | 3.2UJ | 094816-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.901 | 0.330 | 1.00 | NE | J | 3.2UJ | 094816-004 | SW846 9060 |
| **TAV-MW3** | Total Organic Carbon #1 | 0.593 | 0.330 | 1.00 | NE | J | J- | 094797-004 | SW846 9060 |
| 17-Oct-13 | Total Organic Carbon #2 | 0.918 | 0.330 | 1.00 | NE | J | J- | 094797-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.752 | 0.330 | 1.00 | NE | J | J- | 094797-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.582 | 0.330 | 1.00 | NE | J | J- | 094797-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.711 | 0.330 | 1.00 | NE | J | J- | 094797-004 | SW846 9060 |
| **TAV-MW4** | Total Organic Carbon #1 | 0.665 | 0.330 | 1.00 | NE | J | J- | 094821-004 | SW846 9060 |
| 30-Oct-13 | Total Organic Carbon #2 | 0.815 | 0.330 | 1.00 | NE | J | J- | 094821-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.697 | 0.330 | 1.00 | NE | J | J- | 094821-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.727 | 0.330 | 1.00 | NE | J | J- | 094821-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.726 | 0.330 | 1.00 | NE | J | J- | 094821-004 | SW846 9060 |

Refer to footnotes on page 5A-89.

## Table 5A-5 *(Continued)*
## Summary of Total Organic Carbon Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW5** | Total Organic Carbon #1 | 0.584 | 0.330 | 1.00 | NE | J | J- | 094793-004 | SW846 9060 |
| 15-Oct-13 | Total Organic Carbon #2 | 0.760 | 0.330 | 1.00 | NE | J | J- | 094793-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.643 | 0.330 | 1.00 | NE | J | J- | 094793-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.747 | 0.330 | 1.00 | NE | J | J- | 094793-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.683 | 0.330 | 1.00 | NE | J | J- | 094793-004 | SW846 9060 |
| **TAV-MW6** | Total Organic Carbon #1 | 0.862 | 0.330 | 1.00 | NE | J | | 094834-004 | SW846 9060 |
| 06-Nov-13 | Total Organic Carbon #2 | 1.10 | 0.330 | 1.00 | NE | | | 094834-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.908 | 0.330 | 1.00 | NE | J | | 094834-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.900 | 0.330 | 1.00 | NE | J | | 094834-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.942 | 0.330 | 1.00 | NE | J | | 094834-004 | SW846 9060 |
| **TAV-MW7** | Total Organic Carbon #1 | 0.798 | 0.330 | 1.00 | NE | J | J- | 094799-004 | SW846 9060 |
| 21-Oct-13 | Total Organic Carbon #2 | 1.10 | 0.330 | 1.00 | NE | | J- | 094799-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.869 | 0.330 | 1.00 | NE | J | J- | 094799-004 | SW846 9060 |
| | Total Organic Carbon #4 | 1.04 | 0.330 | 1.00 | NE | | J- | 094799-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.950 | 0.330 | 1.00 | NE | J | J- | 094799-004 | SW846 9060 |
| **TAV-MW8** | Total Organic Carbon #1 | 0.733 | 0.330 | 1.00 | NE | J | J- | 094819-004 | SW846 9060 |
| 29-Oct-13 | Total Organic Carbon #2 | 1.02 | 0.330 | 1.00 | NE | | J- | 094819-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.802 | 0.330 | 1.00 | NE | J | J- | 094819-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.875 | 0.330 | 1.00 | NE | J | J- | 094819-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.585 | 0.330 | 1.00 | NE | J | J- | 094819-004 | SW846 9060 |
| **TAV-MW9** | Total Organic Carbon #1 | 1.13 | 0.330 | 1.00 | NE | | 2.32UJ | 094804-004 | SW846 9060 |
| 22-Oct-13 | Total Organic Carbon #2 | 1.24 | 0.330 | 1.00 | NE | | 2.74UJ | 094804-004 | SW846 9060 |
| | Total Organic Carbon #3 | 1.14 | 0.330 | 1.00 | NE | | 2.41UJ | 094804-004 | SW846 9060 |
| | Total Organic Carbon #4 | 1.40 | 0.330 | 1.00 | NE | | 2.49UJ | 094804-004 | SW846 9060 |
| | Total Organic Carbon Average | 1.23 | 0.330 | 1.00 | NE | | 2.49UJ | 094804-004 | SW846 9060 |
| **TAV-MW9** | Total Organic Carbon #1 | 1.14 | 0.330 | 1.00 | NE | | 2.32UJ | 094805-004 | SW846 9060 |
| (Duplicate) | Total Organic Carbon #2 | 1.57 | 0.330 | 1.00 | NE | | 2.74UJ | 094805-004 | SW846 9060 |
| 22-Oct-13 | Total Organic Carbon #3 | 1.19 | 0.330 | 1.00 | NE | | 2.41UJ | 094805-004 | SW846 9060 |
| | Total Organic Carbon #4 | 1.32 | 0.330 | 1.00 | NE | | 2.49UJ | 094805-004 | SW846 9060 |
| | Total Organic Carbon Average | 1.30 | 0.330 | 1.00 | NE | | 2.49UJ | 094805-004 | SW846 9060 |
| **TAV-MW10** | Total Organic Carbon #1 | 0.831 | 0.330 | 1.00 | NE | J | | 094836-004 | SW846 9060 |
| 07-Nov-13 | Total Organic Carbon #2 | 1.05 | 0.330 | 1.00 | NE | | | 094836-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.852 | 0.330 | 1.00 | NE | J | | 094836-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.934 | 0.330 | 1.00 | NE | J | | 094836-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.915 | 0.330 | 1.00 | NE | J | | 094836-004 | SW846 9060 |

Refer to footnotes on page 5A-89.

**Table 5A-5** *(Concluded)*
**Summary of Total Organic Carbon Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW11** | Total Organic Carbon #1 | 0.640 | 0.330 | 1.00 | NE | J | J- | 094823-004 | SW846 9060 |
| 31-Oct-13 | Total Organic Carbon #2 | 0.746 | 0.330 | 1.00 | NE | J | J- | 094823-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.681 | 0.330 | 1.00 | NE | J | J- | 094823-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.634 | 0.330 | 1.00 | NE | J | J- | 094823-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.675 | 0.330 | 1.00 | NE | J | J- | 094823-004 | SW846 9060 |
| **TAV-MW12** | Total Organic Carbon #1 | 0.740 | 0.330 | 1.00 | NE | J | 3.1U | 094830-004 | SW846 9060 |
| 05-Nov-13 | Total Organic Carbon #2 | 0.944 | 0.330 | 1.00 | NE | J | 2.9U | 094830-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.872 | 0.330 | 1.00 | NE | J | 3.0U | 094830-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.853 | 0.330 | 1.00 | NE | J | 2.9U | 094830-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.852 | 0.330 | 1.00 | NE | J | 3.0U | 094830-004 | SW846 9060 |
| **TAV-MW12** | Total Organic Carbon #1 | 0.810 | 0.330 | 1.00 | NE | J | 3.1U | 094831-004 | SW846 9060 |
| (Duplicate) | Total Organic Carbon #2 | 0.874 | 0.330 | 1.00 | NE | J | 2.9U | 094831-004 | SW846 9060 |
| 05-Nov-13 | Total Organic Carbon #3 | 0.839 | 0.330 | 1.00 | NE | J | 3.0U | 094831-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.780 | 0.330 | 1.00 | NE | J | 2.9U | 094831-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.826 | 0.330 | 1.00 | NE | J | 3.0U | 094831-004 | SW846 9060 |
| **TAV-MW13** | Total Organic Carbon #1 | 0.760 | 0.330 | 1.00 | NE | J | J- | 094795-004 | SW846 9060 |
| 16-Oct-13 | Total Organic Carbon #2 | 1.15 | 0.330 | 1.00 | NE | | J- | 094795-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.837 | 0.330 | 1.00 | NE | J | J- | 094795-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.731 | 0.330 | 1.00 | NE | J | J- | 094795-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.870 | 0.330 | 1.00 | NE | J | J- | 094795-004 | SW846 9060 |
| **TAV-MW14** | Total Organic Carbon #1 | 0.830 | 0.330 | 1.00 | NE | J | | 094825-004 | SW846 9060 |
| 04-Nov-13 | Total Organic Carbon #2 | 1.09 | 0.330 | 1.00 | NE | | | 094825-004 | SW846 9060 |
| | Total Organic Carbon #3 | 0.958 | 0.330 | 1.00 | NE | J | | 094825-004 | SW846 9060 |
| | Total Organic Carbon #4 | 0.893 | 0.330 | 1.00 | NE | J | | 094825-004 | SW846 9060 |
| | Total Organic Carbon Average | 0.944 | 0.330 | 1.00 | NE | J | | 094825-004 | SW846 9060 |

Refer to footnotes on page 5A-89.

## Table 5A-6
## Summary of Unfiltered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **AVN-1** | Calcium | 43.0 | 0.060 | 0.200 | NE | | | 093517-011 | SW846 6020 |
| 18-Feb-13 | Magnesium | 9.44 | 0.010 | 0.030 | NE | | | 093517-011 | SW846 6020 |
| | Potassium | 3.45 | 0.080 | 0.300 | NE | | | 093517-011 | SW846 6020 |
| | Sodium | 37.2 | 0.080 | 0.250 | NE | | | 093517-011 | SW846 6020 |
| **LWDS-MW1** | Calcium | 68.7 | 0.300 | 1.00 | NE | | | 093525-011 | SW846 6020 |
| 11-Mar-13 | Magnesium | 20.4 | 0.010 | 0.030 | NE | | | 093525-011 | SW846 6020 |
| | Potassium | 3.17 | 0.080 | 0.300 | NE | | | 093525-011 | SW846 6020 |
| | Sodium | 64.5 | 0.400 | 1.25 | NE | | | 093525-011 | SW846 6020 |
| **LWDS-MW1** (Duplicate) | Calcium | 66.2 | 0.300 | 1.00 | NE | | | 093526-011 | SW846 6020 |
| 11-Mar-13 | Magnesium | 18.5 | 0.010 | 0.030 | NE | | | 093526-011 | SW846 6020 |
| | Potassium | 3.01 | 0.080 | 0.300 | NE | | | 093526-011 | SW846 6020 |
| | Sodium | 66.9 | 0.400 | 1.25 | NE | | | 093526-011 | SW846 6020 |
| **LWDS-MW2** | Calcium | 46.6 | 0.060 | 0.200 | NE | | | 093513-011 | SW846 6020 |
| 13-Feb-13 | Magnesium | 13.0 | 0.010 | 0.030 | NE | | | 093513-011 | SW846 6020 |
| | Potassium | 2.94 | 0.080 | 0.300 | NE | | | 093513-011 | SW846 6020 |
| | Sodium | 48.1 | 0.080 | 0.250 | NE | | J | 093513-011 | SW846 6020 |
| **TAV-MW2** | Calcium | 75.6 | 0.300 | 1.00 | NE | | | 093508-011 | SW846 6020 |
| 12-Feb-13 | Magnesium | 20.0 | 0.010 | 0.030 | NE | | | 093508-011 | SW846 6020 |
| | Potassium | 3.86 | 0.080 | 0.300 | NE | | | 093508-011 | SW846 6020 |
| | Sodium | 75.3 | 0.400 | 1.25 | NE | | J | 093508-011 | SW846 6020 |
| **TAV-MW4** | Calcium | 53.8 | 0.300 | 1.00 | NE | | | 093521-011 | SW846 6020 |
| 20-Feb-13 | Magnesium | 13.9 | 0.010 | 0.030 | NE | | | 093521-011 | SW846 6020 |
| | Potassium | 3.19 | 0.080 | 0.300 | NE | | | 093521-011 | SW846 6020 |
| | Sodium | 43.4 | 0.080 | 0.250 | NE | | | 093521-011 | SW846 6020 |
| **TAV-MW6** | Calcium | 63.1 | 0.300 | 1.00 | NE | | | 093533-011 | SW846 6020 |
| 25-Feb-13 | Magnesium | 19.5 | 0.010 | 0.030 | NE | | | 093533-011 | SW846 6020 |
| | Potassium | 3.83 | 0.080 | 0.300 | NE | | | 093533-011 | SW846 6020 |
| | Sodium | 65.9 | 0.400 | 1.25 | NE | | | 093533-011 | SW846 6020 |
| **TAV-MW8** | Calcium | 62.1 | 0.300 | 1.00 | NE | | | 093511-011 | SW846 6020 |
| 15-Feb-13 | Magnesium | 16.5 | 0.010 | 0.030 | NE | | | 093511-011 | SW846 6020 |
| | Potassium | 3.81 | 0.080 | 0.300 | NE | | | 093511-011 | SW846 6020 |
| | Sodium | 92.4 | 0.400 | 1.25 | NE | | J | 093511-011 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-6 *(Continued)*
## Summary of Unfiltered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW10** | Calcium | 64.5 | 0.300 | 1.00 | NE | | | 093536-011 | SW846 6020 |
| 27-Feb-13 | Magnesium | 18.1 | 0.010 | 0.030 | NE | | | 093536-011 | SW846 6020 |
| | Potassium | 4.83 | 0.080 | 0.300 | NE | | | 093536-011 | SW846 6020 |
| | Sodium | 62.0 | 0.400 | 1.25 | NE | | | 093536-011 | SW846 6020 |
| **TAV-MW11** | Calcium | 61.3 | 0.300 | 1.00 | NE | | | 093515-011 | SW846 6020 |
| 14-Feb-13 | Magnesium | 15.1 | 0.010 | 0.030 | NE | | | 093515-011 | SW846 6020 |
| | Potassium | 3.86 | 0.080 | 0.300 | NE | | | 093515-011 | SW846 6020 |
| | Sodium | 60.0 | 0.400 | 1.25 | NE | | J | 093515-011 | SW846 6020 |
| **TAV-MW12** | Calcium | 60.6 | 0.300 | 1.00 | NE | | | 093519-011 | SW846 6020 |
| 19-Feb-13 | Magnesium | 17.8 | 0.010 | 0.030 | NE | | | 093519-011 | SW846 6020 |
| | Potassium | 3.81 | 0.080 | 0.300 | NE | | | 093519-011 | SW846 6020 |
| | Sodium | 60.8 | 0.400 | 1.25 | NE | | | 093519-011 | SW846 6020 |
| **TAV-MW13** | Calcium | 50.0 | 0.060 | 0.200 | NE | | | 093574-011 | SW846 6020 |
| 26-Feb-13 | Magnesium | 15.6 | 0.010 | 0.030 | NE | | | 093574-011 | SW846 6020 |
| | Potassium | 3.57 | 0.080 | 0.300 | NE | | | 093574-011 | SW846 6020 |
| | Sodium | 48.5 | 0.080 | 0.250 | NE | | | 093574-011 | SW846 6020 |
| **TAV-MW14** | Calcium | 63.8 | 0.300 | 1.00 | NE | | | 093530-011 | SW846 6020 |
| 21-Feb-13 | Magnesium | 17.9 | 0.010 | 0.030 | NE | | | 093530-011 | SW846 6020 |
| | Potassium | 4.14 | 0.080 | 0.300 | NE | | | 093530-011 | SW846 6020 |
| | Sodium | 58.7 | 0.400 | 1.25 | NE | | | 093530-011 | SW846 6020 |
| **TAV-MW14** (Duplicate) | Calcium | 62.1 | 0.300 | 1.00 | NE | | | 093531-011 | SW846 6020 |
| 21-Feb-13 | Magnesium | 17.3 | 0.010 | 0.030 | NE | | | 093531-011 | SW846 6020 |
| | Potassium | 3.91 | 0.080 | 0.300 | NE | | | 093531-011 | SW846 6020 |
| | Sodium | 61.8 | 0.400 | 1.25 | NE | | | 093531-011 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-6 *(Continued)*
## Summary of Unfiltered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **AVN-1** | Aluminum | 0.0154 | 0.015 | 0.050 | NE | J | | 093964-009 | SW846 6020 |
| 30-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093964-009 | SW846 6020 |
| | Arsenic | 0.00313 | 0.0017 | 0.005 | 0.010 | J | | 093964-009 | SW846 6020 |
| | Barium | 0.0775 | 0.0006 | 0.002 | 2.00 | | | 093964-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093964-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093964-009 | SW846 6020 |
| | Calcium | 44.0 | 0.060 | 0.200 | NE | | | 093964-009 | SW846 6020 |
| | Chromium | 0.0274 | 0.002 | 0.010 | 0.100 | | | 093964-009 | SW846 6020 |
| | Cobalt | 0.000111 | 0.0001 | 0.001 | NE | J | | 093964-009 | SW846 6020 |
| | Copper | 0.00787 | 0.00035 | 0.001 | NE | | | 093964-009 | SW846 6020 |
| | Iron | 0.200 | 0.033 | 0.100 | NE | | | 093964-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093964-009 | SW846 6020 |
| | Magnesium | 10.3 | 0.010 | 0.030 | NE | | | 093964-009 | SW846 6020 |
| | Manganese | 0.00149 | 0.001 | 0.005 | NE | J | | 093964-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093964-009 | SW846 7470 |
| | Nickel | 0.00372 | 0.0005 | 0.002 | NE | | | 093964-009 | SW846 6020 |
| | Potassium | 3.59 | 0.080 | 0.300 | NE | | | 093964-009 | SW846 6020 |
| | Selenium | 0.002 | 0.0015 | 0.005 | 0.050 | J | | 093964-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093964-009 | SW846 6020 |
| | Sodium | 40.5 | 0.080 | 0.250 | NE | | | 093964-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093964-009 | SW846 6020 |
| | Uranium | 0.00223 | 0.000067 | 0.0002 | 0.030 | | | 093964-009 | SW846 6020 |
| | Vanadium | 0.00872 | 0.001 | 0.005 | NE | | | 093964-009 | SW846 6010 |
| | Zinc | 0.00702 | 0.0035 | 0.010 | NE | J | | 093964-009 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-6 *(Continued)*
## Summary of Unfiltered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **LWDS-MW1** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093986-009 | SW846 6020 |
| 10-Jun-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093986-009 | SW846 6020 |
| | Arsenic | 0.00303 | 0.0017 | 0.005 | 0.010 | J | | 093986-009 | SW846 6020 |
| | Barium | 0.0881 | 0.0006 | 0.002 | 2.00 | | | 093986-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093986-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093986-009 | SW846 6020 |
| | Calcium | 73.1 | 0.300 | 1.00 | NE | | | 093986-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093986-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 093986-009 | SW846 6020 |
| | Copper | 0.000685 | 0.00035 | 0.001 | NE | J | | 093986-009 | SW846 6020 |
| | Iron | 0.133 | 0.033 | 0.100 | NE | | | 093986-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093986-009 | SW846 6020 |
| | Magnesium | 22.8 | 0.010 | 0.030 | NE | | | 093986-009 | SW846 6020 |
| | Manganese | 0.00113 | 0.001 | 0.005 | NE | J | | 093986-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093986-009 | SW846 7470 |
| | Nickel | 0.00201 | 0.0005 | 0.002 | NE | | | 093986-009 | SW846 6020 |
| | Potassium | 3.13 | 0.080 | 0.300 | NE | | | 093986-009 | SW846 6020 |
| | Selenium | 0.00683 | 0.0015 | 0.005 | 0.050 | | | 093986-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093986-009 | SW846 6020 |
| | Sodium | 71.6 | 0.400 | 1.25 | NE | | | 093986-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093986-009 | SW846 6020 |
| | Uranium | 0.00346 | 0.000067 | 0.0002 | 0.030 | | | 093986-009 | SW846 6020 |
| | Vanadium | 0.0051 | 0.001 | 0.005 | NE | | | 093986-009 | SW846 6010 |
| | Zinc | 0.00496 | 0.0035 | 0.010 | NE | J | | 093986-009 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-6 *(Continued)*
## Summary of Unfiltered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **LWDS-MW2** | Aluminum | 0.038 | 0.015 | 0.050 | NE | J | | 093958-009 | SW846 6020 |
| 29-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093958-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093958-009 | SW846 6020 |
| | Barium | 0.0695 | 0.0006 | 0.002 | 2.00 | | | 093958-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093958-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093958-009 | SW846 6020 |
| | Calcium | 47.2 | 0.060 | 0.200 | NE | | | 093958-009 | SW846 6020 |
| | Chromium | 0.00344 | 0.002 | 0.010 | 0.100 | J | | 093958-009 | SW846 6020 |
| | Cobalt | 0.000137 | 0.0001 | 0.001 | NE | J | | 093958-009 | SW846 6020 |
| | Copper | 0.00745 | 0.00035 | 0.001 | NE | | 0.013UJ | 093958-009 | SW846 6020 |
| | Iron | 0.123 | 0.033 | 0.100 | NE | | | 093958-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093958-009 | SW846 6020 |
| | Magnesium | 13.7 | 0.010 | 0.030 | NE | | | 093958-009 | SW846 6020 |
| | Manganese | 0.00222 | 0.001 | 0.005 | NE | J | 0.028UJ | 093958-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093958-009 | SW846 7470 |
| | Nickel | 0.00155 | 0.0005 | 0.002 | NE | J | | 093958-009 | SW846 6020 |
| | Potassium | 3.04 | 0.080 | 0.300 | NE | | | 093958-009 | SW846 6020 |
| | Selenium | 0.00239 | 0.0015 | 0.005 | 0.050 | J | | 093958-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093958-009 | SW846 6020 |
| | Sodium | 44.7 | 0.080 | 0.250 | NE | | | 093958-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093958-009 | SW846 6020 |
| | Uranium | 0.00307 | 0.000067 | 0.0002 | 0.030 | | | 093958-009 | SW846 6020 |
| | Vanadium | 0.00715 | 0.001 | 0.005 | NE | | | 093958-009 | SW846 6010 |
| | Zinc | 0.00658 | 0.0035 | 0.010 | NE | J | 0.041U | 093958-009 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-6 *(Continued)*
## Summary of Unfiltered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **LWDS-MW2** (Duplicate) | Aluminum | 0.0554 | 0.015 | 0.050 | NE | | | 093960-009 | SW846 6020 |
| 29-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093960-009 | SW846 6020 |
| | Arsenic | 0.00281 | 0.0017 | 0.005 | 0.010 | J | | 093960-009 | SW846 6020 |
| | Barium | 0.0671 | 0.0006 | 0.002 | 2.00 | | | 093960-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093960-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093960-009 | SW846 6020 |
| | Calcium | 45.0 | 0.060 | 0.200 | NE | | | 093960-009 | SW846 6020 |
| | Chromium | 0.0034 | 0.002 | 0.010 | 0.100 | J | | 093960-009 | SW846 6020 |
| | Cobalt | 0.000144 | 0.0001 | 0.001 | NE | J | | 093960-009 | SW846 6020 |
| | Copper | 0.00731 | 0.00035 | 0.001 | NE | | 0.013UJ | 093960-009 | SW846 6020 |
| | Iron | 0.156 | 0.033 | 0.100 | NE | | | 093960-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093960-009 | SW846 6020 |
| | Magnesium | 13.5 | 0.010 | 0.030 | NE | | | 093960-009 | SW846 6020 |
| | Manganese | 0.00247 | 0.001 | 0.005 | NE | J | 0.028UJ | 093960-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093960-009 | SW846 7470 |
| | Nickel | 0.00173 | 0.0005 | 0.002 | NE | J | | 093960-009 | SW846 6020 |
| | Potassium | 2.82 | 0.080 | 0.300 | NE | | | 093960-009 | SW846 6020 |
| | Selenium | 0.00253 | 0.0015 | 0.005 | 0.050 | J | | 093960-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093960-009 | SW846 6020 |
| | Sodium | 43.5 | 0.080 | 0.250 | NE | | | 093960-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093960-009 | SW846 6020 |
| | Uranium | 0.00311 | 0.000067 | 0.0002 | 0.030 | | | 093960-009 | SW846 6020 |
| | Vanadium | 0.00707 | 0.001 | 0.005 | NE | | | 093960-009 | SW846 6010 |
| | Zinc | 0.00569 | 0.0035 | 0.010 | NE | J | 0.041U | 093960-009 | SW846 6020 |

Refer to footnotes on page 5A-89.

**Table 5A-6** *(Continued)*
**Summary of Unfiltered Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW2** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093950-009 | SW846 6020 |
| 28-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093950-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093950-009 | SW846 6020 |
| | Barium | 0.0636 | 0.0006 | 0.002 | 2.00 | | | 093950-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093950-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093950-009 | SW846 6020 |
| | Calcium | 72.3 | 0.300 | 1.00 | NE | | | 093950-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093950-009 | SW846 6020 |
| | Cobalt | 0.00021 | 0.0001 | 0.001 | NE | J | | 093950-009 | SW846 6020 |
| | Copper | 0.00165 | 0.00035 | 0.001 | NE | | | 093950-009 | SW846 6020 |
| | Iron | 0.150 | 0.033 | 0.100 | NE | | | 093950-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093950-009 | SW846 6020 |
| | Magnesium | 22.8 | 0.010 | 0.030 | NE | | | 093950-009 | SW846 6020 |
| | Manganese | 0.00147 | 0.001 | 0.005 | NE | J | | 093950-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093950-009 | SW846 7470 |
| | Nickel | 0.00228 | 0.0005 | 0.002 | NE | | | 093950-009 | SW846 6020 |
| | Potassium | 3.86 | 0.080 | 0.300 | NE | | | 093950-009 | SW846 6020 |
| | Selenium | 0.00287 | 0.0015 | 0.005 | 0.050 | J | | 093950-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093950-009 | SW846 6020 |
| | Sodium | 65.0 | 0.400 | 1.25 | NE | | | 093950-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093950-009 | SW846 6020 |
| | Uranium | 0.00637 | 0.000067 | 0.0002 | 0.030 | | | 093950-009 | SW846 6020 |
| | Vanadium | 0.00564 | 0.001 | 0.005 | NE | | | 093950-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093950-009 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-6 *(Continued)*
## Summary of Unfiltered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW3** | Aluminum | 0.0172 | 0.015 | 0.050 | NE | J | | 093969-009 | SW846 6020 |
| 21-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093969-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093969-009 | SW846 6020 |
| | Barium | 0.0472 | 0.0006 | 0.002 | 2.00 | | | 093969-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093969-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093969-009 | SW846 6020 |
| | Calcium | 55.7 | 0.300 | 1.00 | NE | N | | 093969-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093969-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 093969-009 | SW846 6020 |
| | Copper | 0.00066 | 0.00035 | 0.001 | NE | J | | 093969-009 | SW846 6020 |
| | Iron | 0.125 | 0.033 | 0.100 | NE | | | 093969-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093969-009 | SW846 6020 |
| | Magnesium | 15.7 | 0.010 | 0.030 | NE | | | 093969-009 | SW846 6020 |
| | Manganese | 0.00118 | 0.001 | 0.005 | NE | J | | 093969-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093969-009 | SW846 7470 |
| | Nickel | 0.00157 | 0.0005 | 0.002 | NE | J | | 093969-009 | SW846 6020 |
| | Potassium | 4.48 | 0.080 | 0.300 | NE | | | 093969-009 | SW846 6020 |
| | Selenium | 0.00253 | 0.0015 | 0.005 | 0.050 | J | | 093969-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093969-009 | SW846 6020 |
| | Sodium | 54.6 | 0.400 | 1.25 | NE | N | | 093969-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093969-009 | SW846 6020 |
| | Uranium | 0.00332 | 0.000067 | 0.0002 | 0.030 | | J | 093969-009 | SW846 6020 |
| | Vanadium | 0.00558 | 0.001 | 0.005 | NE | | | 093969-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093969-009 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-6 *(Continued)*
## Summary of Unfiltered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW4** | Aluminum | 0.0245 | 0.015 | 0.050 | NE | J | | 093976-009 | SW846 6020 |
| 05-Jun-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093976-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093976-009 | SW846 6020 |
| | Barium | 0.0828 | 0.0006 | 0.002 | 2.00 | B | | 093976-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093976-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093976-009 | SW846 6020 |
| | Calcium | 53.9 | 0.300 | 1.00 | NE | B | | 093976-009 | SW846 6020 |
| | Chromium | 0.0276 | 0.002 | 0.010 | 0.100 | | | 093976-009 | SW846 6020 |
| | Cobalt | 0.000152 | 0.0001 | 0.001 | NE | J | | 093976-009 | SW846 6020 |
| | Copper | 0.00131 | 0.00035 | 0.001 | NE | B | 0.0022U | 093976-009 | SW846 6020 |
| | Iron | 0.153 | 0.033 | 0.100 | NE | | | 093976-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093976-009 | SW846 6020 |
| | Magnesium | 15.6 | 0.010 | 0.030 | NE | | | 093976-009 | SW846 6020 |
| | Manganese | 0.00171 | 0.001 | 0.005 | NE | J | | 093976-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093976-009 | SW846 7470 |
| | Nickel | 0.00215 | 0.0005 | 0.002 | NE | B | 0.0028U | 093976-009 | SW846 6020 |
| | Potassium | 2.98 | 0.080 | 0.300 | NE | | | 093976-009 | SW846 6020 |
| | Selenium | 0.00367 | 0.0015 | 0.005 | 0.050 | J | | 093976-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093976-009 | SW846 6020 |
| | Sodium | 48.7 | 0.080 | 0.250 | NE | | | 093976-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093976-009 | SW846 6020 |
| | Uranium | 0.00294 | 0.000067 | 0.0002 | 0.030 | | | 093976-009 | SW846 6020 |
| | Vanadium | 0.00706 | 0.001 | 0.005 | NE | | | 093976-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093976-009 | SW846 6020 |

Refer to footnotes on page 5A-89.

**Table 5A-6** *(Continued)*
**Summary of Unfiltered Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW5** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093949-009 | SW846 6020 |
| 15-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093949-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093949-009 | SW846 6020 |
| | Barium | 0.0612 | 0.0006 | 0.002 | 2.00 | | | 093949-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093949-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093949-009 | SW846 6020 |
| | Calcium | 48.3 | 0.060 | 0.200 | NE | N | | 093949-009 | SW846 6020 |
| | Chromium | 0.00333 | 0.002 | 0.010 | 0.100 | J | | 093949-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 093949-009 | SW846 6020 |
| | Copper | 0.00162 | 0.00035 | 0.001 | NE | | | 093949-009 | SW846 6020 |
| | Iron | 0.109 | 0.033 | 0.100 | NE | | | 093949-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093949-009 | SW846 6020 |
| | Magnesium | 14.6 | 0.010 | 0.030 | NE | | | 093949-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093949-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093949-009 | SW846 7470 |
| | Nickel | 0.00272 | 0.0005 | 0.002 | NE | | | 093949-009 | SW846 6020 |
| | Potassium | 2.94 | 0.080 | 0.300 | NE | | | 093949-009 | SW846 6020 |
| | Selenium | 0.00288 | 0.0015 | 0.005 | 0.050 | J | | 093949-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093949-009 | SW846 6020 |
| | Sodium | 46.9 | 0.080 | 0.250 | NE | N | | 093949-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093949-009 | SW846 6020 |
| | Uranium | 0.00351 | 0.000067 | 0.0002 | 0.030 | | | 093949-009 | SW846 6020 |
| | Vanadium | 0.00634 | 0.001 | 0.005 | NE | | | 093949-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093949-009 | SW846 6020 |

Refer to footnotes on page 5A-89.

**Table 5A-6** *(Continued)*
**Summary of Unfiltered Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW6** | Aluminum | 0.170 | 0.015 | 0.050 | NE | | | 093990-009 | SW846 6020 |
| 11-Jun-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093990-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093990-009 | SW846 6020 |
| | Barium | 0.0724 | 0.0006 | 0.002 | 2.00 | | | 093990-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093990-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093990-009 | SW846 6020 |
| | Calcium | 66.4 | 0.300 | 1.00 | NE | | | 093990-009 | SW846 6020 |
| | Chromium | 0.00294 | 0.002 | 0.010 | 0.100 | J | | 093990-009 | SW846 6020 |
| | Cobalt | 0.000157 | 0.0001 | 0.001 | NE | J | | 093990-009 | SW846 6020 |
| | Copper | 0.000746 | 0.00035 | 0.001 | NE | J | | 093990-009 | SW846 6020 |
| | Iron | 0.317 | 0.033 | 0.100 | NE | | | 093990-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093990-009 | SW846 6020 |
| | Magnesium | 20.4 | 0.010 | 0.030 | NE | | | 093990-009 | SW846 6020 |
| | Manganese | 0.00478 | 0.001 | 0.005 | NE | J | | 093990-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093990-009 | SW846 7470 |
| | Nickel | 0.00205 | 0.0005 | 0.002 | NE | | | 093990-009 | SW846 6020 |
| | Potassium | 3.94 | 0.080 | 0.300 | NE | | | 093990-009 | SW846 6020 |
| | Selenium | 0.00553 | 0.0015 | 0.005 | 0.050 | | | 093990-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093990-009 | SW846 6020 |
| | Sodium | 63.3 | 0.400 | 1.25 | NE | | | 093990-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093990-009 | SW846 6020 |
| | Uranium | 0.00382 | 0.000067 | 0.0002 | 0.030 | | | 093990-009 | SW846 6020 |
| | Vanadium | 0.00621 | 0.001 | 0.005 | NE | | 0.0064U | 093990-009 | SW846 6010 |
| | Zinc | 0.00409 | 0.0035 | 0.010 | NE | J | | 093990-009 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-6 *(Continued)*
## Summary of Unfiltered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW7** | Aluminum | 0.034 | 0.015 | 0.050 | NE | J | | 093977-009 | SW846 6020 |
| 22-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093977-009 | SW846 6020 |
| | Arsenic | 0.00178 | 0.0017 | 0.005 | 0.010 | J | | 093977-009 | SW846 6020 |
| | Barium | 0.0572 | 0.0006 | 0.002 | 2.00 | | | 093977-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093977-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093977-009 | SW846 6020 |
| | Calcium | 60.7 | 0.300 | 1.00 | NE | N | | 093977-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093977-009 | SW846 6020 |
| | Cobalt | 0.000152 | 0.0001 | 0.001 | NE | J | | 093977-009 | SW846 6020 |
| | Copper | 0.000747 | 0.00035 | 0.001 | NE | J | 0.0082UJ | 093977-009 | SW846 6020 |
| | Iron | 0.196 | 0.033 | 0.100 | NE | | | 093977-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093977-009 | SW846 6020 |
| | Magnesium | 19.9 | 0.010 | 0.030 | NE | | | 093977-009 | SW846 6020 |
| | Manganese | 0.00505 | 0.001 | 0.005 | NE | | | 093977-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093977-009 | SW846 7470 |
| | Nickel | 0.00173 | 0.0005 | 0.002 | NE | J | | 093977-009 | SW846 6020 |
| | Potassium | 3.91 | 0.080 | 0.300 | NE | | | 093977-009 | SW846 6020 |
| | Selenium | 0.00276 | 0.0015 | 0.005 | 0.050 | J | | 093977-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093977-009 | SW846 6020 |
| | Sodium | 62.3 | 0.400 | 1.25 | NE | N | | 093977-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093977-009 | SW846 6020 |
| | Uranium | 0.00464 | 0.000067 | 0.0002 | 0.030 | | J | 093977-009 | SW846 6020 |
| | Vanadium | 0.00702 | 0.001 | 0.005 | NE | | | 093977-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093977-009 | SW846 6020 |

Refer to footnotes on page 5A-89.

**Table 5A-6** *(Continued)*
**Summary of Unfiltered Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW7** (Duplicate) | Aluminum | 0.0346 | 0.015 | 0.050 | NE | J | | 093979-009 | SW846 6020 |
| 22-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093979-009 | SW846 6020 |
| | Arsenic | 0.00181 | 0.0017 | 0.005 | 0.010 | J | | 093979-009 | SW846 6020 |
| | Barium | 0.0583 | 0.0006 | 0.002 | 2.00 | | | 093979-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093979-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093979-009 | SW846 6020 |
| | Calcium | 61.5 | 0.300 | 1.00 | NE | N | | 093979-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093979-009 | SW846 6020 |
| | Cobalt | 0.000133 | 0.0001 | 0.001 | NE | J | | 093979-009 | SW846 6020 |
| | Copper | 0.0292 | 0.00035 | 0.001 | NE | | | 093979-009 | SW846 6020 |
| | Iron | 0.178 | 0.033 | 0.100 | NE | | | 093979-009 | SW846 6020 |
| | Lead | 0.00153 | 0.0005 | 0.002 | NE | J | | 093979-009 | SW846 6020 |
| | Magnesium | 20.8 | 0.010 | 0.030 | NE | | | 093979-009 | SW846 6020 |
| | Manganese | 0.00508 | 0.001 | 0.005 | NE | | | 093979-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093979-009 | SW846 7470 |
| | Nickel | 0.00178 | 0.0005 | 0.002 | NE | J | | 093979-009 | SW846 6020 |
| | Potassium | 3.86 | 0.080 | 0.300 | NE | | | 093979-009 | SW846 6020 |
| | Selenium | 0.00319 | 0.0015 | 0.005 | 0.050 | J | | 093979-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093979-009 | SW846 6020 |
| | Sodium | 58.0 | 0.400 | 1.25 | NE | N | | 093979-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093979-009 | SW846 6020 |
| | Uranium | 0.00444 | 0.000067 | 0.0002 | 0.030 | | J | 093979-009 | SW846 6020 |
| | Vanadium | 0.00663 | 0.001 | 0.005 | NE | | | 093979-009 | SW846 6010 |
| | Zinc | 0.0215 | 0.0035 | 0.010 | NE | | | 093979-009 | SW846 6020 |

Refer to footnotes on page 5A-89.

**Table 5A-6** *(Continued)*
**Summary of Unfiltered Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW8** | Aluminum | 0.126 | 0.015 | 0.050 | NE | | | 093983-009 | SW846 6020 |
| 23-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093983-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093983-009 | SW846 6020 |
| | Barium | 0.0567 | 0.0006 | 0.002 | 2.00 | | | 093983-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093983-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093983-009 | SW846 6020 |
| | Calcium | 59.0 | 0.300 | 1.00 | NE | N | | 093983-009 | SW846 6020 |
| | Chromium | 0.00295 | 0.002 | 0.010 | 0.100 | J | | 093983-009 | SW846 6020 |
| | Cobalt | 0.000125 | 0.0001 | 0.001 | NE | J | | 093983-009 | SW846 6020 |
| | Copper | 0.00116 | 0.00035 | 0.001 | NE | | | 093983-009 | SW846 6020 |
| | Iron | 0.200 | 0.033 | 0.100 | NE | | | 093983-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093983-009 | SW846 6020 |
| | Magnesium | 17.8 | 0.010 | 0.030 | NE | | | 093983-009 | SW846 6020 |
| | Manganese | 0.00295 | 0.001 | 0.005 | NE | J | | 093983-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093983-009 | SW846 7470 |
| | Nickel | 0.0016 | 0.0005 | 0.002 | NE | J | | 093983-009 | SW846 6020 |
| | Potassium | 3.60 | 0.080 | 0.300 | NE | | | 093983-009 | SW846 6020 |
| | Selenium | 0.00349 | 0.0015 | 0.005 | 0.050 | J | | 093983-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093983-009 | SW846 6020 |
| | Sodium | 57.1 | 0.400 | 1.25 | NE | N | | 093983-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093983-009 | SW846 6020 |
| | Uranium | 0.00318 | 0.000067 | 0.0002 | 0.030 | | J | 093983-009 | SW846 6020 |
| | Vanadium | 0.00615 | 0.001 | 0.005 | NE | | | 093983-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093983-009 | SW846 6020 |

Refer to footnotes on page 5A-89.

**Table 5A-6** *(Continued)*
**Summary of Unfiltered Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW9** | Aluminum | 0.0583 | 0.015 | 0.050 | NE | | | 093963-009 | SW846 6020 |
| 20-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093963-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093963-009 | SW846 6020 |
| | Barium | 0.0653 | 0.0006 | 0.002 | 2.00 | | | 093963-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093963-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093963-009 | SW846 6020 |
| | Calcium | 58.5 | 0.300 | 1.00 | NE | N | | 093963-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093963-009 | SW846 6020 |
| | Cobalt | 0.000147 | 0.0001 | 0.001 | NE | J | | 093963-009 | SW846 6020 |
| | Copper | 0.00169 | 0.00035 | 0.001 | NE | | | 093963-009 | SW846 6020 |
| | Iron | 0.163 | 0.033 | 0.100 | NE | | | 093963-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093963-009 | SW846 6020 |
| | Magnesium | 19.4 | 0.010 | 0.030 | NE | | | 093963-009 | SW846 6020 |
| | Manganese | 0.00781 | 0.001 | 0.005 | NE | | | 093963-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093963-009 | SW846 7470 |
| | Nickel | 0.00186 | 0.0005 | 0.002 | NE | J | | 093963-009 | SW846 6020 |
| | Potassium | 3.95 | 0.080 | 0.300 | NE | | | 093963-009 | SW846 6020 |
| | Selenium | 0.00281 | 0.0015 | 0.005 | 0.050 | J | | 093963-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093963-009 | SW846 6020 |
| | Sodium | 56.3 | 0.400 | 1.25 | NE | N | | 093963-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093963-009 | SW846 6020 |
| | Uranium | 0.00482 | 0.000067 | 0.0002 | 0.030 | | J | 093963-009 | SW846 6020 |
| | Vanadium | 0.00597 | 0.001 | 0.005 | NE | | | 093963-009 | SW846 6010 |
| | Zinc | 0.0155 | 0.0035 | 0.010 | NE | | | 093963-009 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-6 *(Continued)*
## Summary of Unfiltered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW10** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093994-009 | SW846 6020 |
| 12-Jun-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093994-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093994-009 | SW846 6020 |
| | Barium | 0.0614 | 0.0006 | 0.002 | 2.00 | | | 093994-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093994-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093994-009 | SW846 6020 |
| | Calcium | 65.5 | 0.300 | 1.00 | NE | | | 093994-009 | SW846 6020 |
| | Chromium | 0.00274 | 0.002 | 0.010 | 0.100 | J | | 093994-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 093994-009 | SW846 6020 |
| | Copper | 0.00081 | 0.00035 | 0.001 | NE | J | | 093994-009 | SW846 6020 |
| | Iron | 0.125 | 0.033 | 0.100 | NE | | | 093994-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093994-009 | SW846 6020 |
| | Magnesium | 17.2 | 0.010 | 0.030 | NE | | | 093994-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093994-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093994-009 | SW846 7470 |
| | Nickel | 0.00172 | 0.0005 | 0.002 | NE | J | | 093994-009 | SW846 6020 |
| | Potassium | 4.44 | 0.080 | 0.300 | NE | | | 093994-009 | SW846 6020 |
| | Selenium | 0.00337 | 0.0015 | 0.005 | 0.050 | J | | 093994-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093994-009 | SW846 6020 |
| | Sodium | 64.6 | 0.400 | 1.25 | NE | | | 093994-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093994-009 | SW846 6020 |
| | Uranium | 0.00342 | 0.000067 | 0.0002 | 0.030 | | | 093994-009 | SW846 6020 |
| | Vanadium | 0.00589 | 0.001 | 0.005 | NE | | 0.0064U | 093994-009 | SW846 6010 |
| | Zinc | 0.00567 | 0.0035 | 0.010 | NE | J | | 093994-009 | SW846 6020 |

Refer to footnotes on page 5A-89.

**Table 5A-6** *(Continued)*
**Summary of Unfiltered Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW11** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093968-009 | SW846 6020 |
| 03-Jun-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093968-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093968-009 | SW846 6020 |
| | Barium | 0.0645 | 0.0006 | 0.002 | 2.00 | B | | 093968-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093968-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093968-009 | SW846 6020 |
| | Calcium | 55.2 | 0.300 | 1.00 | NE | B | | 093968-009 | SW846 6020 |
| | Chromium | 0.00329 | 0.002 | 0.010 | 0.100 | J | | 093968-009 | SW846 6020 |
| | Cobalt | 0.000167 | 0.0001 | 0.001 | NE | J | | 093968-009 | SW846 6020 |
| | Copper | 0.0011 | 0.00035 | 0.001 | NE | B | 0.0022U | 093968-009 | SW846 6020 |
| | Iron | 0.127 | 0.033 | 0.100 | NE | | | 093968-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093968-009 | SW846 6020 |
| | Magnesium | 15.9 | 0.010 | 0.030 | NE | | | 093968-009 | SW846 6020 |
| | Manganese | 0.0062 | 0.001 | 0.005 | NE | | | 093968-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093968-009 | SW846 7470 |
| | Nickel | 0.00221 | 0.0005 | 0.002 | NE | B | 0.0028U | 093968-009 | SW846 6020 |
| | Potassium | 3.57 | 0.080 | 0.300 | NE | | | 093968-009 | SW846 6020 |
| | Selenium | 0.00378 | 0.0015 | 0.005 | 0.050 | J | | 093968-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093968-009 | SW846 6020 |
| | Sodium | 53.8 | 0.400 | 1.25 | NE | | | 093968-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093968-009 | SW846 6020 |
| | Uranium | 0.00285 | 0.000067 | 0.0002 | 0.030 | | | 093968-009 | SW846 6020 |
| | Vanadium | 0.0063 | 0.001 | 0.005 | NE | | | 093968-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093968-009 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-6 *(Continued)*
## Summary of Unfiltered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW12** | Aluminum | 0.226 | 0.015 | 0.050 | NE | | | 093972-009 | SW846 6020 |
| 04-Jun-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093972-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093972-009 | SW846 6020 |
| | Barium | 0.0646 | 0.0006 | 0.002 | 2.00 | B | | 093972-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093972-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093972-009 | SW846 6020 |
| | Calcium | 58.8 | 0.300 | 1.00 | NE | B | | 093972-009 | SW846 6020 |
| | Chromium | 0.0025 | 0.002 | 0.010 | 0.100 | J | | 093972-009 | SW846 6020 |
| | Cobalt | 0.000292 | 0.0001 | 0.001 | NE | J | | 093972-009 | SW846 6020 |
| | Copper | 0.00134 | 0.00035 | 0.001 | NE | B | 0.0022U | 093972-009 | SW846 6020 |
| | Iron | 0.349 | 0.033 | 0.100 | NE | | | 093972-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093972-009 | SW846 6020 |
| | Magnesium | 19.2 | 0.010 | 0.030 | NE | | | 093972-009 | SW846 6020 |
| | Manganese | 0.00735 | 0.001 | 0.005 | NE | | | 093972-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093972-009 | SW846 7470 |
| | Nickel | 0.0025 | 0.0005 | 0.002 | NE | B | 0.0028U | 093972-009 | SW846 6020 |
| | Potassium | 3.59 | 0.080 | 0.300 | NE | | | 093972-009 | SW846 6020 |
| | Selenium | 0.00264 | 0.0015 | 0.005 | 0.050 | J | | 093972-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093972-009 | SW846 6020 |
| | Sodium | 61.5 | 0.400 | 1.25 | NE | | | 093972-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093972-009 | SW846 6020 |
| | Uranium | 0.00467 | 0.000067 | 0.0002 | 0.030 | | | 093972-009 | SW846 6020 |
| | Vanadium | 0.00565 | 0.001 | 0.005 | NE | | | 093972-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093972-009 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-6 *(Continued)*
## Summary of Unfiltered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW13** | Aluminum | 0.0256 | 0.015 | 0.050 | NE | J | | 093957-009 | SW846 6020 |
| 16-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093957-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093957-009 | SW846 6020 |
| | Barium | 0.0567 | 0.0006 | 0.002 | 2.00 | | | 093957-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093957-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093957-009 | SW846 6020 |
| | Calcium | 52.8 | 0.300 | 1.00 | NE | N | | 093957-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093957-009 | SW846 6020 |
| | Cobalt | 0.000114 | 0.0001 | 0.001 | NE | J | | 093957-009 | SW846 6020 |
| | Copper | 0.00129 | 0.00035 | 0.001 | NE | | 0.012UJ | 093957-009 | SW846 6020 |
| | Iron | 0.134 | 0.033 | 0.100 | NE | | 0.18U | 093957-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093957-009 | SW846 6020 |
| | Magnesium | 15.3 | 0.010 | 0.030 | NE | | | 093957-009 | SW846 6020 |
| | Manganese | 0.00943 | 0.001 | 0.005 | NE | | | 093957-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093957-009 | SW846 7470 |
| | Nickel | 0.00148 | 0.0005 | 0.002 | NE | J | | 093957-009 | SW846 6020 |
| | Potassium | 3.49 | 0.080 | 0.300 | NE | | | 093957-009 | SW846 6020 |
| | Selenium | 0.00248 | 0.0015 | 0.005 | 0.050 | J | | 093957-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093957-009 | SW846 6020 |
| | Sodium | 51.9 | 0.400 | 1.25 | NE | N | | 093957-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093957-009 | SW846 6020 |
| | Uranium | 0.0037 | 0.000067 | 0.0002 | 0.030 | | | 093957-009 | SW846 6020 |
| | Vanadium | 0.00605 | 0.001 | 0.005 | NE | | | 093957-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093957-009 | SW846 6020 |

Refer to footnotes on page 5A-89.

**Table 5A-6** *(Continued)*
**Summary of Unfiltered Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW13** (Duplicate) | Aluminum | 0.0285 | 0.015 | 0.050 | NE | J | | 093959-009 | SW846 6020 |
| 16-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093959-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093959-009 | SW846 6020 |
| | Barium | 0.0591 | 0.0006 | 0.002 | 2.00 | | | 093959-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093959-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093959-009 | SW846 6020 |
| | Calcium | 51.9 | 0.300 | 1.00 | NE | N | | 093959-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093959-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 093959-009 | SW846 6020 |
| | Copper | 0.00126 | 0.00035 | 0.001 | NE | | 0.012UJ | 093959-009 | SW846 6020 |
| | Iron | 0.190 | 0.033 | 0.100 | NE | | | 093959-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093959-009 | SW846 6020 |
| | Magnesium | 15.5 | 0.010 | 0.030 | NE | | | 093959-009 | SW846 6020 |
| | Manganese | 0.0177 | 0.001 | 0.005 | NE | | | 093959-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093959-009 | SW846 7470 |
| | Nickel | 0.00143 | 0.0005 | 0.002 | NE | J | | 093959-009 | SW846 6020 |
| | Potassium | 3.42 | 0.080 | 0.300 | NE | | | 093959-009 | SW846 6020 |
| | Selenium | 0.00284 | 0.0015 | 0.005 | 0.050 | J | | 093959-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093959-009 | SW846 6020 |
| | Sodium | 49.6 | 0.080 | 0.250 | NE | N | | 093959-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093959-009 | SW846 6020 |
| | Uranium | 0.00375 | 0.000067 | 0.0002 | 0.030 | | | 093959-009 | SW846 6020 |
| | Vanadium | 0.00621 | 0.001 | 0.005 | NE | | | 093959-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093959-009 | SW846 6020 |

Refer to footnotes on page 5A-89.

**Table 5A-6** *(Continued)*
**Summary of Unfiltered Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW14** | Aluminum | 0.0324 | 0.015 | 0.050 | NE | J | | 093980-009 | SW846 6020 |
| 06-Jun-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093980-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093980-009 | SW846 6020 |
| | Barium | 0.0629 | 0.0006 | 0.002 | 2.00 | B | | 093980-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093980-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093980-009 | SW846 6020 |
| | Calcium | 63.8 | 0.300 | 1.00 | NE | B | | 093980-009 | SW846 6020 |
| | Chromium | 0.00216 | 0.002 | 0.010 | 0.100 | J | | 093980-009 | SW846 6020 |
| | Cobalt | 0.000223 | 0.0001 | 0.001 | NE | J | | 093980-009 | SW846 6020 |
| | Copper | 0.00102 | 0.00035 | 0.001 | NE | B | 0.0022U | 093980-009 | SW846 6020 |
| | Iron | 0.203 | 0.033 | 0.100 | NE | | | 093980-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093980-009 | SW846 6020 |
| | Magnesium | 20.8 | 0.010 | 0.030 | NE | | | 093980-009 | SW846 6020 |
| | Manganese | 0.00286 | 0.001 | 0.005 | NE | J | | 093980-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093980-009 | SW846 7470 |
| | Nickel | 0.00277 | 0.0005 | 0.002 | NE | B | 0.0028U | 093980-009 | SW846 6020 |
| | Potassium | 3.83 | 0.080 | 0.300 | NE | | | 093980-009 | SW846 6020 |
| | Selenium | 0.00269 | 0.0015 | 0.005 | 0.050 | J | | 093980-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093980-009 | SW846 6020 |
| | Sodium | 67.4 | 0.400 | 1.25 | NE | | | 093980-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093980-009 | SW846 6020 |
| | Uranium | 0.00428 | 0.000067 | 0.0002 | 0.030 | | | 093980-009 | SW846 6020 |
| | Vanadium | 0.00456 | 0.001 | 0.005 | NE | J | | 093980-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093980-009 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-6 *(Continued)*
## Summary of Unfiltered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **AVN-1** | Calcium | 43.3 | 0.060 | 0.200 | NE | | | 094408-009 | SW846 6020 |
| 23-Jul-13 | Magnesium | 10.3 | 0.010 | 0.030 | NE | | J | 094408-009 | SW846 6020 |
| | Potassium | 3.29 | 0.080 | 0.300 | NE | | | 094408-009 | SW846 6020 |
| | Sodium | 38.4 | 0.080 | 0.250 | NE | | J | 094408-009 | SW846 6020 |
| **LWDS-MW1** | Calcium | 68.8 | 0.300 | 1.00 | NE | | | 094420-009 | SW846 6020 |
| 29-Jul-13 | Magnesium | 18.8 | 0.010 | 0.030 | NE | | J | 094420-009 | SW846 6020 |
| | Potassium | 2.82 | 0.080 | 0.300 | NE | | | 094420-009 | SW846 6020 |
| | Sodium | 67.7 | 0.400 | 1.25 | NE | | J | 094420-009 | SW846 6020 |
| **LWDS-MW2** | Calcium | 46.3 | 0.060 | 0.200 | NE | | | 094396-009 | SW846 6020 |
| 17-Jul-13 | Magnesium | 13.2 | 0.010 | 0.030 | NE | | | 094396-009 | SW846 6020 |
| | Potassium | 2.84 | 0.080 | 0.300 | NE | | | 094396-009 | SW846 6020 |
| | Sodium | 42.3 | 0.080 | 0.250 | NE | | | 094396-009 | SW846 6020 |
| **TAV-MW2** | Calcium | 68.5 | 1.20 | 4.00 | NE | | | 094394-009 | SW846 6020 |
| 16-Jul-13 | Magnesium | 23.4 | 0.010 | 0.030 | NE | | | 094394-009 | SW846 6020 |
| | Potassium | 4.07 | 0.080 | 0.300 | NE | | | 094394-009 | SW846 6020 |
| | Sodium | 61.4 | 1.60 | 5.00 | NE | | | 094394-009 | SW846 6020 |
| **TAV-MW4** | Calcium | 48.7 | 0.060 | 0.200 | NE | | | 094413-009 | SW846 6020 |
| 24-Jul-13 | Magnesium | 14.3 | 0.010 | 0.030 | NE | | J | 094413-009 | SW846 6020 |
| | Potassium | 2.97 | 0.080 | 0.300 | NE | | | 094413-009 | SW846 6020 |
| | Sodium | 43.9 | 0.080 | 0.250 | NE | | J | 094413-009 | SW846 6020 |
| **TAV-MW6** | Calcium | 66.2 | 0.300 | 1.00 | NE | | | 094417-009 | SW846 6020 |
| 31-Jul-13 | Magnesium | 21.0 | 0.010 | 0.030 | NE | | | 094417-009 | SW846 6020 |
| | Potassium | 4.37 | 0.080 | 0.300 | NE | | | 094417-009 | SW846 6020 |
| | Sodium | 63.7 | 0.400 | 1.25 | NE | | | 094417-009 | SW846 6020 |
| **TAV-MW6** (Duplicate) | Calcium | 66.6 | 0.300 | 1.00 | NE | | | 094418-009 | SW846 6020 |
| 31-Jul-13 | Magnesium | 19.5 | 0.010 | 0.030 | NE | | | 094418-009 | SW846 6020 |
| | Potassium | 3.84 | 0.080 | 0.300 | NE | | | 094418-009 | SW846 6020 |
| | Sodium | 60.7 | 0.400 | 1.25 | NE | | | 094418-009 | SW846 6020 |
| **TAV-MW8** | Calcium | 58.1 | 0.300 | 1.00 | NE | | | 094404-009 | SW846 6020 |
| 22-Jul-13 | Magnesium | 15.9 | 0.010 | 0.030 | NE | | J | 094404-009 | SW846 6020 |
| | Potassium | 3.50 | 0.080 | 0.300 | NE | | | 094404-009 | SW846 6020 |
| | Sodium | 55.6 | 0.400 | 1.25 | NE | | J | 094404-009 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-6 *(Continued)*
## Summary of Unfiltered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW10** | Calcium | 62.9 | 0.600 | 2.00 | NE | | | 094422-009 | SW846 6020 |
| 30-Jul-13 | Magnesium | 17.7 | 0.050 | 0.150 | NE | | J | 094422-009 | SW846 6020 |
| | Potassium | 4.25 | 0.400 | 1.50 | NE | | | 094422-009 | SW846 6020 |
| | Sodium | 67.7 | 0.800 | 2.50 | NE | | J | 094422-009 | SW846 6020 |
| **TAV-MW11** | Calcium | 52.0 | 1.20 | 4.00 | NE | | | 094401-009 | SW846 6020 |
| 18-Jul-13 | Magnesium | 15.3 | 0.010 | 0.030 | NE | | | 094401-009 | SW846 6020 |
| | Potassium | 3.97 | 0.080 | 0.300 | NE | | | 094401-009 | SW846 6020 |
| | Sodium | 48.7 | 1.60 | 5.00 | NE | | | 094401-009 | SW846 6020 |
| **TAV-MW11** (Duplicate) | Calcium | 53.2 | 1.20 | 4.00 | NE | | | 094402-009 | SW846 6020 |
| 18-Jul-13 | Magnesium | 16.5 | 0.010 | 0.030 | NE | | | 094402-009 | SW846 6020 |
| | Potassium | 4.18 | 0.080 | 0.300 | NE | | | 094402-009 | SW846 6020 |
| | Sodium | 50.4 | 1.60 | 5.00 | NE | | | 094402-009 | SW846 6020 |
| **TAV-MW12** | Calcium | 59.5 | 0.300 | 1.00 | NE | | | 094406-009 | SW846 6020 |
| 23-Jul-13 | Magnesium | 17.7 | 0.010 | 0.030 | NE | | J | 094406-009 | SW846 6020 |
| | Potassium | 3.55 | 0.080 | 0.300 | NE | | | 094406-009 | SW846 6020 |
| | Sodium | 61.7 | 0.400 | 1.25 | NE | | J | 094406-009 | SW846 6020 |
| **TAV-MW13** | Calcium | 51.4 | 1.20 | 4.00 | NE | | | 094392-009 | SW846 6020 |
| 15-Jul-13 | Magnesium | 15.5 | 0.010 | 0.030 | NE | | | 094392-009 | SW846 6020 |
| | Potassium | 3.64 | 0.080 | 0.300 | NE | | | 094392-009 | SW846 6020 |
| | Sodium | 50.0 | 0.080 | 0.250 | NE | | | 094392-009 | SW846 6020 |
| **TAV-MW14** | Calcium | 66.9 | 0.300 | 1.00 | NE | | | 094411-009 | SW846 6020 |
| 24-Jul-13 | Magnesium | 19.3 | 0.010 | 0.030 | NE | | J | 094411-009 | SW846 6020 |
| | Potassium | 4.13 | 0.080 | 0.300 | NE | | | 094411-009 | SW846 6020 |
| | Sodium | 62.4 | 0.400 | 1.25 | NE | | J | 094411-009 | SW846 6020 |
| | | | | | | | | | |
| **AVN-1** | Calcium | 39.9 | 0.060 | 0.200 | NE | | | 094808-017 | SW846 6020 |
| 23-Oct-13 | Magnesium | 9.30 | 0.010 | 0.030 | NE | | J | 094808-017 | SW846 6020 |
| | Potassium | 3.20 | 0.080 | 0.300 | NE | N | | 094808-017 | SW846 6020 |
| | Sodium | 34.3 | 0.080 | 0.250 | NE | | | 094808-017 | SW846 6020 |
| **LWDS-MW1** | Calcium | 68.2 | 0.300 | 1.00 | NE | | | 094838-017 | SW846 6020 |
| 11-Nov-13 | Magnesium | 21.7 | 0.010 | 0.030 | NE | | | 094838-017 | SW846 6020 |
| | Potassium | 3.15 | 0.080 | 0.300 | NE | | | 094838-017 | SW846 6020 |
| | Sodium | 68.4 | 0.400 | 1.25 | NE | | | 094838-017 | SW846 6020 |
| **LWDS-MW2** | Calcium | 43.3 | 0.060 | 0.200 | NE | | | 094810-017 | SW846 6020 |
| 24-Oct-13 | Magnesium | 12.8 | 0.010 | 0.030 | NE | | J | 094810-017 | SW846 6020 |
| | Potassium | 2.63 | 0.080 | 0.300 | NE | N | | 094810-017 | SW846 6020 |
| | Sodium | 41.8 | 0.080 | 0.250 | NE | | | 094810-017 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-6 *(Continued)*
## Summary of Unfiltered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW2** | Calcium | 74.3 | 0.300 | 1.00 | NE | | | 094815-017 | SW846 6020 |
| 28-Oct-13 | Magnesium | 24.2 | 0.010 | 0.030 | NE | | | 094815-017 | SW846 6020 |
| | Potassium | 3.94 | 0.080 | 0.300 | NE | | | 094815-017 | SW846 6020 |
| | Sodium | 67.2 | 0.400 | 1.25 | NE | | | 094815-017 | SW846 6020 |
| **TAV-MW2** (Duplicate) | Calcium | 74.1 | 0.300 | 1.00 | NE | | | 094816-017 | SW846 6020 |
| 28-Oct-13 | Magnesium | 23.2 | 0.010 | 0.030 | NE | | | 094816-017 | SW846 6020 |
| | Potassium | 3.82 | 0.080 | 0.300 | NE | | | 094816-017 | SW846 6020 |
| | Sodium | 67.7 | 0.400 | 1.25 | NE | | | 094816-017 | SW846 6020 |
| **TAV-MW3** | Calcium | 56.8 | 0.300 | 1.00 | NE | | | 094797-017 | SW846 6020 |
| 17-Oct-13 | Magnesium | 13.7 | 0.010 | 0.030 | NE | | J | 094797-017 | SW846 6020 |
| | Potassium | 4.40 | 0.080 | 0.300 | NE | | | 094797-017 | SW846 6020 |
| | Sodium | 53.4 | 0.400 | 1.25 | NE | | | 094797-017 | SW846 6020 |
| **TAV-MW4** | Calcium | 52.3 | 0.300 | 1.00 | NE | | | 094821-017 | SW846 6020 |
| 30-Oct-13 | Magnesium | 15.5 | 0.010 | 0.030 | NE | | | 094821-017 | SW846 6020 |
| | Potassium | 3.26 | 0.080 | 0.300 | NE | | | 094821-017 | SW846 6020 |
| | Sodium | 46.4 | 0.400 | 1.25 | NE | | | 094821-017 | SW846 6020 |
| **TAV-MW5** | Calcium | 47.4 | 0.060 | 0.200 | NE | | | 094793-017 | SW846 6020 |
| 15-Oct-13 | Magnesium | 14.5 | 0.010 | 0.030 | NE | | J | 094793-017 | SW846 6020 |
| | Potassium | 2.87 | 0.080 | 0.300 | NE | | | 094793-017 | SW846 6020 |
| | Sodium | 46.7 | 0.080 | 0.250 | NE | | | 094793-017 | SW846 6020 |
| **TAV-MW6** | Calcium | 70.0 | 0.300 | 1.00 | NE | | | 094834-017 | SW846 6020 |
| 06-Nov-13 | Magnesium | 19.2 | 0.010 | 0.030 | NE | | | 094834-017 | SW846 6020 |
| | Potassium | 4.02 | 0.080 | 0.300 | NE | | | 094834-017 | SW846 6020 |
| | Sodium | 63.6 | 0.400 | 1.25 | NE | | | 094834-017 | SW846 6020 |
| **TAV-MW7** | Calcium | 62.4 | 0.600 | 2.00 | NE | | | 094799-017 | SW846 6020 |
| 21-Oct-13 | Magnesium | 18.7 | 0.010 | 0.030 | NE | | J | 094799-017 | SW846 6020 |
| | Potassium | 4.33 | 0.080 | 0.300 | NE | N | | 094799-017 | SW846 6020 |
| | Sodium | 58.1 | 0.800 | 2.50 | NE | | | 094799-017 | SW846 6020 |
| **TAV-MW8** | Calcium | 57.3 | 0.300 | 1.00 | NE | | | 094819-017 | SW846 6020 |
| 29-Oct-13 | Magnesium | 17.6 | 0.010 | 0.030 | NE | | | 094819-017 | SW846 6020 |
| | Potassium | 3.94 | 0.080 | 0.300 | NE | | | 094819-017 | SW846 6020 |
| | Sodium | 58.2 | 0.400 | 1.25 | NE | | | 094819-017 | SW846 6020 |
| **TAV-MW9** | Calcium | 63.3 | 0.600 | 2.00 | NE | | | 094804-017 | SW846 6020 |
| 22-Oct-13 | Magnesium | 19.4 | 0.010 | 0.030 | NE | | J | 094804-017 | SW846 6020 |
| | Potassium | 3.95 | 0.080 | 0.300 | NE | N | | 094804-017 | SW846 6020 |
| | Sodium | 61.2 | 0.800 | 2.50 | NE | | | 094804-017 | SW846 6020 |

Refer to footnotes on page 5A-89.

**Table 5A-6** *(Concluded)*
**Summary of Unfiltered Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW9** (Duplicate) | Calcium | 64.9 | 0.600 | 2.00 | NE | | | 094805-017 | SW846 6020 |
| 22-Oct-13 | Magnesium | 20.0 | 0.010 | 0.030 | NE | | J | 094805-017 | SW846 6020 |
| | Potassium | 4.10 | 0.080 | 0.300 | NE | N | | 094805-017 | SW846 6020 |
| | Sodium | 58.9 | 0.800 | 2.50 | NE | | | 094805-017 | SW846 6020 |
| **TAV-MW10** | Calcium | 58.6 | 0.300 | 1.00 | NE | | | 094836-017 | SW846 6020 |
| 07-Nov-13 | Magnesium | 16.5 | 0.010 | 0.030 | NE | | | 094836-017 | SW846 6020 |
| | Potassium | 4.30 | 0.080 | 0.300 | NE | | | 094836-017 | SW846 6020 |
| | Sodium | 53.4 | 0.400 | 1.25 | NE | | | 094836-017 | SW846 6020 |
| **TAV-MW11** | Calcium | 54.6 | 0.300 | 1.00 | NE | | | 094823-017 | SW846 6020 |
| 31-Oct-13 | Magnesium | 17.2 | 0.010 | 0.030 | NE | | | 094823-017 | SW846 6020 |
| | Potassium | 4.13 | 0.080 | 0.300 | NE | | | 094823-017 | SW846 6020 |
| | Sodium | 53.6 | 0.400 | 1.25 | NE | | | 094823-017 | SW846 6020 |
| **TAV-MW12** | Calcium | 58.2 | 0.300 | 1.00 | NE | | | 094830-017 | SW846 6020 |
| 05-Nov-13 | Magnesium | 17.6 | 0.010 | 0.030 | NE | | | 094830-017 | SW846 6020 |
| | Potassium | 3.55 | 0.080 | 0.300 | NE | | | 094830-017 | SW846 6020 |
| | Sodium | 57.9 | 0.400 | 1.25 | NE | | | 094830-017 | SW846 6020 |
| **TAV-MW12** (Duplicate) | Calcium | 66.3 | 0.600 | 2.00 | NE | B | | 094831-017 | SW846 6020 |
| 05-Nov-13 | Magnesium | 21.8 | 0.100 | 0.300 | NE | | | 094831-017 | SW846 6020 |
| | Potassium | 3.89 | 0.080 | 0.300 | NE | | | 094831-017 | SW846 6020 |
| | Sodium | 66.7 | 0.800 | 2.50 | NE | | | 094831-017 | SW846 6020 |
| **TAV-MW13** | Calcium | 50.0 | 0.060 | 0.200 | NE | | | 094795-017 | SW846 6020 |
| 16-Oct-13 | Magnesium | 14.2 | 0.010 | 0.030 | NE | | J | 094795-017 | SW846 6020 |
| | Potassium | 3.33 | 0.080 | 0.300 | NE | | | 094795-017 | SW846 6020 |
| | Sodium | 49.3 | 0.080 | 0.250 | NE | | | 094795-017 | SW846 6020 |
| **TAV-MW14** | Calcium | 62.2 | 0.300 | 1.00 | NE | | | 094825-017 | SW846 6020 |
| 04-Nov-13 | Magnesium | 17.1 | 0.010 | 0.030 | NE | | | 094825-017 | SW846 6020 |
| | Potassium | 4.09 | 0.080 | 0.300 | NE | | | 094825-017 | SW846 6020 |
| | Sodium | 58.2 | 0.400 | 1.25 | NE | | | 094825-017 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-7
## Summary of Filtered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **AVN-1** | Iron | 0.069 | 0.033 | 0.100 | NE | J | | 093517-012 | SW846 6020 |
| 18-Feb-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 093517-012 | SW846 6020 |
| **LWDS-MW1** | Iron | 0.137 | 0.033 | 0.100 | NE | | | 093525-012 | SW846 6020 |
| 11-Mar-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 093525-012 | SW846 6020 |
| **LWDS-MW1** (Duplicate) | Iron | 0.138 | 0.033 | 0.100 | NE | | | 093526-012 | SW846 6020 |
| 11-Mar-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 093526-012 | SW846 6020 |
| **LWDS-MW2** | Iron | 0.0917 | 0.033 | 0.100 | NE | J | | 093513-012 | SW846 6020 |
| 13-Feb-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 093513-012 | SW846 6020 |
| **TAV-MW2** | Iron | 0.131 | 0.033 | 0.100 | NE | | | 093508-012 | SW846 6020 |
| 12-Feb-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 093508-012 | SW846 6020 |
| **TAV-MW4** | Iron | 0.0831 | 0.033 | 0.100 | NE | J | | 093521-012 | SW846 6020 |
| 20-Feb-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 093521-012 | SW846 6020 |
| **TAV-MW6** | Iron | 0.103 | 0.033 | 0.100 | NE | | | 093533-012 | SW846 6020 |
| 25-Feb-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 093533-012 | SW846 6020 |
| **TAV-MW8** | Iron | 0.102 | 0.033 | 0.100 | NE | | | 093511-012 | SW846 6020 |
| 15-Feb-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 093511-012 | SW846 6020 |
| **TAV-MW10** | Iron | 0.117 | 0.033 | 0.100 | NE | | | 093536-012 | SW846 6020 |
| 27-Feb-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 093536-012 | SW846 6020 |
| **TAV-MW11** | Iron | 0.102 | 0.033 | 0.100 | NE | | | 093515-012 | SW846 6020 |
| 14-Feb-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 093515-012 | SW846 6020 |
| **TAV-MW12** | Iron | 0.0972 | 0.033 | 0.100 | NE | J | | 093519-012 | SW846 6020 |
| 19-Feb-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 093519-012 | SW846 6020 |
| **TAV-MW13** | Iron | 0.0929 | 0.033 | 0.100 | NE | J | | 093574-012 | SW846 6020 |
| 26-Feb-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 093574-012 | SW846 6020 |
| **TAV-MW14** | Iron | 0.102 | 0.033 | 0.100 | NE | | | 093530-012 | SW846 6020 |
| 21-Feb-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 093530-012 | SW846 6020 |
| **TAV-MW14** (Duplicate) | Iron | 0.106 | 0.033 | 0.100 | NE | | | 093531-012 | SW846 6020 |
| 21-Feb-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 093531-012 | SW846 6020 |

Refer to footnotes on page 5A-89.

**Table 5A-7** *(Continued)*
**Summary of Filtered Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **AVN-1** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093964-010 | SW846 6020 |
| 30-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093964-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093964-010 | SW846 6020 |
| | Barium | 0.074 | 0.0006 | 0.002 | 2.00 | | | 093964-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093964-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093964-010 | SW846 6020 |
| | Calcium | 44.1 | 0.060 | 0.200 | NE | | | 093964-010 | SW846 6020 |
| | Chromium | 0.00231 | 0.002 | 0.010 | 0.100 | J | | 093964-010 | SW846 6020 |
| | Cobalt | 0.000108 | 0.0001 | 0.001 | NE | J | | 093964-010 | SW846 6020 |
| | Copper | 0.00672 | 0.00035 | 0.001 | NE | | | 093964-010 | SW846 6020 |
| | Iron | 0.0762 | 0.033 | 0.100 | NE | J | | 093964-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093964-010 | SW846 6020 |
| | Magnesium | 10.8 | 0.010 | 0.030 | NE | | | 093964-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093964-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093964-010 | SW846 7470 |
| | Nickel | 0.00226 | 0.0005 | 0.002 | NE | | | 093964-010 | SW846 6020 |
| | Potassium | 3.42 | 0.080 | 0.300 | NE | | | 093964-010 | SW846 6020 |
| | Selenium | 0.00255 | 0.0015 | 0.005 | 0.050 | J | | 093964-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093964-010 | SW846 6020 |
| | Sodium | 41.4 | 0.080 | 0.250 | NE | | | 093964-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093964-010 | SW846 6020 |
| | Uranium | 0.00218 | 0.000067 | 0.0002 | 0.030 | | | 093964-010 | SW846 6020 |
| | Vanadium | 0.00699 | 0.001 | 0.005 | NE | | | 093964-010 | SW846 6010 |
| | Zinc | 0.00552 | 0.0035 | 0.010 | NE | J | | 093964-010 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-7 *(Continued)*
## Summary of Filtered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **LWDS-MW1** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093986-010 | SW846 6020 |
| 10-Jun-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093986-010 | SW846 6020 |
| | Arsenic | 0.00293 | 0.0017 | 0.005 | 0.010 | J | | 093986-010 | SW846 6020 |
| | Barium | 0.0936 | 0.0006 | 0.002 | 2.00 | | | 093986-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093986-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093986-010 | SW846 6020 |
| | Calcium | 69.6 | 0.300 | 1.00 | NE | | | 093986-010 | SW846 6020 |
| | Chromium | 0.0025 | 0.002 | 0.010 | 0.100 | J | | 093986-010 | SW846 6020 |
| | Cobalt | 0.000158 | 0.0001 | 0.001 | NE | J | | 093986-010 | SW846 6020 |
| | Copper | 0.000684 | 0.00035 | 0.001 | NE | J | | 093986-010 | SW846 6020 |
| | Iron | 0.134 | 0.033 | 0.100 | NE | | | 093986-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093986-010 | SW846 6020 |
| | Magnesium | 20.9 | 0.010 | 0.030 | NE | | | 093986-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093986-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093986-010 | SW846 7470 |
| | Nickel | 0.00194 | 0.0005 | 0.002 | NE | J | | 093986-010 | SW846 6020 |
| | Potassium | 3.10 | 0.080 | 0.300 | NE | | | 093986-010 | SW846 6020 |
| | Selenium | 0.00658 | 0.0015 | 0.005 | 0.050 | | | 093986-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093986-010 | SW846 6020 |
| | Sodium | 75.1 | 0.400 | 1.25 | NE | | | 093986-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093986-010 | SW846 6020 |
| | Uranium | 0.0033 | 0.000067 | 0.0002 | 0.030 | | | 093986-010 | SW846 6020 |
| | Vanadium | 0.00523 | 0.001 | 0.005 | NE | | 0.0064U | 093986-010 | SW846 6010 |
| | Zinc | 0.010 | 0.0035 | 0.010 | NE | | | 093986-010 | SW846 6020 |

Refer to footnotes on page 5A-89.

**Table 5A-7** *(Continued)*
**Summary of Filtered Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **LWDS-MW2** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093958-010 | SW846 6020 |
| 29-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093958-010 | SW846 6020 |
| | Arsenic | 0.00231 | 0.0017 | 0.005 | 0.010 | J | | 093958-010 | SW846 6020 |
| | Barium | 0.0676 | 0.0006 | 0.002 | 2.00 | | | 093958-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093958-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093958-010 | SW846 6020 |
| | Calcium | 46.3 | 0.060 | 0.200 | NE | | | 093958-010 | SW846 6020 |
| | Chromium | 0.00292 | 0.002 | 0.010 | 0.100 | J | | 093958-010 | SW846 6020 |
| | Cobalt | 0.000138 | 0.0001 | 0.001 | NE | J | 0.00096U | 093958-010 | SW846 6020 |
| | Copper | 0.00744 | 0.00035 | 0.001 | NE | | 0.012UJ | 093958-010 | SW846 6020 |
| | Iron | 0.0791 | 0.033 | 0.100 | NE | J | | 093958-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093958-010 | SW846 6020 |
| | Magnesium | 14.5 | 0.010 | 0.030 | NE | | | 093958-010 | SW846 6020 |
| | Manganese | 0.00149 | 0.001 | 0.005 | NE | J | 0.029UJ | 093958-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093958-010 | SW846 7470 |
| | Nickel | 0.0014 | 0.0005 | 0.002 | NE | J | | 093958-010 | SW846 6020 |
| | Potassium | 2.92 | 0.080 | 0.300 | NE | | | 093958-010 | SW846 6020 |
| | Selenium | 0.00251 | 0.0015 | 0.005 | 0.050 | J | | 093958-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093958-010 | SW846 6020 |
| | Sodium | 47.7 | 0.080 | 0.250 | NE | | | 093958-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093958-010 | SW846 6020 |
| | Uranium | 0.00306 | 0.000067 | 0.0002 | 0.030 | | | 093958-010 | SW846 6020 |
| | Vanadium | 0.00734 | 0.001 | 0.005 | NE | | | 093958-010 | SW846 6010 |
| | Zinc | 0.00532 | 0.0035 | 0.010 | NE | J | 0.045U | 093958-010 | SW846 6020 |

Refer to footnotes on page 5A-89.

**Table 5A-7** *(Continued)*
**Summary of Filtered Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **LWDS-MW2** (Duplicate) | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093960-010 | SW846 6020 |
| 29-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093960-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093960-010 | SW846 6020 |
| | Barium | 0.0657 | 0.0006 | 0.002 | 2.00 | | | 093960-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093960-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093960-010 | SW846 6020 |
| | Calcium | 45.9 | 0.060 | 0.200 | NE | | | 093960-010 | SW846 6020 |
| | Chromium | 0.00299 | 0.002 | 0.010 | 0.100 | J | | 093960-010 | SW846 6020 |
| | Cobalt | 0.000104 | 0.0001 | 0.001 | NE | J | 0.00096U | 093960-010 | SW846 6020 |
| | Copper | 0.00677 | 0.00035 | 0.001 | NE | | 0.012UJ | 093960-010 | SW846 6020 |
| | Iron | 0.0788 | 0.033 | 0.100 | NE | J | | 093960-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093960-010 | SW846 6020 |
| | Magnesium | 14.1 | 0.010 | 0.030 | NE | | | 093960-010 | SW846 6020 |
| | Manganese | 0.00141 | 0.001 | 0.005 | NE | J | 0.029UJ | 093960-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093960-010 | SW846 7470 |
| | Nickel | 0.00134 | 0.0005 | 0.002 | NE | J | | 093960-010 | SW846 6020 |
| | Potassium | 2.82 | 0.080 | 0.300 | NE | | | 093960-010 | SW846 6020 |
| | Selenium | 0.00256 | 0.0015 | 0.005 | 0.050 | J | | 093960-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093960-010 | SW846 6020 |
| | Sodium | 42.3 | 0.080 | 0.250 | NE | | | 093960-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093960-010 | SW846 6020 |
| | Uranium | 0.00308 | 0.000067 | 0.0002 | 0.030 | | | 093960-010 | SW846 6020 |
| | Vanadium | 0.00711 | 0.001 | 0.005 | NE | | | 093960-010 | SW846 6010 |
| | Zinc | 0.00505 | 0.0035 | 0.010 | NE | J | 0.045U | 093960-010 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-7 *(Continued)*
## Summary of Filtered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW2** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093950-010 | SW846 6020 |
| 28-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093950-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093950-010 | SW846 6020 |
| | Barium | 0.0608 | 0.0006 | 0.002 | 2.00 | | | 093950-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093950-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093950-010 | SW846 6020 |
| | Calcium | 69.8 | 0.300 | 1.00 | NE | | | 093950-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093950-010 | SW846 6020 |
| | Cobalt | 0.000204 | 0.0001 | 0.001 | NE | J | | 093950-010 | SW846 6020 |
| | Copper | 0.000827 | 0.00035 | 0.001 | NE | J | | 093950-010 | SW846 6020 |
| | Iron | 0.130 | 0.033 | 0.100 | NE | | | 093950-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093950-010 | SW846 6020 |
| | Magnesium | 24.1 | 0.010 | 0.030 | NE | | | 093950-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093950-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093950-010 | SW846 7470 |
| | Nickel | 0.00137 | 0.0005 | 0.002 | NE | J | | 093950-010 | SW846 6020 |
| | Potassium | 4.05 | 0.080 | 0.300 | NE | | | 093950-010 | SW846 6020 |
| | Selenium | 0.00278 | 0.0015 | 0.005 | 0.050 | J | | 093950-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093950-010 | SW846 6020 |
| | Sodium | 68.1 | 0.400 | 1.25 | NE | | | 093950-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093950-010 | SW846 6020 |
| | Uranium | 0.00615 | 0.000067 | 0.0002 | 0.030 | | | 093950-010 | SW846 6020 |
| | Vanadium | 0.00559 | 0.001 | 0.005 | NE | | | 093950-010 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093950-010 | SW846 6020 |

Refer to footnotes on page 5A-89.

**Table 5A-7** *(Continued)*
**Summary of Filtered Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW3** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093969-010 | SW846 6020 |
| 21-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093969-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093969-010 | SW846 6020 |
| | Barium | 0.0444 | 0.0006 | 0.002 | 2.00 | | | 093969-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093969-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093969-010 | SW846 6020 |
| | Calcium | 56.1 | 0.300 | 1.00 | NE | | | 093969-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093969-010 | SW846 6020 |
| | Cobalt | 0.000102 | 0.0001 | 0.001 | NE | J | | 093969-010 | SW846 6020 |
| | Copper | 0.000468 | 0.00035 | 0.001 | NE | J | | 093969-010 | SW846 6020 |
| | Iron | 0.0961 | 0.033 | 0.100 | NE | J | | 093969-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093969-010 | SW846 6020 |
| | Magnesium | 15.0 | 0.010 | 0.030 | NE | | | 093969-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093969-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093969-010 | SW846 7470 |
| | Nickel | 0.00132 | 0.0005 | 0.002 | NE | J | | 093969-010 | SW846 6020 |
| | Potassium | 4.28 | 0.080 | 0.300 | NE | | | 093969-010 | SW846 6020 |
| | Selenium | 0.00291 | 0.0015 | 0.005 | 0.050 | J | | 093969-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093969-010 | SW846 6020 |
| | Sodium | 53.7 | 0.800 | 2.50 | NE | | | 093969-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093969-010 | SW846 6020 |
| | Uranium | 0.00315 | 0.000067 | 0.0002 | 0.030 | | | 093969-010 | SW846 6020 |
| | Vanadium | 0.00579 | 0.001 | 0.005 | NE | | | 093969-010 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093969-010 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-7 *(Continued)*
## Summary of Filtered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW4** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093976-010 | SW846 6020 |
| 05-Jun-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093976-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093976-010 | SW846 6020 |
| | Barium | 0.0839 | 0.0006 | 0.002 | 2.00 | B | | 093976-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093976-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093976-010 | SW846 6020 |
| | Calcium | 52.1 | 0.300 | 1.00 | NE | B | | 093976-010 | SW846 6020 |
| | Chromium | 0.0275 | 0.002 | 0.010 | 0.100 | | | 093976-010 | SW846 6020 |
| | Cobalt | 0.000168 | 0.0001 | 0.001 | NE | J | | 093976-010 | SW846 6020 |
| | Copper | 0.000879 | 0.00035 | 0.001 | NE | B, J | 0.0022U | 093976-010 | SW846 6020 |
| | Iron | 0.107 | 0.033 | 0.100 | NE | | | 093976-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093976-010 | SW846 6020 |
| | Magnesium | 15.8 | 0.010 | 0.030 | NE | | | 093976-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093976-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093976-010 | SW846 7470 |
| | Nickel | 0.00214 | 0.0005 | 0.002 | NE | B | 0.0028U | 093976-010 | SW846 6020 |
| | Potassium | 2.99 | 0.080 | 0.300 | NE | | | 093976-010 | SW846 6020 |
| | Selenium | 0.00373 | 0.0015 | 0.005 | 0.050 | J | | 093976-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093976-010 | SW846 6020 |
| | Sodium | 48.8 | 0.080 | 0.250 | NE | | | 093976-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093976-010 | SW846 6020 |
| | Uranium | 0.00307 | 0.000067 | 0.0002 | 0.030 | | | 093976-010 | SW846 6020 |
| | Vanadium | 0.00699 | 0.001 | 0.005 | NE | | | 093976-010 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093976-010 | SW846 6020 |

Refer to footnotes on page 5A-89.

**Table 5A-7** *(Continued)*
**Summary of Filtered Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW5** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093949-010 | SW846 6020 |
| 15-Jun-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093949-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093949-010 | SW846 6020 |
| | Barium | 0.0617 | 0.0006 | 0.002 | 2.00 | | | 093949-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093949-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093949-010 | SW846 6020 |
| | Calcium | 48.3 | 0.060 | 0.200 | NE | N | | 093949-010 | SW846 6020 |
| | Chromium | 0.00339 | 0.002 | 0.010 | 0.100 | J | | 093949-010 | SW846 6020 |
| | Cobalt | 0.000134 | 0.0001 | 0.001 | NE | J | | 093949-010 | SW846 6020 |
| | Copper | 0.00101 | 0.00035 | 0.001 | NE | | | 093949-010 | SW846 6020 |
| | Iron | 0.100 | 0.033 | 0.100 | NE | | | 093949-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093949-010 | SW846 6020 |
| | Magnesium | 14.3 | 0.010 | 0.030 | NE | | | 093949-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093949-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093949-010 | SW846 7470 |
| | Nickel | 0.00131 | 0.0005 | 0.002 | NE | J | | 093949-010 | SW846 6020 |
| | Potassium | 2.72 | 0.080 | 0.300 | NE | | | 093949-010 | SW846 6020 |
| | Selenium | 0.00281 | 0.0015 | 0.005 | 0.050 | J | | 093949-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093949-010 | SW846 6020 |
| | Sodium | 49.8 | 0.080 | 0.250 | NE | N | | 093949-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093949-010 | SW846 6020 |
| | Uranium | 0.00339 | 0.000067 | 0.0002 | 0.030 | | | 093949-010 | SW846 6020 |
| | Vanadium | 0.00692 | 0.001 | 0.005 | NE | | | 093949-010 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093949-010 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-7 *(Continued)*
## Summary of Filtered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW6** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093990-010 | SW846 6020 |
| 11-Jun-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093990-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093990-010 | SW846 6020 |
| | Barium | 0.0676 | 0.0006 | 0.002 | 2.00 | | | 093990-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093990-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093990-010 | SW846 6020 |
| | Calcium | 70.1 | 0.300 | 1.00 | NE | | | 093990-010 | SW846 6020 |
| | Chromium | 0.00309 | 0.002 | 0.010 | 0.100 | J | | 093990-010 | SW846 6020 |
| | Cobalt | 0.00011 | 0.0001 | 0.001 | NE | J | | 093990-010 | SW846 6020 |
| | Copper | 0.000612 | 0.00035 | 0.001 | NE | J | | 093990-010 | SW846 6020 |
| | Iron | 0.139 | 0.033 | 0.100 | NE | | | 093990-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093990-010 | SW846 6020 |
| | Magnesium | 19.7 | 0.010 | 0.030 | NE | | | 093990-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093990-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093990-010 | SW846 7470 |
| | Nickel | 0.00281 | 0.0005 | 0.002 | NE | | | 093990-010 | SW846 6020 |
| | Potassium | 3.53 | 0.080 | 0.300 | NE | | | 093990-010 | SW846 6020 |
| | Selenium | 0.00503 | 0.0015 | 0.005 | 0.050 | | | 093990-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093990-010 | SW846 6020 |
| | Sodium | 71.4 | 0.400 | 1.25 | NE | | | 093990-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093990-010 | SW846 6020 |
| | Uranium | 0.00376 | 0.000067 | 0.0002 | 0.030 | | | 093990-010 | SW846 6020 |
| | Vanadium | 0.00638 | 0.001 | 0.005 | NE | | 0.0064U | 093990-010 | SW846 6010 |
| | Zinc | 0.00441 | 0.0035 | 0.010 | NE | J | | 093990-010 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-7 *(Continued)*
## Summary of Filtered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW7** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093977-010 | SW846 6020 |
| 22-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093977-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093977-010 | SW846 6020 |
| | Barium | 0.0537 | 0.0006 | 0.002 | 2.00 | | | 093977-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093977-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093977-010 | SW846 6020 |
| | Calcium | 62.2 | 0.300 | 1.00 | NE | | | 093977-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093977-010 | SW846 6020 |
| | Cobalt | 0.000112 | 0.0001 | 0.001 | NE | J | | 093977-010 | SW846 6020 |
| | Copper | 0.000436 | 0.00035 | 0.001 | NE | J | 0.0044U | 093977-010 | SW846 6020 |
| | Iron | 0.0977 | 0.033 | 0.100 | NE | J | | 093977-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093977-010 | SW846 6020 |
| | Magnesium | 18.8 | 0.010 | 0.030 | NE | | | 093977-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093977-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093977-010 | SW846 7470 |
| | Nickel | 0.00136 | 0.0005 | 0.002 | NE | J | | 093977-010 | SW846 6020 |
| | Potassium | 4.26 | 0.080 | 0.300 | NE | | | 093977-010 | SW846 6020 |
| | Selenium | 0.00289 | 0.0015 | 0.005 | 0.050 | J | | 093977-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093977-010 | SW846 6020 |
| | Sodium | 57.7 | 0.800 | 2.50 | NE | | | 093977-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093977-010 | SW846 6020 |
| | Uranium | 0.00468 | 0.000067 | 0.0002 | 0.030 | | | 093977-010 | SW846 6020 |
| | Vanadium | 0.007 | 0.001 | 0.005 | NE | | | 093977-010 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093977-010 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-7 *(Continued)*
## Summary of Filtered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW7** (Continued) | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093979-010 | SW846 6020 |
| 22-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093979-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093979-010 | SW846 6020 |
| | Barium | 0.0536 | 0.0006 | 0.002 | 2.00 | | | 093979-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093979-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093979-010 | SW846 6020 |
| | Calcium | 59.8 | 0.300 | 1.00 | NE | | | 093979-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093979-010 | SW846 6020 |
| | Cobalt | 0.000124 | 0.0001 | 0.001 | NE | J | | 093979-010 | SW846 6020 |
| | Copper | 0.000421 | 0.00035 | 0.001 | NE | J | 0.0044U | 093979-010 | SW846 6020 |
| | Iron | 0.0961 | 0.033 | 0.100 | NE | J | | 093979-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093979-010 | SW846 6020 |
| | Magnesium | 19.8 | 0.010 | 0.030 | NE | | | 093979-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093979-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093979-010 | SW846 7470 |
| | Nickel | 0.00119 | 0.0005 | 0.002 | NE | J | | 093979-010 | SW846 6020 |
| | Potassium | 4.10 | 0.080 | 0.300 | NE | | | 093979-010 | SW846 6020 |
| | Selenium | 0.00274 | 0.0015 | 0.005 | 0.050 | J | | 093979-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093979-010 | SW846 6020 |
| | Sodium | 57.0 | 0.800 | 2.50 | NE | | | 093979-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093979-010 | SW846 6020 |
| | Uranium | 0.00442 | 0.000067 | 0.0002 | 0.030 | | | 093979-010 | SW846 6020 |
| | Vanadium | 0.00686 | 0.001 | 0.005 | NE | | | 093979-010 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093979-010 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-7 *(Continued)*
## Summary of Filtered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW8** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093983-010 | SW846 6020 |
| 23-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093983-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093983-010 | SW846 6020 |
| | Barium | 0.052 | 0.0006 | 0.002 | 2.00 | | | 093983-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093983-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093983-010 | SW846 6020 |
| | Calcium | 57.1 | 0.300 | 1.00 | NE | | | 093983-010 | SW846 6020 |
| | Chromium | 0.00245 | 0.002 | 0.010 | 0.100 | J | | 093983-010 | SW846 6020 |
| | Cobalt | 0.0001 | 0.0001 | 0.001 | NE | J | | 093983-010 | SW846 6020 |
| | Copper | 0.000405 | 0.00035 | 0.001 | NE | J | | 093983-010 | SW846 6020 |
| | Iron | 0.0926 | 0.033 | 0.100 | NE | J | | 093983-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093983-010 | SW846 6020 |
| | Magnesium | 17.7 | 0.010 | 0.030 | NE | | | 093983-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093983-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093983-010 | SW846 7470 |
| | Nickel | 0.00112 | 0.0005 | 0.002 | NE | J | | 093983-010 | SW846 6020 |
| | Potassium | 3.86 | 0.080 | 0.300 | NE | | | 093983-010 | SW846 6020 |
| | Selenium | 0.00345 | 0.0015 | 0.005 | 0.050 | J | | 093983-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093983-010 | SW846 6020 |
| | Sodium | 55.0 | 0.800 | 2.50 | NE | | | 093983-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093983-010 | SW846 6020 |
| | Uranium | 0.00327 | 0.000067 | 0.0002 | 0.030 | | | 093983-010 | SW846 6020 |
| | Vanadium | 0.00677 | 0.001 | 0.005 | NE | | | 093983-010 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093983-010 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-7 *(Continued)*
## Summary of Filtered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW9** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093963-010 | SW846 6020 |
| 20-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093963-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093963-010 | SW846 6020 |
| | Barium | 0.0602 | 0.0006 | 0.002 | 2.00 | | | 093963-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093963-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093963-010 | SW846 6020 |
| | Calcium | 63.2 | 0.300 | 1.00 | NE | | | 093963-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093963-010 | SW846 6020 |
| | Cobalt | 0.000161 | 0.0001 | 0.001 | NE | J | | 093963-010 | SW846 6020 |
| | Copper | 0.000797 | 0.00035 | 0.001 | NE | J | | 093963-010 | SW846 6020 |
| | Iron | 0.102 | 0.033 | 0.100 | NE | | | 093963-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093963-010 | SW846 6020 |
| | Magnesium | 18.8 | 0.010 | 0.030 | NE | | | 093963-010 | SW846 6020 |
| | Manganese | 0.00482 | 0.001 | 0.005 | NE | J | | 093963-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093963-010 | SW846 7470 |
| | Nickel | 0.00162 | 0.0005 | 0.002 | NE | J | | 093963-010 | SW846 6020 |
| | Potassium | 4.09 | 0.080 | 0.300 | NE | | | 093963-010 | SW846 6020 |
| | Selenium | 0.00279 | 0.0015 | 0.005 | 0.050 | J | | 093963-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093963-010 | SW846 6020 |
| | Sodium | 53.2 | 0.800 | 2.50 | NE | | | 093963-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093963-010 | SW846 6020 |
| | Uranium | 0.00488 | 0.000067 | 0.0002 | 0.030 | | | 093963-010 | SW846 6020 |
| | Vanadium | 0.00602 | 0.001 | 0.005 | NE | | | 093963-010 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093963-010 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-7 *(Continued)*
## Summary of Filtered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW10** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093994-010 | SW846 6020 |
| 12-Jun-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093994-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093994-010 | SW846 6020 |
| | Barium | 0.0623 | 0.0006 | 0.002 | 2.00 | | | 093994-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093994-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093994-010 | SW846 6020 |
| | Calcium | 65.4 | 0.300 | 1.00 | NE | | | 093994-010 | SW846 6020 |
| | Chromium | 0.00342 | 0.002 | 0.010 | 0.100 | J | | 093994-010 | SW846 6020 |
| | Cobalt | 0.000113 | 0.0001 | 0.001 | NE | J | | 093994-010 | SW846 6020 |
| | Copper | 0.00054 | 0.00035 | 0.001 | NE | J | | 093994-010 | SW846 6020 |
| | Iron | 0.123 | 0.033 | 0.100 | NE | | | 093994-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093994-010 | SW846 6020 |
| | Magnesium | 17.1 | 0.010 | 0.030 | NE | | | 093994-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093994-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093994-010 | SW846 7470 |
| | Nickel | 0.00175 | 0.0005 | 0.002 | NE | J | | 093994-010 | SW846 6020 |
| | Potassium | 4.30 | 0.080 | 0.300 | NE | | | 093994-010 | SW846 6020 |
| | Selenium | 0.00405 | 0.0015 | 0.005 | 0.050 | J | | 093994-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093994-010 | SW846 6020 |
| | Sodium | 64.1 | 0.400 | 1.25 | NE | | | 093994-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093994-010 | SW846 6020 |
| | Uranium | 0.0034 | 0.000067 | 0.0002 | 0.030 | | | 093994-010 | SW846 6020 |
| | Vanadium | 0.00609 | 0.001 | 0.005 | NE | | 0.0064U | 093994-010 | SW846 6010 |
| | Zinc | 0.00442 | 0.0035 | 0.010 | NE | J | | 093994-010 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-7 *(Continued)*
## Summary of Filtered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW11** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093968-010 | SW846 6020 |
| 03-Jun-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093968-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093968-010 | SW846 6020 |
| | Barium | 0.0667 | 0.0006 | 0.002 | 2.00 | B | | 093968-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093968-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093968-010 | SW846 6020 |
| | Calcium | 57.3 | 0.300 | 1.00 | NE | B | | 093968-010 | SW846 6020 |
| | Chromium | 0.00338 | 0.002 | 0.010 | 0.100 | J | | 093968-010 | SW846 6020 |
| | Cobalt | 0.000205 | 0.0001 | 0.001 | NE | J | | 093968-010 | SW846 6020 |
| | Copper | 0.00107 | 0.00035 | 0.001 | NE | B | 0.0022U | 093968-010 | SW846 6020 |
| | Iron | 0.115 | 0.033 | 0.100 | NE | | | 093968-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093968-010 | SW846 6020 |
| | Magnesium | 16.9 | 0.010 | 0.030 | NE | | | 093968-010 | SW846 6020 |
| | Manganese | 0.00129 | 0.001 | 0.005 | NE | J | | 093968-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093968-010 | SW846 7470 |
| | Nickel | 0.00239 | 0.0005 | 0.002 | NE | B | 0.0028U | 093968-010 | SW846 6020 |
| | Potassium | 3.63 | 0.080 | 0.300 | NE | | | 093968-010 | SW846 6020 |
| | Selenium | 0.00379 | 0.0015 | 0.005 | 0.050 | J | | 093968-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093968-010 | SW846 6020 |
| | Sodium | 56.3 | 0.400 | 1.25 | NE | | | 093968-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093968-010 | SW846 6020 |
| | Uranium | 0.003 | 0.000067 | 0.0002 | 0.030 | | | 093968-010 | SW846 6020 |
| | Vanadium | 0.00601 | 0.001 | 0.005 | NE | | | 093968-010 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093968-010 | SW846 6020 |

Refer to footnotes on page 5A-89.

**Table 5A-7** *(Continued)*
**Summary of Filtered Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW12** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093972-010 | SW846 6020 |
| 04-Jun-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093972-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093972-010 | SW846 6020 |
| | Barium | 0.0615 | 0.0006 | 0.002 | 2.00 | B | | 093972-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093972-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093972-010 | SW846 6020 |
| | Calcium | 58.4 | 0.300 | 1.00 | NE | B | | 093972-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093972-010 | SW846 6020 |
| | Cobalt | 0.000286 | 0.0001 | 0.001 | NE | J | | 093972-010 | SW846 6020 |
| | Copper | 0.000913 | 0.00035 | 0.001 | NE | B, J | 0.0022U | 093972-010 | SW846 6020 |
| | Iron | 0.119 | 0.033 | 0.100 | NE | | | 093972-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093972-010 | SW846 6020 |
| | Magnesium | 19.4 | 0.010 | 0.030 | NE | | | 093972-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093972-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093972-010 | SW846 7470 |
| | Nickel | 0.00227 | 0.0005 | 0.002 | NE | B | 0.0028U | 093972-010 | SW846 6020 |
| | Potassium | 3.49 | 0.080 | 0.300 | NE | | | 093972-010 | SW846 6020 |
| | Selenium | 0.00241 | 0.0015 | 0.005 | 0.050 | J | | 093972-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093972-010 | SW846 6020 |
| | Sodium | 62.1 | 0.400 | 1.25 | NE | | | 093972-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093972-010 | SW846 6020 |
| | Uranium | 0.00438 | 0.000067 | 0.0002 | 0.030 | | | 093972-010 | SW846 6020 |
| | Vanadium | 0.00542 | 0.001 | 0.005 | NE | | | 093972-010 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093972-010 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-7 *(Continued)*
## Summary of Filtered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW13** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093957-010 | SW846 6020 |
| 16-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093957-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093957-010 | SW846 6020 |
| | Barium | 0.0592 | 0.0006 | 0.002 | 2.00 | | | 093957-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093957-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093957-010 | SW846 6020 |
| | Calcium | 54.5 | 0.300 | 1.00 | NE | N | | 093957-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093957-010 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 093957-010 | SW846 6020 |
| | Copper | 0.000656 | 0.00035 | 0.001 | NE | J | 0.0059UJ | 093957-010 | SW846 6020 |
| | Iron | 0.0986 | 0.033 | 0.100 | NE | J | | 093957-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093957-010 | SW846 6020 |
| | Magnesium | 16.1 | 0.010 | 0.030 | NE | | | 093957-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093957-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093957-010 | SW846 7470 |
| | Nickel | 0.00129 | 0.0005 | 0.002 | NE | J | | 093957-010 | SW846 6020 |
| | Potassium | 3.25 | 0.080 | 0.300 | NE | | | 093957-010 | SW846 6020 |
| | Selenium | 0.0025 | 0.0015 | 0.005 | 0.050 | J | | 093957-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093957-010 | SW846 6020 |
| | Sodium | 53.1 | 0.400 | 1.25 | NE | N | | 093957-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093957-010 | SW846 6020 |
| | Uranium | 0.00373 | 0.000067 | 0.0002 | 0.030 | | | 093957-010 | SW846 6020 |
| | Vanadium | 0.0061 | 0.001 | 0.005 | NE | | | 093957-010 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093957-010 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-7 *(Continued)*
## Summary of Filtered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW13** (Duplicate) | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093959-010 | SW846 6020 |
| 16-May-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093959-010 | SW846 6020 |
| | Arsenic | 0.00229 | 0.0017 | 0.005 | 0.010 | J | | 093959-010 | SW846 6020 |
| | Barium | 0.0608 | 0.0006 | 0.002 | 2.00 | | | 093959-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093959-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093959-010 | SW846 6020 |
| | Calcium | 53.3 | 0.300 | 1.00 | NE | N | | 093959-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093959-010 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 093959-010 | SW846 6020 |
| | Copper | 0.000724 | 0.00035 | 0.001 | NE | J | 0.0059UJ | 093959-010 | SW846 6020 |
| | Iron | 0.105 | 0.033 | 0.100 | NE | | | 093959-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093959-010 | SW846 6020 |
| | Magnesium | 16.3 | 0.010 | 0.030 | NE | | | 093959-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093959-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093959-010 | SW846 7470 |
| | Nickel | 0.00136 | 0.0005 | 0.002 | NE | J | | 093959-010 | SW846 6020 |
| | Potassium | 3.55 | 0.080 | 0.300 | NE | | | 093959-010 | SW846 6020 |
| | Selenium | 0.00245 | 0.0015 | 0.005 | 0.050 | J | | 093959-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093959-010 | SW846 6020 |
| | Sodium | 54.2 | 0.400 | 1.25 | NE | N | | 093959-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093959-010 | SW846 6020 |
| | Uranium | 0.0038 | 0.000067 | 0.0002 | 0.030 | | | 093959-010 | SW846 6020 |
| | Vanadium | 0.00618 | 0.001 | 0.005 | NE | | | 093959-010 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093959-010 | SW846 6020 |

Refer to footnotes on page 5A-89.

**Table 5A-7** *(Continued)*
**Summary of Filtered Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW14** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093980-010 | SW846 6020 |
| 06-Jun-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093980-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093980-010 | SW846 6020 |
| | Barium | 0.0561 | 0.0006 | 0.002 | 2.00 | B | | 093980-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093980-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093980-010 | SW846 6020 |
| | Calcium | 64.8 | 0.300 | 1.00 | NE | B | | 093980-010 | SW846 6020 |
| | Chromium | 0.00209 | 0.002 | 0.010 | 0.100 | J | | 093980-010 | SW846 6020 |
| | Cobalt | 0.000204 | 0.0001 | 0.001 | NE | J | | 093980-010 | SW846 6020 |
| | Copper | 0.00111 | 0.00035 | 0.001 | NE | B | 0.0022U | 093980-010 | SW846 6020 |
| | Iron | 0.127 | 0.033 | 0.100 | NE | | | 093980-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093980-010 | SW846 6020 |
| | Magnesium | 21.2 | 0.010 | 0.030 | NE | | | 093980-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093980-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093980-010 | SW846 7470 |
| | Nickel | 0.00247 | 0.0005 | 0.002 | NE | B | 0.0028U | 093980-010 | SW846 6020 |
| | Potassium | 3.93 | 0.080 | 0.300 | NE | | | 093980-010 | SW846 6020 |
| | Selenium | 0.00227 | 0.0015 | 0.005 | 0.050 | J | | 093980-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093980-010 | SW846 6020 |
| | Sodium | 64.3 | 0.400 | 1.25 | NE | | | 093980-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093980-010 | SW846 6020 |
| | Uranium | 0.00432 | 0.000067 | 0.0002 | 0.030 | | | 093980-010 | SW846 6020 |
| | Vanadium | 0.00443 | 0.001 | 0.005 | NE | J | | 093980-010 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093980-010 | SW846 6020 |

Refer to footnotes on page 5A-89.

**Table 5A-7** *(Continued)*
**Summary of Filtered Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **AVN-1** | Iron | 0.0956 | 0.033 | 0.100 | NE | J | | 094408-010 | SW846 6020 |
| 23-Jul-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094408-010 | SW846 6020 |
| **LWDS-MW1** | Iron | 0.143 | 0.033 | 0.100 | NE | | | 094420-010 | SW846 6020 |
| 29-Jul-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094420-010 | SW846 6020 |
| **LWDS-MW2** | Iron | 0.0461 | 0.033 | 0.100 | NE | J | | 094396-010 | SW846 6020 |
| 17-Jul-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094396-010 | SW846 6020 |
| **TAV-MW2** | Iron | 0.0774 | 0.033 | 0.100 | NE | J | | 094394-010 | SW846 6020 |
| 16-Jul-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094394-010 | SW846 6020 |
| **TAV-MW4** | Iron | 0.108 | 0.033 | 0.100 | NE | | | 094413-010 | SW846 6020 |
| 24-Jul-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094413-010 | SW846 6020 |
| **TAV-MW6** | Iron | 0.120 | 0.033 | 0.100 | NE | | | 094417-010 | SW846 6020 |
| 31-Jul-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094417-010 | SW846 6020 |
| **TAV-MW6** (Duplicate) | Iron | 0.125 | 0.033 | 0.100 | NE | | | 094418-010 | SW846 6020 |
| 31-Jul-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094418-010 | SW846 6020 |
| **TAV-MW8** | Iron | 0.105 | 0.033 | 0.100 | NE | | | 094404-010 | SW846 6020 |
| 22-Jul-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094404-010 | SW846 6020 |
| **TAV-MW10** | Iron | 0.147 | 0.033 | 0.100 | NE | | | 094422-010 | SW846 6020 |
| 30-Jul-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094422-010 | SW846 6020 |
| **TAV-MW11** | Iron | 0.0565 | 0.033 | 0.100 | NE | J | | 094401-010 | SW846 6020 |
| 18-Jul-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094401-010 | SW846 6020 |
| **TAV-MW11** (Duplicate) | Iron | 0.0612 | 0.033 | 0.100 | NE | J | | 094402-010 | SW846 6020 |
| 18-Jul-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094402-010 | SW846 6020 |
| **TAV-MW12** | Iron | 0.105 | 0.033 | 0.100 | NE | | | 094406-010 | SW846 6020 |
| 23-Jul-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094406-010 | SW846 6020 |
| **TAV-MW13** | Iron | 0.0552 | 0.033 | 0.100 | NE | J | | 094392-010 | SW846 6020 |
| 15-Jul-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094392-010 | SW846 6020 |
| **TAV-MW14** | Iron | 0.138 | 0.033 | 0.100 | NE | | | 094411-010 | SW846 6020 |
| 24-Jul-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094411-010 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-7 *(Continued)*
## Summary of Filtered Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **AVN-1** | Iron | 0.0921 | 0.033 | 0.100 | NE | J | | 094808-009 | SW846 6020 |
| 23-Oct-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094808-009 | SW846 6020 |
| **LWDS-MW1** | Iron | 0.154 | 0.033 | 0.100 | NE | | | 094838-009 | SW846 6020 |
| 11-Nov-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094838-009 | SW846 6020 |
| **LWDS-MW2** | Iron | 0.0926 | 0.033 | 0.100 | NE | J | | 094810-009 | SW846 6020 |
| 24-Oct-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094810-009 | SW846 6020 |
| **TAV-MW2** | Iron | 0.126 | 0.033 | 0.100 | NE | | | 094815-009 | SW846 6020 |
| 28-Oct-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094815-009 | SW846 6020 |
| **TAV-MW2** (Duplicate) | Iron | 0.141 | 0.033 | 0.100 | NE | | | 094816-009 | SW846 6020 |
| 28-Oct-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094816-009 | SW846 6020 |
| **TAV-MW3** | Iron | 0.124 | 0.033 | 0.100 | NE | | | 094797-009 | SW846 6020 |
| 17-Oct-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094797-009 | SW846 6020 |
| **TAV-MW4** | Iron | 0.0869 | 0.033 | 0.100 | NE | J | | 094821-009 | SW846 6020 |
| 30-Oct-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094821-009 | SW846 6020 |
| **TAV-MW5** | Iron | 0.114 | 0.033 | 0.100 | NE | | | 094793-009 | SW846 6020 |
| 15-Oct-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094793-009 | SW846 6020 |
| **TAV-MW6** | Iron | 0.131 | 0.033 | 0.100 | NE | | | 094834-009 | SW846 6020 |
| 06-Nov-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094834-009 | SW846 6020 |
| **TAV-MW7** | Iron | 0.122 | 0.033 | 0.100 | NE | | | 094799-009 | SW846 6020 |
| 21-Oct-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094799-009 | SW846 6020 |
| **TAV-MW8** | Iron | 0.103 | 0.033 | 0.100 | NE | | | 094819-009 | SW846 6020 |
| 29-Oct-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094819-009 | SW846 6020 |
| **TAV-MW9** | Iron | 0.137 | 0.033 | 0.100 | NE | | | 094804-009 | SW846 6020 |
| 22-Oct-13 | Manganese | 0.00125 | 0.001 | 0.005 | NE | J | | 094804-009 | SW846 6020 |
| **TAV-MW9** (Duplicate) | Iron | 0.133 | 0.033 | 0.100 | NE | | | 094805-009 | SW846 6020 |
| 22-Oct-13 | Manganese | 0.00139 | 0.001 | 0.005 | NE | J | | 094805-009 | SW846 6020 |
| **TAV-MW10** | Iron | 0.117 | 0.033 | 0.100 | NE | | | 094836-009 | SW846 6020 |
| 07-Nov-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094836-009 | SW846 6020 |
| **TAV-MW11** | Iron | 0.104 | 0.033 | 0.100 | NE | | | 094823-009 | SW846 6020 |
| 31-Oct-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094823-009 | SW846 6020 |
| **TAV-MW12** | Iron | 0.118 | 0.033 | 0.100 | NE | | | 094830-009 | SW846 6020 |
| 05-Nov-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094830-009 | SW846 6020 |
| **TAV-MW12** (Duplicate) | Iron | 0.113 | 0.033 | 0.100 | NE | | | 094831-009 | SW846 6020 |
| 05-Nov-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094831-009 | SW846 6020 |

Refer to footnotes on page 5A-89.

**Table 5A-7** *(Concluded)*
**Summary of Filtered Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW13** | Iron | 0.125 | 0.033 | 0.100 | NE | | | 094795-009 | SW846 6020 |
| 16-Oct-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094795-009 | SW846 6020 |
| **TAV-MW14** | Iron | 0.111 | 0.033 | 0.100 | NE | | | 094825-009 | SW846 6020 |
| 04-Nov-13 | Manganese | ND | 0.001 | 0.005 | NE | U | | 094825-009 | SW846 6020 |

Refer to footnotes on page 5A-89.

## Table 5A-8
## Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[b] (pCi/L) | MCL[d] | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **AVN-1** | Americium-241 | 0.469 ± 14.6 | 22.1 | 10.8 | NE | U | BD | 093964-033 | EPA 901.1 |
| 30-May-13 | Cesium-137 | -0.821 ± 2.03 | 3.38 | 1.62 | NE | U | BD | 093964-033 | EPA 901.1 |
| | Cobalt-60 | 1.23 ± 2.15 | 3.81 | 1.79 | NE | U | BD | 093964-033 | EPA 901.1 |
| | Potassium-40 | 12.4 ± 49.4 | 32.5 | 15.1 | NE | U | BD | 093964-033 | EPA 901.1 |
| | Gross Alpha | 1.71 | NA | NA | 15 pCi/L | NA | None | 093964-034 | EPA 900.0 |
| | Gross Beta | 3.57 ± 1.14 | 1.51 | 0.735 | 4mrem/yr | | J | 093964-034 | EPA 900.0 |
| | Tritium | -5.6 ± 82.9 | 157 | 70.2 | NE | U | BD | 093964-036 | EPA 906.0 M |
| **LWDS-MW1** | Americium-241 | 2.35 ± 9.98 | 15.5 | 7.57 | NE | U | BD | 093986-033 | EPA 901.1 |
| 10-Jun-13 | Cesium-137 | 2.85 ± 3.32 | 2.57 | 1.23 | NE | X | R | 093986-033 | EPA 901.1 |
| | Cobalt-60 | -0.769 ± 1.62 | 2.72 | 1.28 | NE | U | BD | 093986-033 | EPA 901.1 |
| | Potassium-40 | 8.77 ± 41.9 | 29.3 | 13.8 | NE | U | BD | 093986-033 | EPA 901.1 |
| | Gross Alpha | 4.55 | NA | NA | 15 pCi/L | NA | None | 093986-034 | EPA 900.0 |
| | Gross Beta | 3.25 ± 1.47 | 2.13 | 1.03 | 4mrem/yr | | J | 093986-034 | EPA 900.0 |
| | Tritium | -35.7 ± 102 | 178 | 86.4 | NE | U | BD | 093986-036 | EPA 906.0 M |
| **LWDS-MW2** | Americium-241 | 10.7 ± 15.5 | 23.2 | 11.3 | NE | U | BD | 093958-033 | EPA 901.1 |
| 29-May-13 | Cesium-137 | 1.61 ± 1.85 | 3.19 | 1.53 | NE | U | BD | 093958-033 | EPA 901.1 |
| | Cobalt-60 | 0.00996 ± 1.83 | 3.35 | 1.57 | NE | U | BD | 093958-033 | EPA 901.1 |
| | Potassium-40 | 18.4 ± 44.9 | 32.4 | 15.1 | NE | U | BD | 093958-033 | EPA 901.1 |
| | Gross Alpha | 2.46 | NA | NA | 15 pCi/L | NA | None | 093958-034 | EPA 900.0 |
| | Gross Beta | 3.37 ± 1.26 | 1.79 | 0.872 | 4mrem/yr | | J | 093958-034 | EPA 900.0 |
| | Tritium | 0.00 ± 84.4 | 159 | 70.8 | NE | U | BD | 093958-036 | EPA 906.0 M |
| **LWDS-MW2** (Duplicate) | Americium-241 | 3.21 ± 14.7 | 23.4 | 11.3 | NE | U | BD | 093960-033 | EPA 901.1 |
| 29-May-13 | Cesium-137 | -0.517 ± 1.79 | 3.14 | 1.50 | NE | U | BD | 093960-033 | EPA 901.1 |
| | Cobalt-60 | 1.61 ± 2.11 | 3.82 | 1.79 | NE | U | BD | 093960-033 | EPA 901.1 |
| | Potassium-40 | 45.4 ± 29.9 | 45.4 | 20.9 | NE | U | BD | 093960-033 | EPA 901.1 |
| | Gross Alpha | 2.62 | NA | NA | 15 pCi/L | NA | None | 093960-034 | EPA 900.0 |
| | Gross Beta | 3.76 ± 1.22 | 1.63 | 0.794 | 4mrem/yr | | J | 093960-034 | EPA 900.0 |
| | Tritium | -56.9 ± 77.2 | 160 | 71.3 | NE | U | BD | 093960-036 | EPA 906.0 M |
| **TAV-MW2** | Americium-241 | 2.91 ± 11.3 | 17.6 | 8.61 | NE | U | BD | 093950-033 | EPA 901.1 |
| 28-May-13 | Cesium-137 | 0.896 ± 2.08 | 3.65 | 1.75 | NE | U | BD | 093950-033 | EPA 901.1 |
| | Cobalt-60 | -1.37 ± 2.31 | 3.75 | 1.76 | NE | U | BD | 093950-033 | EPA 901.1 |
| | Potassium-40 | 68.0 ± 41.5 | 38.4 | 18.0 | NE | X | R | 093950-033 | EPA 901.1 |
| | Gross Alpha | 4.08 | NA | NA | 15 pCi/L | NA | None | 093950-034 | EPA 900.0 |
| | Gross Beta | 5.78 ± 1.45 | 1.62 | 0.787 | 4mrem/yr | | J | 093950-034 | EPA 900.0 |
| | Tritium | 17.1 ± 87.1 | 160 | 71.2 | NE | U | BD | 093950-036 | EPA 906.0 M |

Refer to footnotes on page 5A-89.

## Table 5A-8 *(Continued)*
## Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[b] (pCi/L) | MCL[d] | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW3** | Americium-241 | 14.4 ± 15.6 | 25.6 | 12.5 | NE | U | BD | 093969-033 | EPA 901.1 |
| 21-May-13 | Cesium-137 | -0.81 ± 1.84 | 3.17 | 1.51 | NE | U | BD | 093969-033 | EPA 901.1 |
| | Cobalt-60 | -0.792 ± 1.87 | 3.25 | 1.51 | NE | U | BD | 093969-033 | EPA 901.1 |
| | Potassium-40 | 26.2 ± 25.2 | 43.1 | 20.4 | NE | U | BD | 093969-033 | EPA 901.1 |
| | Gross Alpha | 4.42 | NA | NA | 15 pCi/L | NA | None | 093969-034 | EPA 900.0 |
| | Gross Beta | 7.18 ± 1.69 | 1.72 | 0.835 | 4mrem/yr | | J | 093969-034 | EPA 900.0 |
| | Tritium | -47.7 ± 102 | 180 | 87.3 | NE | U | BD | 093969-036 | EPA 906.0 M |
| **TAV-MW4** | Americium-241 | -13.7 ± 15.6 | 20.8 | 10.2 | NE | U | BD | 093976-033 | EPA 901.1 |
| 05-Jun-13 | Cesium-137 | 0.275 ± 2.01 | 3.50 | 1.68 | NE | U | BD | 093976-033 | EPA 901.1 |
| | Cobalt-60 | 0.586 ± 2.17 | 3.85 | 1.81 | NE | U | BD | 093976-033 | EPA 901.1 |
| | Potassium-40 | -10.8 ± 42.5 | 49.9 | 23.8 | NE | U | BD | 093976-033 | EPA 901.1 |
| | Gross Alpha | 3.41 | NA | NA | 15 pCi/L | NA | None | 093976-034 | EPA 900.0 |
| | Gross Beta | 3.87 ± 1.28 | 1.71 | 0.834 | 4mrem/yr | | J | 093976-034 | EPA 900.0 |
| | Tritium | 82.0 ± 104 | 173 | 83.3 | NE | U | BD | 093976-036 | EPA 906.0 M |
| **TAV-MW5** | Americium-241 | 9.33 ± 7.39 | 9.84 | 4.83 | NE | U | BD | 093949-033 | EPA 901.1 |
| 15-May-13 | Cesium-137 | 0.573 ± 1.74 | 3.10 | 1.50 | NE | U | BD | 093949-033 | EPA 901.1 |
| | Cobalt-60 | 0.102 ± 1.73 | 3.10 | 1.47 | NE | U | BD | 093949-033 | EPA 901.1 |
| | Potassium-40 | -13.5 ± 37.3 | 43.1 | 20.7 | NE | U | BD | 093949-033 | EPA 901.1 |
| | Gross Alpha | 4.66 | NA | NA | 15 pCi/L | NA | None | 093949-034 | EPA 900.0 |
| | Gross Beta | 3.35 ± 0.935 | 1.06 | 0.505 | 4mrem/yr | | J | 093949-034 | EPA 900.0 |
| | Tritium | 3.47 ± 67.7 | 123 | 56.5 | NE | U | BD | 093949-036 | EPA 906.0 M |
| **TAV-MW6** | Americium-241 | 0.698 ± 7.08 | 10.5 | 5.17 | NE | U | BD | 093990-033 | EPA 901.1 |
| 11-Jun-13 | Cesium-137 | -0.678 ± 1.70 | 2.88 | 1.39 | NE | U | BD | 093990-033 | EPA 901.1 |
| | Cobalt-60 | 0.265 ± 1.99 | 3.11 | 1.47 | NE | U | BD | 093990-033 | EPA 901.1 |
| | Potassium-40 | 16.2 ± 37.4 | 27.4 | 12.9 | NE | U | BD | 093990-033 | EPA 901.1 |
| | Gross Alpha | 6.86 | NA | NA | 15 pCi/L | NA | None | 093990-034 | EPA 900.0 |
| | Gross Beta | 5.49 ± 1.86 | 2.49 | 1.21 | 4mrem/yr | | J | 093990-034 | EPA 900.0 |
| | Tritium | -68.9 ± 100 | 177 | 85.8 | NE | U | BD | 093990-036 | EPA 906.0 M |
| **TAV-MW7** | Americium-241 | -2.76 ± 11.6 | 18.2 | 8.86 | NE | U | BD | 093977-033 | EPA 901.1 |
| 22-May-13 | Cesium-137 | 0.506 ± 1.74 | 3.01 | 1.43 | NE | U | BD | 093977-033 | EPA 901.1 |
| | Cobalt-60 | 1.16 ± 2.27 | 3.38 | 1.58 | NE | U | BD | 093977-033 | EPA 901.1 |
| | Potassium-40 | -27.3 ± 33.7 | 45.2 | 21.5 | NE | U | BD | 093977-033 | EPA 901.1 |
| | Gross Alpha | 3.77 | NA | NA | 15 pCi/L | NA | None | 093977-034 | EPA 900.0 |
| | Gross Beta | 6.83 ± 1.66 | 1.75 | 0.851 | 4mrem/yr | | J | 093977-034 | EPA 900.0 |
| | Tritium | 38.5 ± 103 | 176 | 85.2 | NE | U | BD | 093977-036 | EPA 906.0 M |

Refer to footnotes on page 5A-89.

## Table 5A-8 *(Continued)*
## Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[b] (pCi/L) | MCL[d] | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW7** (Duplicate) | Americium-241 | 5.31 ± 7.99 | 12.4 | 6.00 | NE | U | BD | 093979-033 | EPA 901.1 |
| 22-May-13 | Cesium-137 | -1.19 ± 3.55 | 4.46 | 2.11 | NE | U | BD | 093979-033 | EPA 901.1 |
| | Cobalt-60 | 1.50 ± 2.66 | 4.52 | 2.05 | NE | U | BD | 093979-033 | EPA 901.1 |
| | Potassium-40 | 52.4 ± 42.1 | 47.6 | 21.7 | NE | X | R | 093979-033 | EPA 901.1 |
| | Gross Alpha | 5.08 | NA | NA | 15 pCi/L | NA | None | 093979-034 | EPA 900.0 |
| | Gross Beta | 5.49 ± 1.51 | 1.86 | 0.909 | 4mrem/yr | | J | 093979-034 | EPA 900.0 |
| | Tritium | -49.5 ± 97.7 | 172 | 83.3 | NE | U | BD | 093979-036 | EPA 906.0 M |
| **TAV-MW8** | Americium-241 | -1.46 ± 13.3 | 20.5 | 9.96 | NE | U | BD | 093983-033 | EPA 901.1 |
| 23-May-13 | Cesium-137 | 0.0394 ± 2.39 | 4.23 | 2.01 | NE | U | BD | 093983-033 | EPA 901.1 |
| | Cobalt-60 | -0.013 ± 2.44 | 4.38 | 2.03 | NE | U | BD | 093983-033 | EPA 901.1 |
| | Potassium-40 | -33.8 ± 49.9 | 57.9 | 27.3 | NE | U | BD | 093983-033 | EPA 901.1 |
| | Gross Alpha | 4.44 | NA | NA | 15 pCi/L | NA | None | 093983-034 | EPA 900.0 |
| | Gross Beta | 4.57 ± 1.26 | 1.51 | 0.731 | 4mrem/yr | | J | 093983-034 | EPA 900.0 |
| | Tritium | -41.3 ± 102 | 179 | 86.8 | NE | U | BD | 093983-036 | EPA 906.0 M |
| **TAV-MW9** | Americium-241 | 1.97 ± 10.8 | 16.9 | 8.26 | NE | U | BD | 093963-033 | EPA 901.1 |
| 20-May-13 | Cesium-137 | 0.272 ± 2.17 | 3.74 | 1.80 | NE | U | BD | 093963-033 | EPA 901.1 |
| | Cobalt-60 | 0.741 ± 1.92 | 3.43 | 1.61 | NE | U | BD | 093963-033 | EPA 901.1 |
| | Potassium-40 | 1.17 ± 42.7 | 27.1 | 12.5 | NE | U | BD | 093963-033 | EPA 901.1 |
| | Gross Alpha | 2.76 | NA | NA | 15 pCi/L | NA | None | 093963-034 | EPA 900.0 |
| | Gross Beta | 7.55 ± 1.79 | 1.84 | 0.894 | 4mrem/yr | | J | 093963-034 | EPA 900.0 |
| | Tritium | 0.00 ± 106 | 183 | 88.7 | NE | U | BD | 093963-036 | EPA 906.0 M |
| **TAV-MW10** | Americium-241 | -0.872 ± 9.95 | 15.1 | 7.39 | NE | U | BD | 093994-033 | EPA 901.1 |
| 12-Jun-13 | Cesium-137 | -2.26 ± 2.36 | 2.92 | 1.41 | NE | U | BD | 093994-033 | EPA 901.1 |
| | Cobalt-60 | 1.58 ± 2.66 | 3.14 | 1.49 | NE | U | BD | 093994-033 | EPA 901.1 |
| | Potassium-40 | -34.8 ± 35.9 | 39.4 | 18.9 | NE | U | BD | 093994-033 | EPA 901.1 |
| | Gross Alpha | 4.51 | NA | NA | 15 pCi/L | NA | None | 093994-034 | EPA 900.0 |
| | Gross Beta | 5.24 ± 1.87 | 2.56 | 1.24 | 4mrem/yr | | J | 093994-034 | EPA 900.0 |
| | Tritium | -32.6 ± 98.7 | 173 | 83.7 | NE | U | BD | 093994-036 | EPA 906.0 M |
| **TAV-MW11** | Americium-241 | -16.8 ± 11.0 | 8.78 | 4.30 | NE | U | BD | 093968-033 | EPA 901.1 |
| 03-Jun-13 | Cesium-137 | 1.55 ± 1.59 | 2.70 | 1.30 | NE | U | BD | 093968-033 | EPA 901.1 |
| | Cobalt-60 | 1.70 ± 1.79 | 2.93 | 1.38 | NE | U | BD | 093968-033 | EPA 901.1 |
| | Potassium-40 | 20.4 ± 36.3 | 27.8 | 13.1 | NE | U | BD | 093968-033 | EPA 901.1 |
| | Gross Alpha | 3.22 | NA | NA | 15 pCi/L | NA | None | 093968-034 | EPA 900.0 |
| | Gross Beta | 5.33 ± 1.35 | 1.51 | 0.733 | 4mrem/yr | | J | 093968-034 | EPA 900.0 |
| | Tritium | 5.28 ± 99.3 | 173 | 83.2 | NE | U | BD | 093968-036 | EPA 906.0 M |

Refer to footnotes on page 5A-89.

## Table 5A-8 *(Concluded)*
## Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[b] (pCi/L) | MCL[d] | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW12** | Americium-241 | -2.73 ± 8.88 | 13.4 | 6.56 | NE | U | BD | 093972-033 | EPA 901.1 |
| 04-Jun-13 | Cesium-137 | -1.98 ± 3.28 | 3.80 | 1.84 | NE | U | BD | 093972-033 | EPA 901.1 |
| | Cobalt-60 | 0.250 ± 1.75 | 3.12 | 1.47 | NE | U | BD | 093972-033 | EPA 901.1 |
| | Potassium-40 | -15.7 ± 35.2 | 41.4 | 19.8 | NE | U | BD | 093972-033 | EPA 901.1 |
| | Gross Alpha | 6.09 | NA | NA | 15 pCi/L | NA | None | 093972-034 | EPA 900.0 |
| | Gross Beta | 3.57 ± 1.25 | 1.73 | 0.845 | 4mrem/yr | | J | 093972-034 | EPA 900.0 |
| | Tritium | -81.3 ± 94.9 | 172 | 82.6 | NE | U | BD | 093972-036 | EPA 906.0 M |
| **TAV-MW13** | Americium-241 | -2.77 ± 9.77 | 14.9 | 7.25 | NE | U | BD | 093957-033 | EPA 901.1 |
| 16-May-13 | Cesium-137 | 2.22 ± 3.27 | 2.70 | 1.29 | NE | U | BD | 093957-033 | EPA 901.1 |
| | Cobalt-60 | 0.443 ± 1.63 | 2.95 | 1.39 | NE | U | BD | 093957-033 | EPA 901.1 |
| | Potassium-40 | -22 ± 36.1 | 38.9 | 18.6 | NE | U | BD | 093957-033 | EPA 901.1 |
| | Gross Alpha | 5.05 | NA | NA | 15 pCi/L | NA | None | 093957-034 | EPA 900.0 |
| | Gross Beta | 3.81 ± 1.18 | 1.50 | 0.727 | 4mrem/yr | | NJ+ | 093957-034 | EPA 900.0 |
| | Tritium | 16.9 ± 67.1 | 120 | 54.9 | NE | U | BD | 093957-036 | EPA 906.0 M |
| **TAV-MW13** (Duplicate) | Americium-241 | -1.45 ± 7.01 | 10.4 | 5.07 | NE | U | BD | 093959-033 | EPA 901.1 |
| 16-May-13 | Cesium-137 | 0.401 ± 1.81 | 2.81 | 1.35 | NE | U | BD | 093959-033 | EPA 901.1 |
| | Cobalt-60 | 0.615 ± 2.57 | 2.96 | 1.39 | NE | U | BD | 093959-033 | EPA 901.1 |
| | Potassium-40 | -34.8 ± 35.8 | 40.3 | 19.3 | NE | U | BD | 093959-033 | EPA 901.1 |
| | Gross Alpha | 4.85 | NA | NA | 15 pCi/L | NA | None | 093959-034 | EPA 900.0 |
| | Gross Beta | 4.78 ± 1.26 | 1.45 | 0.700 | 4mrem/yr | | NJ+ | 093959-034 | EPA 900.0 |
| | Tritium | -6.64 ± 63.7 | 118 | 54.0 | NE | U | BD | 093959-036 | EPA 906.0 M |
| **TAV-MW14** | Americium-241 | -28.1 ± 14.2 | 9.65 | 4.74 | NE | U | R | 093980-033 | EPA 901.1 |
| 06-Jun-13 | Cesium-137 | 0.850 ± 1.78 | 3.14 | 1.52 | NE | U | BD | 093980-033 | EPA 901.1 |
| | Cobalt-60 | 1.11 ± 2.05 | 3.17 | 1.51 | NE | U | BD | 093980-033 | EPA 901.1 |
| | Potassium-40 | 8.96 ± 43.6 | 28.1 | 13.3 | NE | U | BD | 093980-033 | EPA 901.1 |
| | Gross Alpha | 2.66 | NA | NA | 15 pCi/L | NA | None | 093980-034 | EPA 900.0 |
| | Gross Beta | 5.54 ± 1.59 | 2.01 | 0.985 | 4mrem/yr | | J | 093980-034 | EPA 900.0 |
| | Tritium | 42.3 ± 101 | 173 | 83.3 | NE | U | BD | 093980-036 | EPA 906.0 M |

Refer to footnotes on page 5A-89.

## Table 5A-9
## Summary of Field Water Quality Measurements[h],
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Sample Date | Temperature (°C) | Specific Conductivity (µmhos/cm) | Oxidation Reduction Potential (mV) | pH | Turbidity (NTU) | Dissolved Oxygen (% Sat) | Dissolved Oxygen (mg/L) |
|---|---|---|---|---|---|---|---|---|
| **AVN-1** | 18-Feb-13 | 18.95 | 386 | 210.8 | 7.30 | 2.14 | 41.4 | 3.85 |
| **LWDS-MW1** | 11-Mar-13 | 17.09 | 667 | 229.0 | 7.25 | 0.56 | 75.5 | 7.27 |
| **LWDS-MW2** | 13-Feb-13 | 17.34 | 430 | 204.9 | 7.23 | 2.01 | 44.9 | 4.30 |
| **TAV-MW2** | 12-Feb-13 | 16.16 | 667 | 217.9 | 7.01 | 1.00 | 46.2 | 4.53 |
| **TAV-MW4** | 20-Feb-13 | 17.19 | 476 | 201.1 | 7.25 | 0.43 | 66.2 | 6.36 |
| **TAV-MW6** | 25-Feb-13 | 16.63 | 635 | 223.1 | 7.14 | 2.86 | 68.8 | 6.70 |
| **TAV-MW8** | 15-Feb-13 | 19.16 | 544 | 225.2 | 7.14 | 13.3 | 64.8 | 5.97 |
| **TAV-MW10** | 27-Feb-13 | 17.48 | 596 | 225.8 | 7.13 | 0.26 | 68.9 | 6.58 |
| **TAV-MW11** | 14-Feb-13 | 17.18 | 525 | 219.9 | 7.12 | 0.54 | 70.8 | 6.80 |
| **TAV-MW12** | 19-Feb-13 | 19.01 | 561 | 197.4 | 7.11 | 0.62 | 64.5 | 5.97 |
| **TAV-MW13** | 26-Feb-13 | 17.71 | 492 | 215.2 | 7.16 | 0.78 | 24.8 | 2.36 |
| **TAV-MW14** | 21-Feb-13 | 17.31 | 608 | 218.9 | 7.15 | 1.56 | 68.2 | 6.55 |
| | | | | | | | | |
| **AVN-1** | 30-May-13 | 21.20 | 388 | 259.1 | 7.41 | 0.95 | 45.2 | 4.01 |
| **LWDS-MW1** | 10-Jun-13 | 26.36 | 676 | 389.0 | 7.23 | 0.79 | 89.1 | 7.16 |
| **LWDS-MW2** | 29-May-13 | 20.68 | 433 | 207.3 | 7.33 | 1.41 | 51.8 | 4.64 |
| **TAV-MW2** | 28-May-13 | 22.36 | 673 | 176.5 | 7.06 | 0.70 | 50.1 | 4.35 |
| **TAV-MW3** | 21-May-13 | 21.21 | 509 | 163.4 | 7.27 | 0.68 | 61.3 | 5.42 |
| **TAV-MW4** | 05-Jun-13 | 21.47 | 484 | 372.7 | 7.32 | 0.70 | 74.2 | 6.52 |
| **TAV-MW5** | 15-May-13 | 20.61 | 464 | 171.1 | 7.27 | 0.44 | 51.1 | 4.58 |
| **TAV-MW6** | 11-Jun-13 | 21.91 | 640 | 394.6 | 7.26 | 6.86 | 79.9 | 6.99 |
| **TAV-MW7** | 22-May-13 | 22.40 | 564 | 157.9 | 7.12 | 1.84 | 5.1 | 0.44 |
| **TAV-MW8** | 23-May-13 | 22.23 | 548 | 162.7 | 7.23 | 4.35 | 59.6 | 5.18 |
| **TAV-MW9** | 20-May-13 | 20.04 | 544 | 67.1 | 7.04 | 1.74 | 14.8 | 1.34 |
| **TAV-MW10** | 12-Jun-13 | 23.85 | 600 | 390.3 | 7.24 | 0.25 | 83.4 | 7.03 |
| **TAV-MW11** | 03-Jun-13 | 21.63 | 531 | 370.2 | 7.30 | 0.68 | 79.0 | 6.95 |
| **TAV-MW12** | 04-Jun-13 | 22.96 | 567 | 380.6 | 7.18 | 6.23 | 72.4 | 6.21 |
| **TAV-MW13** | 16-May-13 | 22.26 | 496 | 170.3 | 7.20 | 0.98 | 26.0 | 2.25 |
| **TAV-MW14** | 06-Jun-13 | 21.76 | 612 | 378.9 | 7.19 | 1.35 | 78.8 | 6.91 |

Refer to footnotes on page 5A-89.

**Table 5A-9** *(Concluded)*
**Summary of Field Water Quality Measurements[h],**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Sample Date | Temperature (°C) | Specific Conductivity (µmhos/cm) | Oxidation Reduction Potential (mV) | pH | Turbidity (NTU) | Dissolved Oxygen (% Sat) | Dissolved Oxygen (mg/L) |
|---|---|---|---|---|---|---|---|---|
| **AVN-1** | 23-Jul-13 | 22.94 | 455 | 111.8 | 7.51 | 5.73 | 40.7 | 3.50 |
| **LWDS-MW1** | 29-Jul-13 | 21.51 | 783 | 121.4 | 7.55 | 0.85 | 73.2 | 6.45 |
| **LWDS-MW2** | 17-Jul-13 | 20.48 | 506 | 134.7 | 7.52 | 0.47 | 50.0 | 4.50 |
| **TAV-MW2** | 16-Jul-13 | 21.68 | 784 | 120.5 | 7.26 | 0.60 | 50.0 | 4.39 |
| **TAV-MW4** | 24-Jul-13 | 21.70 | 558 | 132.4 | 7.43 | 1.65 | 65.9 | 5.78 |
| **TAV-MW6** | 31-Jul-13 | 22.76 | 748 | 142.2 | 7.37 | 1.83 | 80.6 | 6.93 |
| **TAV-MW8** | 22-Jul-13 | 23.01 | 636 | 134.6 | 7.37 | 1.52 | 73.9 | 6.33 |
| **TAV-MW10** | 30-Jul-13 | 23.57 | 699 | 125.0 | 7.38 | 0.46 | 62.7 | 5.31 |
| **TAV-MW11** | 18-Jul-13 | 22.07 | 621 | 144.2 | 7.42 | 0.44 | 78.4 | 6.84 |
| **TAV-MW12** | 23-Jul-13 | 22.41 | 568 | 94.4 | 7.55 | 4.55 | 75.4 | 6.52 |
| **TAV-MW13** | 15-Jul-13 | 19.98 | 576 | 107.8 | 7.42 | 1.67 | 21.5 | 1.95 |
| **TAV-MW14** | 24-Jul-13 | 21.56 | 663 | 96.3 | 7.55 | 1.59 | 78.2 | 6.85 |
| | | | | | | | | |
| **AVN-1** | 23-Oct-13 | 20.58 | 420 | 162.0 | 7.17 | 2.31 | 43.5 | 3.91 |
| **LWDS-MW1** | 11-Nov-13 | 18.97 | 723 | 192.5 | 7.13 | 0.57 | 78.6 | 7.28 |
| **LWDS-MW2** | 24-Oct-13 | 19.98 | 468 | 130.1 | 7.08 | 0.37 | 50.2 | 4.56 |
| **TAV-MW2** | 28-Oct-13 | 19.79 | 719 | 154.3 | 6.83 | 2.31 | 54.6 | 4.96 |
| **TAV-MW3** | 17-Oct-13 | 19.89 | 552 | 172.5 | 7.07 | 3.41 | 66.7 | 6.07 |
| **TAV-MW4** | 30-Oct-13 | 18.18 | 518 | 167.0 | 7.12 | 0.73 | 71.1 | 6.70 |
| **TAV-MW5** | 15-Oct-13 | 20.11 | 502 | 179.3 | 7.02 | 0.40 | 56.6 | 5.13 |
| **TAV-MW6** | 06-Nov-13 | 17.96 | 689 | 142.5 | 6.96 | 5.65 | 74.3 | 7.03 |
| **TAV-MW7** | 21-Oct-13 | 19.91 | 609 | 154.2 | 6.85 | 4.34 | 5.7 | 0.51 |
| **TAV-MW8** | 29-Oct-13 | 18.81 | 591 | 165.1 | 7.04 | 1.27 | 68.4 | 6.36 |
| **TAV-MW9** | 22-Oct-13 | 19.24 | 624 | 13.0 | 6.76 | 2.06 | 18.4 | 1.69 |
| **TAV-MW10** | 07-Nov-13 | 19.21 | 642 | 150.0 | 7.00 | 0.37 | 76.2 | 7.03 |
| **TAV-MW11** | 31-Oct-13 | 19.59 | 573 | 151.2 | 7.06 | 0.46 | 75.1 | 6.86 |
| **TAV-MW12** | 05-Nov-13 | 18.27 | 616 | 144.2 | 6.96 | 13.1 | 65.1 | 6.12 |
| **TAV-MW13** | 16-Oct-13 | 19.64 | 532 | 155.2 | 7.02 | 0.98 | 28.5 | 2.62 |
| **TAV-MW14** | 04-Nov-13 | 20.68 | 663 | 165.4 | 6.99 | 3.73 | 76.5 | 6.85 |

Refer to footnotes on page 5A-89.

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## *Footnotes for Technical Area V Analytical Results Tables*

| | |
|---|---|
| % | = percent. |
| µg/L | = micrograms per liter. |
| CFR | = Code of Federal Regulations. |
| EPA | = U.S. Environmental Protection Agency. |
| ID | = Identifier. |
| mg/L | = milligrams per liter. |
| mrem/yr | = millirem per year. |
| No. | = Number. |
| pCi/L | = picocuries per liter. |

**[a]Result**

Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 5A- 1-4).

| | |
|---|---|
| **Bold** | = Value exceeds the established MCL. |
| ND | = Not detected (at MDL). Activities of zero or less are considered to be not detected. |

**[b]MDL or MDA**

MDL applies to the data listed in Tables 5A-1 through 5A-7. MDA applies to radiological data in Table 5A-8.

| | |
|---|---|
| MDA | = The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level. |
| MDL | = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific. |
| NA | = Not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity. |

**[c]PQL or Critical Level**

The PQL applies to Tables 5A-1 through 5A-7. Critical level applies to Table 5A-8.

| | |
|---|---|
| Critical level | = The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific. |
| NA | = Not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity. |
| PQL | = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions. |

**[d]MCL**

MCL = Maximum contaminant level. MCLs were established by the U.S. EPA Office of Water, National Primary Water Regulations (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- Gross alpha particle activity, excluding total uranium = 15 pCi/L (40 CFR Parts 9, 141, and 142, Table 5A- 1-4).
- Any combination of Beta and/or Gamma emitting radionuclides = 4 mrem/yr (as dose rate).

NE = not established.

**[e]Lab Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

| | |
|---|---|
| B | = Analyte is detected in associated laboratory method blank. |
| H | = Analytical holding time was exceeded. |
| J | = Amount detected is below the PQL. |
| N | = Results associated with a spike analysis that was outside control limits. |
| NA | = Not applicable. |
| U | = Analyte is absent or below the MDL. |
| X | = Data rejected due to peak not meeting identification criteria. |

## *Footnotes for Technical Area V Analytical Results Tables (Concluded)*

**[f]Validation Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = The associated value is an estimated quantity.
J- = The associated numerical value is an estimated quantity with a suspected negative bias.
None = No data validation for corrected gross alpha activity.
NJ = Presumptive evidence of the presence of the material at an estimated quantity.
NJ+ = Presumptive evidence of the presence of the material at an estimated quantity with a suspected positive bias.
U = The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
UJ = The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R = The data are unusable, and resampling or reanalysis are necessary for verification.

**[g]Analytical Method**

Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.

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

EPA, 1984, "Methods for Chemical Analysis of Water and Wastes." EPA 600-4-79-020.

EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.

**[h]Field Water Quality Measurements**

Field measurements collected prior to sampling.

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

# Attachment 5B
# Technical Area V
# Plots

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# Attachment 5B Plots


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

5B-2 Trichloroethene Concentrations, TAV-MW6 ..... 5B-6

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5B-6 Nitrate Plus Nitrite Concentrations, LWDS-MW1 ..... 5B-10

5B-7 Nitrate Plus Nitrite Concentrations, TAV-MW10 ..... 5B-11

5B-8 Nitrate Plus Nitrite Concentrations, AVN-1 ..... 5B-12

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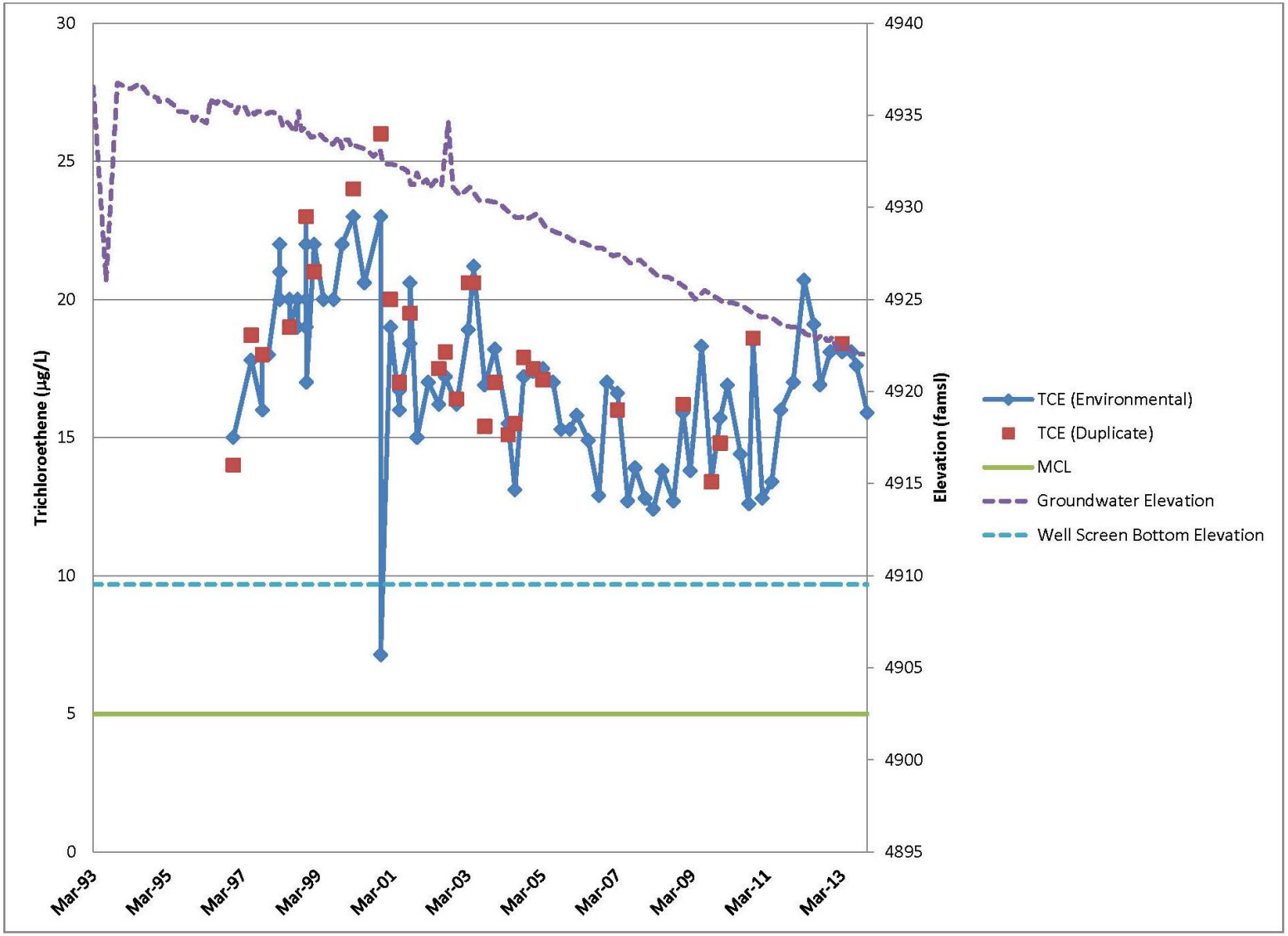


**Figure 5B-1. Trichloroethene Concentrations, LWDS-MW1**

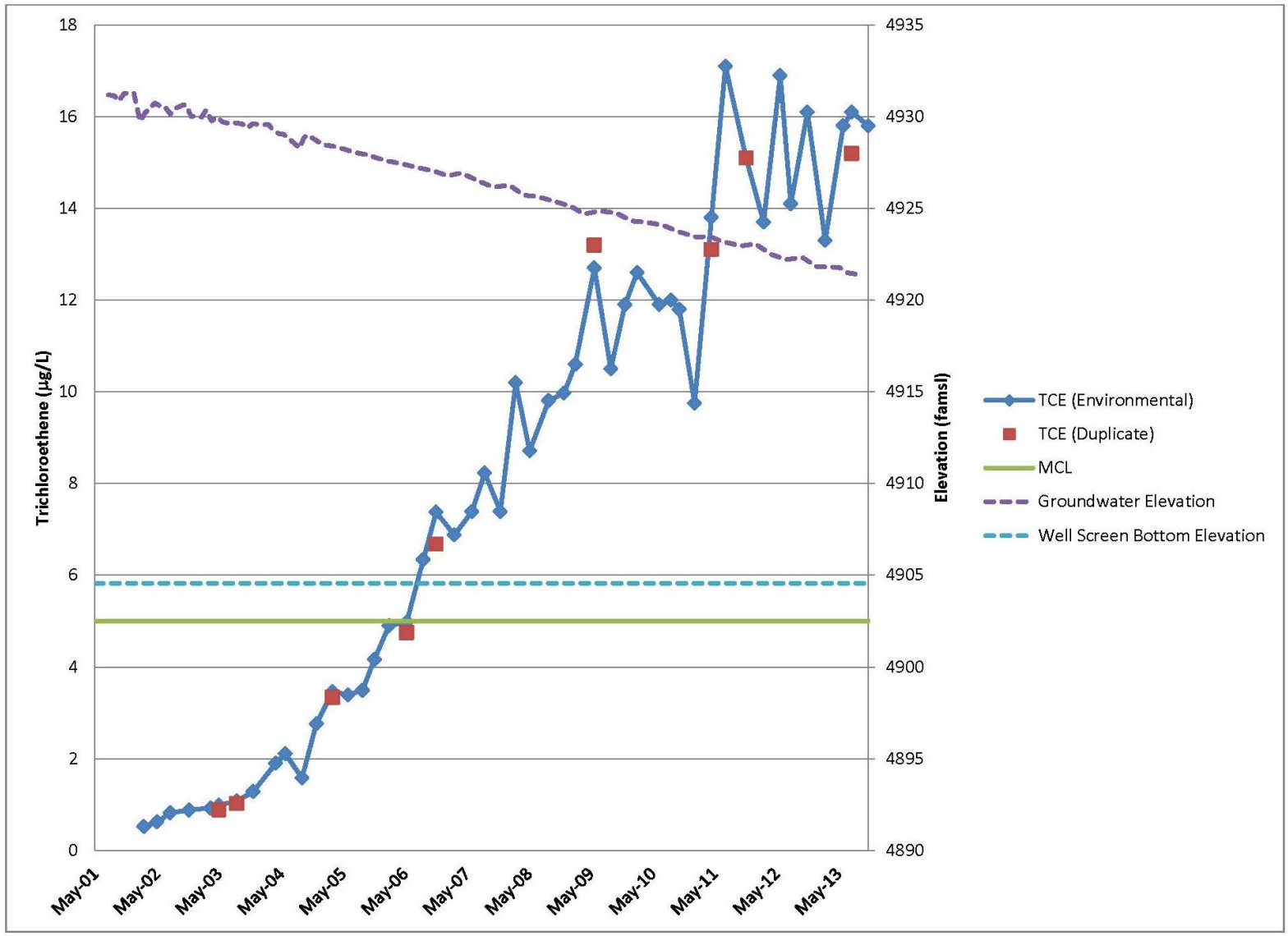


**Figure 5B-2. Trichloroethene Concentrations, TAV-MW6**

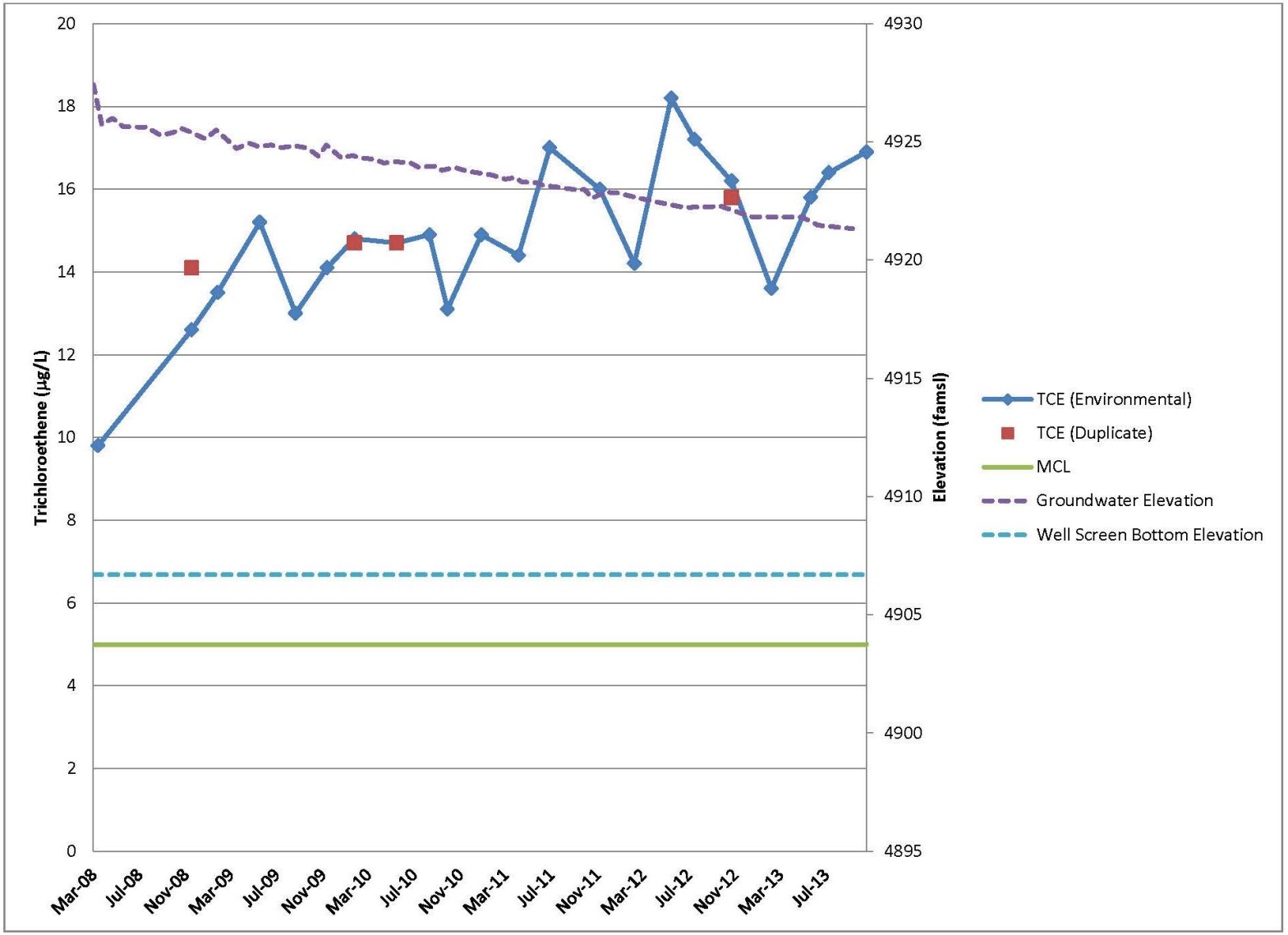


**Figure 5B-3. Trichloroethene Concentrations, TAV-MW10**

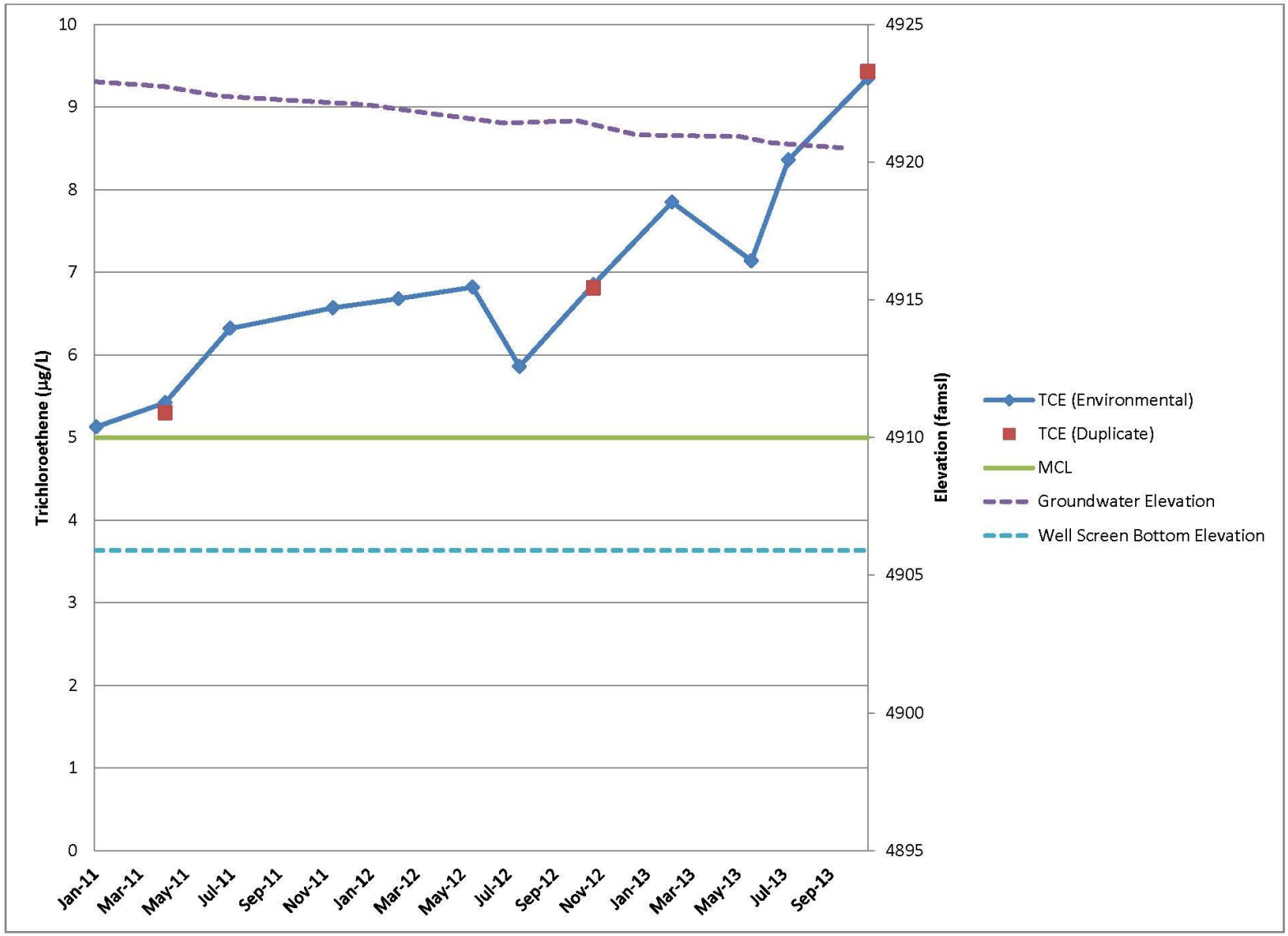


**Figure 5B-4. Trichloroethene Concentrations, TAV-MW12**

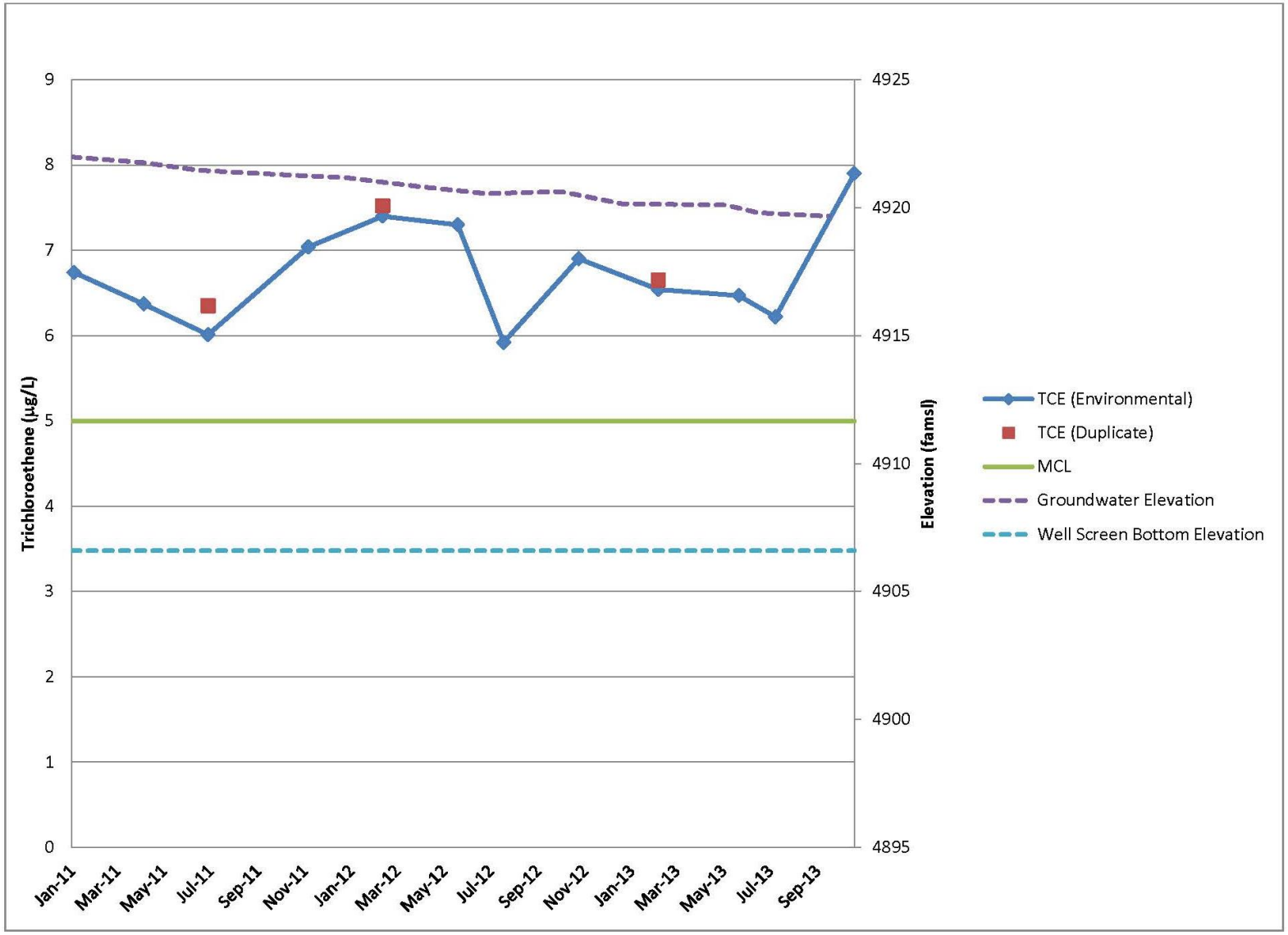


**Figure 5B-5. Trichloroethene Concentrations, TAV-MW14**

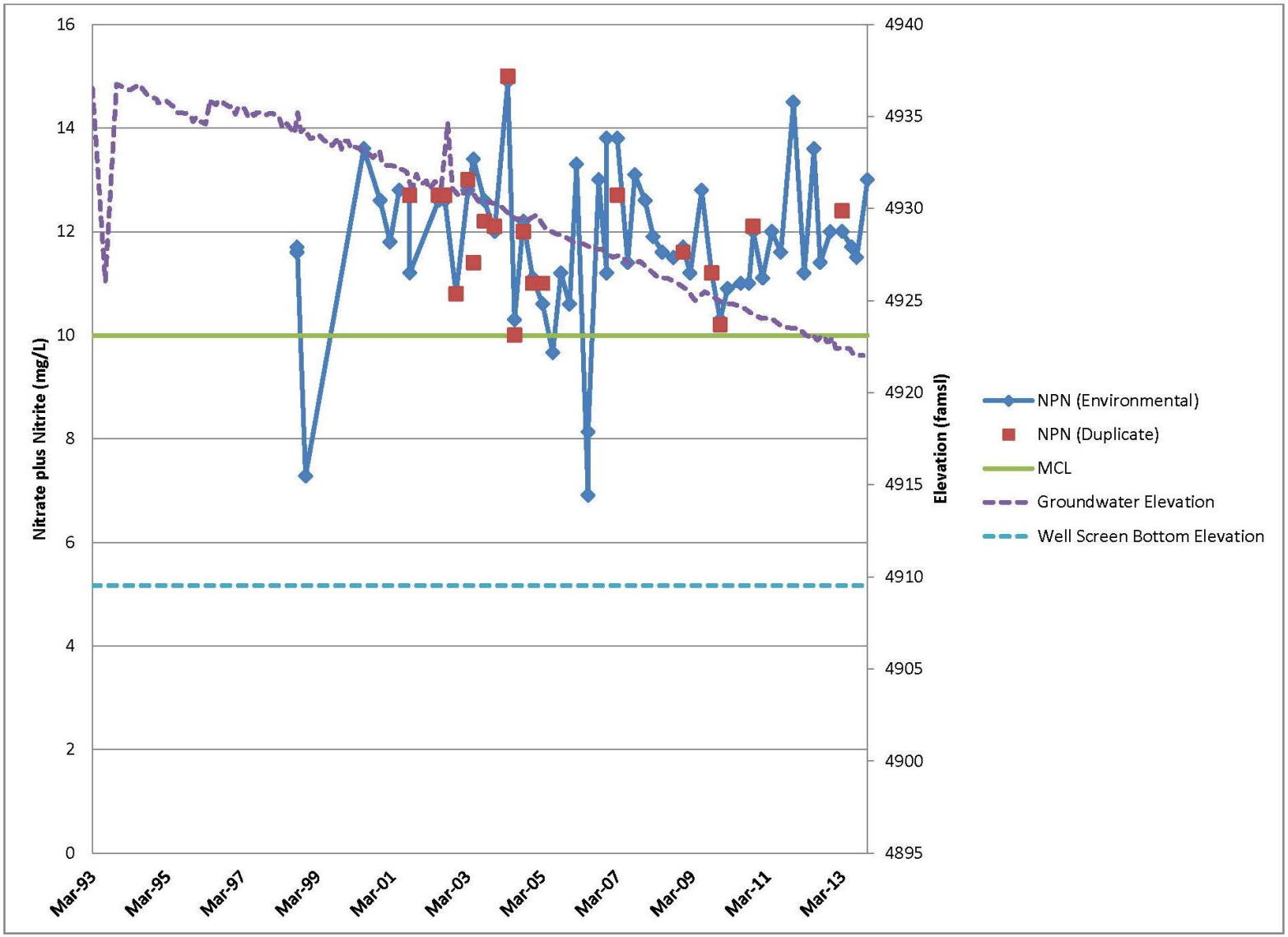


**Figure 5B-6. Nitrate Plus Nitrite Concentrations, LWDS-MW1**

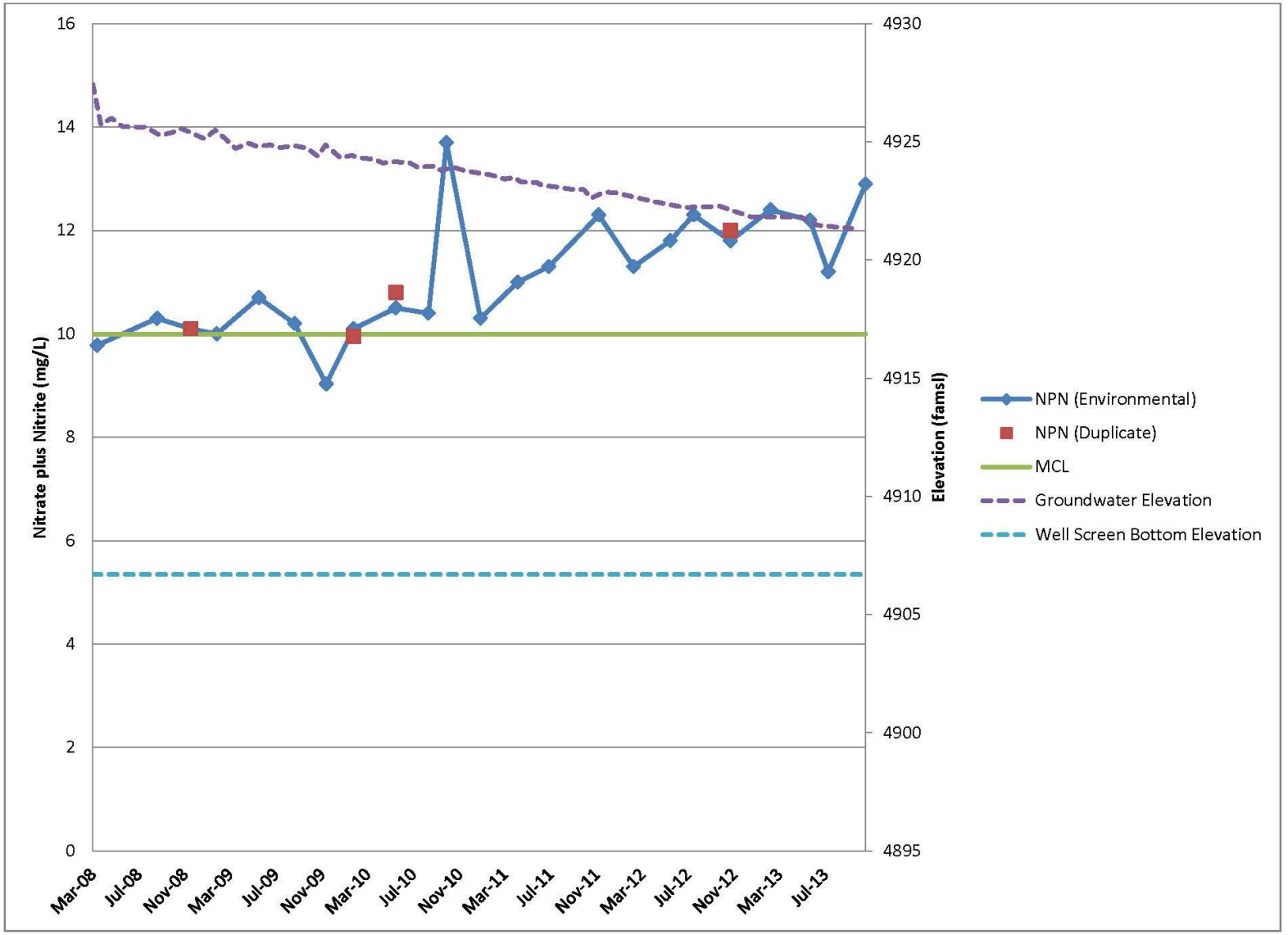


**Figure 5B-7. Nitrate Plus Nitrite Concentrations, TAV-MW10**

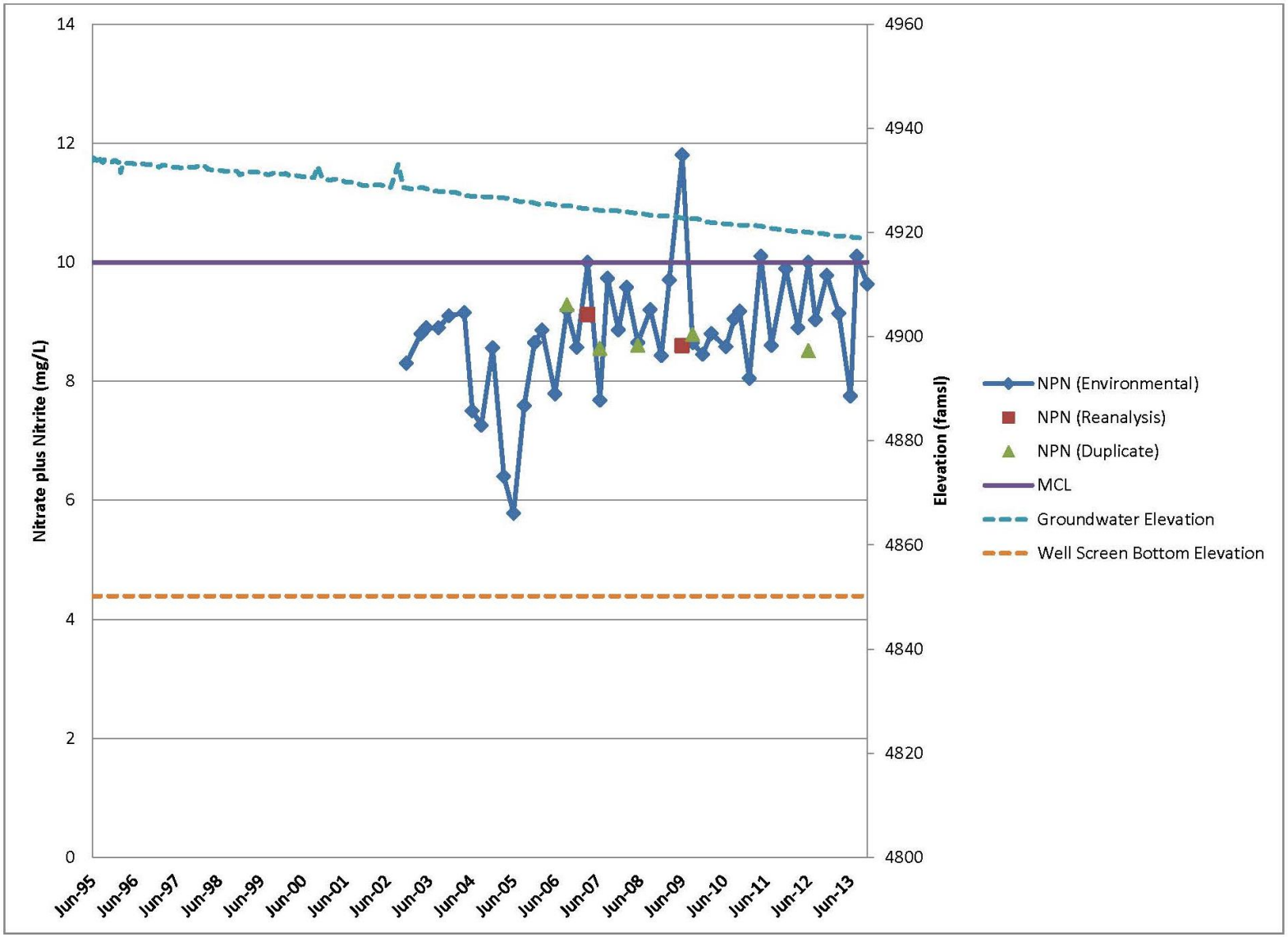


**Figure 5B-8. Nitrate Plus Nitrite Concentrations, AVN-1**

# Attachment 5C
# Technical Area V
# Hydrographs

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# Attachment 5C Hydrographs


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5C-2 TA-V Study Area Wells (2 of 3)..... 5C-6

5C-3 TA-V Study Area Wells (3 of 3)..... 5C-7

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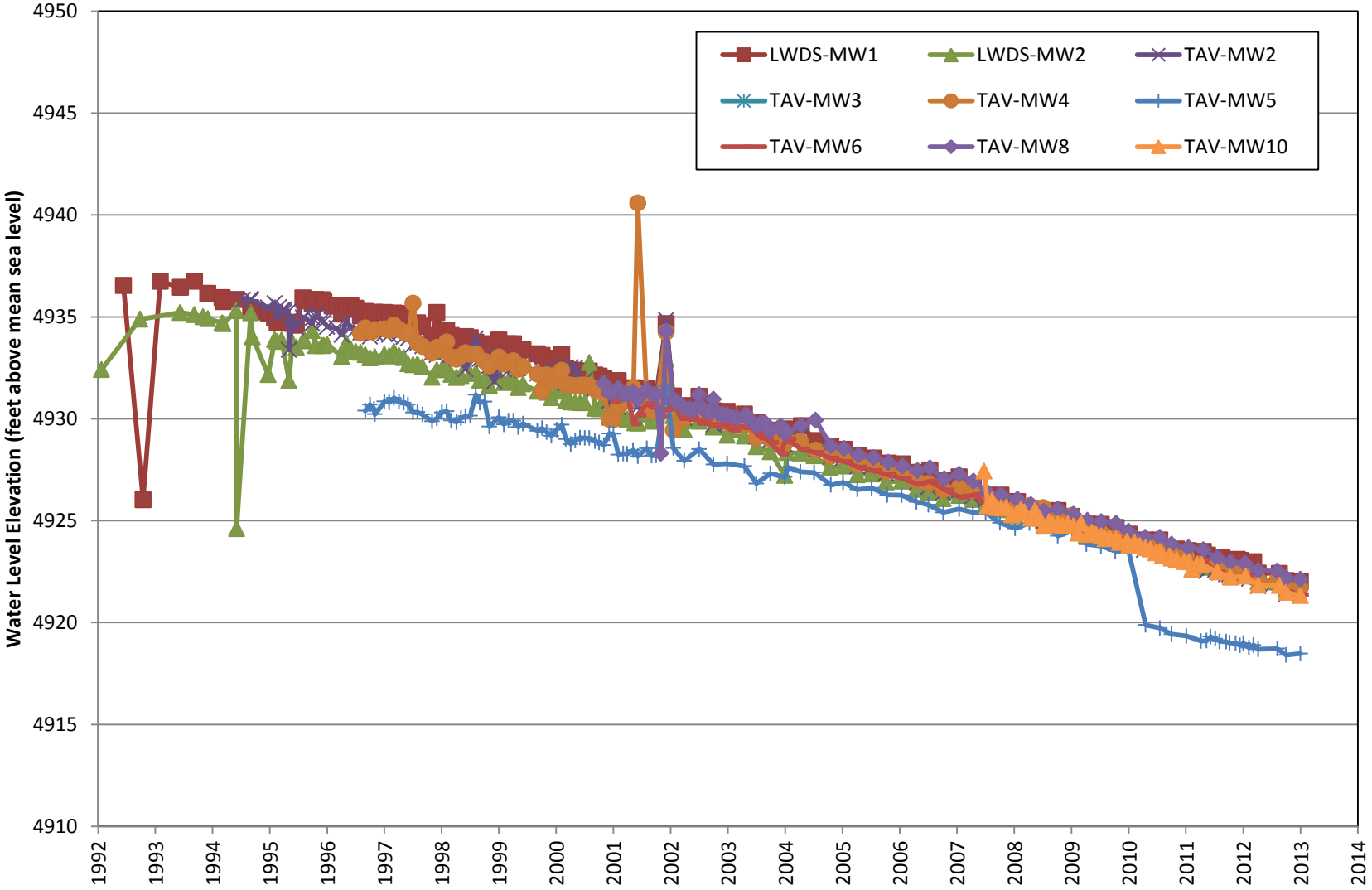


**Figure 5C-1. TA-V Study Area Wells (1 of 3)**

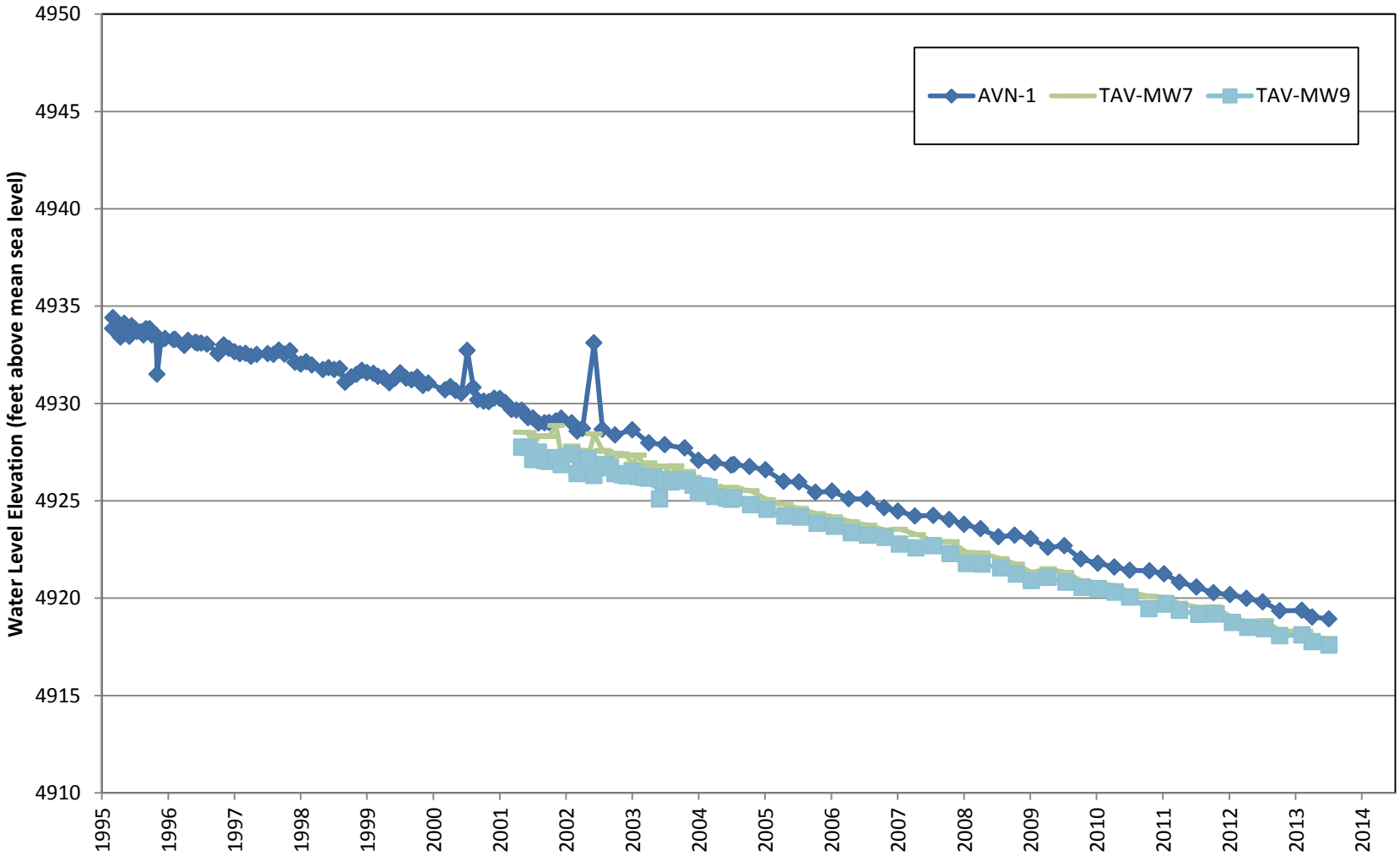


**Figure 5C-2. TA-V Study Area Wells (2 of 3)**

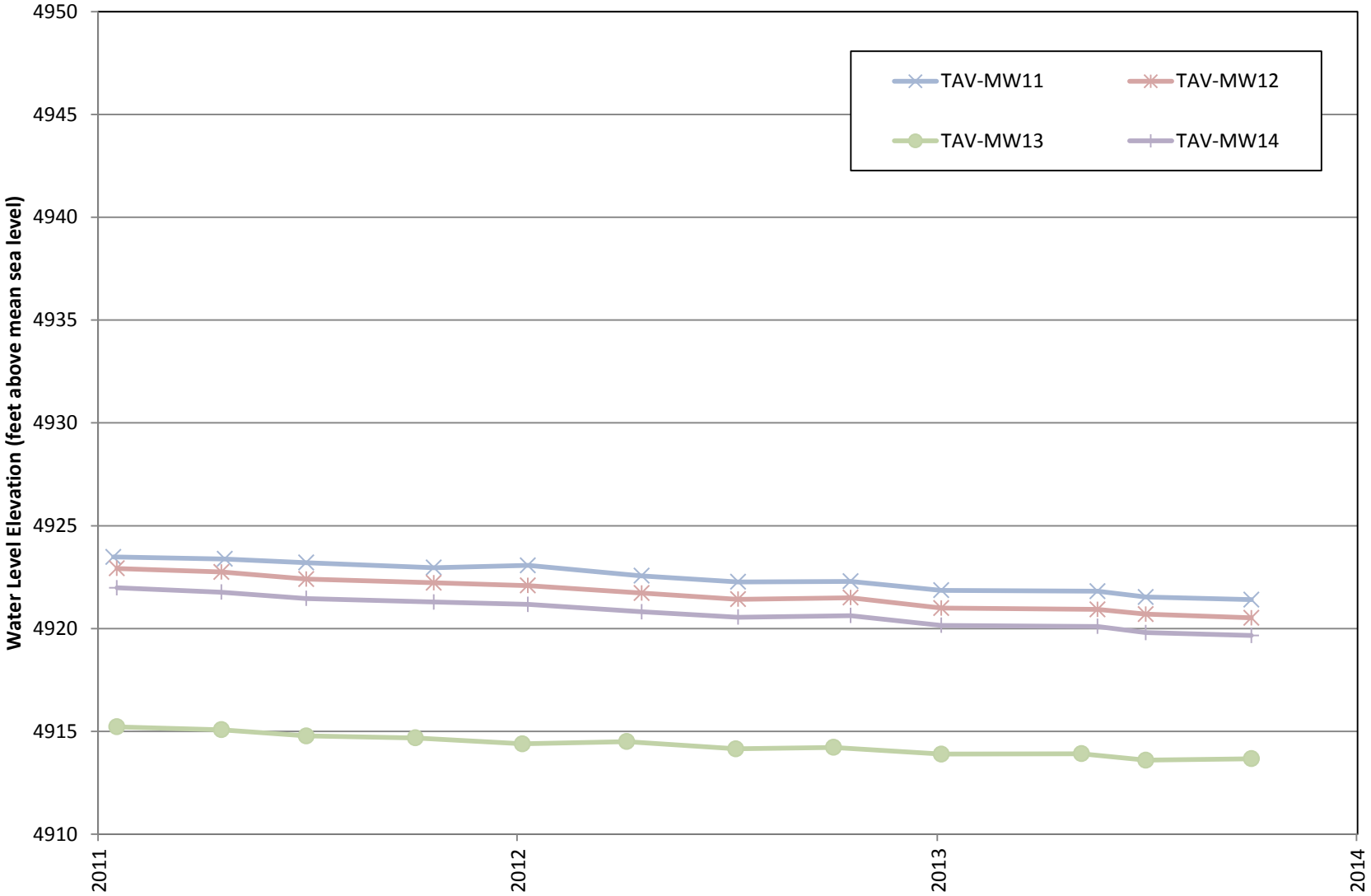


**Figure 5C-3. TA-V Study Area Wells (3 of 3)**

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# Attachment 5D
# Technical Area V
# Soil-Vapor Monitoring
# Calendar Year 2013 Activities

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# Attachment 5D Tables


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5D-2 Method Detection Limits for Volatile Organic Compounds (EPA Method[f] TO-15), Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 5D-22

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5D-9 TA-V Soil-Vapor Monitoring TCE Results (ppbv) at TAV-SV02 ..... 5D-37

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# Technical Area V Soil-Vapor Monitoring Calendar Year 2013

Sandia National Laboratories/New Mexico (SNL/NM) performed soil-vapor sampling inside Technical Area V (TA-V) on February 28 and March 8, 2013. Soil-vapor sampling activities were conducted to meet requirements established in the *Technical Area V Groundwater Investigation Work Plan, Revision 2,* which was submitted as Appendix A of the responses to the New Mexico Environment Department Notice of Disapproval (SNL February 2010), and in conformance with procedures outlined in the event-specific TA-V Soil-Vapor Monitoring, Mini-Sampling and Analysis Plans (SAP) for Second Quarter, Fiscal Year 2013 (SNL January 2013).

This summary describes sampling activities and presents analytical results from the February and March 2013 soil-vapor monitoring. Environmental samples were collected from monitoring wells TAV-SV01, TAV-SV02, and TAV-SV03, through soil-vapor sampling ports at depths of 50 feet (ft), 100 ft, 150 ft, 200 ft, 250 ft, 300 ft, 350 ft, 400 ft, 450 ft, and 500 ft below ground surface (bgs). The locations of the three soil-vapor monitoring wells are shown in Figure 5D-1, and the well completion diagrams are provided in Figures 5D-2 through 5D-4. Samples collected from all wells were analyzed for volatile organic compounds (VOCs) by analytical method U.S. Environmental Protection Agency (EPA) TO-15. A duplicate sample was collected at each monitoring well from a selected sample depth.

**Well Evacuation**

Purging removes stagnant air from each tube and draws representative soil-vapor from the soil pore space surrounding the sampling port in the subsurface. In accordance with the mini-SAP, the minimum purge requirement is three tubing volumes. If necessary, purging continued until organic vapor field parameters stabilized. Organic vapor was measured with a VOC monitoring instrument at the exhaust port of the vacuum pump.

The TA-V soil-vapor sampling equipment includes a vacuum pump, a sampling manifold assembly, and a multiport purging chamber. The multiport purging chamber is equipped with individual valves, fittings, and tubing that can be connected up to ten individual sample ports. The multiport purging chamber allows up to ten sampling locations to be purged at the same time. During February and March 2013, valves were connected to each sampling port and purged until minimum purge requirements were satisfied at all monitoring wells, and vapor samples were collected in SUMMA® canisters.

**Analytical Results**

Soil-vapor samples were submitted to Test America California (TACA) for VOC analyses by EPA Method TO-15. Analytical reports from TACA, including certificates of analyses, analytical methods, method detection limits (MDLs), reporting limits (RLs), dates of analyses, results of quality control (QC) analyses, and data validation findings are filed in the SNL/NM Customer Funded Records Program.

Table 5D-1 summarizes detected VOCs from soil-vapor samples. Table 5D-2 summarizes MDLs for associated VOCs. Detected VOCs included acetone; benzene; bromodichloromethane; bromoform; 2-butanone; carbon disulfide; carbon tetrachloride; chloroform; chloromethane; dibromochloromethane; dichlorodifluoromethane; 1,1-dichloroethane; 1,1-dichloroethene; cis-1,2-dichloroethene; 1,2-dichlorobenzene; 2-hexanone; hexachlorobutadiene; methylene chloride; tetrachloroethene; toluene; 1,1,2-trichloro-1,2,2-trifluoroethane; trichloroethene (TCE); and trichlorofluoromethane. TCE was detected in all wells, except at 50 and 100 ft bgs sample ports from monitoring well TAV-SV01. TCE concentrations ranged from 5.2 parts per billion by volume (ppb v/v) at TAV-SV03 (50 ft bgs sample port) to 2,100 ppb v/v at TAV-SV03 (350 ft bgs sample port). The

concentrations of TCE versus depth are plotted for all samples events for TAV-SV01, TAV-SV02, and TAV-SV03 in Figures 5D-5, 5D-6, and 5D-7, respectively. Those for Total VOCs are shown in Figures 5D-8 through 5D-10. The concentrations of VOCs appear to be stable over time.

Table 5D-3 summarizes field measurements collected prior to and after sample collection. Field measurements included organic vapor readings from each sample port, purge volumes, and starting and ending vacuum pressure readings for each sample container.

**Field QC**

Field QC samples included environmental duplicate and field blank samples. The field QC samples were submitted for analysis along with the environmental samples in accordance with QC procedures specified in the Mini-SAP.

**Duplicate Environmental Samples**

Duplicate environmental samples are collected in order to estimate the overall reproducibility of the sampling and analytical process. Duplicate samples were collected from the sample ports located at 400 ft bgs, 100 ft bgs, and 500 ft bgs at monitoring wells TAV-SV01, TAV-SV02, and TAV-SV03, respectively. The duplicate sample was collected immediately after the original environmental sample, in order to reduce variability caused by time and/or sampling mechanics. Duplicate samples were analyzed for all analytical parameters.

The relative percent difference (RPD) values are only calculated for compounds detected above the MDL in both samples. Table 5D-4 summarizes results of duplicate sample analyses and calculated RPD values. The RPD values for 2-hexanone in TAV-SV02 and for carbon disulfide, 1,1,2-trichloro-1,2,2-trifluoroethane, and TCE in TAV-SV03 were greater than 20 percent.

**Field Blank Sample**

A field blank sample is submitted whenever samples were collected for VOC analysis to assess whether contamination of the samples had occurred during shipment and storage. The sample is prepared in the field by collecting an ultra-pure nitrogen gas sample. A total of three field blank samples were submitted with February and March 2013 samples. If listed compounds were detected in associated environmental samples at concentrations less than five times the field blank concentrations, then the compounds were qualified as not detected during data validation.

**Laboratory QC**

Internal laboratory QC samples, including method blanks and duplicate laboratory control samples, were analyzed concurrently with all environmental samples. All chemical data was reviewed and qualified in accordance with AOP 00-03, "Data Validation Procedure for Chemical and Radiochemical Data." The data validation reports are filed in the SNL/NM Customer Funded Records Center.

All data are determined as acceptable and reported QC measures are adequate. Data which resulted in qualification are summarized below.

- Acetone, benzene, 2-butanone, methylene chloride, 4-methyl-2-pentanone, tetrachloroethene, toluene, TCE, m,p-xylene, and total xylenes were detected in the field blank associated with all samples. The associated sample results that were detects < 5X the field blank concentrations and > RL. These compounds were qualified as not detected during data validation.

**Variances and Nonconformances**

No variances or nonconformances from the requirements specified in the work plan or TA-V Mini-SAP were identified during February and March 2013 sampling activities.

**Project Field Notes/Comments**

Field observations and project concerns noted during February and March 2013 monitoring activities are summarized below.

- The TA-V parking lot was repaved during TA-V monitoring activities. Sampling at monitoring well TAV-SV01 was performed upon completion of the parking lot.

**Summary**

During February and March 2013, soil-vapor samples were collected at three TA-V monitoring wells for VOC analysis. TCE was detected in all wells, except at TAV-SV01 (50 and 100 ft bgs sample ports), at reported concentrations ranging from 5.2 to 2,100 ppb v/v.

**References**


**SNL January 2013** Sandia National Laboratories/New Mexico (SNL/NM), January 2013. *TA-V Soil-Vapor Monitoring Mini-SAP for Second Quarter, Fiscal Year 2013*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, January 25, 2013.

**SNL February 2010** Sandia National Laboratories/New Mexico (SNL/NM), February 2010. *DOE/Sandia Responses to NMED's Comments in Notice of Disapproval: Corrective Measures Evaluation Report for Technical Area V Groundwater, July 2005—November 2009 Response to Notice of Deficiency, Sandia National Laboratories, EPA ID# NM5890110518 HWB-SNL-05-027*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico, February 22, 2010.

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# Attachment 5D
# Tables

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# Table 5D-1
## Summary of Detected Volatile Organic Compounds,
## Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID/ Sample Port | Analyte | Result[a] (ppb v/v) | MDL[b] (ppb v/v) | RL[c] (ppb v/v) | Laboratory Qualifier[d] | Validation Qualifier[e] | Sample No. | Analytical Method[f] |
|---|---|---|---|---|---|---|---|---|
| **TAV-SV01-50** | Acetone | 3.9 | 0.60 | 1.2 | | U | 093538-001 | EPA TO15 |
| 08-Mar-13 | Benzene | 0.38 | 0.20 | 0.40 | J | 0.4U | 093538-001 | EPA TO15 |
| | 2-Butanone | 0.99 | 0.40 | 0.80 | | | 093538-001 | EPA TO15 |
| | Carbon disulfide | 0.26 | 0.20 | 0.80 | J | | 093538-001 | EPA TO15 |
| | Dichlorodifluoromethane | 0.57 | 0.15 | 0.40 | | | 093538-001 | EPA TO15 |
| | Tetrachloroethene | 0.49 | 0.15 | 0.40 | | U | 093538-001 | EPA TO15 |
| | Toluene | 1.2 | 0.15 | 0.40 | | U | 093538-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 0.55 | 0.20 | 0.40 | | | 093538-001 | EPA TO15 |
| | Trichloroethene | 1.4 | 0.15 | 0.40 | | U | 093538-001 | EPA TO15 |
| | Trichlorofluoromethane | 0.24 | 0.15 | 0.40 | J | | 093538-001 | EPA TO15 |
| | m,p-Xylene | 0.37 | 0.20 | 0.80 | J | 0.8U | 093538-001 | EPA TO15 |
| | Xylene, Total | 0.37 | 0.15 | 0.40 | J | 0.4U | 093538-001 | EPA TO15 |
| | Total Organics | 1.62 | NA | NA | NA | NA | 093538-001 | EPA TO15 |
| **TAV-SV01-100** | Acetone | 7.7 | 0.60 | 1.2 | | U | 093539-001 | EPA TO15 |
| 08-Mar-13 | Bromodichloromethane | 0.35 | 0.15 | 0.30 | | | 093539-001 | EPA TO15 |
| | 2-Butanone | 2.3 | 0.40 | 0.80 | | | 093539-001 | EPA TO15 |
| | Carbon tetrachloride | 0.35 | 0.20 | 0.80 | J | | 093539-001 | EPA TO15 |
| | Chloroform | 0.75 | 0.10 | 0.30 | | | 093539-001 | EPA TO15 |
| | Dibromochloromethane | 0.24 | 0.10 | 0.40 | J | | 093539-001 | EPA TO15 |
| | Dichlorodifluoromethane | 0.54 | 0.15 | 0.40 | | | 093539-001 | EPA TO15 |
| | 2-Hexanone | 0.21 | 0.20 | 0.80 | J | | 093539-001 | EPA TO15 |
| | Tetrachloroethene | 0.91 | 0.15 | 0.40 | | U | 093539-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 1.7 | 0.20 | 0.40 | | | 093539-001 | EPA TO15 |
| | Trichloroethene | 6.5 | 0.15 | 0.40 | | U | 093539-001 | EPA TO15 |
| | Trichlorofluoromethane | 0.24 | 0.15 | 0.40 | J | | 093539-001 | EPA TO15 |
| | Total Organics | 6.68 | NA | NA | NA | NA | 093539-001 | EPA TO15 |

Refer to footnotes on page 5D-25.

## Table 5D-1 *(Continued)*
## Summary of Detected Volatile Organic Compounds,
## Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID/ Sample Port | Analyte | Result[a] (ppb v/v) | MDL[b] (ppb v/v) | RL[c] (ppb v/v) | Laboratory Qualifier[d] | Validation Qualifier[e] | Sample No. | Analytical Method[f] |
|---|---|---|---|---|---|---|---|---|
| **TAV-SV01-150** | Acetone | 5.4 | 0.60 | 1.2 | | U | 093540-001 | EPA TO15 |
| 08-Mar-13 | Benzene | 0.22 | 0.20 | 0.40 | J | 0.4U | 093540-001 | EPA TO15 |
| | Bromodichloromethane | 3.5 | 0.15 | 0.30 | | | 093540-001 | EPA TO15 |
| | 2-Butanone | 1.5 | 0.40 | 0.80 | | | 093540-001 | EPA TO15 |
| | Carbon tetrachloride | 0.68 | 0.20 | 0.80 | J | | 093540-001 | EPA TO15 |
| | Chloroform | 5.0 | 0.10 | 0.30 | | | 093540-001 | EPA TO15 |
| | Dibromochloromethane | 1.6 | 0.10 | 0.40 | | | 093540-001 | EPA TO15 |
| | Dichlorodifluoromethane | 0.46 | 0.15 | 0.40 | | | 093540-001 | EPA TO15 |
| | 1,1-Dichloroethane | 0.31 | 0.15 | 0.30 | | | 093540-001 | EPA TO15 |
| | 2-Hexanone | 0.26 | 0.20 | 0.80 | J | | 093540-001 | EPA TO15 |
| | Tetrachloroethene | 1.0 | 0.15 | 0.40 | | U | 093540-001 | EPA TO15 |
| | Toluene | 0.18 | 0.15 | 0.40 | J | 0.4U | 093540-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 3.0 | 0.20 | 0.40 | | | 093540-001 | EPA TO15 |
| | Trichloroethene | 27 | 0.15 | 0.40 | | | 093540-001 | EPA TO15 |
| | Trichlorofluoromethane | 0.24 | 0.15 | 0.40 | J | | 093540-001 | EPA TO15 |
| | Total Organics | 43.55 | NA | NA | NA | NA | 093540-001 | EPA TO15 |
| **TAV-SV01-200** | Acetone | 6.4 | 2.5 | 5.0 | | U | 093541-001 | EPA TO15 |
| 08-Mar-13 | Bromodichloromethane | 6.3 | 0.62 | 1.2 | | | 093541-001 | EPA TO15 |
| | Carbon tetrachloride | 1.7 | 0.83 | 3.3 | J | | 093541-001 | EPA TO15 |
| | Chloroform | 10 | 0.41 | 1.2 | | | 093541-001 | EPA TO15 |
| | Dibromochloromethane | 4.3 | 0.41 | 1.7 | | | 093541-001 | EPA TO15 |
| | 1,1-Dichloroethane | 1.7 | 0.62 | 1.2 | | | 093541-001 | EPA TO15 |
| | 1,1-Dichloroethene | 1.1 | 0.83 | 3.3 | J | | 093541-001 | EPA TO15 |
| | cis-1,2-Dichloroethene | 0.83 | 0.83 | 1.7 | J | | 093541-001 | EPA TO15 |
| | Tetrachloroethene | 1.3 | 0.62 | 1.7 | J | 1.7U | 093541-001 | EPA TO15 |
| | Trichloroethene | 5.7 | 0.83 | 1.7 | | | 093541-001 | EPA TO15 |
| | Trichlorofluoromethane | 83 | 0.62 | 1.7 | | | 093541-001 | EPA TO15 |
| | Total Organics | 114.63 | NA | NA | NA | NA | 093541-001 | EPA TO15 |

Refer to footnotes on page 5D-25.

## Table 5D-1 *(Continued)*
## Summary of Detected Volatile Organic Compounds,
## Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID/ Sample Port | Analyte | Result[a] (ppb v/v) | MDL[b] (ppb v/v) | RL[c] (ppb v/v) | Laboratory Qualifier[d] | Validation Qualifier[e] | Sample No. | Analytical Method[f] |
|---|---|---|---|---|---|---|---|---|
| **TAV-SV01-250** | Acetone | 7.3 | 2.4 | 4.8 | | U | 093542-001 | EPA TO15 |
| 08-Mar-13 | Benzene | 0.86 | 0.81 | 1.6 | J | 1.6U | 093542-001 | EPA TO15 |
| | Bromodichloromethane | 5.5 | 0.61 | 1.2 | | | 093542-001 | EPA TO15 |
| | Carbon tetrachloride | 2.4 | 0.81 | 3.2 | J | | 093542-001 | EPA TO15 |
| | Chloroform | 10 | 0.40 | 1.2 | | | 093542-001 | EPA TO15 |
| | Dibromochloromethane | 4.5 | 0.40 | 1.6 | | | 093542-001 | EPA TO15 |
| | 1,1-Dichloroethane | 2.3 | 0.61 | 1.2 | | | 093542-001 | EPA TO15 |
| | 1,1-Dichloroethene | 2.0 | 0.81 | 3.2 | J | | 093542-001 | EPA TO15 |
| | cis-1,2-Dichloroethene | 2.1 | 0.81 | 1.6 | | | 093542-001 | EPA TO15 |
| | Hexachlorobutadiene | 1.0 | 0.81 | 3.2 | J | | 093542-001 | EPA TO15 |
| | Tetrachloroethene | 1.7 | 0.61 | 1.6 | | U | 093542-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 5.6 | 0.81 | 1.6 | | | 093542-001 | EPA TO15 |
| | Trichloroethene | 130 | 0.61 | 1.6 | | | 093542-001 | EPA TO15 |
| | Total Organics | 165.4 | NA | NA | NA | NA | 093542-001 | EPA TO15 |
| **TAV-SV01-300** | Acetone | 4.5 | 2.5 | 4.9 | J | 4.9U | 093543-001 | EPA TO15 |
| 08-Mar-13 | Bromodichloromethane | 5.0 | 0.62 | 1.2 | | | 093543-001 | EPA TO15 |
| | Carbon tetrachloride | 2.7 | 0.82 | 3.3 | J | | 093543-001 | EPA TO15 |
| | Chloroform | 9.7 | 0.41 | 1.2 | | | 093543-001 | EPA TO15 |
| | Dibromochloromethane | 3.6 | 0.41 | 1.6 | | | 093543-001 | EPA TO15 |
| | 1,1-Dichloroethane | 1.9 | 0.62 | 1.2 | | | 093543-001 | EPA TO15 |
| | cis-1,2-Dichloroethene | 2.6 | 0.82 | 1.6 | | | 093543-001 | EPA TO15 |
| | Methylene chloride | 1.3 | 0.82 | 1.6 | J | | 093543-001 | EPA TO15 |
| | Tetrachloroethene | 1.7 | 0.62 | 1.6 | | U | 093543-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 3.0 | 0.82 | 1.6 | | | 093543-001 | EPA TO15 |
| | Trichloroethene | 130 | 0.62 | 1.6 | | | 093543-001 | EPA TO15 |
| | Total Organics | 159.8 | NA | NA | NA | NA | 093543-001 | EPA TO15 |

Refer to footnotes on page 5D-25.

**Table 5D-1** *(Continued)*
**Summary of Detected Volatile Organic Compounds,**
**Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID/ Sample Port | Analyte | Result[a] (ppb v/v) | MDL[b] (ppb v/v) | RL[c] (ppb v/v) | Laboratory Qualifier[d] | Validation Qualifier[e] | Sample No. | Analytical Method[f] |
|---|---|---|---|---|---|---|---|---|
| **TAV-SV01-350** | Acetone | 8.7 | 2.4 | 4.8 | | | 093544-001 | EPA TO15 |
| 08-Mar-13 | Bromodichloromethane | 5.3 | 0.61 | 1.2 | | | 093544-001 | EPA TO15 |
| | 2-Butanone | 1.8 | 1.6 | 3.2 | J | | 093544-001 | EPA TO15 |
| | Carbon tetrachloride | 2.3 | 0.81 | 3.2 | J | | 093544-001 | EPA TO15 |
| | Chloroform | 9.9 | 0.40 | 1.2 | | | 093544-001 | EPA TO15 |
| | Dibromochloromethane | 4.1 | 0.40 | 1.6 | | | 093544-001 | EPA TO15 |
| | 1,1-Dichloroethane | 0.91 | 0.61 | 1.2 | J | | 093544-001 | EPA TO15 |
| | 1,1-Dichloroethene | 1.3 | 0.81 | 3.2 | J | | 093544-001 | EPA TO15 |
| | cis-1,2-Dichloroethene | 5.3 | 0.81 | 1.6 | | | 093544-001 | EPA TO15 |
| | Methylene chloride | 1.2 | 0.81 | 1.6 | J | | 093544-001 | EPA TO15 |
| | Tetrachloroethene | 1.5 | 0.61 | 1.6 | J | 1.6U | 093544-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 3.1 | 0.81 | 1.6 | | | 093544-001 | EPA TO15 |
| | Trichloroethene | 120 | 0.61 | 1.6 | | | 093544-001 | EPA TO15 |
| | Total Organics | 163.91 | NA | NA | NA | NA | 093544-001 | EPA TO15 |
| **TAV-SV01-400** | Acetone | 26 | 7.6 | 15 | | | 093545-001 | EPA TO15 |
| 08-Mar-13 | Bromodichloromethane | 4.5 | 1.9 | 3.8 | | | 093545-001 | EPA TO15 |
| | Chloroform | 9.3 | 1.3 | 3.8 | | | 093545-001 | EPA TO15 |
| | Dibromochloromethane | 3.4 | 1.3 | 5.1 | J | | 093545-001 | EPA TO15 |
| | 1,1-Dichloroethane | 2.3 | 1.9 | 3.8 | J | | 093545-001 | EPA TO15 |
| | cis-1,2-Dichloroethene | 45 | 2.5 | 5.1 | | | 093545-001 | EPA TO15 |
| | Tetrachloroethene | 4.2 | 1.9 | 5.1 | J | 5.1U | 093545-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 4.2 | 2.5 | 5.1 | J | | 093545-001 | EPA TO15 |
| | Trichloroethene | 470 | 1.4 | 5.1 | | | 093545-001 | EPA TO15 |
| | Total Organics | 564.7 | NA | NA | NA | NA | 093545-001 | EPA TO15 |
| **TAV-SV01-400** | Acetone | 8.2 | 7.8 | 16 | J | 16U | 093546-001 | EPA TO15 |
| (Duplicate) | Bromodichloromethane | 5.1 | 2.0 | 3.9 | | | 093546-001 | EPA TO15 |
| 08-Mar-13 | Chloroform | 9.6 | 1.3 | 3.9 | | | 093546-001 | EPA TO15 |
| | Dibromochloromethane | 3.9 | 1.3 | 5.2 | J | | 093546-001 | EPA TO15 |
| | 1,1-Dichloroethane | 2.2 | 2.0 | 3.9 | J | | 093546-001 | EPA TO15 |
| | cis-1,2-Dichloroethene | 46 | 2.6 | 5.2 | | | 093546-001 | EPA TO15 |
| | Tetrachloroethene | 4.6 | 2.0 | 5.2 | J | 5.2U | 093546-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 5.0 | 2.6 | 5.2 | | | 093546-001 | EPA TO15 |
| | Trichloroethene | 520 | 2.0 | 5.2 | | | 093546-001 | EPA TO15 |
| | Total Organics | 591.8 | NA | NA | NA | NA | 093546-001 | EPA TO15 |

Refer to footnotes on page 5D-25.

## Table 5D-1 *(Continued)*
## Summary of Detected Volatile Organic Compounds,
## Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID/ Sample Port | Analyte | Result[a] (ppb v/v) | MDL[b] (ppb v/v) | RL[c] (ppb v/v) | Laboratory Qualifier[d] | Validation Qualifier[e] | Sample No. | Analytical Method[f] |
|---|---|---|---|---|---|---|---|---|
| **TAV-SV01-450** | Chloroform | 7.0 | 6.0 | 18 | J | | 093547-001 | EPA TO15 |
| 08-Mar-13 | cis-1,2-Dichloroethene | 170 | 12 | 24 | | | 093547-001 | EPA TO15 |
| | Trichloroethene | 1400 | 8.9 | 24 | | | 093547-001 | EPA TO15 |
| | Total Organics | 1577 | NA | NA | NA | NA | 093547-001 | EPA TO15 |
| **TAV-SV01-500** | Chloroform | 5.0 | 4.9 | 15 | J | | 093548-001 | EPA TO15 |
| 08-Mar-13 | cis-1,2-Dichloroethene | 57 | 9.9 | 20 | | | 093548-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 19 | 9.9 | 20 | J | | 093548-001 | EPA TO15 |
| | Trichloroethene | 1200 | 7.4 | 20 | | | 093548-001 | EPA TO15 |
| | Total Organics | 1281 | NA | NA | NA | NA | 093548-001 | EPA TO15 |
| **TAV-SV02-050** | Acetone | 22 | 0.60 | 1.2 | | U | 093550-001 | EPA TO15 |
| 28-Feb-13 | Bromodichloromethane | 5.5 | 0.15 | 0.30 | | | 093550-001 | EPA TO15 |
| | 2-Butanone | 5.6 | 0.40 | 0.80 | | U | 093550-001 | EPA TO15 |
| | Chloroform | 4.3 | 0.10 | 0.30 | | | 093550-001 | EPA TO15 |
| | Dibromochloromethane | 0.25 | 0.10 | 0.40 | J | | 093550-001 | EPA TO15 |
| | Dichlorodifluoromethane | 0.63 | 0.15 | 0.40 | | | 093550-001 | EPA TO15 |
| | 2-Hexanone | 0.73 | 0.20 | 0.80 | J | | 093550-001 | EPA TO15 |
| | Methylene chloride | 0.42 | 0.20 | 0.40 | | U | 093550-001 | EPA TO15 |
| | 4-methyl-, 2-Pentanone | 0.21 | 0.15 | 0.40 | J | 0.4U | 093550-001 | EPA TO15 |
| | Tetrachloroethene | 0.71 | 0.15 | 0.40 | | | 093550-001 | EPA TO15 |
| | Toluene | 0.26 | 0.15 | 0.40 | J | 0.4U | 093550-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 28 | 0.20 | 0.40 | | | 093550-001 | EPA TO15 |
| | Trichloroethene | 7.8 | 0.15 | 0.40 | | | 093550-001 | EPA TO15 |
| | Trichlorofluoromethane | 0.99 | 0.15 | 0.40 | | | 093550-001 | EPA TO15 |
| | Total Organics | 48.91 | NA | NA | NA | NA | 093550-001 | EPA TO15 |

Refer to footnotes on page 5D-25.

## Table 5D-1 *(Continued)*
## Summary of Detected Volatile Organic Compounds,
## Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID/ Sample Port | Analyte | Result[a] (ppb v/v) | MDL[b] (ppb v/v) | RL[c] (ppb v/v) | Laboratory Qualifier[d] | Validation Qualifier[e] | Sample No. | Analytical Method[f] |
|---|---|---|---|---|---|---|---|---|
| **TAV-SV02-100** | Acetone | 12 | 0.60 | 1.2 | | U | 093551-001 | EPA TO15 |
| 28-Feb-13 | Bromodichloromethane | 33 | 0.15 | 0.30 | | | 093551-001 | EPA TO15 |
| | 2-Butanone | 3.9 | 0.40 | 0.80 | | U | 093551-001 | EPA TO15 |
| | Carbon tetrachloride | 0.30 | 0.20 | 0.80 | J | | 093551-001 | EPA TO15 |
| | Chloroform | 27 | 0.10 | 0.30 | | | 093551-001 | EPA TO15 |
| | Dibromochloromethane | 4.2 | 0.10 | 0.40 | | | 093551-001 | EPA TO15 |
| | Dichlorodifluoromethane | 0.56 | 0.15 | 0.40 | | | 093551-001 | EPA TO15 |
| | 2-Hexanone | 0.63 | 0.20 | 0.80 | J | | 093551-001 | EPA TO15 |
| | Methylene chloride | 1.6 | 0.20 | 0.40 | | U | 093551-001 | EPA TO15 |
| | 4-methyl-, 2-Pentanone | 0.21 | 0.15 | 0.40 | J | 0.4U | 093551-001 | EPA TO15 |
| | Tetrachloroethene | 2.8 | 0.15 | 0.40 | | | 093551-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 190 | 1.5 | 2.9 | | | 093551-001 | EPA TO15 |
| | Trichloroethene | 36 | 0.15 | 0.40 | | | 093551-001 | EPA TO15 |
| | Total Organics | 294.49 | NA | NA | NA | NA | 093551-001 | EPA TO15 |
| **TAV-SV02-100** | Acetone | 12 | 0.60 | 1.2 | | U | 093552-001 | EPA TO15 |
| (Duplicate) | Bromodichloromethane | 32 | 0.15 | 0.30 | | | 093552-001 | EPA TO15 |
| 28-Feb-13 | 2-Butanone | 3.7 | 0.40 | 0.80 | | U | 093552-001 | EPA TO15 |
| | Carbon tetrachloride | 0.29 | 0.20 | 0.80 | J | | 093552-001 | EPA TO15 |
| | Chloroform | 26 | 0.10 | 0.30 | | | 093552-001 | EPA TO15 |
| | Dibromochloromethane | 4.2 | 0.10 | 0.40 | | | 093552-001 | EPA TO15 |
| | Dichlorodifluoromethane | 0.52 | 0.15 | 0.40 | | | 093552-001 | EPA TO15 |
| | 1,1-Dichloroethene | 0.48 | 0.20 | 0.80 | J | | 093552-001 | EPA TO15 |
| | 2-Hexanone | 0.51 | 0.20 | 0.80 | J | | 093552-001 | EPA TO15 |
| | Methylene chloride | 1.7 | 0.20 | 0.40 | | U | 093552-001 | EPA TO15 |
| | Tetrachloroethene | 2.8 | 0.15 | 0.40 | | | 093552-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 190 | 1.4 | 2.8 | | | 093552-001 | EPA TO15 |
| | Trichloroethene | 35 | 0.15 | 0.40 | | | 093552-001 | EPA TO15 |
| | Trichlorofluoromethane | 2.2 | 0.15 | 0.40 | | | 093552-001 | EPA TO15 |
| | Total Organics | 294 | NA | NA | NA | NA | 093552-001 | EPA TO15 |

Refer to footnotes on page 5D-25.

## Table 5D-1 *(Continued)*
## Summary of Detected Volatile Organic Compounds,
## Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID/ Sample Port | Analyte | Result[a] (ppb v/v) | MDL[b] (ppb v/v) | RL[c] (ppb v/v) | Laboratory Qualifier[d] | Validation Qualifier[e] | Sample No. | Analytical Method[f] |
|---|---|---|---|---|---|---|---|---|
| **TAV-SV02-150** | Acetone | 2.1 | 0.60 | 1.2 | | U | 093553-001 | EPA TO15 |
| 28-Feb-13 | Bromodichloromethane | 42 | 0.15 | 0.30 | | | 093553-001 | EPA TO15 |
| | Bromoform | 0.36 | 0.20 | 0.80 | J | | 093553-001 | EPA TO15 |
| | 2-Butanone | 0.54 | 0.40 | 0.80 | J | 0.8U | 093553-001 | EPA TO15 |
| | Carbon disulfide | 0.40 | 0.20 | 0.80 | J | | 093553-001 | EPA TO15 |
| | Carbon tetrachloride | 0.57 | 0.20 | 0.80 | J | | 093553-001 | EPA TO15 |
| | Chloroform | 38 | 0.10 | 0.30 | | | 093553-001 | EPA TO15 |
| | Dibromochloromethane | 11 | 0.10 | 0.40 | | | 093553-001 | EPA TO15 |
| | Dichlorodifluoromethane | 0.56 | 0.15 | 0.40 | | | 093553-001 | EPA TO15 |
| | 1,2-Dichlorobenzene | 0.56 | 0.15 | 0.40 | | | 093553-001 | EPA TO15 |
| | 1,1-Dichloroethane | 0.18 | 0.15 | 0.30 | J | | 093553-001 | EPA TO15 |
| | Methylene chloride | 1.1 | 0.20 | 0.40 | | U | 093553-001 | EPA TO15 |
| | Tetrachloroethene | 4.7 | 0.15 | 0.40 | | | 093553-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 370 | 3.7 | 7.4 | | | 093553-001 | EPA TO15 |
| | Trichloroethene | 72 | 1.1 | 2.9 | | | 093553-001 | EPA TO15 |
| | Trichlorofluoromethane | 3.6 | 0.15 | 0.40 | | | 093553-001 | EPA TO15 |
| | Total Organics | 543.93 | NA | NA | NA | NA | 093553-001 | EPA TO15 |
| **TAV-SV02-200** | Acetone | 10 | 7.3 | 15 | J | 15U | 093554-001 | EPA TO15 |
| 28-Feb-13 | Bromodichloromethane | 37 | 1.8 | 3.7 | | | 093554-001 | EPA TO15 |
| | Chloroform | 36 | 1.2 | 3.7 | | | 093554-001 | EPA TO15 |
| | Dibromochloromethane | 14 | 1.2 | 4.9 | | | 093554-001 | EPA TO15 |
| | 1,1-Dichloroethane | 2.2 | 1.8 | 3.7 | J | | 093554-001 | EPA TO15 |
| | cis-1,2-Dichloroethene | 2.7 | 2.4 | 4.9 | J | | 093554-001 | EPA TO15 |
| | Tetrachloroethene | 5.1 | 1.8 | 4.9 | | | 093554-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 260 | 2.4 | 4.9 | | | 093554-001 | EPA TO15 |
| | Trichloroethene | 290 | 1.8 | 4.9 | | | 093554-001 | EPA TO15 |
| | Total Organics | 647 | NA | NA | NA | NA | 093554-001 | EPA TO15 |

Refer to footnotes on page 5D-25.

**Table 5D-1** *(Continued)*
**Summary of Detected Volatile Organic Compounds,**
**Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID/ Sample Port | Analyte | Result[a] (ppb v/v) | MDL[b] (ppb v/v) | RL[c] (ppb v/v) | Laboratory Qualifier[d] | Validation Qualifier[e] | Sample No. | Analytical Method[f] |
|---|---|---|---|---|---|---|---|---|
| **TAV-SV02-250** | Acetone | 23 | 8.8 | 18 | | U | 093555-001 | EPA TO15 |
| 28-Feb-13 | Bromodichloromethane | 13 | 2.2 | 4.4 | | | 093555-001 | EPA TO15 |
| | Chloroform | 19 | 1.5 | 4.4 | | | 093555-001 | EPA TO15 |
| | Dibromochloromethane | 4.3 | 1.5 | 5.9 | J | | 093555-001 | EPA TO15 |
| | 1,1-Dichloroethane | 3.0 | 2.2 | 4.4 | J | | 093555-001 | EPA TO15 |
| | cis-1,2-Dichloroethene | 4.5 | 2.9 | 5.9 | J | | 093555-001 | EPA TO15 |
| | Tetrachloroethene | 5.0 | 2.2 | 5.9 | J | | 093555-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 210 | 2.9 | 5.9 | | | 093555-001 | EPA TO15 |
| | Trichloroethene | 390 | 2.2 | 5.9 | | | 093555-001 | EPA TO15 |
| | Total Organics | 648.8 | NA | NA | NA | NA | 093555-001 | EPA TO15 |
| **TAV-SV02-300** | Bromodichloromethane | 17 | 2.7 | 5.5 | | | 093556-001 | EPA TO15 |
| 28-Feb-13 | Chloroform | 22 | 1.8 | 5.5 | | | 093556-001 | EPA TO15 |
| | Dibromochloromethane | 6.0 | 1.8 | 7.3 | J | | 093556-001 | EPA TO15 |
| | 1,1-Dichloroethane | 3.3 | 2.7 | 5.5 | J | | 093556-001 | EPA TO15 |
| | cis-1,2-Dichloroethene | 5.7 | 3.6 | 7.3 | J | | 093556-001 | EPA TO15 |
| | Tetrachloroethene | 5.1 | 2.7 | 7.3 | J | | 093556-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 220 | 3.6 | 7.3 | | | 093556-001 | EPA TO15 |
| | Trichloroethene | 400 | 2.7 | 7.3 | | | 093556-001 | EPA TO15 |
| | Trichlorofluoromethane | 2.8 | 2.7 | 7.3 | J | | 093556-001 | EPA TO15 |
| | Total Organics | 681.9 | NA | NA | NA | NA | 093556-001 | EPA TO15 |
| **TAV-SV02-350** | Bromodichloromethane | 19 | 2.1 | 4.3 | | | 093557-001 | EPA TO15 |
| 28-Feb-13 | Chloroform | 22 | 1.4 | 4.3 | | | 093557-001 | EPA TO15 |
| | Dibromochloromethane | 7.2 | 1.4 | 5.7 | | | 093557-001 | EPA TO15 |
| | 1,1-Dichloroethane | 2.9 | 2.1 | 4.3 | J | | 093557-001 | EPA TO15 |
| | cis-1,2-Dichloroethene | 4.8 | 2.9 | 5.7 | J | | 093557-001 | EPA TO15 |
| | Tetrachloroethene | 4.4 | 2.1 | 5.7 | J | | 093557-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 200 | 2.9 | 5.7 | | | 093557-001 | EPA TO15 |
| | Trichloroethene | 350 | 2.1 | 5.7 | | | 093557-001 | EPA TO15 |
| | Trichlorofluoromethane | 2.7 | 2.1 | 5.7 | J | | 093557-001 | EPA TO15 |
| | Total Organics | 613 | NA | NA | NA | NA | 093557-001 | EPA TO15 |

Refer to footnotes on page 5D-25.

## Table 5D-1 *(Continued)*
## Summary of Detected Volatile Organic Compounds,
## Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID/ Sample Port | Analyte | Result[a] (ppb v/v) | MDL[b] (ppb v/v) | RL[c] (ppb v/v) | Laboratory Qualifier[d] | Validation Qualifier[e] | Sample No. | Analytical Method[f] |
|---|---|---|---|---|---|---|---|---|
| **TAV-SV02-400** | Bromodichloromethane | 11 | 3.6 | 7.1 | | | 093558-001 | EPA TO15 |
| 28-Feb-13 | Chloroform | 19 | 2.4 | 7.1 | | | 093558-001 | EPA TO15 |
| | Dibromochloromethane | 4.8 | 2.4 | 9.5 | J | | 093558-001 | EPA TO15 |
| | 1,1-Dichloroethane | 4.2 | 3.6 | 7.1 | J | | 093558-001 | EPA TO15 |
| | cis-1,2-Dichloroethene | 8.0 | 4.8 | 9.5 | J | | 093558-001 | EPA TO15 |
| | Tetrachloroethene | 5.0 | 3.6 | 9.5 | J | | 093558-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 200 | 4.8 | 9.5 | | | 093558-001 | EPA TO15 |
| | Trichloroethene | 460 | 3.6 | 9.5 | | | 093558-001 | EPA TO15 |
| | Total Organics | 712 | NA | NA | NA | NA | 093558-001 | EPA TO15 |
| **TAV-SV02-450** | Bromodichloromethane | 15 | 2.2 | 4.4 | | | 093559-001 | EPA TO15 |
| 28-Feb-13 | Chloroform | 20 | 1.5 | 4.4 | | | 093559-001 | EPA TO15 |
| | Dibromochloromethane | 5.6 | 1.5 | 5.8 | J | | 093559-001 | EPA TO15 |
| | 1,1-Dichloroethane | 3.1 | 2.2 | 4.4 | J | | 093559-001 | EPA TO15 |
| | cis-1,2-Dichloroethene | 7.6 | 2.9 | 5.8 | | | 093559-001 | EPA TO15 |
| | Tetrachloroethene | 4.9 | 2.2 | 5.8 | J | | 093559-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 210 | 2.9 | 5.8 | | | 093559-001 | EPA TO15 |
| | Trichloroethene | 370 | 2.2 | 5.8 | | | 093559-001 | EPA TO15 |
| | Trichlorofluoromethane | 2.9 | 2.2 | 5.8 | J | | 093559-001 | EPA TO15 |
| | Total Organics | 639.1 | NA | NA | NA | NA | 093559-001 | EPA TO15 |
| **TAV-SV02-500** | Chloroform | 12 | 3.7 | 11 | | | 093560-001 | EPA TO15 |
| 28-Feb-13 | cis-1,2-Dichloroethene | 74 | 7.4 | 15 | | | 093560-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 160 | 7.4 | 15 | | | 093560-001 | EPA TO15 |
| | Trichloroethene | 1400 | 5.5 | 15 | | | 093560-001 | EPA TO15 |
| | Total Organics | 1646 | NA | NA | NA | NA | 093560-001 | EPA TO15 |
| **TAV-SV03-050** | Acetone | 5.1 | 2.2 | 4.4 | | | 093562-001 | EPA TO15 |
| 28-Feb-13 | Dichlorodifluoromethane | 0.94 | 0.55 | 1.5 | J | | 093562-001 | EPA TO15 |
| | Tetrachloroethene | 1.1 | 0.55 | 1.5 | J | | 093562-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 130 | 0.74 | 1.5 | | | 093562-001 | EPA TO15 |
| | Trichloroethene | 5.2 | 0.55 | 1.5 | | | 093562-001 | EPA TO15 |
| | Trichlorofluoromethane | 0.59 | 0.55 | 1.5 | J | | 093562-001 | EPA TO15 |
| | Total Organics | 142.93 | NA | NA | NA | NA | 093562-001 | EPA TO15 |
| **TAV-SV03-100** | Tetrachloroethene | 1.7 | 1.3 | 3.4 | J | | 093563-001 | EPA TO15 |
| 28-Feb-13 | 1,1,2-Trichloro-1,2,2-trifluoroethane | 360 | 5.4 | 11 | | | 093563-001 | EPA TO15 |
| | Trichloroethene | 38 | 1.3 | 3.4 | | | 093563-001 | EPA TO15 |
| | Total Organics | 399.7 | NA | NA | NA | NA | 093563-001 | EPA TO15 |

Refer to footnotes on page 5D-25.

**Table 5D-1** *(Continued)*
**Summary of Detected Volatile Organic Compounds,**
**Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID/ Sample Port | Analyte | Result[a] (ppb v/v) | MDL[b] (ppb v/v) | RL[c] (ppb v/v) | Laboratory Qualifier[d] | Validation Qualifier[e] | Sample No. | Analytical Method[f] |
|---|---|---|---|---|---|---|---|---|
| **TAV-SV03-150** | 1,1,2-Trichloro-1,2,2-trifluoroethane | 530 | 6.7 | 13 | | | 093564-001 | EPA TO15 |
| 28-Feb-13 | Trichloroethene | 150 | 2.5 | 6.6 | | | 093564-001 | EPA TO15 |
| | Total Organics | 680 | NA | NA | NA | NA | 093564-001 | EPA TO15 |
| **TAV-SV03-200** | Benzene | 7.7 | 3.3 | 6.6 | | | 093565-001 | EPA TO15 |
| 28-Feb-13 | Chloroform | 4.2 | 1.7 | 5.0 | J | | 093565-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 470 | 6.7 | 13 | | | 093565-001 | EPA TO15 |
| | Trichloroethene | 520 | 2.5 | 6.6 | | | 093565-001 | EPA TO15 |
| | Total Organics | 1001.9 | NA | NA | NA | NA | 093565-001 | EPA TO15 |
| **TAV-SV03-250** | Benzene | 30 | 5.3 | 11 | | | 093566-001 | EPA TO15 |
| 28-Feb-13 | Toluene | 4.5 | 4.0 | 11 | J | | 093566-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 660 | 5.3 | 11 | | | 093566-001 | EPA TO15 |
| | Trichloroethene | 780 | 4.0 | 11 | | | 093566-001 | EPA TO15 |
| | Total Organics | 1474.5 | NA | NA | NA | NA | 093566-001 | EPA TO15 |
| **TAV-SV03-300** | Benzene | 18 | 8.9 | 18 | | | 093567-001 | EPA TO15 |
| 28-Feb-13 | Chloroform | 4.9 | 4.4 | 13 | J | | 093567-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 300 | 8.9 | 18 | | | 093567-001 | EPA TO15 |
| | Trichloroethene | 1600 | 6.6 | 18 | | | 093567-001 | EPA TO15 |
| | Total Organics | 1922.9 | NA | NA | NA | NA | 093567-001 | EPA TO15 |
| **TAV-SV03-350** | Benzene | 17 | 12 | 24 | J | | 093568-001 | EPA TO15 |
| 28-Feb-13 | 1,1,2-Trichloro-1,2,2-trifluoroethane | 460 | 12 | 24 | | | 093568-001 | EPA TO15 |
| | Trichloroethene | 2100 | 9.0 | 24 | | | 093568-001 | EPA TO15 |
| | Total Organics | 2577 | NA | NA | NA | NA | 093568-001 | EPA TO15 |
| **TAV-SV03-400** | 1,1,2-Trichloro-1,2,2-trifluoroethane | 330 | 12 | 24 | | | 093569-001 | EPA TO15 |
| 28-Feb-13 | Trichloroethene | 1900 | 9.0 | 24 | | | 093569-001 | EPA TO15 |
| | Total Organics | 2230 | NA | NA | NA | NA | 093569-001 | EPA TO15 |
| **TAV-SV03-450** | Benzene | 7.1 | 6.7 | 13 | J | | 093570-001 | EPA TO15 |
| 28-Feb-13 | 1,1,2-Trichloro-1,2,2-trifluoroethane | 270 | 6.7 | 13 | | | 093570-001 | EPA TO15 |
| | Trichloroethene | 1100 | 5.0 | 13 | | | 093570-001 | EPA TO15 |
| | Total Organics | 1377.1 | NA | NA | NA | NA | 093570-001 | EPA TO15 |

Refer to footnotes on page 5D-25.

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

**Calendar Year 2013**

| Well ID/ Sample Port | Analyte | Result[a] (ppb v/v) | MDL[b] (ppb v/v) | RL[c] (ppb v/v) | Laboratory Qualifier[d] | Validation Qualifier[e] | Sample No. | Analytical Method[f] |
|---|---|---|---|---|---|---|---|---|
| **TAV-SV03-500** | Benzene | 0.24 | 0.20 | 0.40 | J | | 093571-001 | EPA TO15 |
| 28-Feb-13 | 2-Butanone | 1.4 | 0.40 | 0.80 | | | 093571-001 | EPA TO15 |
| | Carbon disulfide | 0.44 | 0.20 | 0.80 | J | | 093571-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 3.0 | 0.20 | 0.40 | | | 093571-001 | EPA TO15 |
| | Trichloroethene | 14 | 0.15 | 0.40 | | | 093571-001 | EPA TO15 |
| | Trichlorofluoromethane | 0.23 | 0.15 | 0.40 | J | | 093571-001 | EPA TO15 |
| | Total Organics | 19.07 | NA | NA | NA | NA | 093571-001 | EPA TO15 |
| **TAV-SV03-500** | Acetone | 5.0 | 0.60 | 1.2 | | | 093572-001 | EPA TO15 |
| (Duplicate) | Benzene | 0.22 | 0.20 | 0.40 | J | | 093572-001 | EPA TO15 |
| 28-Feb-13 | 2-Butanone | 1.7 | 0.40 | 0.80 | | | 093572-001 | EPA TO15 |
| | Carbon disulfide | 0.34 | 0.20 | 0.80 | J | | 093572-001 | EPA TO15 |
| | Chloromethane | 0.46 | 0.40 | 0.80 | J | | 093572-001 | EPA TO15 |
| | Dibromochloromethane | 0.44 | 0.15 | 0.40 | | | 093572-001 | EPA TO15 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 0.57 | 0.20 | 0.40 | | | 093572-001 | EPA TO15 |
| | Trichloroethene | 6.6 | 0.15 | 0.40 | | | 093572-001 | EPA TO15 |
| | Trichlorofluoromethane | 0.22 | 0.15 | 0.40 | J | | 093572-001 | EPA TO15 |
| | Total Organics | 15.55 | NA | NA | NA | NA | 093572-001 | EPA TO15 |

Refer to footnotes on page 5D-25.

## Table 5D-2
## Method Detection Limits for Volatile Organic Compounds (EPA Method[f] TO-15), Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Analyte | MDL[b] (ppb v/v) | Analyte | MDL[b] (ppb v/v) |
|---|---|---|---|
| 1,1,1-Trichloroethane | 0.15 – 9.0 | Carbon disulfide | 0.20 – 12.0 |
| 1,1,2,2-Tetrachloroethane | 0.10 – 6.0 | Carbon tetrachloride | 0.20 – 12.0 |
| 1,1,2-Trichloroethane | 0.15 – 9.0 | Chlorobenzene | 0.10 – 6.0 |
| 1,1-Dichloroethane | 0.15 – 9.0 | Chloroethane | 0.70 – 42.0 |
| 1,1-Dichloroethene | 0.20 – 12.0 | Chloroform | 0.10 – 6.0 |
| 1,2,2-tetrafluoroethane, 1,2-Dichloro-1 | 0.15 – 9.0 | Chloromethane | 0.40 – 24.0 |
| 1,2,4-Trichlorobenzene | 0.70 – 42.0 | Dibromochloromethane | 0.10 – 6.0 |
| 1,2,4-Trimethylbenzene | 0.20 – 12.0 | Dichlorodifluoromethane | 0.15 – 9.0 |
| 1,2-Dibromoethane | 0.20 – 12.0 | Ethyl benzene | 0.15 – 9.0 |
| 1,2-Dichlorobenzene | 0.15 – 9.0 | Hexachlorobutadiene | 0.20 – 12.0 |
| 1,2-Dichloroethane | 0.20 – 12.0 | Methylene chloride | 0.20 – 12.0 |
| 1,2-Dichloropropane | 0.15 – 9.0 | Styrene | 0.15 – 9.0 |
| 1,3,5-Trimethylbenzene | 0.15 – 9.0 | Tetrachloroethene | 0.15 – 9.0 |
| 1,3-Dichlorobenzene | 0.15 – 9.0 | Toluene | 0.15 – 9.0 |
| 1,4-Dichlorobenzene | 0.15 – 9.0 | Trichloroethene | 0.15 – 9.0 |
| 2,2-trifluoroethane, 1,1,2-Trichloro-1 | 0.20 – 12.0 | Trichlorofluoromethane | 0.15 – 9.0 |
| 2-Butanone | 0.40 – 24.0 | Vinyl acetate | 0.20 – 12.0 |
| 2-Hexanone | 0.20 – 12.0 | Vinyl chloride | 0.15 – 9.0 |
| 4-Ethyltoluene | 0.15 – 9.0 | Xylene | 0.15 – 21.0 |
| 4-methyl-, 2-Pentanone | 0.15 – 9.0 | cis-1,2-Dichloroethene | 0.20 – 12.0 |
| Acetone | 0.60 – 36.0 | cis-1,3-Dichloropropene | 0.15 – 9.0 |
| Benzene | 0.20 – 12.0 | m-, p-Xylene | 0.20 – 12.0 |
| Benzyl chloride | 0.20 – 12.0 | o-Xylene | 0.15 – 9.0 |
| Bromodichloromethane | 0.15 – 9.0 | trans-1,2-Dichloroethene | 0.20 – 12.0 |
| Bromoform | 0.20 – 12.0 | trans-1,3-Dichloropropene | 0.15 – 9.0 |
| Bromomethane | 0.20 – 12.0 | | |

Refer to footnotes on page 5D-25.

## Table 5D-3
## Summary of Photoionization Detector and Vacuum Pressure Field Measurements[g], Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID/ Sample Port | Sample Date | PID (ppm) | Purge Volume (cu-ft) | Canister Number | Starting Vacuum Pressure (in-Hg) | Ending Vacuum Pressure (in-Hg) |
|---|---|---|---|---|---|---|
| **TAV-SV01-050** | 08-Mar-13 | 0.0 | 0.065 | 34001173 | -27 | -8 |
| **TAV-SV01-100** | | 0.0 | 0.117 | 34001325 | -27 | -8 |
| **TAV-SV01-150** | | 0.0 | 0.168 | 34001439 | -27 | -6 |
| **TAV-SV01-200** | | 0.0 | 0.219 | 34000210 | -27 | -8 |
| **TAV-SV01-250** | | 0.0 | 0.270 | 34000018 | -27 | -8 |
| **TAV-SV01-300** | | 0.0 | 0.321 | 34001351 | -27 | -8 |
| **TAV-SV01-350** | | 0.0 | 0.372 | 34000017 | -27 | -8 |
| **TAV-SV01-400** | | 0.0 | 0.423 | 34000362 | -27 | -8 |
| **TAV-SV01-400** (Duplicate) | | | | 34000552 | -27 | -8 |
| **TAV-SV01-450** | | 0.0 | 0.475 | 34000146 | -27 | -8 |
| **TAV-SV01-500** | | 0.0 | 0.526 | 34000080 | -27 | -8 |
| **TAV-SV02-050** | 28-Feb-13 | 0.0 | 0.065 | 34000294 | -25 | -8 |
| **TAV-SV02-100** | | 0.0 | 0.117 | 34000714 | -26 | -8 |
| **TAV-SV02-100** (Duplicate) | | | | 34001153 | -25 | -8 |
| **TAV-SV02-150** | | 0.0 | 0.168 | 34000111 | -26 | -8 |
| **TAV-SV02-200** | | 0.0 | 0.219 | 34000460 | -26 | -8 |
| **TAV-SV02-250** | | 0.0 | 0.270 | 34001276 | -26 | -8 |
| **TAV-SV02-300** | | 0.0 | 0.321 | 34001446 | -26 | -8 |
| **TAV-SV02-350** | | 0.0 | 0.372 | 34000353 | -26 | -8 |
| **TAV-SV02-400** | | 0.0 | 0.423 | 34000381 | -26 | -8 |
| **TAV-SV02-450** | | 0.0 | 0.475 | 34000422 | -26 | -8 |
| **TAV-SV02-500** | | 0.0 | 0.526 | 34000208 | -26 | -8 |
| **TAV-SV03-050** | 28-Feb-13 | 0.0 | 0.065 | 34000075 | -26 | -8 |
| **TAV-SV03-100** | | 0.0 | 0.117 | 34001125 | -26 | -8 |
| **TAV-SV03-150** | | 0.0 | 0.168 | 34000821 | -26 | -8 |
| **TAV-SV03-200** | | 0.0 | 0.219 | 34000151 | -26 | -8 |
| **TAV-SV03-250** | | 0.0 | 0.270 | 34000853 | -26 | -8 |
| **TAV-SV03-300** | | 0.0 | 0.321 | 34001500 | -25 | -8 |
| **TAV-SV03-350** | | 0.0 | 0.372 | 34001657 | -26 | -8 |
| **TAV-SV03-400** | | 0.0 | 0.423 | 34000846 | -25 | -8 |
| **TAV-SV03-450** | | 0.0 | 0.475 | 34000012 | -26 | -8 |
| **TAV-SV03-500** | | 0.0 | 0.526 | 34001160 | -25 | -8 |
| **TAV-SV03-500** (Duplicate) | | | | 34001167 | -26 | -8 |

Refer to footnotes on page 5D-25.

## Table 5D-4
## Summary of Detected Duplicate Compounds,
## Technical Area V Soil-Vapor Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID/Parameter | Environmental Sample (R1) | Duplicate Sample (R2) | RPD[h] |
|---|---|---|---|
| | ppb v/v unless otherwise noted | | |
| **TAV-SV01-400** | | | |
| Bromodichloromethane | 4.5 | 5.1 | 13 |
| Chloroform | 9.3 | 9.6 | 3 |
| Dibromochloromethane | 3.4 | 3.9 | 14 |
| 1,1-Dichloroethane | 2.3 | 2.2 | 4 |
| cis-1,2-Dichloroethene | 45 | 46 | 2 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 4.2 | 5.0 | 17 |
| Trichloroethene | 470 | 520 | 10 |
| **TAV-SV02-100** | | | |
| Bromodichloromethane | 33 | 32 | 3 |
| Carbon tetrachloride | 0.30 | 0.29 | 3 |
| Chloroform | 27 | 26 | 4 |
| Dibromochloromethane | 4.2 | 4.2 | < 1 |
| Dichlorodifluoromethane | 0.56 | 0.52 | 7 |
| 2-Hexanone | 0.63 | 0.51 | 21 |
| Tetrachloroethene | 2.8 | 2.8 | < 1 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 190 | 190 | < 1 |
| Trichloroethene | 36 | 35 | 3 |
| **TAV-SV03-500** | | | |
| Benzene | 0.24 | 0.22 | 9 |
| 2-Butanone | 1.4 | 1.7 | 19 |
| Carbon disulfide | 0.44 | 0.34 | 26 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 3.0 | 0.57 | 136 |
| Trichloroethene | 14 | 6.6 | 72 |
| Trichlorofluoromethane | 0.23 | 0.22 | 4 |

Refer to footnotes on page 5D-25.

## *Footnotes for Technical Area V Soil-Vapor Monitoring Tables*

ID = Identifier.
No. = Number.

**[a]Result**
ppb v/v = Parts per billion by volume
Total Organics = Sum of validated detected organic compounds, where Xylene is the sum of m,p-Xylene and o-Xylene.

**[b]MDL**
MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

**[c]RL**
RL = Reporting limit. The minimum levels, concentrations, or quantities of a target variable that can be reported with a specified degree of confidence.

**[d]Lab Qualifier**
J = Result is less than the RL but greater than or equal to the MDL, and the concentration is an approximate value.
NA = Not applicable.

**[e]Validation Qualifier**
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
NA = Not applicable.
U = The analyte was analyzed for but not was not detected. The associated numerical value is the sample quantitation limit.

**[f]Analytical Method**
U.S. Environmental Protection Agency, 1999, "*Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition, Compendium Method TO-15"* Center for Environmental Research Information, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio.

**[g]Field Measurements**
Field measurements collected prior to and after sampling.
cu-ft = Cubic feet.
in-Hg = Inches of mercury.
PID = Photoionization detector.
ppm = Parts per million.

**[h]RPD**
RPD = Relative percent difference is calculated with the following equation and rounded to nearest whole number.

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

where: R1 = Analysis result.
R2 = Duplicate analysis result.

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# Attachment 5D
# Figures

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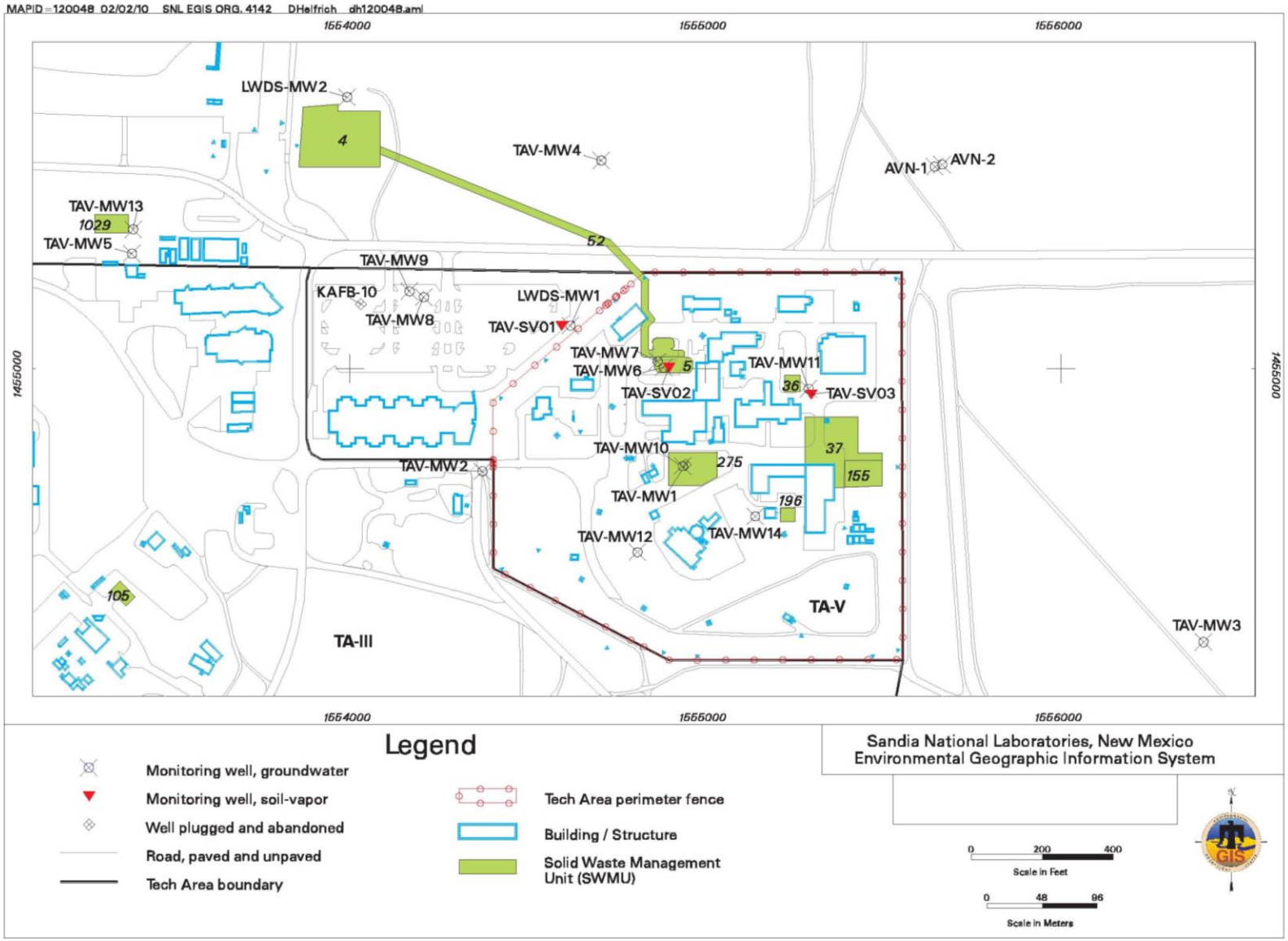



**Figure 5D-1. TA-V Soil-Vapor Monitoring Well Locations**

| | |
|---|---|
| **Well Name:** | TAV-SV01 |
| **Project Name:** | TAV SOIL VAPOR WELLS |
| **NMOSE Well File Code:** | N/A |
| **Owner Name:** | SNL/NM |
| **Date Drilling Started:** | 1/27/2011 |
| **Date Well Dev. Completed:** | 3/17/2011 |

| | |
|---|---|
| **Drilling Contractor:** | WDC EXPLORATION & WELLS |
| **Drilling Method:** | ARCH |
| **Borehole Depth (FBGS):** | 506 |
| **Casing Depth (FBGS):** | |
| **Geo Location:** | TA-V |
| **Completion Zone:** | ALLUVIAL FAN FACIES |
| **Completion Formation:** | SANTA FE |

**Survey Data**

| | |
|---|---|
| **Survey Date:** | 3/29/2011 |
| **Surveyed By:** | SURVEYING CONTROL, INC. |
| State Plane Coordinates: NAD 83 | |
| **(X) Easting:** | 1554596.11 |
| **(Y) Northing:** | 1455120.73 |

**Surveyed Evaluations (FAMSL) NAVD 88**

| | |
|---|---|
| **Protective Casing:** | 5423.48 |
| **Top of Inner Well Casing:** | |
| **Concrete Pad:** | 5423.43 |
| **Ground Surface:** | 5423.4 |

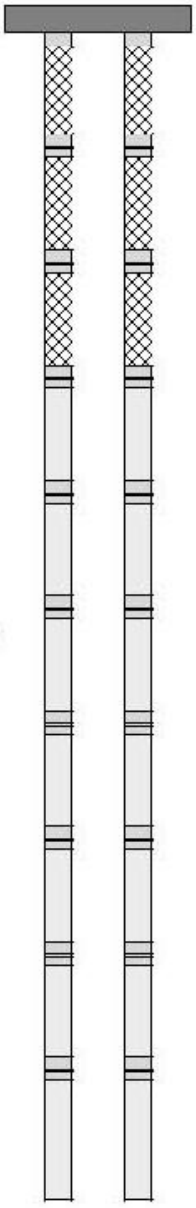
**Calculated Depths and Elevations**

| | |
|---|---|
| **Initial Depth to Water (FBGS):** | |
| **Date Initial Depth Measured:** | |
| **Last Measured Water Elevation (FAMSL):** | |
| **Date Last Measured:** | |

**Miscellaneous Information**

| | |
|---|---|
| **Screen Slot Size (in.):** | n/a |
| **Date Updated:** | 02-MAY-2011 |
| **Date Printed from EDMS:** | 4/17/2012 11:03:20 AM |

**Comments:**
SV = SOIL VAPOR. SVSS=SOIL VAPOR SAMPLING SCREEN.



**Completion Data Measured Depths (FBGS)**

**Casing Stickup:**

| Interval | Material | Start | Stop | Length | ID/OD (in.) |
|---|---|---|---|---|---|
| BOREHOLE | | 0 | 506 | 506 | /9.625 |
| VAULT | | 0 | 6 | 6 | |
| SEAL | BENTONITE CHIPS | 6 | 44 | 38 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 44 | 54 | 10 | |
| SVSS 50 | STAINLESS STEEL | 49.5 | 50.5 | 1 | /0.375 |
| SEAL | BENTONITE CHIPS | 54 | 94 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 94 | 104 | 10 | |
| SVSS 100 | STAINLESS STEEL | 99.5 | 100.5 | 1 | /0.375 |
| SEAL | BENTONITE CHIPS | 104 | 144 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 144 | 154 | 10 | |
| SVSS 150 | STAINLESS STEEL | 149.5 | 150.5 | 1 | /0.375 |
| SEAL | BENTONITE CHIPS | 154 | 194 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 194 | 204 | 10 | |
| SVSS 200 | STAINLESS STEEL | 199.5 | 200.5 | 1 | /0.375 |
| SEAL | BENTONITE CHIPS | 204 | 244 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 244 | 254 | 10 | |
| SVSS 250 | STAINLESS STEEL | 249.5 | 250.5 | 1 | /0.375 |
| SEAL | BENTONITE CHIPS | 254 | 294 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 294 | 304 | 10 | |
| SVSS 300 | STAINLESS STEEL | 299.5 | 300.5 | 1 | /0.375 |
| SEAL | BENTONITE CHIPS | 304 | 344 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 344 | 354 | 10 | |
| SVSS 350 | STAINLESS STEEL | 349.5 | 350.5 | 1 | /0.375 |
| SEAL | BENTONITE CHIPS | 354 | 394 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 394 | 404 | 10 | |
| SVSS 400 | STAINLESS STEEL | 399.5 | 400.5 | 1 | /0.375 |
| SEAL | BENTONITE CHIPS | 404 | 444 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 444 | 454 | 10 | |
| SVSS 450 | STAINLESS STEEL | 449.5 | 450.5 | 1 | /0.375 |
| SEAL | BENTONITE CHIPS | 454 | 494 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 494 | 506 | 12 | |
| SVSS 500 | STAINLESS STEEL | 499.5 | 500.5 | 1 | /0.375 |

Some well diagram info truncated due to numeric constraints.

**Figure 5D-2. Soil-Vapor Monitoring Well Completion Information for TAV-SV01**

| | |
|---|---|
| **Well Name:** | TAV-SV02 |
| **Project Name:** | TAV SOIL VAPOR WELLS |
| **NMOSE Well File Code:** | N/A |
| **Owner Name:** | SNL/NM |
| **Date Drilling Started:** | 3/3/2011 |
| **Date Well Dev. Completed:** | 3/17/2011 |

| | |
|---|---|
| **Drilling Contractor:** | WDC EXPLORATION & WELLS |
| **Drilling Method:** | ARCH |
| **Borehole Depth (FBGS):** | 506 |
| **Casing Depth (FBGS):** | |
| **Geo Location:** | TA-V |
| **Completion Zone:** | ALLUVIAL FAN FACIES |
| **Completion Formation:** | SANTA FE |

**Survey Data**

| | |
|---|---|
| **Survey Date:** | 3/29/2011 |
| **Surveyed By:** | SURVEYING CONTROL, INC. |

State Plane Coordinates: NAD 83

| | |
|---|---|
| **(X) Easting:** | 1554898.53 |
| **(Y) Northing:** | 1455002.42 |

**Surveyed Evaluations (FAMSL) NAVD 88**

| | |
|---|---|
| **Protective Casing:** | 5431.91 |
| **Top of Inner Well Casing:** | |
| **Concrete Pad:** | 5431.88 |
| **Ground Surface:** | 5431.9 |

**Calculated Depths and Elevations**

**Initial Depth to Water (FBGS):**

**Date Initial Depth Measured:**

**Last Measured Water Elevation (FAMSL):**

**Date Last Measured:**

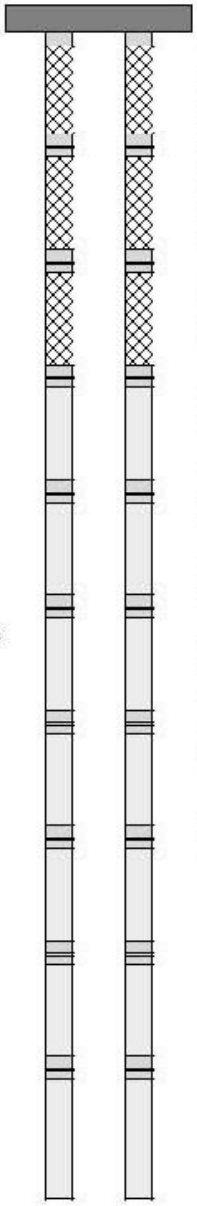
**Miscellaneous Information**

**Screen Slot Size (in.):** n/a

**Date Updated:** 02-MAY-2011

**Date Printed from EDMS:** 4/17/2012 11:04:53 AM

**Comments:**
SV = SOIL VAPOR. SVSS=SOIL VAPOR SAMPLING SCREEN.



**Completion Data Measured Depths (FBGS)**

**Casing Stickup:**

| Interval | Material | Start | Stop | Length | ID/OD(in.) |
|---|---|---|---|---|---|
| BOREHOLE | | 0 | 506 | 506 | /9.625 |
| VAULT | | 0 | 6 | 6 | |
| SEAL | BENTONITE CHIPS | 6 | 44 | 38 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 44 | 54 | 10 | |
| SVSS 50 | STAINLESS STEEL | 49.5 | 50.5 | 1 | /0.375 |
| SEAL | BENTONITE CHIPS | 54 | 94 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 94 | 104 | 10 | |
| SVSS 100 | STAINLESS STEEL | 99.5 | 100.5 | 1 | /0.375 |
| SEAL | BENTONITE CHIPS | 104 | 144 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 144 | 154 | 10 | |
| SVSS 150 | STAINLESS STEEL | 149.5 | 150.5 | 1 | /0.375 |
| SEAL | BENTONITE CHIPS | 154 | 194 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 194 | 204 | 10 | |
| SVSS 200 | STAINLESS STEEL | 199.5 | 200.5 | 1 | /0.375 |
| SEAL | BENTONITE CHIPS | 204 | 244 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 244 | 254 | 10 | |
| SVSS 250 | STAINLESS STEEL | 249.5 | 250.5 | 1 | /0.375 |
| SEAL | BENTONITE CHIPS | 254 | 294 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 294 | 304 | 10 | |
| SVSS 300 | STAINLESS STEEL | 299.5 | 300.5 | 1 | /0.375 |
| SEAL | BENTONITE CHIPS | 304 | 344 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 344 | 354 | 10 | |
| SVSS 350 | STAINLESS STEEL | 349.5 | 350.5 | 1 | /0.375 |
| SEAL | BENTONITE CHIPS | 354 | 394 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 394 | 404 | 10 | |
| SVSS 400 | STAINLESS STEEL | 399.5 | 400.5 | 1 | /0.375 |
| SEAL | BENTONITE CHIPS | 404 | 444 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 444 | 454 | 10 | |
| SVSS 450 | STAINLESS STEEL | 449.5 | 450.5 | 1 | /0.375 |
| SEAL | BENTONITE CHIPS | 454 | 494 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 494 | 506 | 12 | |
| SVSS 500 | STAINLESS STEEL | 499.5 | 500.5 | 1 | /0.375 |

Some well diagram info truncated due to numeric constraints.

**Figure 5D-3. Soil-Vapor Monitoring Well Completion Information for TAV-SV02**

| | | | |
|---|---|---|---|
| **Well Name:** | TAV-SV03 | **Drilling Contractor:** | WDC EXPLORATION & WELLS |
| **Project Name:** | TAV SOIL VAPOR WELLS | **Drilling Method:** | ARCH |
| **NMOSE Well File Code:** | N/A | **Borehole Depth (FBGS):** | 506 |
| **Owner Name:** | SNL/NM | **Casing Depth (FBGS):** | |
| **Date Drilling Started:** | 2/22/2011 | **Geo Location:** | TA-V |
| **Date Well Dev. Completed:** | 3/17/2011 | **Completion Zone:** | ALLUVIAL FAN FACIES |
| | | **Completion Formation:** | SANTA FE |

**Survey Data**

**Survey Date:** 3/29/2011
**Surveyed By:** SURVEYING CONTROL, INC.

State Plane Coordinates: NAD 83
**(X) Easting:** 1555298.42
**(Y) Northing:** 1454927.34

**Surveyed Evaluations (FAMSL) NAVD 88**

**Protective Casing:** 5440.19
**Top of Inner Well Casing:**
**Concrete Pad:** 5440.20
**Ground Surface:** 5440.2

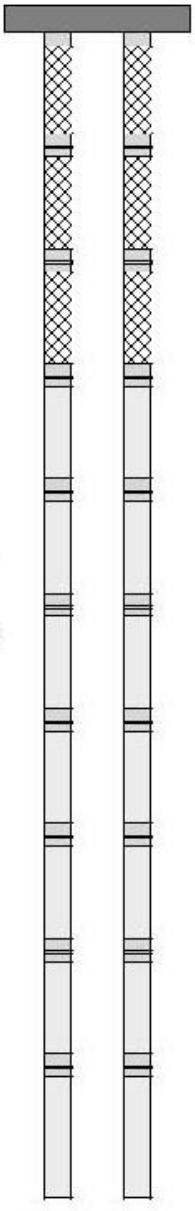
**Calculated Depths and Elevations**

**Initial Depth to Water (FBGS):**
**Date Initial Depth Measured:**
**Last Measured Water Elevation (FAMSL):**
**Date Last Measured:**

**Miscellaneous Information**

**Screen Slot Size (in.):** n/a
**Date Updated:** 02-MAY-2011
**Date Printed from EDMS:** 4/17/2012 11:06:11 AM

**Comments:**
SV = SOIL VAPOR. SVSS=SOIL VAPOR SAMPLING SCREEN.



**Completion Data Measured Depths (FBGS)**

**Casing Stickup:**

| Interval | Material | Start | Stop | Length | ID/OD(in.) |
|---|---|---|---|---|---|
| BOREHOLE | | 0 | 100 | 100 | / 11.75 |
| VAULT | | 0 | 6 | 6 | |
| SEAL | BENTONITE CHIPS | 6 | 44 | 38 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 44 | 54 | 10 | |
| SVSS 50 | STAINLESS STEEL | 49.5 | 50.5 | 1 | / 0.375 |
| SEAL | BENTONITE CHIPS | 54 | 94 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 94 | 104 | 10 | |
| SVSS 100 | STAINLESS STEEL | 99.5 | 100.5 | 1 | / 0.375 |
| BOREHOLE | | 100 | 507 | 407 | / 9.625 |
| SEAL | BENTONITE CHIPS | 104 | 144 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 144 | 154 | 10 | |
| SVSS 150 | STAINLESS STEEL | 149.5 | 150.5 | 1 | / 0.375 |
| SEAL | BENTONITE CHIPS | 154 | 194 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 194 | 204 | 10 | |
| SVSS 200 | STAINLESS STEEL | 199.5 | 200.5 | 1 | / 0.375 |
| SEAL | BENTONITE CHIPS | 204 | 244 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 244 | 254 | 10 | |
| SVSS 250 | STAINLESS STEEL | 249.5 | 250.5 | 1 | / 0.375 |
| SEAL | BENTONITE CHIPS | 254 | 294 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 294 | 304 | 10 | |
| SVSS 300 | STAINLESS STEEL | 299.5 | 300.5 | 1 | / 0.375 |
| SEAL | BENTONITE CHIPS | 304 | 344 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 344 | 354 | 10 | |
| SVSS 350 | STAINLESS STEEL | 349.5 | 350.5 | 1 | / 0.375 |
| SEAL | BENTONITE CHIPS | 354 | 394 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 394 | 404 | 10 | |
| SVSS 400 | STAINLESS STEEL | 399.5 | 400.5 | 1 | / 0.375 |
| SEAL | BENTONITE CHIPS | 404 | 444 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 444 | 454 | 10 | |
| SVSS 450 | STAINLESS STEEL | 449.5 | 450.5 | 1 | / 0.375 |
| SEAL | BENTONITE CHIPS | 454 | 494 | 40 | |
| SV SAMPLING ZONE | 10/20 SILICA SAND | 494 | 507 | 13 | |
| SVSS 500 | STAINLESS STEEL | 499.5 | 500.5 | 1 | |

Some well diagram info truncated due to numeric constraints.

**Figure 5D-4. Soil-Vapor Monitoring Well Completion Information for TAV-SV03**

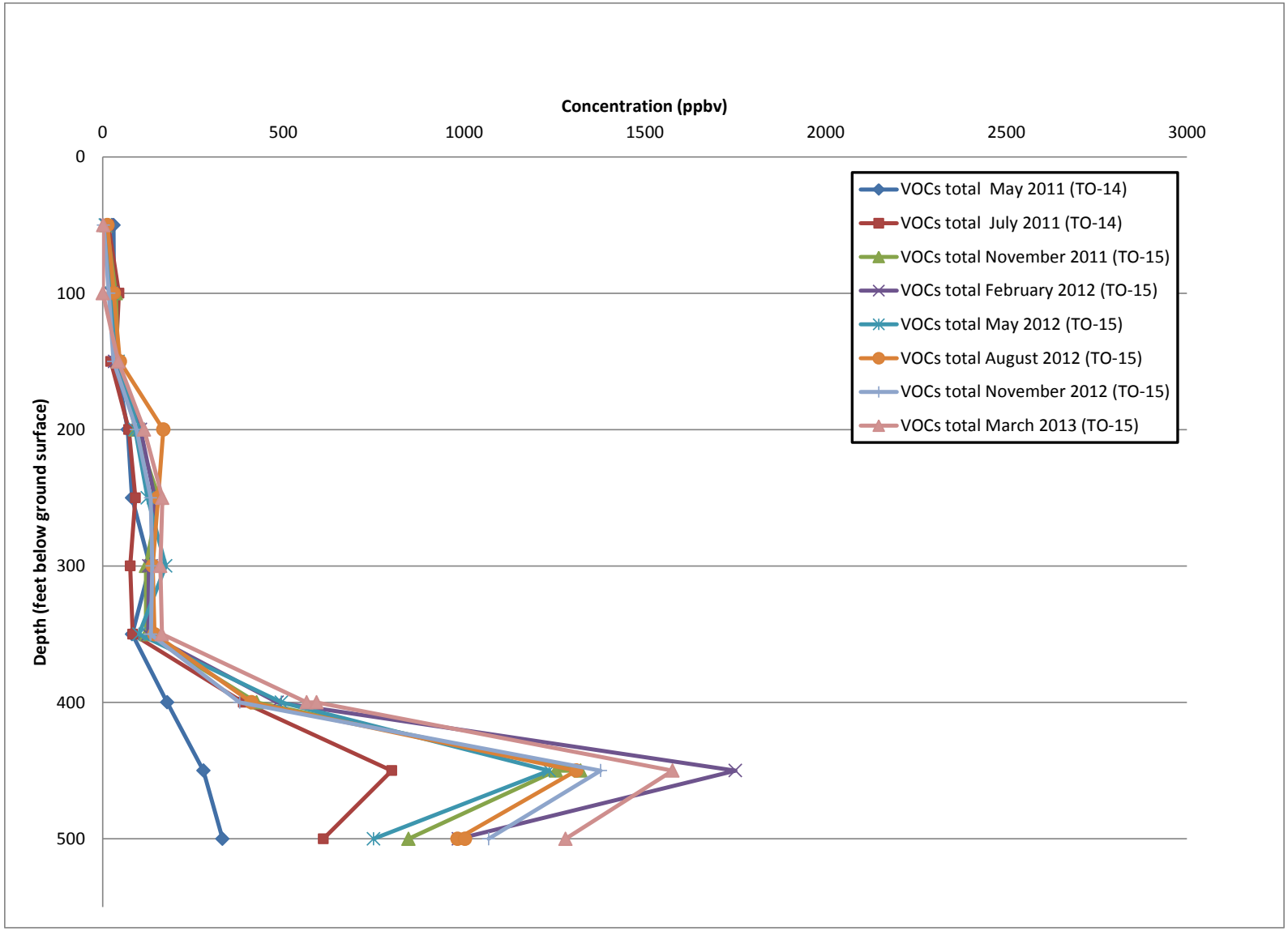



**Figure 5D-5. TA-V Soil-Vapor Monitoring Total VOC Results (ppbv) at TAV-SV01**

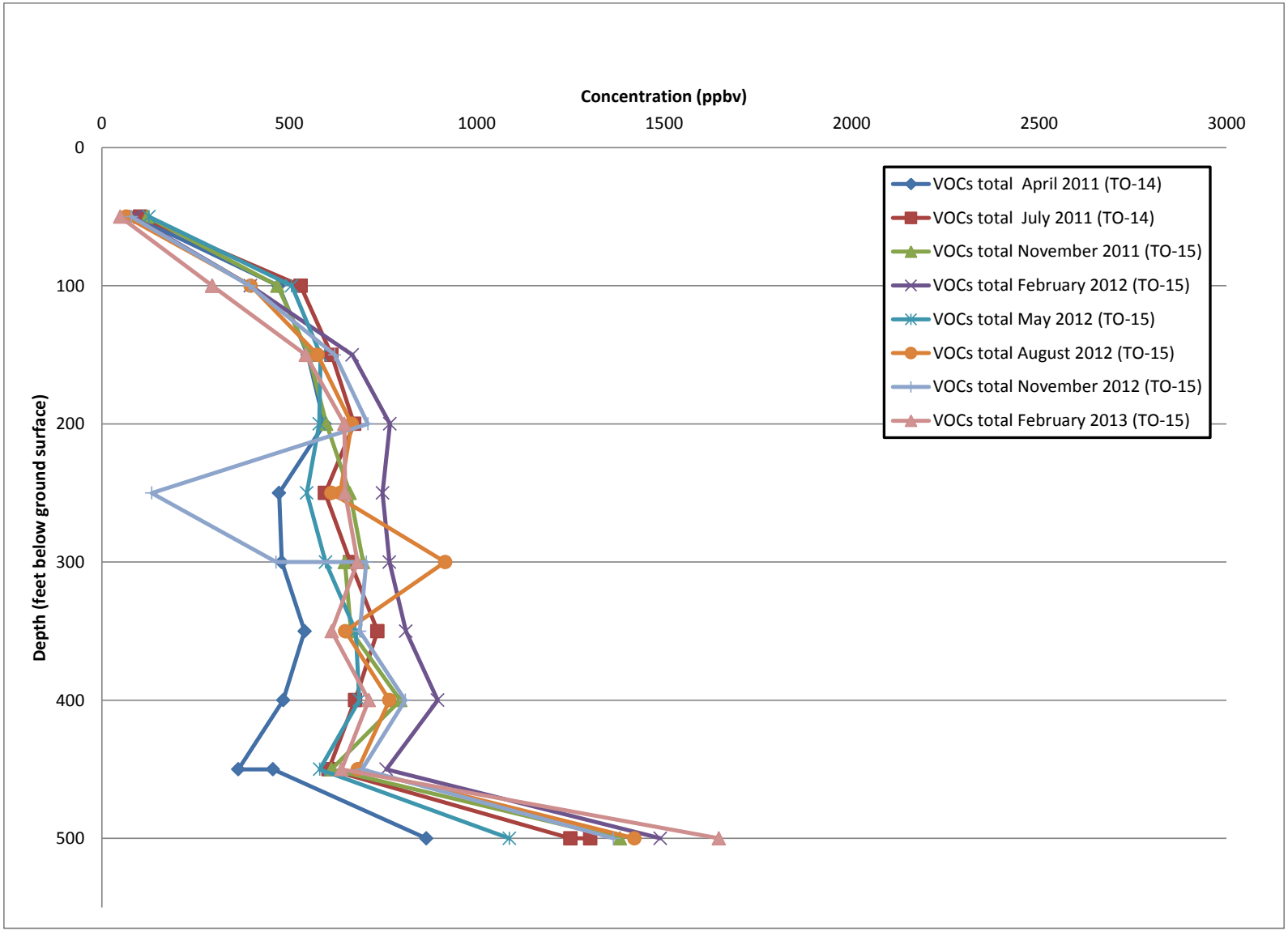



**Figure 5D-6. TA-V Soil-Vapor Monitoring Total VOC Results (ppbv) at TAV-SV02**

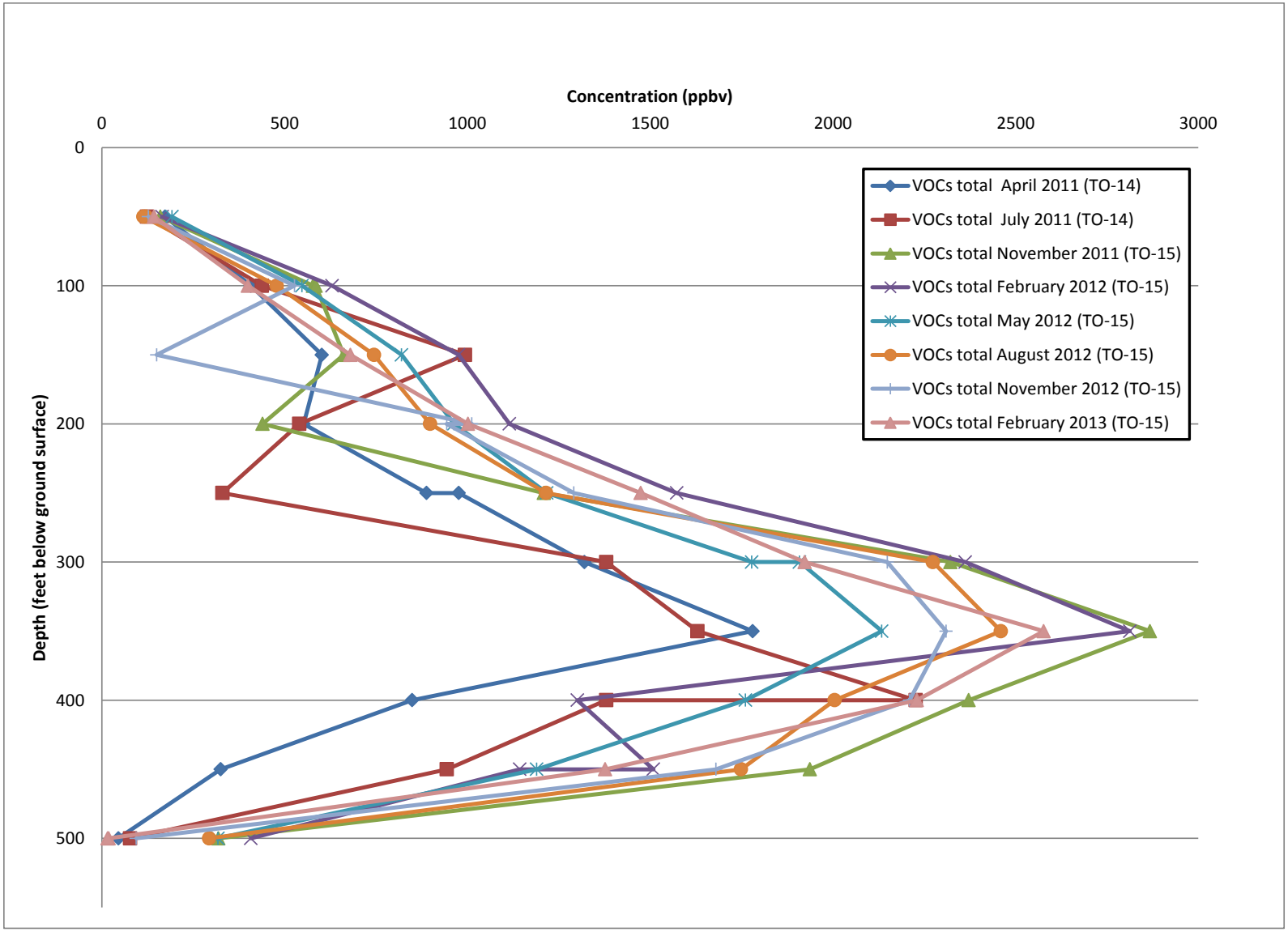



**Figure 5D-7. TA-V Soil-Vapor Monitoring Total VOC Results (ppbv) at TAV-SV03**

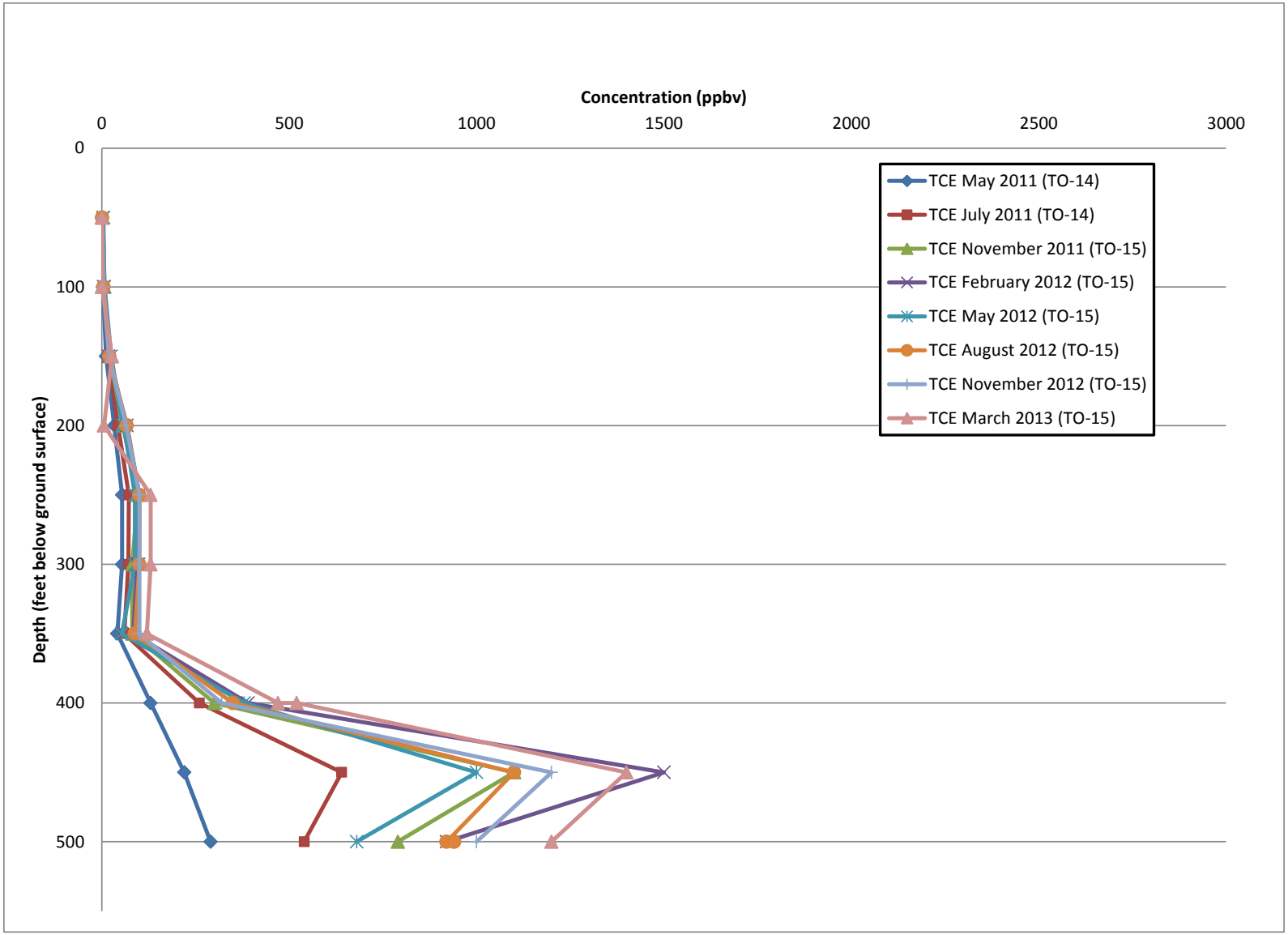



**Figure 5D-8. TA-V Soil-Vapor Monitoring TCE Results (ppbv) at TAV-SV01**

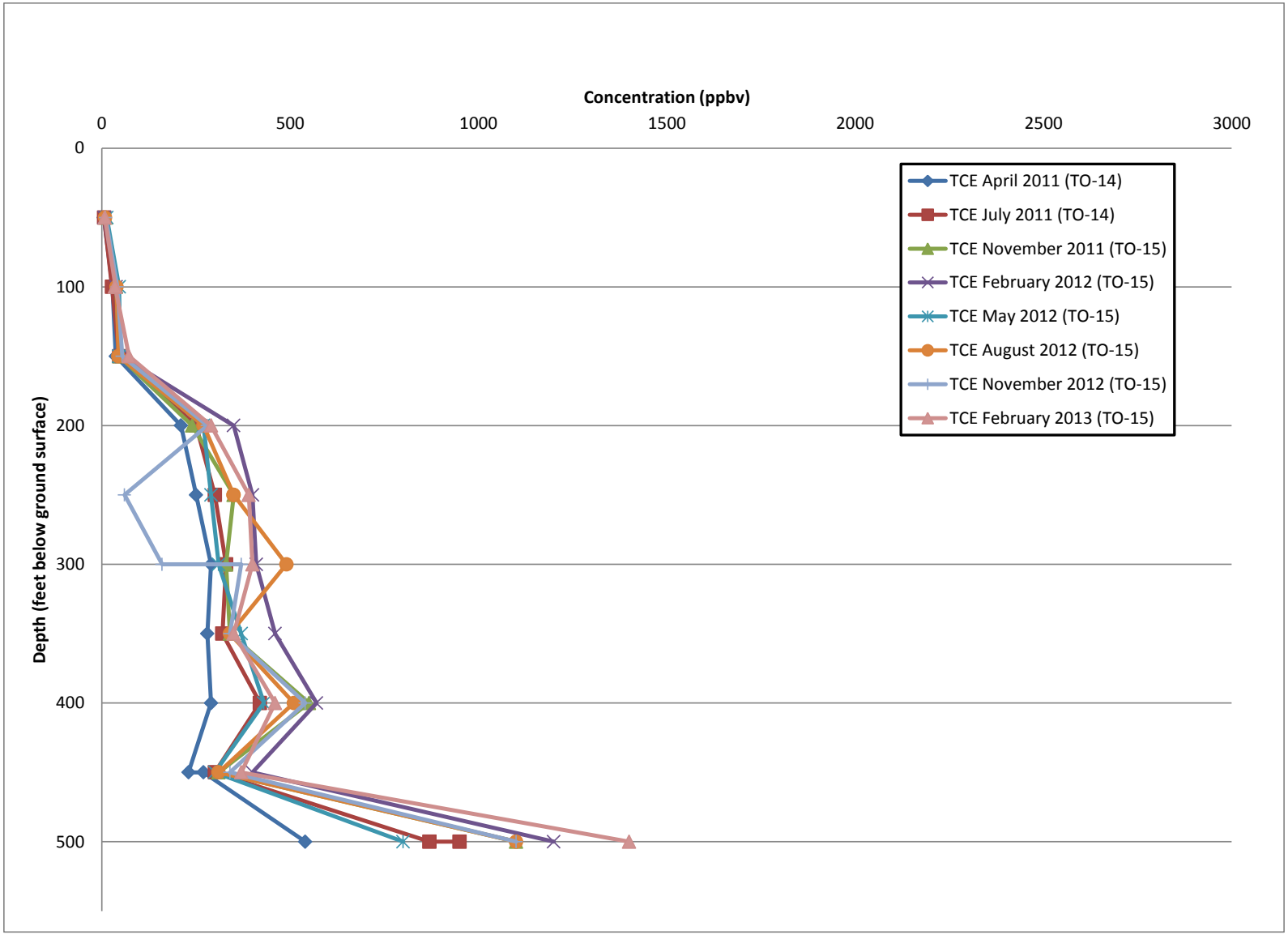



**Figure 5D-9. TA-V Soil-Vapor Monitoring TCE Results (ppbv) at TAV-SV02**

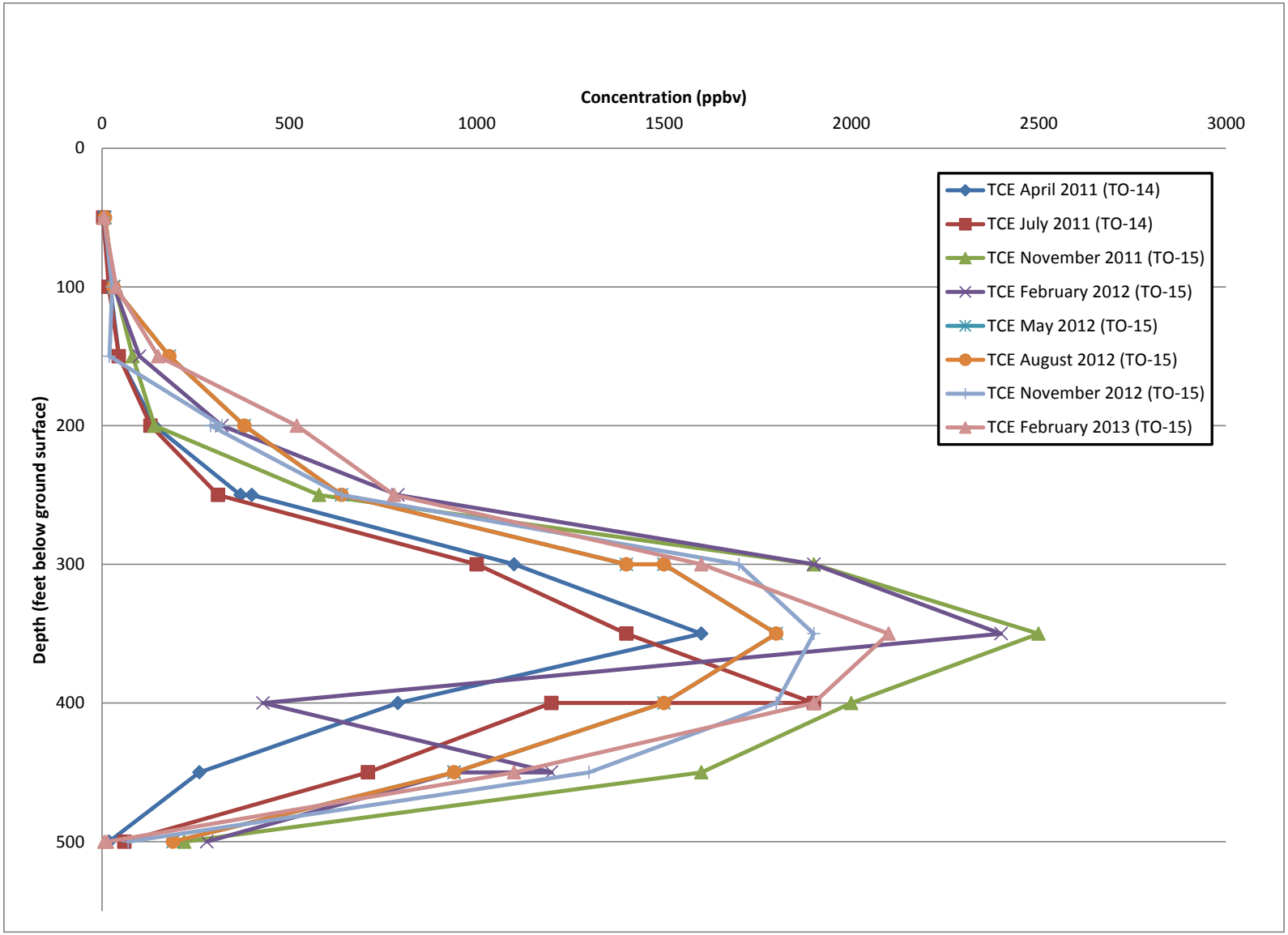



**Figure 5D-10. TA-V Soil-Vapor Monitoring TCE Results (ppbv) at TAV-SV03**

# 6.0 Tijeras Arroyo Groundwater Study Area

## 6.1 Introduction

Trichloroethene (TCE) and nitrate have been identified as constituents of concern (COCs) in groundwater at the Tijeras Arroyo Groundwater (TAG) Study Area (also referred to as "Tijeras Area Ground-Water Investigation Area of Concern") based on historical groundwater monitoring results. Detections of these two COCs exceed the U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) in groundwater samples collected from the TAG Study Area monitoring wells. Since August 1996, the historical maximum TCE concentration detected at the site has been 9.6 micrograms per liter (µg/L), and the maximum nitrate detection has been 49 milligrams per liter (mg/L). The EPA MCLs and State of New Mexico drinking water standards for TCE and nitrate are 5 µg/L and 10 mg/L (as nitrogen), respectively.

Characteristics of the TAG Study Area include concentrations of TCE below to just above the MCL at scattered locations in the perched groundwater system (PGWS) and concentrations of nitrate above the MCL at scattered locations in the PGWS and regional aquifer.

### 6.1.1 Location

The TAG Study Area encompasses approximately 40 square miles (sq mi) in the north-central portion of Kirtland Air Force Base (KAFB) (Figure 6-1). Three of the five Technical Areas (TAs) at Sandia National Laboratories, New Mexico (SNL/NM) are within the TAG Study Area. Together, the three TAs (TA-I, TA-II, and TA-IV) encompass approximately 641 acres. The SNL/NM facility is a government-owned, contractor-operated, multi-program laboratory overseen by the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) through the Sandia Field Office in Albuquerque, New Mexico. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM under Contract DE-AC04-94AL85000.

The parties identified as potentially responsible for groundwater contamination within the TAG area include the DOE/NNSA and its contractor Sandia, KAFB, the Albuquerque Bernalillo County Water Utility Authority (ABCWUA), and the City of Albuquerque (COA). KAFB controls facilities and properties with a variety of land uses along the north, west, south, and southeast boundaries of TA-I, TA-II, and TA-IV. The area located along the northern and western boundaries of the three TAs contains KAFB housing, office buildings, a fire station, training schools, machine workshops, storage yards, a detention facility, an electromagnetic research facility, and inactive sewage lagoons. Bordering the southern and southeastern edges of the three TAs are undeveloped open spaces, active landfills, closed landfills, emergency-response training areas, and the Tijeras Arroyo Golf Course. The COA residential areas are located along most of the northern boundary of KAFB and a major sanitary-waste line operated by ABCWUA trends along Tijeras Arroyo.

### 6.1.2 Site History

In early 1928, the first airport in Albuquerque was constructed where TA-I and TA-II are currently located. In the spring of 1946, during a dismantling operation, 2,250 military aircraft were dismantled adjacent to the taxiways. In July 1945, the "Z Division" of the Manhattan Engineers District, an extension of the original Los Alamos Laboratory, was established as the forerunner of SNL/NM. At that time, the primary mission of the Z Division was to provide engineering, production, stockpiling, and testing support for nuclear weapon components and systems. In the summer of 1949, the major weapons production was transferred to other manufacturing facilities and the early work at SNL/NM concentrated on prototype research and manufacturing of experimental devices. Since 1949, SNL/NM has grown from

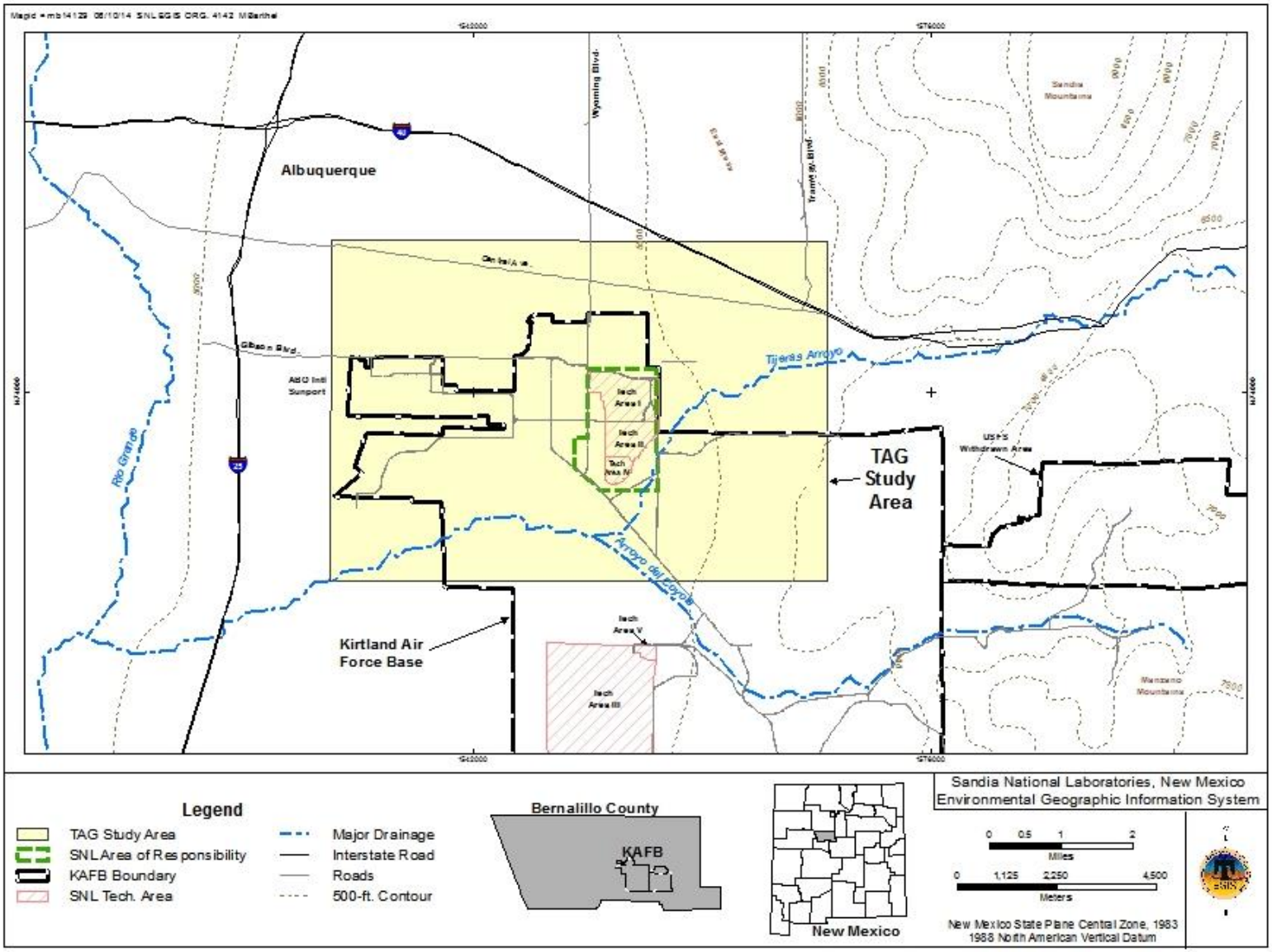



**Figure 6-1. Location of the TAG Study Area**

a factory-style ordnance facility to a national laboratory dedicated to research, development, and testing of both defense and nondefense components. The current work performed in TA-I, TA-II, and TA-IV can be divided into four main types: nuclear weapon, nonnuclear weapon, technical support, and special research and development. Numerous SNL/NM facilities may have potentially released hazardous materials to the soil and groundwater; however, the current research-oriented mission for most SNL/NM operations involves a diverse inventory of chemicals, which are generally stored and used indoors in small quantities.

SNL/NM Environmental Restoration (ER) Operations (formerly ER Project) has conducted numerous groundwater investigations in the TAG Study Area since 1992 (SNL November 2005) (Table 6-1). Many of these investigations were site-specific and conducted in support of various Solid Waste Management Unit (SWMU) assessments. Other investigations in the TAG Study Area were more regional studies conducted by the SNL/NM Site-Wide Hydrogeologic Characterization Project (SNL February 1998). Both KAFB and COA have also completed numerous groundwater investigations in the TAG Study Area, the results of which are presented in the *Tijeras Arroyo Groundwater Investigation Report* (SNL November 2005).

### 6.1.3 Monitoring History

Investigations of groundwater quality in the TAG Study Area have been conducted by SNL/NM personnel over the past 20 years (Table 6-1). In 1992, SNL/NM personnel began to investigate groundwater quality as part of the overall TA-II investigation of the regional aquifer with the installation of three groundwater monitoring wells. During this initial investigation, the PGWS was discovered at a depth of approximately 320 feet (ft) below ground surface (bgs). In October 1994, the analytical results for a groundwater sample from the PGWS showed TCE at a concentration of 1 µg/L, which prompted SNL/NM personnel to further investigate groundwater contamination in the study area.

Beginning in October 2000, meetings of the TAG High Performing Team (HPT) served as a forum for discussing TAG issues. During these meetings, members of the HPT (staff from SNL/NM, KAFB, COA, the New Mexico Environment Department [NMED], and EPA) debated the validity of using groundwater analytical results previously collected using low-flow sampling devices. Based on the perceived inadequacy of the sampling method, TAG quarterly groundwater sampling was temporarily suspended by SNL/NM personnel until an alternative sampling method could be implemented. In June 2003, DOE/NNSA and Sandia submitted the *Tijeras Arroyo Groundwater Investigation Work Plan* (SNL June 2003) to the NMED. The work plan presented a comprehensive scope of work for groundwater investigations that are being jointly conducted by SNL/NM personnel, KAFB, and COA. Based on the requirements of the work plan, SNL/NM personnel resumed quarterly groundwater sampling in July 2003 using conventional groundwater purging/sampling techniques. The NMED approved the TAG Investigation Work Plan in September 2003 (NMED September 2003).

Since initial discoveries of TCE and nitrate at the TAG Study Area, numerous characterization activities have been conducted (Table 6-1). Results of these characterization activities are summarized in the *Tijeras Arroyo Groundwater Investigation Report* (SNL November 2005). The November 2005 report presents a conceptual model that provides a comprehensive list of groundwater monitoring data sources used to support the investigations.

In April 2004, the Compliance Order on Consent (the Order) became effective between the DOE, Sandia, and the NMED, and the Order specifies TAG as an area of groundwater contamination (NMED April 2004). In response to the Order, DOE/Sandia submitted the *Tijeras Arroyo Groundwater Corrective Measures Evaluation Work Plan* to the NMED in July 2004 (SNL July 2004). After fulfilling the requirements of the Corrective Measures Evaluations (CME) Work Plan, DOE/Sandia submitted the CME Report to the NMED (SNL August 2005).

## Table 6-1. Historical Timeline of the TAG Study Area

| Month | Year | Event | Reference |
|---|---|---|---|
| November–July | 1992–1993 | SNL/NM personnel began investigation of TA-II groundwater. PGWS discovered as first wells were installed (TA2-SW1-320, TA2-NW1-325, and TA2-NW1-595). | SNL March 1995a |
| March | 1994 | Groundwater sampling analytical results for TA-II wells reported in the Calendar Year (CY) 1993 SNL/NM Annual Groundwater Monitoring Report. | SNL March 1994 |
| March–July | 1994 | Installed monitoring wells TA2-W-01 and TJA-2. | SNL March 1995a |
| October | 1994 | Analytical results for groundwater sampling first detected TCE. | SNL March 1996a |
| March | 1995 | Groundwater sampling analytical results for TA-II wells reported in the CY 1994 SNL/NM Annual Groundwater Monitoring Report. | SNL March 1995b |
| August–September | 1995 | Installed monitoring wells WYO-1, WYO-2, and PGS-2. | SNL March 1996b |
| November | 1995 | Analytical results for groundwater sampling first detected TCE above the EPA MCL of 5 µg/L. | SNL March 1996b |
| November | 1995 | Installed monitoring well TA2-W-19. | SNL March 1996b |
| March | 1996 | Groundwater sampling analytical results for TA-II wells reported in the CY 1995 SNL/NM Annual Groundwater Monitoring Report. | SNL March 1996a |
| March | 1996 | Sandia North Groundwater Investigation Plan submitted to the NMED. | SNL March 1996b |
| September | 1996 | Shallow Water-Bearing Zone Hydrologic Evaluation prepared. | Wolford September 1996 |
| November | 1996 | Pressure transducer program initiated for select monitoring wells. | SNL March 1998a |
| November–December | 1996 | Installed TA-II soil-vapor monitoring wells TA2-VW-20 and TA2-VW-21. | IT January 1997 |
| March | 1997 | Groundwater sampling analytical results for Sandia North wells in TA-I and TA-II reported in the CY 1996 SNL/NM Annual Groundwater Monitoring Report. | SNL March 1997 |
| March | 1997 | Sandia North Geological Investigation Project Report prepared. | Fritts and Van Hart March 1997 |
| March–April | 1997 | Installed monitoring wells TAI-W-01 and TA2-W-25. | SNL March 1998a |
| August | 1997 | Borehole geophysical investigation (electromagnetic induction, neutron, and natural gamma) completed on 21 SNL/NM and KAFB monitoring wells. | SNL March 1998a |
| January–February | 1998 | Installed monitoring wells TAI-W-02, TAI-W-03, TAI-W-06, TA2-W-24, TA2-W-26, and TA2-W-27. | SNL June 2000 |
| March | 1998 | Groundwater sampling analytical results for Sandia North wells in TA-I and TA-II reported in the CY 1997 SNL/NM Annual Groundwater Monitoring Report. | SNL March 1998b |
| March | 1998 | Fiscal Year (FY) 1997 Sandia North Groundwater Investigation Annual Report submitted to the NMED. | SNL March 1998a |
| August–December | 1998 | Installed monitoring wells TAI-W-04, TAI-W-05, TAI-W-07, TJA-3, TJA-4, and TJA-5. | SNL June 2000 |
| March | 1999 | Groundwater sampling analytical results for Sandia North wells in TA-I and TA-II reported in the FY 1998 SNL/NM Annual Groundwater Monitoring Report. | SNL March 1999 |
| May–June | 1999 | Colloidal borescope investigation performed on 18 SNL/NM and KAFB monitoring wells. | AquaVISION July 1999 |
| October | 1999 | Analysis of the USGS aeromagnetic survey performed to revise the interpretation of the SNL/NM and KAFB area geologic structure. | Van Hart et al. October 1999 |
| March | 2000 | Groundwater sampling analytical results for Sandia North wells in TA-I and TA-II reported in the FY 1999 SNL/NM Annual Groundwater Monitoring Report. | SNL March 2000 |
| June | 2000 | FY 1998 Sandia North Groundwater Investigation Annual Report submitted to the NMED. | SNL June 2000 |

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

| Month | Year | Event | Reference |
|---|---|---|---|
| October | 2000 | TAG High Performing Team convened for the first time. | SNL June 2003 |
| December | 2000 | Project name changed from the Sandia North to the Tijeras Arroyo Groundwater Investigation. | Collins December 2000 |
| January–March | 2001 | Installed groundwater monitoring wells TJA-6 and TJA-7, and soil-vapor monitoring wells 46-VW-01, 46-VW-02, and 227-VW-01. | SNL November 2002 |
| February | 2001 | Preliminary model of the PGWS updated. | BGW February 2001 |
| April | 2001 | Groundwater sampling analytical results for TAG wells reported in the FY 2000 SNL/NM Annual Groundwater Monitoring Report. | SNL April 2001 |
| June | 2001 | Geologic model of the PGWS updated. | Van Hart June 2001 |
| July | 2001 | Monitoring wells WYO-1 and WYO-2 plugged and abandoned, replaced by WYO-3 and WYO-4. | SNL June 2003 |
| October | 2001 | Monitoring well TA1-W-08 installed. | SNL November 2002 |
| March | 2002 | Groundwater sampling analytical results for TAG wells reported in the FY 2001 SNL/NM Annual Groundwater Monitoring Report. | SNL March 2002 |
| November | 2002 | TAG Continuing Investigation Report submitted to the NMED. | SNL November 2002 |
| March | 2003 | Groundwater sampling analytical results for TAG wells reported in the FY 2002 SNL/NM Annual Groundwater Monitoring Report. | SNL March 2003 |
| June | 2003 | Subsurface geology at KAFB, including the TAG area, updated. | Van Hart June 2003 |
| June | 2003 | TAG Investigation Work Plan submitted to the NMED. | SNL June 2003 |
| September | 2003 | TAG Investigation Work Plan approved by the NMED. | NMED September 2003 |
| December–January | 2003–2004 | Slug (hydraulic conductivity) tests at groundwater monitoring wells were performed. | Collins May 2004 |
| March | 2004 | Groundwater sampling analytical results for TAG wells reported in the FY 2003 SNL/NM Annual Groundwater Monitoring Report. | SNL March 2004 |
| April | 2004 | The Compliance Order on Consent (the Order) identified TAG as an area with groundwater contamination requiring a CME. | NMED April 2004 |
| July | 2004 | TAG CME Work Plan submitted to the NMED. | SNL July 2004 |
| July-August | 2004 | Soil-vapor monitoring wells TAG-SV-01 through TAG-SV-05 installed. | SNL November 2005 |
| October | 2004 | TAG CME Work Plan for the SNL/NM Area of Responsibility approved by the NMED. | NMED October 2004 |
| September | 2005 | CME Report for TAG submitted to NMED. | SNL August 2005 |
| October | 2005 | Groundwater sampling analytical results for TAG wells reported in the FY 2004 SNL/NM Annual Groundwater Monitoring Report. | SNL October 2005 |
| November | 2005 | TAG Investigation Report submitted to the NMED. | SNL November 2005 |
| November | 2006 | Groundwater sampling analytical results for TAG wells reported in the FY 2005 SNL/NM Annual Groundwater Monitoring Report. | SNL November 2006 |
| March | 2007 | Groundwater sampling analytical results for TAG wells reported in the FY 2006 SNL/NM Annual Groundwater Monitoring Report. | SNL March 2007 |
| March | 2008 | Groundwater sampling analytical results for TAG wells reported in the FY 2007 SNL/NM Annual Groundwater Monitoring Report. | SNL March 2008 |
| August | 2008 | NMED issues Notice of Disapproval on November 2005 TAG Investigation Report. | NMED August 2008 |
| February | 2009 | DOE/NNSA and Sandia submit Response to NMED's August 2008 Notice of Disapproval on November 2005 TAG Investigation Report. | SNL February 2009 |

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

| Month | Year | Event | Reference |
|---|---|---|---|
| June | 2009 | Groundwater sampling analytical results for TAG wells reported in the CY 2008 SNL/NM Annual Groundwater Monitoring Report. | SNL June 2009 |
| April | 2009 | NMED requires characterization of perchlorate in groundwater in five wells in the TAG Study Area. | NMED April 2009 |
| August | 2009 | NMED issues Second Notice of Disapproval on November 2005 TAG Investigation Report. | NMED August 2009 |
| January | 2010 | DOE/NNSA and Sandia submit Response to NMED's August 2009 Second Notice of Disapproval on November 2005 TAG Investigation Report | SNL January 2010 |
| February | 2010 | NMED issues Notice of Approval for the November 2005 TAG Investigation Report. | NMED February 2010 |
| October | 2010 | Groundwater sampling analytical results for TAG wells reported in the CY 2009 SNL/NM Annual Groundwater Monitoring Report. | SNL October 2010 |
| September | 2011 | Groundwater sampling analytical results for TAG wells reported in the CY 2010 SNL/NM Annual Groundwater Monitoring Report. | SNL September 2011 |
| September | 2012 | Groundwater sampling analytical results for TAG wells reported in the CY 2011 SNL/NM Annual Groundwater Monitoring Report. | SNL September 2012 |
| September | 2013 | Groundwater sampling analytical results for TAG wells reported in the CY 2012 SNL/NM Annual Groundwater Monitoring Report. | SNL September 2013 |

**NOTES:**
µg/L = Microgram(s) per liter.
BGW = Balleau Groundwater, Inc.
CME = Corrective Measures Evaluation.
CY = Calendar Year.
DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
FY = Fiscal Year.
IT = IT Corporation.
KAFB = Kirtland Air Force Base.
MCL = Maximum Contaminant Level.
NMED = New Mexico Environment Department.
NNSA = National Nuclear Security Administration.
PGWS = Perched Groundwater System.
Sandia = Sandia Corporation.
SNL = Sandia National Laboratories.
SNL/NM = Sandia National Laboratories, New Mexico.
TA = Technical Area.
TAG = Tijeras Arroyo Groundwater.
TCE = Trichloroethene.
USGS = U.S. Geological Survey.

Table XI-1 of the Order (NMED April 2004) specifies the minimum sampling frequency for the groundwater monitoring and sampling schedule for TAG as: "Six events – after the TAG HPT Characterization Plans approved by the Department and starting no later than first quarter of Calendar Year 2004 . . . ." The six quarterly sampling events required by the work plan were completed at the end of Fiscal Year 2005. Having fulfilled these requirements, DOE/NNSA and Sandia have continued groundwater monitoring and TAG wells have been sampled quarterly, semiannually, or annually. All sampling continues to follow the procedures outlined in the NMED-approved work plan (SNL June 2003).

### 6.1.4 Current Monitoring Network

Currently, 21 wells in the TAG Study Area are monitored for water quality, and 30 wells are monitored for water levels (Figure 6-2; Table 6-2). Two groundwater systems are present in the TAG Study Area: the PGWS at approximately 220 to 330 ft bgs, and the regional aquifer at approximately 440 to 570 ft bgs. Groundwater monitoring wells are completed in either the PGWS or the regional aquifer (Table 6-2).

### 6.1.5 Summary of Calendar Year 2013 Activities

The following activities took place for the TAG investigation during Calendar Year (CY) 2013:

- Quarterly or annual water level measurements were obtained from TAG wells.
- Quarterly groundwater sampling events were conducted at seven wells (TA2-SW1-320, TA2-W-19, TA2-W-26, TJA-2, TJA-4, TJA-7, and WYO-4) in March, June, August/September, and November 2013 (SNL February 2013, May 2013, July 2013, and October 2013). The sampling frequency for monitoring well TJA-3 was modified to quarterly sampling in November 2013.
- Semiannual groundwater sampling was conducted at four wells (TA2-W-01, TA2-W-27, TJA-3, and TJA-6) in March 2013 and August/September 2013 (SNL February 2013 and July 2013).
- Annual groundwater sampling was conducted at 10 wells (PGS-2, TA1-W-01, TA1-W-02, TA1-W-03, TA1-W-04, TA1-W-05, TA1-W-06, TA1-W-08, TA2-NW1-595, and WYO-3) in August/September 2013 (SNL July 2013).
- Tables of analytical results (Attachment 6A), concentration versus time graphs (Attachment 6B), and hydrographs (Attachment 6C) were prepared in support of this report.

### 6.1.6 Summary of Future Activities

The following activities are anticipated for the TAG investigation during the next reporting period (CY 2014):

- Quarterly or annual water level measurements for TAG wells.
- Quarterly groundwater sampling at eight wells: TA2-SW1-320, TA2-W-19, TA2-W-26, TJA-2, TJA-4, TJA-3, TJA-7, and WYO-4.
- Semiannual groundwater sampling at four wells: TA1-W-06, TA2-W-01, TA2-W-27, and TJA-6.
- Annual groundwater sampling at nine wells: PGS-2, TA1-W-01, TA1-W-02, TA1-W-03, TA1-W-04, TA1-W-05, TA1-W-08, TA2-NW1-595, and WYO-3.

### 6.1.7 Conceptual Model

Two groundwater systems are present in the TAG Study Area: the PGWS at approximately 220 to 330 ft bgs, and the regional aquifer at approximately 440 to 570 ft bgs. The uppermost saturated interval of the PGWS is between 10 and 30 ft in thickness. Groundwater in the PGWS moves toward the southeast and is assumed to merge with the underlying regional aquifer southeast of Tijeras Arroyo. Figure 6-3 presents a diagram of the TAG conceptual model.

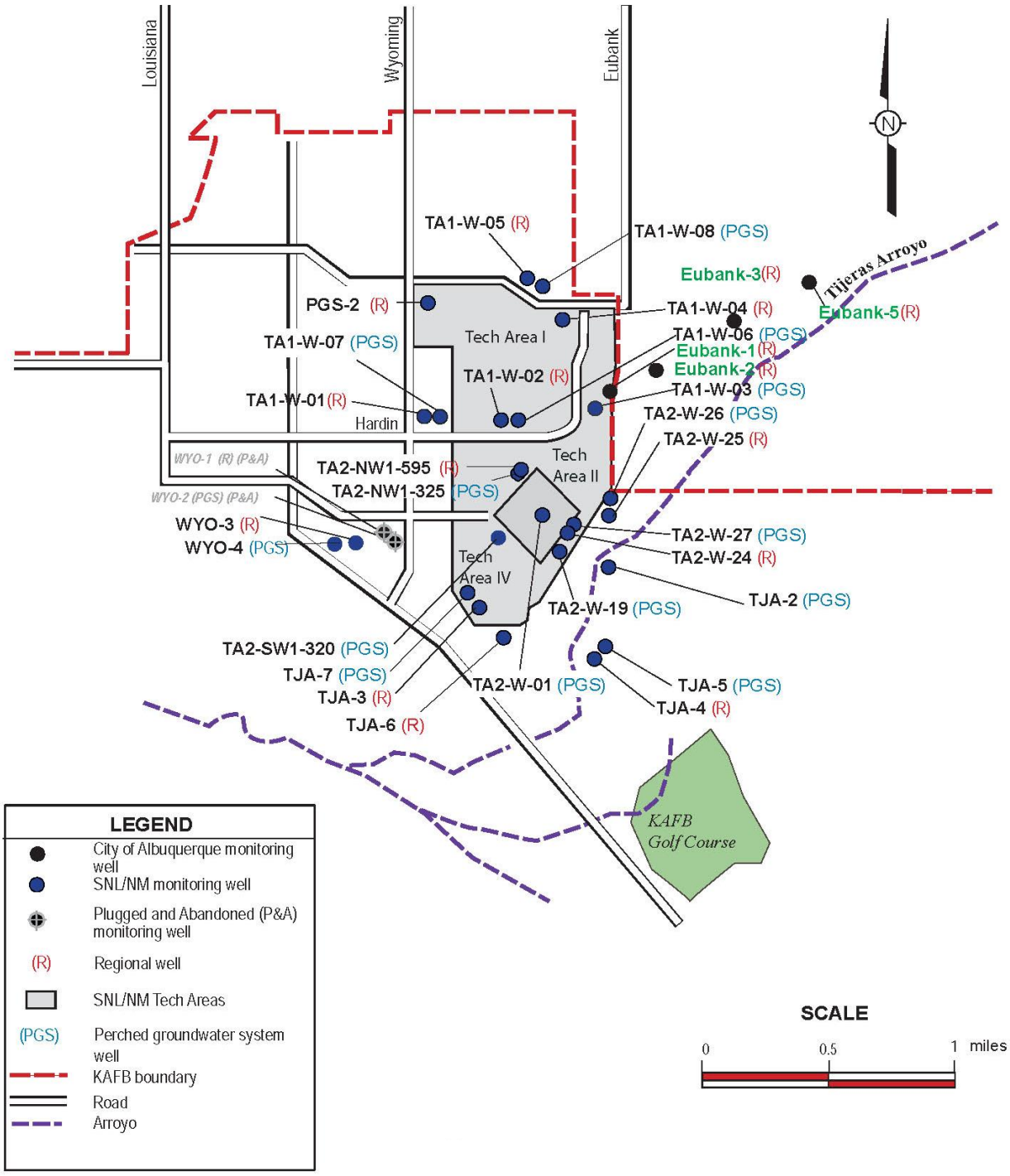



**Figure 6-2. Tijeras Arroyo Groundwater (TAG) Investigation Monitoring Well Locations**

## Table 6-2. Groundwater Monitoring Wells in the TAG Study Area

| Well | Installation Year | WQ | WL | Comments |
|---|---|---|---|---|
| Eubank-1 | 1988 | | ✓ | Regional aquifer (COA well)[a] |
| Eubank-2 | 1997 | | ✓ | Regional aquifer (COA well)[a] |
| Eubank-3 | 1997 | | ✓ | Regional aquifer (COA well)[a] |
| Eubank-5 | 1997 | | ✓ | Regional aquifer (COA well)[a] |
| PGS-2 | 1995 | ✓ | ✓ | Regional aquifer |
| TA1-W-01 | 1997 | ✓ | ✓ | Regional aquifer |
| TA1-W-02 | 1998 | ✓ | ✓ | Regional aquifer |
| TA1-W-03 | 1998 | ✓ | ✓ | PGWS |
| TA1-W-04 | 1998 | ✓ | ✓ | Regional aquifer |
| TA1-W-05 | 1998 | ✓ | ✓ | Regional aquifer |
| TA1-W-06 | 1998 | ✓ | ✓ | PGWS |
| TA1-W-07 | 1998 | | ✓ | PGWS |
| TA1-W-08 | 2001 | ✓ | ✓ | PGWS |
| TA2-NW1-595 | 1993 | ✓ | ✓ | Regional aquifer |
| TA2-NW1-325 | 1993 | | ✓ | PGWS |
| TA2-SW1-320 | 1992 | ✓ | ✓ | PGWS |
| TA2-W-01 | 1994 | ✓ | ✓ | PGWS |
| TA2-W-19 | 1995 | ✓ | ✓ | PGWS |
| TA2-W-24 | 1998 | | ✓ | Regional aquifer |
| TA2-W-25 | 1997 | | ✓ | Regional aquifer |
| TA2-W-26 | 1998 | ✓ | ✓ | PGWS |
| TA2-W-27 | 1998 | ✓ | ✓ | PGWS |
| TJA-2 | 1994 | ✓ | ✓ | PGWS |
| TJA-3 | 1998 | ✓ | ✓ | Regional aquifer |
| TJA-4 | 1998 | ✓ | ✓ | Regional aquifer |
| TJA-5 | 1998 | | ✓ | PGWS |
| TJA-6 | 2001 | ✓ | ✓ | Regional aquifer |
| TJA-7 | 2001 | ✓ | ✓ | PGWS |
| WYO-3 | 2001 | ✓ | ✓ | Regional aquifer |
| WYO-4 | 2001 | ✓ | ✓ | PGWS |

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

[a]WL data for Eubank-2, Eubank-3, and Eubank- 5 provided by Environmental Service Division of the City of Albuquerque Environmental Health Department.

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

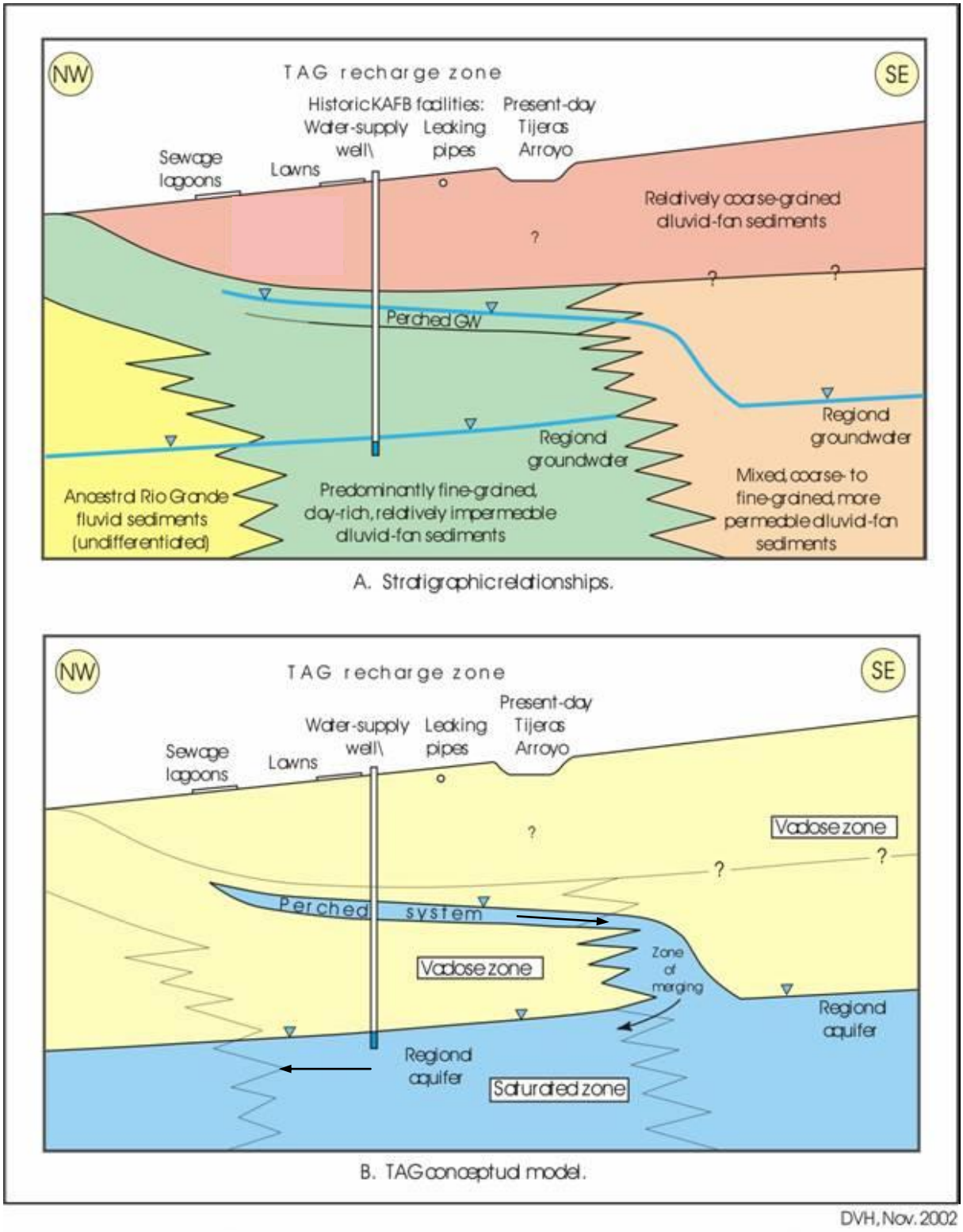



**Figure 6-3. TAG Conceptual Model Illustration (Van Hart June 2003)**

Data pertaining to the hydrogeologic setting have been synthesized into the TAG conceptual model. The hydrogeologic setting for the TAG Study Area is well understood and based on a significant number of monitoring wells. Groundwater occurs in both the PGWS and regional aquifer. However, the PGWS has a limited lateral extent that encompasses approximately 3.8 sq mi of north-central KAFB. The PGWS may extend northward across the KAFB boundary. In the TAG Study Area, the depth to groundwater for the PGWS ranges from 220 to 330 ft bgs. The uppermost saturated zone in the PGWS varies from approximately 10 to 30 ft in thickness, depending on the well location. Borehole geophysical surveys indicate that a few relatively damp intervals are present below the uppermost saturated zone, but borehole-yield testing has revealed that most of these deeper intervals are too thin or permeable to yield sufficient volumes of water for the construction of monitoring wells. The PGWS is not used as a potable water supply source.

The direction of groundwater flow in the PGWS is to the southeast. Groundwater flows through low-yield, alluvial-fan sediments with an average hydraulic gradient of approximately 0.007 feet per foot (ft/ft). Groundwater elevations in the PGWS are decreasing in the northwestern portion of the study area, but are increasing in the southeastern area. The PGWS is recharged by both artificial (leaking water supply/sewer lines and previously by the former KAFB sewage lagoons) and natural sources (Tijeras Arroyo and possibly ancestral Tijeras Creek). Principal hydrogeologic controls on the PGWS include eastward bedding-plane dip attributed to the western limb of an inferred syncline; stratigraphic variations (i.e., braided paleochannels); and multiple recharge locations in the northwestern portion of the TAG Study Area.

Multiple overlapping lenses and layers of low conductivity, mostly unsaturated sediments, serve as a perching horizon beneath the PGWS. Beneath the central TAG Study Area, a layer of approximately 180 to 280 ft of these unsaturated sediments separates the PGWS from the regional aquifer. Groundwater in the PGWS merges with the regional aquifer southeast of Tijeras Arroyo where the alluvial-fan sediments are slightly more permeable.

The regional aquifer is more laterally extensive than the PGWS, underlying the entire TAG Study Area as well as the Albuquerque Basin. Across the TAG Study Area, the depth to the regional aquifer ranges from approximately 440 to 570 ft bgs. The regional aquifer is composed of both the Ancestral Rio Grande (ARG) fluvial lithofacies and the alluvial-fan lithofacies. Locally, groundwater in the regional aquifer flows to the northwest, in a nearly opposite direction to that of the PGWS. The gradient in the regional aquifer averages approximately 0.018 ft/ft across the TAG Study Area, but is steeper near water-supply wells operated by KAFB, the ABCWUA, and the Veterans Administration (VA). The regional aquifer is recharged on the eastern side of the study area by natural sources including mountain-front flow, Tijeras Arroyo, and the PGWS. The mounding shown on the base-wide potentiometric surface map (Plate 1), approximately 1 mile east of TA-II, indicates that underflow along Tijeras Arroyo is most likely recharging the regional aquifer to some degree. Groundwater elevations in the regional aquifer are influenced by water-supply pumping. Seasonal pumping variations cause sporadic water-level fluctuations in some monitoring wells near the water-supply wells. The principal hydrogeologic control upon groundwater flow direction in the regional aquifer is the combined drawdown effect of the KAFB, ABCWUA, and VA water-supply wells.

The aqueous geochemical signatures of the PGWS and the regional aquifer are distinctive. The geochemical signature of the PGWS varies slightly between well locations, but tends to exhibit higher concentrations of calcium, sulfate, and chloride than those for the regional aquifer. Groundwater in the regional aquifer exhibits higher bicarbonate/alkalinity concentrations.

#### 6.1.7.1 Regional Hydrogeologic Conditions

Tijeras Arroyo is the most significant surface-water drainage feature on KAFB and trends southwest across KAFB and eventually drains into the Rio Grande, approximately 3 miles west of KAFB. Surface water flows in the arroyo several times per year as a result of significant thunderstorms. The average annual precipitation for the area, as measured at Albuquerque International Sunport, is 8.2 inches (SNL February 2001). During most rainfall events, rainfall quickly infiltrates into the soil in the study area. However, virtually all of the moisture subsequently undergoes evapotranspiration. Estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL February 1998).

The TAG Study Area overlies the eastern margin of the Albuquerque Basin where the basin-bounding faults mostly trend parallel to the Sandia-Manzanita-Manzano mountain front. The stratigraphic unit of greatest interest is the Upper Santa Fe Group, which is primarily composed of two interfingering lithofacies: an alluvial-fan lithofacies and the ARG fluvial lithofacies. Both lithofacies are less than 5 Mega Annum (Ma) and are composed of unconsolidated to poorly cemented gravel, sand, silt, and clay (Stone et al. February 2000). The alluvial-fan lithofacies consists of poorly sorted piedmont-slope deposits derived from the Sandia, Manzanita, and Manzano Mountains east of the study area. Fine-grained units within the alluvial-fan lithofacies produce low-permeability zones that are capable of perching groundwater. The ARG fluvial lithofacies is derived from northern sources and is typically well sorted and medium- to coarse-grained.

#### 6.1.7.2 Hydrologic Conditions at the TAG Study Area

The thickness of the vadose zone is reduced in the central portion of the TAG Study Area where the PGWS is present. Discontinuous, yet overlapping multiple lenses of unsaturated alluvial-fan sediments serve as a perching horizon beneath the PGWS in that area. The PGWS is present at approximately 220 to 330 ft bgs, and the regional aquifer system is present at approximately 440 to 570 ft bgs. Groundwater in the PGWS most likely merges with the regional aquifer southeast of Tijeras Arroyo where the alluvial-fan sediments are slightly more permeable.

A comparison of aquifer characteristics for the PGWS and the regional aquifer in the TAG Study Area is provided in Table 6-3. The PGWS covers approximately 3.8 sq mi. Monitoring wells bound the PGWS on the western and southern margins. The northern margin of the PGWS has not been fully defined and may extend across the northern KAFB boundary (Figure 6-1). A southeastern margin is not discernible because the PGWS merges with the regional aquifer. The direction of groundwater flow in the PGWS is inferred to be principally to the southeast, with an average horizontal gradient of approximately 0.007 ft/ft. The horizontal gradient of the PGWS is variable across the TAG Study Area (Figure 6-4). Beneath TA-I, TA-II, and TA-VI, the horizontal gradient varies from 0.005 to 0.017 ft/ft. The horizontal gradient is steeper east of TA-II at 0.04 ft/ft. The vertical gradient is approximately 0.95 ft/ft over most of the PGWS, and continuous vertical flow is suggested by the merging of the two groundwater systems to the southeast.

#### 6.1.7.3 Local Direction of Flow

Figure 6-4 presents the October 2013 potentiometric surface for the PGWS. The direction of groundwater flow in the PGWS is toward the southeast. The average horizontal gradient of the PGWS is approximately 0.007 ft/ft. Historically, water levels in the PGWS have fluctuated across the study area (SNL November 2005). In the vicinity of the former sewage lagoons, water levels have been declining since 1987, apparently in response to the lagoons being removed from service. Conversely, water levels have increased southeast of Tijeras Arroyo in some regional aquifer monitoring wells in response to ongoing water operations (BGW February 2001) (Attachment 6C, Figures 6C-6).

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

| Characteristic | PGWS | Regional Aquifer |
|---|---|---|
| Pressure Head | Unconfined (water table) conditions. | Unconfined to semi-confined conditions. |
| Lithofacies Distribution | Restricted to the alluvial-fan lithofacies. | Contained within both the alluvial-fan lithofacies and the ARG fluvial lithofacies. |
| Flow Direction | Primarily to the southeast. | Primarily to the northwest. |
| Horizontal Gradient | Approximate average of 0.007 ft/ft. | Approximate average of 0.018 ft/ft, but steeper near water-supply wells. |
| Flow velocities | 4 to 10 ft/yr, laterally. | 4 to 10 ft/yr, laterally. |
| Usage | Not used for water supply purposes. | Utilized for water supply by KAFB, ABCWUA, and VA. |
| Lateral extent | Limited lateral extent across north-central KAFB. | Laterally extensive across the Albuquerque Basin. |
| Saturated Thickness | Uppermost saturated interval only about 10 to 30 ft in thickness. | In excess of 1,000 ft in thickness across much of the study area. |
| Geochemical Variability | Geochemical signatures variable between monitoring wells. | Geochemical signatures consistent between monitoring wells. |
| Geochemical Uniqueness | High chloride, nitrate, and sulfate concentrations. | Low calcium concentrations, but high bicarbonate/alkalinity concentrations. |
| Water levels | Steadily declining water levels in the northwest, but increasing in the southeast part of the TAG Study Area. | Increasing water levels in the north, declining water levels in the center, and increasing in the southeastern part of the TAG Study Area. |
| Recharge | Recharged by both anthropogenic (leaking water supply/sewer lines, irrigated lawns, Tijeras Arroyo Golf Course), and natural sources, such as Tijeras Arroyo. | Recharged by natural sources including mountain front flow, the PGWS, and Tijeras Arroyo. |
| Principal Hydrologic Controls | Stratigraphic variations such as multiple overlapping lenses; several recharge locations; stratigraphic dip of the alluvial-fan sediments. | Combined drawdown of KAFB, ABCWUA, and VA water-supply wells. |

**NOTES:**
ABCWUA = Albuquerque Bernalillo County Water Utility Authority.
ARG = Ancestral Rio Grande (lithofacies).
ft = Foot (feet).
ft/ft = Feet per foot.
ft/yr = Feet per year.
KAFB = Kirtland Air Force Base.
PGWS = Perched Groundwater System.
SNL = Sandia National Laboratories.
TAG = Tijeras Arroyo Groundwater.
VA = Veterans Administration.

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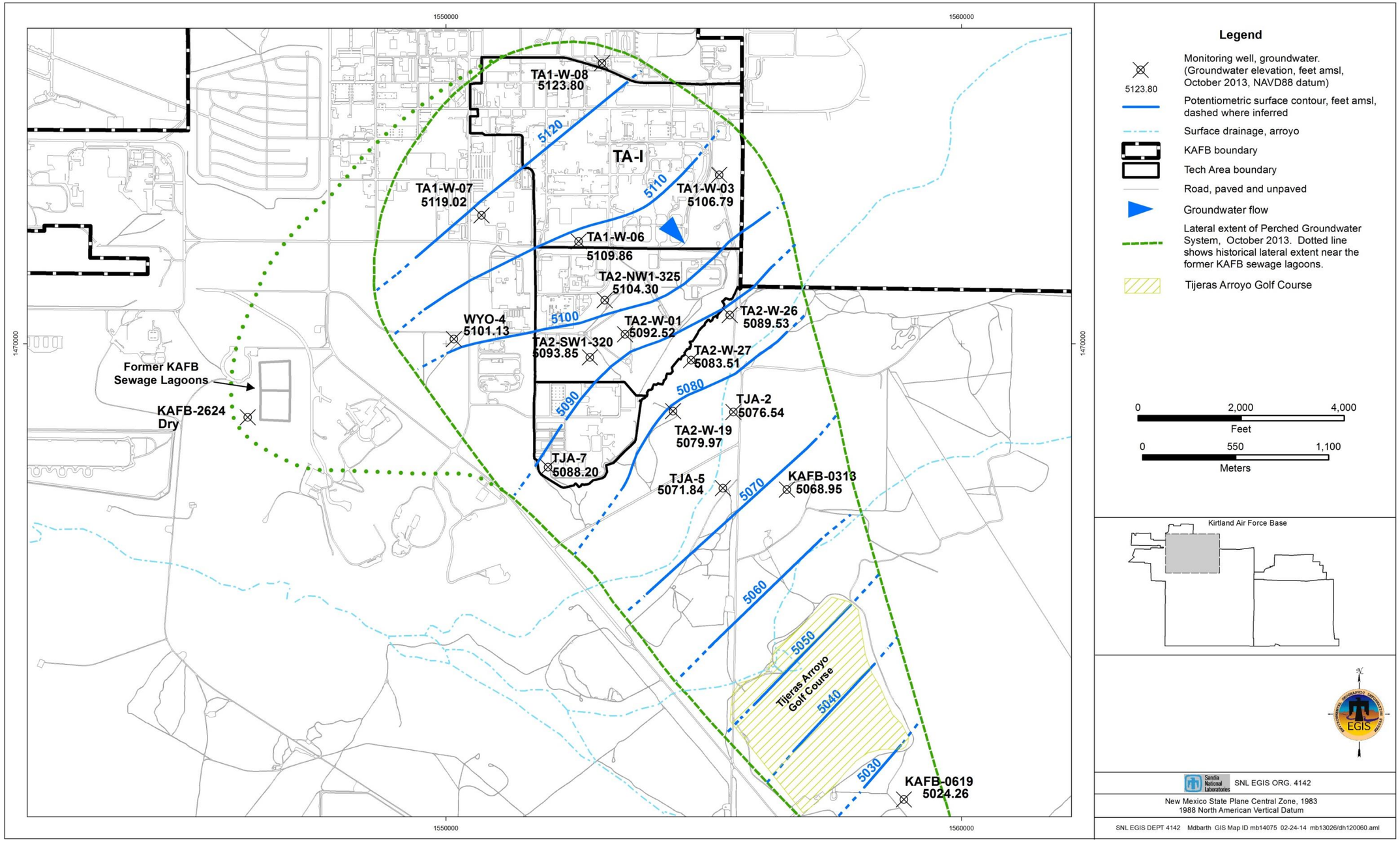


**Figure 6-4. Tijeras Arroyo Groundwater Investigation Potentiometric Surface Map for the Perched Groundwater System (October 2013)**

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Figure 6-5 presents the October 2013 potentiometric surface for the regional aquifer. The direction of groundwater flow in the regional aquifer is to the northwest toward the KAFB, ABCWUA, and VA water-supply wells. The horizontal gradient of the regional aquifer across the central portion of the study area is approximately 0.018 ft/ft. Vertical flow gradients within the TAG Study Area have not been measured, but are inferred to be downward, consistent with other SNL/NM groundwater study areas.

Historically, water levels in the regional aquifer have fluctuated across the study area (SNL November 2005) (Attachment 6C, Figures 6C-1 through 6C-7). A line of demarcation between increasing and declining water levels is evident along the eastern extent of the ARG-fluvial lithofacies. Increases in groundwater elevations of up to 1.8 feet per year (ft/yr) in the southeast portion of the study area reflect recharge of the regional aquifer from the PGWS, Tijeras Arroyo, the golf course, and the mountain front. Until recently, declining water levels approaching 1.5 ft/yr were associated with long-term pumping of KAFB, ABCWUA, and VA water-supply wells. However, since late 2008, hydrographs for regional aquifer wells in the northern part of the TAG Study Area show an increasing trend in groundwater elevations. For example, hydrographs for monitoring wells TA1-W-01, TA1-W-02, TA1-W-04, and WYO-3 show recent increases in groundwater elevations (Attachment 6C, Figures 6C-1 and 6C-2). Presumably, this is in response to the ABCWUA transitioning to surface water withdrawals for potable water supplies and decreasing dependence on water-supply wells immediately north of KAFB.

#### 6.1.7.4 Contaminant Sources

Personnel from the DOE/NNSA and Sandia, the KAFB Environmental Compliance Program, and the COA have evaluated a variety of potentially contaminated sites. The TAG Investigation Report (SNL November 2005) presents a comprehensive summary of the environmental investigations that have been conducted by these three parties. As described in the TAG Investigation Report, two potential TCE and three potential nitrate sources are believed to be the responsibility of DOE/NNSA and Sandia. A brief description of each potential release site is provided as follows.

**SWMU 46 (Old Acid Waste Line Outfall)—TCE and Nitrate:** An estimated 1.3 billion gallons of wastewater from six TA-I research/office buildings (839, 840, 841, 860, 863, and 892) discharged into the three outfall ditches at the south end of SWMU 226 where SWMU 46 is located. TCE and nitrate were possibly present in the wastewater. Septic water from possible cross connects between the SWMU 226 waste line and sewer lines may have discharged at SWMU 46. In 2000, two soil-vapor monitoring wells were installed at SWMU 46, and soil-vapor sampling was conducted quarterly. Monitoring well 46-VW-01 is located near the waste-line outfall, and soil-vapor sampling ports are set at 50-ft intervals from 15 to 265 ft bgs. The maximum TCE concentration to date is 46,000 parts per billion by volume (ppbv) from the port set at 115 ft bgs. Monitoring well 46-VW-02, located 900 ft farther southeast, has soil-vapor sampling ports set at 50-ft intervals from 46 to 296 ft bgs. The maximum TCE concentration to date at this well is 650 ppbv from the port set at 96 ft bgs.

**SWMU 165 (Building 901 Septic System)—TCE and Nitrate:** The TA-II septic system leach field was connected to a personnel shower/laundry facility (Building 901) and small research/machine shop (Building 902). Nitrate was most likely present in the septic waste water. Possible TCE and high explosive compounds were present in the wastewater. No significant contamination has been detected in soil samples. Groundwater samples from PGWS monitoring well TA2-SW1-320 have contained a maximum nitrate concentration of 44 mg/L.

**SWMU 187 (TA-I Sanitary Sewer System)—Nitrate:** The sanitary sewer system has sewer lines that possibly leaked in the past and possibly had several cross connects with wastewater lines. The system is connected to numerous research/office buildings in TA-I. No significant contamination has been detected in soil samples.

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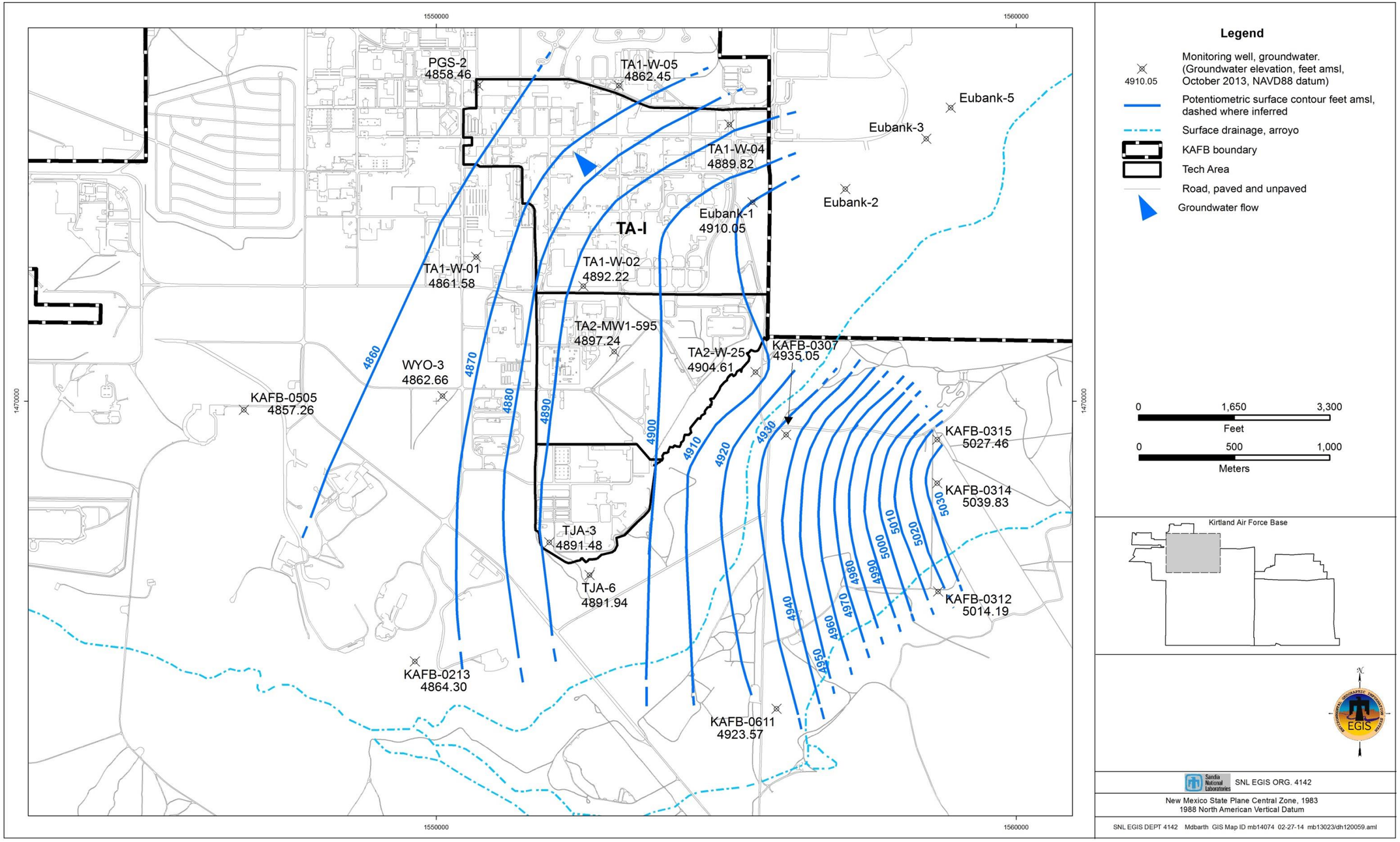


**Figure 6-5. Tijeras Arroyo Groundwater Investigation Potentiometric Surface Map for the Regional Aquifer (October 2013)**

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Soil-vapor and soil samples collected from the vadose zone (land surface to the water table) during drilling operations and from the soil-vapor monitoring network have indicated evidence of vapor-phase volatile organic compounds (VOCs). However, no free phase TCE and no water-saturated core samples have been encountered in any of the soil samples collected from the boreholes. The original source of the TCE was the aqueous phase (i.e., wastewater), and the current vapor phase contaminants have partitioned from the aqueous phase. All anthropogenic sources of recharge (i.e., wastewater) have been removed from service and no longer contribute water to the vadose zone at TA-I.

Based on soil-vapor data (SNL November 2005), the mass of TCE that the vapor phase is contributing to the regional aquifer is minimal. In addition, the consistency of soil-vapor concentrations over time indicates that this TCE soil-vapor plume is immobile. Therefore, the only potential mechanism for transporting these contaminants to the aquifer would be through partitioning back into the aqueous phase and additional recharge that might move through the system. Given that both current anthropogenic and natural recharge to the PGWS is minimal, it is extremely unlikely that significant transport of the vadose zone TCE into the aquifer will occur. Therefore, the vapor phase TCE in the vadose zone is not considered to be a continuing source of contamination to the groundwater that needs to be addressed under the source control criteria defined in the *RCRA Corrective Action Plan (Final)* (EPA May 1994).

Nitrate was present in sewage wastewater discharged to SNL/NM, KAFB, and ABCWUA septic systems and sanitary sewer lines in the area. The nitrate was transported to the PGWS water table by high volumes of wastewater disposed of at various locations. Because nitrate is extremely soluble and cannot exist as a separate phase (i.e., vapor or nonaqueous phase liquid), and because no water-saturated core samples have been encountered in any of the soil samples collected from boreholes, a secondary source of anthropogenic nitrate contamination in the vadose zone does not exist.

#### 6.1.7.5 Contaminant Distribution and Transport in Groundwater

**Perched Groundwater System**

The distribution of TCE in groundwater is discontinuous across the PGWS and does not indicate a single release site. Based on the historic use of chlorinated solvents across SNL/NM and KAFB, the known extent of TCE in the PGWS is associated with multiple releases of aqueous-phase solvents and subsequent transport through the vadose zone.

The maximum historical concentration of TCE in the PGWS is 9.6 µg/L, which was collected from monitoring well TA2-W-26 in March 1998. The results for groundwater samples from only three TAG Study Area monitoring wells (TA2-W-19, TA2-W-26, and WYO-4) have exceeded the MCL for TCE (5 µg/L).

The maximum historical concentration of nitrate in the PGWS within the TAG Study Area is 44 mg/L for monitoring well TA2-SW1-320. Concentrations of nitrate in the PGWS exceeding the MCL for nitrate (10 mg/L) are scattered across the TAG Study Area. Historically, two plumes have been identified in the PGWS, consisting of Plume 3 beneath SNL/NM TA-II and Plume 4 beneath the Tijeras Arroyo Golf Course (MWH Americas, Inc. July 2003). However, the subsequent installation and sampling of several monitoring wells failed to identify a boundary between Plumes 3 and 4. Therefore, the PGWS nitrate plume is now shown as one contiguous plume and is referred to as Plume 4 (CH2M HILL, Inc. June 2009).

Plume 4, which originates near monitoring well TA2-SW1-320, is located beneath the southwest portion of TA-II and extends southward to the Tijeras Arroyo Golf Course. The plume is 2 miles long and 0.8 miles wide (CH2M HILL, Inc. June 2009), and the upgradient portion is considered to emanate from SWMU 165, the Building 901 Septic System.

**Regional Aquifer**

The regional aquifer monitoring wells have generally yielded no groundwater samples with detectable TCE concentrations except for low-level detections in samples from monitoring well TJA-3. No sample results for the SNL/NM TAG Study Area regional aquifer monitoring wells exceed the MCL of 5 µg/L for TCE.

For the regional aquifer, groundwater samples from nine SNL/NM TAG Study Area monitoring wells have exceeded the MCL for nitrate during at least one sampling event. The maximum historical concentration of nitrate for monitoring wells completed in the regional aquifer is 49 mg/L for monitoring well TJA-4. The nitrate contamination in the regional aquifer southeast of TA-II forms what is referred to as Plume 2 (CH2M HILL, Inc. June 2009). Plume 2 is most likely responsible for the nitrate concentrations in samples from monitoring well TJA-4, a well near where the PGWS and regional aquifer merge. Plume 2 is 3 miles long and 1.5 miles wide and the potential sources of nitrate contamination are not completely defined.

Potential downgradient receptors for the TAG nitrate and TCE plumes are the ABCWUA, KAFB, and VA production wells located to the north and northwest of TA-I. Numerical simulations suggest that nitrate and TCE in the PGWS would migrate to the southeast, merge with the regional aquifer, and then travel back to the north and northwest. Additionally, downgradient concentrations of nitrate and TCE are decreasing in groundwater to below levels of concern through dispersion and dilution as the plume moves into the more hydraulically conductive deposits near the production wells.

## 6.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM ER Operations, as well as implements and enforces federal regulations mandated by Resource Conservation and Recovery Act (RCRA). All ER SWMUs and Areas of Concern are listed in Module IV of the SNL/NM RCRA Permit, *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518* (NMED 1993).

All corrective action requirements pertaining to the TAG Study Area are contained in the Order (NMED April 2004). The groundwater monitoring activities for the TAG investigation are not associated with a single SWMU, but have a broader scope. Groundwater characterization activities for TAG were originally conducted voluntarily as proposed in the Groundwater Investigation Plan (SNL March 1996b). Recently, TAG activities have been conducted as required by the NMED-approved TAG Investigation Work Plan (SNL June 2003).

The Order, effective in April 2004, transferred regulatory authority for corrective action requirements from the Hazardous and Solid Waste Amendments module of the SNL/NM RCRA Permit to the Order (NMED April 2004). The TAG investigation must comply with requirements set forth in the Order for site characterization and the development of a CME for the SNL Area of Responsibility (Figure 6-1). The Order also contains schedules that define dates for the delivery of plans and reports related to TAG. The NMED is the regulatory agency responsible for enforcing the CME requirements identified in the Order.

Although the Order requires that DOE/NNSA and Sandia evaluate the nature and extent of contamination in the TAG Study Area, no specific reporting requirements are prescribed in the Order (NMED April 2004). However, the TAG Investigation Report (SNL November 2005) specifies that data would continue to be presented in annual reports, such as this Annual Groundwater Monitoring Report. The outline of this report is based on the required elements of a "Periodic Monitoring Report" as described in Section X.D. of the Order (NMED April 2004).

In this Annual Groundwater Monitoring Report, TAG monitoring data are presented for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (i.e., gamma spectroscopy, gross alpha/beta activity, and tritium) are provided voluntarily by the DOE/NNSA and Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Order (NMED April 2004). Additional information on radionuclides, and the scope of the Order, is available in Section III.A of the Order.

## 6.3 Scope of Activities

The CY 2013 activities for the TAG investigation, including plans and reports, are listed in Section 6.1.5. However, the recent field activity completed in the study area was solely groundwater monitoring. The four groundwater sampling events are summarized in Table 6-4, and the analytical parameters for each well and each sampling event are listed in Table 6-5.

Quality control (QC) samples are collected in the field at the time of environmental sample collection. Field QC samples include duplicate environmental, equipment blank (EB), field blank (FB), split, and trip blank (TB) samples. Field QC samples are used to monitor the sampling process. Duplicate environmental samples are used to measure the precision of the sampling process. EB samples are used to verify the effectiveness of sampling equipment decontamination procedures. Split samples are used to verify the performance of the analytical laboratory. TB samples are used to determine whether VOCs contaminated the sample during preparation, transportation, and handling prior to receipt by the analytical laboratory.

## 6.4 Field Methods and Measurements

The monitoring procedures conducted for TAG groundwater monitoring are described in detail in Section 1.3. The water level information was used to create the potentiometric surface maps presented in Figures 6-4 and 6-5 and the hydrographs presented in Attachment 6C.

## 6.5 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using EPA-specified protocols described in Section 1.3.2 (Tables 1-5 and 1-6).

## 6.6 Summary of Analytical Results

This section discusses monitoring results, exceedances of standards, and pertinent trends in concentrations for COCs in the TAG Study Area that exceeded standards. The analytical results and field measurements for all TAG sampling events are presented in Attachment 6A, Tables 6A-1 through 6A-7; concentration trend plots for COCs that exceed the MCLs are presented in Attachment 6B, Figures 6B-1 through 6B-6. A summary of detected VOC results is presented in Table 6A-1. The method detection limits (MDLs) for all analyzed VOCs are listed in Table 6A-2.

The VOCs detected at low concentrations in groundwater samples from TAG Study Area monitoring wells include the following:

- 1,1-Dichloroethane
- 1,1-Dichloroethene
- Bromodichloromethane
- Chloroform
- cis-1,2-Dichloroethene
- Tetrachloroethene
- TCE
- Toluene

**Table 6-4. Groundwater Monitoring Well Network and Sampling Dates for the TAG Study Area, Calendar Year 2013**

| Date of Sampling Event | Wells Sampled | | SAP |
|---|---|---|---|
| March 2013 | TA2-SW1-320<br>TA2-W-01<br>TA2-W-19<br>TA2-W-26<br>TA2-W-27<br>TJA-2 | TJA-3<br>TJA-4<br>TJA-6<br>TJA-7<br>WYO-4 | *Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY13, 2nd Quarter Sampling* (SNL February 2013) |
| June 2013 | TA2-SW1-320<br>TA2-W-19<br>TA2-W-26<br>TJA-2 | TJA-4<br>TJA-7<br>WYO-4 | *Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY13, 3rd Quarter Sampling* (SNL May 2013) |
| August/September 2013 | PGS-2<br>TA1-W-01<br>TA1-W-02<br>TA1-W-03<br>TA1-W-04<br>TA1-W-05<br>TA1-W-06<br>TA1-W-08<br>TA2-NW1-595<br>TA2-SW1-320<br>TA2-W-01 | TA2-W-19<br>TA2-W-26<br>TA2-W-27<br>TJA-2<br>TJA-3<br>TJA-4<br>TJA-6<br>TJA-7<br>WYO-3<br>WYO-4 | *Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY13, 4th Quarter Sampling* (SNL July 2013) |
| November 2013 | TA2-SW1-320<br>TA2-W-19<br>TA2-W-26<br>TJA-2 | TJA-3<br>TJA-4<br>TJA-7<br>WYO-4 | *Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY14, 1st Quarter Sampling* (SNL October 2013) |

**NOTES:**
FY = Fiscal Year.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories.
TAG = Tijeras Arroyo Groundwater.

**Table 6-5. Parameters Sampled at TAG Wells for Each Sampling Event, Calendar Year 2013**

| Parameter | March 2013 | | |
|---|---|---|---|
| NPN<br>VOCs | TA2-SW1-320 (low-flow)<br>TA2-W-01<br>TA2-W-19<br>TA2-W-26<br>TA2-W-27 | TA2-W-27 (dup)<br>TJA-2<br>TJA-3<br>TJA-4<br>TJA-6 | TJA-7<br>TJA-7 (dup)<br>WYO-4 |
| **Parameter** | **June 2013** | | |
| NPN<br>VOCs | TA2-SW1-320 (low-flow)<br>TA2-W-19<br>TA2-W-26<br>TA2-W-26 (dup) | TJA-2<br>TJA-4<br>TJA-7<br>WYO-4 | |
| **Parameter** | **August/September 2013** | | |
| Alkalinity<br>Anions<br>Gamma Spec*<br>Gross alpha/beta activity<br>NPN<br>TAL Metals, plus Total Uranium<br>Tritium<br>VOCs | PGS-2 (low-flow)<br>TA1-W-01<br>TA1-W-02<br>TA1-W-02 (dup)<br>TA1-W-03<br>TA1-W-04<br>TA1-W-05<br>TA1-W-06 | TA1-W-08<br>TA2-NW1-595<br>TA2-SW1-320 (low-flow)<br>TA2-W-01<br>TA2-W-19<br>TA2-W-26<br>TA2-W-27<br>TJA-2 | TJA-2 (dup)<br>TJA-3<br>TJA-4<br>TJA-6<br>TJA-7<br>WYO-3<br>WYO-3 (dup)<br>WYO-4 |
| **Parameter** | **November 2013** | | |
| NPN<br>VOCs | TA2-SW1-320 (low flow)<br>TA2-W-19<br>TA2-W-26<br>TJA-2<br>TJA-3 | TJA-3 (dup)<br>TJA-4<br>TJA-4 (dup)<br>TJA-7<br>WYO-4 | |

**NOTES:**

dup = Duplicate sample.
Gamma Spec* = Gamma spectroscopy short list (americium-241, cesium-137, cobalt-60, and potassium-40).
NPN = Nitrate plus nitrite (reported as nitrogen).
Low-flow = QED™ Environmental Systems or Geotech Environmental Equipment, Inc. (low-flow sampling system).
TAG = Tijeras Arroyo Groundwater.
TAL = Target Analyte List.
VOC = Volatile organic compound.

Eight VOCs were detected during CY 2013. Five of these VOCs have promulgated MCLs. Only TCE exceeds its MCL of 5 µg/L (Table 6A-1). TCE was detected above the MCL in the sample from one PGWS monitoring well, WYO-4. The maximum concentration of TCE reported for monitoring well WYO-4 during this reporting period is 9.23 µg/L in the sample collected during the August 2013 sampling event. Figure 6B-1 (Attachment 6B) shows that the TCE concentrations in samples from monitoring well WYO-4 slightly exceed the MCL, and the trend ranges from stable to slightly increasing over time.

The analytical results for nitrate plus nitrite (NPN) (reported as nitrogen) are presented in Table 6A-3 (Attachment 6A). The NPN results exceed the MCL of 10 mg/L in samples from monitoring wells TA2-SW1-320, TA2-W-19, TJA-2, TJA-4, and TJA-7. The maximum concentration of NPN detected during this reporting period is 38.5 mg/L in the duplicate sample from monitoring well TJA-4 collected during the November 2013 sampling event. Figures 6B-2 through 6B-6 (Attachment 6B) show that the NPN concentrations in monitoring wells TA2-SW1-320, TJA-4, and TJA-7 have generally

exceeded the MCL for the duration of the wells, and trends range from slightly increasing to slightly decreasing over time. In contrast, NPN concentrations in monitoring wells TA2-W-19 and TJA-2 only occasionally exceeded the MCL, and trends are slightly increasing over time.

Analytical results for anions and alkalinity are presented in Table 6A-4; no anion concentrations exceed established MCLs. Total metal analytical results are presented in Table 6A-5; no metal results exceed established MCLs.

Gross alpha activity is measured as a screening tool and in accordance with 40 Code of Federal Regulations, Parts 9, 141, and 142, Table I-4 does not include uranium, which is measured independently. Therefore, gross alpha activity measurements were corrected by subtracting the total uranium activity. Radiological results are further reviewed by an SNL/NM Certified Health Physicist to assure that the samples are nonradioactive. Groundwater samples were analyzed for tritium, gross alpha/beta activity, and gamma-emitting radionuclides. The results are presented in Table 6A-6. All radionuclide activities are below MCLs, where established.

Field water quality parameters are measured during purging of each well prior to sampling and include temperature, specific conductance, oxidation-reduction potential, pH, turbidity, and dissolved oxygen. The parameter measurements obtained immediately before collecting the samples are presented in Table 6A-7.

## 6.7 Quality Control Results

Field and laboratory QC samples were collected and prepared as described in Section 1.3. Data validation qualifiers are provided with the analytical results in Tables 6A-1 through 6A-6 (Attachment 6A). The results of QC samples and the impact on data quality for the TAG quarterly sampling events are discussed in the following paragraphs.

Duplicate sample results for all wells and all sampling periods show good correlation for all calculated parameters (relative percent difference values less than 20 for organic compounds and less than 35 for inorganic analyses).

The results for the EB analyses are as follows:

- **March 2013 Sampling Event—**The EB sample was collected prior to sampling monitoring wells TA2-W-27 and TJA-7 and submitted for analysis of VOCs and NPN. The organic compounds bromodichloromethane, chloroform, and dibromochloromethane were detected in the EB samples. No corrective action was required, because these compounds were not detected in the associated environmental samples.

- **June 2013 Sampling Event—**An EB sample was collected prior to sampling monitoring well TA2-W-26 and submitted for analysis of VOCs and NPN. Bromodichloromethane and chloroform were detected in the EB sample. No corrective action was required for bromodichloromethane because this compound was not detected in the associated environmental sample. Chloroform results in associated environmental samples were qualified as not detected during data validation because sample results are less than 5 times the EB value.

- **August/September 2013 Sampling Event—**EB samples were collected prior to sampling monitoring wells TA1-W-02, TJA-2, and WYO-3 and submitted for VOC, NPN, anions, alkalinity, metals, gamma spectroscopy, gross alpha, gross beta, and tritium analyses. Acetone, bromodichloromethane, chloroform, chloride, copper, dibromochloromethane, and NPN were detected above laboratory MDLs. No corrective action was necessary for

acetone, bromodichloromethane, chloroform, chloride, dibromochloromethane, or NPN because these analytes were not detected in environmental samples, nor were detected in environmental samples at concentrations greater than five times the blank result. Copper was detected in environmental samples at concentrations less than five times the associated EB results, the reported concentrations for copper was qualified as not detected during data validation.

- **November 2013 Sampling Event—**EB samples were collected prior to sampling monitoring wells TJA-3 and TJA-4 and submitted for analysis of VOCs and NPN. Bromodichloromethane, bromoform, chloroform, and dibromochloromethane were detected in the EB samples. No corrective action was required because these compounds were not detected in the associated environmental samples.

The results for the TB analyses are as follows:

- **March 2013 Sampling Event—**No VOCs were detected above laboratory MDLs in any TB sample.

- **June 2013 Sampling Event—**No VOCs were detected above laboratory MDLs in any TB sample.

- **August/September 2013 Sampling Event—**No VOCs were detected above laboratory MDLs in any TB sample.

- **November 2013 Sampling Event—**No VOCs were detected above laboratory MDLs in any TB sample.

The results for the FB analyses are as follows:

- **March 2013 Sampling Event—**FB samples were collected at monitoring wells TJA-4 and TJA-6. The compounds detected included bromodichloromethane, bromoform, chloroform, and dibromochloromethane. No corrective action was required, because these compounds were not detected in the associated environmental samples.

- **June 2013 Sampling Event—**A FB sample was collected at monitoring well TJA-2. The compounds detected included acetone, bromodichloromethane, chloroform, and dibromochloromethane. No corrective action was required, because these compounds were not detected in the associated environmental samples.

- **August/September 2013 Sampling Event—**FB samples were collected at monitoring wells TA1-W-03, TA2-NW1-595, and TJA-3. The compounds detected in FB samples included bromodichloromethane and chloroform. No corrective action was required for bromodichloromethane, because this compound was not detected in the associated environmental samples. Chloroform in monitoring well TA1-W-03 was qualified as not detected during data validation, because the compound was reported in the FB at a concentration greater than the environmental sample result.

- **November 2013 Sampling Event—**A FB sample was collected at monitoring well TJA-2. The compounds detected included bromodichloromethane, bromoform, chloroform, and dibromochloromethane. No corrective action was required, because these compounds were not detected in the associated environmental sample.

Laboratory data qualifiers are provided with the analytical results in Tables 6A-1 through 6A-6 (Attachment 6A).

### 6.8 Variances and Nonconformances

No variances or nonconformances from field or sampling requirements specified in the TAG Investigation Mini-Sampling and Analysis Plans (SAPs) (SNL February 2013, May 2013, July 2013, and October 2013) were noted during sampling activities. However, project-specific issues associated with these sampling events are noted as follows:

- **All Sampling Events—**(1) Monitoring well WYO-4 was purged dry prior to sampling. This well was allowed to recover to a minimum of 80 percent of the original water level and then samples were collected. (2) A QED Environmental Systems, Inc. (QED™) (MicroPurge® low-flow sampling method) sampling system was used to collect a groundwater sample from monitoring well PGS-2. (3) A Geotech Environmental Equipment, Inc. bladder pump sampling system was used to collect a groundwater sample from monitoring well TA2-SW1-320. Conventional sampling equipment cannot be lowered to the proper sampling depth in either of these two wells due to well construction issues.

- **March 2013 Sampling Event—**A new dedicated low flow sampling system manufactured by Geotech Environmental Equipment, Inc. was installed in monitoring well TA2-SW1-320.

- **June 2013 Sampling Event—**No variances, nonconformances, or project-specific issues relevant to requirements in the TAG Investigation mini-SAP (SNL May 2013) were identified during June 2013 sampling activities.

- **August/September 2013 Sampling Event—** No variances, nonconformances, or project-specific issues relevant to requirements in the TAG Investigation mini-SAP (SNL July 2013) were identified during August and September 2013 sampling activities.

- **November 2013 Sampling Event**—A VOC sample was collected from the source deionized water used during the equipment decontamination process. The compounds bromodichloromethane, bromoform, chloroform, and dibromochloromethane were detected at concentrations of 4.64 µg/L, 0.590 µg/L, 5.47 µg/L, and 3.46 µg/L, respectively.

### 6.9 Summary and Conclusions

This section provides a brief summary of activities, discussion of COCs that exceed standards, trends of concentrations versus time, the conceptual model, and plans for studies to be completed during CY 2014 at the TAG Study Area.

The TAG Study Area encompasses an area of approximately 40 sq mi in the north-central portion of KAFB. Groundwater investigations were initiated in 1992, and the current monitoring network consists of 21 monitoring wells for water quality analysis and 30 wells for water level measurements. For this reporting period, monitoring wells were sampled in March, June, August/September, and November 2013. The groundwater samples were analyzed for VOCs, NPN, anions, alkalinity, Target Analyte List metals (plus uranium), gross alpha/beta activity, tritium, and radionuclides by gamma spectroscopy. Depending on their locations and historical concentrations of COCs, the monitoring wells were sampled quarterly, semiannually, or annually during this reporting period.

Only NPN and TCE were detected above MCLs in groundwater samples from TAG Study Area wells. NPN concentrations exceed the MCL of 10 mg/L in samples from monitoring wells TA2-SW1-320, TA2-W-19, TJA-2, TJA-4, and TJA-7, with a maximum concentration of 38.5 mg/L in the sample from monitoring well TJA-4 collected during the November 2013 sampling event.

TCE concentrations exceed the MCL of 5 µg/L in samples from monitoring well WYO-4, which is screened in the PGWS. The maximum concentration of TCE detected for monitoring well WYO-4 during this reporting period is 9.23 µg/L in the sample collected during the August 2013 sampling event. TCE concentrations in monitoring well WYO-4 have slightly exceeded the MCL for the duration of the well, and the trend ranges from stable to slightly increasing over time.

The analytical results for this reporting period are consistent with historical concentrations. The following conclusions are based on a comprehensive review of available information for current groundwater contamination conditions in the TAG Study Area:

- The distribution of TCE in the PGWS is sporadic across the study area and reflects multiple release sites and the effect of stratigraphic heterogeneity.
- Based on the historical use and disposal of chlorinated solvents, the extent of TCE in groundwater is probably associated with multiple aqueous releases of solvents and subsequent vapor-phase transport through the vadose zone.
- The distribution of nitrate above the background level is laterally widespread in the PGWS.
- In the regional aquifer, concentrations of nitrate above the MCL occur in the western and southeastern portions of the TAG Study Area.
- The potential sources of TCE and/or nitrate in the TAG Study Area include the former sewage lagoons, wastewater outfalls, septic systems, landfills, sewer lines, and the golf course.
- The conceptual model described in Section 6.1.7 does not require modification based on the water level and analytical data for this reporting period.

Ongoing environmental studies of the TAG Study Area include the following:

- Continue collection of groundwater samples at the 21 TAG groundwater monitoring wells on a quarterly, semiannual, or annual basis. At a minimum, the analytes for groundwater sampling will consist of VOCs and nitrate.
- Continue periodic measurements of groundwater elevations in all TAG monitoring wells.
- Maintain contact with the KAFB Environmental Compliance Program personnel with respect to the results of TCE and nitrate abatement studies.
- As available, obtain groundwater results from KAFB, USGS, and the COA.
- Continue to integrate SNL/NM, KAFB, and COA data into the CME process currently underway for the SNL/NM area of responsibility.

- Continue to report future TAG investigation results in this SNL/NM Annual Groundwater Monitoring Report.

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

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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,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-W-01** | Tetrachloroethene | 0.320 | 0.300 | 1.00 | 5.00 | J | | 093663-001 | SW846 8260B |
| 06-Mar-13 | Trichloroethene | 1.48 | 0.300 | 1.00 | 5.00 | | | 093663-001 | SW846 8260B |
| **TA2-W-19** | 1,1-Dichloroethane | 0.460 | 0.300 | 1.00 | NE | J | | 093672-001 | SW846 8260B |
| 13-Mar-13 | Trichloroethene | 3.77 | 0.300 | 1.00 | 5.00 | | | 093672-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 0.480 | 0.300 | 1.00 | 70.0 | J | | 093672-001 | SW846 8260B |
| **TA2-W-26** | Chloroform | 0.340 | 0.300 | 1.00 | NE | J | | 093670-001 | SW846 8260B |
| 12-Mar-13 | Tetrachloroethene | 1.08 | 0.300 | 1.00 | 5.00 | | | 093670-001 | SW846 8260B |
| | Trichloroethene | 1.46 | 0.300 | 1.00 | 5.00 | | | 093670-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 0.380 | 0.300 | 1.00 | 70.0 | J | | 093670-001 | SW846 8260B |
| **TA2-W-27** | Tetrachloroethene | 1.17 | 0.300 | 1.00 | 5.00 | | | 093667-001 | SW846 8260B |
| 07-Mar-13 | Trichloroethene | 1.10 | 0.300 | 1.00 | 5.00 | | | 093667-001 | SW846 8260B |
| **TA2-W-27** (Duplicate) | Tetrachloroethene | 1.09 | 0.300 | 1.00 | 5.00 | | | 093668-001 | SW846 8260B |
| 07-Mar-13 | Trichloroethene | 1.06 | 0.300 | 1.00 | 5.00 | | | 093668-001 | SW846 8260B |
| **TJA-2** | 1,1-Dichloroethane | 0.430 | 0.300 | 1.00 | NE | J | | 093674-001 | SW846 8260B |
| 14-Mar-13 | Trichloroethene | 4.06 | 0.300 | 1.00 | 5.00 | | | 093674-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 0.420 | 0.300 | 1.00 | 70.0 | J | | 093674-001 | SW846 8260B |
| **TJA-7** 20-Mar-13 | Trichloroethene | 0.820 | 0.300 | 1.00 | 5.00 | J | | 093683-001 | SW846 8260B |
| **TJA-7** (Duplicate) 20-Mar-13 | Trichloroethene | 0.820 | 0.300 | 1.00 | 5.00 | J | | 093684-001 | SW846 8260B |
| **WYO-4** | 1,1-Dichloroethane | 1.07 | 0.300 | 1.00 | NE | | | 093676-001 | SW846 8260B |
| 18-Mar-13 | Bromodichloromethane | 0.760 | 0.300 | 1.00 | NE | J | J+ | 093676-001 | SW846 8260B |
| | Toluene | 0.450 | 0.300 | 1.00 | 1000 | J | | 093676-001 | SW846 8260B |
| | Trichloroethene | **8.40** | 0.300 | 1.00 | 5.00 | | | 093676-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 1.99 | 0.300 | 1.00 | 70.0 | | | 093676-001 | SW846 8260B |
| | | | | | | | | | |
| **TA2-W-19** | 1,1-Dichloroethane | 0.330 | 0.300 | 1.00 | NE | J | | 094033-001 | SW846 8260B |
| 19-Jun-13 | Trichloroethene | 2.35 | 0.300 | 1.00 | 5.00 | | | 094033-001 | SW846 8260B |
| **TA2-W-26** | Chloroform | 0.320 | 0.300 | 1.00 | NE | J | 1.0U | 094037-001 | SW846 8260B |
| 20-Jun-13 | Tetrachloroethene | 0.880 | 0.300 | 1.00 | 5.00 | J | | 094037-001 | SW846 8260B |
| | Trichloroethene | 0.950 | 0.300 | 1.00 | 5.00 | J | | 094037-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 0.370 | 0.300 | 1.00 | 70.0 | J | | 094037-001 | SW846 8260B |
| **TA2-W-26** (Duplicate) | Chloroform | 0.310 | 0.300 | 1.00 | NE | J | 1.0U | 094038-001 | SW846 8260B |
| 20-Jun-13 | Tetrachloroethene | 0.830 | 0.300 | 1.00 | 5.00 | J | | 094038-001 | SW846 8260B |
| | Trichloroethene | 0.960 | 0.300 | 1.00 | 5.00 | J | | 094038-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 0.320 | 0.300 | 1.00 | 70.0 | J | | 094038-001 | SW846 8260B |

Refer to footnotes on page 6A-49.

## Table 6A-1 *(Continued)*
## Summary of Detected Volatile Organic Compounds,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-2** 18-Jun-13 | 1,1-Dichloroethane | 0.410 | 0.300 | 1.00 | NE | J | | 094030-001 | SW846 8260B |
| | Trichloroethene | 3.54 | 0.300 | 1.00 | 5.00 | | | 094030-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 0.370 | 0.300 | 1.00 | 70.0 | J | | 094030-001 | SW846 8260B |
| **TJA-7** 17-Jun-13 | Trichloroethene | 0.860 | 0.300 | 1.00 | 5.00 | J | | 094028-001 | SW846 8260B |
| **WYO-4** 24-Jun-13 | 1,1-Dichloroethane | 1.05 | 0.300 | 1.00 | NE | | | 094040-001 | SW846 8260B |
| | Trichloroethene | **8.40** | 0.300 | 1.00 | 5.00 | | | 094040-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 2.03 | 0.300 | 1.00 | 70.0 | | | 094040-001 | SW846 8260B |
| | | | | | | | | | |
| **TA1-W-03** 08-Aug-13 | Chloroform | 0.400 | 0.300 | 1.00 | NE | J | 1.0U | 094520-001 | SW846 8260B |
| **TA1-W-06** 14-Aug-13 | 1,1-Dichloroethene | 0.940 | 0.300 | 1.00 | 7.00 | J, N | | 094527-001 | SW846 8260B |
| | Chloroform | 0.320 | 0.300 | 1.00 | NE | J | | 094527-001 | SW846 8260B |
| | Trichloroethene | 0.410 | 0.300 | 1.00 | 5.00 | J | | 094527-001 | SW846 8260B |
| **TA2-W-01** 27-Aug-13 | Tetrachloroethene | 0.450 | 0.300 | 1.00 | 5.00 | J | | 094545-001 | SW846 8260B |
| | Trichloroethene | 1.76 | 0.300 | 1.00 | 5.00 | | | 094545-001 | SW846 8260B |
| **TA2-W-19** 03-Sep-13 | 1,1-Dichloroethane | 0.520 | 0.300 | 1.00 | NE | J | | 094551-001 | SW846 8260B |
| | Trichloroethene | 3.85 | 0.300 | 1.00 | 5.00 | | | 094551-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 0.590 | 0.300 | 1.00 | 70.0 | J | | 094551-001 | SW846 8260B |
| **TA2-W-26** 29-Aug-13 | Chloroform | 0.390 | 0.300 | 1.00 | NE | J | | 094549-001 | SW846 8260B |
| | Tetrachloroethene | 1.14 | 0.300 | 1.00 | 5.00 | | | 094549-001 | SW846 8260B |
| | Trichloroethene | 1.33 | 0.300 | 1.00 | 5.00 | | | 094549-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 0.500 | 0.300 | 1.00 | 70.0 | J | | 094549-001 | SW846 8260B |
| **TA2-W-27** 28-Aug-13 | Tetrachloroethene | 1.62 | 0.300 | 1.00 | 5.00 | | | 094547-001 | SW846 8260B |
| | Trichloroethene | 1.28 | 0.300 | 1.00 | 5.00 | | | 094547-001 | SW846 8260B |
| **TJA-2** 05-Sep-13 | 1,1-Dichloroethane | 0.540 | 0.300 | 1.00 | NE | J | | 094555-001 | SW846 8260B |
| | Trichloroethene | 4.05 | 0.300 | 1.00 | 5.00 | | | 094555-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 0.580 | 0.300 | 1.00 | 70.0 | J | | 094555-001 | SW846 8260B |
| **TJA-2** (Duplicate) 05-Sep-13 | 1,1-Dichloroethane | 0.530 | 0.300 | 1.00 | NE | J | | 094556-001 | SW846 8260B |
| | Trichloroethene | 4.25 | 0.300 | 1.00 | 5.00 | | | 094556-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 0.580 | 0.300 | 1.00 | 70.0 | J | | 094556-001 | SW846 8260B |
| **TJA-3** 21-Aug-13 | Trichloroethene | 4.27 | 0.300 | 1.00 | 5.00 | | | 094539-001 | SW846 8260B |

Refer to footnotes on page 6A-49.

## Table 6A-1 *(Concluded)*
## Summary of Detected Volatile Organic Compounds,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-7** 10-Sep-13 | Trichloroethene | 0.900 | 0.300 | 1.00 | 5.00 | J | | 094561-001 | SW846 8260B |
| **WYO-4** 26-Aug-13 | 1,1-Dichloroethane | 1.27 | 0.300 | 1.00 | NE | | | 094543-001 | SW846 8260B |
| | Trichloroethene | **9.23** | 0.300 | 1.00 | 5.00 | | | 094543-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 2.77 | 0.300 | 1.00 | 70.0 | | | 094543-001 | SW846 8260B |
| | | | | | | | | | |
| **TA2-W-19** 14-Nov-13 | 1,1-Dichloroethane | 0.390 | 0.300 | 1.00 | NE | J | | 094881-001 | SW846 8260B |
| | Trichloroethene | 2.75 | 0.300 | 1.00 | 5.00 | | | 094881-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 0.430 | 0.300 | 1.00 | 70.0 | J | | 094881-001 | SW846 8260B |
| **TA2-W-26** 12-Nov-13 | Chloroform | 0.330 | 0.300 | 1.00 | NE | J | | 094874-001 | SW846 8260B |
| | Tetrachloroethene | 0.900 | 0.300 | 1.00 | 5.00 | J | | 094874-001 | SW846 8260B |
| | Trichloroethene | 1.28 | 0.300 | 1.00 | 5.00 | | | 094874-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 0.370 | 0.300 | 1.00 | 70.0 | J | | 094874-001 | SW846 8260B |
| **TJA-2** 19-Nov-13 | 1,1-Dichloroethane | 0.470 | 0.300 | 1.00 | NE | J | | 094886-001 | SW846 8260B |
| | Trichloroethene | 3.51 | 0.300 | 1.00 | 5.00 | | | 094886-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 0.410 | 0.300 | 1.00 | 70.0 | J | | 094886-001 | SW846 8260B |
| **TJA-3** 13-Nov-13 | Trichloroethene | 0.330 | 0.300 | 1.00 | 5.00 | J | | 094878-001 | SW846 8260B |
| **TJA-3** (Duplicate) 13-Nov-13 | Trichloroethene | 0.400 | 0.300 | 1.00 | 5.00 | J | | 094879-001 | SW846 8260B |
| **TJA-7** 21-Nov-13 | Trichloroethene | 0.980 | 0.300 | 1.00 | 5.00 | J | | 094894-001 | SW846 8260B |
| **WYO-4** 18-Nov-13 | 1,1-Dichloroethane | 1.06 | 0.300 | 1.00 | NE | | | 094883-001 | SW846 8260B |
| | Trichloroethene | **8.49** | 0.300 | 1.00 | 5.00 | | | 094883-001 | SW846 8260B |
| | cis-1,2-Dichloroethene | 1.93 | 0.300 | 1.00 | 70.0 | | | 094883-001 | SW846 8260B |

Refer to footnotes on page 6A-49.

## Table 6A-2
## Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846 8260B), Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Analyte | MDL[b] (µg/L) | Analyte | MDL[b] (µg/L) |
|---|---|---|---|
| 1,1,1-Trichloroethane | 0.300 | Chlorobenzene | 0.300 |
| 1,1,2,2-Tetrachloroethane | 0.300 | Chloroethane | 0.300 |
| 1,1,2-Trichloroethane | 0.300 | Chloroform | 0.300 |
| 1,1-Dichloroethane | 0.300 | Chloromethane | 0.300 |
| 1,1-Dichloroethene | 0.300 | Cyclohexane | 0.300 |
| 1,2,3-Trichlorobenzene | 0.300 | Dibromochloromethane | 0.300 |
| 1,2,4-Trichlorobenzene | 0.300 | Dichlorodifluoromethane | 0.300 |
| 1,2-Dibromo-3-chloropropane | 0.300 | Ethyl benzene | 0.300 |
| 1,2-Dibromoethane | 0.300 | Isopropylbenzene | 0.300 |
| 1,2-Dichlorobenzene | 0.300 | Methyl acetate | 1.50 |
| 1,2-Dichloroethane | 0.300 | Methylcyclohexane | 3.00 |
| 1,2-Dichloropropane | 0.300 | Methylene chloride | 3.00 |
| 1,3-Dichlorobenzene | 0.300 | Styrene | 0.300 |
| 1,4-Dichlorobenzene | 0.300 | Tert-butyl methyl ether | 0.300 |
| 2,2-trifluoroethane, 1,1,2-Trichloro-1 | 1.50 | Tetrachloroethene | 0.300 |
| 2-Butanone | 2.00 | Toluene | 0.300 |
| 2-Hexanone | 2.20 | Trichloroethene | 0.300 |
| 4-methyl-, 2-Pentanone | 1.50 | Trichlorofluoromethane | 0.300 |
| Acetone | 3.00 | Vinyl chloride | 0.300 |
| Benzene | 0.300 | Xylene | 0.300 |
| Bromochloromethane | 0.300 | cis-1,2-Dichloroethene | 0.300 |
| Bromodichloromethane | 0.300 | cis-1,3-Dichloropropene | 0.300 |
| Bromoform | 0.300 | m-, p-Xylene | 0.300 |
| Bromomethane | 0.300 | o-Xylene | 0.300 |
| Carbon disulfide | 1.50 | trans-1,2-Dichloroethene | 0.300 |
| Carbon tetrachloride | 0.300 | trans-1,3-Dichloropropene | 0.300 |

Refer to footnotes on page 6A-49.

## Table 6A-3
## Summary of Nitrate plus Nitrite Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-SW1-320** 21-Mar-13 | Nitrate plus nitrite | **21.4** | 0.850 | 2.50 | 10.0 | | | 093686-018 | EPA 353.2 |
| **TA2-W-01** 06-Mar-13 | Nitrate plus nitrite | 4.79 | 0.170 | 0.500 | 10.0 | | | 093663-018 | EPA 353.2 |
| **TA2-W-19** 13-Mar-13 | Nitrate plus nitrite | **10.2** | 0.170 | 0.500 | 10.0 | | | 093672-018 | EPA 353.2 |
| **TA2-W-26** 12-Mar-13 | Nitrate plus nitrite | 5.90 | 0.170 | 0.500 | 10.0 | | | 093670-018 | EPA 353.2 |
| **TA2-W-27** 07-Mar-13 | Nitrate plus nitrite | 4.33 | 0.170 | 0.500 | 10.0 | | | 093667-018 | EPA 353.2 |
| **TA2-W-27** (Duplicate) 07-Mar-13 | Nitrate plus nitrite | 4.29 | 0.170 | 0.500 | 10.0 | | | 093668-018 | EPA 353.2 |
| **TJA-2** 14-Mar-13 | Nitrate plus nitrite | **12.5** | 0.170 | 0.500 | 10.0 | | | 093674-018 | EPA 353.2 |
| **TJA-3** 04-Mar-13 | Nitrate plus nitrite | 2.60 | 0.170 | 0.500 | 10.0 | | | 093658-018 | EPA 353.2 |
| **TJA-4** 19-Mar-13 | Nitrate plus nitrite | **29.6** | 0.850 | 2.50 | 10.0 | | | 093678-018 | EPA 353.2 |
| **TJA-6** 05-Mar-13 | Nitrate plus nitrite | 2.57 | 0.170 | 0.500 | 10.0 | | | 093660-018 | EPA 353.2 |
| **TJA-7** 20-Mar-13 | Nitrate plus nitrite | **23.0** | 0.850 | 2.50 | 10.0 | | | 093683-018 | EPA 353.2 |
| **TJA-7** (Duplicate) 20-Mar-13 | Nitrate plus nitrite | **22.1** | 0.850 | 2.50 | 10.0 | | | 093684-018 | EPA 353.2 |
| **WYO-4** 18-Mar-13 | Nitrate plus nitrite | 3.81 | 0.170 | 0.500 | 10.0 | | | 093676-018 | EPA 353.2 |
| | | | | | | | | | |
| **TA2-SW1-320** 13-Jun-13 | Nitrate plus nitrite | **25.4** | 0.850 | 2.50 | 10.0 | | | 094024-018 | EPA 353.2 |
| **TA2-W-19** 19-Jun-13 | Nitrate plus nitrite | **12.4** | 0.850 | 2.50 | 10.0 | | | 094033-018 | EPA 353.2 |
| **TA2-W-26** 20-Jun-13 | Nitrate plus nitrite | 5.88 | 0.170 | 0.500 | 10.0 | | | 094037-018 | EPA 353.2 |
| **TA2-W-26** (Duplicate) 20-Jun-13 | Nitrate plus nitrite | 5.98 | 0.170 | 0.500 | 10.0 | | | 094038-018 | EPA 353.2 |
| **TJA-2** 18-Jun-13 | Nitrate plus nitrite | **12.8** | 0.850 | 2.50 | 10.0 | | | 094030-018 | EPA 353.2 |

Refer to footnotes on page 6A-49.

**Table 6A-3** *(Continued)*
**Summary of Nitrate plus Nitrite Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-4** 14-Jun-13 | Nitrate plus nitrite | **33.2** | 0.850 | 2.50 | 10.0 | | | 094026-018 | EPA 353.2 |
| **TJA-7** 17-Jun-13 | Nitrate plus nitrite | **27.2** | 0.850 | 2.50 | 10.0 | | | 094028-018 | EPA 353.2 |
| **WYO-4** 24-Jun-13 | Nitrate plus nitrite | 3.02 | 0.170 | 0.500 | 10.0 | | | 094040-018 | EPA 353.2 |
| | | | | | | | | | |
| **PGS-2** 05-Aug-13 | Nitrate plus nitrite | 1.48 | 0.085 | 0.250 | 10.0 | | | 094511-018 | EPA 353.2 |
| **TA1-W-01** 06-Aug-13 | Nitrate plus nitrite | 2.95 | 0.170 | 0.500 | 10.0 | | | 094513-018 | EPA 353.2 |
| **TA1-W-02** 07-Aug-13 | Nitrate plus nitrite | 1.18 | 0.085 | 0.250 | 10.0 | | | 094517-018 | EPA 353.2 |
| **TA1-W-02** (Duplicate) 07-Aug-13 | Nitrate plus nitrite | 1.17 | 0.085 | 0.250 | 10.0 | | | 094518-018 | EPA 353.2 |
| **TA1-W-03** 08-Aug-13 | Nitrate plus nitrite | 7.67 | 0.170 | 0.500 | 10.0 | | | 094520-018 | EPA 353.2 |
| **TA1-W-04** 12-Aug-13 | Nitrate plus nitrite | 1.71 | 0.085 | 0.250 | 10.0 | | | 094523-018 | EPA 353.2 |
| **TA1-W-05** 13-Aug-13 | Nitrate plus nitrite | 1.19 | 0.085 | 0.250 | 10.0 | | | 094525-018 | EPA 353.2 |
| **TA1-W-06** 14-Aug-13 | Nitrate plus nitrite | 3.33 | 0.170 | 0.500 | 10.0 | | | 094527-018 | EPA 353.2 |
| **TA1-W-08** 15-Aug-13 | Nitrate plus nitrite | 7.82 | 0.170 | 0.500 | 10.0 | | | 094529-018 | EPA 353.2 |
| **TA2-SW1-320** 11-Sep-13 | Nitrate plus nitrite | **21.9** | 0.850 | 2.50 | 10.0 | | | 094563-018 | EPA 353.2 |
| **TA2-NW1-595** 20-Aug-13 | Nitrate plus nitrite | 3.85 | 0.085 | 0.250 | 10.0 | | | 094536-018 | EPA 353.2 |
| **TA2-W-01** 27-Aug-13 | Nitrate plus nitrite | 4.64 | 0.170 | 0.500 | 10.0 | | | 094545-018 | EPA 353.2 |
| **TA2-W-19** 03-Sep-13 | Nitrate plus nitrite | **10.7** | 0.170 | 0.500 | 10.0 | | | 094551-018 | EPA 353.2 |
| **TA2-W-26** 29-Aug-13 | Nitrate plus nitrite | 5.98 | 0.170 | 0.500 | 10.0 | | | 094549-018 | EPA 353.2 |
| **TA2-W-27** 28-Aug-13 | Nitrate plus nitrite | 4.26 | 0.170 | 0.500 | 10.0 | | | 094547-018 | EPA 353.2 |

Refer to footnotes on page 6A-49.

## Table 6A-3 *(Continued)*
## Summary of Nitrate plus Nitrite Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-2** 05-Sep-13 | Nitrate plus nitrite | **11.8** | 0.170 | 0.500 | 10.0 | | | 094555-018 | EPA 353.2 |
| **TJA-2** (Duplicate) 05-Sep-13 | Nitrate plus nitrite | **11.4** | 0.170 | 0.500 | 10.0 | | | 094556-018 | EPA 353.2 |
| **TJA-3** 21-Aug-13 | Nitrate plus nitrite | 1.00 | 0.017 | 0.050 | 10.0 | | | 094539-018 | EPA 353.2 |
| **TJA-4** 09-Sep-13 | Nitrate plus nitrite | **29.2** | 0.850 | 2.50 | 10.0 | | | 094558-018 | EPA 353.2 |
| **TJA-6** 12-Sep-13 | Nitrate plus nitrite | 2.47 | 0.170 | 0.500 | 10.0 | | | 094541-018 | EPA 353.2 |
| **TJA-7** 10-Sep-13 | Nitrate plus nitrite | **23.7** | 0.850 | 2.50 | 10.0 | | | 094561-018 | EPA 353.2 |
| **WYO-3** 19-Aug-13 | Nitrate plus nitrite | 2.06 | 0.085 | 0.250 | 10.0 | | | 094533-018 | EPA 353.2 |
| **WYO-3** (Duplicate) 19-Aug-13 | Nitrate plus nitrite | 1.97 | 0.085 | 0.250 | 10.0 | | | 094534-018 | EPA 353.2 |
| **WYO-4** 26-Aug-13 | Nitrate plus nitrite | 2.99 | 0.170 | 0.500 | 10.0 | | | 094543-018 | EPA 353.2 |
| | | | | | | | | | |
| **TA2-SW1-320** 22-Nov-13 | Nitrate plus nitrite | **27.0** | 0.850 | 2.50 | 10.0 | | | 094896-018 | EPA 353.2 |
| **TA2-W-19** 14-Nov-13 | Nitrate plus nitrite | **12.7** | 0.170 | 0.500 | 10.0 | | | 094881-018 | EPA 353.2 |
| **TA2-W-26** 12-Nov-13 | Nitrate plus nitrite | 6.57 | 0.170 | 0.500 | 10.0 | | | 094874-018 | EPA 353.2 |
| **TJA-2** 19-Nov-13 | Nitrate plus nitrite | **11.9** | 0.170 | 0.500 | 10.0 | | | 094886-018 | EPA 353.2 |
| **TJA-3** 13-Nov-13 | Nitrate plus nitrite | 3.10 | 0.170 | 0.500 | 10.0 | | | 094878-018 | EPA 353.2 |
| **TJA-3** (Duplicate) 13-Nov-13 | Nitrate plus nitrite | 2.91 | 0.170 | 0.500 | 10.0 | | | 094879-018 | EPA 353.2 |
| **TJA-4** 20-Nov-13 | Nitrate plus nitrite | **36.9** | 0.850 | 2.50 | 10.0 | | | 094891-018 | EPA 353.2 |
| **TJA-4** (Duplicate) 20-Nov-13 | Nitrate plus nitrite | **38.5** | 0.850 | 2.50 | 10.0 | | | 094892-018 | EPA 353.2 |

Refer to footnotes on page 6A-49.

**Table 6A-3** *(Concluded)*
**Summary of Nitrate plus Nitrite Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-7** 21-Nov-13 | Nitrate plus nitrite | **27.2** | 0.850 | 2.50 | 10.0 | | | 094894-018 | EPA 353.2 |
| **WYO-4** 18-Nov-13 | Nitrate plus nitrite | 3.22 | 0.170 | 0.500 | 10.0 | | | 094883-018 | EPA 353.2 |

Refer to footnotes on page 6A-49.

## Table 6A-4
## Summary of Anions and Alkalinity Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **PGS-2** | Bromide | 0.276 | 0.067 | 0.200 | NE | | | 094511-016 | SW846 9056 |
| 05-Aug-13 | Chloride | 17.3 | 0.670 | 2.00 | NE | | | 094511-016 | SW846 9056 |
| | Fluoride | ND | 0.033 | 0.100 | 4.0 | U | | 094511-016 | SW846 9056 |
| | Sulfate | 73.9 | 1.33 | 4.00 | NE | | | 094511-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 242 | 0.725 | 1.00 | NE | | | 094511-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094511-022 | SM 2320B |
| **TA1-W-01** | Bromide | 0.199 | 0.067 | 0.200 | NE | J | | 094513-016 | SW846 9056 |
| 06-Aug-13 | Chloride | 14.0 | 0.670 | 2.00 | NE | | | 094513-016 | SW846 9056 |
| | Fluoride | 0.402 | 0.033 | 0.100 | 4.0 | | | 094513-016 | SW846 9056 |
| | Sulfate | 75.9 | 1.33 | 4.00 | NE | | | 094513-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 174 | 0.725 | 1.00 | NE | | | 094513-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094513-022 | SM 2320B |
| **TA1-W-02** | Bromide | 0.180 | 0.067 | 0.200 | NE | J | | 094517-016 | SW846 9056 |
| 07-Aug-13 | Chloride | 13.8 | 0.670 | 2.00 | NE | | | 094517-016 | SW846 9056 |
| | Fluoride | 0.380 | 0.033 | 0.100 | 4.0 | | | 094517-016 | SW846 9056 |
| | Sulfate | 78.5 | 1.33 | 4.00 | NE | | | 094517-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 176 | 0.725 | 1.00 | NE | | | 094517-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094517-022 | SM 2320B |
| **TA1-W-02** (Duplicate) | Bromide | 0.184 | 0.067 | 0.200 | NE | J | | 094518-016 | SW846 9056 |
| 07-Aug-13 | Chloride | 13.5 | 0.670 | 2.00 | NE | | | 094518-016 | SW846 9056 |
| | Fluoride | 0.380 | 0.033 | 0.100 | 4.0 | | | 094518-016 | SW846 9056 |
| | Sulfate | 76.7 | 1.33 | 4.00 | NE | | | 094518-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 175 | 0.725 | 1.00 | NE | | | 094518-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094518-022 | SM 2320B |
| **TA1-W-03** | Bromide | 3.23 | 0.067 | 0.200 | NE | | | 094520-016 | SW846 9056 |
| 08-Aug-13 | Chloride | 233 | 6.70 | 20.0 | NE | | | 094520-016 | SW846 9056 |
| | Fluoride | 0.231 | 0.033 | 0.100 | 4.0 | | | 094520-016 | SW846 9056 |
| | Sulfate | 485 | 13.3 | 40.0 | NE | | | 094520-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 73.8 | 0.725 | 1.00 | NE | | | 094520-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094520-022 | SM 2320B |
| **TA1-W-04** | Bromide | 0.178 | 0.067 | 0.200 | NE | J | | 094523-016 | SW846 9056 |
| 12-Aug-13 | Chloride | 14.3 | 0.335 | 1.00 | NE | | | 094523-016 | SW846 9056 |
| | Fluoride | 0.442 | 0.033 | 0.100 | 4.0 | | | 094523-016 | SW846 9056 |
| | Sulfate | 62.8 | 0.665 | 2.00 | NE | | | 094523-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 176 | 0.725 | 1.00 | NE | | | 094523-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094523-022 | SM 2320B |

Refer to footnotes on page 6A-49.

## Table 6A-4 *(Continued)*
## Summary of Anions and Alkalinity Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA1-W-05** | Bromide | 0.144 | 0.067 | 0.200 | NE | J | | 094525-016 | SW846 9056 |
| 13-Aug-13 | Chloride | 11.2 | 0.670 | 2.00 | NE | | | 094525-016 | SW846 9056 |
| | Fluoride | 0.305 | 0.033 | 0.100 | 4.0 | | | 094525-016 | SW846 9056 |
| | Sulfate | 104 | 1.33 | 4.00 | NE | | | 094525-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 213 | 0.725 | 1.00 | NE | | | 094525-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094525-022 | SM 2320B |
| **TA1-W-06** | Bromide | 1.27 | 0.067 | 0.200 | NE | | | 094527-016 | SW846 9056 |
| 14-Aug-13 | Chloride | 106 | 1.34 | 4.00 | NE | | | 094527-016 | SW846 9056 |
| | Fluoride | 0.330 | 0.033 | 0.100 | 4.0 | | | 094527-016 | SW846 9056 |
| | Sulfate | 217 | 2.66 | 8.00 | NE | | | 094527-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 90.8 | 0.725 | 1.00 | NE | | | 094527-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094527-022 | SM 2320B |
| **TA1-W-08** | Bromide | 2.69 | 0.067 | 0.200 | NE | | | 094529-016 | SW846 9056 |
| 15-Aug-13 | Chloride | 218 | 6.70 | 20.0 | NE | | | 094529-016 | SW846 9056 |
| | Fluoride | 0.240 | 0.033 | 0.100 | 4.0 | | | 094529-016 | SW846 9056 |
| | Sulfate | 771 | 13.3 | 40.0 | NE | | | 094529-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 84.5 | 0.725 | 1.00 | NE | | | 094529-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094529-022 | SM 2320B |
| **TA2-SW1-320** | Bromide | 0.571 | 0.067 | 0.200 | NE | | | 094563-016 | SW846 9056 |
| 11-Sep-13 | Chloride | 35.7 | 0.670 | 2.00 | NE | | | 094563-016 | SW846 9056 |
| | Fluoride | 0.400 | 0.033 | 0.100 | 4.0 | | | 094563-016 | SW846 9056 |
| | Sulfate | 15.1 | 0.133 | 0.400 | NE | | | 094563-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 109 | 0.725 | 1.00 | NE | | | 094563-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094563-022 | SM 2320B |
| **TA2-NW1-595** | Bromide | 1.38 | 0.067 | 0.200 | NE | | | 094536-016 | SW846 9056 |
| 20-Aug-13 | Chloride | 109 | 1.34 | 4.00 | NE | | | 094536-016 | SW846 9056 |
| | Fluoride | 0.352 | 0.033 | 0.100 | 4.0 | | | 094536-016 | SW846 9056 |
| | Sulfate | 115 | 2.66 | 8.00 | NE | | | 094536-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 134 | 0.725 | 1.00 | NE | | | 094536-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094536-022 | SM 2320B |
| **TA2-W-01** | Bromide | 1.44 | 0.067 | 0.200 | NE | | | 094545-016 | SW846 9056 |
| 27-Aug-13 | Chloride | 102 | 1.34 | 4.00 | NE | | | 094545-016 | SW846 9056 |
| | Fluoride | 0.353 | 0.033 | 0.100 | 4.0 | | | 094545-016 | SW846 9056 |
| | Sulfate | 57.3 | 2.66 | 8.00 | NE | | | 094545-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 99.3 | 0.725 | 1.00 | NE | B | | 094545-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094545-022 | SM 2320B |

Refer to footnotes on page 6A-49.

## Table 6A-4 *(Continued)*
## Summary of Anions and Alkalinity Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-W-19** | Bromide | 0.807 | 0.067 | 0.200 | NE | | | 094551-016 | SW846 9056 |
| 03-Sep-13 | Chloride | 63.3 | 0.670 | 2.00 | NE | | | 094551-016 | SW846 9056 |
| | Fluoride | 0.376 | 0.033 | 0.100 | 4.0 | | | 094551-016 | SW846 9056 |
| | Sulfate | 54.8 | 1.33 | 4.00 | NE | | | 094551-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 107 | 0.725 | 1.00 | NE | | | 094551-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094551-022 | SM 2320B |
| **TA2-W-26** | Bromide | 2.41 | 0.067 | 0.200 | NE | | | 094549-016 | SW846 9056 |
| 29-Aug-13 | Chloride | 187 | 3.35 | 10.0 | NE | | | 094549-016 | SW846 9056 |
| | Fluoride | 0.265 | 0.033 | 0.100 | 4.0 | | | 094549-016 | SW846 9056 |
| | Sulfate | 391 | 6.65 | 20.0 | NE | | | 094549-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 83.4 | 0.725 | 1.00 | NE | B | | 094549-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094549-022 | SM 2320B |
| **TA2-W-27** | Bromide | 1.54 | 0.067 | 0.200 | NE | | | 094547-016 | SW846 9056 |
| 28-Aug-13 | Chloride | 114 | 1.34 | 4.00 | NE | | | 094547-016 | SW846 9056 |
| | Fluoride | 0.336 | 0.033 | 0.100 | 4.0 | | | 094547-016 | SW846 9056 |
| | Sulfate | 151 | 2.66 | 8.00 | NE | | | 094547-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 99.9 | 0.725 | 1.00 | NE | B | | 094547-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094547-022 | SM 2320B |
| **TJA-2** | Bromide | 0.856 | 0.067 | 0.200 | NE | | | 094555-016 | SW846 9056 |
| 05-Sep-13 | Chloride | 63.5 | 0.670 | 2.00 | NE | | | 094555-016 | SW846 9056 |
| | Fluoride | 0.307 | 0.033 | 0.100 | 4.0 | | | 094555-016 | SW846 9056 |
| | Sulfate | 52.2 | 1.33 | 4.00 | NE | | | 094555-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 107 | 0.725 | 1.00 | NE | | | 094555-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094555-022 | SM 2320B |
| **TJA-2** (Duplicate) | Bromide | 0.864 | 0.067 | 0.200 | NE | | | 094556-016 | SW846 9056 |
| 05-Sep-13 | Chloride | 64.4 | 0.670 | 2.00 | NE | | | 094556-016 | SW846 9056 |
| | Fluoride | 0.308 | 0.033 | 0.100 | 4.0 | | | 094556-016 | SW846 9056 |
| | Sulfate | 52.8 | 1.33 | 4.00 | NE | | | 094556-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 106 | 0.725 | 1.00 | NE | | | 094556-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094556-022 | SM 2320B |
| **TJA-3** | Bromide | 0.161 | 0.067 | 0.200 | NE | J | | 094539-016 | SW846 9056 |
| 21-Aug-13 | Chloride | 12.8 | 0.670 | 2.00 | NE | | | 094539-016 | SW846 9056 |
| | Fluoride | 0.392 | 0.033 | 0.100 | 4.0 | | | 094539-016 | SW846 9056 |
| | Sulfate | 81.4 | 1.33 | 4.00 | NE | | | 094539-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 171 | 0.725 | 1.00 | NE | | | 094539-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094539-022 | SM 2320B |

Refer to footnotes on page 6A-49.

## Table 6A-4 *(Concluded)*
## Summary of Anions and Alkalinity Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-4** | Bromide | 0.343 | 0.067 | 0.200 | NE | | | 094558-016 | SW846 9056 |
| 09-Sep-13 | Chloride | 20.4 | 0.335 | 1.00 | NE | | | 094558-016 | SW846 9056 |
| | Fluoride | 0.345 | 0.033 | 0.100 | 4.0 | | | 094558-016 | SW846 9056 |
| | Sulfate | 17.7 | 0.133 | 0.400 | NE | | | 094558-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 133 | 0.725 | 1.00 | NE | | | 094558-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094558-022 | SM 2320B |
| **TJA-6** | Bromide | 0.178 | 0.067 | 0.200 | NE | J | | 094541-016 | SW846 9056 |
| 12-Sep-13 | Chloride | 13.6 | 0.335 | 1.00 | NE | | | 094541-016 | SW846 9056 |
| | Fluoride | 0.359 | 0.033 | 0.100 | 4.0 | | | 094541-016 | SW846 9056 |
| | Sulfate | 64.2 | 0.665 | 2.00 | NE | | | 094541-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 159 | 0.725 | 1.00 | NE | | | 094541-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094541-022 | SM 2320B |
| **TJA-7** | Bromide | 0.404 | 0.067 | 0.200 | NE | | | 094561-016 | SW846 9056 |
| 10-Sep-13 | Chloride | 23.7 | 0.335 | 1.00 | NE | | | 094561-016 | SW846 9056 |
| | Fluoride | 0.336 | 0.033 | 0.100 | 4.0 | | | 094561-016 | SW846 9056 |
| | Sulfate | 20.3 | 0.665 | 2.00 | NE | | | 094561-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 127 | 0.725 | 1.00 | NE | | | 094561-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094561-022 | SM 2320B |
| **WYO-3** | Bromide | ND | 0.670 | 2.00 | NE | U | | 094533-016 | SW846 9056 |
| 19-Aug-13 | Chloride | 14.5 | 0.670 | 2.00 | NE | | | 094533-016 | SW846 9056 |
| | Fluoride | 0.606 | 0.330 | 1.00 | 4.0 | J | | 094533-016 | SW846 9056 |
| | Sulfate | 94.6 | 1.33 | 4.00 | NE | | | 094533-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 137 | 0.725 | 1.00 | NE | | | 094533-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094533-022 | SM 2320B |
| **WYO-3** (Duplicate) | Bromide | 0.188 | 0.067 | 0.200 | NE | J | | 094534-016 | SW846 9056 |
| 19-Aug-13 | Chloride | 14.6 | 0.670 | 2.00 | NE | | | 094534-016 | SW846 9056 |
| | Fluoride | 0.567 | 0.033 | 0.100 | 4.0 | | | 094534-016 | SW846 9056 |
| | Sulfate | 95.6 | 1.33 | 4.00 | NE | | | 094534-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 138 | 0.725 | 1.00 | NE | | | 094534-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094534-022 | SM 2320B |
| **WYO-4** | Bromide | 1.28 | 0.067 | 0.200 | NE | | | 094543-016 | SW846 9056 |
| 26-Aug-13 | Chloride | 116 | 1.34 | 4.00 | NE | | | 094543-016 | SW846 9056 |
| | Fluoride | 0.381 | 0.033 | 0.100 | 4.0 | | | 094543-016 | SW846 9056 |
| | Sulfate | 53.6 | 2.66 | 8.00 | NE | | | 094543-016 | SW846 9056 |
| | Bicarbonate Alkalinity | 101 | 0.725 | 1.00 | NE | B | | 094543-022 | SM 2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094543-022 | SM 2320B |

Refer to footnotes on page 6A-49.

## Table 6A-5
## Summary of Target Analyte List Metals plus Uranium Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **PGS-2** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 094511-009 | SW846 6020 |
| 05-Aug-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094511-009 | SW846 6020 |
| | Arsenic | 0.00206 | 0.0017 | 0.005 | 0.010 | J | | 094511-009 | SW846 6020 |
| | Barium | 0.0732 | 0.0006 | 0.002 | 2.00 | | | 094511-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094511-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094511-009 | SW846 6020 |
| | Calcium | 69.9 | 0.600 | 2.00 | NE | | | 094511-009 | SW846 6020 |
| | Chromium | 0.0154 | 0.002 | 0.010 | 0.100 | | | 094511-009 | SW846 6020 |
| | Cobalt | 0.000187 | 0.0001 | 0.001 | NE | J | | 094511-009 | SW846 6020 |
| | Copper | 0.00101 | 0.00035 | 0.001 | NE | | | 094511-009 | SW846 6020 |
| | Iron | 0.253 | 0.033 | 0.100 | NE | | | 094511-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094511-009 | SW846 6020 |
| | Magnesium | 15.3 | 0.010 | 0.030 | NE | | | 094511-009 | SW846 6020 |
| | Manganese | 0.00242 | 0.001 | 0.005 | NE | J | | 094511-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 094511-009 | SW846 7470 |
| | Nickel | 0.0628 | 0.0005 | 0.002 | NE | | | 094511-009 | SW846 6020 |
| | Potassium | 2.84 | 0.080 | 0.300 | NE | | | 094511-009 | SW846 6020 |
| | Selenium | 0.00211 | 0.0015 | 0.005 | 0.050 | J | | 094511-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094511-009 | SW846 6020 |
| | Sodium | 46.2 | 0.800 | 2.50 | NE | | | 094511-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094511-009 | SW846 6020 |
| | Uranium | 0.000523 | 0.000067 | 0.0002 | 0.030 | | | 094511-009 | SW846 6020 |
| | Vanadium | 0.00497 | 0.001 | 0.005 | NE | J | | 094511-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094511-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-5 *(Continued)*
## Summary of Target Analyte List Metals plus Uranium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA1-W-01** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 094513-009 | SW846 6020 |
| 06-Aug-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094513-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094513-009 | SW846 6020 |
| | Barium | 0.0474 | 0.0006 | 0.002 | 2.00 | | | 094513-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094513-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094513-009 | SW846 6020 |
| | Calcium | 67.9 | 0.600 | 2.00 | NE | | | 094513-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094513-009 | SW846 6020 |
| | Cobalt | 0.000132 | 0.0001 | 0.001 | NE | J | | 094513-009 | SW846 6020 |
| | Copper | 0.000737 | 0.00035 | 0.001 | NE | J | | 094513-009 | SW846 6020 |
| | Iron | 0.178 | 0.033 | 0.100 | NE | | | 094513-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094513-009 | SW846 6020 |
| | Magnesium | 12.9 | 0.010 | 0.030 | NE | | | 094513-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 094513-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 094513-009 | SW846 7470 |
| | Nickel | 0.00216 | 0.0005 | 0.002 | NE | | | 094513-009 | SW846 6020 |
| | Potassium | 2.24 | 0.080 | 0.300 | NE | | | 094513-009 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | U | | 094513-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094513-009 | SW846 6020 |
| | Sodium | 25.5 | 0.080 | 0.250 | NE | | | 094513-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094513-009 | SW846 6020 |
| | Uranium | 0.00342 | 0.000067 | 0.0002 | 0.030 | | | 094513-009 | SW846 6020 |
| | Vanadium | 0.00411 | 0.001 | 0.005 | NE | J | | 094513-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094513-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-5 *(Continued)*
## Summary of Target Analyte List Metals plus Uranium Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA1-W-02** | Aluminum | 0.0505 | 0.015 | 0.050 | NE | | | 094517-009 | SW846 6020 |
| 07-Aug-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094517-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094517-009 | SW846 6020 |
| | Barium | 0.047 | 0.0006 | 0.002 | 2.00 | | | 094517-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094517-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094517-009 | SW846 6020 |
| | Calcium | 68.8 | 0.600 | 2.00 | NE | | | 094517-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094517-009 | SW846 6020 |
| | Cobalt | 0.000137 | 0.0001 | 0.001 | NE | J | | 094517-009 | SW846 6020 |
| | Copper | 0.000806 | 0.00035 | 0.001 | NE | J | 0.0043U | 094517-009 | SW846 6020 |
| | Iron | 0.206 | 0.033 | 0.100 | NE | | | 094517-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094517-009 | SW846 6020 |
| | Magnesium | 13.3 | 0.010 | 0.030 | NE | | | 094517-009 | SW846 6020 |
| | Manganese | 0.00195 | 0.001 | 0.005 | NE | J | | 094517-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 094517-009 | SW846 7470 |
| | Nickel | 0.0022 | 0.0005 | 0.002 | NE | | | 094517-009 | SW846 6020 |
| | Potassium | 2.07 | 0.080 | 0.300 | NE | | | 094517-009 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | U | | 094517-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094517-009 | SW846 6020 |
| | Sodium | 23.5 | 0.080 | 0.250 | NE | | | 094517-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094517-009 | SW846 6020 |
| | Uranium | 0.00346 | 0.000067 | 0.0002 | 0.030 | | | 094517-009 | SW846 6020 |
| | Vanadium | 0.00543 | 0.001 | 0.005 | NE | | | 094517-009 | SW846 6010 |
| | Zinc | 0.00474 | 0.0035 | 0.010 | NE | J | | 094517-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-5 *(Continued)*
## Summary of Target Analyte List Metals plus Uranium Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA1-W-02** (Duplicate) | Aluminum | 0.053 | 0.015 | 0.050 | NE | | | 094518-009 | SW846 6020 |
| 07-Aug-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094518-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094518-009 | SW846 6020 |
| | Barium | 0.0473 | 0.0006 | 0.002 | 2.00 | | | 094518-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094518-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094518-009 | SW846 6020 |
| | Calcium | 69.6 | 0.600 | 2.00 | NE | | | 094518-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094518-009 | SW846 6020 |
| | Cobalt | 0.000133 | 0.0001 | 0.001 | NE | J | | 094518-009 | SW846 6020 |
| | Copper | 0.000847 | 0.00035 | 0.001 | NE | J | 0.0043U | 094518-009 | SW846 6020 |
| | Iron | 0.206 | 0.033 | 0.100 | NE | | | 094518-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094518-009 | SW846 6020 |
| | Magnesium | 13.6 | 0.010 | 0.030 | NE | | | 094518-009 | SW846 6020 |
| | Manganese | 0.00198 | 0.001 | 0.005 | NE | J | | 094518-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 094518-009 | SW846 7470 |
| | Nickel | 0.00212 | 0.0005 | 0.002 | NE | | | 094518-009 | SW846 6020 |
| | Potassium | 2.06 | 0.080 | 0.300 | NE | | | 094518-009 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | U | | 094518-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094518-009 | SW846 6020 |
| | Sodium | 24.0 | 0.080 | 0.250 | NE | | | 094518-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094518-009 | SW846 6020 |
| | Uranium | 0.00337 | 0.000067 | 0.0002 | 0.030 | | | 094518-009 | SW846 6020 |
| | Vanadium | 0.00493 | 0.001 | 0.005 | NE | J | | 094518-009 | SW846 6010 |
| | Zinc | 0.0061 | 0.0035 | 0.010 | NE | J | | 094518-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-5 *(Continued)*
## Summary of Target Analyte List Metals plus Uranium Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA1-W-03** | Aluminum | 0.0276 | 0.015 | 0.050 | NE | J | | 094520-009 | SW846 6020 |
| 08-Aug-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094520-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094520-009 | SW846 6020 |
| | Barium | 0.0307 | 0.0006 | 0.002 | 2.00 | | | 094520-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094520-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094520-009 | SW846 6020 |
| | Calcium | 292 | 0.600 | 2.00 | NE | | | 094520-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094520-009 | SW846 6020 |
| | Cobalt | 0.000476 | 0.0001 | 0.001 | NE | J | | 094520-009 | SW846 6020 |
| | Copper | 0.00248 | 0.00035 | 0.001 | NE | | | 094520-009 | SW846 6020 |
| | Iron | 0.758 | 0.033 | 0.100 | NE | | | 094520-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094520-009 | SW846 6020 |
| | Magnesium | 32.8 | 0.010 | 0.030 | NE | | | 094520-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 094520-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 094520-009 | SW846 7470 |
| | Nickel | 0.00741 | 0.0005 | 0.002 | NE | | J+ | 094520-009 | SW846 6020 |
| | Potassium | 2.59 | 0.080 | 0.300 | NE | | | 094520-009 | SW846 6020 |
| | Selenium | 0.0335 | 0.0015 | 0.005 | 0.050 | | J- | 094520-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094520-009 | SW846 6020 |
| | Sodium | 51.1 | 0.800 | 2.50 | NE | | | 094520-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094520-009 | SW846 6020 |
| | Uranium | 0.00119 | 0.000067 | 0.0002 | 0.030 | | | 094520-009 | SW846 6020 |
| | Vanadium | 0.00283 | 0.001 | 0.005 | NE | J | | 094520-009 | SW846 6010 |
| | Zinc | 0.00363 | 0.0035 | 0.010 | NE | J | | 094520-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

**Table 6A-5** *(Continued)*
**Summary of Target Analyte List Metals plus Uranium Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA1-W-04** | Aluminum | 0.0353 | 0.015 | 0.050 | NE | J | | 094523-009 | SW846 6020 |
| 12-Aug-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094523-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094523-009 | SW846 6020 |
| | Barium | 0.0559 | 0.0006 | 0.002 | 2.00 | | | 094523-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094523-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094523-009 | SW846 6020 |
| | Calcium | 62.3 | 0.300 | 1.00 | NE | | | 094523-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094523-009 | SW846 6020 |
| | Cobalt | 0.000101 | 0.0001 | 0.001 | NE | J | | 094523-009 | SW846 6020 |
| | Copper | 0.00106 | 0.00035 | 0.001 | NE | | | 094523-009 | SW846 6020 |
| | Iron | 0.137 | 0.033 | 0.100 | NE | | | 094523-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094523-009 | SW846 6020 |
| | Magnesium | 10.5 | 0.010 | 0.030 | NE | | | 094523-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 094523-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 094523-009 | SW846 7470 |
| | Nickel | 0.00134 | 0.0005 | 0.002 | NE | J | | 094523-009 | SW846 6020 |
| | Potassium | 2.07 | 0.080 | 0.300 | NE | | | 094523-009 | SW846 6020 |
| | Selenium | 0.00161 | 0.0015 | 0.005 | 0.050 | J | | 094523-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094523-009 | SW846 6020 |
| | Sodium | 23.7 | 0.400 | 1.25 | NE | | | 094523-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094523-009 | SW846 6020 |
| | Uranium | 0.00295 | 0.000067 | 0.0002 | 0.030 | | | 094523-009 | SW846 6020 |
| | Vanadium | 0.00545 | 0.001 | 0.005 | NE | | | 094523-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094523-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

**Table 6A-5** *(Continued)*
**Summary of Target Analyte List Metals plus Uranium Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA1-W-05** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 094525-009 | SW846 6020 |
| 13-Aug-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094525-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094525-009 | SW846 6020 |
| | Barium | 0.0378 | 0.0006 | 0.002 | 2.00 | | | 094525-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094525-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094525-009 | SW846 6020 |
| | Calcium | 82.2 | 0.300 | 1.00 | NE | | | 094525-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094525-009 | SW846 6020 |
| | Cobalt | 0.000115 | 0.0001 | 0.001 | NE | J | | 094525-009 | SW846 6020 |
| | Copper | 0.000643 | 0.00035 | 0.001 | NE | J | | 094525-009 | SW846 6020 |
| | Iron | 0.166 | 0.033 | 0.100 | NE | | | 094525-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094525-009 | SW846 6020 |
| | Magnesium | 11.8 | 0.010 | 0.030 | NE | | | 094525-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 094525-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 094525-009 | SW846 7470 |
| | Nickel | 0.00162 | 0.0005 | 0.002 | NE | J | | 094525-009 | SW846 6020 |
| | Potassium | 2.27 | 0.080 | 0.300 | NE | | | 094525-009 | SW846 6020 |
| | Selenium | 0.00165 | 0.0015 | 0.005 | 0.050 | J | | 094525-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094525-009 | SW846 6020 |
| | Sodium | 31.5 | 0.400 | 1.25 | NE | | | 094525-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094525-009 | SW846 6020 |
| | Uranium | 0.00343 | 0.000067 | 0.0002 | 0.030 | | | 094525-009 | SW846 6020 |
| | Vanadium | 0.00358 | 0.001 | 0.005 | NE | J | | 094525-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094525-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-5 *(Continued)*
## Summary of Target Analyte List Metals plus Uranium Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA1-W-06** | Aluminum | 0.152 | 0.015 | 0.050 | NE | | | 094527-009 | SW846 6020 |
| 14-Aug-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094527-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094527-009 | SW846 6020 |
| | Barium | 0.0272 | 0.0006 | 0.002 | 2.00 | | | 094527-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094527-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094527-009 | SW846 6020 |
| | Calcium | 124 | 0.300 | 1.00 | NE | | | 094527-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094527-009 | SW846 6020 |
| | Cobalt | 0.000221 | 0.0001 | 0.001 | NE | J | | 094527-009 | SW846 6020 |
| | Copper | 0.00122 | 0.00035 | 0.001 | NE | | J- | 094527-009 | SW846 6020 |
| | Iron | 0.388 | 0.033 | 0.100 | NE | | | 094527-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094527-009 | SW846 6020 |
| | Magnesium | 17.4 | 0.010 | 0.030 | NE | | | 094527-009 | SW846 6020 |
| | Manganese | 0.00242 | 0.001 | 0.005 | NE | J | | 094527-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 094527-009 | SW846 7470 |
| | Nickel | 0.00255 | 0.0005 | 0.002 | NE | | J- | 094527-009 | SW846 6020 |
| | Potassium | 2.09 | 0.080 | 0.300 | NE | | | 094527-009 | SW846 6020 |
| | Selenium | 0.00897 | 0.0015 | 0.005 | 0.050 | | | 094527-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094527-009 | SW846 6020 |
| | Sodium | 29.0 | 0.400 | 1.25 | NE | | | 094527-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094527-009 | SW846 6020 |
| | Uranium | 0.00114 | 0.000067 | 0.0002 | 0.030 | | | 094527-009 | SW846 6020 |
| | Vanadium | 0.00493 | 0.001 | 0.005 | NE | J | | 094527-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094527-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-5 *(Continued)*
## Summary of Target Analyte List Metals plus Uranium Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA1-W-08** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 094529-009 | SW846 6020 |
| 15-Aug-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094529-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094529-009 | SW846 6020 |
| | Barium | 0.0211 | 0.0006 | 0.002 | 2.00 | | | 094529-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094529-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094529-009 | SW846 6020 |
| | Calcium | 309 | 0.600 | 2.00 | NE | | | 094529-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094529-009 | SW846 6020 |
| | Cobalt | 0.000494 | 0.0001 | 0.001 | NE | J | | 094529-009 | SW846 6020 |
| | Copper | 0.00323 | 0.00035 | 0.001 | NE | | J- | 094529-009 | SW846 6020 |
| | Iron | 0.773 | 0.033 | 0.100 | NE | | | 094529-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094529-009 | SW846 6020 |
| | Magnesium | 40.4 | 0.010 | 0.030 | NE | | | 094529-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 094529-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 094529-009 | SW846 7470 |
| | Nickel | 0.00695 | 0.0005 | 0.002 | NE | | J- | 094529-009 | SW846 6020 |
| | Potassium | 3.09 | 0.080 | 0.300 | NE | | | 094529-009 | SW846 6020 |
| | Selenium | 0.0304 | 0.0015 | 0.005 | 0.050 | | | 094529-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094529-009 | SW846 6020 |
| | Sodium | 82.1 | 0.800 | 2.50 | NE | | | 094529-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094529-009 | SW846 6020 |
| | Uranium | 0.00164 | 0.000067 | 0.0002 | 0.030 | | | 094529-009 | SW846 6020 |
| | Vanadium | 0.00369 | 0.001 | 0.005 | NE | J | | 094529-009 | SW846 6010 |
| | Zinc | 0.00365 | 0.0035 | 0.010 | NE | J | | 094529-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-5 *(Continued)*
## Summary of Target Analyte List Metals plus Uranium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-SW1-320** | Aluminum | 0.120 | 0.015 | 0.050 | NE | | | 094563-009 | SW846 6020 |
| 11-Sep-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094563-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094563-009 | SW846 6020 |
| | Barium | 0.220 | 0.0006 | 0.002 | 2.00 | | | 094563-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094563-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094563-009 | SW846 6020 |
| | Calcium | 68.6 | 0.300 | 1.00 | NE | B | | 094563-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094563-009 | SW846 6020 |
| | Cobalt | 0.000146 | 0.0001 | 0.001 | NE | J | | 094563-009 | SW846 6020 |
| | Copper | 0.000545 | 0.00035 | 0.001 | NE | J | | 094563-009 | SW846 6020 |
| | Iron | 0.195 | 0.033 | 0.100 | NE | | | 094563-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094563-009 | SW846 6020 |
| | Magnesium | 12.8 | 0.010 | 0.030 | NE | | | 094563-009 | SW846 6020 |
| | Manganese | 0.00418 | 0.001 | 0.005 | NE | J | | 094563-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094563-009 | SW846 7470 |
| | Nickel | 0.00181 | 0.0005 | 0.002 | NE | J | | 094563-009 | SW846 6020 |
| | Potassium | 2.08 | 0.080 | 0.300 | NE | | | 094563-009 | SW846 6020 |
| | Selenium | 0.00416 | 0.0015 | 0.005 | 0.050 | J | | 094563-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094563-009 | SW846 6020 |
| | Sodium | 17.7 | 0.160 | 0.500 | NE | | | 094563-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094563-009 | SW846 6020 |
| | Uranium | 0.00138 | 0.000067 | 0.0002 | 0.030 | B | | 094563-009 | SW846 6020 |
| | Vanadium | 0.00545 | 0.001 | 0.005 | NE | | | 094563-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094563-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-5 *(Continued)*
## Summary of Target Analyte List Metals plus Uranium Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-NW1-595** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 094536-009 | SW846 6020 |
| 20-Aug-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094536-009 | SW846 6020 |
| | Arsenic | 0.00175 | 0.0017 | 0.005 | 0.010 | J | | 094536-009 | SW846 6020 |
| | Barium | 0.0472 | 0.0006 | 0.002 | 2.00 | | | 094536-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094536-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094536-009 | SW846 6020 |
| | Calcium | 114 | 0.600 | 2.00 | NE | B | | 094536-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094536-009 | SW846 6020 |
| | Cobalt | 0.000108 | 0.0001 | 0.001 | NE | J | | 094536-009 | SW846 6020 |
| | Copper | 0.000626 | 0.00035 | 0.001 | NE | J | J- | 094536-009 | SW846 6020 |
| | Iron | 0.168 | 0.033 | 0.100 | NE | | | 094536-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094536-009 | SW846 6020 |
| | Magnesium | 18.9 | 0.010 | 0.030 | NE | | | 094536-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 094536-009 | SW846 6020 |
| | Mercury | ND | 0.00067 | 0.0002 | 0.002 | U | | 094536-009 | SW846 7470 |
| | Nickel | 0.00186 | 0.0005 | 0.002 | NE | J | J- | 094536-009 | SW846 6020 |
| | Potassium | 2.56 | 0.080 | 0.300 | NE | | | 094536-009 | SW846 6020 |
| | Selenium | 0.00806 | 0.0015 | 0.005 | 0.050 | | | 094536-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094536-009 | SW846 6020 |
| | Sodium | 33.0 | 0.800 | 0.250 | NE | | | 094536-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094536-009 | SW846 6020 |
| | Uranium | 0.00238 | 0.000067 | 0.0002 | 0.030 | | | 094536-009 | SW846 6020 |
| | Vanadium | 0.00349 | 0.001 | 0.005 | NE | J | | 094536-009 | SW846 6010 |
| | Zinc | 0.0067 | 0.0035 | 0.010 | NE | J | | 094536-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-5 *(Continued)*
## Summary of Target Analyte List Metals plus Uranium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-W-01** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 094545-009 | SW846 6020 |
| 27-Aug-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094545-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094545-009 | SW846 6020 |
| | Barium | 0.0875 | 0.0006 | 0.002 | 2.00 | | | 094545-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094545-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094545-009 | SW846 6020 |
| | Calcium | 88.2 | 0.300 | 1.00 | NE | | | 094545-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094545-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 094545-009 | SW846 6020 |
| | Copper | 0.000555 | 0.00035 | 0.001 | NE | J | | 094545-009 | SW846 6020 |
| | Iron | 0.158 | 0.033 | 0.100 | NE | B | 0.19U | 094545-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094545-009 | SW846 6020 |
| | Magnesium | 10.9 | 0.010 | 0.030 | NE | | | 094545-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 094545-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094545-009 | SW846 7470 |
| | Nickel | 0.00167 | 0.0005 | 0.002 | NE | J | | 094545-009 | SW846 6020 |
| | Potassium | 1.75 | 0.080 | 0.300 | NE | | | 094545-009 | SW846 6020 |
| | Selenium | 0.00839 | 0.0015 | 0.005 | 0.050 | | | 094545-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094545-009 | SW846 6020 |
| | Sodium | 21.7 | 0.080 | 0.250 | NE | | | 094545-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094545-009 | SW846 6020 |
| | Uranium | 0.00104 | 0.000067 | 0.0002 | 0.030 | | | 094545-009 | SW846 6020 |
| | Vanadium | 0.00405 | 0.001 | 0.005 | NE | J | | 094545-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094545-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-5 *(Continued)*
## Summary of Target Analyte List Metals plus Uranium Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-W-19** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 094551-009 | SW846 6020 |
| 03-Sep-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094551-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094551-009 | SW846 6020 |
| | Barium | 0.0467 | 0.0006 | 0.002 | 2.00 | | | 094551-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094551-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094551-009 | SW846 6020 |
| | Calcium | 81.6 | 0.300 | 1.00 | NE | | | 094551-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094551-009 | SW846 6020 |
| | Cobalt | 0.000102 | 0.0001 | 0.001 | NE | J | | 094551-009 | SW846 6020 |
| | Copper | 0.000522 | 0.00035 | 0.001 | NE | J | | 094551-009 | SW846 6020 |
| | Iron | 0.140 | 0.033 | 0.100 | NE | | | 094551-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094551-009 | SW846 6020 |
| | Magnesium | 12.2 | 0.010 | 0.030 | NE | | | 094551-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 094551-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 094551-009 | SW846 7470 |
| | Nickel | 0.00179 | 0.0005 | 0.002 | NE | J | | 094551-009 | SW846 6020 |
| | Potassium | 1.83 | 0.080 | 0.300 | NE | | | 094551-009 | SW846 6020 |
| | Selenium | 0.00464 | 0.0015 | 0.005 | 0.050 | J | | 094551-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094551-009 | SW846 6020 |
| | Sodium | 23.4 | 0.080 | 0.250 | NE | | | 094551-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094551-009 | SW846 6020 |
| | Uranium | 0.00142 | 0.000067 | 0.0002 | 0.030 | | | 094551-009 | SW846 6020 |
| | Vanadium | 0.00441 | 0.001 | 0.005 | NE | J | NJ- | 094551-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094551-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-5 *(Continued)*
## Summary of Target Analyte List Metals plus Uranium Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-W-26** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 094549-009 | SW846 6020 |
| 29-Aug-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094549-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094549-009 | SW846 6020 |
| | Barium | 0.0646 | 0.0006 | 0.002 | 2.00 | | | 094549-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094549-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094549-009 | SW846 6020 |
| | Calcium | 216 | 0.300 | 1.00 | NE | | | 094549-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094549-009 | SW846 6020 |
| | Cobalt | 0.000192 | 0.0001 | 0.001 | NE | J | | 094549-009 | SW846 6020 |
| | Copper | 0.0013 | 0.00035 | 0.001 | NE | | J- | 094549-009 | SW846 6020 |
| | Iron | 0.361 | 0.033 | 0.100 | NE | B | | 094549-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094549-009 | SW846 6020 |
| | Magnesium | 26.4 | 0.010 | 0.030 | NE | | | 094549-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 094549-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094549-009 | SW846 7470 |
| | Nickel | 0.00362 | 0.0005 | 0.002 | NE | | | 094549-009 | SW846 6020 |
| | Potassium | 2.65 | 0.080 | 0.300 | NE | | | 094549-009 | SW846 6020 |
| | Selenium | 0.0242 | 0.0015 | 0.005 | 0.050 | | | 094549-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094549-009 | SW846 6020 |
| | Sodium | 39.7 | 0.080 | 0.250 | NE | | | 094549-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094549-009 | SW846 6020 |
| | Uranium | 0.00125 | 0.000067 | 0.0002 | 0.030 | | | 094549-009 | SW846 6020 |
| | Vanadium | 0.00284 | 0.001 | 0.005 | NE | J | | 094549-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094549-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-5 *(Continued)*
## Summary of Target Analyte List Metals plus Uranium Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-W-27** | Aluminum | 0.0164 | 0.015 | 0.050 | NE | J | | 094547-009 | SW846 6020 |
| 28-Aug-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094547-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094547-009 | SW846 6020 |
| | Barium | 0.0559 | 0.0006 | 0.002 | 2.00 | | | 094547-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094547-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094547-009 | SW846 6020 |
| | Calcium | 116 | 0.300 | 1.00 | NE | | | 094547-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094547-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 094547-009 | SW846 6020 |
| | Copper | 0.000492 | 0.00035 | 0.001 | NE | J | J- | 094547-009 | SW846 6020 |
| | Iron | 0.198 | 0.033 | 0.100 | NE | B | | 094547-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094547-009 | SW846 6020 |
| | Magnesium | 16.1 | 0.010 | 0.030 | NE | | | 094547-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 094547-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094547-009 | SW846 7470 |
| | Nickel | 0.0017 | 0.0005 | 0.002 | NE | J | | 094547-009 | SW846 6020 |
| | Potassium | 2.15 | 0.080 | 0.300 | NE | | | 094547-009 | SW846 6020 |
| | Selenium | 0.0125 | 0.0015 | 0.005 | 0.050 | | | 094547-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094547-009 | SW846 6020 |
| | Sodium | 28.1 | 0.080 | 0.250 | NE | | | 094547-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094547-009 | SW846 6020 |
| | Uranium | 0.00106 | 0.000067 | 0.0002 | 0.030 | | | 094547-009 | SW846 6020 |
| | Vanadium | 0.00371 | 0.001 | 0.005 | NE | J | | 094547-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094547-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

**Table 6A-5** *(Continued)*
**Summary of Target Analyte List Metals plus Uranium Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-2** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 094555-009 | SW846 6020 |
| 05-Sep-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094555-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094555-009 | SW846 6020 |
| | Barium | 0.0437 | 0.0006 | 0.002 | 2.00 | | | 094555-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094555-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094555-009 | SW846 6020 |
| | Calcium | 77.2 | 0.300 | 1.00 | NE | | | 094555-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094555-009 | SW846 6020 |
| | Cobalt | 0.000127 | 0.0001 | 0.001 | NE | J | | 094555-009 | SW846 6020 |
| | Copper | 0.000612 | 0.00035 | 0.001 | NE | J | 0.0020U | 094555-009 | SW846 6020 |
| | Iron | 0.150 | 0.033 | 0.100 | NE | | | 094555-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094555-009 | SW846 6020 |
| | Magnesium | 11.7 | 0.010 | 0.030 | NE | | | 094555-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 094555-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094555-009 | SW846 7470 |
| | Nickel | 0.00236 | 0.0005 | 0.002 | NE | | | 094555-009 | SW846 6020 |
| | Potassium | 1.82 | 0.080 | 0.300 | NE | | | 094555-009 | SW846 6020 |
| | Selenium | 0.00555 | 0.0015 | 0.005 | 0.050 | | | 094555-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094555-009 | SW846 6020 |
| | Sodium | 25.0 | 0.080 | 0.250 | NE | | | 094555-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094555-009 | SW846 6020 |
| | Uranium | 0.00128 | 0.000067 | 0.0002 | 0.030 | | | 094555-009 | SW846 6020 |
| | Vanadium | 0.00453 | 0.001 | 0.005 | NE | J | | 094555-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094555-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

**Table 6A-5** *(Continued)*
**Summary of Target Analyte List Metals plus Uranium Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-2** (Duplicate) | Aluminum | ND | 0.015 | 0.050 | NE | U | | 094556-009 | SW846 6020 |
| 05-Sep-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094556-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094556-009 | SW846 6020 |
| | Barium | 0.0455 | 0.0006 | 0.002 | 2.00 | | | 094556-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094556-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094556-009 | SW846 6020 |
| | Calcium | 85.5 | 0.300 | 1.00 | NE | | | 094556-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094556-009 | SW846 6020 |
| | Cobalt | 0.000131 | 0.0001 | 0.001 | NE | J | | 094556-009 | SW846 6020 |
| | Copper | 0.000515 | 0.00035 | 0.001 | NE | J | 0.0020U | 094556-009 | SW846 6020 |
| | Iron | 0.136 | 0.033 | 0.100 | NE | | | 094556-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094556-009 | SW846 6020 |
| | Magnesium | 11.5 | 0.010 | 0.030 | NE | | | 094556-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 094556-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094556-009 | SW846 7470 |
| | Nickel | 0.00224 | 0.0005 | 0.002 | NE | | | 094556-009 | SW846 6020 |
| | Potassium | 1.82 | 0.080 | 0.300 | NE | | | 094556-009 | SW846 6020 |
| | Selenium | 0.00627 | 0.0015 | 0.005 | 0.050 | | | 094556-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094556-009 | SW846 6020 |
| | Sodium | 23.8 | 0.080 | 0.250 | NE | | | 094556-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094556-009 | SW846 6020 |
| | Uranium | 0.00132 | 0.000067 | 0.0002 | 0.030 | | | 094556-009 | SW846 6020 |
| | Vanadium | 0.00477 | 0.001 | 0.005 | NE | J | | 094556-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094556-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-5 *(Continued)*
## Summary of Target Analyte List Metals plus Uranium Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-3** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 094539-009 | SW846 6020 |
| 21-Aug-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094539-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094539-009 | SW846 6020 |
| | Barium | 0.0449 | 0.0006 | 0.002 | 2.00 | | | 094539-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094539-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094539-009 | SW846 6020 |
| | Calcium | 77.2 | 0.600 | 2.00 | NE | B | | 094539-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094539-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 094539-009 | SW846 6020 |
| | Copper | 0.000546 | 0.00035 | 0.001 | NE | J | | 094539-009 | SW846 6020 |
| | Iron | 0.117 | 0.033 | 0.100 | NE | | | 094539-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094539-009 | SW846 6020 |
| | Magnesium | 12.4 | 0.010 | 0.030 | NE | | | 094539-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 094539-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094539-009 | SW846 7470 |
| | Nickel | 0.00136 | 0.0005 | 0.002 | NE | J | | 094539-009 | SW846 6020 |
| | Potassium | 2.02 | 0.080 | 0.300 | NE | | | 094539-009 | SW846 6020 |
| | Selenium | 0.00178 | 0.0015 | 0.005 | 0.050 | J | | 094539-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094539-009 | SW846 6020 |
| | Sodium | 26.7 | 0.080 | 0.250 | NE | | | 094539-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094539-009 | SW846 6020 |
| | Uranium | 0.00271 | 0.000067 | 0.0002 | 0.030 | | | 094539-009 | SW846 6020 |
| | Vanadium | 0.00413 | 0.001 | 0.005 | NE | J | | 094539-009 | SW846 6010 |
| | Zinc | 0.00351 | 0.0035 | 0.010 | NE | J | | 094539-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

**Table 6A-5** *(Continued)*
**Summary of Target Analyte List Metals plus Uranium Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-4** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 094558-009 | SW846 6020 |
| 09-Sep-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094558-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094558-009 | SW846 6020 |
| | Barium | 0.171 | 0.0006 | 0.002 | 2.00 | | | 094558-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094558-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094558-009 | SW846 6020 |
| | Calcium | 71.2 | 0.300 | 1.00 | NE | B | | 094558-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094558-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 094558-009 | SW846 6020 |
| | Copper | 0.000473 | 0.00035 | 0.001 | NE | J | | 094558-009 | SW846 6020 |
| | Iron | 0.115 | 0.033 | 0.100 | NE | | | 094558-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094558-009 | SW846 6020 |
| | Magnesium | 14.3 | 0.010 | 0.030 | NE | | | 094558-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 094558-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094558-009 | SW846 7470 |
| | Nickel | 0.00161 | 0.0005 | 0.002 | NE | J | | 094558-009 | SW846 6020 |
| | Potassium | 3.04 | 0.080 | 0.300 | NE | | | 094558-009 | SW846 6020 |
| | Selenium | 0.00323 | 0.0015 | 0.005 | 0.050 | J | | 094558-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094558-009 | SW846 6020 |
| | Sodium | 23.1 | 0.400 | 1.25 | NE | | | 094558-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094558-009 | SW846 6020 |
| | Uranium | 0.00292 | 0.000067 | 0.0002 | 0.030 | B | | 094558-009 | SW846 6020 |
| | Vanadium | 0.00539 | 0.001 | 0.005 | NE | | | 094558-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094558-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-5 *(Continued)*
## Summary of Target Analyte List Metals plus Uranium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-6** | Aluminum | 0.304 | 0.015 | 0.050 | NE | | | 094541-009 | SW846 6020 |
| 12-Sep-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094541-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094541-009 | SW846 6020 |
| | Barium | 0.0676 | 0.0006 | 0.002 | 2.00 | | | 094541-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094541-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094541-009 | SW846 6020 |
| | Calcium | 63.3 | 0.300 | 1.00 | NE | B | | 094541-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094541-009 | SW846 6020 |
| | Cobalt | 0.00018 | 0.0001 | 0.001 | NE | J | | 094541-009 | SW846 6020 |
| | Copper | 0.000983 | 0.00035 | 0.001 | NE | J | | 094541-009 | SW846 6020 |
| | Iron | 0.367 | 0.033 | 0.100 | NE | | | 094541-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094541-009 | SW846 6020 |
| | Magnesium | 12.5 | 0.100 | 0.300 | NE | | | 094541-009 | SW846 6020 |
| | Manganese | 0.00808 | 0.001 | 0.005 | NE | | | 094541-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094541-009 | SW846 7470 |
| | Nickel | 0.00186 | 0.0005 | 0.002 | NE | J | | 094541-009 | SW846 6020 |
| | Potassium | 2.33 | 0.080 | 0.300 | NE | | | 094541-009 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | U | | 094541-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094541-009 | SW846 6020 |
| | Sodium | 22.4 | 0.400 | 1.25 | NE | | | 094541-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094541-009 | SW846 6020 |
| | Uranium | 0.00296 | 0.000067 | 0.0002 | 0.030 | B | | 094541-009 | SW846 6020 |
| | Vanadium | 0.00577 | 0.001 | 0.005 | NE | | | 094541-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094541-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

**Table 6A-5** *(Continued)*
**Summary of Target Analyte List Metals plus Uranium Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-7** | Aluminum | 0.202 | 0.015 | 0.050 | NE | | | 094561-009 | SW846 6020 |
| 10-Sep-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094561-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094561-009 | SW846 6020 |
| | Barium | 0.228 | 0.0006 | 0.002 | 2.00 | | | 094561-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094561-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094561-009 | SW846 6020 |
| | Calcium | 69.7 | 0.300 | 1.00 | NE | B | | 094561-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094561-009 | SW846 6020 |
| | Cobalt | 0.000901 | 0.0001 | 0.001 | NE | J | | 094561-009 | SW846 6020 |
| | Copper | 0.000747 | 0.00035 | 0.001 | NE | J | | 094561-009 | SW846 6020 |
| | Iron | 0.272 | 0.033 | 0.100 | NE | | | 094561-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094561-009 | SW846 6020 |
| | Magnesium | 14.3 | 0.010 | 0.030 | NE | | | 094561-009 | SW846 6020 |
| | Manganese | 0.00342 | 0.001 | 0.005 | NE | J | | 094561-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094561-009 | SW846 7470 |
| | Nickel | 0.00189 | 0.0005 | 0.002 | NE | J | | 094561-009 | SW846 6020 |
| | Potassium | 2.06 | 0.080 | 0.300 | NE | | | 094561-009 | SW846 6020 |
| | Selenium | 0.00531 | 0.0015 | 0.005 | 0.050 | | | 094561-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094561-009 | SW846 6020 |
| | Sodium | 18.3 | 0.160 | 0.500 | NE | | | 094561-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094561-009 | SW846 6020 |
| | Uranium | 0.00176 | 0.000067 | 0.0002 | 0.030 | B | | 094561-009 | SW846 6020 |
| | Vanadium | 0.00475 | 0.001 | 0.005 | NE | J | | 094561-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094561-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-5 *(Continued)*
## Summary of Target Analyte List Metals plus Uranium Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **WYO-3** | Aluminum | 0.0476 | 0.015 | 0.050 | NE | J | | 094533-009 | SW846 6020 |
| 19-Aug-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094533-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094533-009 | SW846 6020 |
| | Barium | 0.0416 | 0.0006 | 0.002 | 2.00 | | | 094533-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094533-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094533-009 | SW846 6020 |
| | Calcium | 68.3 | 0.600 | 2.00 | NE | B | | 094533-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094533-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 094533-009 | SW846 6020 |
| | Copper | 0.000662 | 0.00035 | 0.001 | NE | J | 0.0037U | 094533-009 | SW846 6020 |
| | Iron | 0.131 | 0.033 | 0.100 | NE | | | 094533-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094533-009 | SW846 6020 |
| | Magnesium | 12.8 | 0.010 | 0.030 | NE | | | 094533-009 | SW846 6020 |
| | Manganese | 0.00159 | 0.001 | 0.005 | NE | J | | 094533-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094533-009 | SW846 7470 |
| | Nickel | 0.00133 | 0.0005 | 0.002 | NE | J | | 094533-009 | SW846 6020 |
| | Potassium | 2.33 | 0.080 | 0.300 | NE | | | 094533-009 | SW846 6020 |
| | Selenium | 0.00172 | 0.0015 | 0.005 | 0.050 | J | | 094533-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094533-009 | SW846 6020 |
| | Sodium | 26.5 | 0.080 | 0.250 | NE | | | 094533-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094533-009 | SW846 6020 |
| | Uranium | 0.0027 | 0.000067 | 0.0002 | 0.030 | | | 094533-009 | SW846 6020 |
| | Vanadium | 0.00638 | 0.001 | 0.005 | NE | | | 094533-009 | SW846 6010 |
| | Zinc | 0.00666 | 0.0035 | 0.010 | NE | J | | 094533-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-5 *(Continued)*
## Summary of Target Analyte List Metals plus Uranium Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **WYO-3** (Duplicate) | Aluminum | 0.0412 | 0.015 | 0.050 | NE | J | | 094534-009 | SW846 6020 |
| 19-Aug-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094534-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094534-009 | SW846 6020 |
| | Barium | 0.0404 | 0.0006 | 0.002 | 2.00 | | | 094534-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094534-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094534-009 | SW846 6020 |
| | Calcium | 67.6 | 0.600 | 2.00 | NE | B | | 094534-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094534-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 094534-009 | SW846 6020 |
| | Copper | 0.000742 | 0.00035 | 0.001 | NE | J | 0.0037U | 094534-009 | SW846 6020 |
| | Iron | 0.136 | 0.033 | 0.100 | NE | | | 094534-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094534-009 | SW846 6020 |
| | Magnesium | 13.0 | 0.010 | 0.030 | NE | | | 094534-009 | SW846 6020 |
| | Manganese | 0.00169 | 0.001 | 0.005 | NE | J | | 094534-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094534-009 | SW846 7470 |
| | Nickel | 0.0014 | 0.0005 | 0.002 | NE | J | | 094534-009 | SW846 6020 |
| | Potassium | 2.37 | 0.080 | 0.300 | NE | | | 094534-009 | SW846 6020 |
| | Selenium | 0.00166 | 0.0015 | 0.005 | 0.050 | J | | 094534-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094534-009 | SW846 6020 |
| | Sodium | 27.0 | 0.080 | 0.250 | NE | | | 094534-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094534-009 | SW846 6020 |
| | Uranium | 0.00271 | 0.000067 | 0.0002 | 0.030 | | | 094534-009 | SW846 6020 |
| | Vanadium | 0.00611 | 0.001 | 0.005 | NE | | | 094534-009 | SW846 6010 |
| | Zinc | 0.00458 | 0.0035 | 0.010 | NE | J | | 094534-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-5 *(Concluded)*
## Summary of Target Analyte List Metals plus Uranium Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **WYO-4** | Aluminum | 0.0382 | 0.015 | 0.050 | NE | J | | 094543-009 | SW846 6020 |
| 26-Aug-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094543-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094543-009 | SW846 6020 |
| | Barium | 0.159 | 0.0006 | 0.002 | 2.00 | | | 094543-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094543-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094543-009 | SW846 6020 |
| | Calcium | 86.5 | 0.300 | 1.00 | NE | | | 094543-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094543-009 | SW846 6020 |
| | Cobalt | 0.000115 | 0.0001 | 0.001 | NE | J | | 094543-009 | SW846 6020 |
| | Copper | 0.000964 | 0.00035 | 0.001 | NE | J | | 094543-009 | SW846 6020 |
| | Iron | 0.180 | 0.033 | 0.100 | NE | B | 0.19U | 094543-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094543-009 | SW846 6020 |
| | Magnesium | 14.0 | 0.010 | 0.030 | NE | | | 094543-009 | SW846 6020 |
| | Manganese | 0.00154 | 0.001 | 0.005 | NE | J | | 094543-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094543-009 | SW846 7470 |
| | Nickel | 0.00197 | 0.0005 | 0.002 | NE | J | | 094543-009 | SW846 6020 |
| | Potassium | 1.98 | 0.080 | 0.300 | NE | | | 094543-009 | SW846 6020 |
| | Selenium | 0.00615 | 0.0015 | 0.005 | 0.050 | | | 094543-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094543-009 | SW846 6020 |
| | Sodium | 19.9 | 0.080 | 0.250 | NE | | | 094543-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094543-009 | SW846 6020 |
| | Uranium | 0.00127 | 0.000067 | 0.0002 | 0.030 | | | 094543-009 | SW846 6020 |
| | Vanadium | 0.00487 | 0.001 | 0.005 | NE | J | | 094543-009 | SW846 6010 |
| | Zinc | 0.00401 | 0.0035 | 0.010 | NE | J | | 094543-009 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-6
## Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[b] (pCi/L) | MCL[d] (pCi/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **PGS-2** | Americium-241 | -2.4 ± 5.69 | 9.46 | 4.63 | NE | U | BD | 094511-033 | EPA 901.1 |
| 05-Aug-13 | Cesium-137 | -0.26 ± 1.92 | 3.28 | 1.58 | NE | U | BD | 094511-033 | EPA 901.1 |
| | Cobalt-60 | 0.756 ± 1.99 | 3.61 | 1.71 | NE | U | BD | 094511-033 | EPA 901.1 |
| | Potassium-40 | 22.3 ± 46.1 | 31.0 | 14.5 | NE | U | BD | 094511-033 | EPA 901.1 |
| | Gross Alpha | 1.04 | NA | NA | 15 pCi/L | NA | None | 094511-034 | EPA 900.0 |
| | Gross Beta | 2.83 ± 1.27 | 1.89 | 0.923 | 4mrem/yr | | J | 094511-034 | EPA 900.0 |
| | Tritium | -13.6 ± 110 | 190 | 92.3 | NE | U | BD | 094511-036 | EPA 906.0 M |
| **TA1-W-01** | Americium-241 | 7.32 ± 9.79 | 11.9 | 5.82 | NE | U | BD | 094513-033 | EPA 901.1 |
| 06-Aug-13 | Cesium-137 | -3.59 ± 4.17 | 3.83 | 1.86 | NE | U | BD | 094513-033 | EPA 901.1 |
| | Cobalt-60 | 1.04 ± 1.73 | 3.13 | 1.47 | NE | U | BD | 094513-033 | EPA 901.1 |
| | Potassium-40 | -10 ± 33.6 | 37.4 | 17.8 | NE | U | BD | 094513-033 | EPA 901.1 |
| | Gross Alpha | 0.22 | NA | NA | 15 pCi/L | NA | None | 094513-034 | EPA 900.0 |
| | Gross Beta | 4.03 ± 1.35 | 1.81 | 0.883 | 4mrem/yr | | J | 094513-034 | EPA 900.0 |
| | Tritium | 13.6 ± 111 | 191 | 92.5 | NE | U | BD | 094513-036 | EPA 906.0 M |
| **TA1-W-02** | Americium-241 | -2.68 ± 6.23 | 8.94 | 4.37 | NE | U | BD | 094517-033 | EPA 901.1 |
| 07-Aug-13 | Cesium-137 | 0.749 ± 2.33 | 2.15 | 1.02 | NE | U | BD | 094517-033 | EPA 901.1 |
| | Cobalt-60 | -2.48 ± 3.37 | 2.81 | 1.32 | NE | U | BD | 094517-033 | EPA 901.1 |
| | Potassium-40 | -18.6 ± 29.0 | 36.2 | 17.3 | NE | U | BD | 094517-033 | EPA 901.1 |
| | Gross Alpha | 1.24 | NA | NA | 15 pCi/L | NA | None | 094517-034 | EPA 900.0 |
| | Gross Beta | 3.35 ± 0.900 | 1.06 | 0.515 | 4mrem/yr | | | 094517-034 | EPA 900.0 |
| | Tritium | 6.77 ± 110 | 190 | 92.1 | NE | U | BD | 094517-036 | EPA 906.0 M |
| **TA1-W-02** (Duplicate) | Americium-241 | -14.6 ± 17.0 | 18.3 | 8.94 | NE | U | BD | 094518-033 | EPA 901.1 |
| 07-Aug-13 | Cesium-137 | -1.61 ± 3.22 | 3.88 | 1.87 | NE | U | BD | 094518-033 | EPA 901.1 |
| | Cobalt-60 | -4.2 ± 5.01 | 4.59 | 2.19 | NE | U | BD | 094518-033 | EPA 901.1 |
| | Potassium-40 | -23.2 ± 44.1 | 54.5 | 26.2 | NE | U | BD | 094518-033 | EPA 901.1 |
| | Gross Alpha | 0.92 | NA | NA | 15 pCi/L | NA | None | 094518-034 | EPA 900.0 |
| | Gross Beta | 2.53 ± 1.14 | 1.71 | 0.830 | 4mrem/yr | | J | 094518-034 | EPA 900.0 |
| | Tritium | 22.3 ± 110 | 188 | 91.2 | NE | U | BD | 094518-036 | EPA 906.0 M |
| **TA1-W-03** | Americium-241 | 0.475 ± 14.7 | 22.8 | 11.1 | NE | U | BD | 094520-033 | EPA 901.1 |
| 08-Aug-13 | Cesium-137 | -0.208 ± 1.78 | 3.15 | 1.51 | NE | U | BD | 094520-033 | EPA 901.1 |
| | Cobalt-60 | -0.0918 ± 1.87 | 3.38 | 1.58 | NE | U | BD | 094520-033 | EPA 901.1 |
| | Potassium-40 | -11.9 ± 37.8 | 43.0 | 20.4 | NE | U | BD | 094520-033 | EPA 901.1 |
| | Gross Alpha | -4.03 | NA | NA | 15 pCi/L | NA | None | 094520-034 | EPA 900.0 |
| | Gross Beta | 0.560 ± 2.80 | 4.80 | 2.33 | 4mrem/yr | U | BD | 094520-034 | EPA 900.0 |
| | Tritium | 25.0 ± 112 | 191 | 92.9 | NE | U | BD | 094520-036 | EPA 906.0 M |

Refer to footnotes on page 6A-49.

**Table 6A-6** *(Continued)*
**Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[b] (pCi/L) | MCL[d] (pCi/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA1-W-04** | Americium-241 | 0.896 ± 7.55 | 13.1 | 6.38 | NE | U | BD | 094523-033 | EPA 901.1 |
| 12-Aug-13 | Cesium-137 | -1.38 ± 2.44 | 4.03 | 1.91 | NE | U | BD | 094523-033 | EPA 901.1 |
| | Cobalt-60 | 0.463 ± 2.58 | 4.73 | 2.19 | NE | U | BD | 094523-033 | EPA 901.1 |
| | Potassium-40 | 45.7 ± 52.3 | 45.2 | 20.8 | NE | X | R | 094523-033 | EPA 901.1 |
| | Gross Alpha | -0.01 | NA | NA | 15 pCi/L | NA | None | 094523-034 | EPA 900.0 |
| | Gross Beta | 0.870 ± 0.504 | 0.761 | 0.365 | 4mrem/yr | | J | 094523-034 | EPA 900.0 |
| | Tritium | -29.5 ± 93.2 | 180 | 81.1 | NE | U | BD | 094523-036 | EPA 906.0 M |
| **TA1-W-05** | Americium-241 | 2.37 ± 13.5 | 23.8 | 11.6 | NE | U | BD | 094525-033 | EPA 901.1 |
| 13-Aug-13 | Cesium-137 | 1.64 ± 1.95 | 3.38 | 1.62 | NE | U | BD | 094525-033 | EPA 901.1 |
| | Cobalt-60 | 3.71 ± 3.88 | 3.71 | 1.53 | NE | U | BD | 094525-033 | EPA 901.1 |
| | Potassium-40 | 31.1 ± 38.7 | 31.6 | 14.6 | NE | U | BD | 094525-033 | EPA 901.1 |
| | Gross Alpha | -1.98 | NA | NA | 15 pCi/L | NA | None | 094525-034 | EPA 900.0 |
| | Gross Beta | 1.83 ± 1.02 | 1.56 | 0.756 | 4mrem/yr | | J | 094525-034 | EPA 900.0 |
| | Tritium | -5.77 ± 93.9 | 176 | 79.4 | NE | U | BD | 094525-036 | EPA 906.0 M |
| **TA1-W-06** | Americium-241 | -18.6 ± 20.7 | 17.8 | 8.67 | NE | U | BD | 094527-033 | EPA 901.1 |
| 14-Aug-13 | Cesium-137 | -0.472 ± 2.01 | 3.47 | 1.66 | NE | U | BD | 094527-033 | EPA 901.1 |
| | Cobalt-60 | 1.77 ± 3.73 | 4.07 | 1.92 | NE | U | BD | 094527-033 | EPA 901.1 |
| | Potassium-40 | 7.25 ± 53.3 | 35.2 | 16.4 | NE | U | BD | 094527-033 | EPA 901.1 |
| | Gross Alpha | -1.70 | NA | NA | 15 pCi/L | NA | None | 094527-034 | EPA 900.0 |
| | Gross Beta | 1.54 ± 0.700 | 1.01 | 0.482 | 4mrem/yr | | J | 094527-034 | EPA 900.0 |
| | Tritium | 43.9 ± 101 | 179 | 80.5 | NE | U | BD | 094527-036 | EPA 906.0 M |
| **TA1-W-08** | Americium-241 | 6.34 ± 12.7 | 21.3 | 10.4 | NE | U | BD | 094529-033 | EPA 901.1 |
| 15-Aug-13 | Cesium-137 | 1.75 ± 2.18 | 3.66 | 1.76 | NE | U | BD | 094529-033 | EPA 901.1 |
| | Cobalt-60 | -0.154 ± 2.15 | 3.75 | 1.76 | NE | U | BD | 094529-033 | EPA 901.1 |
| | Potassium-40 | 20.2 ± 45.3 | 32.9 | 15.3 | NE | U | BD | 094529-033 | EPA 901.1 |
| | Gross Alpha | -4.49 | NA | NA | 15 pCi/L | NA | None | 094529-034 | EPA 900.0 |
| | Gross Beta | 1.18 ± 2.24 | 3.81 | 1.82 | 4mrem/yr | U | BD | 094529-034 | EPA 900.0 |
| | Tritium | -5.8 ± 81.2 | 155 | 68.8 | NE | U | BD | 094529-036 | EPA 906.0 M |

Refer to footnotes on page 6A-49.

## Table 6A-6 *(Continued)*
## Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[b] (pCi/L) | MCL[d] (pCi/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-SW1-320** | Americium-241 | -19 ± 14.4 | 18.3 | 8.90 | NE | U | BD | 094563-033 | EPA 901.1 |
| 11-Sep-13 | Cesium-137 | -1.12 ± 3.48 | 4.54 | 2.19 | NE | U | BD | 094563-033 | EPA 901.1 |
| | Cobalt-60 | 0.698 ± 2.05 | 3.70 | 1.73 | NE | U | BD | 094563-033 | EPA 901.1 |
| | Potassium-40 | -11.5 ± 35.4 | 45.5 | 21.6 | NE | U | BD | 094563-033 | EPA 901.1 |
| | Gross Alpha | 0.12 | NA | NA | 15 pCi/L | NA | None | 094563-034 | EPA 900.0 |
| | Gross Beta | 2.81 ± 1.23 | 1.78 | 0.855 | 4mrem/yr | | J | 094563-034 | EPA 900.0 |
| | Tritium | -10.5 ± 94.7 | 179 | 80.6 | NE | U | BD | 094563-036 | EPA 906.0 M |
| **TA2-NW1-595** | Americium-241 | 5.51 ± 11.4 | 17.3 | 8.44 | NE | U | BD | 094536-033 | EPA 901.1 |
| 20-Aug-13 | Cesium-137 | -0.327 ± 1.99 | 3.37 | 1.61 | NE | U | BD | 094536-033 | EPA 901.1 |
| | Cobalt-60 | 1.80 ± 2.23 | 3.89 | 1.83 | NE | U | BD | 094536-033 | EPA 901.1 |
| | Potassium-40 | -25.3 ± 40.3 | 47.4 | 22.6 | NE | U | BD | 094536-033 | EPA 901.1 |
| | Gross Alpha | -1.20 | NA | NA | 15 pCi/L | NA | None | 094536-034 | EPA 900.0 |
| | Gross Beta | 1.34 ± 0.720 | 1.09 | 0.520 | 4mrem/yr | | J | 094536-034 | EPA 900.0 |
| | Tritium | -47 ± 90.6 | 179 | 80.8 | NE | U | BD | 094536-036 | EPA 906.0 M |
| **TA2-W-01** | Americium-241 | 10.8 ± 13.0 | 20.0 | 9.71 | NE | U | BD | 094545-033 | EPA 901.1 |
| 27-Aug-13 | Cesium-137 | 1.24 ± 1.99 | 3.40 | 1.62 | NE | U | BD | 094545-033 | EPA 901.1 |
| | Cobalt-60 | -0.254 ± 1.87 | 3.39 | 1.58 | NE | U | BD | 094545-033 | EPA 901.1 |
| | Potassium-40 | 0.0163 ± 46.5 | 30.6 | 14.1 | NE | U | BD | 094545-033 | EPA 901.1 |
| | Gross Alpha | -2.33 | NA | NA | 15 pCi/L | NA | None | 094545-034 | EPA 900.0 |
| | Gross Beta | 2.63 ± 1.07 | 1.56 | 0.756 | 4mrem/yr | | J | 094545-034 | EPA 900.0 |
| | Tritium | -4.6 ± 69.4 | 128 | 58.7 | NE | U | BD | 094545-036 | EPA 906.0 M |
| **TA2-W-19** | Americium-241 | 1.19 ± 17.1 | 27.1 | 13.1 | NE | U | BD | 094551-033 | EPA 901.1 |
| 03-Sep-13 | Cesium-137 | -0.639 ± 2.43 | 3.52 | 1.66 | NE | U | BD | 094551-033 | EPA 901.1 |
| | Cobalt-60 | 3.19 ± 2.18 | 3.82 | 1.76 | NE | U | BD | 094551-033 | EPA 901.1 |
| | Potassium-40 | -6.53 ± 35.7 | 51.3 | 24.1 | NE | U | BD | 094551-033 | EPA 901.1 |
| | Gross Alpha | 2.70 | NA | NA | 15 pCi/L | NA | None | 094551-034 | EPA 900.0 |
| | Gross Beta | 1.50 ± 1.05 | 1.68 | 0.819 | 4mrem/yr | U | BD | 094551-034 | EPA 900.0 |
| | Tritium | -101 ± 109 | 194 | 94.3 | NE | U | BD | 094551-036 | EPA 906.0 M |
| **TA2-W-26** | Americium-241 | 2.18 ± 15.5 | 27.3 | 13.3 | NE | U | BD | 094549-033 | EPA 901.1 |
| 29-Aug-13 | Cesium-137 | -0.0407 ± 1.98 | 3.40 | 1.61 | NE | U | BD | 094549-033 | EPA 901.1 |
| | Cobalt-60 | -1.09 ± 2.25 | 3.69 | 1.70 | NE | U | BD | 094549-033 | EPA 901.1 |
| | Potassium-40 | -8.36 ± 40.6 | 49.3 | 23.2 | NE | U | BD | 094549-033 | EPA 901.1 |
| | Gross Alpha | -4.21 | NA | NA | 15 pCi/L | NA | None | 094549-034 | EPA 900.0 |
| | Gross Beta | 2.68 ± 1.99 | 3.21 | 1.56 | 4mrem/yr | U | BD | 094549-034 | EPA 900.0 |
| | Tritium | -11.1 ± 67.5 | 126 | 57.6 | NE | U | BD | 094549-036 | EPA 906.0 M |

Refer to footnotes on page 6A-49.

**Table 6A-6** *(Continued)*
**Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[b] (pCi/L) | MCL[d] (pCi/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-W-27** | Americium-241 | 2.31 ± 6.96 | 10.7 | 5.23 | NE | U | BD | 094547-033 | EPA 901.1 |
| 28-Aug-13 | Cesium-137 | 3.24 ± 2.49 | 3.63 | 1.73 | NE | U | BD | 094547-033 | EPA 901.1 |
| | Cobalt-60 | -0.0665 ± 2.28 | 4.11 | 1.93 | NE | U | BD | 094547-033 | EPA 901.1 |
| | Potassium-40 | -31.9 ± 36.4 | 50.6 | 24.1 | NE | U | BD | 094547-033 | EPA 901.1 |
| | Gross Alpha | -0.91 | NA | NA | 15 pCi/L | NA | None | 094547-034 | EPA 900.0 |
| | Gross Beta | 1.88 ± 1.17 | 1.86 | 0.908 | 4mrem/yr | | J | 094547-034 | EPA 900.0 |
| | Tritium | 17.3 ± 69.9 | 125 | 57.2 | NE | U | BD | 094547-036 | EPA 906.0 M |
| **TJA-2** | Americium-241 | -3.22 ± 13.1 | 20.0 | 9.79 | NE | U | BD | 094555-033 | EPA 901.1 |
| 05-Sep-13 | Cesium-137 | 1.49 ± 2.43 | 4.43 | 2.13 | NE | U | BD | 094555-033 | EPA 901.1 |
| | Cobalt-60 | 1.83 ± 2.25 | 4.00 | 1.87 | NE | U | BD | 094555-033 | EPA 901.1 |
| | Potassium-40 | -21.1 ± 39.9 | 49.5 | 23.4 | NE | U | BD | 094555-033 | EPA 901.1 |
| | Gross Alpha | 2.84 | NA | NA | 15 pCi/L | NA | None | 094555-034 | EPA 900.0 |
| | Gross Beta | 2.02 ± 1.11 | 1.73 | 0.843 | 4mrem/yr | | J | 094555-034 | EPA 900.0 |
| | Tritium | 27.3 ± 94.9 | 171 | 76.7 | NE | U | BD | 094555-036 | EPA 906.0 M |
| **TJA-2** (Duplicate) | Americium-241 | 2.45 ± 7.92 | 11.9 | 5.79 | NE | U | BD | 094556-033 | EPA 901.1 |
| 05-Sep-13 | Cesium-137 | 0.969 ± 1.90 | 3.37 | 1.61 | NE | U | BD | 094556-033 | EPA 901.1 |
| | Cobalt-60 | -0.584 ± 1.79 | 3.14 | 1.45 | NE | U | BD | 094556-033 | EPA 901.1 |
| | Potassium-40 | -36.4 ± 40.5 | 43.6 | 20.6 | NE | U | BD | 094556-033 | EPA 901.1 |
| | Gross Alpha | 0.56 | NA | NA | 15 pCi/L | NA | None | 094556-034 | EPA 900.0 |
| | Gross Beta | 1.15 ± 1.05 | 1.72 | 0.836 | 4mrem/yr | U | BD | 094556-034 | EPA 900.0 |
| | Tritium | 32.5 ± 95.5 | 171 | 76.7 | NE | U | BD | 094556-036 | EPA 906.0 M |
| **TJA-3** | Americium-241 | -10.5 ± 14.7 | 19.5 | 9.50 | NE | U | BD | 094539-033 | EPA 901.1 |
| 21-Aug-13 | Cesium-137 | 2.51 ± 2.78 | 4.56 | 2.19 | NE | U | BD | 094539-033 | EPA 901.1 |
| | Cobalt-60 | -0.391 ± 2.97 | 4.32 | 2.03 | NE | U | BD | 094539-033 | EPA 901.1 |
| | Potassium-40 | -25 ± 43.9 | 49.5 | 23.4 | NE | U | BD | 094539-033 | EPA 901.1 |
| | Gross Alpha | 2.06 | NA | NA | 15 pCi/L | NA | None | 094539-034 | EPA 900.0 |
| | Gross Beta | 1.45 ± 0.707 | 1.05 | 0.501 | 4mrem/yr | | J | 094539-034 | EPA 900.0 |
| | Tritium | -17.6 ± 94.2 | 179 | 80.8 | NE | U | BD | 094539-036 | EPA 906.0 M |
| **TJA-4** | Americium-241 | 0.763 ± 7.39 | 11.1 | 5.40 | NE | U | BD | 094558-033 | EPA 901.1 |
| 09-Sep-13 | Cesium-137 | -1.6 ± 4.97 | 3.46 | 1.65 | NE | U | BD | 094558-033 | EPA 901.1 |
| | Cobalt-60 | 2.76 ± 2.35 | 3.38 | 1.57 | NE | U | BD | 094558-033 | EPA 901.1 |
| | Potassium-40 | -31.9 ± 33.6 | 39.4 | 18.5 | NE | U | BD | 094558-033 | EPA 901.1 |
| | Gross Alpha | 2.78 | NA | NA | 15 pCi/L | NA | None | 094558-034 | EPA 900.0 |
| | Gross Beta | 3.90 ± 1.39 | 1.76 | 0.842 | 4mrem/yr | | J | 094558-034 | EPA 900.0 |
| | Tritium | 109 ± 97.9 | 155 | 68.8 | NE | U | BD | 094558-036 | EPA 906.0 M |

Refer to footnotes on page 6A-49.

## Table 6A-6 *(Concluded)*
## Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[b] (pCi/L) | MCL[d] (pCi/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-6** | Americium-241 | 8.06 ± 11.4 | 16.9 | 8.24 | NE | U | BD | 094541-033 | EPA 901.1 |
| 12-Sep-13 | Cesium-137 | 0.00772 ± 2.02 | 3.45 | 1.65 | NE | U | BD | 094541-033 | EPA 901.1 |
| | Cobalt-60 | 1.31 ± 2.13 | 3.77 | 1.78 | NE | U | BD | 094541-033 | EPA 901.1 |
| | Potassium-40 | 6.94 ± 46.2 | 30.0 | 13.9 | NE | U | BD | 094541-033 | EPA 901.1 |
| | Gross Alpha | 1.95 | NA | NA | 15 pCi/L | NA | None | 094541-034 | EPA 900.0 |
| | Gross Beta | 2.49 ± 0.863 | 1.09 | 0.515 | 4mrem/yr | | J | 094541-034 | EPA 900.0 |
| | Tritium | 86.6 ± 94.6 | 155 | 68.5 | NE | U | BD | 094541-036 | EPA 906.0 M |
| **TJA-7** | Americium-241 | 0.616 ± 7.11 | 10.6 | 5.16 | NE | U | BD | 094561-033 | EPA 901.1 |
| 10-Sep-13 | Cesium-137 | -0.565 ± 2.79 | 3.66 | 1.76 | NE | U | BD | 094561-033 | EPA 901.1 |
| | Cobalt-60 | 1.52 ± 1.98 | 3.56 | 1.67 | NE | U | BD | 094561-033 | EPA 901.1 |
| | Potassium-40 | -7.8 ± 40.4 | 48.5 | 23.1 | NE | U | BD | 094561-033 | EPA 901.1 |
| | Gross Alpha | 1.19 | NA | NA | 15 pCi/L | NA | None | 094561-034 | EPA 900.0 |
| | Gross Beta | 1.95 ± 1.02 | 1.52 | 0.725 | 4mrem/yr | | J | 094561-034 | EPA 900.0 |
| | Tritium | 44.6 ± 88.2 | 155 | 68.5 | NE | U | BD | 094561-036 | EPA 906.0 M |
| **WYO-3** | Americium-241 | 3.25 ± 7.49 | 11.2 | 5.46 | NE | U | BD | 094533-033 | EPA 901.1 |
| 19-Aug-13 | Cesium-137 | 0.753 ± 1.79 | 3.20 | 1.52 | NE | U | BD | 094533-033 | EPA 901.1 |
| | Cobalt-60 | 1.69 ± 2.17 | 3.89 | 1.83 | NE | U | BD | 094533-033 | EPA 901.1 |
| | Potassium-40 | -17.1 ± 30.5 | 42.8 | 20.2 | NE | U | BD | 094533-033 | EPA 901.1 |
| | Gross Alpha | 3.02 | NA | NA | 15 pCi/L | NA | None | 094533-034 | EPA 900.0 |
| | Gross Beta | 2.10 ± 0.816 | 1.14 | 0.548 | 4mrem/yr | | J | 094533-034 | EPA 900.0 |
| | Tritium | -35.5 ± 92.7 | 180 | 81.4 | NE | U | BD | 094533-036 | EPA 906.0 M |
| **WYO-3** (Duplicate) | Americium-241 | -7.47 ± 12.0 | 19.3 | 9.37 | NE | U | BD | 094534-033 | EPA 901.1 |
| 19-Aug-13 | Cesium-137 | 2.63 ± 4.59 | 3.27 | 1.56 | NE | U | BD | 094534-033 | EPA 901.1 |
| | Cobalt-60 | 0.729 ± 2.09 | 3.78 | 1.77 | NE | U | BD | 094534-033 | EPA 901.1 |
| | Potassium-40 | -27.4 ± 33.2 | 42.0 | 19.8 | NE | U | BD | 094534-033 | EPA 901.1 |
| | Gross Alpha | 1.04 | NA | NA | 15 pCi/L | NA | None | 094534-034 | EPA 900.0 |
| | Gross Beta | 1.76 ± 0.698 | 0.961 | 0.459 | 4mrem/yr | | J | 094534-034 | EPA 900.0 |
| | Tritium | -47.4 ± 91.4 | 181 | 81.5 | NE | U | BD | 094534-036 | EPA 906.0 M |
| **WYO-4** | Americium-241 | 14.5 ± 19.0 | 28.2 | 13.7 | NE | U | BD | 094543-033 | EPA 901.1 |
| 26-Aug-13 | Cesium-137 | -0.622 ± 1.81 | 3.16 | 1.50 | NE | U | BD | 094543-033 | EPA 901.1 |
| | Cobalt-60 | -0.0543 ± 1.93 | 3.41 | 1.58 | NE | U | BD | 094543-033 | EPA 901.1 |
| | Potassium-40 | -14.1 ± 39.2 | 44.8 | 21.2 | NE | U | BD | 094543-033 | EPA 901.1 |
| | Gross Alpha | -1.67 | NA | NA | 15 pCi/L | NA | None | 094543-034 | EPA 900.0 |
| | Gross Beta | 3.84 ± 1.19 | 1.54 | 0.747 | 4mrem/yr | | J | 094543-034 | EPA 900.0 |
| | Tritium | -7.92 ± 63.9 | 119 | 54.3 | NE | U | BD | 094543-036 | EPA 906.0 M |

Refer to footnotes on page 6A-49.

## Table 6A-7
## Summary of Field Water Quality Measurements[h],
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Sample Date | Temperature (°C) | Specific Conductivity (µmhos/cm) | Oxidation Reduction Potential (mV) | pH | Turbidity (NTU) | Dissolved Oxygen (% Sat) | Dissolved Oxygen (mg/L) |
|---|---|---|---|---|---|---|---|---|
| **TA2-SW1-320** | 21-Mar-13 | 14.03 | 445 | 244.5 | 7.52 | 0.40 | 72.9 | 7.58 |
| **TA2-W-01** | 06-Mar-13 | 17.82 | 563 | 220.7 | 7.33 | 0.21 | 82.8 | 7.85 |
| **TA2-W-19** | 13-Mar-13 | 18.20 | 526 | 230.5 | 7.34 | 0.36 | 87.7 | 8.27 |
| **TA2-W-26** | 12-Mar-13 | 17.62 | 1189 | 228.4 | 7.30 | 0.42 | 81.3 | 7.71 |
| **TA2-W-27** | 07-Mar-13 | 19.85 | 720 | 222.6 | 7.30 | 0.33 | 91.2 | 8.29 |
| **TJA-2** | 14-Mar-13 | 17.69 | 521 | 233.7 | 7.35 | 0.28 | 88.1 | 8.33 |
| **TJA-3** | 04-Mar-13 | 17.96 | 445 | 222.3 | 7.18 | 0.88 | 73.6 | 6.96 |
| **TJA-4** | 19-Mar-13 | 16.93 | 500 | 230.5 | 7.29 | 0.24 | 59.5 | 5.70 |
| **TJA-6** | 05-Mar-13 | 17.89 | 415 | 212.3 | 7.19 | 2.32 | 61.5 | 5.82 |
| **TJA-7** | 20-Mar-13 | 17.40 | 460 | 228.9 | 7.27 | 0.93 | 79.5 | 7.53 |
| **WYO-4** | 18-Mar-13 | 14.98 | 572 | 242.1 | 7.49 | 0.39 | 78.7 | 7.90 |
| | | | | | | | | |
| **TA2-SW1-320** | 13-Jun-13 | 23.72 | 451 | 379.9 | 7.58 | 0.70 | 88.5 | 7.50 |
| **TA2-W-19** | 19-Jun-13 | 22.45 | 524 | 180.7 | 7.24 | 0.36 | 101.5 | 8.77 |
| **TA2-W-26** | 20-Jun-13 | 19.61 | 1197 | 178.8 | 7.24 | 0.67 | 84.5 | 7.71 |
| **TJA-2** | 18-Jun-13 | 18.62 | 522 | 393.8 | 7.54 | 0.43 | 88.7 | 8.29 |
| **TJA-4** | 14-Jun-13 | 19.48 | 505 | 372.8 | 7.45 | 0.51 | 64.6 | 5.93 |
| **TJA-7** | 17-Jun-13 | 21.98 | 464 | 399.0 | 7.40 | 1.82 | 87.0 | 7.75 |
| **WYO-4** | 24-Jun-13 | 21.80 | 574 | 161.1 | 7.33 | 0.58 | 86.7 | 7.60 |
| | | | | | | | | |
| **PGS-2** | 05-Aug-13 | 22.08 | 648 | 125.4 | 7.60 | 1.01 | 10.6 | 0.92 |
| **TA1-W-01** | 06-Aug-13 | 22.94 | 540 | 153.2 | 7.34 | 0.42 | 79.0 | 6.85 |
| **TA1-W-02** | 07-Aug-13 | 20.63 | 523 | 148.9 | 7.37 | 1.72 | 66.1 | 5.92 |
| **TA1-W-03** | 08-Aug-13 | 18.87 | 1754 | 140.6 | 7.54 | 0.95 | 83.2 | 7.70 |
| **TA1-W-04** | 12-Aug-13 | 19.48 | 493 | 144.8 | 7.47 | 0.55 | 69.7 | 6.38 |
| **TA1-W-05** | 13-Aug-13 | 20.54 | 610 | 159.7 | 7.26 | 0.47 | 81.8 | 7.34 |
| **TA1-W-06** | 14-Aug-13 | 19.33 | 892 | 143.6 | 7.62 | 4.74 | 83.9 | 7.70 |
| **TA1-W-08** | 15-Aug-13 | 20.66 | 2050 | 139.1 | 7.58 | 0.56 | 82.1 | 7.32 |
| **TA2-SW1-320** | 11-Sep-13 | 18.71 | 526 | 135.6 | 7.67 | 3.57 | 80.7 | 7.42 |
| **TA2-NW1-595** | 20-Aug-13 | 20.21 | 812 | 140.7 | 7.40 | 0.67 | 86.3 | 7.79 |
| **TA2-W-01** | 27-Aug-13 | 20.48 | 656 | 139.5 | 7.53 | 0.65 | 86.0 | 7.73 |
| **TA2-W-19** | 03-Sep-13 | 19.12 | 611 | 151.1 | 7.56 | 0.45 | 93.8 | 8.66 |
| **TA2-W-26** | 29-Aug-13 | 19.38 | 1403 | 141.1 | 7.51 | 0.65 | 83.4 | 7.64 |
| **TA2-W-27** | 28-Aug-13 | 21.32 | 841 | 139.7 | 7.49 | 0.84 | 95.5 | 8.44 |
| **TJA-2** | 05-Sep-13 | 19.59 | 610 | 138.1 | 7.54 | 0.65 | 90.9 | 8.30 |
| **TJA-3** | 21-Aug-13 | 21.63 | 523 | 148.0 | 7.40 | 0.44 | 77.9 | 6.86 |

Refer to footnotes on page 6A-49.

**Table 6A-7** *(Concluded)*
**Summary of Field Water Quality Measurements[h],**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Sample Date | Temperature (°C) | Specific Conductivity (µmhos/cm) | Oxidation Reduction Potential (mV) | pH | Turbidity (NTU) | Dissolved Oxygen (% Sat) | Dissolved Oxygen (mg/L) |
|---|---|---|---|---|---|---|---|---|
| **TJA-4** | 09-Sep-13 | 19.72 | 590 | 138.5 | 7.48 | 0.48 | 64.4 | 5.89 |
| **TJA-6** | 12-Sep-13 | 19.85 | 489 | 135.0 | 7.43 | 9.69 | 63.8 | 5.82 |
| **TJA-7** | 10-Sep-13 | 18.23 | 544 | 135.5 | 7.51 | 3.30 | 85.4 | 8.03 |
| **WYO-3** | 19-Aug-13 | 21.81 | 502 | 123.5 | 7.73 | 0.88 | 82.3 | 7.21 |
| **WYO-4** | 26-Aug-13 | 21.25 | 670 | 127.4 | 7.65 | 1.21 | 85.7 | 7.57 |
| | | | | | | | | |
| **TA2-SW1-320** | 22-Nov-13 | 5.05 | 336.1 | 256.9 | 7.83 | 9.79 | 61.0 | 7.76 |
| **TA2-W-19** | 14-Nov-13 | 18.20 | 541.3 | 220.0 | 7.66 | 0.42 | 91.7 | 8.60 |
| **TA2-W-26** | 12-Nov-13 | 14.73 | 1172.5 | 194.5 | 7.48 | 0.86 | 77.4 | 7.81 |
| **TJA-2** | 19-Nov-13 | 15.54 | 511.9 | 264.2 | 7.67 | 0.55 | 84.7 | 8.45 |
| **TJA-3** | 13-Nov-13 | 19.23 | 477.0 | 210.3 | 7.53 | 0.41 | 76.2 | 7.00 |
| **TJA-4** | 20-Nov-13 | 16.48 | 505.6 | 282.7 | 7.63 | 0.66 | 61.5 | 6.00 |
| **TJA-7** | 21-Nov-13 | 16.57 | 462.4 | 270.6 | 7.69 | 1.84 | 81.8 | 7.96 |
| **WYO-4** | 18-Nov-13 | 13.95 | 539.4 | 224.0 | 7.77 | 0.72 | 78.1 | 8.05 |

Refer to footnotes on page 6A-49.

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## *Footnotes for Tijeras Arroyo Groundwater Analytical Results Tables*

| | |
|---|---|
| % | = percent. |
| μg/L | = micrograms per liter. |
| CFR | = Code of Federal Regulations. |
| EPA | = U.S. Environmental Protection Agency. |
| ID | = Identifier. |
| mg/L | = milligrams per liter. |
| mrem | = millirem per year. |
| No. | = Number. |
| pCi/L | = picocuries per liter. |

**[a]Result**

Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 10A-1-4).

| | |
|---|---|
| **Bold** | = Values in bold exceed the established MCL. |
| ND | = Not detected (at MDL). Activities of zero or less are considered to be not detected. |

**[b]MDL or MDA**

MDL applies to the data listed in Tables 6A-1 through 6A-5. MDA applies to the radiological data in Table 6A-6.

| | |
|---|---|
| MDA | = The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level. |
| MDL | = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific. |
| NA | = Not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity. |

**[c]PQL or Critical Level**

PQL applies to the data listed in Tables 6A-1 through 6A-5. Critical Level applies to Table 6A-6.

| | |
|---|---|
| Critical level | = The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific. |
| NA | = Not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity. |
| PQL | = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions. |

**[d]MCL**

MCL = Maximum contaminant level. MCLs were established by the EPA Office of Water, National Primary Water Regulations (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- Gross Alpha particle activity, excluding total uranium = 15 pCi/L (40 CFR Parts 9, 141, and 142, Table 10A- 1-4).
- Any combination of Beta and/or Gamma emitting radionuclides = 4 mrem/yr (as dose rate).

NE = Not established.

**[e]Lab Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

| | |
|---|---|
| B | = Analyte is detected in associated laboratory method blank. |
| J | = Amount detected is below the PQL. |
| N | = Results associated with a spike analysis that was outside control limits. |
| NA | = Not applicable. |
| U | = Analyte is absent or below the MDL. |
| X | = Data rejected due to peak not meeting identification criteria. |

## *Footnotes for Tijeras Arroyo Groundwater Analytical Results Tables (Concluded)*

**[f]Validation Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = The associated value is an estimated quantity.
J+ = The associated numerical value is an estimated quantity with a suspected positive bias.
J- = The associated numerical value is an estimated quantity with a suspected negative bias.
None = No data validation for corrected gross alpha activity.
NJ- = Presumptive evidence of the presence of the material at an estimated quantity with a suspected negative bias.
R = The data are unusable, and resampling or reanalysis are necessary for verification.
U = The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
UJ = The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

**[g]Analytical Method**

Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.

DOE, 1990, "EML [Environmental Measurements Laboratory] Procedures Manual," 27th ed., Vol. 1, Rev. 1992, HASL-300.

EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.

EPA, 1984, "Methods for Chemical Analysis of Water and Wastes." EPA 600-4-79-020.

EPA, 1983, "The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0," EPA-600/4-84-017.

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

DOE = U.S. Department of Energy.
HASL = Health and Safety Laboratory.
SM = Standard Method.

**[h]Field Water Quality Measurements**

Field measurements collected prior to sampling.

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

# Attachment 6B
# Tijeras Arroyo Groundwater
# Plots

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# Attachment 6B Plots


6B-1 Trichloroethene Concentrations, WYO-4 ..... 6B-5

6B-2 Nitrate plus Nitrite Concentrations, TA2-SW1-320 ..... 6B-6

6B-3 Nitrate plus Nitrite Concentrations, TA2-W-19 ..... 6B-7

6B-4 Nitrate plus Nitrite Concentrations, TJA-2 ..... 6B-8

6B-5 Nitrate plus Nitrite Concentrations, TJA-4 ..... 6B-9

6B-6 Nitrate plus Nitrite Concentrations, TJA-7 ..... 6B-10

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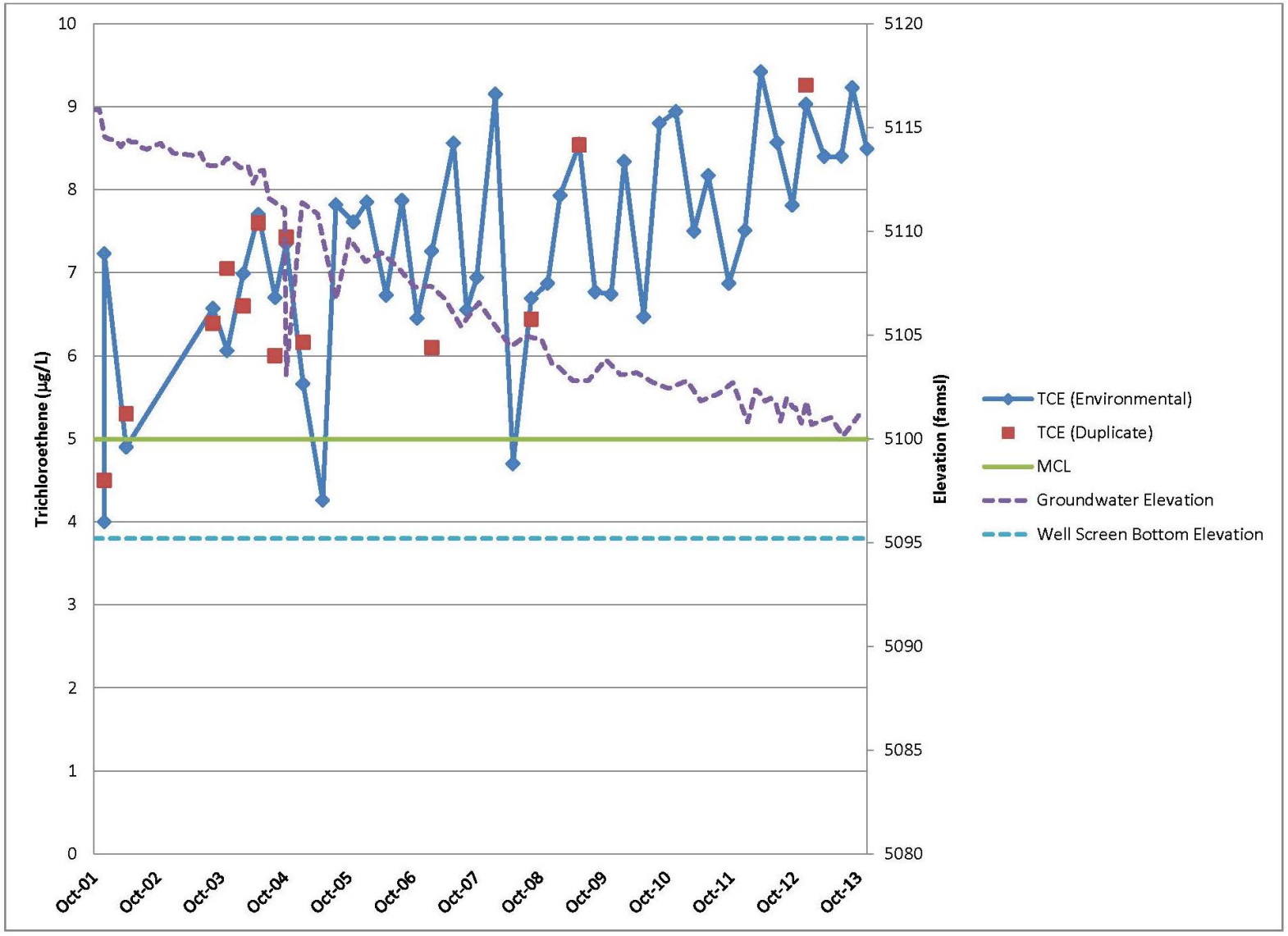


**Figure 6B-1. Trichloroethene Concentrations, WYO-4**

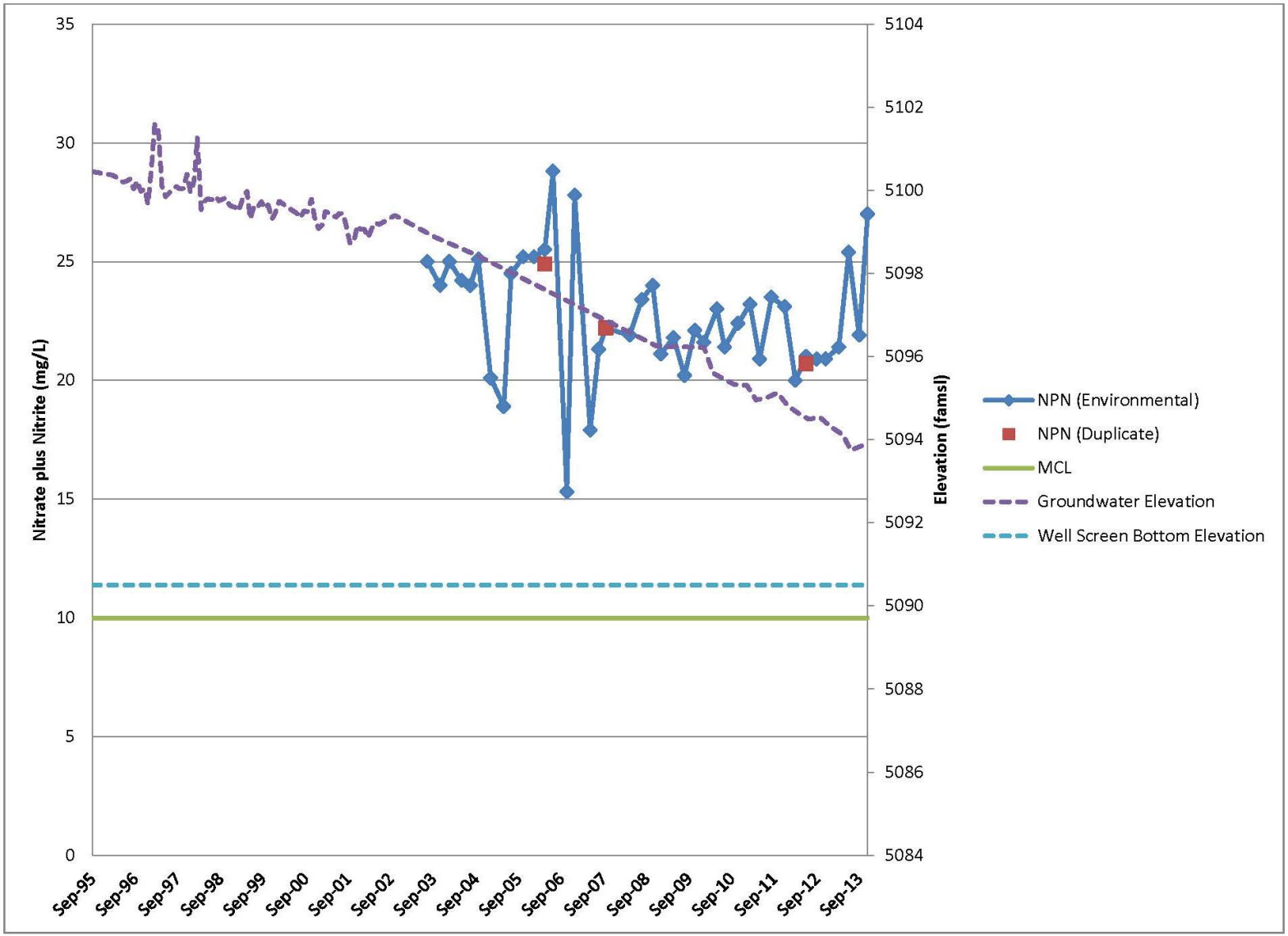


**Figure 6B-2. Nitrate plus Nitrite Concentrations, TA2-SW1-320**

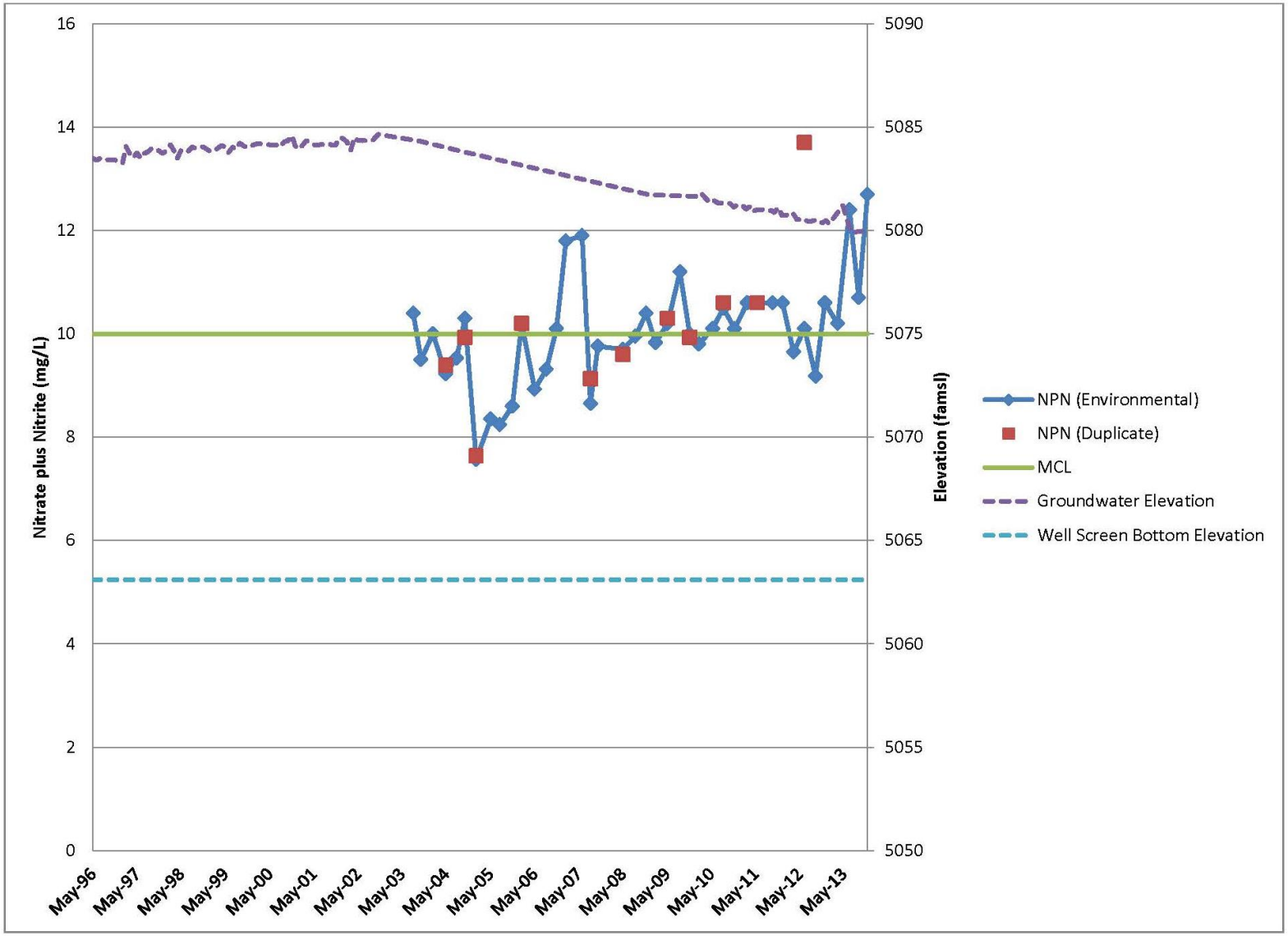


**Figure 6B-3. Nitrate plus Nitrite Concentrations, TA2-W-19**

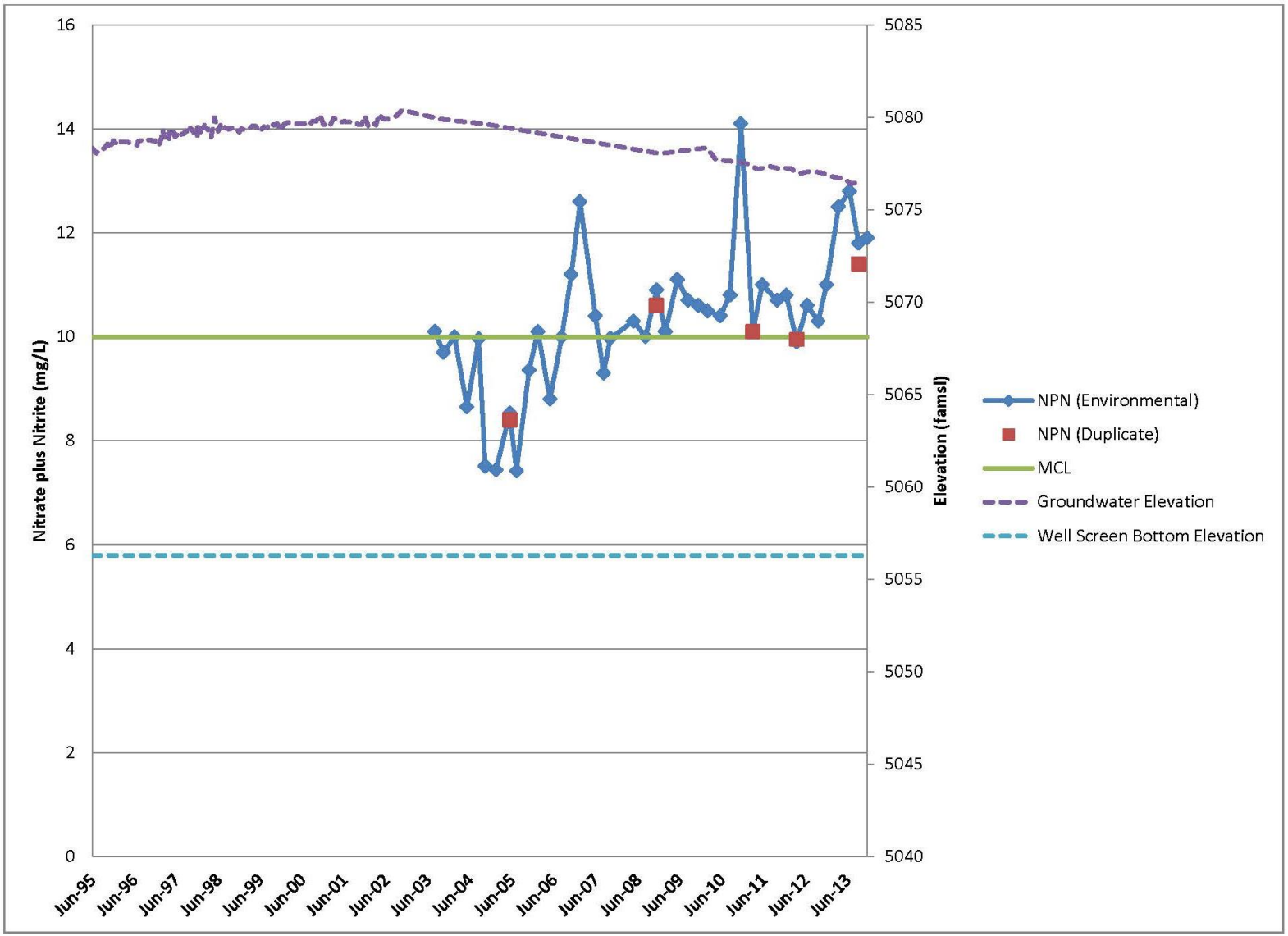


**Figure 6B-4. Nitrate plus Nitrite Concentrations, TJA-2**

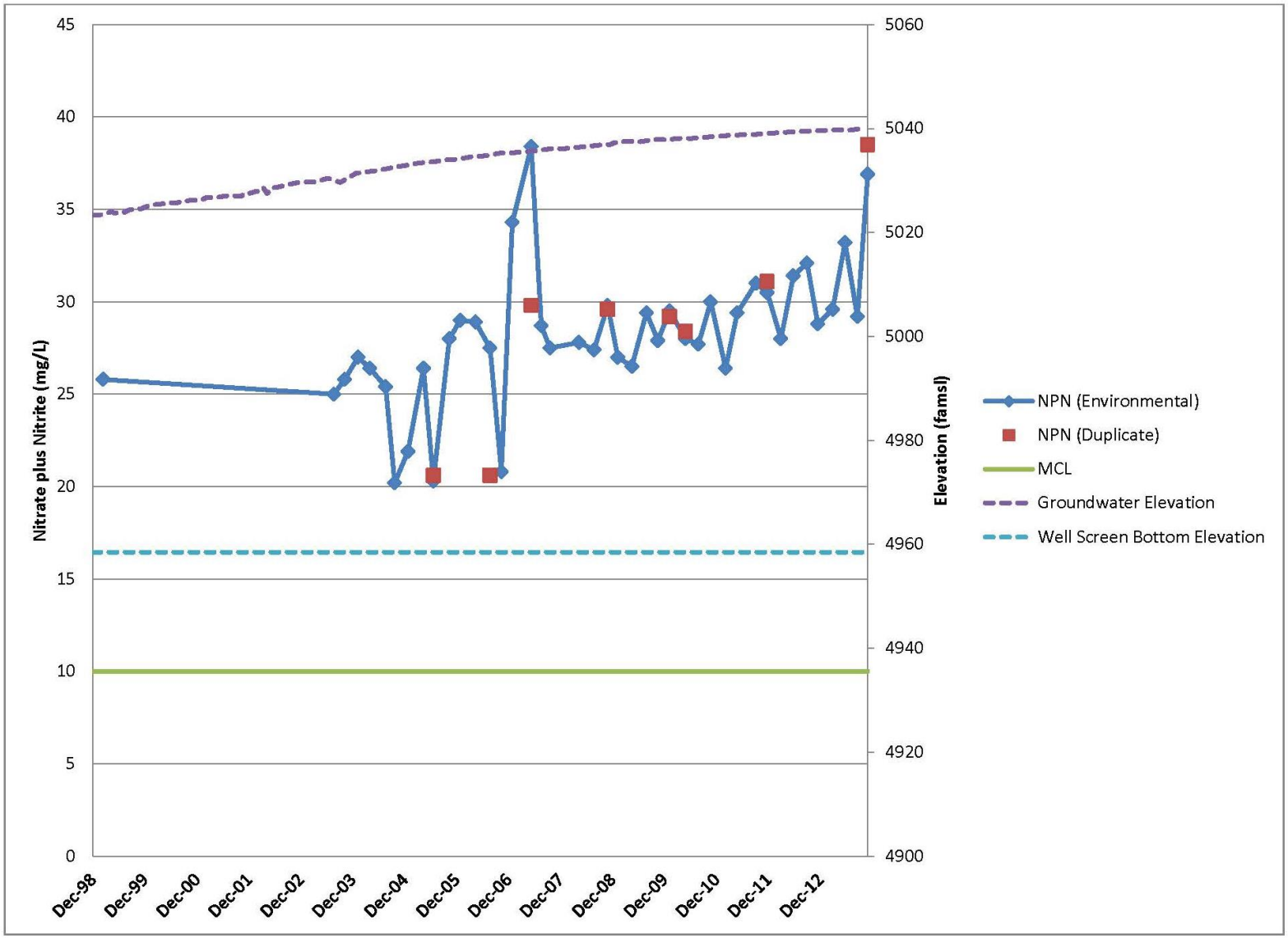


**Figure 6B-5. Nitrate plus Nitrite Concentrations, TJA-4**

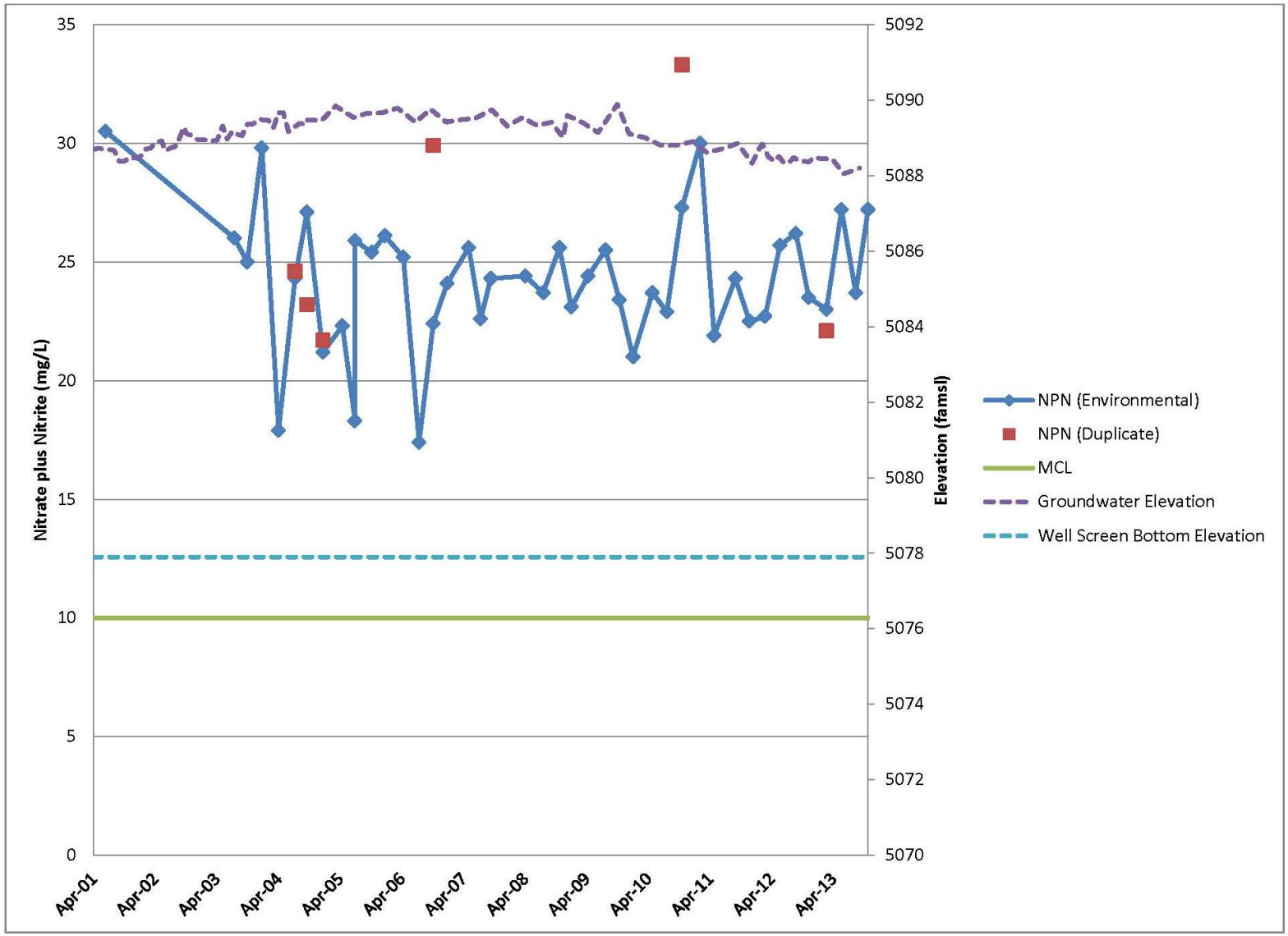


**Figure 6B-6. Nitrate plus Nitrite Concentrations, TJA-7**

# Attachment 6C
# Tijeras Arroyo Groundwater
# Hydrographs

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# Attachment 6C Hydrographs


6C-1 TAG Study Area Wells (1 of 7) ..... 6C-5

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

6C-3 TAG Study Area Wells (3 of 7) ..... 6C-7

6C-4 TAG Study Area Wells (4 of 7) ..... 6C-8

6C-5 TAG Study Area Wells (5 of 7) ..... 6C-9

6C-6 TAG Study Area Wells (6 of 7) ..... 6C-10

6C-7 TAG Study Area Wells (7 of 7) ..... 6C-11

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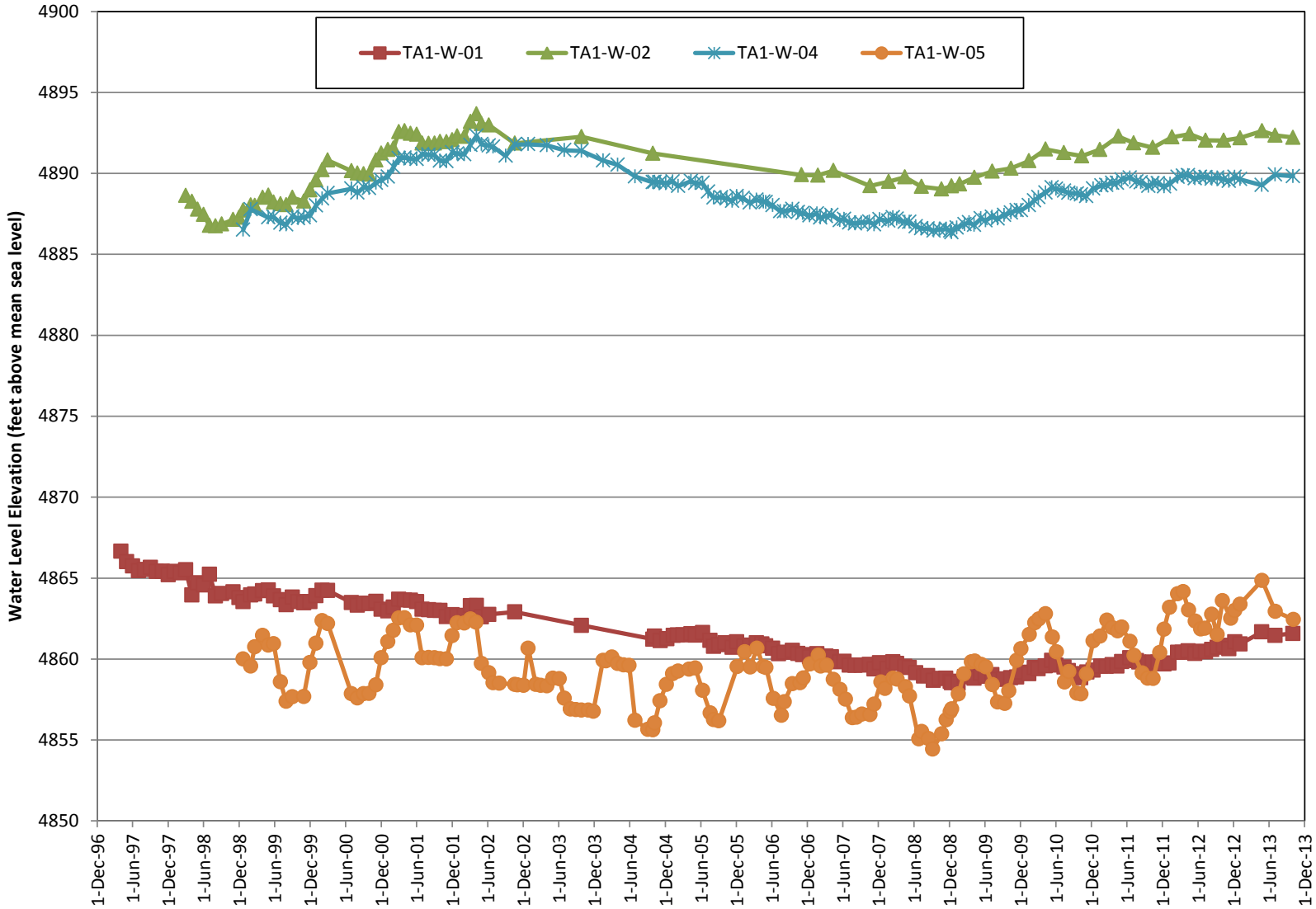


**Figure 6C-1. TAG Study Area Wells (1 of 7)**

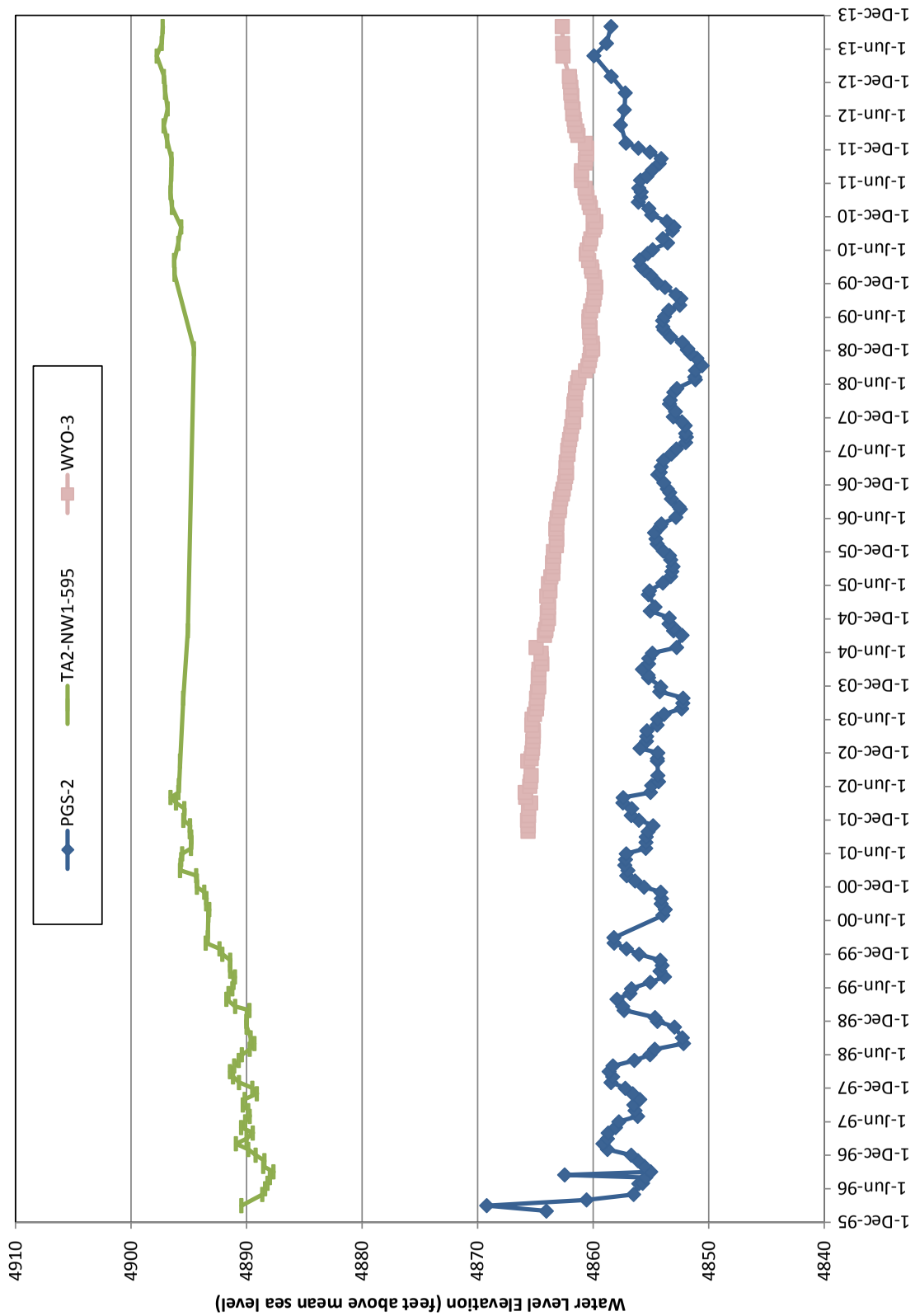


**Figure 6C-2. TAG Study Area Wells (2 of 7)**

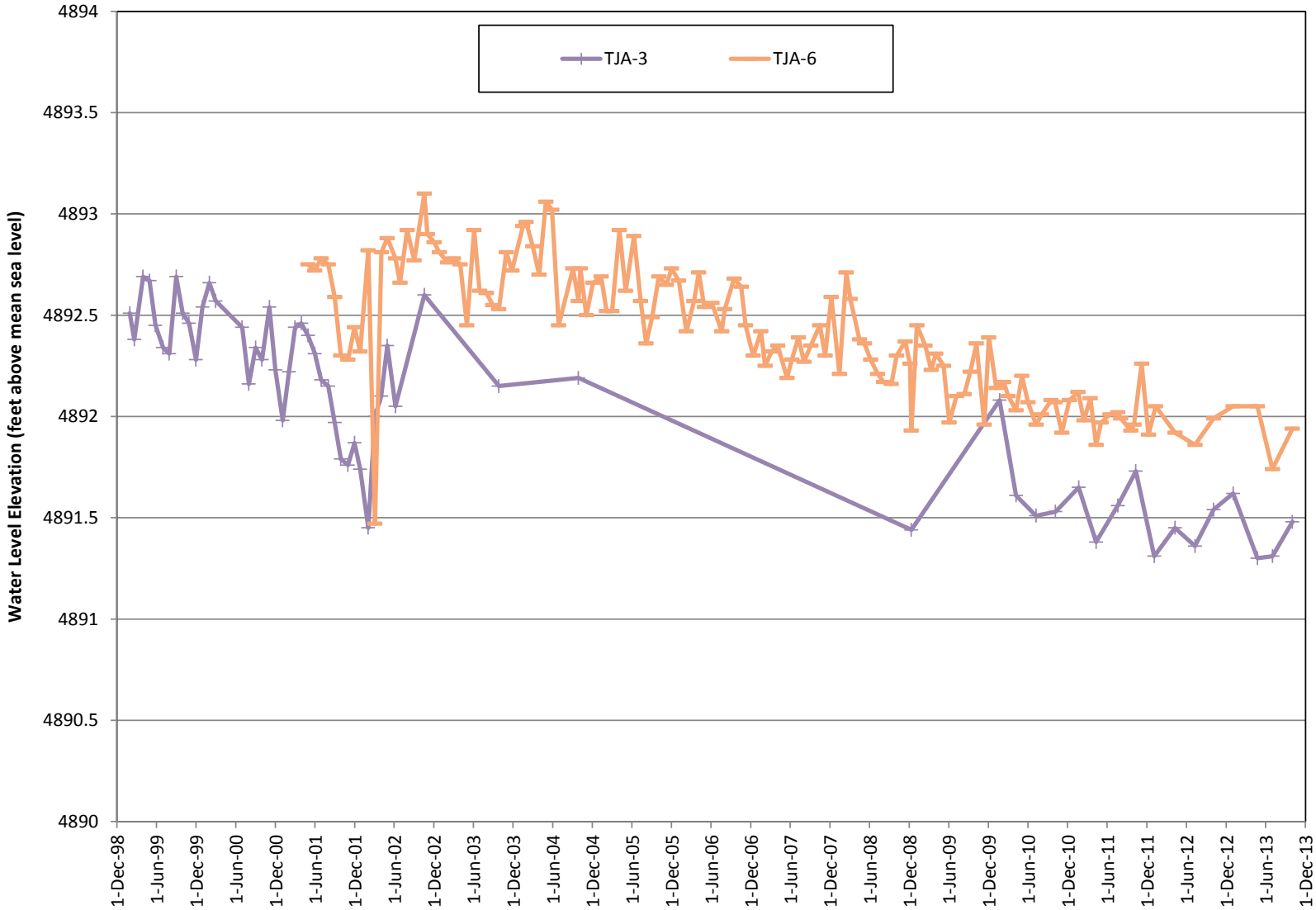


**Figure 6C-3. TAG Study Area Wells (3 of 7)**

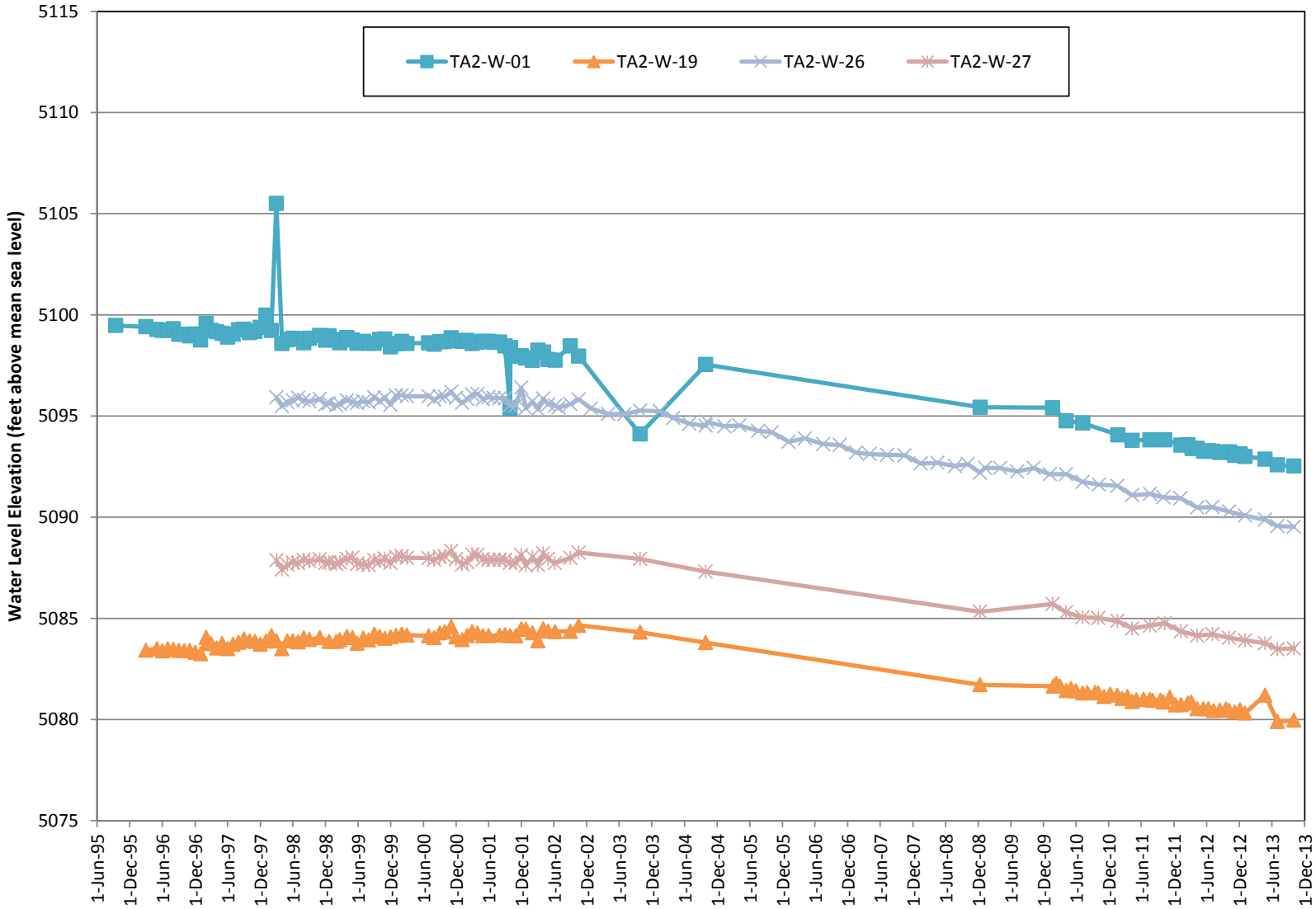


**Figure 6C-4. TAG Study Area Wells (4 of 7)**

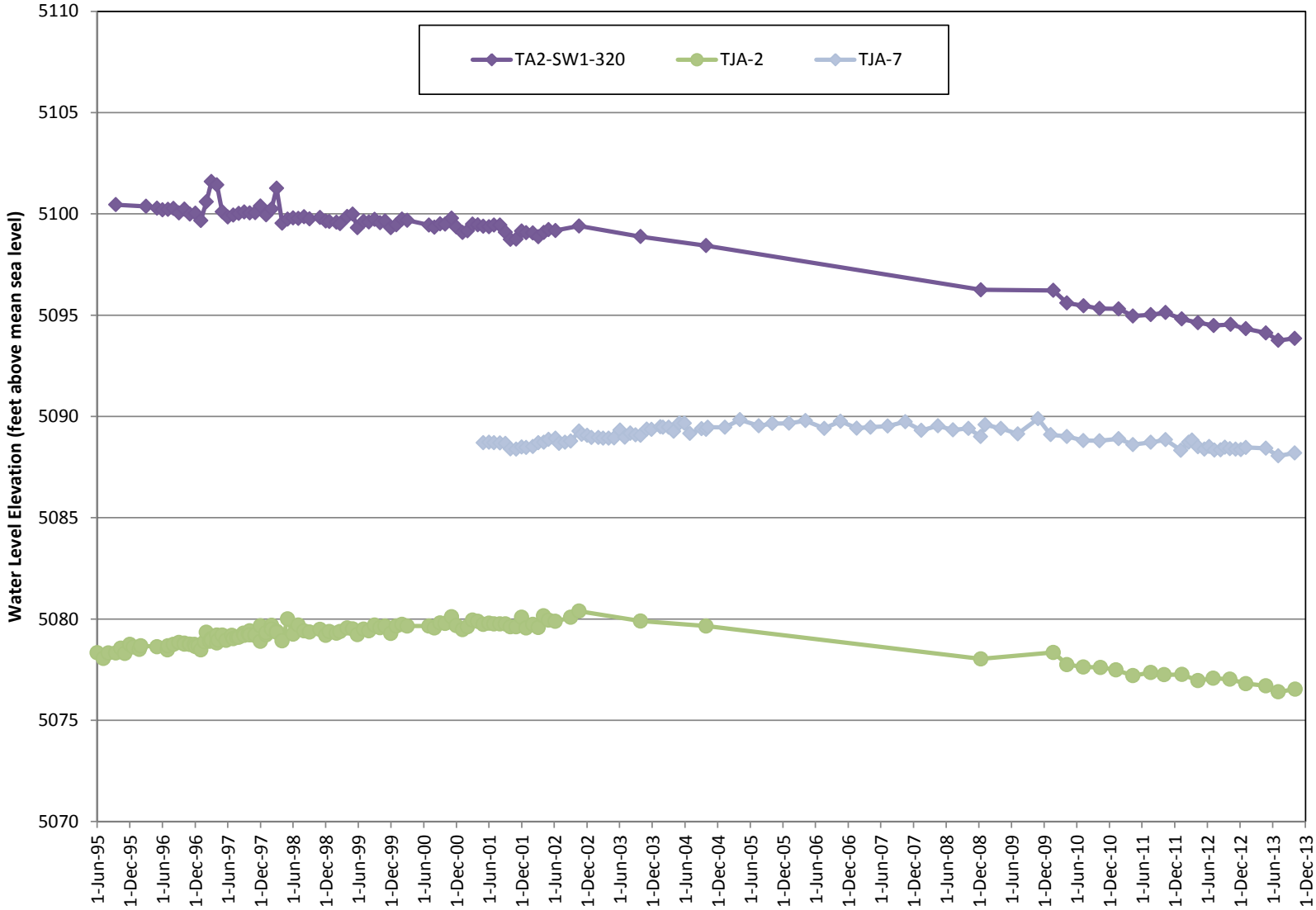


**Figure 6C-5. TAG Study Area Wells (5 of 7)**

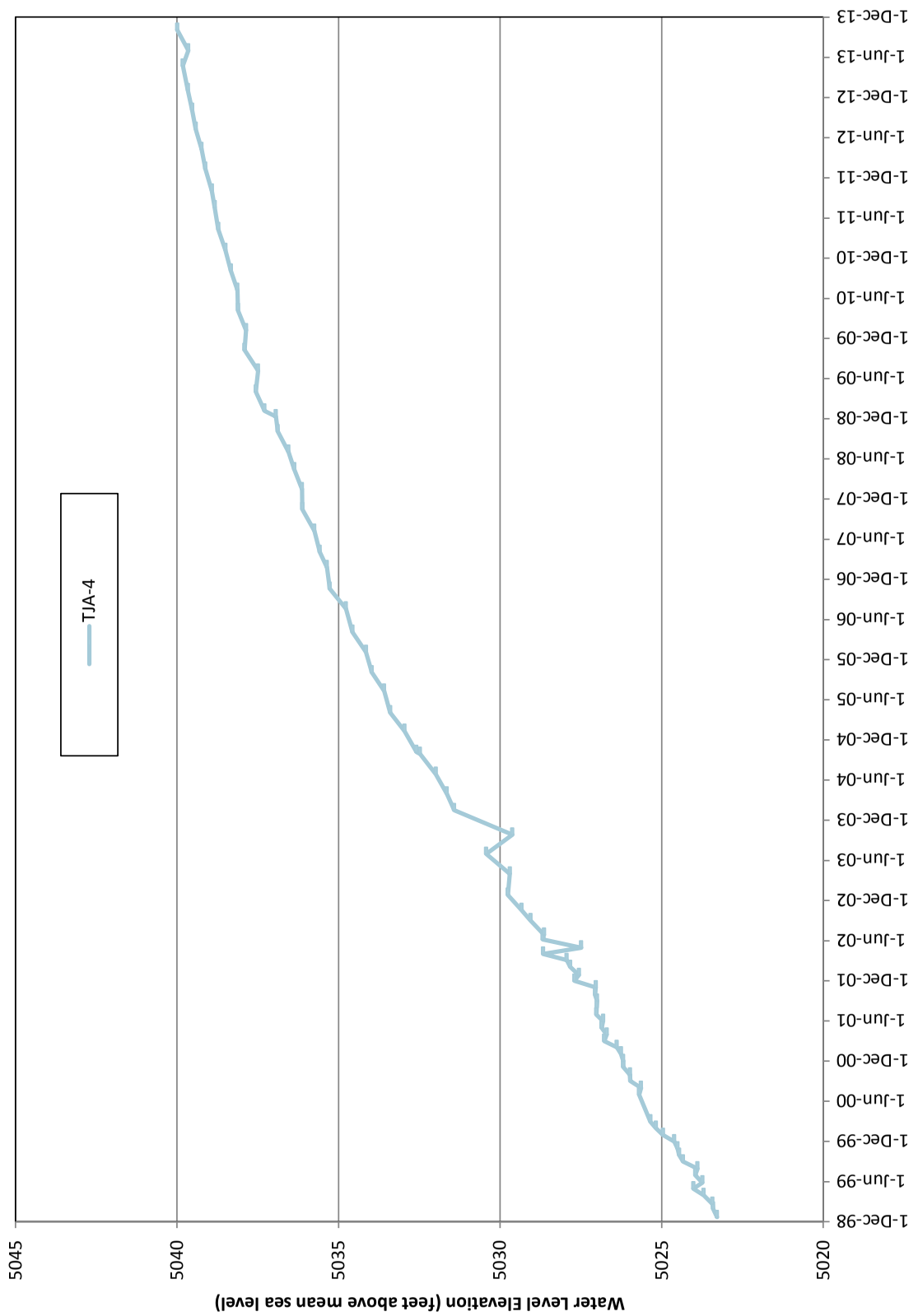


**Figure 6C-6. TAG Study Area Wells (6 of 7)**

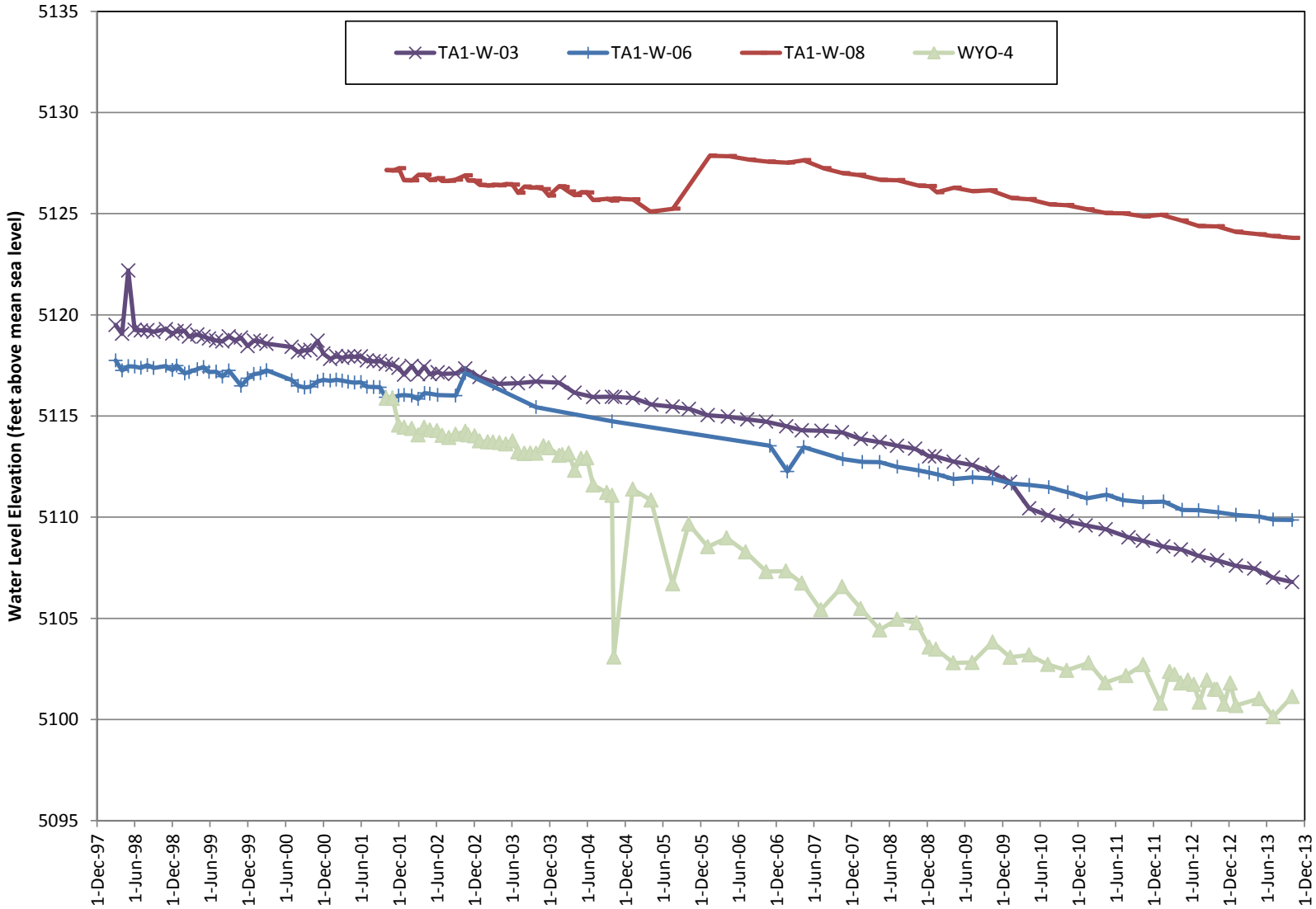


**Figure 6C-7. TAG Study Area Wells (7 of 7)**

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# 7.0 Burn Site Groundwater Study Area

## 7.1 Introduction

Unique features of the Burn Site Groundwater (BSG) Study Area (also referred to as "Burn Site Area Groundwater Investigation Area of Concern"), located in the Manzanita Mountains (Figure 7-1), include low concentrations of nitrate in a fractured bedrock aquifer. Nitrate has been identified as a constituent of concern (COC) in groundwater at the study area based on detections above the U.S. Environmental Protection Agency (EPA) maximum contaminant level (MCL) in samples collected from monitoring wells. Since August 1998, the maximum concentration of nitrate detected in the study area has been 41.9 milligrams per liter (mg/L). The EPA MCL and State of New Mexico drinking water standard for nitrate is 10 mg/L (as nitrogen).

Perchlorate has been detected in only one groundwater monitoring well in the BSG Study Area. Currently there is no EPA MCL or State of New Mexico drinking water standard for perchlorate. However, Section IV.B of the Compliance Order on Consent (the Order), between the New Mexico Environment Department (NMED), the U.S. Department of Energy (DOE), and Sandia Corporation (Sandia) stipulates that a select group of groundwater monitoring wells be sampled for perchlorate using a screening level/method detection limit (MDL) of 4 micrograms per liter (μg/L) (NMED April 2004). Furthermore, the Order requires that for detections equal to or greater than 4 μg/L, the DOE, National Nuclear Security Administration (NNSA) and Sandia will evaluate the nature and extent of perchlorate contamination. Since March 2006, the maximum concentration of perchlorate in the BSG Study Area has been 8.93 μg/L.

### 7.1.1 Location

The Coyote Canyon Test Area at Sandia National Laboratories, New Mexico (SNL/NM) is located in the eastern portion of Kirtland Air Force Base (KAFB). The SNL/NM facility is a government-owned/contractor-operated laboratory. Sandia, a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM for the DOE/NNSA. The DOE/NNSA Field Office administers the contract and oversees contractor operations at the site.

The Burn Site is located in Lurance Canyon, one of three canyons that are located on the eastern edge of the Coyote Canyon Test Area and within the Manzanita Mountains. Two other canyons, Madera Canyon and Sol se Mete Canyon, intersect Lurance Canyon to the west of the Burn Site. These three canyons are the headwaters of Arroyo del Coyote. Testing activities at the Lurance Canyon Burn Facility, which includes the Burn Site, began in 1967.

The BSG Study Area is located along the eastern margin of the Albuquerque Basin, and the terrain is characterized by large topographic relief, exceeding 500 feet (ft). Lurance Canyon, deeply incised into Paleozoic and Precambrian rocks, provides local westward drainage of ephemeral surface water flows to Arroyo del Coyote.

### 7.1.2 Site History

The Lurance Canyon Burn Site (Solid Waste Management Unit [SWMU] 94) and the nearby Lurance Canyon Explosive Test Site (SWMU 65) have been used since 1967. Most research has involved testing the fire survivability of transportation containers, weapon components, simulated weapons, and satellite components. Historical operations also include open detonation of high explosive (HE) compounds (Table 7-1) and the open burning of HE compounds, liquid propellants, and solid propellants. Most HE testing occurred between 1967 and 1975 and was completely phased out by the 1980s.

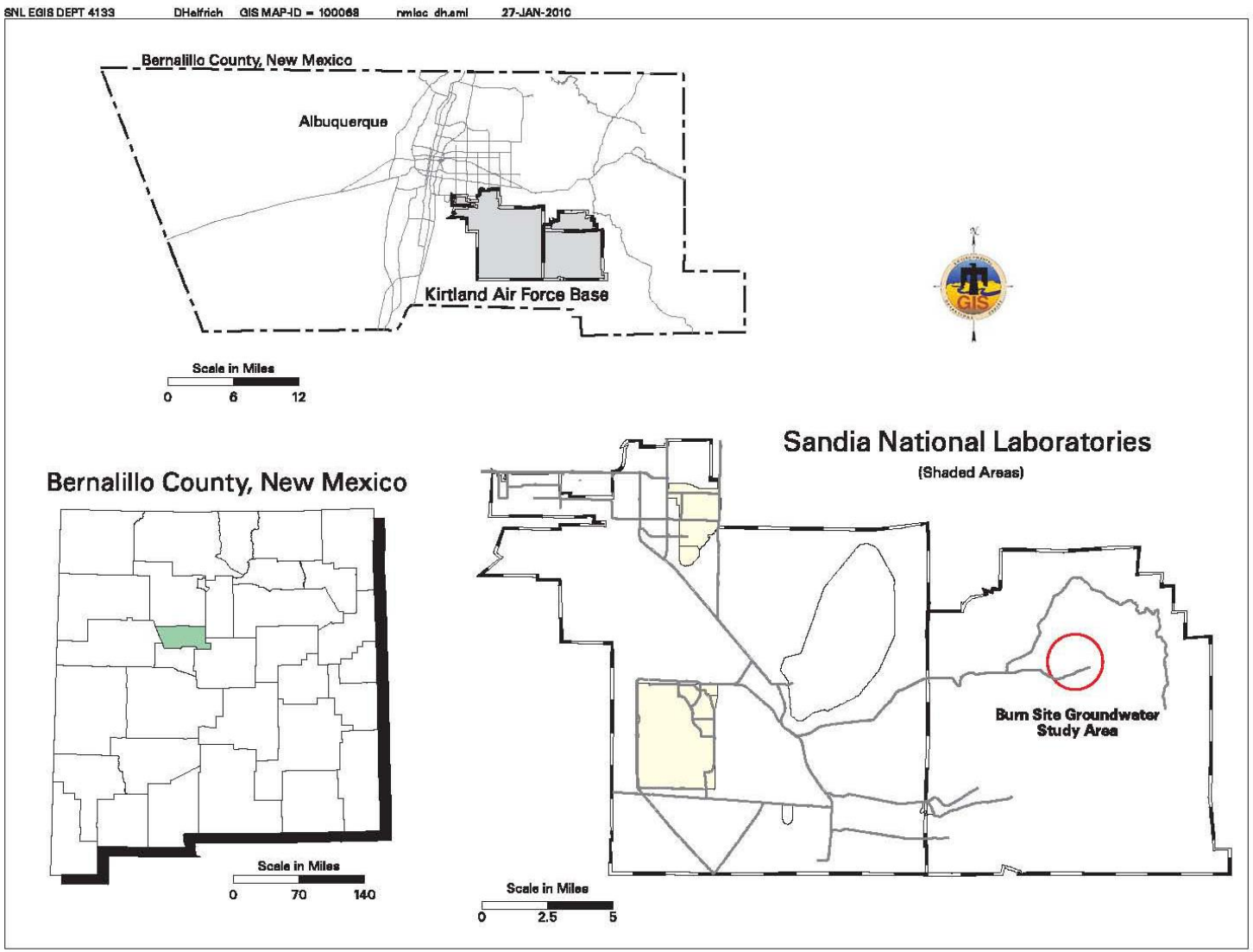


**Figure 7-1. Location of the Burn Site Groundwater Study Area**

**Table 7-1. Historical Timeline of the Burn Site Groundwater Study Area**

| Month | Year | Event | Reference |
|---|---|---|---|
| | 1967-early 1980s | HE testing conducted at the BSG Study Area until early 1980s. Burn testing began in 1970s using excavation pits and portable burn pans with JP-4. Open detonations of HE materials conducted. Wastewater discharged into unlined pits. | SNL November 2001 |
| | 1987 | Eighteen potential SWMUs were identified during the Comprehensive Environmental Assessment and Response Program investigation. HE compounds, nitrate, and diesel range organics identified as potential COCs. | DOE September 1987 |
| February | 1998 | Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report containing description of BSG hydrogeology submitted. | SNL February 1998 |
| November | 1996 | Groundwater sample from Burn Site Well yielded nitrate concentration of 25 mg/L. | SNL January 2005 |
| July | 1997 | NMED/DOE/OB, DOE and Sandia agree on installation of deep and shallow monitoring wells and one year of quarterly sampling. | SNL July 1997 |
| November | 1997 | Monitoring wells CYN-MW2S and 12AUP-01 are installed to serve as piezometers. (Piezometers are constructed of narrow-diameter casing and not used for collecting groundwater samples.) | SNL June 1998 |
| December | 1997 | Monitoring well CYN-MW1D installed. | SNL June 1998 |
| March | 1999 | GWPP Fiscal Year 1998 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL March 1999 |
| June | 1999 | Monitoring wells CYN-MW3 and CYN-MW4 installed. | SNL November 2001 |
| | Various (e.g., 1994) | BSG Study Area SWMUs 94 and 65 proposed and approved for NFA/CAC. | Numerous references, for example: SNL February 2004 |
| March | 2000 | GWPP Fiscal Year 1999 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL March 2000 |
| April | 2001 | GWPP Fiscal Year 2000 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL April 2001 |
| August | 2001 | Monitoring well CYN-MW5 installed 1.7 miles west of the BSG Study Area. | SNL June 2005 |
| November | 2001 | Comprehensive BSG Investigation Report documenting hydrogeologic characteristics of the study area prepared. | SNL November 2001 |
| March | 2002 | GWPP Fiscal Year 2001 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL March 2002 |
| March | 2003 | GWPP Fiscal Year 2002 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL March 2003 |
| June | 2003 | Further refinements of the hydrogeologic setting of the BSG Study Area are presented. | Van Hart June 2003 |
| March | 2004 | GWPP Fiscal Year 2003 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL March 2004 |
| April | 2004 | Compliance Order on Consent lists BSG as an Area of Concern that requires a CME. | NMED April 2004 |
| June | 2004 | A CCM of the BSG Study Area prepared. | SNL June 2004a |
| June | 2004 | A CME work plan for the BSG Study Area prepared. | SNL June 2004b |
| January | 2005 | Nitrate source evaluation of deep soil in the BSG Study Area performed. | SNL January 2005 |

**Table 7-1. Historical Timeline of the Burn Site Groundwater Study Area** *(Continued)*

| Month | Year | Event | Reference |
|---|---|---|---|
| February | 2005 | NMED requires additional site characterization and the preparation of an Interim Measures Work Plan. | NMED February 2005 |
| May | 2005 | BSG Interim Measures Work Plan submitted. | SNL May 2005 |
| July | 2005 | NMED sends an RSI for the Interim Measures Work Plan. | NMED July 2005 |
| August | 2005 | Response for RSI is submitted to NMED. | SNL August 2005 |
| October | 2005 | GWPP Fiscal Year 2004 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL October 2005 |
| December | 2005 | Monitoring wells CYN-MW6 and CYN-MW7 installed. | SNL October 2006 |
| January | 2006 | Monitoring well CYN-MW8 installed. | SNL October 2006 |
| March | 2007 | GWPP Fiscal Year 2006 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL March 2007 |
| April | 2008 | BSG CCM resubmitted. | SNL April 2008a |
| April | 2008 | BSG CME Work Plan resubmitted. | SNL April 2008b |
| March | 2008 | GWPP Fiscal Year 2007 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL March 2008 |
| April | 2009 | NMED requires supplemental characterization of soil and groundwater in the BSG Study Area. | NMED April 2009 |
| November | 2009 | BSG Characterization Work Plan submitted. | SNL November 2009 |
| June | 2009 | GWPP Calendar Year 2008 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL June 2009a |
| February | 2010 | Received notice of conditional approval for the November 2009 BSG Characterization Work Plan. | NMED February 2010 |
| July | 2010 | Completed subsurface soil sampling at 10 deep soil boring locations to determine contaminant sources. | SNL November 2009 |
| July | 2010 | Installed four groundwater monitoring wells (CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12) to determine extent of groundwater contamination. | SNL November 2009 |
| September | 2010 | An extension request for the BSG CME Report submitted. | SNL September 2010 |
| September | 2010 | Initial sampling at groundwater monitoring wells CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12. | SNL August 2010 |
| October | 2010 | Received approval of a time extension for submittal of the BSG CME Report. | NMED October 2010 |
| October | 2010 | GWPP Calendar Year 2009 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL October 2010 |
| August | 2011 | Received approval of the March 2008 Corrective Measures Evaluation Work Plan, BSG. | NMED August 2011 |
| September | 2011 | GWPP Calendar Year 2010 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL September 2011 |
| January | 2012 | Summary Report for BSG Characterization Field Program submitted. | SNL January 2012 |
| February | 2012 | Monitoring Well Plug and Abandonment Plan and Well Construction Plan for BSG wells and status of CYN-MW3 submitted. | SNL February 2012 |
| April | 2012 | Received notice of approval for the January 2012 BSG Monitoring Well Plug and Abandonment Plan and Well Construction Plan. | NMED April 2012 |
| June | 2012 | Received notice of approval for the January 2012 Summary Report for BSG Characterization Field Program. | NMED June 2012 |

**Table 7-1. Historical Timeline of the Burn Site Groundwater Study Area** *(Concluded)*

| Month | Year | Event | Reference |
|---|---|---|---|
| September | 2012 | GWPP Calendar Year 2011 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL September 2012 |
| December | 2012 | Completed field program to decommission BSG monitoring wells 12AUP-01, CYN-MW1D, CYN-MW2S, and install monitoring well CYN-MW13. | SNL March 2013a |
| August | 2013 | DOE/NNSA submitted an Extension Request to the NMED for the Burn Site Groundwater Corrective Measures Evaluation Report to March 31, 2013. | DOE August 2013 |
| September | 2013 | Groundwater sampling analytical results for BSG wells reported in the Calendar Year 2012 SNL/NM Annual Groundwater Monitoring Report. | SNL September 2013a |
| October | 2013 | In October 2013, DOE Office of Environmental Management submitted an Internal Remedy Review of the Burn Site Groundwater Area of Concern to DOE/NNSA Sandia Field Office. | DOE October 2013 |
| November | 2013 | Monitoring Well Plug and Abandonment Plan and Well Construction Plan for Installation of groundwater monitoring wells CYN-MW14 and CYN-MW15 submitted. | SNL September 2013b |

**NOTES:**
BSG = Burn Site Groundwater.
CAC = Corrective Action Complete.
CCM = Current Conceptual Site Model.
CME = Corrective Measures Evaluation.
CYN = Canyons.
COC = Constituent of concern.
DOE = U.S. Department of Energy.
GWPP = Groundwater Protection Program.
HE = High explosive.
JP-4 = Jet propellant fuel composition 4.
mg/L = Milligram(s) per liter.
MW = Monitoring well.
NFA = No Further Action.
NMED = New Mexico Environment Department.
NNSA = National Nuclear Security Administration.
OB = Oversight Bureau.
RSI = Request for Supplemental Information.
Sandia = Sandia Corporation.
SNL = Sandia National Laboratories.
SNL/NM = Sandia National Laboratories, New Mexico.
SWMU = Solid Waste Management Unit.

Burn testing began in the early 1970s and has continued to the present. Early burn testing was conducted in unlined pits excavated in native soil. By 1975, portable, steel, burn pans were used for open burning, mostly using jet propellant fuel composition 4 (JP-4). The Light Air Transport Accident Resistant Container Unit was constructed in 1980, and other engineered burn units were constructed by 1983. These burn units used jet fuel, gasoline, and diesel for the burn tests. In the mid-1990s, jet propellant fuel composition 8 (JP-8) replaced JP-4 as the petroleum fuel used for burn tests.

### 7.1.3 Monitoring History

Groundwater samples collected during 1996 from the Burn Site Well (a nonpotable production well used for fire suppression) contained elevated concentrations of nitrate (24.3 mg/L in November 1996). In 1997, the NMED, DOE, and Sandia agreed to investigate the source of this contamination. Later in 1997,

monitoring wells CYN-MW1D and CYN-MW2S were installed downgradient of the Burn Site Well (Table 7-2). Samples from monitoring well CYN-MW1D contained nitrate concentrations exceeding the MCL. Two more monitoring wells, CYN-MW3 and CYN-MW4, were installed between 1999 and 2001 to further characterize the study area. Based on regulatory requirements (discussed further in Section 7.2), monitoring wells CYN-MW6, CYN-MW7, and CYN-MW8 were installed in 2006.

**Table 7-2. Groundwater Monitoring Wells at the Burn Site Groundwater Study Area**

| Well | Installation Year | WQ | WL | Comments |
|---|---|---|---|---|
| 2AUP01 | 1996 | | √ | Underflow monitoring well, plugged and abandoned in November 2012 |
| Burn Site Well | 1986 | | | Nonpotable production well |
| CYN-MW1D | 1997 | | √ | Bedrock groundwater well, plugged and abandoned in November 2012 |
| CYN-MW2S | 1997 | | √ | Underflow monitoring well, plugged and abandoned in November 2012 |
| CYN-MW3 | 1999 | | √ | Bedrock groundwater well |
| CYN-MW4 | 1999 | √ | √ | Bedrock groundwater well |
| CYN-MW6 | 2005 | | √ | Bedrock groundwater well |
| CYN-MW7 | 2005 | √ | √ | Bedrock groundwater well |
| CYN-MW8 | 2006 | √ | √ | Bedrock groundwater well |
| CYN-MW9 | 2010 | √ | √ | Bedrock groundwater well |
| CYN-MW10 | 2010 | √ | √ | Bedrock groundwater well |
| CYN-MW11 | 2010 | √ | √ | Bedrock groundwater well |
| CYN-MW12 | 2010 | √ | √ | Bedrock groundwater well |
| CYN-MW13 | 2012 | | √ | Bedrock groundwater well installed in December 2012, replaced CYN-MW1D |

**NOTES:**
Check marks in the WQ and WL columns indicate WQ sampling and WL measurements were obtained during this reporting period.
CYN = Canyons.
MW = Monitoring well.
WL = Water level.
WQ = Water quality.

Previous monitoring reports include analytical results for monitoring well CYN-MW5. Groundwater monitoring well CYN-MW5 was installed in 2001 as part of the investigation of Drain and Septic System (DSS) sites. This monitoring well was sampled for eight quarters as part of the DSS investigation and was incorporated into the BSG Study Area investigation as a downgradient well. However, in its February 2005 letter, the NMED stated that it "will not consider monitoring well CYN-MW5 as a downgradient well because it is located over two miles away from the Burn Site" (NMED February 2005). Based on the NMED determination, monitoring well CYN-MW5 has not been sampled as part of the BSG investigation since the third quarter of Fiscal Year 2005. Most recently, sampling at monitoring well CYN-MW5 has been incorporated into the SNL/NM Long-Term Stewardship groundwater sampling program in response to NMED requirements (NMED April 2010). Results for recent sampling of monitoring well CYN-MW5 are presented in Chapter 9.0 of this Annual Groundwater Monitoring Report.

Since the initial discovery of nitrate at the BSG Study Area, numerous characterization activities have been conducted (Table 7-1). The results of these characterization activities are summarized in two versions of the *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Burn Site* (SNL June 2004a and April 2008a). These two versions of the BSG conceptual site model provide a comprehensive list of groundwater monitoring data sources used to support the summary of investigations.

In April 2004, the Order became effective between the DOE, Sandia, and the NMED, and the Order specifies the Burn Site as an area of groundwater contamination (NMED April 2004). In response to the Order, DOE/NNSA and Sandia submitted the Corrective Measures Evaluation (CME) Work Plan for the BSG Study Area to the NMED in June 2004 (SNL June 2004b). Based on requirements stipulated by the NMED (discussed in Section 7.2), DOE/NNSA and Sandia submitted the BSG Interim Measures Work Plan (IMWP) (SNL May 2005) on May 30, 2005. As detailed in the IMWP, three monitoring wells (CYN-MW6, CYN-MW7, and CYN-MW8) were installed near the Burn Site during December 2005 to January 2006 at locations shown on Figure 7-2. Quarterly sampling for eight quarters began for these three monitoring wells in March 2006 and was completed in December 2007. Samples from the two monitoring wells (CYN-MW7 and CYN-MW8) downgradient of CYN-MW1D were analyzed for nitrate.

Groundwater samples from monitoring well (CYN-MW6) adjacent to SWMU 94F were analyzed for nitrate, total petroleum hydrocarbons (TPH) as gasoline range organics (GRO), diesel range organics (DRO), and other parameters. Groundwater monitoring programs have continued as outlined in the IMWP (SNL May 2005).

Based on a letter received from the NMED (April 2009), DOE/NNSA and Sandia are required to further characterize the nature and extent of the perchlorate contamination at the BSG Study Area. DOE/NNSA and Sandia prepared the BSG Characterization Work Plan (SNL November 2009) that was approved by the NMED (NMED February 2010). In July 2010, DOE/NNSA and Sandia implemented the requirements of the work plan and installed four new groundwater monitoring wells (CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12) to determine the extent of groundwater contamination (Section 7.1.5). These four new wells were sampled for the first time in September 2010.

In February 2012, DOE/NNSA and Sandia submitted a work plan to decommission three groundwater monitoring wells, 12AUP-01, CYN-MW1D, and CYN-MW2S; and install a replacement groundwater monitoring well, CYN-MW13 (SNL February 2012). Monitoring wells 12AUP-01 and CYN-MW2S had been installed over 15 years ago at the contact of unconsolidated coarse sand and gravel (alluvium) and the underlying bedrock. Although the alluvium at this contact was dry during drilling, these wells were installed in anticipation of recharge occurring after rainfall events. However, these wells were consistently dry and served no useful purpose. Monitoring well CYN-MW1D was constructed with a nonstandard completion (low carbon steel screen and riser pipe), had very turbid water, and exhibited erratic nitrate concentrations. A video log showed that the well was heavily corroded (SNL February 2012). In April 2012, the NMED approved the work plan (NMED April 2012); the three monitoring wells (12AUP-01, CYN-MW1D, and CYN-MW2S) were decommissioned in November 2012; and replacement monitoring well CYN-MW13 was installed in December 2012.

### 7.1.4 Current Monitoring Network

Currently eight monitoring wells in the BSG Study Area are monitored for water quality, including CYN-MW4, CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, and CYN-MW13 (Figure 7-2). Monitoring well CYN-MW1D (recently replaced with CYN-MW13) and the two shallow monitoring wells (12AUP-01 and CYN-MW2S) were decommissioned during Calendar Year (CY) 2012, and none of these wells were samples in CY 2013. In addition, monitoring well CYN-MW3 was dry and CYN-MW6 did not produce adequate water volume during all CY 2013 sampling events.

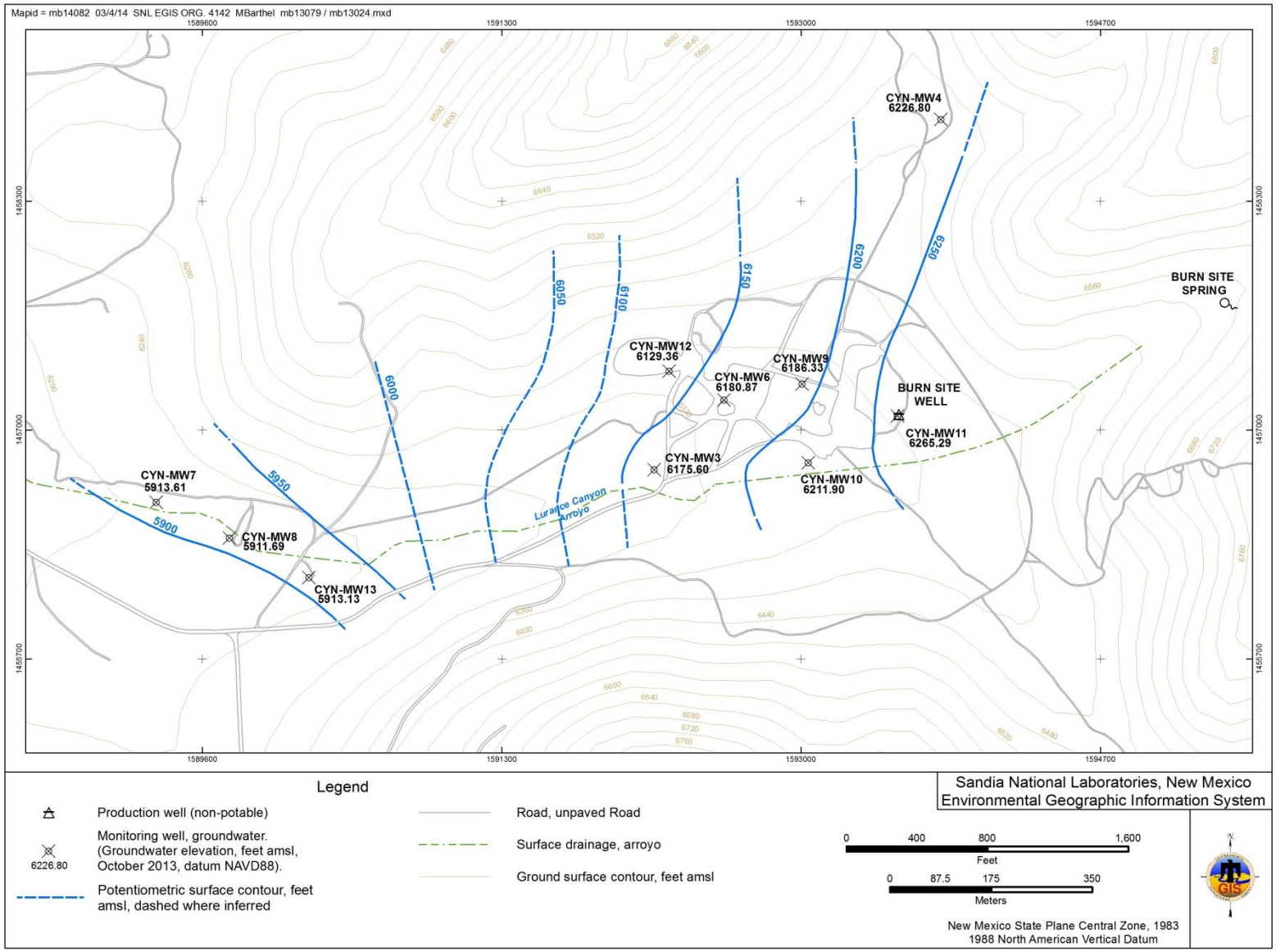


**Figure 7-2. Burn Site Groundwater Study Area Potentiometric Surface Map (October 2013)**

### 7.1.5 Summary of Calendar Year 2013 Activities

The following activities were performed for the BSG Study Area during CY 2013:

- Semiannual groundwater sampling was conducted at eight monitoring wells (CYN-MW4, CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, and CYN-MW13) in April/May, and December 2013.

- Initial groundwater monitoring activities were performed at monitoring well CYN-MW13 during CY13.

- Tables of analytical results (Attachment 7A), concentration versus time graphs (Attachment 7B), and hydrographs (Attachment 7C) were prepared in support of this report.

- A Monitoring Well Plug and Abandonment Plan and Well Construction Plan for installation of groundwater monitoring wells CYN-MW14 and CYN-MW15 was submitted to the NMED (SNL September 2013b).

- In August 2013, DOE/NNSA submitted an Extension Request to the NMED for the Burn Site Groundwater Corrective Measures Evaluation Report to March 31, 2013 (DOE August 2013).

- In October 2013, DOE Office of Environmental Management submitted an Internal Remedy Review of the Burn Site Groundwater Area of Concern to DOE/NNSA Sandia Field Office (DOE October 2013). This review suggested that more characterization activities were required at the BSG Study Area before a Corrective Measures Evaluation could be completed.

### 7.1.6 Summary of Future Activities

The following activities are anticipated for the BSG Study Area investigation during CY 2014:

- Semiannual groundwater sampling will be conducted at nine monitoring wells (CYN-MW4, CYN-MW6 (if water level recovers), CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, and CYN-MW13) during the second and fourth quarters of CY 2014.

- Semiannual reporting of perchlorate analyses for monitoring well CYN-MW6 (if water level recovers) will be performed.

- If the Monitoring Well Plug and Abandonment Plan and Well Construction Plan (SNL September 2013b) is approved by NMED, groundwater monitoring wells CYN-MW14 and CYN-MW15 will be installed and a report describing well installation field activities will be prepared and submitted to the NMED.

### 7.1.7 Conceptual Site Model

Groundwater flow in the BSG Study Area is controlled by the local geologic framework and structural features described in the following sections.

#### 7.1.7.1 Regional Hydrogeologic Conditions

The Manzanita Mountains are composed of a complex sequence of uplifted Precambrian metamorphic and granitic units that were subjected to several episodes of significant deformation. These units are capped by Paleozoic sandstones, shales, and limestones of the Sandia Formation and Madera Group. The geologic history of the Manzanita Mountains is thoroughly described in the *Groundwater Investigation, Canyons Test Area, Operable Unit 1333, Burn Site, Lurance Canyon* (SNL November 2001) and utilizes the model presented by Brown et al. (1999). The local geology is also summarized in the *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Burn Site* (SNL June 2004a and April 2008a).

Groundwater in the Manzanita Mountains predominantly occurs in fractured metamorphic and intrusive units that consist of metavolcanics, quartzite, metasediments (schists and phyllites), and the Manzanita Granite. Groundwater migrates through bedrock fractures in a generally westward direction. The only perennial spring in the area, the Burn Site Spring, is located upgradient and upslope of the testing facilities at a limestone outcrop. The permeability of the fractured bedrock units is low and well yields are minimal. Groundwater discharges to small ephemeral springs located at the base of the Manzanita Mountains approximately 3 miles west of the Burn Site. Additionally, some groundwater may discharge as underflow to unconsolidated sedimentary deposits of the Albuquerque Basin.

The Precambrian metamorphic rocks (predominantly schists and phyllite) and the Precambrian intrusive rocks (predominantly granitic gneiss) are typically fractured as a result of the long and complex history of regional deformation. Drill core data and outcrop exposures indicate that the fractures in shallow bedrock are filled with chemical precipitates such as calcium carbonate. The carbonate precipitation likely occurred when the water table was regionally elevated prior to the development of the Rio Grande. As chemical precipitates filled the fractures, permeability was effectively reduced, creating a semiconfined unit above underlying bedrock with open fractures.

The Burn Site is bisected by a north-south trending system of faults, consisting locally of several high angle normal faults that are mostly downfaulted to the east. Faults (where exposed) are characterized by zones of crushing and brecciation. The Burn Site Fault trends north to south in the vicinity of the Burn Site Well and monitoring well CYN-MW4 (SNL June 2004a). Nearby outcrops indicate that the fault displacement is approximately 160 ft.

The canyon floor at the BSG Study Area consists of unconsolidated alluvium over bedrock. These deposits typically are sand and gravel derived from erosion of upslope colluvium and bedrock. These alluvial deposits range in thickness from 21 to 55 ft as evidenced in boreholes drilled at the BSG Study Area.

#### 7.1.7.2 Hydrogeologic Conditions at the BSG Study Area

When the Burn Site Well was installed in 1986, the depth to groundwater bearing strata was approximately 222 ft below ground surface. Following completion of the well in fractured bedrock, the water level rose approximately 154 ft due to positive head. The fractured rocks of the Manzanita Mountains are recharged by infiltration of precipitation, largely occurring from summer thundershowers and, to a lesser degree, winter snowfall on the higher elevations. Groundwater recharge is restricted by high evapotranspiration rates (losses to the atmosphere by evaporation and plant transpiration) and low permeability of the fractured bedrock.

Regionally, groundwater in the western Manzanita Mountains flows generally toward the west from a groundwater flow divide located east of the BSG Study Area (SNL November 2001). Groundwater flow along Lurance Canyon, discharges primarily as direct underflow to the unconsolidated basin fill deposits

of the Albuquerque Basin. Based on field observations, some discharge also occurs at springs along the mountain front. Much of the flow that discharges from these springs undergoes evapotranspiration. Some flow from the springs infiltrates nearby alluvial deposits.

Annual precipitation in the Manzanita Mountains is in the form of rainfall and minor snowfall. July and August are typically the wettest months; 45 to 62 percent of annual precipitation falls during summer thunderstorms from July to October (National Weather Service 2002). The average annual precipitation in this drainage basin is estimated to range between 12 and 16 inches (SNL April 2008a). Annual potential evapotranspiration in the Albuquerque area greatly exceeds annual precipitation. Because much of the rainfall in the Lurance Canyon drainage occurs during the summer, losses to evapotranspiration are high. A small percentage of precipitation may infiltrate into the exposed bedrock or into alluvial deposits along the canyon floor.

Ephemeral surface water flows occur in response to precipitation in the drainage basin. In 1997, two monitoring wells (CYN-MW2S and 12AUP-01 [Figure 7-2]) were constructed in Lurance Canyon to monitor water levels within the channel deposits at the contact with underlying Precambrian bedrock. No groundwater was detected in either shallow monitoring well until September 2, 2004. After a series of rain events, between 1 and 2 inches of water were measured in monitoring well 12AUP-01. The water level remained fairly constant for about one month. However, no water has been measured in monitoring well 12AUP-01 since 2005. No groundwater has been measured in monitoring well CYN-MW2S since installation. It is likely that significant saturation in the alluvium occurs only after a series of significant rain events. Episodic accumulation of precipitation may provide a mechanism for recharging the brecciated fault zones and uncemented fractures in the underlying bedrock.

#### 7.1.7.3 Local Direction of Flow

Figure 7-2 presents the October 2013 potentiometric surface for the BSG monitoring well network. The general direction of groundwater flow beneath the BSG Study Area is to the west-southwest as indicated by the potentiometric surface. No water supply wells are located near the BSG Study Area, except for the Burn Site Well that is used only rarely (last pumped in 2003) for nonpotable applications, such as fire suppression in testing structures and for fuel pool tests. Groundwater levels in the Paleozoic and Precambrian bedrock near the BSG Study Area are not influenced by regional water supply well pumping from the basin fill deposits of the Albuquerque Basin, which are located to the west of the Tijeras Fault Zone.

The potentiometric surface shown on Figure 7-2 infers an average horizontal gradient of approximately 0.1 ft/ft in the semiconfined to confined bedrock fracture system. The apparent horizontal groundwater gradient based on BSG monitoring wells varies from approximately 0.07 to 0.17 feet per foot (ft/ft). The horizontal gradient west of the BSG Study Area flattens substantially (Plate 1).

The range of hydraulic gradients in Lurance Canyon indicates that localized controls are associated with brecciated fault zones in the low-permeability fractured bedrock at the BSG Study Area. Limited groundwater flow velocity information is based on COC first arrival estimates. Based on contaminant releases from SWMU 94F arriving at monitoring well CYN-MW1D, the minimum apparent velocity of the COCs is estimated to be approximately 160 feet per year (ft/yr) (SNL April 2008a). No information is available about vertical flow velocity within the fractured rocks at the BSG Study Area. However, vertical movement of groundwater within the brecciated fault zones probably occurs as rapid, partially saturated to saturated flow. Filled fractures within the upper portion of the metamorphic and intrusive rocks act as a semiconfined unit restricting vertical flow.

Water levels have been routinely monitored in BSG monitoring wells since 1999. Figures 7C-1 through 7C-5 (Attachment 7C) show groundwater levels in BSG wells that are completed in bedrock. No

substantial seasonal variation in water levels is evident in these wells. The wide range of hydraulic gradients in Lurance Canyon and the lack of correlation between water level fluctuations in these wells support the assessment that the low-permeability fractured groundwater system at the BSG Study Area is poorly interconnected. Water level fluctuations may be a result of local heterogeneities in hydraulic properties related to the fractured system. The BSG monitoring wells have shown significant groundwater declines over the past four to five years, with decreases in water levels ranging from 0.76 to 3.46 ft/yr. Declining water levels may be due to reduced amounts of precipitation during the drought of the last several years.

#### 7.1.7.4 Contaminant Sources

Nitrate in the BSG Study Area may be derived from both natural and anthropogenic sources. The NMED-specified background concentration for nitrate in groundwater is 4 mg/L (Dinwiddie 1997). Potential natural sources include the weathering of rocks, atmospheric deposition, and the grading of soils and alluvium. Evaporation and transpiration of rainwater that has infiltrated canyon alluvial sediments might have increased nitrate concentrations. Potential anthropogenic nitrate sources include septic systems, wastewater discharges, and the degradation of HE compounds. SNL/NM personnel have conducted several sampling events in the BSG Study Area to identify the source of nitrate; however, no conclusive source has been identified (SNL May 2005). Additional studies are being conducted.

Some evidence indicates that evaporation and transpiration may concentrate nitrate in sediments beneath ephemeral drainages in the vicinity of the Manzanita Mountains. This evidence includes nitrate concentrations that exceed the MCL in groundwater beneath these drainages and a chloride to nitrate ratio in groundwater that is similar to the chloride to nitrate ratio in rainfall (McQuillan and Space 1995).
SWMU 65 is located in the center of the BSG Study Area and contains open-air detonation areas where nitrate-based explosives were used. The detonations dispersed HE compounds across the ground surface, and subsequent degradation (weathering) of these HE materials most likely released nitrate. SWMU 94 testing also involved burning HE compounds and propellants. Nitrate is highly soluble in water, and precipitation can enhance the migration of nitrate to groundwater. In addition to nitrate, petroleum products were detected in soil samples; therefore, the potential for petroleum products in groundwater was evaluated.

#### 7.1.7.5 Contaminant Distribution and Transport in Groundwater

Nitrate was first detected above the MCL of 10 mg/L in groundwater samples from the Burn Site Well. Since the completion of monitoring wells CYN-MW1D (December 1997), CYN-MW3 (June 1999), CYN-MW6 (February 2006), CYN-MW9 (July 2010), CYN-MW12 (July 2010), and CYN-MW13 (December 2012), nitrate concentrations that exceed the MCL have been consistently detected in samples from these wells. Nitrate concentrations in samples from monitoring wells CYN-MW10 and CYN-MW11 are near or just above the MCL (Table 7-3). Nitrate concentrations in groundwater samples from monitoring wells CYN-MW4, CYN-MW7, and CYN-MW8 have not exceeded the MCL.

Potential downgradient receptors for the nitrate plume are Coyote Springs, approximately 3 miles west of the study area, and the Albuquerque Bernalillo County Water Utility Authority and KAFB well fields, located approximately 7 to 12 miles to the west-northwest of the study area. Numerical simulations suggest nitrate concentrations will be decreasing in groundwater to below the MCL by the time the nitrate reaches Coyote Springs, and to below MDLs in the regional aquifer through dispersion and dilution as the plume moves into the more hydraulically conductive alluvial-fan and Ancestral Rio Grande deposits west of Coyote Springs. Numerical simulations also show that groundwater travel times exceed 600 years from the study area to the Albuquerque Bernalillo County Water Utility Authority and KAFB well fields (SNL May 2005).

**Table 7-3. Summary of Historical Nitrate Concentrations in Groundwater Monitoring Wells that Exceed the MCL at the Burn Site Groundwater Study Area**

| Well | Historical Maximum NPN Concentration (mg/L) | Distance and Direction from Burn Site Well |
|---|---|---|
| Burn Site Well | 24.3 | 0 |
| CYN-MW1D | 28.0 | 3,400 ft south southwest |
| CYN-MW3 | 14.7 | 1,400 ft west |
| CYN-MW6 | 39.9 | 1,000 ft west |
| CYN-MW9 | 41.9 | 600 ft west northwest |
| CYN-MW10 | 11.4 | 600 ft west southwest |
| CYN-MW11 | 12.3 | 30 ft south |
| CYN-MW12 | 14.7 | 1,300 ft west northwest |
| CYN-MW13 | 35.0 | 3,400 ft south southwest |

**NOTES:**
CYN = Canyons.
ft = Feet.
MCL = Maximum Contaminant Level.
mg/L = Milligrams per liter.
MW = Monitoring well.
NPN = Nitrate plus nitrite.

## 7.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM Environmental Restoration (ER) Operations as well as implements and enforces federal regulations mandated by the Resource Conservation and Recovery Act (RCRA). All ER SWMUs and Areas of Concern are listed in Module IV of the SNL/NM RCRA Permit, *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518* (NMED 1993).

All corrective action requirements pertaining to the BSG Study Area are contained in the Order (NMED April 2004). The groundwater monitoring activities for BSG are not associated with a single SWMU, but are more regional in nature. Before the Order became effective in April 2004, groundwater investigations at the BSG Study Area had been conducted voluntarily by SNL/NM ER Operations.

Initially, groundwater monitoring for the BSG was initiated to satisfy the requirements of the SNL/NM Hazardous Solid Waste Amendments (HSWA) permit for characterization of SWMUs. The Order transferred regulatory authority for corrective action requirements from the HSWA module to the Order (NMED April 2004). The BSG investigation must comply with requirements set forth in the Order for site characterization and the development of a CME.

In response to the Order, DOE/NNSA and Sandia submitted two documents to the NMED: *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Burn Site* (SNL June 2004a), and *Corrective Measures Evaluation Work Plan for Sandia National Laboratories/New Mexico Burn Site* (SNL June 2004b). The current conceptual site model provides site-specific characteristics by which remedial alternatives were evaluated. The CME Work Plan (SNL June 2004b) provides a description and justification of the remedial alternatives considered and the methods and criteria to be used in the evaluation. The CME Work Plan was completed to comply with requirements set forth in the Order (NMED April 2004) and with the guidance of the RCRA Corrective Action Plan (EPA 1994).

On March 1, 2005, DOE/NNSA and Sandia received a letter from the NMED that rejected the CME Work Plan and stipulated the following requirements (NMED February 2005):

- DOE/NNSA and Sandia must prepare and submit an IMWP within 90 days from the receipt of the letter (by May 30, 2005).

- The NMED requires additional characterization of the nitrate-contaminated groundwater near the BSG Study Area. Specifically, the downgradient extent of groundwater with nitrate concentrations greater than 10 mg/L shall be determined.

- The NMED does not accept the *Corrective Measures Evaluation Work Plan for Sandia National Laboratories/New Mexico Burn Site* (SNL June 2004b) because it is not satisfied with the existing characterization of nitrate-contaminated groundwater near the BSG Study Area.

- The NMED also requires the installation of one additional monitoring well "adjacent to SWMU-94F in order to establish groundwater conditions in this petroleum-contamination source area."

In May 2005, DOE/NNSA and Sandia submitted an IMWP to the NMED that proposed the installation of additional groundwater monitoring wells to characterize the extent of nitrate contamination in the bedrock aquifer downgradient of monitoring well CYN-MW1D and fuel-related compounds downgradient of SWMU 94F (SNL May 2005). The selected interim measures described in the IMWP included additional well installation, groundwater monitoring, and institutional controls. These interim measures were proposed to serve three purposes: provide data to support the CME; monitor the migration of the nitrate plume to provide an early warning system to trigger an action if a danger to downgradient ecological receptors (Coyote Springs) becomes apparent; and protect human health and the environment by limiting exposure to contaminated groundwater by restricting access to the monitoring wells.

In support of the selected interim measures, the IMWP (SNL May 2005) included the following reports as attachments:

- Remedial Alternatives Data Gaps Review
- Nitrate Source Evaluation
- Evaluation of Contaminant Transport

The Remedial Alternatives Data Gaps Review included detailed definitions of remedial alternatives and a preliminary evaluation of remedial alternatives with the purpose of identifying data gaps (SNL May 2005). One of the data gaps identified included determining background nitrate concentrations and evaluating the potential for a residual source of nitrate in the vadose zone. The investigation initiated to fill this data gap and the analytical results were presented in the Nitrate Source Evaluation. The Evaluation of Contaminant Transport consisted of a simplified cross-sectional modeling approach to simulate transport and dilution of nitrate between the current location of nitrate in BSG and potential human and ecological receptors.

Data collected as part of additional characterization required by the IMWP (SNL May 2005) were incorporated into an updated version of the conceptual site model (SNL April 2008a). The updated conceptual site model provides the basis for a technically defensible remediation program that was developed and documented in the CME Work Plan (SNL April 2008b), the results of which will eventually be documented in the CME Report. The April 2008 CME Work Plan (SNL April 2008b) was developed to address the concerns outlined in the letter from the NMED (February 2005) and to comply

with requirements of the Order (NMED April 2004). The CME Work Plan (SNL April 2008b) provides information and data gathered during interim measures and performance and compliance goals and objectives for the remediation of the BSG.

On April 30, 2009, DOE/NNSA and Sandia received a letter was from the NMED entitled, *Perchlorate Contamination in Groundwater, Sandia National Laboratories, EPA ID #NM5890110518* (NMED April 2009). The letter discussed the occurrence of perchlorate in groundwater at concentrations at or greater than 1 µg/L at various locations at SNL/NM. The letter also stated that DOE/NNSA and Sandia must characterize the nature and extent of the perchlorate contamination at the BSG Study Area and submit to the NMED a plan for such characterization. DOE/NNSA and Sandia met with the NMED in June and July 2009 (SNL June 2009b and July 2009) and submitted a letter requesting an extension to November 30, 2009 (DOE July 2009). The results of the discussions at the June and July meetings (SNL June 2009b and July 2009) have been incorporated into the BSG Characterization Work Plan (SNL November 2009), which included such items as number and locations of wells and boreholes.

In February 2010, DOE/NNSA and Sandia received notice of conditional approval for the November 2009 BSG Characterization Work Plan (NMED February 2010). In July 2010, DOE/NNSA and Sandia implemented the requirements of the work plan and completed subsurface soil sampling at 10 deep soil boring locations to determine contaminant sources and installed four groundwater monitoring wells to determine the extent of groundwater contamination. Based on an outstanding schedule commitment, DOE/NNSA and Sandia submitted an extension request for the BSG CME Report in September 2010 (SNL September 2010), which was approved by the NMED (October 2010) with a revised CME Report submittal date of March 31, 2014.

In this report BSG monitoring data are presented for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (i.e., gamma spectroscopy, gross alpha/beta activity, and tritium) are provided voluntarily by the DOE/NNSA and Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Order (NMED April 2004). Additional information on radionuclides and the scope of the Order is available in Section III.A of the Order.

### 7.3 Scope of Activities

The activities for the BSG investigation conducted during this reporting period, including plans and reports, are listed in Section 7.1.5. The field activities completed in the study area during 2013 include groundwater monitoring (Table 7-4). The analytical parameters for each well and each sampling event are listed in Table 7-5.

Quality control (QC) samples are collected in the field at the time of environmental sample collection. Field QC samples include duplicate environmental samples, split samples, equipment blank (EB), field blank (FB), and trip blank (TB) samples. Duplicate environmental samples are used to measure the precision of the sampling process. Split samples are used to verify the performance of the analytical laboratory. EB samples are used to verify the effectiveness of sampling equipment decontamination procedures. FB samples provide a check for potential ambient sources of sample contamination during the sampling process and/or sampling error. TB samples are used to determine whether volatile organic compounds (VOCs) contaminated the sample during preparation, transportation, and handling prior to receipt by the analytical laboratory.

**Table 7-4. Groundwater Monitoring Well Network and Sampling Dates for the Burn Site Groundwater Study Area, Calendar Year 2013**

| Date of Sampling Event | Wells Sampled | | SAP |
|---|---|---|---|
| April/May 2013 | CYN-MW4<br>CYN-MW7<br>CYN-MW8<br>CYN-MW9 | CYN-MW10<br>CYN-MW11<br>CYN-MW12<br>CYN-MW13 | *Burn Site Groundwater Monitoring, Mini-SAP for Third Quarter Fiscal Year 2013* (SNL March 2013b) |
| December 2013 | CYN-MW4<br>CYN-MW7<br>CYN-MW8<br>CYN-MW9 | CYN-MW10<br>CYN-MW11<br>CYN-MW12<br>CYN-MW13 | *Burn Site Groundwater Monitoring, Mini-SAP for First Quarter Fiscal Year 2014* (SNL November 2013) |

**NOTES:**
CYN = Canyons.
MW = Monitoring well.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories.

**Table 7-5. Parameters Sampled at Burn Site Groundwater Study Area Wells for Each Sampling Event, Calendar Year 2013**

| Parameter | April/May 2013 | |
|---|---|---|
| Anions<br>Gamma Spec*<br>Gross Alpha<br>Gross Beta<br>Isotopic Uranium<br>NPN<br>TAL Metals, plus Total Uranium<br>TPH-DRO<br>TPH-GRO<br>Tritium<br>VOCs<br>HE compounds | CYN-MW4<br>CYN-MW7<br>CYN-MW8<br>CYN-MW9<br>CYN-MW10 | CYN-MW10 (dup)<br>CYN-MW11<br>CYN-MW12<br>CYN-MW13<br>CYN-MW13 (dup) |
| NPN | CYN-MW13 (resample)<br>CYN-MW13 (resample dup) | |
| Alkalinity<br>Cations | CYN-MW13<br>CYN-MW13 (dup) | |
| **Parameter** | **December 2013** | |
| NPN<br>TPH-DRO<br>TPH-GRO | CYN-MW4<br>CYN-MW4 (dup)<br>CYN-MW7<br>CYN-MW8<br>CYN-MW9 | CYN-MW10<br>CYN-MW11<br>CYN-MW11 (dup)<br>CYN-MW12<br>CYN-MW13 |

**NOTES:**
CYN = Canyons.
DRO = Diesel range organics.
Dup = Duplicate sample.
Gamma Spec* = Gamma spectroscopy short list (Americium-241, Cesium-137, Cobalt-60, and Potassium-40).
GRO = Gasoline range organics.
HE = High explosive.
MW = Monitoring well.
NPN = Nitrate plus nitrate (reported as nitrogen).
TAL = Target Analyte List.
TPH = Total petroleum hydrocarbons.
VOC = Volatile organic compound.

## 7.4 Field Methods and Measurements

The monitoring procedures conducted for the BSG groundwater monitoring are described in detail in Section 1.3. The water level information was used to create the potentiometric surface map presented on Figure 7-2 and the hydrographs presented in Figures 7C-1 through 7C-5 (Attachment 7C).

## 7.5 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using EPA-specified protocols described in Section 1.3.2 (Tables 1-5 and 1-6).

## 7.6 Summary of Analytical Results

This section discusses analytical results, exceedances of regulatory standards, and pertinent trends in COC concentrations. The analytical results and field measurements for the CY 2013 BSG sampling events are presented in Tables 7A-1 through 7A-9 (Attachment 7A). Data qualifiers are explained in the footnotes following Table 7A-9.

No VOCs or HE compounds were detected. The MDLs for all analyzed VOCs are listed in Table 7A-1, and the MDLs for all analyzed HE compounds are listed in Table 7A-2.

The analytical results for nitrate plus nitrite (NPN) (reported as nitrogen) are presented in Table 7A-3, and Figure 7-3 presents NPN concentration contours for the BSG Study Area. NPN results exceed the MCL of 10 mg/L in samples from monitoring wells CYN-MW9, CYN-MW11, CYN-MW12, and CYN-MW13. NPN concentrations in samples from the other BSG wells are less than the MCL (Table 7A-3). For CY 2013, the NPN concentrations for wells exceeding the MCL are summarized as follows:

- Monitoring well CYN-MW9 had reported concentrations of 33.7 mg/L (April 2013) and 41.9 mg/L (December 2013). The historical range of NPN concentrations for monitoring well CYN-MW9 is approximately 29 to 42 mg/L with a consistent trend, with the exception of the December 2013 result (Figure 7B-1).

- Monitoring well CYN-MW11 had reported concentrations of 8.97 mg/L (April 2013), 12.3 mg/L (December 2013), and 10.1 mg/L (December 2013, duplicate). The historical range of NPN concentrations for monitoring well CYN-MW11 is approximately 9 to 12 mg/L with a consistent trend (Figure 7B-2).

- Monitoring well CYN-MW12 had reported concentrations of 14.7 mg/L (April 2013) and 14.4 mg/L (December 2013). The historical range of NPN concentrations for monitoring well CYN-MW12 is approximately 11 to 15 mg/L with a slightly increasing trend (Figure 7B-3).

- Monitoring well CYN-MW13 had reported concentrations of 33.5 mg/L (April 2013), 32.6 mg/L (April 2013, duplicate), 35.0 mg/L (May 2013), 32.3 mg/L (May 2013 duplicate), and 33.7 mg/L (December 2013). All NPN concentrations for monitoring well CYN-MW13 are displayed in Figure 7B-4.

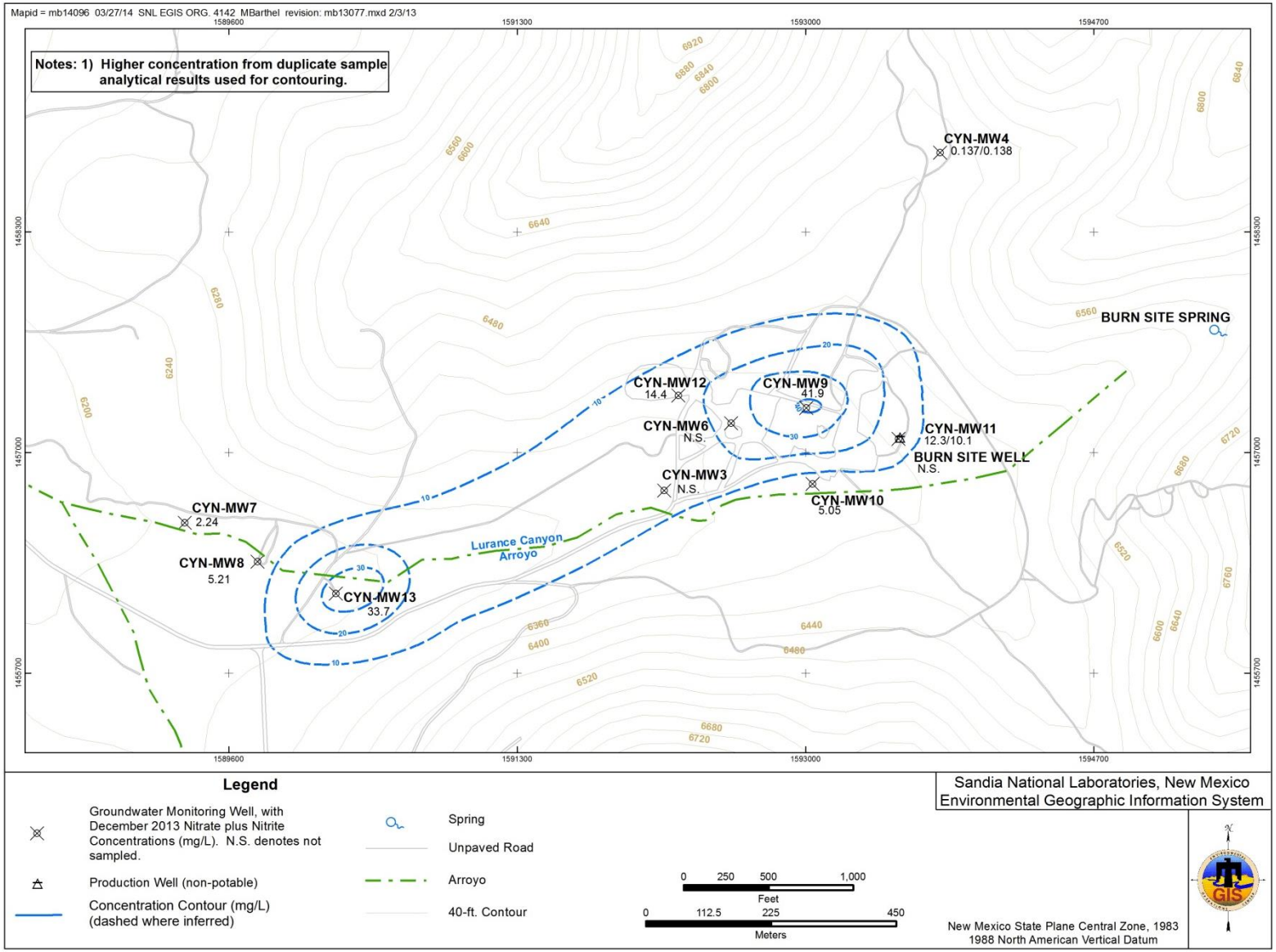


**Figure 7-3. Nitrate plus Nitrite Concentration Contour Map for the Burn Site Groundwater Study Area**

The results for TPH are listed for TPH-DRO and TPH-GRO in Table 7A-4. No MCLs have been established for TPH-DRO or TPH-GRO. No detections of TPH-GRO were reported for any of the samples collected during the CY 2013 sampling events. Several detections of TPH-DRO were reported in samples collected from monitoring wells CYN-MW8, CYN-MW9, and CYN-MW13 at concentrations ranging from 71.7 to 99.4 µg/L. However, these TPH-DRO results were qualified with "J" by the laboratory (Table 7A-4).

The analytical results for anions are presented in Table 7A-5. None of the analytes exceed MCLs, where established.

Total metal results are presented in Table 7A-6. No metals exceed established MCLs.

Groundwater samples were analyzed for tritium, gross alpha/beta activity, isotopic uranium, and radionuclides by gamma spectroscopy. The results are presented in Table 7A-7. All radionuclide activity results are below established MCLs. Gross alpha activity is measured as a screening tool and according to 40 Code of Federal Regulations Parts 9, 141, and 142, Table I-4, does not include uranium, which is measured independently. Therefore, gross alpha activity measurements were corrected by subtracting out the total uranium activity. Radiological results are further reviewed by an SNL/NM Certified Health Physicist to assure that the samples are nonradioactive. Corrected gross alpha activity results are below the MCL of 15 picocuries per liter (pCi/L).

Additional samples for alkalinity and major cations (as calcium, magnesium, potassium, and sodium) were collected from monitoring well CYN-MW13 only. Groundwater samples for cations are collected after groundwater is passed through in-line filters of 0.45 micron pore size. There are no established MCLs for these analytical parameters. Results for these parameters are reported in Table 7A-8.

Field water quality parameters are measured during sample purging of each well prior to sampling and include temperature, specific conductance, oxidation-reduction potential, pH, turbidity, and dissolved oxygen. The parameter measurements obtained immediately prior to sample collection are presented in Table 7A-9.

### 7.7 Quality Control Results

Field and laboratory QC samples were collected and prepared as described in Section 1.3. Data validation qualifiers are provided with the analytical results in Tables 7A-3 through 7A-8 (Attachment 7A). The results of QC samples and the impact on data quality for the BSG quarterly sampling events are discussed in the following sections.

Duplicate environmental sample results show good correlation (relative percent difference values less than 35 for inorganic analyses) for all calculated parameters.

The results of the EB sample analyses are as follows:

- **April/May 2013 Sampling Events at Monitoring Wells CYN-MW10 and CYN-MW13**—The EB samples were collected prior to sampling these wells and analyzed for all parameters. Bromodichloromethane, bromoform, chloride, chloroform, copper, and dibromochloromethane were detected above the laboratory MDLs. No corrective action was necessary for all parameters, with the exception of copper, because these analytes were not detected in environmental samples nor were detected in environmental samples at concentrations greater than five times the EB result. The copper values reported in CYN-MW10 environmental samples were qualified as not detected during data validation,

because copper was reported in the EB sample at a concentration greater than reported environmental samples.

- **December 2013 Sampling Events at Monitoring Wells CYN-MW4 and CYN-MW11**—The EB samples were collected prior to sampling these wells and analyzed for all parameters. No analytes were detected above laboratory MDLs in any EB sample.

The results of the TB samples are as follows:

- **April/May 2013 Sampling Event**—10 VOC and 10 TPH-GRO TB samples were submitted during this sampling event. No VOCs, except acetone and carbon disulfide, were detected above laboratory MDLs in any VOC TB sample. No corrective action was required because no VOCs were detected in environmental groundwater sample. TPH-GRO was not detected above laboratory MDLs in any TB sample.

- **December 2013 Sampling Event**—A total of 10 TPH-GRO TB samples were submitted during this sampling event. No TPH-GRO was detected above laboratory MDLs in any TB sample.

The results of the FB samples are as follows:

- **April/May 2013 Sampling Event at Monitoring Wells CYN-MW8 and CYN-MW11**—The VOCs bromodichloromethane, bromoform, chloroform, and dibromochloromethane were detected above laboratory MDLs. No corrective action was necessary as these compounds were not detected in the associated environmental sample. GRO was not detected in any FB sample.

- **December 2013 Sampling Event at Monitoring Wells CYN-MW8 and CYN-MW13**—TPH-GRO was not detected in any FB sample.

### 7.8 Variances and Nonconformances

No variances or nonconformances from field or sampling requirements specified in the BSG monitoring Mini-Sampling and Analysis Plans (March 2013b, and November 2013b) occurred during sampling activities. The following project-specific issues associated with the CY 2012 sampling events for BSG occurred:

- **All Sampling Events**—No groundwater samples were collected from monitoring wells CYN-MW3 or CYN-MW6 due to insufficient water.

- **April/May 2013 Sampling Event**—(1) CYN-MW13 was resampled for NPN. This resample event occurred on May 17, 2013, and reported NPN values confirmed initial sample results. Both April and May 2013 NPN results are reported. (2) Additional chemical analyses, including alkalinity and cations, were collected at monitoring well CYN-MW13.

- **December 2013 Sampling Event**—(1) From December 2 to 3, 2013, SNL/NM's Grounds and Roads Services Team repaired roads to access monitoring wells CYN-MW4, CYN-MW7, CYN-MW8, and CYN-MW13. (2) Various tests activities were performed by SNL/NM's Fire Science and Technology Group during the December 2014 groundwater monitoring event.

## 7.9 Summary and Conclusions

This section provides a brief summary of activities, discussion of COC concentrations, trends of concentrations versus time, the conceptual site model, and plans for studies to be completed during CY 2013 at the BSG Study Area.

The BSG Study Area is located in the vicinity of the active Lurance Canyon Burn Site facility. Groundwater investigations were initiated in 1997 at the request of the NMED after elevated nitrate levels were discovered in the nonpotable Burn Site Well. The study area currently consists of 11 monitoring wells. Monitoring wells were sampled during April/May and December 2013. The samples were analyzed for VOCs, HE compounds, TPH-DRO, TPH-GRO, NPN, Target Analyte List metals (plus uranium), anions, gross alpha/beta activity, tritium, and radionuclides by gamma spectroscopy. Additional chemical analyses for alkalinity and anions/cations were collected at monitoring well CYN-MW13.

NPN was the only COC that exceeded a drinking water standard. NPN was detected at concentrations exceeding the MCL of 10 mg/L in samples from four BSG Study Area monitoring wells: CYN-MW9, CYN-MW11, CYN-MW12, and CYN-MW13. The maximum concentration reported is 41.9 mg/L in the sample collected from monitoring well CYN-MW9 during the December 2013 sampling event. For CY 2013, the NPN concentrations for samples from wells exceeding the MCL are summarized as follows:

- Monitoring well CYN-MW9 had reported concentrations of 33.7 mg/L (April 2013) and 41.9 mg/L (December 2013). The historical range of NPN concentrations for monitoring well CYN-MW9 is approximately 29 to 42 mg/L with a consistent trend, with the exception of the December 2013 result (Figure 7B-1).

- Monitoring well CYN-MW11 had reported concentrations of 8.97 mg/L (April 2013), 12.3 mg/L (December 2013), and 10.1 mg/L (December 2013, duplicate). The historical range of NPN concentrations for monitoring well CYN-MW11 is approximately 9 to 12 mg/L with a consistent trend (Figure 7B-2).

- Monitoring well CYN-MW12 had reported concentrations of 14.7 mg/L (April 2013) and 14.4 mg/L (December 2013). The historical range of NPN concentrations for monitoring well CYN-MW12 is approximately 11 to 15 mg/L with a slightly increasing trend (Figure 7B-3).

- Monitoring well CYN-MW13 had reported concentrations of 33.5 mg/L (April 2013), 32.6 mg/L (April 2013, duplicate), 35.0 mg/L (May 2013), 32.3 mg/L (May 2013 duplicate), and 33.7 mg/L (December 2013). All NPN concentrations for monitoring well CYN-MW13 are displayed in Figure 7B-4.

The analytical results for this reporting period are mostly consistent with historical concentrations. The notable exception is that nitrate concentrations in monitoring well CYN-MW13 are significantly higher than the well it replaced (CYN-MW10). The conceptual site model described in Section 7.1.7 required slight modification based on the analytical results for this reporting period.

During CY 2014, semiannual groundwater sampling will continue at the nine BSG Study Area wells during the second and fourth quarters. In addition, if NMED approves the Well Construction Plan for CYN-MW14 and CYN-MW15 (SNL September 2013b), these wells will be installed and a Field Report will be submitted to the NMED.

## 7.10 References


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# Attachment 7A
# Burn Site Groundwater
# Analytical Results Tables

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# Attachment 7A Tables


7A-1 Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B), Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 7A-5

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## Table 7A-1
## Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B), Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Analyte | MDL[b] (µg/L) | Analyte | MDL[b] (µg/L) |
|---|---|---|---|
| 1,1,1-Trichloroethane | 0.300 | Chlorobenzene | 0.300 |
| 1,1,2,2-Tetrachloroethane | 0.300 | Chloroethane | 0.300 |
| 1,1,2-Trichloroethane | 0.300 | Chloroform | 0.300 |
| 1,1-Dichloroethane | 0.300 | Chloromethane | 0.300 |
| 1,1-Dichloroethene | 0.300 | Cyclohexane | 0.300 |
| 1,2,3-Trichlorobenzene | 0.300 | Dibromochloromethane | 0.300 |
| 1,2,4-Trichlorobenzene | 0.300 | Dichlorodifluoromethane | 0.300 |
| 1,2-Dibromo-3-chloropropane | 0.300 | Ethyl benzene | 0.300 |
| 1,2-Dibromoethane | 0.300 | Isopropylbenzene | 0.300 |
| 1,2-Dichlorobenzene | 0.300 | Methyl acetate | 1.50 |
| 1,2-Dichloroethane | 0.300 | Methylcyclohexane | 3.00 |
| 1,2-Dichloropropane | 0.300 | Methylene chloride | 3.00 |
| 1,3-Dichlorobenzene | 0.300 | Styrene | 0.300 |
| 1,4-Dichlorobenzene | 0.300 | Tert-butyl methyl ether | 0.300 |
| 2,2-trifluoroethane, 1,1,2-Trichloro-1 | 1.50 | Tetrachloroethene | 0.300 |
| 2-Butanone | 2.00 | Toluene | 0.300 |
| 2-Hexanone | 2.20 | Trichloroethene | 0.300 |
| 4-methyl-, 2-Pentanone | 1.50 | Trichlorofluoromethane | 0.300 |
| Acetone | 3.00 | Vinyl chloride | 0.300 |
| Benzene | 0.300 | Xylene | 0.300 |
| Bromochloromethane | 0.300 | cis-1,2-Dichloroethene | 0.300 |
| Bromodichloromethane | 0.300 | cis-1,3-Dichloropropene | 0.300 |
| Bromoform | 0.300 | m-, p-Xylene | 0.300 |
| Bromomethane | 0.300 | o-Xylene | 0.300 |
| Carbon disulfide | 1.50 | trans-1,2-Dichloroethene | 0.300 |
| Carbon tetrachloride | 0.300 | trans-1,3-Dichloropropene | 0.300 |

Refer to footnotes on page 7A-29.

## Table 7A-2
## Method Detection Limits for High Explosive Compounds (EPA Method[g] SW846-8321A), Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Analyte | MDL[b] (µg/L) |
|---|---|
| 1,3,5-Trinitrobenzene | 0.0808 – 0.0920 |
| 1,3-Dinitrobenzene | 0.0808 – 0.0920 |
| 2,4,6-Trinitrotoluene | 0.0808 – 0.0920 |
| 2,4-Dinitrotoluene | 0.0808 – 0.0920 |
| 2,6-Dinitrotoluene | 0.0808 – 0.0920 |
| 2-Amino-4,6-dinitrotoluene | 0.0808 – 0.0920 |
| 2-Nitrotoluene | 0.0828 – 0.0943 |
| 3-Nitrotoluene | 0.0808 – 0.0920 |
| 4-Amino-2,6-dinitrotoluene | 0.0808 – 0.0920 |
| 4-Nitrotoluene | 0.152 – 0.172 |
| HMX | 0.0808 – 0.0920 |
| Nitro-benzene | 0.0808 – 0.0920 |
| Pentaerythritol tetranitrate | 0.101 – 0.115 |
| RDX | 0.0808 – 0.0920 |
| Tetryl | 0.0808 – 0.0920 |

Refer to footnotes on page 7A-29.

## Table 7A-3
## Summary of Nitrate plus Nitrite Results,
## Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW4** 09-Apr-13 | Nitrate plus nitrite as N | 0.124 | 0.017 | 0.050 | 10.0 | | | 093748-018 | EPA 353.2 |
| **CYN-MW7** 03-Apr-13 | Nitrate plus nitrite as N | 2.28 | 0.085 | 0.250 | 10.0 | | | 093733-018 | EPA 353.2 |
| **CYN-MW8** 08-Apr-13 | Nitrate plus nitrite as N | 5.12 | 0.170 | 0.500 | 10.0 | | | 093743-018 | EPA 353.2 |
| **CYN-MW9** 17-Apr-13 | Nitrate plus nitrite as N | **33.7** | 0.850 | 2.50 | 10.0 | | | 093836-018 | EPA 353.2 |
| **CYN-MW10** 10-Apr-13 | Nitrate plus nitrite as N | 5.95 | 0.170 | 0.500 | 10.0 | | | 093754-018 | EPA 353.2 |
| **CYN-MW10** (Duplicate) 10-Apr-13 | Nitrate plus nitrite as N | 6.06 | 0.170 | 0.500 | 10.0 | | | 093756-018 | EPA 353.2 |
| **CYN-MW11** 11-Apr-13 | Nitrate plus nitrite as N | 8.97 | 0.170 | 0.500 | 10.0 | | | 093759-018 | EPA 353.2 |
| **CYN-MW12** 16-Apr-13 | Nitrate plus nitrite as N | **14.7** | 0.170 | 0.500 | 10.0 | | | 093833-018 | EPA 353.2 |
| **CYN-MW13** 04-Apr-13 | Nitrate plus nitrite as N | **33.5** | 0.850 | 2.50 | 10.0 | | | 093739-018 | EPA 353.2 |
| **CYN-MW13** (Duplicate) 04-Apr-13 | Nitrate plus nitrite as N | **32.6** | 0.850 | 2.50 | 10.0 | | | 093740-018 | EPA 353.2 |
| **CYN-MW13** (Resample) 17-May-13 | Nitrate plus nitrite as N | **35.0** | 0.850 | 2.50 | 10.0 | | | 094022-018 | EPA 353.2 |
| **CYN-MW13** (Resample Duplicate) 17-May-13 | Nitrate plus nitrite as N | **32.3** | 0.850 | 2.50 | 10.0 | | | 094023-018 | EPA 353.2 |
| | | | | | | | | | |
| **CYN-MW4** 11-Dec-13 | Nitrate plus nitrite | 0.138 | 0.017 | 0.050 | 10.0 | | | 095003-018 | EPA 353.2 |
| **CYN-MW4** (Duplicate) 11-Dec-13 | Nitrate plus nitrite | 0.137 | 0.017 | 0.050 | 10.0 | | | 095004-018 | EPA 353.2 |
| **CYN-MW7** 09-Dec-13 | Nitrate plus nitrite | 2.24 | 0.170 | 0.500 | 10.0 | | | 095006-018 | EPA 353.2 |
| **CYN-MW8** 04-Dec-13 | Nitrate plus nitrite | 5.21 | 0.170 | 0.500 | 10.0 | | | 095009-018 | EPA 353.2 |
| **CYN-MW9** 16-Dec-13 | Nitrate plus nitrite | **41.9** | 0.850 | 2.50 | 10.0 | | | 094998-018 | EPA 353.2 |
| **CYN-MW10** 02-Dec-13 | Nitrate plus nitrite | 5.05 | 0.170 | 0.500 | 10.0 | | | 094988-018 | EPA 353.2 |

Refer to footnotes on page 7A-29.

**Table 7A-3** *(Concluded)*
**Summary of Nitrate plus Nitrite Results,**
**Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW11** 03-Dec-13 | Nitrate plus nitrite | **12.3** | 0.170 | 0.500 | 10.0 | | | 094993-018 | EPA 353.2 |
| **CYN-MW11** (Duplicate) 03-Dec-13 | Nitrate plus nitrite | **10.1** | 0.170 | 0.500 | 10.0 | | | 094994-018 | EPA 353.2 |
| **CYN-MW12** 16-Dec-13 | Nitrate plus nitrite | **14.4** | 0.850 | 2.50 | 10.0 | | | 094996-018 | EPA 353.2 |
| **CYN-MW13** 10-Dec-13 | Nitrate plus nitrite | **33.7** | 1.70 | 5.00 | 10.0 | | | 095012-018 | EPA 353.2 |

Refer to footnotes on page 7A-29.

## Table 7A-4
## Summary of Diesel Range Organics and Gasoline Range Organics Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW4** | Diesel Range Organics | ND | 53.2 | 213 | NE | U | | 093748-005 | SW846 8015D |
| 09-Apr-13 | Gasoline Range Organics | ND | 16.7 | 50.0 | NE | U | | 093748-006 | SW846 8015A/B |
| **CYN-MW7** | Diesel Range Organics | 91.3 | 51.5 | 206 | NE | B, J | 206U | 093733-005 | SW846 8015D |
| 03-Apr-13 | Gasoline Range Organics | ND | 16.7 | 50.0 | NE | U | | 093733-006 | SW846 8015A/B |
| **CYN-MW8** | Diesel Range Organics | ND | 54.9 | 220 | NE | U | | 093743-005 | SW846 8015D |
| 08-Apr-13 | Gasoline Range Organics | ND | 16.7 | 50.0 | NE | U | | 093743-006 | SW846 8015A/B |
| **CYN-MW9** | Diesel Range Organics | 99.4 | 52.1 | 208 | NE | J | | 093836-005 | SW846 8015D |
| 17-Apr-13 | Gasoline Range Organics | ND | 16.7 | 50.0 | NE | U | | 093836-006 | SW846 8015A/B |
| **CYN-MW10** | Diesel Range Organics | ND | 52.1 | 208 | NE | U | | 093754-005 | SW846 8015D |
| 10-Apr-13 | Gasoline Range Organics | ND | 16.7 | 50.0 | NE | U | | 093754-006 | SW846 8015A/B |
| **CYN-MW10** (Duplicate) | Diesel Range Organics | ND | 52.6 | 211 | NE | U | | 093756-005 | SW846 8015D |
| 10-Apr-13 | Gasoline Range Organics | ND | 16.7 | 50.0 | NE | U | | 093756-006 | SW846 8015A/B |
| **CYN-MW11** | Diesel Range Organics | ND | 51.0 | 204 | NE | U | | 093759-005 | SW846 8015D |
| 11-Apr-13 | Gasoline Range Organics | ND | 16.7 | 50.0 | NE | U | | 093759-006 | SW846 8015A/B |
| **CYN-MW12** | Diesel Range Organics | ND | 52.6 | 211 | NE | U | | 093833-005 | SW846 8015D |
| 16-Apr-13 | Gasoline Range Organics | ND | 16.7 | 50.0 | NE | U | | 093833-006 | SW846 8015A/B |
| **CYN-MW13** | Diesel Range Organics | 78.0 | 52.6 | 211 | NE | B, J | 211U | 093739-005 | SW846 8015D |
| 04-Apr-13 | Gasoline Range Organics | ND | 16.7 | 50.0 | NE | U | | 093739-006 | SW846 8015A/B |
| **CYN-MW13** (Duplicate) | Diesel Range Organics | 121 | 54.3 | 217 | NE | B, J | 217U | 093740-005 | SW846 8015D |
| 04-Apr-13 | Gasoline Range Organics | ND | 16.7 | 50.0 | NE | U | | 093740-006 | SW846 8015A/B |
| | | | | | | | | | |
| **CYN-MW4** | Diesel Range Organics | ND | 50.0 | 200 | NE | U | | 095003-005 | SW846 8015D |
| 11-Dec-13 | Gasoline Range Organics | ND | 16.7 | 50.0 | NE | U | | 095003-006 | SW846 8015A/B |
| **CYN-MW4** (Duplicate) | Diesel Range Organics | ND | 50.0 | 200 | NE | U | | 095004-005 | SW846 8015D |
| 11-Dec-13 | Gasoline Range Organics | ND | 16.7 | 50.0 | NE | U | | 095004-006 | SW846 8015A/B |
| **CYN-MW7** | Diesel Range Organics | ND | 50.0 | 200 | NE | U | | 095006-005 | SW846 8015D |
| 09-Dec-13 | Gasoline Range Organics | ND | 16.7 | 50.0 | NE | U | | 095006-006 | SW846 8015A/B |
| **CYN-MW8** | Diesel Range Organics | 85.9 | 51.0 | 204 | NE | J | | 095009-005 | SW846 8015D |
| 04-Dec-13 | Gasoline Range Organics | ND | 16.7 | 50.0 | NE | U | | 095009-006 | SW846 8015A/B |
| **CYN-MW9** | Diesel Range Organics | 81.6 | 50.0 | 200 | NE | B, J | 200UJ | 094998-005 | SW846 8015D |
| 16-Dec-13 | Gasoline Range Organics | ND | 16.7 | 50.0 | NE | U | | 094998-006 | SW846 8015A/B |
| **CYN-MW10** | Diesel Range Organics | ND | 52.1 | 208 | NE | U | | 094988-005 | SW846 8015D |
| 02-Dec-13 | Gasoline Range Organics | ND | 16.7 | 50.0 | NE | U | | 094988-006 | SW846 8015A/B |

Refer to footnotes on page 7A-29.

**Table 7A-4** *(Concluded)*
**Summary of Diesel Range Organics and Gasoline Range Organics Results,**
**Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW11** | Diesel Range Organics | 93.2 | 54.3 | 217 | NE | J | 217U | 094993-005 | SW846 8015D |
| 03-Dec-13 | Gasoline Range Organics | ND | 16.7 | 50.0 | NE | U | | 094993-006 | SW846 8015A/B |
| **CYN-MW11** (Duplicate) | Diesel Range Organics | ND | 52.1 | 208 | NE | U | | 094994-005 | SW846 8015D |
| 03-Dec-13 | Gasoline Range Organics | ND | 16.7 | 50.0 | NE | U | | 094994-006 | SW846 8015A/B |
| **CYN-MW12** | Diesel Range Organics | 72.3 | 50.0 | 200 | NE | B, J | 200UJ | 094996-005 | SW846 8015D |
| 16-Dec-13 | Gasoline Range Organics | ND | 16.7 | 50.0 | NE | U | | 094996-006 | SW846 8015A/B |
| **CYN-MW13** | Diesel Range Organics | 71.7 | 50.0 | 200 | NE | J | | 095012-005 | SW846 8015D |
| 10-Dec-13 | Gasoline Range Organics | ND | 16.7 | 50.0 | NE | U | | 095012-006 | SW846 8015A/B |

Refer to footnotes on page 7A-29.

## Table 7A-5
## Summary of Anion Results,
## Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW4** | Bromide | 0.394 | 0.067 | 0.200 | NE | | | 093748-016 | SW846 9056 |
| 09-Apr-13 | Chloride | 21.9 | 0.670 | 2.00 | NE | | | 093748-016 | SW846 9056 |
| | Fluoride | 0.754 | 0.033 | 0.100 | 4.0 | | | 093748-016 | SW846 9056 |
| | Sulfate | 117 | 1.33 | 4.00 | NE | | | 093748-016 | SW846 9056 |
| **CYN-MW7** | Bromide | 0.533 | 0.067 | 0.200 | NE | | | 093733-016 | SW846 9056 |
| 03-Apr-13 | Chloride | 38.9 | 0.670 | 2.00 | NE | | | 093733-016 | SW846 9056 |
| | Fluoride | 1.38 | 0.033 | 0.100 | 4.0 | | | 093733-016 | SW846 9056 |
| | Sulfate | 79.8 | 1.33 | 4.00 | NE | | | 093733-016 | SW846 9056 |
| **CYN-MW8** | Bromide | 0.763 | 0.067 | 0.200 | NE | | | 093743-016 | SW846 9056 |
| 08-Apr-13 | Chloride | 50.0 | 0.670 | 2.00 | NE | | | 093743-016 | SW846 9056 |
| | Fluoride | 1.42 | 0.033 | 0.100 | 4.0 | | | 093743-016 | SW846 9056 |
| | Sulfate | 105 | 1.33 | 4.00 | NE | | | 093743-016 | SW846 9056 |
| **CYN-MW9** | Bromide | 1.02 | 0.067 | 0.200 | NE | | | 093836-016 | SW846 9056 |
| 17-Apr-13 | Chloride | 70.9 | 1.34 | 4.00 | NE | | | 093836-016 | SW846 9056 |
| | Fluoride | 0.511 | 0.033 | 0.100 | 4.0 | | | 093836-016 | SW846 9056 |
| | Sulfate | 164 | 2.66 | 8.00 | NE | | | 093836-016 | SW846 9056 |
| **CYN-MW10** | Bromide | 0.729 | 0.067 | 0.200 | NE | | | 093754-016 | SW846 9056 |
| 10-Apr-13 | Chloride | 41.0 | 0.670 | 2.00 | NE | | | 093754-016 | SW846 9056 |
| | Fluoride | 0.741 | 0.033 | 0.100 | 4.0 | | | 093754-016 | SW846 9056 |
| | Sulfate | 149 | 1.33 | 4.00 | NE | | | 093754-016 | SW846 9056 |
| **CYN-MW10** (Duplicate) | Bromide | 0.649 | 0.067 | 0.200 | NE | | | 093756-016 | SW846 9056 |
| 10-Apr-13 | Chloride | 41.5 | 0.670 | 2.00 | NE | | | 093756-016 | SW846 9056 |
| | Fluoride | 0.639 | 0.033 | 0.100 | 4.0 | | | 093756-016 | SW846 9056 |
| | Sulfate | 149 | 1.33 | 4.00 | NE | | | 093756-016 | SW846 9056 |
| **CYN-MW11** | Bromide | 1.02 | 0.067 | 0.200 | NE | | | 093759-016 | SW846 9056 |
| 11-Apr-13 | Chloride | 68.8 | 0.670 | 2.00 | NE | | | 093759-016 | SW846 9056 |
| | Fluoride | 0.722 | 0.033 | 0.100 | 4.0 | | | 093759-016 | SW846 9056 |
| | Sulfate | 153 | 1.33 | 4.00 | NE | | | 093759-016 | SW846 9056 |
| **CYN-MW12** | Bromide | 0.950 | 0.067 | 0.200 | NE | | | 093833-016 | SW846 9056 |
| 16-Apr-13 | Chloride | 79.6 | 1.34 | 4.00 | NE | H | J | 093833-016 | SW846 9056 |
| | Fluoride | 0.936 | 0.033 | 0.100 | 4.0 | | | 093833-016 | SW846 9056 |
| | Sulfate | 204 | 2.66 | 8.00 | NE | H | J | 093833-016 | SW846 9056 |

Refer to footnotes on page 7A-29.

**Table 7A-5** *(Concluded)*
**Summary of Anion Results,**
**Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW13** | Bromide | 0.346 | 0.067 | 0.200 | NE | | | 093739-016 | SW846 9056 |
| 04-Apr-13 | Chloride | 19.4 | 0.670 | 2.00 | NE | | | 093739-016 | SW846 9056 |
| | Fluoride | 1.72 | 0.033 | 0.100 | 4.0 | | | 093739-016 | SW846 9056 |
| | Sulfate | 73.9 | 1.33 | 4.00 | NE | | | 093739-016 | SW846 9056 |
| **CYN-MW13** (Duplicate) | Bromide | 0.339 | 0.067 | 0.200 | NE | | | 093740-016 | SW846 9056 |
| 04-Apr-13 | Chloride | 18.1 | 0.670 | 2.00 | NE | | | 093740-016 | SW846 9056 |
| | Fluoride | 1.66 | 0.033 | 0.100 | 4.0 | | | 093740-016 | SW846 9056 |
| | Sulfate | 72.0 | 1.33 | 4.00 | NE | | | 093740-016 | SW846 9056 |
| **CYN-MW13** (Resample) | Bromide | 0.289 | 0.067 | 0.200 | NE | | | 094022-016 | SW846 9056 |
| 17-May-13 | Chloride | 20.2 | 0.670 | 2.00 | NE | | | 094022-016 | SW846 9056 |
| | Fluoride | 1.76 | 0.033 | 0.100 | 4.0 | | | 094022-016 | SW846 9056 |
| | Sulfate | 81.6 | 1.33 | 4.00 | NE | | | 094022-016 | SW846 9056 |

Refer to footnotes on page 7A-29.

## Table 7A-6
## Summary of Total Metal Results,
## Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW4** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093748-009 | SW846 6020 |
| 09-Apr-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093748-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093748-009 | SW846 6020 |
| | Barium | 0.0444 | 0.0006 | 0.002 | 2.00 | | | 093748-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093748-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093748-009 | SW846 6020 |
| | Calcium | 71.8 | 0.300 | 1.00 | NE | B | | 093748-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093748-009 | SW846 6020 |
| | Cobalt | 0.000218 | 0.0001 | 0.001 | NE | J | | 093748-009 | SW846 6020 |
| | Copper | 0.000964 | 0.00035 | 0.001 | NE | J | | 093748-009 | SW846 6020 |
| | Iron | 0.168 | 0.033 | 0.100 | NE | | | 093748-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093748-009 | SW846 6020 |
| | Magnesium | 35.3 | 0.050 | 0.150 | NE | | | 093748-009 | SW846 6020 |
| | Manganese | 0.00407 | 0.001 | 0.005 | NE | J | | 093748-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093748-009 | SW846 7470 |
| | Nickel | 0.00247 | 0.0005 | 0.002 | NE | B | 0.0048U | 093748-009 | SW846 6020 |
| | Potassium | 6.60 | 0.080 | 0.300 | NE | | | 093748-009 | SW846 6020 |
| | Selenium | 0.0155 | 0.0015 | 0.005 | 0.050 | | | 093748-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093748-009 | SW846 6020 |
| | Sodium | 43.7 | 0.080 | 0.250 | NE | | | 093748-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093748-009 | SW846 6020 |
| | Uranium | 0.0143 | 0.000067 | 0.0002 | 0.030 | | | 093748-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | | 093748-009 | SW846 6010 |
| | Zinc | 0.00655 | 0.0035 | 0.010 | NE | J | | 093748-009 | SW846 6020 |

Refer to footnotes on page 7A-29.

**Table 7A-6** *(Continued)*
**Summary of Total Metal Results,**
**Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW7** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093733-009 | SW846 6020 |
| 03-Apr-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093733-009 | SW846 6020 |
| | Arsenic | 0.00178 | 0.0017 | 0.005 | 0.010 | J | | 093733-009 | SW846 6020 |
| | Barium | 0.100 | 0.0006 | 0.002 | 2.00 | | | 093733-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093733-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093733-009 | SW846 6020 |
| | Calcium | 111 | 0.300 | 1.00 | NE | | | 093733-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093733-009 | SW846 6020 |
| | Cobalt | 0.000167 | 0.0001 | 0.001 | NE | J | J+ | 093733-009 | SW846 6020 |
| | Copper | 0.00154 | 0.00035 | 0.001 | NE | B | 0.0041U | 093733-009 | SW846 6020 |
| | Iron | 0.356 | 0.033 | 0.100 | NE | | | 093733-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093733-009 | SW846 6020 |
| | Magnesium | 22.1 | 0.010 | 0.030 | NE | | | 093733-009 | SW846 6020 |
| | Manganese | 0.00148 | 0.001 | 0.005 | NE | J | | 093733-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093733-009 | SW846 7470 |
| | Nickel | 0.00309 | 0.0005 | 0.002 | NE | | J+ | 093733-009 | SW846 6020 |
| | Potassium | 2.35 | 0.080 | 0.300 | NE | | | 093733-009 | SW846 6020 |
| | Selenium | 0.00606 | 0.0015 | 0.005 | 0.050 | | | 093733-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093733-009 | SW846 6020 |
| | Sodium | 41.3 | 0.080 | 0.250 | NE | | J | 093733-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093733-009 | SW846 6020 |
| | Uranium | 0.00682 | 0.000067 | 0.0002 | 0.030 | | J | 093733-009 | SW846 6020 |
| | Vanadium | 0.00336 | 0.001 | 0.005 | NE | J | | 093733-009 | SW846 6010 |
| | Zinc | 0.0141 | 0.0035 | 0.010 | NE | | | 093733-009 | SW846 6020 |

Refer to footnotes on page 7A-29.

## Table 7A-6 *(Continued)*
## Summary of Total Metal Results,
## Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW8** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093743-009 | SW846 6020 |
| 08-Apr-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093743-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093743-009 | SW846 6020 |
| | Barium | 0.0581 | 0.0006 | 0.002 | 2.00 | | | 093743-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093743-009 | SW846 6020 |
| | Cadmium | 0.000276 | 0.00011 | 0.001 | 0.005 | J | J+ | 093743-009 | SW846 6020 |
| | Calcium | 119 | 0.300 | 1.00 | NE | B | | 093743-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093743-009 | SW846 6020 |
| | Cobalt | 0.000865 | 0.0001 | 0.001 | NE | J | | 093743-009 | SW846 6020 |
| | Copper | 0.0013 | 0.00035 | 0.001 | NE | | J- | 093743-009 | SW846 6020 |
| | Iron | 0.216 | 0.033 | 0.100 | NE | | | 093743-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093743-009 | SW846 6020 |
| | Magnesium | 25.7 | 0.050 | 0.150 | NE | | | 093743-009 | SW846 6020 |
| | Manganese | 0.00455 | 0.001 | 0.005 | NE | J | | 093743-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093743-009 | SW846 7470 |
| | Nickel | 0.00325 | 0.0005 | 0.002 | NE | B | 0.0048U | 093743-009 | SW846 6020 |
| | Potassium | 2.47 | 0.080 | 0.300 | NE | | | 093743-009 | SW846 6020 |
| | Selenium | 0.00698 | 0.0015 | 0.005 | 0.050 | | | 093743-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093743-009 | SW846 6020 |
| | Sodium | 45.8 | 0.080 | 0.250 | NE | | | 093743-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093743-009 | SW846 6020 |
| | Uranium | 0.00864 | 0.000067 | 0.0002 | 0.030 | | | 093743-009 | SW846 6020 |
| | Vanadium | 0.00327 | 0.001 | 0.005 | NE | J | J+ | 093743-009 | SW846 6010 |
| | Zinc | 0.00791 | 0.0035 | 0.010 | NE | J | | 093743-009 | SW846 6020 |

Refer to footnotes on page 7A-29.

**Table 7A-6** *(Continued)*
**Summary of Total Metal Results,**
**Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW9** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093836-009 | SW846 6020 |
| 17-Apr-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093836-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093836-009 | SW846 6020 |
| | Barium | 0.0581 | 0.0006 | 0.002 | 2.00 | | | 093836-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093836-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093836-009 | SW846 6020 |
| | Calcium | 161 | 0.300 | 1.00 | NE | B | | 093836-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093836-009 | SW846 6020 |
| | Cobalt | 0.000334 | 0.0001 | 0.001 | NE | J | | 093836-009 | SW846 6020 |
| | Copper | 0.0015 | 0.00035 | 0.001 | NE | | J- | 093836-009 | SW846 6020 |
| | Iron | 0.329 | 0.033 | 0.100 | NE | | | 093836-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093836-009 | SW846 6020 |
| | Magnesium | 48.2 | 0.050 | 0.150 | NE | | | 093836-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093836-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093836-009 | SW846 7470 |
| | Nickel | 0.00443 | 0.0005 | 0.002 | NE | B | 0.0048U | 093836-009 | SW846 6020 |
| | Potassium | 2.52 | 0.080 | 0.300 | NE | | | 093836-009 | SW846 6020 |
| | Selenium | 0.00793 | 0.0015 | 0.005 | 0.050 | | | 093836-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093836-009 | SW846 6020 |
| | Sodium | 36.9 | 0.080 | 0.250 | NE | | | 093836-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093836-009 | SW846 6020 |
| | Uranium | 0.00779 | 0.000067 | 0.0002 | 0.030 | | | 093836-009 | SW846 6020 |
| | Vanadium | 0.00175 | 0.001 | 0.005 | NE | J | J+ | 093836-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093836-009 | SW846 6020 |

Refer to footnotes on page 7A-29.

## Table 7A-6 *(Continued)*
## Summary of Total Metal Results,
## Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW10** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093754-009 | SW846 6020 |
| 10-Apr-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093754-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093754-009 | SW846 6020 |
| | Barium | 0.0564 | 0.0006 | 0.002 | 2.00 | | | 093754-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093754-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093754-009 | SW846 6020 |
| | Calcium | 126 | 0.300 | 1.00 | NE | B | | 093754-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093754-009 | SW846 6020 |
| | Cobalt | 0.000251 | 0.0001 | 0.001 | NE | J | | 093754-009 | SW846 6020 |
| | Copper | 0.00134 | 0.00035 | 0.001 | NE | | 0.0083UJ | 093754-009 | SW846 6020 |
| | Iron | 0.228 | 0.033 | 0.100 | NE | | | 093754-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093754-009 | SW846 6020 |
| | Magnesium | 35.0 | 0.050 | 0.150 | NE | | | 093754-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093754-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093754-009 | SW846 7470 |
| | Nickel | 0.00342 | 0.0005 | 0.002 | NE | B | 0.0048U | 093754-009 | SW846 6020 |
| | Potassium | 1.97 | 0.080 | 0.300 | NE | | | 093754-009 | SW846 6020 |
| | Selenium | 0.00715 | 0.0015 | 0.005 | 0.050 | | | 093754-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093754-009 | SW846 6020 |
| | Sodium | 39.5 | 0.080 | 0.250 | NE | | | 093754-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093754-009 | SW846 6020 |
| | Uranium | 0.00597 | 0.000067 | 0.0002 | 0.030 | | | 093754-009 | SW846 6020 |
| | Vanadium | 0.00285 | 0.001 | 0.005 | NE | J | J+ | 093754-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093754-009 | SW846 6020 |

Refer to footnotes on page 7A-29.

## Table 7A-6 *(Continued)*
## Summary of Total Metal Results,
## Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW10** (Duplicate) | Aluminum | 0.0834 | 0.015 | 0.050 | NE | | | 093756-009 | SW846 6020 |
| 10-Apr-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093756-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093756-009 | SW846 6020 |
| | Barium | 0.0574 | 0.0006 | 0.002 | 2.00 | | | 093756-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093756-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093756-009 | SW846 6020 |
| | Calcium | 122 | 0.300 | 1.00 | NE | B | | 093756-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093756-009 | SW846 6020 |
| | Cobalt | 0.00025 | 0.0001 | 0.001 | NE | J | | 093756-009 | SW846 6020 |
| | Copper | 0.00128 | 0.00035 | 0.001 | NE | | 0.0083UJ | 093756-009 | SW846 6020 |
| | Iron | 0.229 | 0.033 | 0.100 | NE | | | 093756-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093756-009 | SW846 6020 |
| | Magnesium | 33.2 | 0.050 | 0.150 | NE | | | 093756-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093756-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093756-009 | SW846 7470 |
| | Nickel | 0.00347 | 0.0005 | 0.002 | NE | B | 0.0048U | 093756-009 | SW846 6020 |
| | Potassium | 1.89 | 0.080 | 0.300 | NE | | | 093756-009 | SW846 6020 |
| | Selenium | 0.00745 | 0.0015 | 0.005 | 0.050 | | | 093756-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093756-009 | SW846 6020 |
| | Sodium | 40.6 | 0.080 | 0.250 | NE | | | 093756-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093756-009 | SW846 6020 |
| | Uranium | 0.00583 | 0.000067 | 0.0002 | 0.030 | | | 093756-009 | SW846 6020 |
| | Vanadium | 0.00318 | 0.001 | 0.005 | NE | J | J+ | 093756-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093756-009 | SW846 6020 |

Refer to footnotes on page 7A-29.

## Table 7A-6 *(Continued)*
## Summary of Total Metal Results,
## Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW11** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093759-009 | SW846 6020 |
| 11-Apr-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093759-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093759-009 | SW846 6020 |
| | Barium | 0.0813 | 0.0006 | 0.002 | 2.00 | | | 093759-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093759-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093759-009 | SW846 6020 |
| | Calcium | 136 | 0.300 | 1.00 | NE | B | | 093759-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093759-009 | SW846 6020 |
| | Cobalt | 0.000419 | 0.0001 | 0.001 | NE | J | | 093759-009 | SW846 6020 |
| | Copper | 0.00112 | 0.00035 | 0.001 | NE | | J- | 093759-009 | SW846 6020 |
| | Iron | 0.253 | 0.033 | 0.100 | NE | | | 093759-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093759-009 | SW846 6020 |
| | Magnesium | 42.1 | 0.050 | 0.150 | NE | | | 093759-009 | SW846 6020 |
| | Manganese | 0.313 | 0.001 | 0.005 | NE | | | 093759-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093759-009 | SW846 7470 |
| | Nickel | 0.00402 | 0.0005 | 0.002 | NE | B | 0.0048U | 093759-009 | SW846 6020 |
| | Potassium | 3.33 | 0.080 | 0.300 | NE | | | 093759-009 | SW846 6020 |
| | Selenium | 0.00435 | 0.0015 | 0.005 | 0.050 | J | | 093759-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093759-009 | SW846 6020 |
| | Sodium | 38.2 | 0.080 | 0.250 | NE | | | 093759-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093759-009 | SW846 6020 |
| | Uranium | 0.00597 | 0.000067 | 0.0002 | 0.030 | | | 093759-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | | 093759-009 | SW846 6010 |
| | Zinc | 0.0391 | 0.0035 | 0.010 | NE | | | 093759-009 | SW846 6020 |

Refer to footnotes on page 7A-29.

## Table 7A-6 *(Continued)*
## Summary of Total Metal Results,
## Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW12** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093833-009 | SW846 6020 |
| 16-Apr-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093833-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093833-009 | SW846 6020 |
| | Barium | 0.0369 | 0.0006 | 0.002 | 2.00 | | | 093833-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093833-009 | SW846 6020 |
| | Cadmium | 0.000197 | 0.00011 | 0.001 | 0.005 | J | J+ | 093833-009 | SW846 6020 |
| | Calcium | 152 | 0.300 | 1.00 | NE | B, N | | 093833-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093833-009 | SW846 6020 |
| | Cobalt | 0.000544 | 0.0001 | 0.001 | NE | J | | 093833-009 | SW846 6020 |
| | Copper | 0.00206 | 0.00035 | 0.001 | NE | | J- | 093833-009 | SW846 6020 |
| | Iron | 0.291 | 0.033 | 0.100 | NE | | | 093833-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093833-009 | SW846 6020 |
| | Magnesium | 42.5 | 0.050 | 0.150 | NE | N | | 093833-009 | SW846 6020 |
| | Manganese | 0.0545 | 0.001 | 0.005 | NE | | | 093833-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093833-009 | SW846 7470 |
| | Nickel | 0.00428 | 0.0005 | 0.002 | NE | B | 0.0048U | 093833-009 | SW846 6020 |
| | Potassium | 3.30 | 0.080 | 0.300 | NE | | | 093833-009 | SW846 6020 |
| | Selenium | 0.00804 | 0.0015 | 0.005 | 0.050 | | | 093833-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093833-009 | SW846 6020 |
| | Sodium | 40.9 | 0.080 | 0.250 | NE | N | | 093833-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093833-009 | SW846 6020 |
| | Uranium | 0.00927 | 0.000067 | 0.0002 | 0.030 | | | 093833-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | | 093833-009 | SW846 6010 |
| | Zinc | 0.0193 | 0.0035 | 0.010 | NE | | | 093833-009 | SW846 6020 |

Refer to footnotes on page 7A-29.

## Table 7A-6 *(Continued)*
## Summary of Total Metal Results,
## Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW13** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093739-009 | SW846 6020 |
| 04-Apr-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093739-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093739-009 | SW846 6020 |
| | Barium | 0.109 | 0.0006 | 0.002 | 2.00 | | | 093739-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093739-009 | SW846 6020 |
| | Cadmium | 0.000384 | 0.00011 | 0.001 | 0.005 | J | | 093739-009 | SW846 6020 |
| | Calcium | 114 | 0.300 | 1.00 | NE | | | 093739-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093739-009 | SW846 6020 |
| | Cobalt | 0.000491 | 0.0001 | 0.001 | NE | J | J+ | 093739-009 | SW846 6020 |
| | Copper | 0.0011 | 0.00035 | 0.001 | NE | B | 0.0041U | 093739-009 | SW846 6020 |
| | Iron | 0.406 | 0.033 | 0.100 | NE | | | 093739-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093739-009 | SW846 6020 |
| | Magnesium | 24.0 | 0.010 | 0.030 | NE | | | 093739-009 | SW846 6020 |
| | Manganese | 0.230 | 0.001 | 0.005 | NE | | | 093739-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093739-009 | SW846 7470 |
| | Nickel | 0.00385 | 0.0005 | 0.002 | NE | | J+ | 093739-009 | SW846 6020 |
| | Potassium | 2.58 | 0.080 | 0.300 | NE | | | 093739-009 | SW846 6020 |
| | Selenium | 0.00271 | 0.0015 | 0.005 | 0.050 | J | | 093739-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093739-009 | SW846 6020 |
| | Sodium | 22.5 | 0.080 | 0.250 | NE | | J | 093739-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093739-009 | SW846 6020 |
| | Uranium | 0.00719 | 0.000067 | 0.0002 | 0.030 | | J | 093739-009 | SW846 6020 |
| | Vanadium | 0.00189 | 0.001 | 0.005 | NE | J | | 093739-009 | SW846 6010 |
| | Zinc | 0.119 | 0.0035 | 0.010 | NE | | | 093739-009 | SW846 6020 |

Refer to footnotes on page 7A-29.

**Table 7A-6** *(Concluded)*
**Summary of Total Metal Results,**
**Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW13** (Duplicate) | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093740-009 | SW846 6020 |
| 04-Apr-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093740-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093740-009 | SW846 6020 |
| | Barium | 0.107 | 0.0006 | 0.002 | 2.00 | | | 093740-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093740-009 | SW846 6020 |
| | Cadmium | 0.000387 | 0.00011 | 0.001 | 0.005 | J | | 093740-009 | SW846 6020 |
| | Calcium | 117 | 0.300 | 1.00 | NE | | | 093740-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093740-009 | SW846 6020 |
| | Cobalt | 0.000509 | 0.0001 | 0.001 | NE | J | J+ | 093740-009 | SW846 6020 |
| | Copper | 0.00168 | 0.00035 | 0.001 | NE | B | 0.0041U | 093740-009 | SW846 6020 |
| | Iron | 0.453 | 0.033 | 0.100 | NE | | | 093740-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093740-009 | SW846 6020 |
| | Magnesium | 23.7 | 0.010 | 0.030 | NE | | | 093740-009 | SW846 6020 |
| | Manganese | 0.232 | 0.001 | 0.005 | NE | | | 093740-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093740-009 | SW846 7470 |
| | Nickel | 0.004 | 0.0005 | 0.002 | NE | | J+ | 093740-009 | SW846 6020 |
| | Potassium | 2.70 | 0.080 | 0.300 | NE | | | 093740-009 | SW846 6020 |
| | Selenium | 0.00272 | 0.0015 | 0.005 | 0.050 | J | | 093740-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093740-009 | SW846 6020 |
| | Sodium | 24.0 | 0.080 | 0.250 | NE | | J | 093740-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093740-009 | SW846 6020 |
| | Uranium | ND | 0.000067 | 0.0002 | 0.030 | U | UJ | 093740-009 | SW846 6020 |
| | Vanadium | 0.00205 | 0.001 | 0.005 | NE | J | | 093740-009 | SW846 6010 |
| | Zinc | 0.121 | 0.0035 | 0.010 | NE | | | 093740-009 | SW846 6020 |

Refer to footnotes on page 7A-29.

## Table 7A-7
## Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Tritium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW4** | Americium-241 | -31.8 ± 21.0 | 23.8 | 11.6 | NE | U | BD | 093748-033 | EPA 901.1 |
| 09-Apr-13 | Cesium-137 | 1.62 ± 1.99 | 3.43 | 1.65 | NE | U | BD | 093748-033 | EPA 901.1 |
| | Cobalt-60 | 0.239 ± 1.93 | 3.54 | 1.66 | NE | U | BD | 093748-033 | EPA 901.1 |
| | Potassium-40 | 17.4 ± 44.7 | 32.6 | 15.2 | NE | U | BD | 093748-033 | EPA 901.1 |
| | Gross Alpha | 0.99 | NA | NA | 15 pCi/L | NA | None | 093748-034 | EPA 900.0 |
| | Gross Beta | 39.6 ± 7.04 | 1.98 | 0.956 | 4mrem/yr | | | 093748-034 | EPA 900.0 |
| | Uranium-233/234 | 36.2 ± 4.46 | 0.0616 | 0.0274 | NE | | | 093748-035 | HASL-300 |
| | Uranium-235/236 | 0.609 ± 0.114 | 0.0378 | 0.0147 | NE | | | 093748-035 | HASL-300 |
| | Uranium-238 | 4.40 ± 0.576 | 0.0346 | 0.0139 | NE | | | 093748-035 | HASL-300 |
| | Tritium | 60.4 ± 98.3 | 169 | 75.7 | NE | U | BD | 093748-036 | EPA 906.0 M |
| **CYN-MW7** | Americium-241 | 0.152 ± 7.08 | 12.2 | 5.97 | NE | U | BD | 093733-033 | EPA 901.1 |
| 03-Apr-13 | Cesium-137 | -0.784 ± 1.76 | 3.03 | 1.46 | NE | U | BD | 093733-033 | EPA 901.1 |
| | Cobalt-60 | -0.0434 ± 1.73 | 3.01 | 1.42 | NE | U | BD | 093733-033 | EPA 901.1 |
| | Potassium-40 | 51.3 ± 30.5 | 51.4 | 18.9 | NE | U | BD | 093733-033 | EPA 901.1 |
| | Gross Alpha | 4.81 | NA | NA | 15 pCi/L | NA | None | 093733-034 | EPA 900.0 |
| | Gross Beta | 4.58 ± 1.33 | 1.49 | 0.711 | 4mrem/yr | | | 093733-034 | EPA 900.0 |
| | Uranium-233/234 | 17.4 ± 2.30 | 0.138 | 0.0613 | NE | | | 093733-035 | HASL-300 |
| | Uranium-235/236 | 0.0625 ± 0.0567 | 0.0846 | 0.0329 | NE | U | BD | 093733-035 | HASL-300 |
| | Uranium-238 | 2.39 ± 0.381 | 0.0773 | 0.031 | NE | | | 093733-035 | HASL-300 |
| | Tritium | -67.6 ± 91.3 | 179 | 82.3 | NE | U | BD | 093733-036 | EPA 906.0 M |
| **CYN-MW8** | Americium-241 | 5.68 ± 14.8 | 19.8 | 9.72 | NE | U | BD | 093743-033 | EPA 901.1 |
| 08-Apr-13 | Cesium-137 | -1.35 ± 2.74 | 3.90 | 1.89 | NE | U | BD | 093743-033 | EPA 901.1 |
| | Cobalt-60 | 0.0712 ± 2.08 | 3.70 | 1.75 | NE | U | BD | 093743-033 | EPA 901.1 |
| | Potassium-40 | 5.62 ± 36.5 | 36.0 | 17.0 | NE | U | BD | 093743-033 | EPA 901.1 |
| | Gross Alpha | 4.17 | NA | NA | 15 pCi/L | NA | None | 093743-034 | EPA 900.0 |
| | Gross Beta | 4.78 ± 1.62 | 1.96 | 0.942 | 4mrem/yr | | J | 093743-034 | EPA 900.0 |
| | Uranium-233/234 | 23.7 ± 3.00 | 0.107 | 0.0478 | NE | | | 093743-035 | HASL-300 |
| | Uranium-235/236 | 0.380 ± 0.102 | 0.066 | 0.0256 | NE | | | 093743-035 | HASL-300 |
| | Uranium-238 | 2.85 ± 0.417 | 0.0603 | 0.0242 | NE | | | 093743-035 | HASL-300 |
| | Tritium | 17.8 ± 91.0 | 167 | 74.4 | NE | U | BD | 093743-036 | EPA 906.0 M |

Refer to footnotes on page 7A-29.

## Table 7A-7 *(Continued)*
## Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Tritium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW9** | Americium-241 | 2.35 ± 14.8 | 23.9 | 11.6 | NE | U | BD | 093836-033 | EPA 901.1 |
| 17-Apr-13 | Cesium-137 | 1.77 ± 2.00 | 3.40 | 1.63 | NE | U | BD | 093836-033 | EPA 901.1 |
| | Cobalt-60 | -1.15 ± 2.25 | 3.61 | 1.69 | NE | U | BD | 093836-033 | EPA 901.1 |
| | Potassium-40 | 70.0 ± 27.4 | 39.5 | 18.6 | NE | | J | 093836-033 | EPA 901.1 |
| | Gross Alpha | 2.92 | NA | NA | 15 pCi/L | NA | None | 093836-034 | EPA 900.0 |
| | Gross Beta | 2.54 ± 1.87 | 2.99 | 1.45 | 4mrem/yr | U | BD | 093836-034 | EPA 900.0 |
| | Uranium-233/234 | 8.00 ± 1.02 | 0.0604 | 0.0269 | NE | | | 093836-035 | HASL-300 |
| | Uranium-235/236 | 0.149 ± 0.0464 | 0.0371 | 0.0144 | NE | | | 093836-035 | HASL-300 |
| | Uranium-238 | 2.33 ± 0.321 | 0.0339 | 0.0136 | NE | | | 093836-035 | HASL-300 |
| | Tritium | 63.6 ± 85.0 | 144 | 63.1 | NE | U | BD | 093836-036 | EPA 906.0 M |
| **CYN-MW10** | Americium-241 | -23.6 ± 12.7 | 10.6 | 5.20 | NE | U | R | 093754-033 | EPA 901.1 |
| 10-Apr-13 | Cesium-137 | -0.403 ± 2.73 | 3.50 | 1.69 | NE | U | BD | 093754-033 | EPA 901.1 |
| | Cobalt-60 | 0.00401 ± 1.96 | 3.44 | 1.62 | NE | U | BD | 093754-033 | EPA 901.1 |
| | Potassium-40 | -37.3 ± 40.9 | 44.7 | 21.4 | NE | U | BD | 093754-033 | EPA 901.1 |
| | Gross Alpha | 2.25 | NA | NA | 15 pCi/L | NA | None | 093754-034 | EPA 900.0 |
| | Gross Beta | 3.53 ± 1.69 | 2.52 | 1.22 | 4mrem/yr | | J | 093754-034 | EPA 900.0 |
| | Uranium-233/234 | 5.19 ± 0.679 | 0.0658 | 0.0293 | NE | | | 093754-035 | HASL-300 |
| | Uranium-235/236 | 0.179 ± 0.0535 | 0.0404 | 0.0157 | NE | | | 093754-035 | HASL-300 |
| | Uranium-238 | 1.79 ± 0.259 | 0.0369 | 0.0148 | NE | | | 093754-035 | HASL-300 |
| | Tritium | -5.9 ± 87.3 | 166 | 73.9 | NE | U | BD | 093754-036 | EPA 906.0 M |
| **CYN-MW10** (Duplicate) | Americium-241 | 10.2 ± 12.9 | 19.1 | 9.34 | NE | U | BD | 093756-033 | EPA 901.1 |
| 10-Apr-13 | Cesium-137 | 1.16 ± 2.53 | 3.84 | 1.85 | NE | U | BD | 093756-033 | EPA 901.1 |
| | Cobalt-60 | 0.936 ± 2.19 | 3.90 | 1.84 | NE | U | BD | 093756-033 | EPA 901.1 |
| | Potassium-40 | -32.6 ± 51.2 | 50.4 | 24.0 | NE | U | BD | 093756-033 | EPA 901.1 |
| | Gross Alpha | 1.69 | NA | NA | 15 pCi/L | NA | None | 093756-034 | EPA 900.0 |
| | Gross Beta | 3.88 ± 1.72 | 2.52 | 1.22 | 4mrem/yr | | J | 093756-034 | EPA 900.0 |
| | Uranium-233/234 | 5.25 ± 0.737 | 0.0989 | 0.044 | NE | | | 093756-035 | HASL-300 |
| | Uranium-235/236 | 0.0998 ± 0.0496 | 0.0607 | 0.0236 | NE | | J | 093756-035 | HASL-300 |
| | Uranium-238 | 1.77 ± 0.283 | 0.0555 | 0.0223 | NE | | | 093756-035 | HASL-300 |
| | Tritium | 59.9 ± 97.5 | 168 | 75.0 | NE | U | BD | 093756-036 | EPA 906.0 M |

Refer to footnotes on page 7A-29.

## Table 7A-7 *(Continued)*
## Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Tritium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW11** | Americium-241 | -6.29 ± 10.9 | 18.3 | 8.92 | NE | U | BD | 093759-033 | EPA 901.1 |
| 11-Apr-13 | Cesium-137 | -1.09 ± 1.77 | 2.80 | 1.34 | NE | U | BD | 093759-033 | EPA 901.1 |
| | Cobalt-60 | -1.01 ± 3.25 | 3.46 | 1.64 | NE | U | BD | 093759-033 | EPA 901.1 |
| | Potassium-40 | 33.2 ± 34.8 | 29.5 | 13.8 | NE | X | R | 093759-033 | EPA 901.1 |
| | Gross Alpha | -1.67 | NA | NA | 15 pCi/L | NA | None | 093759-034 | EPA 900.0 |
| | Gross Beta | 9.80 ± 2.81 | 3.52 | 1.72 | 4mrem/yr | | J | 093759-034 | EPA 900.0 |
| | Uranium-233/234 | 5.29 ± 0.679 | 0.0575 | 0.0256 | NE | | | 093759-035 | HASL-300 |
| | Uranium-235/236 | 0.136 ± 0.0439 | 0.0353 | 0.0137 | NE | | | 093759-035 | HASL-300 |
| | Uranium-238 | 1.71 ± 0.243 | 0.0323 | 0.013 | NE | | | 093759-035 | HASL-300 |
| | Tritium | 53.1 ± 95.1 | 165 | 73.8 | NE | U | BD | 093759-036 | EPA 906.0 M |
| **CYN-MW12** | Americium-241 | 11.8 ± 16.4 | 24.3 | 11.9 | NE | U | BD | 093833-033 | EPA 901.1 |
| 16-Apr-13 | Cesium-137 | 1.74 ± 1.85 | 3.14 | 1.51 | NE | U | BD | 093833-033 | EPA 901.1 |
| | Cobalt-60 | -2.03 ± 3.09 | 3.15 | 1.48 | NE | U | BD | 093833-033 | EPA 901.1 |
| | Potassium-40 | -16.3 ± 31.7 | 41.5 | 19.8 | NE | U | BD | 093833-033 | EPA 901.1 |
| | Gross Alpha | 0.16 | NA | NA | 15 pCi/L | NA | None | 093833-034 | EPA 900.0 |
| | Gross Beta | 4.99 ± 1.82 | 2.41 | 1.16 | 4mrem/yr | | J | 093833-034 | EPA 900.0 |
| | Uranium-233/234 | 12.9 ± 1.62 | 0.0633 | 0.0282 | NE | | | 093833-035 | HASL-300 |
| | Uranium-235/236 | 0.147 ± 0.0478 | 0.0389 | 0.0151 | NE | | | 093833-035 | HASL-300 |
| | Uranium-238 | 2.59 ± 0.356 | 0.0355 | 0.0143 | NE | | | 093833-035 | HASL-300 |
| | Tritium | 106 ± 93.5 | 147 | 64.5 | NE | U | BD | 093833-036 | EPA 906.0 M |
| **CYN-MW13** | Americium-241 | 14.9 ± 18.5 | 27.0 | 13.2 | NE | U | BD | 093739-033 | EPA 901.1 |
| 04-Apr-13 | Cesium-137 | -0.921 ± 1.91 | 3.25 | 1.56 | NE | U | BD | 093739-033 | EPA 901.1 |
| | Cobalt-60 | -3.86 ± 4.72 | 3.17 | 1.49 | NE | U | BD | 093739-033 | EPA 901.1 |
| | Potassium-40 | 22.7 ± 46.4 | 30.1 | 14.1 | NE | U | BD | 093739-033 | EPA 901.1 |
| | Gross Alpha | -4.87 | NA | NA | 15 pCi/L | NA | None | 093739-034 | EPA 900.0 |
| | Gross Beta | 3.89 ± 1.24 | 1.61 | 0.780 | 4mrem/yr | | J | 093739-034 | EPA 900.0 |
| | Uranium-233/234 | 9.73 ± 1.29 | 0.0895 | 0.0398 | NE | | | 093739-035 | HASL-300 |
| | Uranium-235/236 | 0.104 ± 0.0462 | 0.0549 | 0.0214 | NE | | J | 093739-035 | HASL-300 |
| | Uranium-238 | 1.92 ± 0.296 | 0.0502 | 0.0202 | NE | | | 093739-035 | HASL-300 |
| | Tritium | 5.74 ± 96.3 | 175 | 80.4 | NE | U | BD | 093739-036 | EPA 906.0 M |

Refer to footnotes on page 7A-29.

**Table 7A-7** *(Concluded)*
**Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Tritium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW13** (Duplicate) | Americium-241 | 0.136 ± 10.9 | 19.2 | 9.39 | NE | U | BD | 093740-033 | EPA 901.1 |
| 04-Apr-13 | Cesium-137 | -0.693 ± 1.85 | 3.03 | 1.45 | NE | U | BD | 093740-033 | EPA 901.1 |
| | Cobalt-60 | 0.592 ± 1.83 | 3.36 | 1.59 | NE | U | BD | 093740-033 | EPA 901.1 |
| | Potassium-40 | 29.6 ± 44.2 | 30.1 | 14.1 | NE | U | BD | 093740-033 | EPA 901.1 |
| | Gross Alpha | -0.10 | NA | NA | 15 pCi/L | NA | None | 093740-034 | EPA 900.0 |
| | Gross Beta | 16.2 ± 3.07 | 1.49 | 0.711 | 4mrem/yr | | | 093740-034 | EPA 900.0 |
| | Uranium-233/234 | 10.3 ± 1.37 | 0.0931 | 0.0414 | NE | | | 093740-035 | HASL-300 |
| | Uranium-235/236 | 0.103 ± 0.0487 | 0.0571 | 0.0222 | NE | | J | 093740-035 | HASL-300 |
| | Uranium-238 | 2.10 ± 0.321 | 0.0522 | 0.021 | NE | | | 093740-035 | HASL-300 |
| | Tritium | -23.5 ± 95.8 | 179 | 82.3 | NE | U | BD | 093740-036 | EPA 906.0 M |

Refer to footnotes on page 7A-29.

## Table 7A-8
## Summary of Alkalinity and Cation Results,
## Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW13** | Bicarbonate Alkalinity | 187 | 0.725 | 1.00 | NE | | | 094022-022 | SM2320B |
| 17-May-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094022-022 | SM2320B |
| | Calcium | 119 | 0.300 | 1.00 | NE | B, N | | 094022-017 | SW846 6020 |
| | Magnesium | 22.6 | 0.010 | 0.030 | NE | | | 094022-017 | SW846 6020 |
| | Potassium | 2.75 | 0.080 | 0.300 | NE | | | 094022-017 | SW846 6020 |
| | Sodium | 26.4 | 0.400 | 1.25 | NE | N | | 094022-017 | SW846 6020 |

Refer to footnotes on page 7A-29.

## Table 7A-9
## Summary of Field Water Quality Measurements[h],
## Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Sample Date | Temperature (°C) | Specific Conductivity (µmhos/cm) | Oxidation Reduction Potential (mV) | pH | Turbidity (NTU) | Dissolved Oxygen (% Sat) | Dissolved Oxygen (mg/L) |
|---|---|---|---|---|---|---|---|---|
| **CYN-MW4** | 09-Apr-13 | 14.81 | 644 | 232.1 | 7.19 | 0.50 | 47.8 | 4.83 |
| **CYN-MW7** | 03-Apr-13 | 17.50 | 685 | 221.6 | 6.96 | 0.62 | 42.7 | 4.08 |
| **CYN-MW8** | 08-Apr-13 | 18.12 | 771 | 220.4 | 7.02 | 0.36 | 47.1 | 4.43 |
| **CYN-MW9** | 17-Apr-13 | 16.90 | 1022 | 237.5 | 6.90 | 0.39 | 53.5 | 5.15 |
| **CYN-MW10** | 10-Apr-13 | 13.69 | 787 | 246.9 | 7.26 | 0.29 | 69.5 | 7.20 |
| **CYN-MW11** | 11-Apr-13 | 15.81 | 902 | 229.4 | 7.10 | 0.30 | 5.1 | 0.51 |
| **CYN-MW12** | 16-Apr-13 | 18.64 | 989 | 232.0 | 6.90 | 0.37 | 12.2 | 1.14 |
| **CYN-MW13** | 04-Apr-13 | 18.72 | 685 | 199.9 | 7.04 | 0.97 | 26.4 | 2.44 |
| **CYN-MW13** | 17-May-13 | 20.07 | 687 | 168.2 | 7.06 | 1.12 | 30.1 | 2.72 |
| | | | | | | | | |
| **CYN-MW4** | 11-Dec-13 | 15.52 | 635.3 | 301.5 | 7.52 | 0.34 | 45.4 | 4.51 |
| **CYN-MW7** | 09-Dec-13 | 15.14 | 660.5 | 244.5 | 7.34 | 0.59 | 46.2 | 4.63 |
| **CYN-MW8** | 04-Dec-13 | 17.37 | 795.1 | 303.1 | 7.36 | 0.26 | 52.5 | 5.03 |
| **CYN-MW9** | 16-Dec-13 | 15.93 | 880.2 | 318.9 | 7.25 | 0.53 | 53.2 | 5.26 |
| **CYN-MW10** | 02-Dec-13 | 14.83 | 750.9 | 308.3 | 7.55 | 0.19 | 74.0 | 7.47 |
| **CYN-MW11** | 03-Dec-13 | 16.20 | 929.6 | 138.7 | 7.43 | 0.68 | 7.9 | 0.78 |
| **CYN-MW12** | 16-Dec-13 | 16.29 | 997.3 | 284.2 | 7.26 | 0.35 | 13.4 | 1.31 |
| **CYN-MW13** | 10-Dec-13 | 16.28 | 685.1 | 256.5 | 7.42 | 2.46 | 25.7 | 2.51 |

Refer to footnotes on page 7A-29.

## *Footnotes for Burn Site Groundwater Analytical Results Tables*

% = percent.
CFR = Code of Federal Regulations.
EPA = U.S. Environmental Protection Agency.
ID = Identifier.
µg/L = micrograms per liter.
mg/L = milligrams per liter.
mrem/yr = millirem per year.
No. = Number.
pCi/L = pico curies per liter.
RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine.
Tetryl = methyl-2,4,6-trinitrophenylnitramine.

**[a]Result**

Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 1-4).

**Bold** = Value exceeds the established MCL.
ND = not detected (at MDL). Activities of zero or less are considered to be not detected.

**[b]MDL or MDA**

The MDL applies to Tables 7A-1 through 7A-6, and Table 7A-8. MDA applies to Table 7A-6.

MDA = The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.
MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA = Not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

**[c]PQL or Critical Level**

The PQL applies to Tables 7A-1 through 7A-6, and Table 7A-8. The Critical Level applies to Table 7A-6.

Critical level = The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA = Not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

**[d]MCL**

MCL = Maximum contaminant level. MCLs were established by the EPA Office of Water, National Primary Water Regulations (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- Gross Alpha particle activity, excluding total uranium = 15 pCi/L (40 CFR Parts 9, 141, and 142, Table 10A- 1-4).
- Any combination of Beta and/or Gamma emitting radionuclides = 4 mrem/yr.

NE = not established.

**[e]Lab Qualifier**

B = The analyte was detected in the blank above the effective MDL.
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
H = Analytical holding time was exceeded.
N = Results associated with a spike analysis that was outside control limits.
NA = Not applicable.
U = Analyte is absent or below the MDL.
X = Data rejected due to peak not meeting identification criteria.

## *Footnotes for Burn Site Groundwater Analytical Results Tables* *(Concluded)*

**[f]Validation Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

| | | |
|---|---|---|
| BD | = | Below detection limit as used in radiochemistry to identify results that are not statistically different from zero. |
| J | = | The associated value is an estimated quantity. |
| J+ | = | The associated numerical value is an estimated quantity with a suspected positive bias. |
| J- | = | The associated numerical value is an estimated quantity with a suspected negative bias. |
| None | = | No data validation for corrected gross alpha activity. |
| U | = | The analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit. |
| UJ | = | The analyte was analyzed for, but not detected. The associated value is an estimate and may be inaccurate or imprecise. |
| R | = | The data are unusable, and resampling and reanalysis are necessary for verification. |

**[g]Analytical Method**

Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.

DOE, Environmental Measurements Laboratory, 1990, "EML Procedures Manual," 27th ed., Vol. 1, Rev. 1992, HASL-300.

EPA, 1999 (and updates), "Perchlorate in Drinking Water Using Ion Chromatography," EPA 815/R-00-014.

EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.

EPA, 1984, "Methods for Chemical Analysis of Water and Wastes." EPA 600-4-79-020.

EPA, 1983, "The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0," EPA-600/4-84-017.

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

DOE = U.S. Department of Energy.
HASL = Health and Safety Laboratory.
SM = Standard Method.

**[h]Field Water Quality Measurements**

Field measurements collected prior to sampling.

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

# Attachment 7B
# Burn Site Groundwater
# Plots

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# Attachment 7B Plots


7B-1 Nitrate plus Nitrite Concentrations, CYN-MW9 ..... 7B-5

7B-2 Nitrate plus Nitrite Concentrations, CYN-MW11 ..... 7B-6

7B-3 Nitrate plus Nitrite Concentrations, CYN-MW12 ..... 7B-7

7B-4 Nitrate plus Nitrite Concentrations, CYN-MW13 ..... 7B-8

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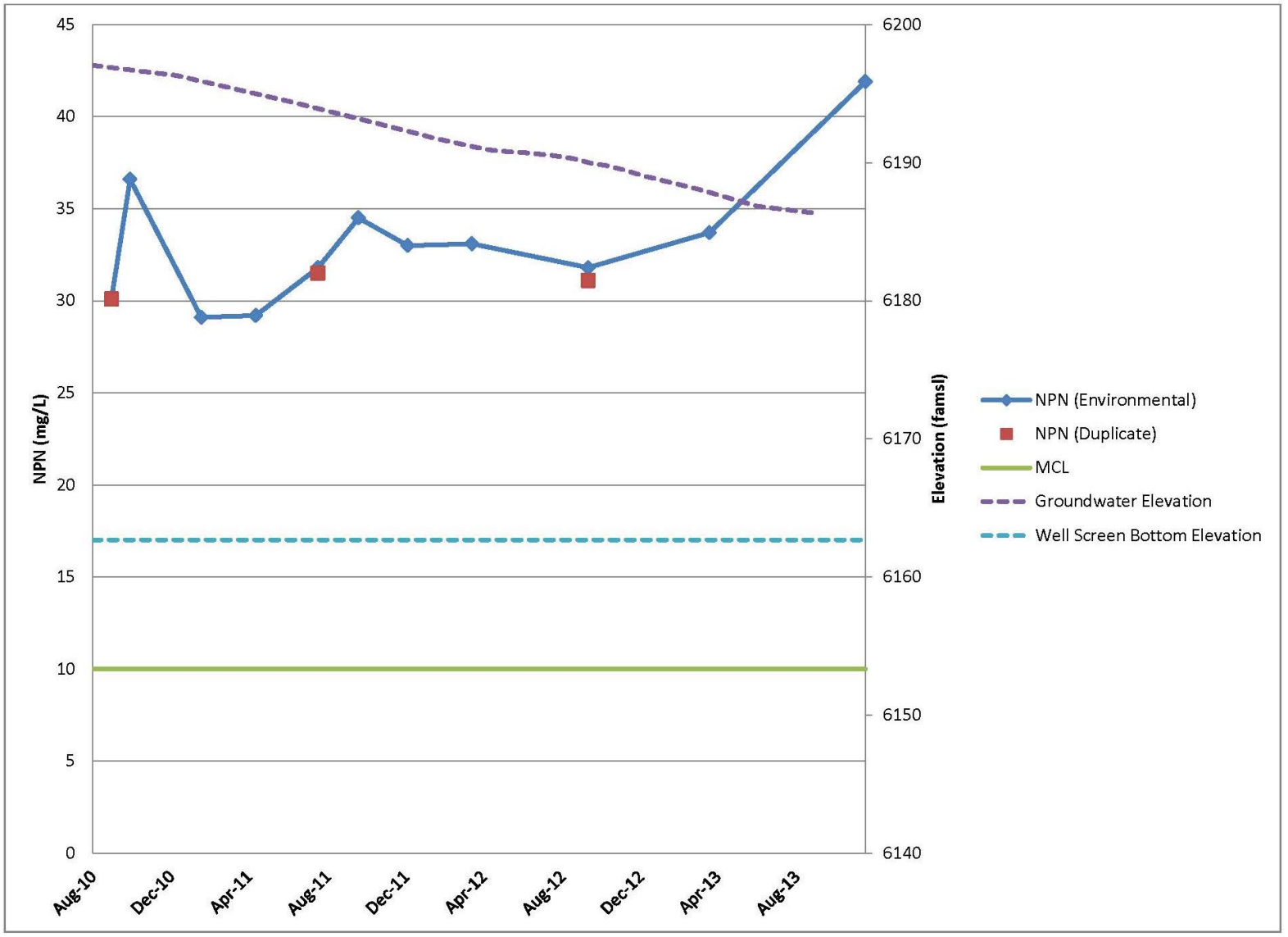


**Figure 7B-1. Nitrate plus Nitrite Concentrations, CYN-MW9**

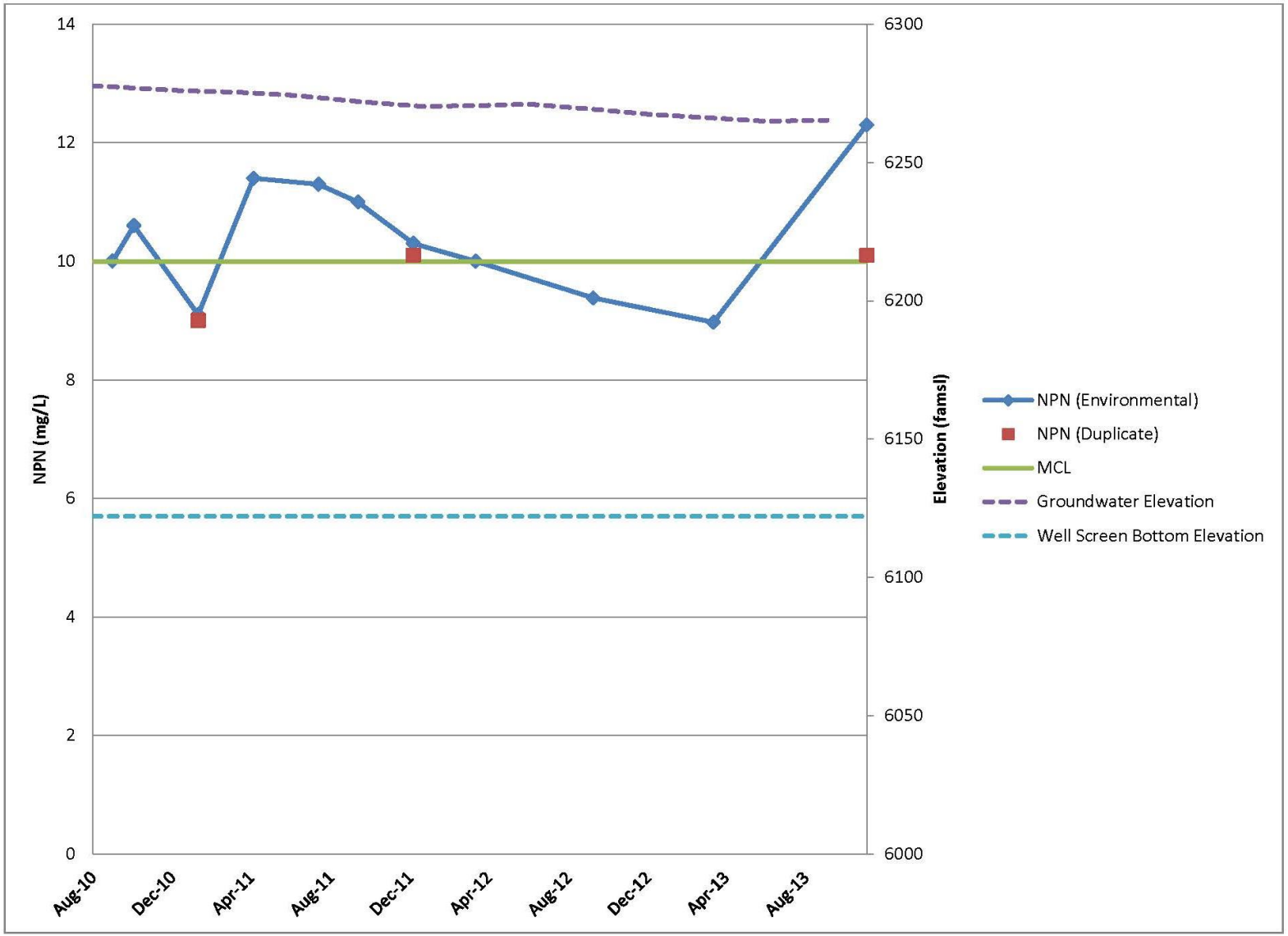


**Figure 7B-2. Nitrate plus Nitrite Concentrations, CYN-MW11**

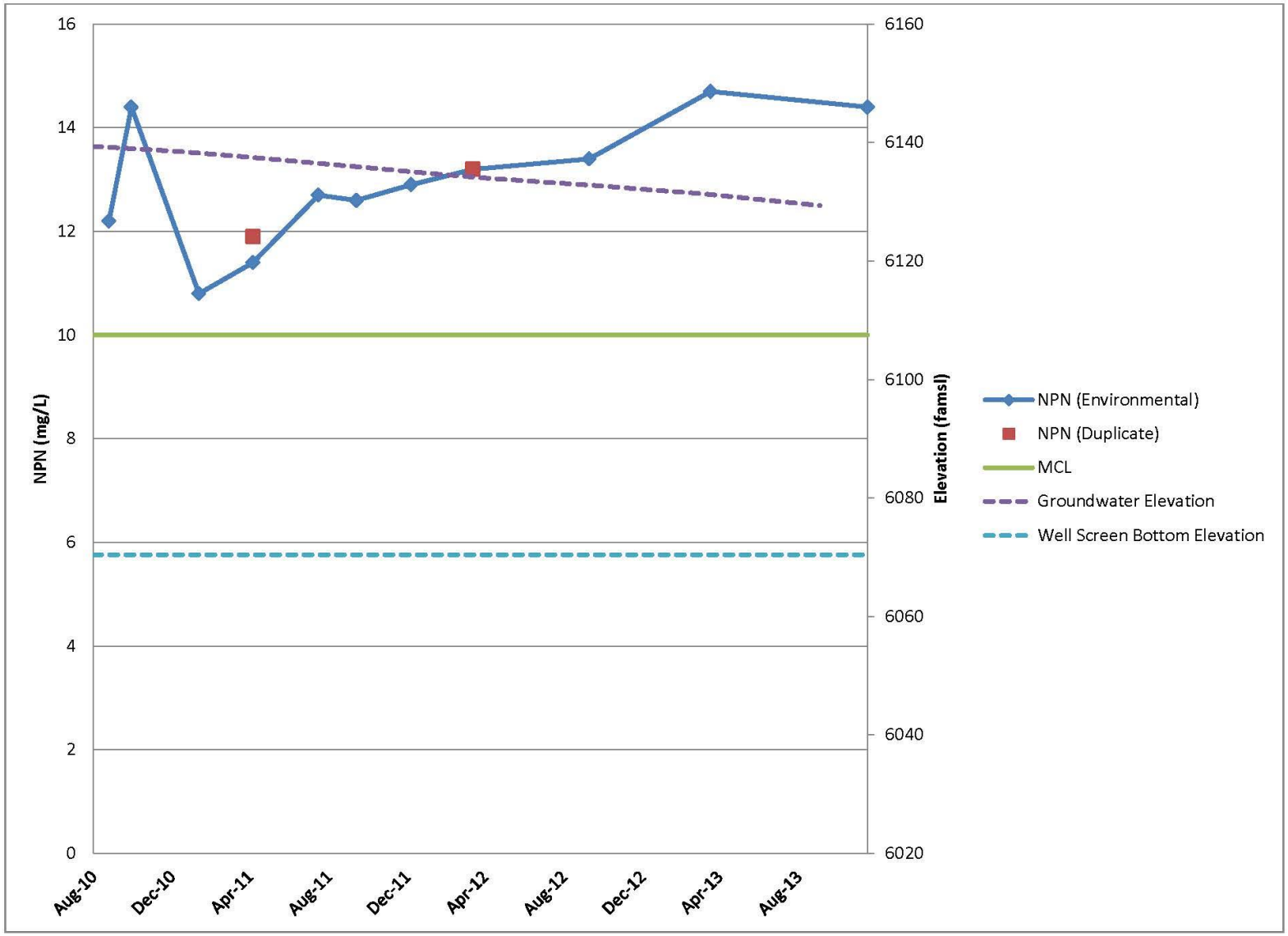


**Figure 7B-3. Nitrate plus Nitrite Concentrations, CYN-MW12**

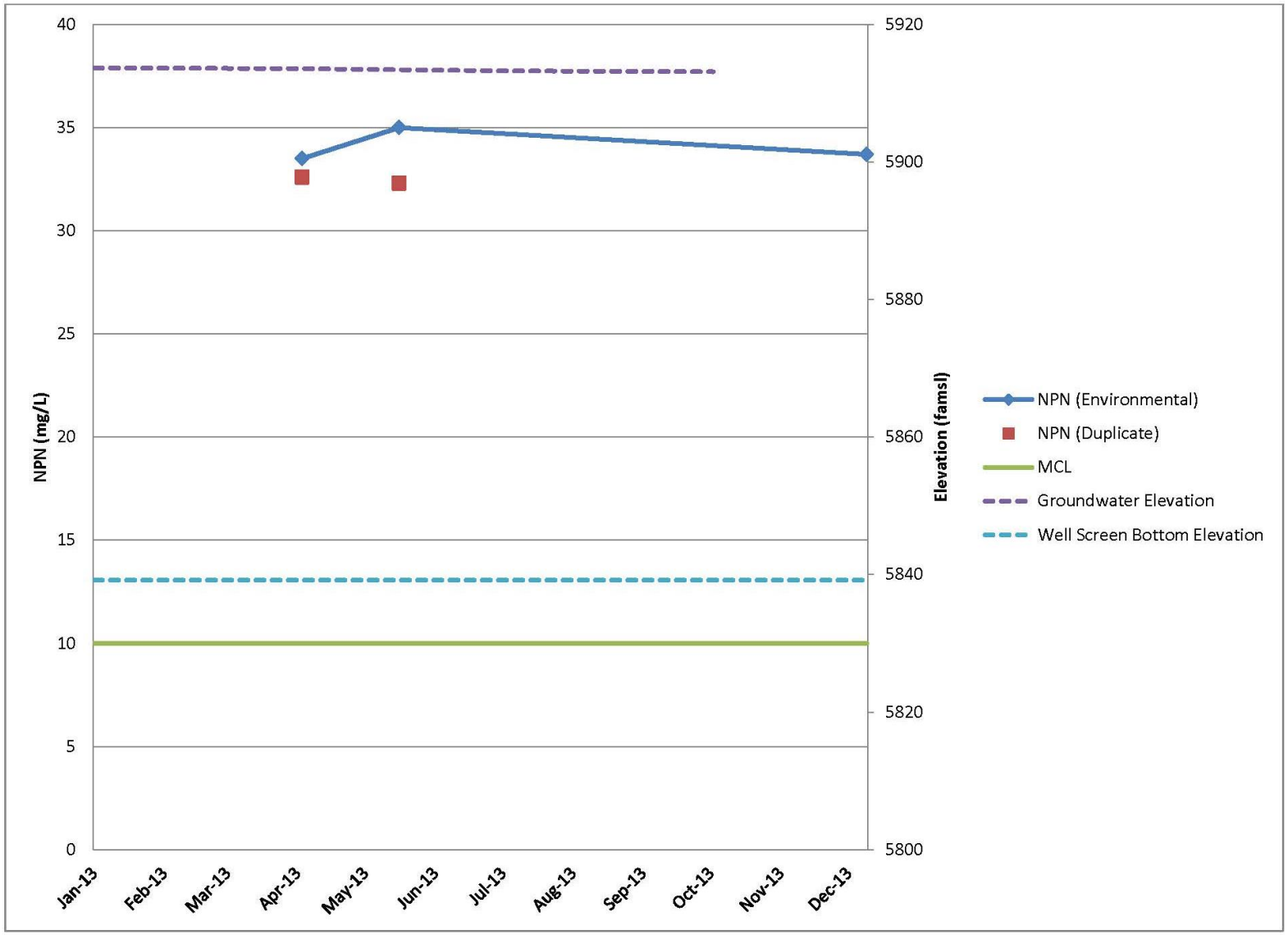


**Figure 7B-4. Nitrate plus Nitrite Concentrations, CYN-MW13**

# Attachment 7C
# Burn Site Groundwater
# Hydrographs

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# Attachment 7C Hydrographs


7C-1 BSG Study Area Wells (1 of 5) ..... 7C-5

7C-2 BSG Study Area Wells (2 of 5) ..... 7C-6

7C-3 BSG Study Area Wells (3 of 5) ..... 7C-7

7C-4 BSG Study Area Wells (4 of 5) ..... 7C-8

7C-5 BSG Study Area Wells (5 of 5) ..... 7C-9

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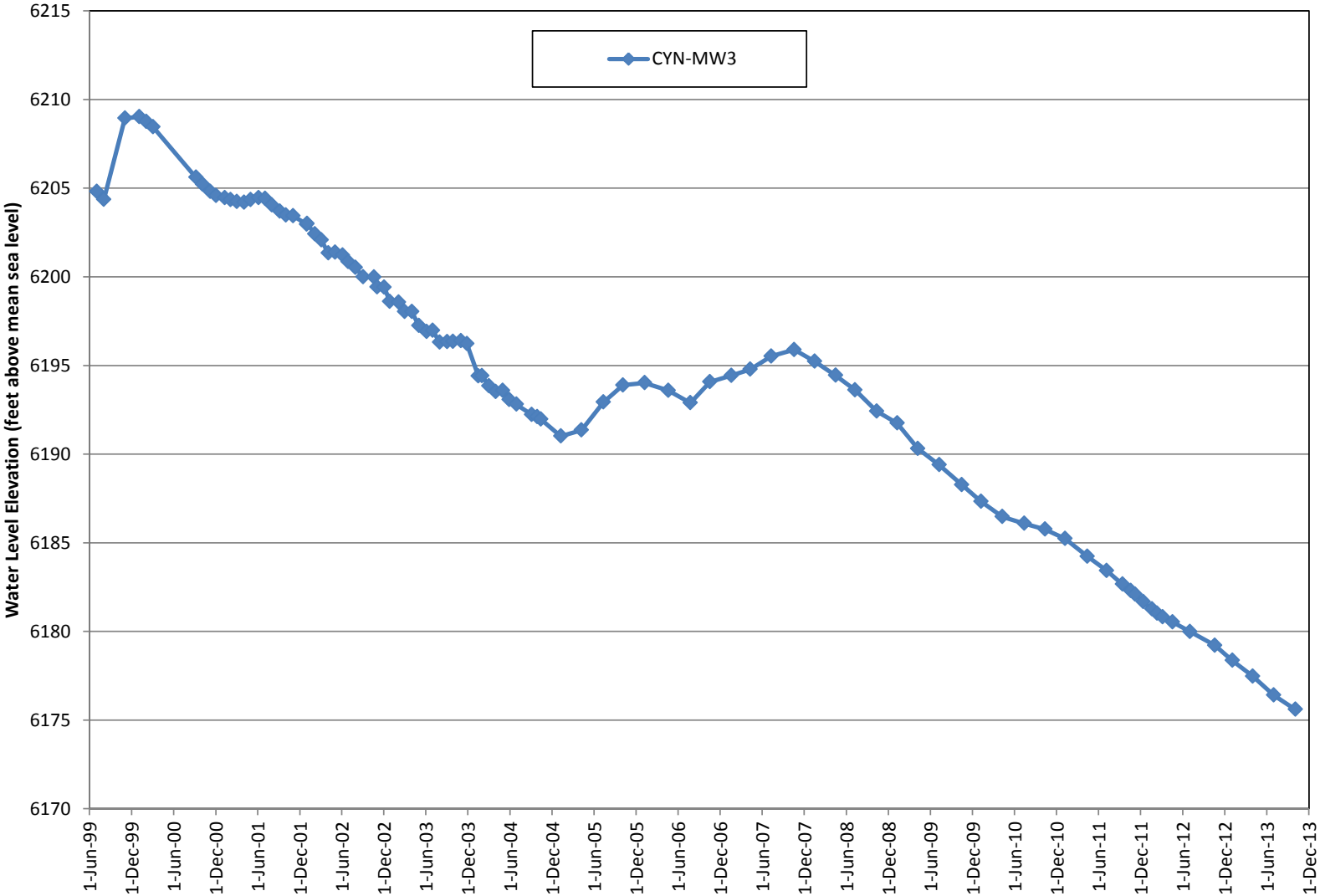


**Figure 7C-1. BSG Study Area Wells (1 of 5)**

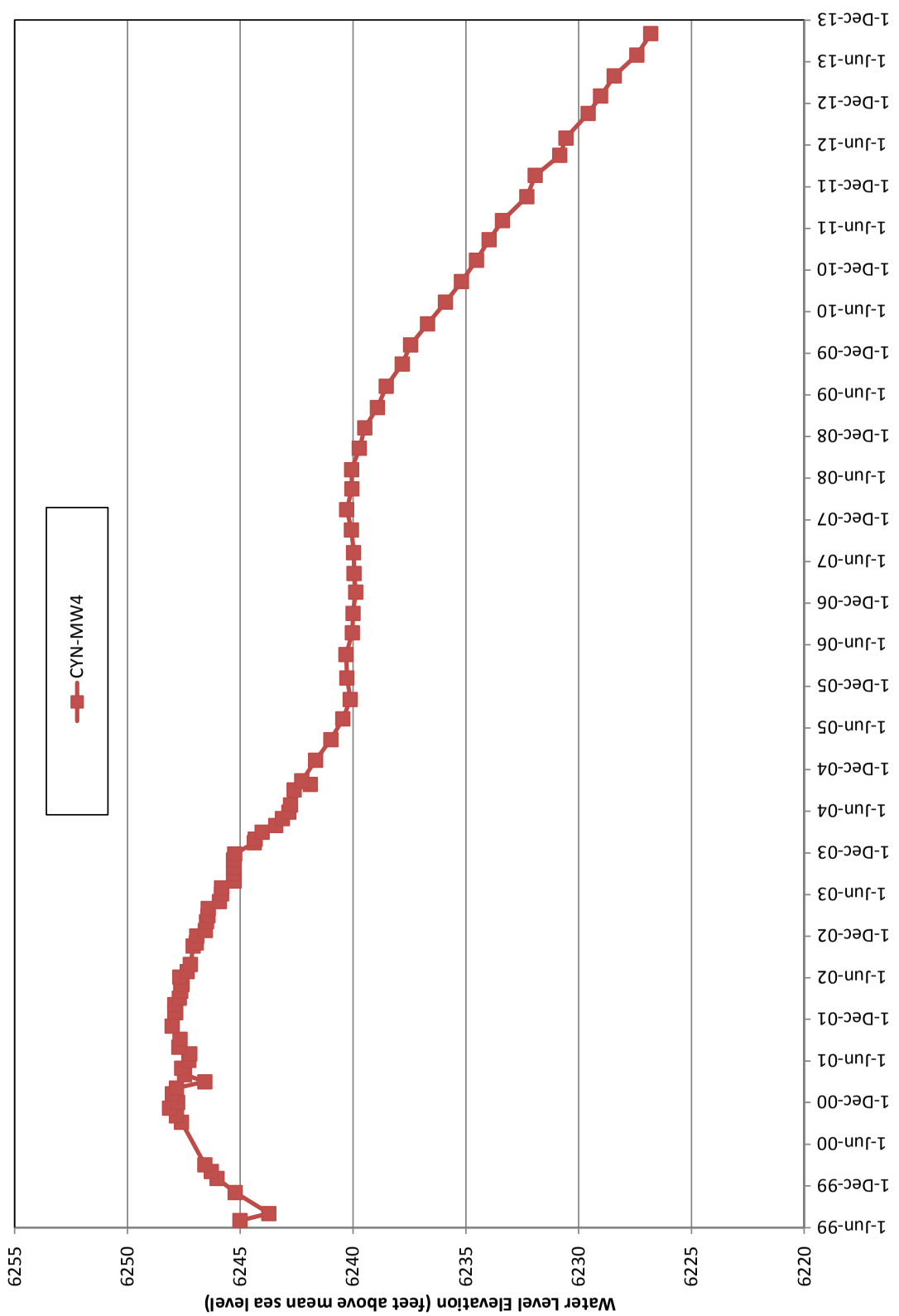


**Figure 7C-2. BSG Study Area Wells (2 of 5)**

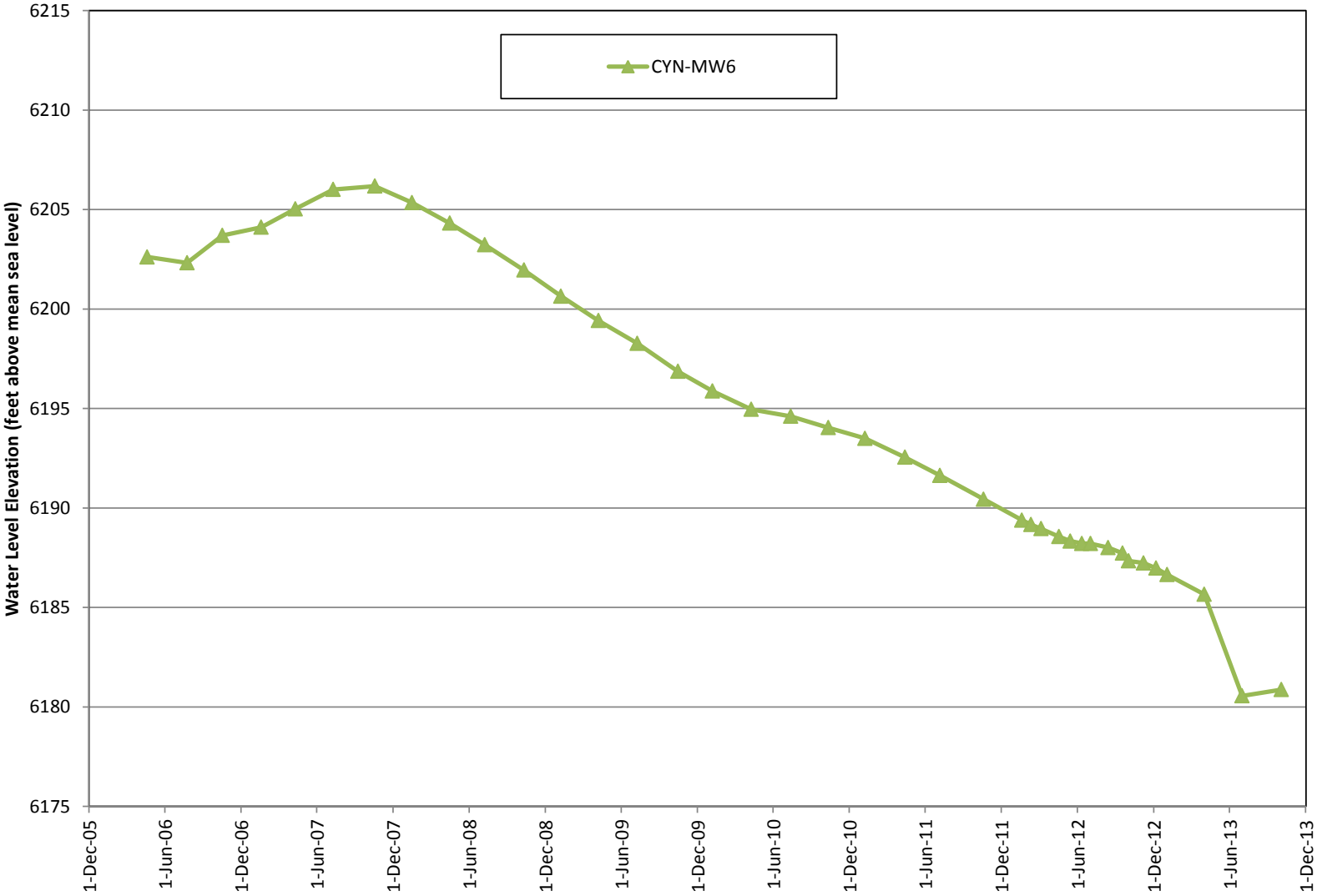


**Figure 7C-3. BSG Study Area Wells (3 of 5)**

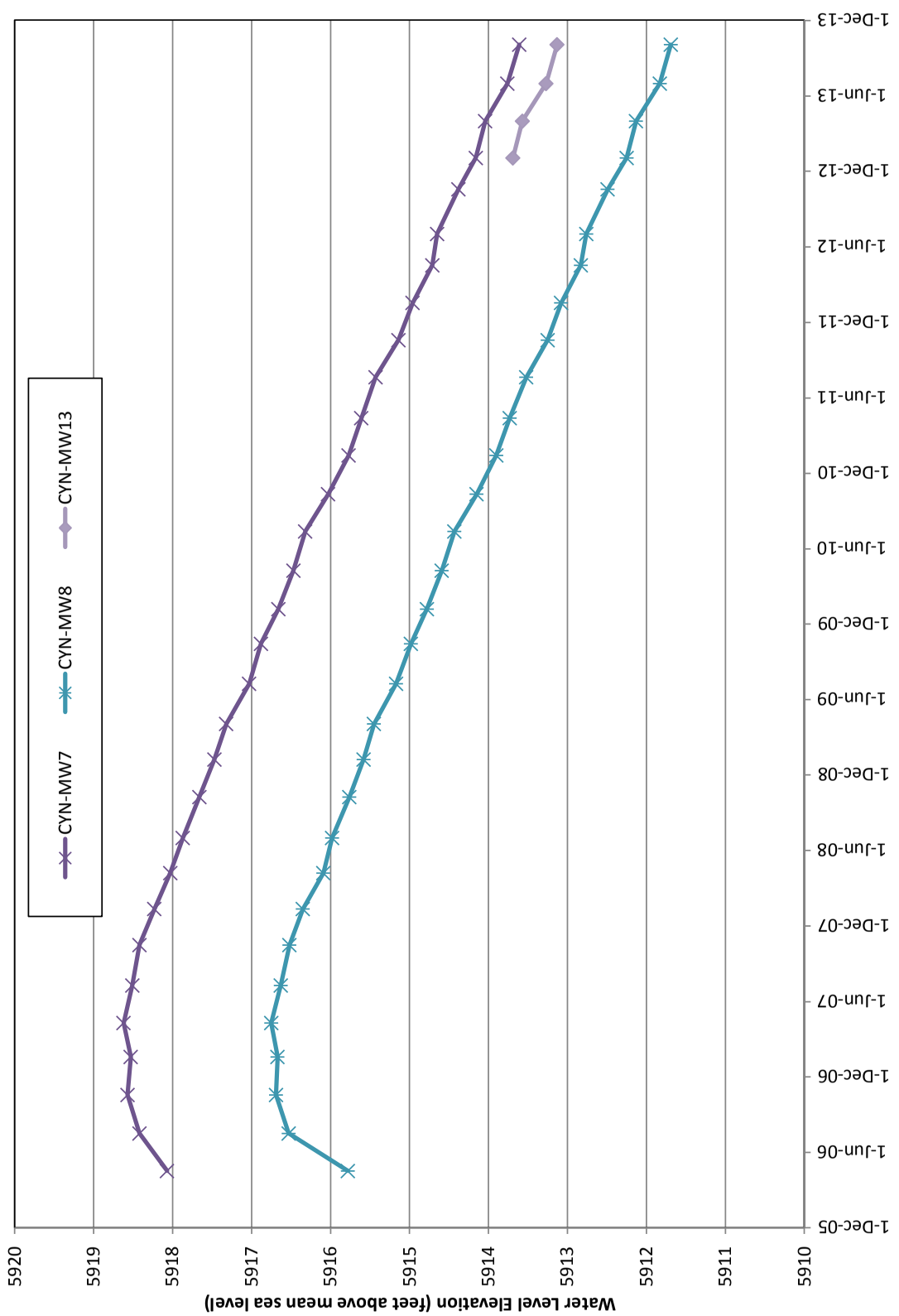


**Figure 7C-4. BSG Study Area Wells (4 of 5)**

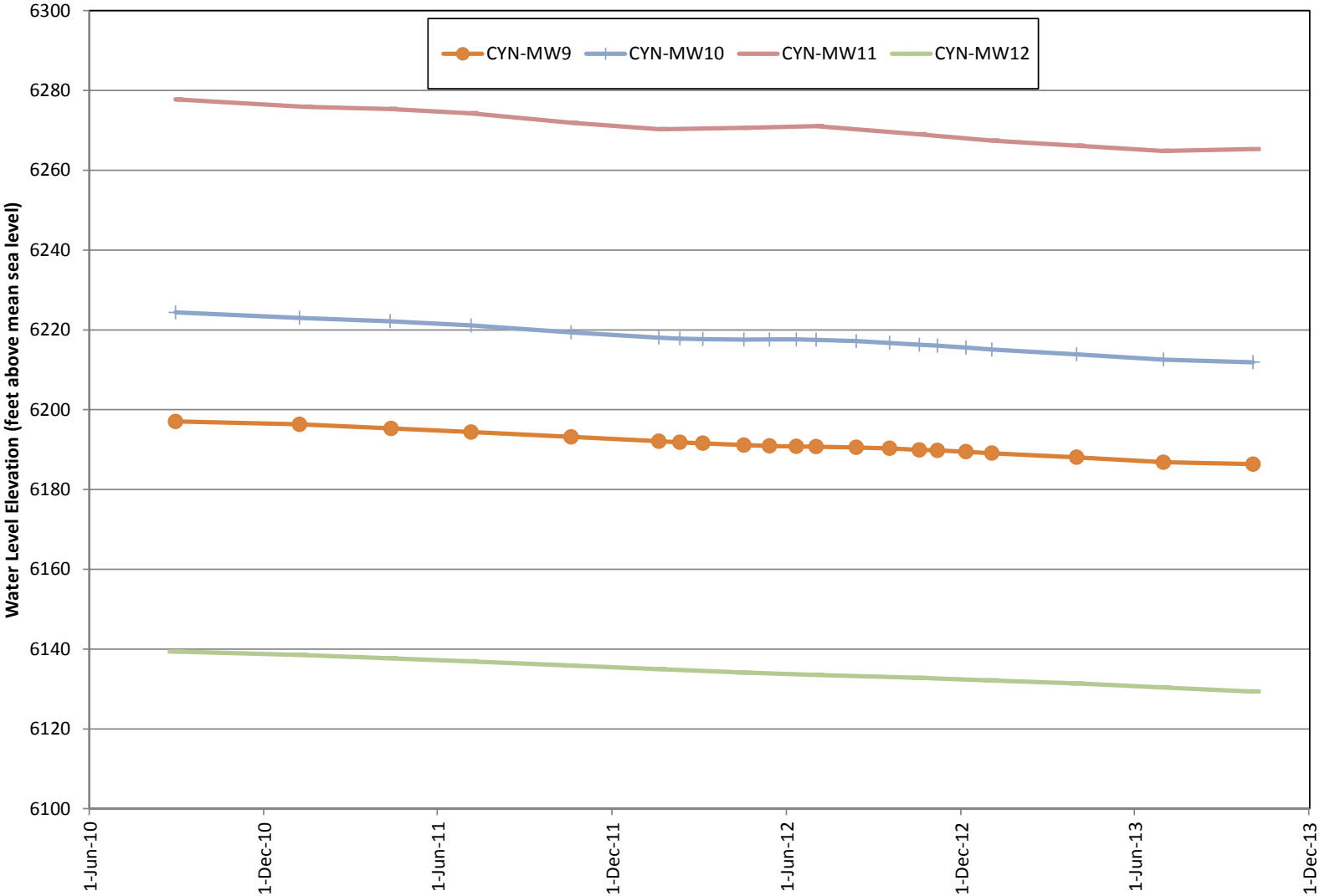


**Figure 7C-5. BSG Study Area Wells (5 of 5)**

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# 8.0 Solid Waste Management Units 8/58

## 8.1 Introduction

This chapter summarizes the Calendar Year (CY) 2013 quarterly groundwater sampling events for Coyote Canyon Blast Area (CCBA) monitoring wells CCBA-MW1 and CCBA-MW2, located within Solid Waste Management Units (SWMUs) 8/58 at Sandia National Laboratories, New Mexico (SNL/NM). The SNL/NM facility is a government-owned, contractor-operated, multi-program laboratory overseen by the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) through the Sandia Field Office in Albuquerque, New Mexico. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM under Contract DE-AC04-94AL85000.

Monitoring wells CCBA-MW1 and CCBA-MW2 were installed at SWMUs 8/58 in August 2011. In April 2012, NMED approved the SWMUs 8/58 well installation report (NMED April 2012). The installation and monitoring of these wells are designed to address the requirements of Section VII.D.6 of the Compliance Order on Consent (the Order) between the New Mexico Environment Department (NMED), DOE, and Sandia (NMED April 2004) and the NMED letter dated April 8, 2010, from the NMED Hazardous Waste Bureau requiring additional corrective action at SWMUs 8/58 (NMED April 2010).

Monitoring well CCBA-MW1 was sampled on January 16, 2013, April 24, 2013, July 16, 2013, and October 10, 2013. Monitoring well CCBA-MW2 was sampled on January 15, 2013, April 25, 2013, July 15, 2013, and October 14, 2013. The groundwater samples were collected in accordance with the NMED-approved Groundwater Characterization Work Plan (SNL September 2010) and Mini-Sampling and Analysis Plans (SAPs) (SNL December 2012, April 2013, June 2013, and September 2013a). The groundwater samples from each well were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), high explosive (HE) compounds, nitrate plus nitrite (NPN), major anions (i.e., bromide, chloride, fluoride, and sulfate), major cations (i.e., calcium, magnesium, potassium, and sodium), alkalinity, Target Analyte List (TAL) metals plus uranium, perchlorate, total cyanide, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium.

Analytical results for the CY 2013 groundwater samples were compared with the U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) for drinking water (EPA 2009). No constituents were detected above established MCLs, except for fluoride. Fluoride results from monitoring well CCBA-MW1 exceeded the established MCL of 4.0 milligrams per liter (mg/L) for all four quarters as shown in Table 8A-6 (Attachment 8A). Fluoride concentrations in samples from monitoring well CCBA-MW1 ranged from 4.57 to 5.00 mg/L.

The eighth and final quarter of required groundwater sampling (NMED April 2010) was conducted in July 2013. During CY 2014, quarterly groundwater sampling and reporting will continue for the SWMUs 8/58 groundwater monitoring wells CCBA-MW1 and CCBA-MW2 until NMED provides additional guidance.

### 8.1.1 Location

SWMUs 8/58 are located on Kirtland Air Force Base (KAFB) near the eastern boundary between U.S. Air Force land and the Withdrawn Area, a 22,500-acre area of the Cibola National Forest that has been withdrawn from the public domain for the exclusive use of KAFB and the DOE/NNSA (Figure 8-1). The sites are located north of Coyote Springs Road, approximately 2.7 miles east of the intersection of Coyote Springs and Lovelace Roads.

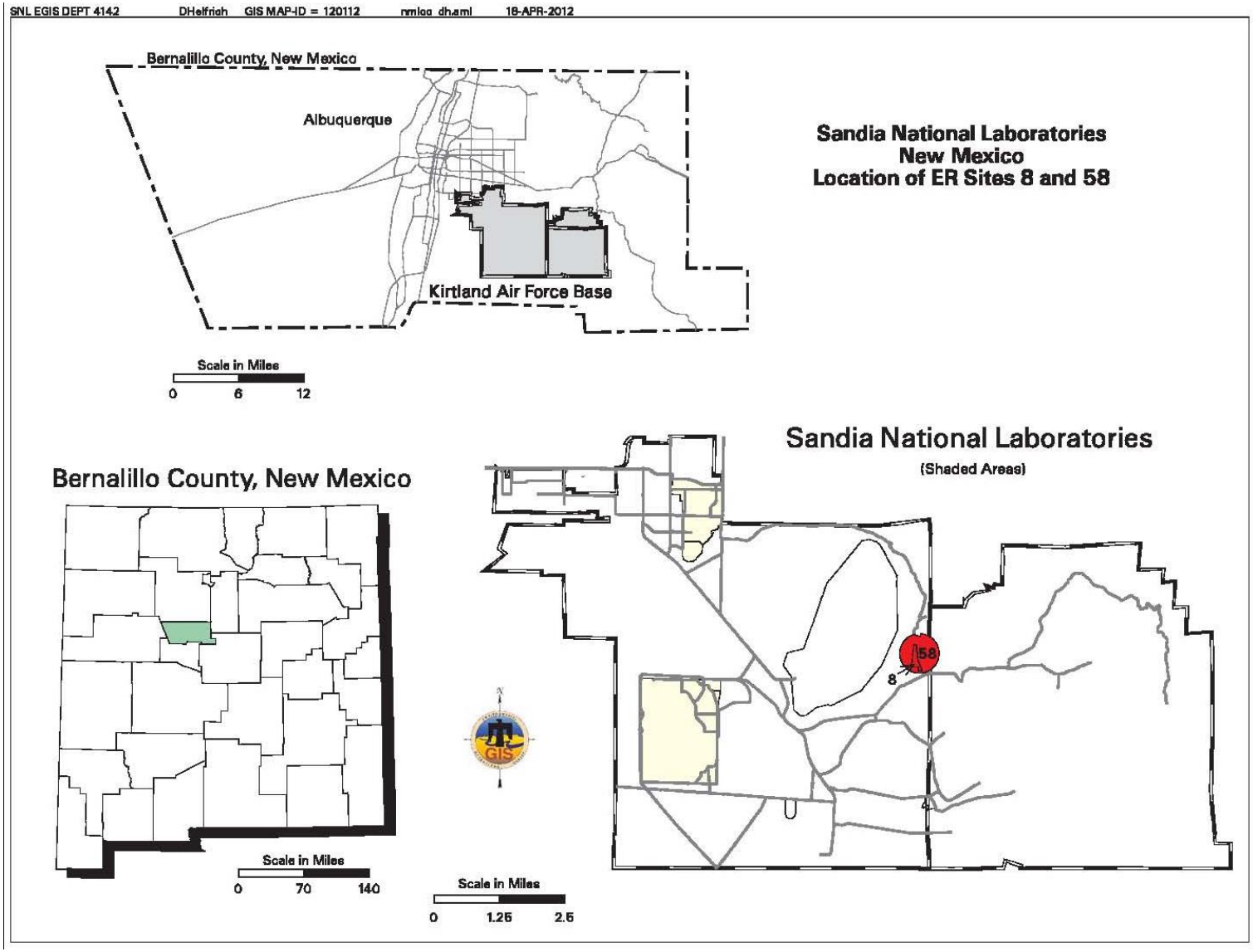


**Figure 8-1. Location of SWMUs 8/58**

SWMUs 8/58 are located in the Arroyo del Coyote watershed, which captures runoff from the western flank of the Manzanita Mountains. No surface water bodies are located at the site. The nearest surface water is Coyote Springs, a perennial spring located approximately 1,400 feet (ft) southwest of SWMU 58 in Arroyo del Coyote. Arroyo del Coyote intersects Tijeras Arroyo approximately 7 miles west of the two sites. Tijeras Arroyo eventually drains into the Rio Grande, approximately 16 miles west of the two sites (SNL September 2003).

SWMU 58 encompasses approximately 258 acres and is the site of the former CCBA where extensive explosive testing was conducted (Figure 8-2). A blast radius of 2,000 ft defines the boundary of SWMU 58. This boundary was based on the visual distribution of fragments (shrapnel) and the surrounding topography.

SWMU 8 is fully contained within the blast radius of SWMU 58 and consists of approximately 30 acres (Figure 8-2). A north-south road that bisects SWMU 58 provides access to the site. The boundaries of SWMU 8 are defined by this road to the east, by the end of debris and test fixtures to the north (approximately 3,200 ft north of Coyote Springs Road), by the base of the steep ridge to the west, and by the end of debris and test fixtures to the south. The majority of debris and test fixtures have been removed.

### 8.1.2 Site History

SWMUs 8/58 are interrelated by the types of tests conducted and their geographic locations. More than a hundred tests have occurred at SWMUs 8/58, and test debris and fixtures remain at numerous locations. Neither site is currently being used for test activities. From 1950 to the late 1960s, at various locations within SWMU 58, numerous SNL/NM research groups conducted tests involving at ground or aboveground explosive detonations (SNL June 1995). Earth penetration tests commenced after this time, but did not involve any hazardous materials. Other unknown tests were conducted at SWMU 58, which may have dispersed other materials onto the site.

Prior to the penetration tests, the primary materials dispersed were HE compound combustion by-products and associated testing materials (such as metals and radionuclides). Primary emissions from the combustion of explosives would have been gaseous and would have dissipated. However, chunks of partially combusted HE compounds were found on site. Solid residues may have been produced by explosives containing metals, such as barium from Baratol. Carbon tetrachloride was alleged to have been poured into the Underground Conduit System (UCS) to displace water before the tests were performed. Jet propellant fuel grade 4 was released to the ground during burn tests. Metals also were dispersed during some tests. Asbestos-containing material was found at various locations scattered throughout SWMUs 8/58. Gaseous argon was released during some experiments and readily dispersed into the atmosphere during the testing.

Debris from the SWMU 58 tests and possibly other off-site sources was disposed of at SWMU 8. Documented tests at SWMU 58 involved large quantities of bulk explosives, which were typically shipped in wooden crates. These wooden crates, along with scrap metals from the tests, comprised most of the solid waste found at SWMU 8.

SWMU 8 and portions of SWMU 58 are located within the Manzano Combat Range, an area where KAFB military training is periodically conducted. Most of the unexploded ordnance (e.g., spent ammunition and smoke cartridges) occasionally found on site results from this ongoing activity rather than past SNL/NM research activities.

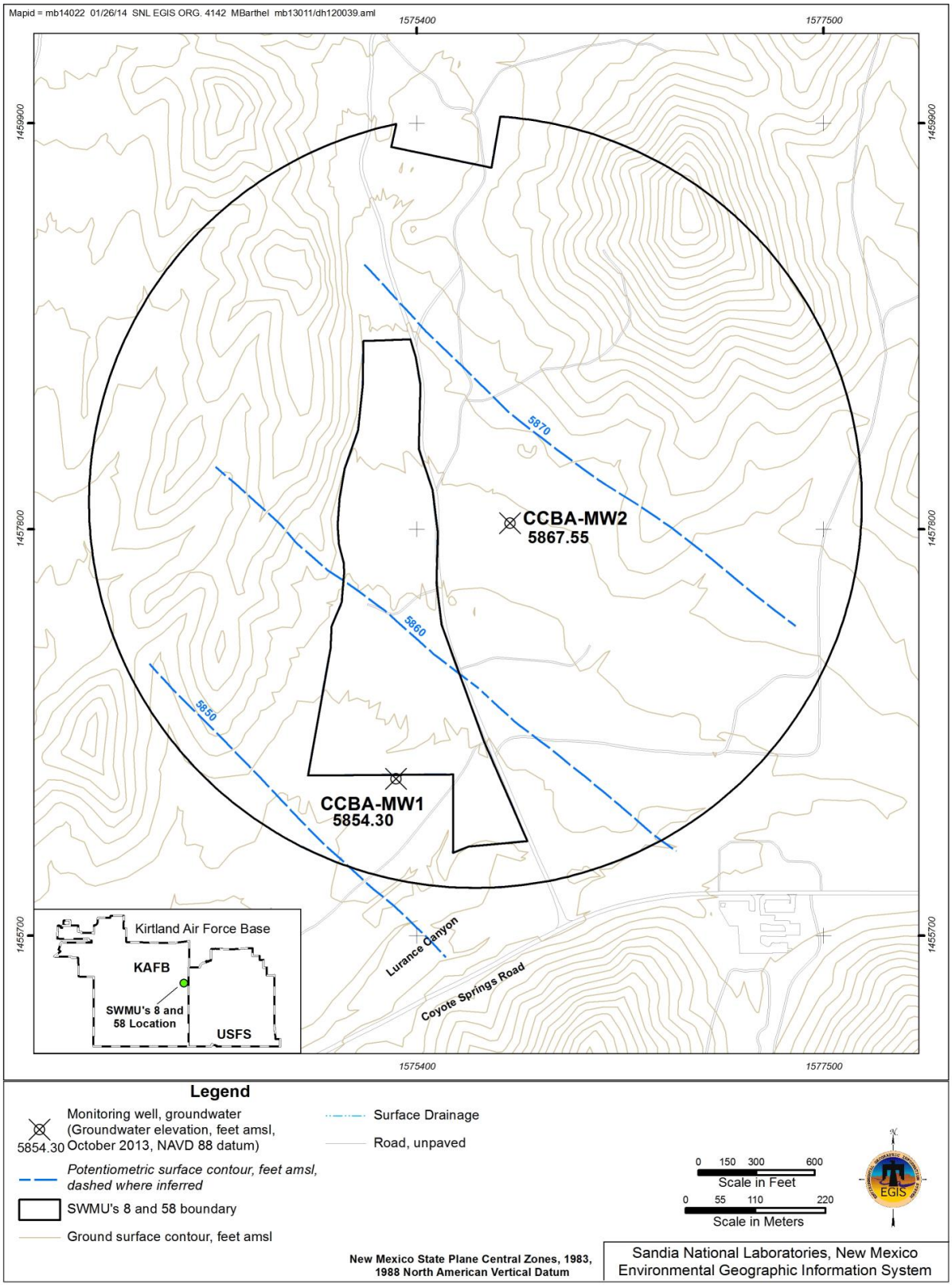


**Figure 8-2. Groundwater Monitoring Wells CCBA-MW1 and CCBA-MW2 Installed at SWMUs 8/58**

SWMU 58 originally contained two control bunkers, an instrument shelter, a three-sided earthen bunker with concrete inner walls clad with metal armor plate, numerous concrete pads and rubble, a UCS for running test wires, and numerous other test structures. Many of these features have been removed (SNL April 2005).

SWMU 8 primarily contained general refuse (e.g., cardboard, paper, wood) and demolition debris. All SWMU 8 debris was removed during a series of investigations and remedial activities conducted from 1996 to 2004, listed in Table 8-1 (SNL April 2005).

SWMUs 8/58 contain similar constituents of concern (COCs) consisting of HE compounds, metals (i.e., arsenic, barium, beryllium, lead, mercury, and nickel), VOCs, SVOCs, asbestos, petroleum fuels, and radionuclides (DOE September 1987).

### 8.1.3 Monitoring History

In 2011, SNL/NM personnel installed two groundwater monitoring wells at SWMUs 8/58 (SNL November 2011) as shown on Figure 8-2. These two new wells were sampled for the first time in October and November 2011 and were sampled for four quarters in CY 2013 as described in Section 8.1.

### 8.1.4 Current Monitoring Network

Currently two groundwater monitoring wells are installed at SWMUs 8/58 (Figure 8-2). Monitoring well CCBA-MW1 is located approximately 0.2 miles north of the ephemeral channel in Lurance Canyon and approximately 0.7 miles east of Coyote Springs. Lurance Canyon is the eastern extension of Arroyo del Coyote (Plate 1). Monitoring well CCBA-MW2 is located approximately 0.4 miles north of the ephemeral channel in Lurance Canyon and approximately 1 mile northeast of Coyote Springs.

Monitoring wells CCBA-MW1 and CCBA-MW2 are monitored quarterly for VOCs, SVOCs, HE compounds, NPN, major anions (i.e., bromide, chloride, fluoride, and sulfate), major cations (i.e., calcium, magnesium, potassium, and sodium), alkalinity, TAL metals plus uranium, perchlorate, total cyanide, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium.

### 8.1.5 Summary of Calendar Year 2013 Activities

The following activities occurred for SWMUs 8/58 during CY 2013:

- Quarterly groundwater sampling was conducted at monitoring wells CCBA-MW1 and CCBA-MW2 in January, April, July, and October 2013 (SNL July 2013, October 2013, January 2014, and September 2013b).
- Quarterly reporting of analytical results from monitoring wells CCBA-MW1 and CCBA-MW2 was conducted.
- Tables of analytical results (Attachment 8A), concentration versus time plots (Attachment 8B), and hydrographs (Attachment 8C) were prepared.

## Table 8-1. Historical Timeline of SWMUs 8/58

| Month | Year | Event | Reference |
|---|---|---|---|
| | 1950-1960's | More than 100 tests were performed at SWMUs 8/58. | DOE September 1987 |
| | 1987 | Identified as potential SWMUs in Comprehensive Environmental Assessment and Response Program Investigation due to the extensive testing done in these areas. | DOE September 1987 |
| February | 1992 | Boundaries for the Radioactive Material Management Areas at SWMUs 8/58 are delineated. | SNL February 1992 |
| October | 1993 | KAFB EOD conducted a visual UXO/HE survey of military debris. Material related to military training exercises was identified and removed. | Young and Byrd 1994 |
| October | 1993 | RUST Geotech conducted surface gamma radiation survey across both sites. Point and area anomalies were detected and identified and removed during the 1995 VCM. | RUST Geotech, Inc. 1994 |
| | 1994 | Sensitive species survey was conducted. Three sensitive species were identified for SWMU 58 (including SWMU 8). Since the survey, the three species have been removed from the New Mexico endangered plant species list and are no longer considered sensitive. | NMFRCD August 1995 |
| | 1994 | Cultural Resources survey conducted seven discrete cultural resource areas were identified. | SNL February 1995a |
| | 1994-2004 | VCM and VCA conducted from 1994 until 2004 to remove surface and buried contaminated soil and wastes. Housekeeping activities conducted during same time to remove debris such as concrete, wood, metal, and shrapnel. | SNL April 1994<br>SNL February 1995b<br>SNL August 1998<br>SNL October 2000<br>SNL January 2004 |
| | 1995-2004 | RFI sampling activities conducted at SWMUs 8/58 to characterize the sites. | SNL August 1996<br>SNL November 1998 |
| | 1996-2004 | UXO/HE visual surface surveys were conducted by SNL/NM personnel. Material identified was subsequently removed by KAFB EOD personnel. | SNL September 1994 |
| February | 1996 | Housekeeping activities for removal of surface debris in preparation for soil sampling during the RFI activities. | SNL May 1997 |
| March | 1997 | Soil sampling at Burn Test feature and contingency borehole sampling at feature 58OO. | SNL April 2005 |
| February | 1998 | Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report (SNL/NM December 1995) containing description of SWMUs 8 and 58 hydrogeology submitted to NMED. | SNL February 1998 |
| October | 1998 | Radiological survey of UCS conducted. | SNL April 2005 |
| November | 1998 | SAP submitted for collecting additional RFI soil samples at SWMUs 8/58. | SNL November 1998 |
| August | 1999 | SAP submitted to NMED for Feature 58FF. | SNL August 1999 |
| February | 2000 | Meeting with NMED to discuss cleanup levels for lead at SWMU 8. It was proposed that the cleanup level for lead should be 750 mg/kg at surface and subsurface soil. | Olson and Moats 2000 |
| October | 2000 | Prepare VCA plan for UCS at SWMU 58. | SNL October 2000 |
| October | 2000 | Debris removal from UCS; radiological survey conducted. | SNL December 2000 |
| January | 2004 | VCA plan submitted to NMED. Plan is to remove remaining debris and metal-contaminated (mainly lead) surface and subsurface soil at various features at SWMU 8. | SNL January 2004 |
| April | 2005 | CAC Proposal for SWMUs 8/58 submitted to NMED. DOE/NNSA and Sandia requests a determination of CAC without controls for SWMUs 8/58 as a whole. | SNL April 2005 |

**Table 8-1. Historical Timeline of SWMUs 8/58** *(Continued)*

| Month | Year | Event | Reference |
|---|---|---|---|
| June | 2005 | SWMU 8 is designated as "CAC without controls" from NMED. NMED also issues an RSI for seven features of SWMU 58. Additional sampling and analysis is requested for these features to characterize the depth and lateral extent of contamination. | NMED June 2005 |
| June | 2005 | Response to RSI submitted. Additional sampling will take place at the features under discussion. A SAP is included as an appendix to the response. | SNL June 2005 |
| September | 2005 | NMED states the additional sampling is adequate to complete the CAC proposal pending the outcome of the sampling results. Additional field sampling begins. | NMED September 2005 |
| March | 2006 | The first supplemental response and proposal for CAC for SWMUs 8/58 submitted. The new sampling analysis reveals no COCs present at levels considered hazardous to human health. DOE/NNSA and Sandia requests CAC without controls for SWMUs 8/58. | SNL March 2006 |
| June | 2006 | NMED RSI states that elevated levels of lead and nickel at Feature 58FF were not sufficiently defined horizontally or vertically, therefore, additional sampling is needed. | NMED June 2006 |
| August | 2006 | A SAP is submitted to NMED outlining additional sampling to be completed at Feature 58FF. Boreholes will be drilled and sampled for lead and nickel only. | SNL August 2006 |
| September | 2006 | Lead and nickel samples collected from five boreholes at Feature 58FF. | SNL January 2007 |
| October | 2006 | NMED officially approves the SAP for Fall 2006 sampling (after the sampling has already been completed). | NMED October 2006 |
| January | 2007 | A second supplemental response and proposal for CAC submitted to NMED for SWMUs 8/58. The September 2006 sampling for lead and nickel reveals no COCs present at levels considered hazardous to human health. DOE/NNSA again requests CAC without controls for SWMUs 8/58. | SNL January 2007 |
| June | 2007 | NMED approves the second RSI response and issues a Certificate of Completion for CAC with Controls for SWMUs 8/58. | NMED June 2007 |
| January | 2008 | Justification for Class III Permit Modification SWMUs 8/58, Volumes 1 through 4. Includes CAC Proposal (Volumes 1–3) and RSI and Notice of Disapproval (Volume 4). | SNL January 2008 |
| June | 2009 | NMED Comments that Influence Out year Planning for the ER Project. E-mail documenting important comments from a meeting with NMED including the decision to remove SWMUs 8/58 from the CAC process. | SNL June 2009 |
| April | 2010 | Letter from NMED formally stating that additional corrective action is needed at SWMUs 8/58, and the specific requirements for what the additional corrective action should entail. | NMED April 2010 |
| September | 2010 | Groundwater Characterization Work Plan for SWMUs 8/58 submitted to NMED (in response to April 8, 2010 letter). | SNL September 2010 |
| January | 2011 | NMED approves SWMUs 8/58 Groundwater Characterization Work Plan. | NMED January 2011 |

**Table 8-1. Historical Timeline of SWMUs 8/58** *(Concluded)*

| Month | Year | Event | Reference |
|---|---|---|---|
| May | 2011 | Letter proposing Groundwater Monitoring Well Location Adjustment for SWMUs 8/58 submitted to NMED. | SNL May 2011a |
| June | 2011 | NMED approves SWMUs 8/58 Proposed Groundwater Monitoring Well Location Adjustment. | NMED June 2011 |
| June | 2011 | Request for Extension to Complete the Final Well Installation Report for five Groundwater Monitoring Wells at SWMUs 8/58. | SNL June 2011 |
| August | 2011 | Monitoring wells CCBA-MW1 and CCBA-MW2 are installed. | SNL November 2011 |
| August | 2011 | NMED approves the Request for Extension to Complete Well Installation Report for Groundwater Monitoring Wells at SWMUs 8/58. | NMED August 2011 |
| October/ November | 2011 | First quarterly sampling event conducted for monitoring wells CCBA-MW1 and CCBA-MW2. | SNL September 2012 |
| November | 2011 | Groundwater Monitoring Well Installation Report for SWMUs 8/58 submitted. | SNL November 2011 |
| January | 2012 | Slug tests performed on monitoring wells CCBA-MW1 and CCBA-MW2 | SNL June 2012 |
| April | 2012 | NMED approved the Well Installation Report for SWMUs 8/58 and SWMU 68 | NMED April 2012 |
| June | 2012 | Hydraulic conductivity calculated for monitoring wells CCBA-MW1 and CCBA-MW2. | SNL June 2012 |
| July | 2013 | The eighth and final sampling event required by NMED for monitoring wells CCBA-MW1 and CCBA-MW2 was completed. | SNL June 2013 |

**NOTES:**
CAC = Corrective Action Complete.
CCBA = Coyote Canyon Blast Area.
COC = Constituent of concern.
DOE = U.S. Department of Energy.
EOD = Explosive Ordnance Disposal.
ER = Environmental Restoration.
HE = High explosive.
KAFB = Kirtland Air Force Base.
mg/kg = Milligrams per kilogram.
MW = Monitoring well.
NMED = New Mexico Environment Department.
NMFRCD = New Mexico Forestry and Resources Conservation Division.
NNSA = National Nuclear Security Administration.
RCRA = Resource Conservation and Recovery Act.
RFI = RCRA Facility Investigation.
RSI = Request for Supplemental Information.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories
SNL/NM = Sandia National Laboratories, New Mexico.
SWMU = Solid Waste Management Unit.
UCS = Underground Conduit System.
UXO = Unexploded ordnance.
VCA = Voluntary Corrective Action.
VCM = Voluntary Corrective Measure.

### 8.1.6 Summary of Future Activities

The following activities are anticipated for SWMUs 8/58 during CY 2014:

- Quarterly groundwater sampling will be conducted at monitoring wells CCBA-MW1 and CCBA-MW2 will continue in CY 2014 unless additional guidance is provided by NMED.

- Quarterly reporting of results for chemical analyses for monitoring wells CCBA-MW1 and CCBA-MW2 groundwater samples will be performed.

### 8.1.7 Current Conceptual Model

This section presents a comprehensive discussion of the hydrogeologic regime, conceptual site model, and contaminant findings for SWMUs 8/58.

#### 8.1.7.1 Regional Hydrogeologic Conditions

SWMUs 8/58 are located in the Arroyo del Coyote watershed that captures runoff from the western flank of the Manzanita Mountains. The elevation at SWMUs 8/58 ranges from approximately 5,880 to 6,280 ft above mean sea level (amsl). SWMU 8 and the central portion of SWMU 58 are generally flat with a moderate slope to the south-southwest towards the ephemeral channel of Lurance Canyon. SWMU 58 is bordered on the northwest and northeast by ridges. No surface water bodies are located at either site. A small arroyo runs from the north to the south through the western portion of the sites and is a tributary of Arroyo del Coyote. Both arroyos are dry except during and immediately following significant thunderstorms. The sites are sparsely vegetated by bunch grasses, cacti, junipers, and pine trees.

Alluvium fills the canyon floor and a veneer of weathered bedrock (colluvium) covers the surrounding slopes. Where present, soil types across the two sites consist of Gila sandy loam, the Tesajo-Millet gravelly loam, and the Salas Complex (clayey to gravelly loam) (SNL December 1995). The soil is poorly developed. The central portion of SWMUs 8/58 is covered with alluvium derived from the surrounding outcrops of Precambrian units (i.e., quartzite, greenstone, metarhyolite, and granite) and from Paleozoic sedimentary units (i.e., limestone, sandstone, and conglomerate). A thin veneer of colluvium covers the steeper slopes that surround the western and northern portions of SWMU 58.

The depth to bedrock is variable across the sites. The northern portion of SWMU 58 is underlain by Precambrian granite (SNL December 1995). Subsurface bedrock beneath the central and southern portions of SWMUs 8/58 consists of Precambrian quartzite. Fractured and moderately dipping quartzite is exposed on the steep hillside south of the sites (Karlstrom et al. April 2000).

The regional potentiometric surface map (Plate 1) shows that groundwater flow is generally toward the west in the vicinity of SWMUs 8/58. Topographic features and faults modify the flow direction at various locations. Faults to the west of the sites may serve as hydraulic barriers or conduits depending on the type and amount of fault gouge.

#### 8.1.7.2 Hydrogeologic Conditions at SWMUs 8/58

The amount of precipitation available for groundwater recharge is minimal due to scant rainfall and high evapotranspiration rates. Summer (monsoonal) thunderstorms are responsible for the majority of rainfall. The average rainfall, as measured at the nearest active rain gauge (the National Weather Service station at the Albuquerque International Sunport) during the period from 1915 through 2005 was 8.67 inches per year (in/yr) (WRCC-DRI 2012). The station is located 8.7 miles northwest of SWMUs 8/58 at an elevation of 5,310 ft amsl. By extrapolation of the precipitation model presented in SNL/NM conceptual model of groundwater flow and contaminant transport at the canyon area (SNL May 2004), the average annual precipitation for SWMUs 8/58, where the elevation averages approximately 6,000 ft amsl, is

estimated to be approximately 11.5 in/yr. Intense sunlight and low humidity throughout much of the year creates high rates of evapotranspiration. Estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL February 1998).

Monitoring wells CCBA-MW1 and CCBA-MW2 were installed by the air-rotary casing hammer drilling method at SWMUs 8/58 in August 2011. Monitoring well CCBA-MW1 is located at the southwestern edge of SWMU 8 and approximately 0.2 miles north of the ephemeral channel in Lurance Canyon (Figure 8-2). Monitoring well CCBA-MW2 is located near the center of SWMU 58 and approximately 1,446 ft northeast of monitoring well CCBA-MW1.

At monitoring well CCBA-MW1 borehole, Quaternary alluvium comprised mostly of poorly sorted sands and gravels was encountered from the ground surface to a depth of approximately 70 ft below ground surface (bgs). Saturated alluvium was encountered at 62 ft bgs, but the quantity of water produced was low. From approximately 65 to 70 ft bgs, the sand and gravel contained a significant amount of cobbles. Quartzite bedrock was encountered at a depth of approximately 70 ft bgs. A significant amount of borehole sloughing resulted in erratic returns of drill cuttings. The borehole was advanced to a total depth of 90 ft bgs to accommodate the 20-foot long well screen required by NMED, a 5-ft long sump, and additional rathole to deal with the severe borehole sloughing problem. Approximately 8 ft of saturated alluvium was encountered.

The well is screened across the water table from 60 to 80 ft bgs (Table 8-2). After installation, the water level in the well rose to 45 ft bgs, which indicates that the borehole most likely intercepted a saturated bedrock fracture zone with a positive pressure head. The uppermost saturated fracture is inferred to have been encountered at a depth of approximately 75 ft bgs in fractured quartzite, which produced a greater volume of water than the alluvium.

An unusually large volume of sand pack was required for building monitoring well CCBA-MW1. A total of 118 bags of sand were used to fill the annulus from the bottom of the sump to the required height above the screen. A monitoring well of similar design would typically require approximately 25 bags of sand. The large annular volume for monitoring well CCBA-MW1 indicates that a borehole with a much larger than normal diameter was created during the drilling process due to the significant amount of borehole sloughing. The large sand pack was considered when the slug tests were interpreted.

At monitoring well CCBA-MW2, dry alluvium consisting of poorly sorted sand and gravel was encountered from the ground surface to a depth of 30 ft bgs. Precambrian granite and gneiss were penetrated from 30 ft bgs to the borehole total depth of 123 ft bgs. The uppermost saturated fracture was encountered at a depth of 100 ft bgs, and the well was screened in fractured bedrock from 98 to 118 ft bgs. Competent bedrock was encountered from 30 ft bgs to the total depth of 123 ft bgs; borehole sloughing did not affect well construction.

Figure 8-3 depicts the potentiometric surface for SWMUs 8/58. The apparent hydraulic gradient between the two monitoring wells (CCBA-MW1 and CCBA-MW2) is steep. The potentiometric surface elevation in monitoring well CCBA-MW2 was 13.57 ft higher than it was in monitoring well CCBA-MW1 in October 2011. The distance between the wells is 1,446 ft. The resulting gradient between the two wells was therefore approximately 0.01 feet per foot to the southwest. The potentiometric surface map is based on the assumptions that the two wells are screened in the same fractured bedrock zone and are hydraulically connected; the fractured bedrock system is isotropic (the series of fractures is uniformly distributed and interconnected); and the contribution of water from the saturated alluvium at monitoring well CCBA-MW1 is negligible.

**Table 8-2. Lithologic and Hydrogeologic Elevation Data for Monitoring Wells at SWMUs 8/58**

| Monitoring Well | Ground Surface Elevation (ft amsl) | Depth to Bedrock (ft bgs) | Depth to Uppermost Saturated Fracture (ft bgs[a]) | Elevation of Uppermost Saturated Fracture (ft amsl) | Depth of Screened Interval (ft bgs) | Potentiometric Surface, October 2012 (ft amsl) | Mid-Point Screen Elevation (ft amsl) | Approximate Pressure Head (ft[b]) | Completion Zone |
|---|---|---|---|---|---|---|---|---|---|
| CCBA-MW1 | 5899.89 | 70 | 75 | 5,825 | 60 - 80 | 5,854.15 | 5829.90 | 24 | Alluvium and quartzite |
| CCBA-MW2 | 5936.95 | 30 | 100 | 5,837 | 98 - 118 | 5,867.72 | 5829.00 | 39 | Granite and gneiss |

**NOTES:**
[a]Observed during drilling.
[b]From mid-point of screen.
amsl = Above mean sea level.
bgs = Below ground surface.
CCBA = Coyote Canyon Blast Area.
ft = Foot (feet).
MW = Monitoring Well.
SWMU = Solid Waste Management Unit.

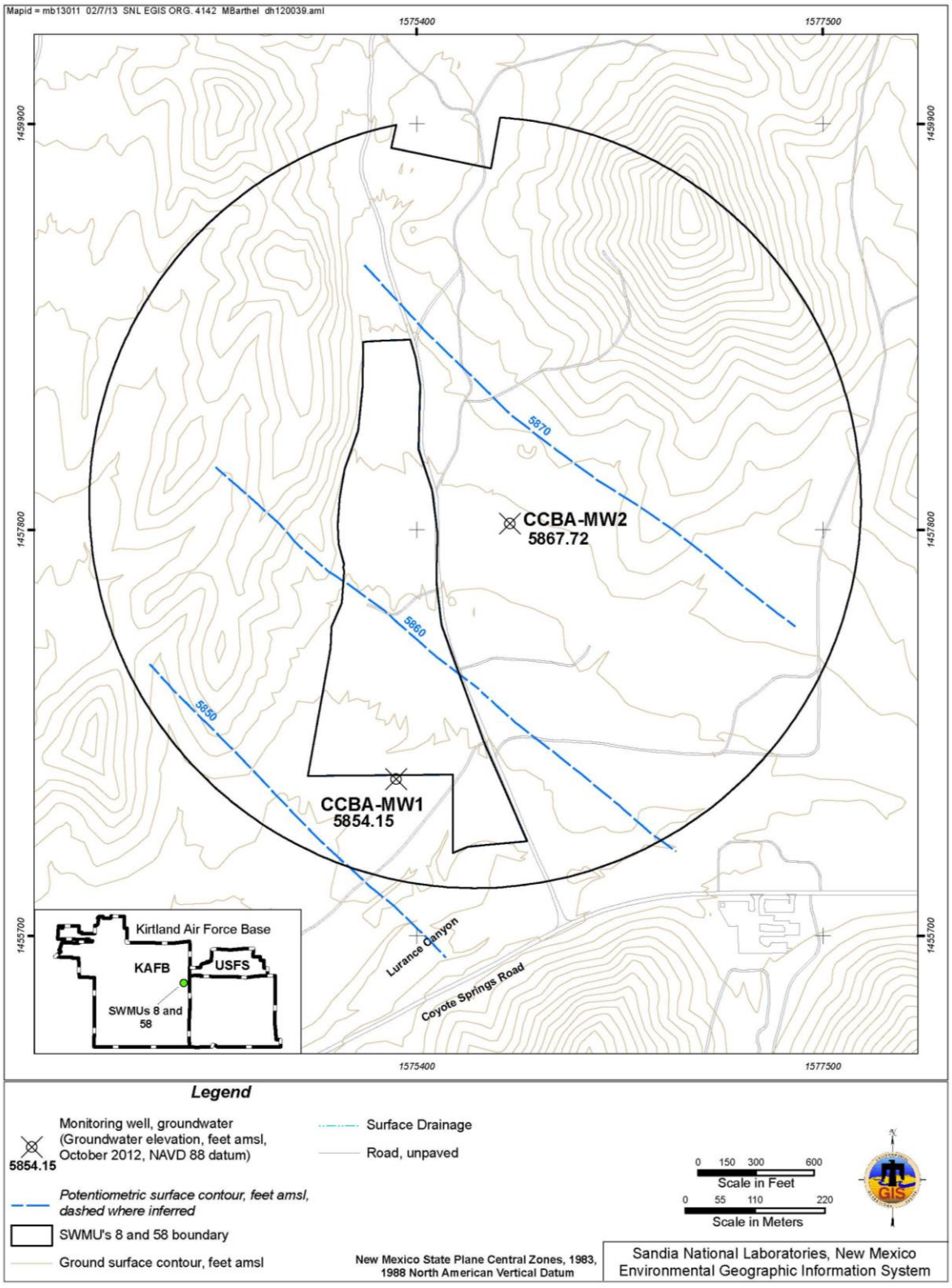


**Figure 8-3. SWMUs 8/58 Potentiometric Surface Map**

Groundwater in the fractured bedrock system is inferred to flow to the southwest. However, if the fractured bedrock system was anisotropic, groundwater would tend to follow the orientation of the fractures and not necessarily migrate normal to the potentiometric surface contours. The potentiometric surfaces represented by the groundwater elevations measured in both wells are above the top of each screen. This indicates that the groundwater in the saturated bedrock fractures is under semiconfined or confined conditions at both wells.

Geochemical analyses of major cations and anions are depicted on the Piper trilinear diagram shown on Figure 8-4. The groundwater composition for both wells is of the bicarbonate type dominated by calcium. The geochemical signatures from CY 2013 are consistent with CY 2012 results (Figure 8-4; SNL September 2013b) and show two separate groupings for monitoring wells CCBA-MW1 and CCBA-MW2. In contrast, results from CY 2011 indicated that mixing of groundwater sources was occurring (Figure 8-4; SNL September 2012).

During sampling, the drawdown in both wells was not excessive. The quantity of water produced by each well was clearly adequate for typical groundwater sampling. Groundwater samples were collected using pneumatic (nitrogen gas) Bennett™ piston pumps. Slug tests were performed on monitoring wells CCBA-MW1 and CCBA-MW2 in January 2012. Calculated hydraulic conductivity values for monitoring well CCBA-MW1 vary from $4.19 \times 10^{-05}$ to $8.13 \times 10^{-04}$ feet per minute (ft/min) and for monitoring well CCBA-MW2 from $3.49 \times 10^{-03}$ to $4.28 \times 10^{-03}$ ft/min (SNL June 2012). It should be noted that the slug test analyses were developed for use in unconsolidated deposits and analyses of bedrock aquifers is dominated by fracture flow. The results for monitoring wells CCBA-MW1 and CCBA-MW2 are within the range of conductivities ($1.0 \times 10^{-05}$ to $1.0 \times 10^{-02}$ ft/min) determined for the regional aquifer within the unconsolidated Santa Fe Group sediments west of SWMUs 8/58 and SWMU 68 (SNL March 1999). This qualitatively suggests that fracture flow at SWMUs 8/58 wells is capable of moving significant amounts of groundwater.

#### 8.1.7.3 Conceptual Site Model for SWMUs 8/58

The conceptual site model for SWMUs 8/58 is based on the findings from two on-site monitoring wells (CCBA-MW1 and CCBA-MW2), several nearby monitoring wells located upgradient and downgradient of the site in Lurance Canyon (Plate 1), and extensive field mapping conducted by the Site-Wide Hydrogeologic Characterization Project (GRAM and Lettis 1995). Lurance Canyon is deeply incised into Paleozoic and Precambrian bedrock and drains westward toward Arroyo del Coyote. No perennial surface water bodies are located at the site. Coyote Springs is located approximately 0.25 miles to the west and downslope of the site.

Groundwater in the area of SWMUs 8/58 predominantly occurs in a fractured bedrock system under semiconfined or confined conditions. Drilling indicates that the depth to groundwater in the fractured Precambrian quartzite and granite is approximately 75 to 100 ft bgs across the site and is dependent on the depth to the uppermost water-bearing fracture. A minor amount of groundwater was encountered in alluvium at 62 ft bgs during the drilling for monitoring well CCBA-MW1.

The geochemical signature is of the bicarbonate type dominated by calcium. The overlying bedrock with naturally filled fractures probably serves as the confining layer. Groundwater flows to the southwest. The hydraulic gradient in the fractured bedrock system is approximately 0.01 feet per foot. Groundwater underflow from the site probably discharges to the unconsolidated basin fill deposits (primarily the Santa Fe Group) of the Albuquerque Basin after crossing the Sandia Fault and the Tijeras Fault. No potable water supply wells are located within 4 miles of the site.

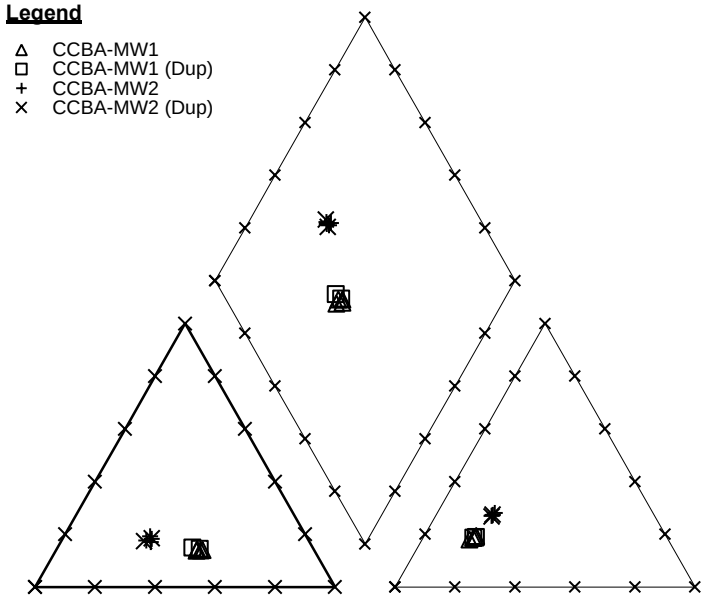


**Figure 8-4. Piper Trilinear Diagram of Major Ion Chemistry for Monitoring Wells CCBA-MW1 and CCBA-MW2 at SWMUs 8/58, CY 2013**

The amount of precipitation available for groundwater recharge is minimal due to the scant rainfall, high evapotranspiration rates, and the shallow sequence of bedrock. The annual precipitation is estimated to be 9 in/yr. Most rainfall occurs during summer thunderstorms. Seasonal effects probably do not significantly influence groundwater levels in the fractured bedrock system near the site.

#### 8.1.7.4 Contaminant Sources

Sixty localized areas of interest, known as features, were investigated at SWMUs 8/58. The features consisted of test devices, various apparatus, debris piles, communication cable systems, and shrapnel. Numerous radiological and ordnance surveys were conducted and hazardous materials were removed. Additional remedial activities were conducted and approximately 1,390 cubic yards of testing debris were removed. Several phases of confirmatory soil sampling were conducted. Human health and ecological risk assessments show that remaining COC concentrations in soil are acceptable for both industrial and residential land use scenarios.

#### 8.1.7.5 Contaminant Distribution and Transport in Groundwater

No groundwater contamination is suspected at SWMUs 8/58. Fluoride is the only analyte that exceeds the MCL in groundwater samples collected at SWMUs 8/58. In CY 2013 fluoride was detected above the MCL of 4.0 mg/L in monitoring well CCBA-MW1 groundwater samples at concentrations that ranged from 4.57 to 5.00 mg/L. However, this detection is most likely attributable to localized hydrothermal mineralization in faults and fractures within the quartzite bedrock in which the well is completed and not associated with SNL/NM testing activities. Review of nearby ore deposits demonstrates that there are large but uneconomic deposits of fluorite-bearing minerals in the Precambrian and Paleozoic rocks in the eastern portion of KAFB (Skelly August 2013). This indicates that the fluorite-bearing minerals are the source of fluoride in the groundwater samples from CCBA-MW1 and not SNL/NM activities. Fluoride concentrations from monitoring well CCBA-MW2 ranged from 1.52 to 1.61 mg/L.

### 8.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM Environmental Restoration (ER) Operations (formerly ER Project) and implements and enforces federal regulations mandated by the Resource Conservation and Recovery Act (RCRA). All ER Operations SWMUs are listed in Module IV of the SNL/NM RCRA Permit, *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518* (NMED 1993).

In April 2004, the Order (NMED April 2004) was issued between the NMED, DOE, and Sandia specifically identified SWMUs 8/58 as requiring further investigation. All corrective action requirements pertaining to SWMUs 8/58 are contained in the Order (NMED April 2004).

A proposal for Corrective Action Complete (CAC) for SWMUs 8/58 was submitted to the NMED in April 2005 (SNL April 2005). The NMED responded to the CAC proposal with a Request for Supplemental Information (RSI) in June 2005 and required additional characterization at the site (NMED June 2005). DOE/NNSA and Sandia responded to this RSI in June 2005 (SNL June 2005) and agreed to complete the additional site characterization work. The NMED approved the RSI response contingent on the results of field investigations proposed in the response (NMED September 2005). SNL/NM personnel completed the fieldwork in September and October 2005, and the results of the field investigations were submitted to the NMED in March 2006 (SNL March 2006). The NMED reviewed the March 2006 supplemental response and issued a second RSI (which required additional site characterization work) in June 2006 (NMED June 2006). DOE/NNSA and Sandia responded to the second RSI in August 2006 (SNL August 2006), and again agreed to complete the additional site characterization work. The second RSI response was verbally approved by the NMED in early August 2006, and the additional fieldwork

was completed in September 2006. The NMED officially approved the second RSI response in October 2006 (NMED October 2006), after fieldwork had been completed. The NMED approved SWMUs 8/58 for CAC with controls in June 2007 (NMED June 2007).

In a meeting with the NMED and participating members of the public held on June 9, 2009, the NMED decided that characterization of SWMUs 8/58 had not satisfied the requirements for CAC and that additional corrective actions were required due to insufficient information about the site hydrogeology and insufficient information about the contaminant source terms. The NMED required DOE/NNSA and Sandia to submit a Groundwater Characterization Work Plan for SWMUs 8/58 (NMED April 2010).

The Groundwater Characterization Work Plan for SWMUs 8/58 was submitted to the NMED in September 2010 (SNL September 2010) and described the activities and procedures to install and sample groundwater monitoring wells to comply with the NMED requirements and guidance of the New Mexico Office of the State Engineer (NMOSE) (NMOSE August 2005). The Work Plan was approved by the NMED in January 2011 (NMED January 2011). Due to the presence of cultural resources in the area and land use permit issues with KAFB, the locations of the proposed monitoring wells were adjusted (SNL May 2011a and NMED June 2011).

Monitoring wells CCBA-MW1 and CCBA-MW2 were installed in August 2011 and quarterly sampling began in October 2011. The well installation report describing field activities was submitted to the NMED in November 2011 (SNL November 2011). The eighth and final sampling event required by NMED for monitoring wells CCBA-MW1 and CCBA-MW2 was completed in July 2013.

In this report monitoring data for SWMUs 8/58 are presented for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (gamma spectroscopy, gross alpha/beta activity, and tritium) are provided voluntarily by the DOE/NNSA and Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Order, as specified in Section III.A of the Order (NMED April 2004).

### 8.3 Scope of Activities

Groundwater monitoring sampling and analysis during CY 2013 is summarized in Table 8-3. The analytical parameters for monitoring wells CCBA-MW1 and CCBA-MW2 for each sampling event are listed in Table 8-4.

### 8.4 Field Methods and Measurements

According to the requirements of the Order (NMED April 2004) addressing Section VII.D.6 and the NMED letter of April 8, 2010 (NMED April 2010), SNL/NM personnel will perform groundwater sampling at SWMUs 8/58. The CY 2013 sampling events were conducted in conformance with appropriate SNL/NM Field Operating Procedures for groundwater sampling activities and the site-specific Mini-SAP for SWMUs 8/58 (SNL December 2012; April 2013; June 2013; and September 2013b).

Groundwater samples were collected from monitoring wells CCBA-MW1 and CCBA-MW2 in January, April, July, and October 2013. Samples were submitted to GEL Laboratories LLC for all chemical analyses. Groundwater samples were analyzed for VOCs, SVOCs, HE compounds, NPN, major anions (i.e., bromide, chloride, fluoride, and sulfate), major cations (i.e., calcium, magnesium, potassium, and sodium), alkalinity, TAL metals plus uranium, perchlorate, total cyanide, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium.

**Table 8-3. Groundwater Monitoring Well Network and Sampling Dates for SWMUs 8/58, Calendar Year 2013**

| Date of Sampling Event | Wells Sampled | SAP |
|---|---|---|
| January 2013 | CCBA-MW1<br>CCBA-MW2 | *SWMU 8 and 58 Groundwater Monitoring Mini-SAP for Second Quarter Fiscal Year 2013* (SNL December 2012) |
| April 2013 | CCBA-MW1<br>CCBA-MW2 | *SWMU 8 and 58 Groundwater Monitoring Mini-SAP for Third Quarter Fiscal Year 2012* (SNL April 2013) |
| July 2013 | CCBA-MW1<br>CCBA-MW2 | *SWMU 8 and 58 Groundwater Monitoring Mini-SAP for Fourth Quarter Fiscal Year 2012* (SNL June 2013) |
| October 2013 | CCBA-MW1<br>CCBA-MW2 | *SWMU 8 and 58 Groundwater Monitoring Mini-SAP for First Quarter Fiscal Year 2014* (SNL September 2013a) |

**NOTES:**
CCBA = Coyote Canyon Blast Area.
MW = Monitoring well.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories.
SWMU = Solid Waste Management Unit.

**Table 8-4. Parameters Sampled at SWMUs 8/58 for Each Sampling Event, Calendar Year 2013**

| Parameter | Sampling Period | |
|---|---|---|
| Anions | **January 2013** | **April 2013** |
| Alkalinity | CCBA-MW1 | CCBA-MW1 |
| Filtered Cations | CCBA-MW1 (dup) | CCBA-MW2 |
| Gamma Spec* | CCBA-MW2 | CCBA-MW2 (dup) |
| Gross Alpha | | |
| Gross Beta | | |
| HE compounds | **July 2013** | **October 2013** |
| Isotopic Uranium | CCBA-MW1 | CCBA-MW1 |
| NPN | CCBA-MW1 (dup) | CCBA-MW2 |
| Perchlorate | CCBA-MW2 | CCBA-MW2 (dup) |
| SVOCs | | |
| TAL Metals, plus Total Uranium | | |
| Total Cyanide | | |
| VOCs | | |

**NOTES:**
CCBA = Coyote Canyon Blast Area.
Dup = Duplicate sample.
Gamma Spec* = Gamma spectroscopy short list (Americium-241, Cesium-137, Cobalt-60, and Potassium-40).
HE = High explosive.
MW = Monitoring well.
NPN = Nitrate plus nitrate (reported as nitrogen).
SVOC = Semivolatile organic compound.
SWMU = Solid waste management unit.
TAL = Target Analyte List.
VOC = Volatile organic compound.

The monitoring procedures are consistent with procedures identified in the EPA technical enforcement guidance document (EPA 1986) and are described in detail in Section 1.3.

The NMED DOE Oversight Bureau collected split samples with DOE/NNSA and Sandia during the April and October 2013 sampling events. The NMED DOE Oversight Bureau analytical results are not reported in this document, but are available through the DOE NNSA Sandia Field Office.

### 8.5 Groundwater Elevation

Throughout CY 2013, water level measurements were obtained to determine groundwater flow directions, hydraulic gradients, and changes in water table elevations. The water level information was used to create the base-wide potentiometric surface map discussed in Section 2.6.2.2 and shown in Plate 1. The potentiometric surface contours presented in Figure 8-3 are derived from the base-wide potentiometric surface map. The hydrograph for SWMUs 8/58 monitoring wells is shown in Figure 8C-1 (Attachment 8C).

### 8.6 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using EPA- and DOE-specified protocols described in Section 1.3.2 (Tables 1-5 and 1-6). Parameters analyzed and sampling periods in CY 2013 are presented in Table 8-4.

### 8.7 Summary of Analytical Results

This section discusses analytical results and field measurements for the CY 2013 sampling events at SWMUs 8/58. Data are presented in Tables 8A-1 through 8A-11 (Attachment 8A). Data qualifiers are explained in the footnotes following Table 8A-11. Analytical reports, including certificates of analyses, analytical methods, method detection limits (MDLs), practical quantitation limits, dates of analyses, results of QC analyses, and data validation findings are filed in the SNL/NM Records Center.

The analytical data were reviewed and qualified in accordance with Administrative Operating Procedure 00-03, *Data Validation Procedure for Chemical and Radiochemical Data, Revision 3* (SNL May 2011b). No problems were identified with the analytical data that resulted in qualification of the data as unusable. The data are acceptable and reported QC measures are adequate.

No VOCs or HE compounds were detected above laboratory MDLs in any groundwater samples collected from SWMUs 8/58. No SVOCs were detected above laboratory MDLs except for benzo(a)pyrene, benzo(b)fluoranthene, and benzo(k)fluoranthene in the January 2013 sampling event (Table 8A-1). Benzo(a)pyrene was reported above the MCL of 0.200 micrograms per liter (µg/L) in CBA-MW2 at a concentration of 0.640 µg/L. Benzo(b)fluoranthane and benzo(k)fluoranthane were detected in both CCBA-MW1 and CCBA-MW2 environmental samples at concentrations ranging from 0.411 µg/L to 0.980 µg/L. No SVOCs were detected in the CCBA-MW1 duplicate environmental sample. This is the initial detection of any SVOC from these monitoring wells. These SVOCs are polycyclic aromatic hydrocarbons found in exhaust fumes and smoke associated with the burning of organic compounds. During the January sampling event, air temperatures were below freezing and the field team used fuel source portable heaters inside the sampling vehicle. Use of the fuel source heater has been discontinued and detections of SVOCs has ceased. Tables 8A-2 through 8A-4 list the MDLs for associated VOCs, SVOCs, and HE compounds, respectively (Attachment 8A).

Table 8A-5 summarizes NPN results (Attachment 8A). NPN values were compared with the nitrate MCL of 10 mg/L. NPN was not detected above the MCL in any groundwater sample. NPN was reported at concentrations from 1.43 to 3.62 mg/L.

Table 8A-6 summarizes alkalinity, major anion (i.e., bromide, chloride, fluoride, and sulfate), and total cyanide results (Attachment 8A). Fluoride was detected above the established MCL of 4.0 mg/L in all samples from monitoring well CCBA-MW1 at concentrations from 4.57 to 5.00 mg/L and is shown on Figure 8B-1. This detection is most likely attributable to the presence of fluorite mineralization in the unconsolidated alluvium and possible weathered quartzite bedrock in which the well is completed and not associated with SNL/NM testing activities. Fluoride concentrations in monitoring well CCBA-MW2 samples ranged from of 1.52 to 1.61 mg/L. No other anions or total cyanide were detected above established MCLs.

Perchlorate was not detected above the screening level/MDL of 0.004 mg/L in any groundwater sample. Table 8A-7 presents perchlorate results (Attachment 8A).

TAL metals plus uranium were analyzed for all samples from monitoring wells at SWMUs 8/58. No metal parameters were detected above established regulatory limits in any groundwater sample. Metal results are summarized in Table 8A-8 (Attachment 8A).

Filtered fractions for major cations as calcium, magnesium, potassium, and sodium were analyzed for all samples. The results are presented in Table 8A-9 (Attachment 8A). These parameters have no established MCLs.

The results for gamma spectroscopy, gross alpha/beta activity, and isotopic uranium are presented in Table 8A-10 (Attachment 8A). Gross alpha activity is measured as a screening tool and in accordance with 40 Code of Federal Regulations, Parts 9, 141, and 142, Table I-4 does not include uranium, which is measured independently. Therefore, gross alpha activity measurements were corrected by subtracting the total uranium activity. Radiological results are further reviewed by an SNL/NM Certified Health Physicist to assure that the samples are nonradioactive. All radionuclide activity results are below MCLs, where established.

Table 8A-11 summarizes field water quality measurements collected prior to sampling (Attachment 8A). Field water quality measurements include turbidity, pH, temperature, specific conductance, oxidation-reduction potential, and dissolved oxygen.

## 8.8 Quality Control Results

Field and laboratory QC samples were prepared to determine the accuracy of the methods used and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process. The results for each QC sample and the impact on data quality for the SWMUs 8/58 quarterly sampling events are discussed in the following sections.

### 8.8.1 Field Quality Control Samples

Field QC samples included duplicate environmental samples, FBs, TBs, and EBs. The following sections discuss the analytical results for each QC sample type.

#### 8.8.1.1 Duplicate Environmental Samples

Duplicate environmental samples were analyzed to estimate the overall reproducibility of the sampling and analytical process. Relative percent difference (RPD) calculations, between duplicate samples, were performed for detected chemical analytes. In January 2013 a duplicate environmental sample was collected from monitoring well CCBA-MW1. The duplicate sample results show good agreement (RPD values less than 20 for organic compounds and less than 35 for inorganic analyses) for all calculated parameters, except aluminum. The RPD for aluminum was calculated at 75, but is an estimated value because of quality control issues associated with the verification of the reporting limit and aluminum is

reported below the practical quantitation limit in one sample. The three duplicate samples collected in April, July, and October (Table 8-4) all show good agreement (RPD values less than 20 for organic compounds and less than 35 for inorganic analyses) for all calculated parameters.

#### 8.8.1.2 Equipment Blank Samples

EB or rinsate samples are collected to verify the equipment decontamination process. The results for EB analyses are as follows:

- **January 2013 Sampling Event**—An EB or rinsate sample was collected prior to sampling monitoring well CCBA-MW1 and submitted for all analyses. Bromodichloromethane, bromoform, chloroform, chloride, dibromochloromethane, and sodium were detected above the laboratory MDLs. No corrective action was necessary for any detected parameter because these analytes were not detected in environmental samples nor were detected in environmental samples at concentrations greater than five times the blank result.

- **April 2013 Sampling Event**—An EB or rinsate sample was collected prior to sampling monitoring well CCBA-MW2 and submitted for all analyses. Bromodichloromethane, bromoform, chloroform, chloride, copper, dibromochloromethane, and sodium were detected above the laboratory MDLs. No corrective action was necessary, except for copper, because these analytes were not detected in the environmental samples, nor were detected in the environmental samples at concentrations greater than five times the EB result. Copper in the CCBA-MW2 environmental samples was qualified as not detected during data validation because copper was reported in the EB sample at a concentration greater than reported in the environmental samples.

- **July 2013 Sampling Event**—An EB or rinsate sample was collected prior to sampling monitoring well CCBA-MW1 and submitted for all analyses. Cadmium, chloroform, chloride, and copper were detected above the laboratory MDLs. No corrective action was necessary, except for copper, because these analytes were not detected in the environmental samples, nor were detected in the environmental samples at concentrations greater than five times the EB result. The copper values reported in environmental samples were qualified as not detected during data validation, because copper was reported in the EB sample at a concentration greater than reported environmental samples.

- **October 2013 Sampling Event**—An EB or rinsate sample was collected prior to sampling monitoring well CCBA-MW2 and submitted for all analyses. Alkalinity, barium, bromodichloromethane, chloroform, dibromochloromethane, and TCE were detected above the laboratory MDLs. No corrective action was necessary because these analytes were not detected in environmental samples, nor were detected in environmental samples at concentrations greater than five times the blank result.

#### 8.8.1.3 Trip Blank Samples

TB samples are submitted whenever samples are collected for VOC analyses to assess whether contamination of the samples had occurred during shipment and storage. A total of 12 TBs were submitted during CY 2013, three per quarter. No VOCs were detected above associated laboratory MDLs for all TB samples.

#### 8.8.1.4 Field Blank Samples

A FB sample was collected for VOCs to assess whether contamination of the samples resulted from ambient field conditions:

- **January 2013 Sampling Event—**Analysis of the monitoring well CCBA-MW1 FB sample detected the VOCs bromodichloromethane, bromoform, chloroform, and dibromochloromethane above associated laboratory MDLs. No corrective action was required, because these compounds were not detected in the associated environmental samples.

- **April 2013 Sampling Event—**Analysis of the monitoring well CCBA-MW1 FB sample detected the VOC compounds bromodichloromethane, bromoform, chloroform, and dibromochloromethane above associated laboratory MDLs. No corrective action was required, because these compounds were not detected in the associated environmental sample.

- **July 2013 Sampling Event—**Analysis of the monitoring well CCBA-MW2 FB sample detected the VOC compound chloroform above associated laboratory MDLs. No corrective action was required, because these compounds were not detected in the associated environmental sample.

- **October 2013 Sampling Event—**Analysis of the monitoring well CCBA-MW1 FB sample detected the VOC compounds acetone, bromodichloromethane, chloroform, and dibromochloromethane above associated laboratory MDLs. No corrective action was required, because these compounds were not detected in the associated environmental sample.

### 8.8.2 Laboratory Quality Control Samples

Internal laboratory QC samples, including method blanks and duplicate laboratory control samples, were analyzed concurrently with all groundwater samples. Some analytical results were qualified during the data validation process, but no significant data quality problems were noted in CY 2013**.**

## 8.9 Variances and Nonconformances

No variances or nonconformances from requirements specified in the Mini-SAP for SWMUs 8/58 (SNL December 2012, April 2013, June 2013, and September 2013a) were noted during sampling activities. However, project-specific issues identified during CY 2013 sampling activities are noted as follows:

- **January 2013 Sampling Event**—Except for fluoride and benzo(a)pyrene, none of the analytical results for the groundwater samples from SWMUs 8/58 exceed the MCLs. Fluoride was detected above the established MCL of 4.0 mg/L in the monitoring well CCBA-MW1 environmental sample and the duplicate environmental sample with concentrations of 4.97 mg/L and 5.00 mg/L, respectively. Fluoride in the monitoring well CCBA-MW2 environmental sample exceeded the MDL with a concentration of 1.52 mg/L. Benzo(a)pyrene was detected above the established MCL of 0.200 µg/L in CCBA-MW2 with a concentration of 0.640 µg/L. This is the first initial detection of any SVOC from these monitoring wells. Benzo(b)pyrene and benzo(k)pyrene were also detected in both CCBA-MW1 and CCBA-MW2 environmental samples at concentrations ranging from 0.411 to 0.980 µg/L, respectively. These SVOCs are polycyclic aromatic hydrocarbons and their detection is likely due to a fuel source portable heater used inside the sampling vehicle due to below freezing temperatures.

## 8.10 Summary and Conclusions

Two groundwater monitoring wells were installed at SWMUs 8/58 in August 2011. During January, April, July, and October of 2013, groundwater samples were collected from monitoring wells CCBA-MW1 and CCBA-MW2. Analytical parameters included VOCs, SVOCs, HE compounds, NPN, major anions, major cations, alkalinity, TAL metals plus uranium, perchlorate, total cyanide, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium. No parameters were detected above established MCLs, except for fluoride and benzo(a)pyrene. Fluoride was detected above the established MCL of 4.0 mg/L in monitoring well CCBA-MW1 samples that ranged from 4.57 to 5.00 mg/L. This detection is most likely attributable to the quartzite bedrock that is rich in subeconomic deposits of fluorite in which the well is completed and not associated with SNL/NM testing activities. Benzo(a)pyrene was detected above the established MCL of 0.200 µg/L in CCBA-MW2 with a concentration of 0.640 µg/L. This is the first initial detection of any SVOC from these monitoring wells. Benzo(b)pyrene and benzo(k)pyrene were also detected in both CCBA-MW1 and CCBA-MW2 environmental samples at concentrations ranging from 0.411 to 0.980 µg/L. Detection of these SVOC compounds is likely due to the use of a fuel sourced portable heater inside the sampling vehicle due to below freezing temperatures. The use of the fuel sourced heater has stopped and the detections of the SVOC compounds has ceased.

The current conceptual model described in Section 8.1.7 does not require modification based on the analytical results for this reporting period.

During CY 2014, quarterly groundwater sampling and reporting will continue for the groundwater monitoring wells (CCBA-MW1 and CCBA-MW2) located at SWMUs 8/58. The eighth and final quarterly groundwater sampling event was completed in July 2013. Quarterly groundwater sampling will continue until additional guidance is provided by NMED.

## 8.11 References


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# Attachment 8A
# Solid Waste Management Units 8/58
# Analytical Results Tables

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# Attachment 8A Tables


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## Table 8A-1
## Summary of Detected Volatile Organic, Semivolatile Organic, and High Explosive Compounds, Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW1** | Benzo(b)fluoranthene | 0.442 | 0.316 | 1.05 | NE | J | | 093341-002 | SW846 8270C |
| 16-Jan-13 | Benzo(k)fluoranthene | 0.411 | 0.316 | 1.05 | NE | J | | 093341-002 | SW846 8270C |
| **CCBA-MW2** | Benzo(a)pyrene | **0.640** | 0.440 | 1.00 | 0.200 | J | | 093336-002 | SW846 8270C |
| 15-Jan-13 | Benzo(b)fluoranthene | 0.640 | 0.300 | 1.00 | NE | J | | 093336-002 | SW846 8270C |
| | Benzo(k)fluoranthene | 0.980 | 0.300 | 1.00 | NE | J | | 093336-002 | SW846 8270C |

Refer to footnotes on page 8A-33.

## Table 8A-2
## Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B), Solid Waste Management Units 8/58 Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Analyte | MDL[b] (µg/L) | Analyte | MDL[b] (µg/L) |
|---|---|---|---|
| 1,1,1-Trichloroethane | 0.300 | Chlorobenzene | 0.300 |
| 1,1,2,2-Tetrachloroethane | 0.300 | Chloroethane | 0.300 |
| 1,1,2-Trichloroethane | 0.300 | Chloroform | 0.300 |
| 1,1-Dichloroethane | 0.300 | Chloromethane | 0.300 |
| 1,1-Dichloroethene | 0.300 | Cyclohexane | 0.300 |
| 1,2,3-Trichlorobenzene | 0.300 | Dibromochloromethane | 0.300 |
| 1,2,4-Trichlorobenzene | 0.300 | Dichlorodifluoromethane | 0.300 |
| 1,2-Dibromo-3-chloropropane | 0.300 | Ethyl benzene | 0.300 |
| 1,2-Dibromoethane | 0.300 | Isopropylbenzene | 0.300 |
| 1,2-Dichlorobenzene | 0.300 | Methyl acetate | 1.50 |
| 1,2-Dichloroethane | 0.300 | Methylcyclohexane | 3.00 |
| 1,2-Dichloropropane | 0.300 | Methylene chloride | 3.00 |
| 1,3-Dichlorobenzene | 0.300 | Styrene | 0.300 |
| 1,4-Dichlorobenzene | 0.300 | Tert-butyl methyl ether | 0.300 |
| 2,2-trifluoroethane, 1,1,2-Trichloro-1 | 1.50 | Tetrachloroethene | 0.300 |
| 2-Butanone | 2.00 | Toluene | 0.300 |
| 2-Hexanone | 2.20 | Trichloroethene | 0.300 |
| 4-methyl-, 2-Pentanone | 1.50 | Trichlorofluoromethane | 0.300 |
| Acetone | 3.00 | Vinyl chloride | 0.300 |
| Benzene | 0.300 | Xylene | 0.300 |
| Bromochloromethane | 0.300 | cis-1,2-Dichloroethene | 0.300 |
| Bromodichloromethane | 0.300 | cis-1,3-Dichloropropene | 0.300 |
| Bromoform | 0.300 | m-, p-Xylene | 0.300 |
| Bromomethane | 0.300 | o-Xylene | 0.300 |
| Carbon disulfide | 1.50 | trans-1,2-Dichloroethene | 0.300 |
| Carbon tetrachloride | 0.300 | trans-1,3-Dichloropropene | 0.300 |

Refer to footnotes on page 8A-33.

## Table 8A-3
## Method Detection Limits for Semivolatile Organic Compounds (EPA Method[g] SW846-8270C), Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Analyte | MDL[b] (µg/L) | Analyte | MDL[b] (µg/L) |
|---|---|---|---|
| 1'-Biphenyl 1 | 3.00 - 3.16 | Butylbenzyl phthalate | 3.00 - 3.16 |
| 1,2,4-Trichlorobenzene | 3.00 - 3.16 | Caprolactam | 3.00 - 3.16 |
| 2,4,5-Trichlorophenol | 3.00 - 3.16 | Carbazole | 0.300 - 0.316 |
| 1,4-Dioxane | 3.00 - 3.16 | Chrysene | 0.300 - 0.316 |
| 2,4,6-Trichlorophenol | 3.00 - 3.16 | Di-n-butyl phthalate | 3.00 - 3.16 |
| 2,4-Dichlorophenol | 3.00 - 3.16 | Di-n-octyl phthalate | 3.00 - 3.16 |
| 2,4-Dimethylphenol | 3.00 - 3.16 | Dibenz[a,h]anthracene | 0.300 - 0.316 |
| 2,4-Dinitrophenol | 5.00 - 5.26 | Dibenzofuran | 3.00 - 3.16 |
| 2,4-Dinitrotoluene | 3.00 - 3.16 | Diethylphthalate | 3.00 - 3.16 |
| 2,6-Dinitrotoluene | 3.00 - 3.16 | Dimethylphthalate | 3.00 - 3.16 |
| 2-Chloronaphthalene | 0.300 - 0.432 | Dinitro-o-cresol | 3.00 - 3.16 |
| 2-Chlorophenol | 3.00 - 3.16 | Diphenyl amine | 3.00 - 3.16 |
| 2-Methylnaphthalene | 0.300 - 0.316 | Fluoranthene | 0.300 - 0.316 |
| 2-Nitroaniline | 3.00 - 3.16 | Fluorene | 0.300 - 0.316 |
| 2-Nitrophenol | 3.00 - 3.16 | Hexachlorobenzene | 3.00 - 3.16 |
| 3,3'-Dichlorobenzidine | 3.00 - 3.16 | Hexachlorobutadiene | 3.00 - 3.16 |
| 3-Nitroaniline | 3.00 - 3.16 | Hexachlorocyclopentadiene | 3.00 - 3.16 |
| 4-Bromophenyl phenyl ether | 3.00 - 3.16 | Hexachloroethane | 3.00 - 3.16 |
| 4-Chloro-3-methylphenol | 3.00 - 3.16 | Indeno(1,2,3-c,d)pyrene | 0.300 - 0.316 |
| 4-Chlorobenzenamine | 3.30 - 3.47 | Isophorone | 3.00 - 3.68 |
| 4-Chlorophenyl phenyl ether | 3.00 - 3.16 | Naphthalene | 0.300 - 0.316 |
| 4-Nitroaniline | 3.00 - 3.16 | Nitro-benzene | 3.00 - 3.16 |
| 4-Nitrophenol | 3.00 - 3.16 | Pentachlorophenol | 3.00 - 3.16 |
| Acenaphthene | 0.300 - 0.316 | Phenanthrene | 0.300 - 0.316 |
| Acenaphthylene | 0.300 - 0.316 | Phenol | 3.00 - 3.16 |
| Acetophenone | 3.00 - 3.16 | Pyrene | 0.300 - 0.316 |
| Anthracene | 0.300 - 0.316 | bis(2-Chloroethoxy)methane | 3.00 - 3.16 |
| Atrazine | 3.00 - 3.16 | bis(2-Chloroethyl)ether | 3.00 - 3.16 |
| Benzaldehyde | 3.00 - 5.26 | bis(2-Chloroisopropyl)ether | 3.00 - 3.16 |
| Benzo(a)anthracene | 0.300 - 0.316 | bis(2-Ethylhexyl)phthalate | 3.00 - 3.16 |
| Benzo(a)pyrene | 0.300 - 0.463 | m,p-Cresol | 3.00 - 3.89 |
| Benzo(b)fluoranthene | 0.300 - 0.316 | n-Nitrosodipropylamine | 3.00 - 3.16 |
| Benzo(ghi)perylene | 0.300 - 0.316 | o-Cresol | 3.00 - 3.16 |
| Benzo(k)fluoranthene | 0.300 - 0.316 | | |

Refer to footnotes on page 8A-33.

## Table 8A-4
## Method Detection Limits for High Explosive Compounds (EPA Method[g] SW846-8321A), Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Analyte | MDL[b] (µg/L) |
|---|---|
| 1,3,5-Trinitrobenzene | 0.0829 – 0.0879 |
| 1,3-Dinitrobenzene | 0.0829 – 0.0879 |
| 2,4,6-Trinitrotoluene | 0.0829 – 0.0879 |
| 2,4-Dinitrotoluene | 0.0829 – 0.0879 |
| 2,6-Dinitrotoluene | 0.0829 – 0.0879 |
| 2-Amino-4,6-dinitrotoluene | 0.0829 – 0.0879 |
| 2-Nitrotoluene | 0.0850 – 0.0901 |
| 3-Nitrotoluene | 0.0829 – 0.0879 |
| 4-Amino-2,6-dinitrotoluene | 0.0829 – 0.0879 |
| 4-Nitrotoluene | 0.155 – 0.165 |
| HMX | 0.0829 – 0.0879 |
| Nitro-benzene | 0.0829 – 0.0879 |
| Pentaerythritol tetranitrate | 0.104 – 0.110 |
| RDX | 0.0829 – 0.0879 |
| Tetryl | 0.0829 – 0.0879 |

Refer to footnotes on page 8A-33.

## Table 8A-5
## Summary of Nitrate plus Nitrate Results,
## Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW1** 16-Jan-13 | Nitrate plus nitrite | 1.49 | 0.085 | 0.250 | 10.0 | | | 093341-018 | EPA 353.2 |
| **CCBA-MW1** (Duplicate) 16-Jan-13 | Nitrate plus nitrite | 1.50 | 0.085 | 0.250 | 10.0 | | | 093342-018 | EPA 353.2 |
| **CCBA-MW2** 15-Jan-13 | Nitrate plus nitrite | 3.27 | 0.170 | 0.500 | 10.0 | | | 093336-018 | EPA 353.2 |
| | | | | | | | | | |
| **CCBA-MW1** 24-Apr-13 | Nitrate plus nitrite | 1.43 | 0.085 | 0.250 | 10.0 | | | 093873-018 | EPA 353.2 |
| **CCBA-MW2** 25-Apr-13 | Nitrate plus nitrite | 3.47 | 0.170 | 0.500 | 10.0 | | | 093878-018 | EPA 353.2 |
| **CCBA-MW2** (Duplicate) 25-Apr-13 | Nitrate plus nitrite | 3.28 | 0.170 | 0.500 | 10.0 | | | 093879-018 | EPA 353.2 |
| | | | | | | | | | |
| **CCBA-MW1** 16-Jul-13 | Nitrate plus nitrite as N | 1.57 | 0.085 | 0.250 | 10.0 | | | 094376-018 | EPA 353.2 |
| **CCBA-MW1** (Duplicate) 16-Jul-13 | Nitrate plus nitrite as N | 1.63 | 0.085 | 0.250 | 10.0 | | | 094377-018 | EPA 353.2 |
| **CCBA-MW2** 15-Jul-13 | Nitrate plus nitrite as N | 3.62 | 0.085 | 0.250 | 10.0 | | | 094371-018 | EPA 353.2 |
| | | | | | | | | | |
| **CCBA-MW1** 10-Oct-13 | Nitrate plus nitrite as N | 1.70 | 0.170 | 0.500 | 10.0 | | | 094774-018 | EPA 353.2 |
| **CCBA-MW2** 14-Oct-13 | Nitrate plus nitrite as N | 3.35 | 0.170 | 0.500 | 10.0 | | | 094779-018 | EPA 353.2 |
| **CCBA-MW2** (Duplicate) 14-Oct-13 | Nitrate plus nitrite as N | 3.31 | 0.170 | 0.500 | 10.0 | | | 094780-018 | EPA 353.2 |

Refer to footnotes on page 8A-33.

## Table 8A-6
## Summary of Alkalinity, Anion, and Total Cyanide Results,
## Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW1** | Bicarbonate Alkalinity | 185 | 0.725 | 1.00 | NE | | | 093341-022 | SM2320B |
| 16-Jan-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093341-022 | SM2320B |
| | Bromide | 0.284 | 0.067 | 0.200 | NE | | | 093341-016 | SW846 9056 |
| | Chloride | 29.5 | 0.134 | 0.400 | NE | | | 093341-016 | SW846 9056 |
| | Fluoride | **4.97** | 0.033 | 0.100 | 4.0 | | | 093341-016 | SW846 9056 |
| | Sulfate | 56.6 | 0.266 | 0.800 | NE | | | 093341-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | UJ | 093341-027 | SW846 9012 |
| **CCBA-MW1** (Duplicate) | Bicarbonate Alkalinity | 183 | 0.725 | 1.00 | NE | | | 093342-022 | SM2320B |
| 16-Jan-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093342-022 | SM2320B |
| | Bromide | 0.285 | 0.067 | 0.200 | NE | | | 093342-016 | SW846 9056 |
| | Chloride | 29.5 | 0.134 | 0.400 | NE | | | 093342-016 | SW846 9056 |
| | Fluoride | **5.00** | 0.033 | 0.100 | 4.0 | | | 093342-016 | SW846 9056 |
| | Sulfate | 56.7 | 0.266 | 0.800 | NE | | | 093342-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | UJ | 093342-027 | SW846 9012 |
| **CCBA-MW2** | Bicarbonate Alkalinity | 180 | 0.725 | 1.00 | NE | | | 093336-022 | SM2320B |
| 15-Jan-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093336-022 | SM2320B |
| | Bromide | 0.508 | 0.067 | 0.200 | NE | | | 093336-016 | SW846 9056 |
| | Chloride | 37.1 | 0.335 | 1.00 | NE | | | 093336-016 | SW846 9056 |
| | Fluoride | 1.52 | 0.033 | 0.100 | 4.0 | | | 093336-016 | SW846 9056 |
| | Sulfate | 95.3 | 0.665 | 2.00 | NE | | | 093336-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | UJ | 093336-027 | SW846 9012 |
| | | | | | | | | | |
| **CCBA-MW1** | Bicarbonate Alkalinity | 200 | 0.725 | 1.00 | NE | | | 093873-022 | SM2320B |
| 24-Apr-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093873-022 | SM2320B |
| | Bromide | 0.350 | 0.067 | 0.200 | NE | | | 093873-016 | SW846 9056 |
| | Chloride | 28.1 | 0.670 | 2.00 | NE | | | 093873-016 | SW846 9056 |
| | Fluoride | **4.57** | 0.330 | 1.00 | 4.0 | | | 093873-016 | SW846 9056 |
| | Sulfate | 56.7 | 1.33 | 4.00 | NE | | | 093873-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | UJ | 093873-027 | SW846 9012 |

Refer to footnotes on page 8A-33.

**Table 8A-6** *(Continued)*
**Summary of Alkalinity, Anion, and Total Cyanide Results,**
**Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW2** | Bicarbonate Alkalinity | 179 | 0.725 | 1.00 | NE | | | 093878-022 | SM2320B |
| 25-Apr-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093878-022 | SM2320B |
| | Bromide | 0.582 | 0.067 | 0.200 | NE | | | 093878-016 | SW846 9056 |
| | Chloride | 38.3 | 0.670 | 2.00 | NE | | | 093878-016 | SW846 9056 |
| | Fluoride | 1.60 | 0.033 | 0.100 | 4.0 | | | 093878-016 | SW846 9056 |
| | Sulfate | 99.5 | 1.33 | 4.00 | NE | | | 093878-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | UJ | 093878-027 | SW846 9012 |
| **CCBA-MW2** (Duplicate) | Bicarbonate Alkalinity | 193 | 0.725 | 1.00 | NE | | | 093879-022 | SM2320B |
| 25-Apr-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093879-022 | SM2320B |
| | Bromide | 0.573 | 0.067 | 0.200 | NE | | | 093879-016 | SW846 9056 |
| | Chloride | 39.0 | 0.670 | 2.00 | NE | | | 093879-016 | SW846 9056 |
| | Fluoride | 1.60 | 0.033 | 0.100 | 4.0 | | | 093879-016 | SW846 9056 |
| | Sulfate | 98.6 | 1.33 | 4.00 | NE | | | 093879-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | UJ | 093879-027 | SW846 9012 |
| | | | | | | | | | |
| **CCBA-MW1** | Bicarbonate Alkalinity | 187 | 0.725 | 1.00 | NE | | | 094376-022 | SM2320B |
| 16-Jul-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094376-022 | SM2320B |
| | Bromide | 0.329 | 0.067 | 0.200 | NE | | | 094376-016 | SW846 9056 |
| | Chloride | 28.4 | 0.335 | 1.00 | NE | | | 094376-016 | SW846 9056 |
| | Fluoride | **4.78** | 0.165 | 0.500 | 4.0 | | | 094376-016 | SW846 9056 |
| | Sulfate | 56.2 | 0.665 | 2.00 | NE | | | 094376-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | UJ | 094376-027 | SW846 9012 |
| **CCBA-MW1** (Duplicate) | Bicarbonate Alkalinity | 187 | 0.725 | 1.00 | NE | | | 094377-022 | SM2320B |
| 16-Jul-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094377-022 | SM2320B |
| | Bromide | 0.329 | 0.067 | 0.200 | NE | | | 094377-016 | SW846 9056 |
| | Chloride | 28.5 | 0.335 | 1.00 | NE | | | 094377-016 | SW846 9056 |
| | Fluoride | **4.82** | 0.165 | 0.500 | 4.0 | | | 094377-016 | SW846 9056 |
| | Sulfate | 56.4 | 0.665 | 2.00 | NE | | | 094377-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | UJ | 094377-027 | SW846 9012 |

Refer to footnotes on page 8A-33.

**Table 8A-6** *(Concluded)*
**Summary of Alkalinity, Anion, and Total Cyanide Results,**
**Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW2** | Bicarbonate Alkalinity | 181 | 0.725 | 1.00 | NE | B | | 094371-022 | SM2320B |
| 15-Jul-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094371-022 | SM2320B |
| | Bromide | 0.566 | 0.067 | 0.200 | NE | | | 094371-016 | SW846 9056 |
| | Chloride | 36.6 | 0.670 | 2.00 | NE | | | 094371-016 | SW846 9056 |
| | Fluoride | 1.61 | 0.033 | 0.100 | 4.0 | | | 094371-016 | SW846 9056 |
| | Sulfate | 93.6 | 1.33 | 4.00 | NE | | | 094371-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | UJ | 094371-027 | SW846 9012 |
| | | | | | | | | | |
| **CCBA-MW1** | Bicarbonate Alkalinity | 182 | 0.725 | 1.00 | NE | | | 094774-022 | SM2320B |
| 10-Oct-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094774-022 | SM2320B |
| | Bromide | 0.347 | 0.067 | 0.200 | NE | | | 094774-016 | SW846 9056 |
| | Chloride | 29.3 | 0.335 | 1.00 | NE | | | 094774-016 | SW846 9056 |
| | Fluoride | **4.93** | 0.066 | 0.200 | 4.0 | | | 094774-016 | SW846 9056 |
| | Sulfate | 57.9 | 0.665 | 2.00 | NE | | | 094774-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | UJ | 094774-027 | SW846 9012 |
| **CCBA-MW2** | Bicarbonate Alkalinity | 181 | 0.725 | 1.00 | NE | B | | 094779-022 | SM2320B |
| 14-Oct-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094779-022 | SM2320B |
| | Bromide | 0.559 | 0.067 | 0.200 | NE | | | 094779-016 | SW846 9056 |
| | Chloride | 36.9 | 0.670 | 2.00 | NE | | | 094779-016 | SW846 9056 |
| | Fluoride | 1.52 | 0.033 | 0.100 | 4.0 | | | 094779-016 | SW846 9056 |
| | Sulfate | 94.7 | 1.33 | 4.00 | NE | | | 094779-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | UJ | 094779-027 | SW846 9012 |
| **CCBA-MW2** (Duplicate) | Bicarbonate Alkalinity | 181 | 0.725 | 1.00 | NE | B | | 094780-022 | SM2320B |
| 14-Oct-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094780-022 | SM2320B |
| | Bromide | 0.560 | 0.067 | 0.200 | NE | | | 094780-016 | SW846 9056 |
| | Chloride | 37.1 | 0.670 | 2.00 | NE | | | 094780-016 | SW846 9056 |
| | Fluoride | 1.52 | 0.033 | 0.100 | 4.0 | | | 094780-016 | SW846 9056 |
| | Sulfate | 96.3 | 1.33 | 4.00 | NE | | | 094780-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | UJ | 094780-027 | SW846 9012 |

Refer to footnotes on page 8A-33.

## Table 8A-7
## Summary of Perchlorate Results,
## Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Perchlorate Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|
| **CCBA-MW1** 16-Jan-13 | ND | 0.004 | 0.012 | NE | U | | 093341-020 | EPA 314.0 |
| **CCBA-MW1** (Duplicate) 16-Jan-13 | ND | 0.004 | 0.012 | NE | U | | 093342-020 | EPA 314.0 |
| **CCBA-MW2** 15-Jan-13 | ND | 0.004 | 0.012 | NE | U | | 093336-020 | EPA 314.0 |
| | | | | | | | | |
| **CCBA-MW1** 24-Apr-13 | ND | 0.004 | 0.012 | NE | U | | 093873-020 | EPA 314.0 |
| **CCBA-MW2** 25-Apr-13 | ND | 0.004 | 0.012 | NE | U | | 093878-020 | EPA 314.0 |
| **CCBA-MW2** (Duplicate) 25-Apr-13 | ND | 0.004 | 0.012 | NE | U | | 093879-020 | EPA 314.0 |
| | | | | | | | | |
| **CCBA-MW1** 16-Jul-13 | ND | 0.004 | 0.012 | NE | U | | 094376-020 | EPA 314.0 |
| **CCBA-MW1** (Duplicate) 16-Jul-13 | ND | 0.004 | 0.012 | NE | U | | 094377-020 | EPA 314.0 |
| **CCBA-MW2** 15-Jul-13 | ND | 0.004 | 0.012 | NE | U | | 094371-020 | EPA 314.0 |
| | | | | | | | | |
| **CCBA-MW1** 10-Oct-13 | ND | 0.004 | 0.012 | NE | U | | 094774-020 | EPA 314.0 |
| **CCBA-MW2** 14-Oct-13 | ND | 0.004 | 0.012 | NE | U | | 094779-020 | EPA 314.0 |
| **CCBA-MW2** (Duplicate) 14-Oct-13 | ND | 0.004 | 0.012 | NE | U | | 094780-020 | EPA 314.0 |

Refer to footnotes on page 8A-33.

## Table 8A-8
## Summary of Target Analyte List Metals and Uranium Results,
## Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW1** | Aluminum | 0.0771 | 0.015 | 0.050 | NE | | J+ | 093341-009 | SW846 6020 |
| 16-Jan-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093341-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093341-009 | SW846 6020 |
| | Barium | 0.00268 | 0.0006 | 0.002 | 2.00 | | J | 093341-009 | SW846 6020 |
| | Beryllium | 0.000406 | 0.0002 | 0.0005 | 0.004 | J | | 093341-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093341-009 | SW846 6020 |
| | Calcium | 41.9 | 0.060 | 0.200 | NE | | | 093341-009 | SW846 6020 |
| | Chromium | 0.00237 | 0.002 | 0.010 | 0.100 | B, J | 0.015U | 093341-009 | SW846 6020 |
| | Cobalt | 0.000152 | 0.0001 | 0.001 | NE | J | | 093341-009 | SW846 6020 |
| | Copper | 0.000581 | 0.00035 | 0.001 | NE | B, J | 0.0025U | 093341-009 | SW846 6020 |
| | Iron | 0.156 | 0.033 | 0.100 | NE | | | 093341-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093341-009 | SW846 6020 |
| | Magnesium | 8.93 | 0.010 | 0.030 | NE | | J | 093341-009 | SW846 6020 |
| | Manganese | 0.00421 | 0.001 | 0.005 | NE | J | | 093341-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093341-009 | SW846 7470 |
| | Nickel | 0.00201 | 0.0005 | 0.002 | NE | | | 093341-009 | SW846 6020 |
| | Potassium | 3.78 | 0.080 | 0.300 | NE | | | 093341-009 | SW846 6020 |
| | Selenium | 0.00224 | 0.0015 | 0.005 | 0.050 | J | | 093341-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093341-009 | SW846 6020 |
| | Sodium | 66.8 | 0.400 | 1.25 | NE | | J | 093341-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093341-009 | SW846 6020 |
| | Uranium | 0.0021 | 0.000067 | 0.0002 | 0.03 | | | 093341-009 | SW846 6020 |
| | Vanadium | 0.00106 | 0.001 | 0.005 | NE | J | | 093341-009 | SW846 6010 |
| | Zinc | 0.00485 | 0.0035 | 0.010 | NE | J | | 093341-009 | SW846 6020 |

Refer to footnotes on page 8A-33.

**Table 8A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW1** (Duplicate) | Aluminum | 0.0351 | 0.015 | 0.050 | NE | J | J+ | 093342-009 | SW846 6020 |
| 16-Jan-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093342-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093342-009 | SW846 6020 |
| | Barium | 0.00253 | 0.0006 | 0.002 | 2.00 | | J | 093342-009 | SW846 6020 |
| | Beryllium | 0.00047 | 0.0002 | 0.0005 | 0.004 | J | | 093342-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093342-009 | SW846 6020 |
| | Calcium | 41.3 | 0.060 | 0.200 | NE | | | 093342-009 | SW846 6020 |
| | Chromium | 0.00268 | 0.002 | 0.010 | 0.100 | B, J | 0.015U | 093342-009 | SW846 6020 |
| | Cobalt | 0.000141 | 0.0001 | 0.001 | NE | J | | 093342-009 | SW846 6020 |
| | Copper | 0.000496 | 0.00035 | 0.001 | NE | B, J | 0.0025U | 093342-009 | SW846 6020 |
| | Iron | 0.159 | 0.033 | 0.100 | NE | | | 093342-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093342-009 | SW846 6020 |
| | Magnesium | 9.45 | 0.010 | 0.030 | NE | | J | 093342-009 | SW846 6020 |
| | Manganese | 0.00401 | 0.001 | 0.005 | NE | J | | 093342-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093342-009 | SW846 7470 |
| | Nickel | 0.00188 | 0.0005 | 0.002 | NE | J | | 093342-009 | SW846 6020 |
| | Potassium | 3.75 | 0.080 | 0.300 | NE | | | 093342-009 | SW846 6020 |
| | Selenium | 0.00229 | 0.0015 | 0.005 | 0.050 | J | | 093342-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093342-009 | SW846 6020 |
| | Sodium | 61.7 | 0.400 | 1.25 | NE | | J | 093342-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093342-009 | SW846 6020 |
| | Uranium | 0.00201 | 0.000067 | 0.0002 | 0.03 | | | 093342-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | | 093342-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093342-009 | SW846 6020 |

Refer to footnotes on page 8A-33.

**Table 8A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW2** | Aluminum | 0.0224 | 0.015 | 0.050 | NE | J | J+ | 093336-009 | SW846 6020 |
| 15-Jan-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093336-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093336-009 | SW846 6020 |
| | Barium | 0.0413 | 0.0006 | 0.002 | 2.00 | | J | 093336-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093336-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093336-009 | SW846 6020 |
| | Calcium | 75.4 | 0.300 | 1.00 | NE | | | 093336-009 | SW846 6020 |
| | Chromium | 0.00274 | 0.002 | 0.010 | 0.100 | B, J | 0.015U | 093336-009 | SW846 6020 |
| | Cobalt | 0.000171 | 0.0001 | 0.001 | NE | J | | 093336-009 | SW846 6020 |
| | Copper | 0.000881 | 0.00035 | 0.001 | NE | B, J | 0.0025U | 093336-009 | SW846 6020 |
| | Iron | 0.244 | 0.033 | 0.100 | NE | | | 093336-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093336-009 | SW846 6020 |
| | Magnesium | 13.8 | 0.010 | 0.030 | NE | | J | 093336-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093336-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093336-009 | SW846 7470 |
| | Nickel | 0.00269 | 0.0005 | 0.002 | NE | | | 093336-009 | SW846 6020 |
| | Potassium | 1.21 | 0.080 | 0.300 | NE | | | 093336-009 | SW846 6020 |
| | Selenium | 0.00433 | 0.0015 | 0.005 | 0.050 | J | | 093336-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093336-009 | SW846 6020 |
| | Sodium | 43.2 | 0.080 | 0.250 | NE | | J | 093336-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093336-009 | SW846 6020 |
| | Uranium | 0.00533 | 0.000067 | 0.0002 | 0.03 | | | 093336-009 | SW846 6020 |
| | Vanadium | 0.00988 | 0.001 | 0.005 | NE | | | 093336-009 | SW846 6010 |
| | Zinc | 0.00366 | 0.0035 | 0.010 | NE | J | | 093336-009 | SW846 6020 |

Refer to footnotes on page 8A-33.

**Table 8A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW1** | Aluminum | 0.0609 | 0.015 | 0.050 | NE | | | 093873-009 | SW846 6020 |
| 24-Apr-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093873-009 | SW846 6020 |
| | Arsenic | 0.00183 | 0.0017 | 0.005 | 0.010 | J | | 093873-009 | SW846 6020 |
| | Barium | 0.00253 | 0.0006 | 0.002 | 2.00 | | | 093873-009 | SW846 6020 |
| | Beryllium | 0.000506 | 0.0002 | 0.0005 | 0.004 | | | 093873-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093873-009 | SW846 6020 |
| | Calcium | 48.0 | 0.600 | 2.00 | NE | B, N | | 093873-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093873-009 | SW846 6020 |
| | Cobalt | 0.000142 | 0.0001 | 0.001 | NE | B, J | 0.00053U | 093873-009 | SW846 6020 |
| | Copper | 0.000771 | 0.00035 | 0.001 | NE | J | | 093873-009 | SW846 6020 |
| | Iron | 0.123 | 0.033 | 0.100 | NE | | | 093873-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093873-009 | SW846 6020 |
| | Magnesium | 11.4 | 0.010 | 0.030 | NE | | | 093873-009 | SW846 6020 |
| | Manganese | 0.00454 | 0.001 | 0.005 | NE | J | | 093873-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093873-009 | SW846 7470 |
| | Nickel | 0.00143 | 0.0005 | 0.002 | NE | J | | 093873-009 | SW846 6020 |
| | Potassium | 4.43 | 0.080 | 0.300 | NE | | | 093873-009 | SW846 6020 |
| | Selenium | 0.00252 | 0.0015 | 0.005 | 0.050 | J | | 093873-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093873-009 | SW846 6020 |
| | Sodium | 66.2 | 0.800 | 2.50 | NE | N | | 093873-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093873-009 | SW846 6020 |
| | Uranium | 0.0024 | 0.000067 | 0.0002 | 0.03 | B | | 093873-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | UJ | 093873-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093873-009 | SW846 6020 |

Refer to footnotes on page 8A-33.

**Table 8A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW2** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093878-009 | SW846 6020 |
| 25-Apr-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093878-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093878-009 | SW846 6020 |
| | Barium | 0.0445 | 0.0006 | 0.002 | 2.00 | | | 093878-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093878-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093878-009 | SW846 6020 |
| | Calcium | 79.8 | 0.600 | 2.00 | NE | B, N | | 093878-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093878-009 | SW846 6020 |
| | Cobalt | 0.000124 | 0.0001 | 0.001 | NE | B, J | 0.00053U | 093878-009 | SW846 6020 |
| | Copper | 0.000652 | 0.00035 | 0.001 | NE | J | 0.0097UJ | 093878-009 | SW846 6020 |
| | Iron | 0.137 | 0.033 | 0.100 | NE | | | 093878-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093878-009 | SW846 6020 |
| | Magnesium | 15.9 | 0.010 | 0.030 | NE | | | 093878-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093878-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093878-009 | SW846 7470 |
| | Nickel | 0.00192 | 0.0005 | 0.002 | NE | J | | 093878-009 | SW846 6020 |
| | Potassium | 1.43 | 0.080 | 0.300 | NE | | | 093878-009 | SW846 6020 |
| | Selenium | 0.00436 | 0.0015 | 0.005 | 0.050 | J | | 093878-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093878-009 | SW846 6020 |
| | Sodium | 52.0 | 0.800 | 2.50 | NE | N | | 093878-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093878-009 | SW846 6020 |
| | Uranium | 0.00571 | 0.000067 | 0.0002 | 0.03 | B | | 093878-009 | SW846 6020 |
| | Vanadium | 0.00846 | 0.001 | 0.005 | NE | | | 093878-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093878-009 | SW846 6020 |

Refer to footnotes on page 8A-33.

**Table 8A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW2** (Duplicate) | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093879-009 | SW846 6020 |
| 25-Apr-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093879-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093879-009 | SW846 6020 |
| | Barium | 0.0452 | 0.0006 | 0.002 | 2.00 | | | 093879-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093879-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093879-009 | SW846 6020 |
| | Calcium | 76.2 | 0.600 | 2.00 | NE | B, N | | 093879-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093879-009 | SW846 6020 |
| | Cobalt | 0.000126 | 0.0001 | 0.001 | NE | B, J | 0.00053U | 093879-009 | SW846 6020 |
| | Copper | 0.000663 | 0.00035 | 0.001 | NE | J | 0.0097UJ | 093879-009 | SW846 6020 |
| | Iron | 0.139 | 0.033 | 0.100 | NE | | | 093879-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093879-009 | SW846 6020 |
| | Magnesium | 16.7 | 0.010 | 0.030 | NE | | | 093879-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093879-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093879-009 | SW846 7470 |
| | Nickel | 0.00198 | 0.0005 | 0.002 | NE | J | | 093879-009 | SW846 6020 |
| | Potassium | 1.44 | 0.080 | 0.300 | NE | | | 093879-009 | SW846 6020 |
| | Selenium | 0.00445 | 0.0015 | 0.005 | 0.050 | J | | 093879-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093879-009 | SW846 6020 |
| | Sodium | 48.5 | 0.800 | 2.50 | NE | N | | 093879-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093879-009 | SW846 6020 |
| | Uranium | 0.0057 | 0.000067 | 0.0002 | 0.03 | B | | 093879-009 | SW846 6020 |
| | Vanadium | 0.00892 | 0.001 | 0.005 | NE | | | 093879-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093879-009 | SW846 6020 |

Refer to footnotes on page 8A-33.

**Table 8A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW1** | Aluminum | 0.0195 | 0.015 | 0.050 | NE | J | | 094376-009 | SW846 6020 |
| 16-Jul-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094376-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094376-009 | SW846 6020 |
| | Barium | 0.00271 | 0.0006 | 0.002 | 2.00 | | | 094376-009 | SW846 6020 |
| | Beryllium | 0.000411 | 0.0002 | 0.0005 | 0.004 | J | | 094376-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094376-009 | SW846 6020 |
| | Calcium | 48.7 | 0.060 | 0.200 | NE | | | 094376-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094376-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 094376-009 | SW846 6020 |
| | Copper | 0.000351 | 0.00035 | 0.001 | NE | J | 0.0047U | 094376-009 | SW846 6020 |
| | Iron | 0.0927 | 0.033 | 0.100 | NE | J | | 094376-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094376-009 | SW846 6020 |
| | Magnesium | 10.2 | 0.010 | 0.030 | NE | | | 094376-009 | SW846 6020 |
| | Manganese | 0.00328 | 0.001 | 0.005 | NE | J | | 094376-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094376-009 | SW846 7470 |
| | Nickel | 0.00068 | 0.0005 | 0.002 | NE | J | | 094376-009 | SW846 6020 |
| | Potassium | 4.16 | 0.080 | 0.300 | NE | | | 094376-009 | SW846 6020 |
| | Selenium | 0.00241 | 0.0015 | 0.005 | 0.050 | J | | 094376-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094376-009 | SW846 6020 |
| | Sodium | 57.2 | 0.400 | 1.25 | NE | | | 094376-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094376-009 | SW846 6020 |
| | Uranium | 0.00219 | 0.000067 | 0.0002 | 0.03 | | | 094376-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | UJ | 094376-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094376-009 | SW846 6020 |

Refer to footnotes on page 8A-33.

**Table 8A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW1** (Duplicate) | Aluminum | 0.019 | 0.015 | 0.050 | NE | J | | 094377-009 | SW846 6020 |
| 16-Jul-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094377-009 | SW846 6020 |
| | Arsenic | 0.00198 | 0.0017 | 0.005 | 0.010 | J | | 094377-009 | SW846 6020 |
| | Barium | 0.00256 | 0.0006 | 0.002 | 2.00 | | | 094377-009 | SW846 6020 |
| | Beryllium | 0.000456 | 0.0002 | 0.0005 | 0.004 | J | | 094377-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094377-009 | SW846 6020 |
| | Calcium | 45.9 | 0.060 | 0.200 | NE | | | 094377-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094377-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 094377-009 | SW846 6020 |
| | Copper | 0.000384 | 0.00035 | 0.001 | NE | J | 0.0047U | 094377-009 | SW846 6020 |
| | Iron | 0.0759 | 0.033 | 0.100 | NE | J | | 094377-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094377-009 | SW846 6020 |
| | Magnesium | 10.7 | 0.010 | 0.030 | NE | | | 094377-009 | SW846 6020 |
| | Manganese | 0.00341 | 0.001 | 0.005 | NE | J | | 094377-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094377-009 | SW846 7470 |
| | Nickel | 0.000571 | 0.0005 | 0.002 | NE | J | | 094377-009 | SW846 6020 |
| | Potassium | 3.74 | 0.080 | 0.300 | NE | | | 094377-009 | SW846 6020 |
| | Selenium | 0.0022 | 0.0015 | 0.005 | 0.050 | J | | 094377-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094377-009 | SW846 6020 |
| | Sodium | 56.3 | 0.400 | 1.25 | NE | | | 094377-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094377-009 | SW846 6020 |
| | Uranium | 0.00209 | 0.000067 | 0.0002 | 0.03 | | | 094377-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | UJ | 094377-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094377-009 | SW846 6020 |

Refer to footnotes on page 8A-33.

**Table 8A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW2** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 094371-009 | SW846 6020 |
| 15-Jul-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094371-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094371-009 | SW846 6020 |
| | Barium | 0.0478 | 0.0006 | 0.002 | 2.00 | | | 094371-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094371-009 | SW846 6020 |
| | Cadmium | 0.000131 | 0.00011 | 0.001 | 0.005 | J | | 094371-009 | SW846 6020 |
| | Calcium | 73.2 | 0.300 | 1.00 | NE | | | 094371-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094371-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 094371-009 | SW846 6020 |
| | Copper | 0.000935 | 0.00035 | 0.001 | NE | J | | 094371-009 | SW846 6020 |
| | Iron | 0.101 | 0.033 | 0.100 | NE | | | 094371-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094371-009 | SW846 6020 |
| | Magnesium | 15.1 | 0.010 | 0.030 | NE | | | 094371-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 094371-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094371-009 | SW846 7470 |
| | Nickel | 0.000641 | 0.0005 | 0.002 | NE | J | | 094371-009 | SW846 6020 |
| | Potassium | 1.34 | 0.080 | 0.300 | NE | | | 094371-009 | SW846 6020 |
| | Selenium | 0.00447 | 0.0015 | 0.005 | 0.050 | J | | 094371-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094371-009 | SW846 6020 |
| | Sodium | 45.2 | 0.080 | 0.250 | NE | | | 094371-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094371-009 | SW846 6020 |
| | Uranium | 0.00532 | 0.000067 | 0.0002 | 0.03 | | | 094371-009 | SW846 6020 |
| | Vanadium | 0.00895 | 0.001 | 0.005 | NE | | | 094371-009 | SW846 6010 |
| | Zinc | 0.00448 | 0.0035 | 0.010 | NE | J | | 094371-009 | SW846 6020 |

Refer to footnotes on page 8A-33.

**Table 8A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW1** | Aluminum | 0.0312 | 0.015 | 0.050 | NE | J | | 094774-009 | SW846 6020 |
| 10-Oct-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094774-009 | SW846 6020 |
| | Arsenic | 0.00205 | 0.0017 | 0.005 | 0.010 | J | | 094774-009 | SW846 6020 |
| | Barium | 0.00268 | 0.0006 | 0.002 | 2.00 | | | 094774-009 | SW846 6020 |
| | Beryllium | 0.000422 | 0.0002 | 0.0005 | 0.004 | J | | 094774-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094774-009 | SW846 6020 |
| | Calcium | 47.7 | 0.600 | 2.00 | NE | | | 094774-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094774-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 094774-009 | SW846 6020 |
| | Copper | 0.000668 | 0.00035 | 0.001 | NE | J | | 094774-009 | SW846 6020 |
| | Iron | 0.0619 | 0.033 | 0.100 | NE | J | | 094774-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094774-009 | SW846 6020 |
| | Magnesium | 9.70 | 0.010 | 0.030 | NE | | | 094774-009 | SW846 6020 |
| | Manganese | 0.00318 | 0.001 | 0.005 | NE | J | | 094774-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094774-009 | SW846 7470 |
| | Nickel | 0.000974 | 0.0005 | 0.002 | NE | J | | 094774-009 | SW846 6020 |
| | Potassium | 3.97 | 0.080 | 0.300 | NE | | | 094774-009 | SW846 6020 |
| | Selenium | 0.00248 | 0.0015 | 0.005 | 0.050 | J | | 094774-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094774-009 | SW846 6020 |
| | Sodium | 63.0 | 0.800 | 2.50 | NE | | | 094774-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094774-009 | SW846 6020 |
| | Uranium | 0.00203 | 0.000067 | 0.0002 | 0.03 | | | 094774-009 | SW846 6020 |
| | Vanadium | 0.00105 | 0.001 | 0.005 | NE | J | | 094774-009 | SW846 6010 |
| | Zinc | 0.00375 | 0.0035 | 0.010 | NE | J | | 094774-009 | SW846 6020 |

Refer to footnotes on page 8A-33.

**Table 8A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW2** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 094779-009 | SW846 6020 |
| 14-Oct-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094779-009 | SW846 6020 |
| | Arsenic | 0.00246 | 0.0017 | 0.005 | 0.010 | J | | 094779-009 | SW846 6020 |
| | Barium | 0.0446 | 0.0006 | 0.002 | 2.00 | | | 094779-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094779-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094779-009 | SW846 6020 |
| | Calcium | 73.8 | 0.600 | 2.00 | NE | | | 094779-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094779-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 094779-009 | SW846 6020 |
| | Copper | 0.000518 | 0.00035 | 0.001 | NE | J | | 094779-009 | SW846 6020 |
| | Iron | 0.0882 | 0.033 | 0.100 | NE | J | | 094779-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094779-009 | SW846 6020 |
| | Magnesium | 14.4 | 0.010 | 0.030 | NE | | | 094779-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 094779-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094779-009 | SW846 7470 |
| | Nickel | 0.00104 | 0.0005 | 0.002 | NE | J | | 094779-009 | SW846 6020 |
| | Potassium | 1.18 | 0.080 | 0.300 | NE | | | 094779-009 | SW846 6020 |
| | Selenium | 0.00467 | 0.0015 | 0.005 | 0.050 | J | | 094779-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094779-009 | SW846 6020 |
| | Sodium | 43.6 | 0.080 | 0.250 | NE | | | 094779-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094779-009 | SW846 6020 |
| | Uranium | 0.00486 | 0.000067 | 0.0002 | 0.03 | | | 094779-009 | SW846 6020 |
| | Vanadium | 0.0102 | 0.001 | 0.005 | NE | | | 094779-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094779-009 | SW846 6020 |

Refer to footnotes on page 8A-33.

**Table 8A-8** *(Concluded)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW2** (Duplicate) | Aluminum | ND | 0.015 | 0.050 | NE | U | | 094780-009 | SW846 6020 |
| 14-Oct-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094780-009 | SW846 6020 |
| | Arsenic | 0.00259 | 0.0017 | 0.005 | 0.010 | J | | 094780-009 | SW846 6020 |
| | Barium | 0.0461 | 0.0006 | 0.002 | 2.00 | | | 094780-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094780-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094780-009 | SW846 6020 |
| | Calcium | 76.6 | 0.600 | 2.00 | NE | | | 094780-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094780-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 094780-009 | SW846 6020 |
| | Copper | 0.000721 | 0.00035 | 0.001 | NE | J | | 094780-009 | SW846 6020 |
| | Iron | 0.0953 | 0.033 | 0.100 | NE | J | | 094780-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094780-009 | SW846 6020 |
| | Magnesium | 15.3 | 0.010 | 0.030 | NE | | | 094780-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 094780-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094780-009 | SW846 7470 |
| | Nickel | 0.00111 | 0.0005 | 0.002 | NE | J | | 094780-009 | SW846 6020 |
| | Potassium | 1.28 | 0.080 | 0.300 | NE | | | 094780-009 | SW846 6020 |
| | Selenium | 0.00468 | 0.0015 | 0.005 | 0.050 | J | | 094780-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094780-009 | SW846 6020 |
| | Sodium | 47.2 | 0.080 | 0.250 | NE | | | 094780-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094780-009 | SW846 6020 |
| | Uranium | 0.00515 | 0.000067 | 0.0002 | 0.03 | | | 094780-009 | SW846 6020 |
| | Vanadium | 0.00983 | 0.001 | 0.005 | NE | | | 094780-009 | SW846 6010 |
| | Zinc | 0.00377 | 0.0035 | 0.010 | NE | J | | 094780-009 | SW846 6020 |

Refer to footnotes on page 8A-33.

## Table 8A-9
## Summary of Cation Results,
## Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW1** | Calcium | 49.8 | 0.060 | 0.200 | NE | B | | 093341-017 | SW846 6020 |
| 16-Jan-13 | Magnesium | 11.3 | 0.010 | 0.030 | NE | | | 093341-017 | SW846 6020 |
| | Potassium | 4.84 | 0.080 | 0.300 | NE | | | 093341-017 | SW846 6020 |
| | Sodium | 72.5 | 0.400 | 1.25 | NE | | | 093341-017 | SW846 6020 |
| **CCBA-MW1** (Duplicate) | Calcium | 49.6 | 0.300 | 1.00 | NE | B | | 093342-017 | SW846 6020 |
| 16-Jan-13 | Magnesium | 11.4 | 0.010 | 0.030 | NE | | | 093342-017 | SW846 6020 |
| | Potassium | 4.84 | 0.080 | 0.300 | NE | | | 093342-017 | SW846 6020 |
| | Sodium | 68.8 | 0.400 | 1.25 | NE | | | 093342-017 | SW846 6020 |
| **CCBA-MW2** | Calcium | 81.8 | 0.300 | 1.00 | NE | B | | 093336-017 | SW846 6020 |
| 15-Jan-13 | Magnesium | 17.3 | 0.010 | 0.030 | NE | | | 093336-017 | SW846 6020 |
| | Potassium | 1.54 | 0.080 | 0.300 | NE | | | 093336-017 | SW846 6020 |
| | Sodium | 53.1 | 0.400 | 1.25 | NE | | | 093336-017 | SW846 6020 |
| | | | | | | | | | |
| **CCBA-MW1** | Calcium | 50.1 | 0.600 | 2.00 | NE | B, N | | 093873-017 | SW846 6020 |
| 24-Apr-13 | Magnesium | 10.6 | 0.010 | 0.030 | NE | | | 093873-017 | SW846 6020 |
| | Potassium | 4.32 | 0.080 | 0.300 | NE | | | 093873-017 | SW846 6020 |
| | Sodium | 66.4 | 0.800 | 2.50 | NE | N | | 093873-017 | SW846 6020 |
| **CCBA-MW2** | Calcium | 77.8 | 0.600 | 2.00 | NE | B, N | | 093878-017 | SW846 6020 |
| 25-Apr-13 | Magnesium | 15.1 | 0.010 | 0.030 | NE | | | 093878-017 | SW846 6020 |
| | Potassium | 1.42 | 0.080 | 0.300 | NE | | | 093878-017 | SW846 6020 |
| | Sodium | 50.0 | 0.800 | 2.50 | NE | N | | 093878-017 | SW846 6020 |
| **CCBA-MW2** (Duplicate) | Calcium | 76.2 | 0.600 | 2.00 | NE | B, N | | 093879-017 | SW846 6020 |
| 25-Apr-13 | Magnesium | 16.3 | 0.010 | 0.030 | NE | | | 093879-017 | SW846 6020 |
| | Potassium | 1.44 | 0.080 | 0.300 | NE | | | 093879-017 | SW846 6020 |
| | Sodium | 49.4 | 0.800 | 2.50 | NE | N | | 093879-017 | SW846 6020 |

Refer to footnotes on page 8A-33.

**Table 8A-9** *(Concluded)*
**Summary of Cation Results,**
**Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW1** | Calcium | 46.3 | 0.060 | 0.200 | NE | | | 094376-017 | SW846 6020 |
| 16-Jul-13 | Magnesium | 10.3 | 0.010 | 0.030 | NE | | | 094376-017 | SW846 6020 |
| | Potassium | 4.43 | 0.080 | 0.300 | NE | | | 094376-017 | SW846 6020 |
| | Sodium | 61.8 | 0.400 | 1.25 | NE | | | 094376-017 | SW846 6020 |
| **CCBA-MW1** (Duplicate) | Calcium | 48.9 | 0.060 | 0.200 | NE | | | 094377-017 | SW846 6020 |
| 16-Jul-13 | Magnesium | 11.0 | 0.010 | 0.030 | NE | | | 094377-017 | SW846 6020 |
| | Potassium | 4.45 | 0.080 | 0.300 | NE | | | 094377-017 | SW846 6020 |
| | Sodium | 60.6 | 0.400 | 1.25 | NE | | | 094377-017 | SW846 6020 |
| **CCBA-MW2** | Calcium | 69.9 | 0.300 | 1.00 | NE | | | 094371-017 | SW846 6020 |
| 15-Jul-13 | Magnesium | 15.5 | 0.010 | 0.030 | NE | | | 094371-017 | SW846 6020 |
| | Potassium | 1.42 | 0.080 | 0.300 | NE | | | 094371-017 | SW846 6020 |
| | Sodium | 43.7 | 0.080 | 0.250 | NE | | | 094371-017 | SW846 6020 |
| | | | | | | | | | |
| **CCBA-MW1** | Calcium | 46.5 | 0.600 | 2.00 | NE | | | 094774-017 | SW846 6020 |
| 10-Oct-13 | Magnesium | 10.2 | 0.010 | 0.030 | NE | | | 094774-017 | SW846 6020 |
| | Potassium | 4.25 | 0.080 | 0.300 | NE | | | 094774-017 | SW846 6020 |
| | Sodium | 65.6 | 0.800 | 2.50 | NE | | | 094774-017 | SW846 6020 |
| **CCBA-MW2** | Calcium | 77.0 | 0.600 | 2.00 | NE | | | 094779-017 | SW846 6020 |
| 14-Oct-13 | Magnesium | 15.1 | 0.010 | 0.030 | NE | | | 094779-017 | SW846 6020 |
| | Potassium | 1.27 | 0.080 | 0.300 | NE | | | 094779-017 | SW846 6020 |
| | Sodium | 45.7 | 0.080 | 0.250 | NE | | | 094779-017 | SW846 6020 |
| **CCBA-MW2** (Duplicate) | Calcium | 74.0 | 0.600 | 2.00 | NE | | | 094780-017 | SW846 6020 |
| 14-Oct-13 | Magnesium | 14.1 | 0.010 | 0.030 | NE | | | 094780-017 | SW846 6020 |
| | Potassium | 1.16 | 0.080 | 0.300 | NE | | | 094780-017 | SW846 6020 |
| | Sodium | 42.2 | 0.080 | 0.250 | NE | | | 094780-017 | SW846 6020 |

Refer to footnotes on page 8A-33.

## Table 8A-10
## Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results, Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW1** | Americium-241 | 10.8 ± 11.7 | 17.0 | 8.30 | NE | U | BD | 093341-033 | EPA 901.1 |
| 16-Jan-13 | Cesium-137 | 1.20 ± 4.12 | 2.92 | 1.41 | NE | U | BD | 093341-033 | EPA 901.1 |
| | Cobalt-60 | -0.119 ± 1.79 | 3.15 | 1.49 | NE | U | BD | 093341-033 | EPA 901.1 |
| | Potassium-40 | -6.29 ± 36.0 | 42.2 | 20.3 | NE | U | BD | 093341-033 | EPA 901.1 |
| | Gross Alpha | 2.09 | NA | NA | 15 pCi/L | NA | None | 093341-034 | EPA 900.0 |
| | Gross Beta | 7.85 ± 1.80 | 1.80 | 0.873 | 4mrem/yr | | J | 093341-034 | EPA 900.0 |
| | Uranium-233/234 | 1.86 ± 0.332 | 0.158 | 0.0702 | NE | | | 093341-035 | HASL-300 |
| | Uranium-235/236 | 0.0314 ± 0.0489 | 0.0889 | 0.0338 | NE | U | BD | 093341-035 | HASL-300 |
| | Uranium-238 | 0.630 ± 0.155 | 0.0658 | 0.0243 | NE | | | 093341-035 | HASL-300 |
| **CCBA-MW1** (Duplicate) | Americium-241 | -3.53 ± 13.5 | 20.1 | 9.85 | NE | U | BD | 093342-033 | EPA 901.1 |
| 16-Jan-13 | Cesium-137 | 0.0224 ± 2.21 | 3.85 | 1.85 | NE | U | BD | 093342-033 | EPA 901.1 |
| | Cobalt-60 | -0.0698 ± 2.21 | 3.90 | 1.84 | NE | U | BD | 093342-033 | EPA 901.1 |
| | Potassium-40 | -7.69 ± 46.7 | 51.8 | 24.7 | NE | U | BD | 093342-033 | EPA 901.1 |
| | Gross Alpha | 0.98 | NA | NA | 15 pCi/L | NA | None | 093342-034 | EPA 900.0 |
| | Gross Beta | 6.89 ± 1.67 | 1.81 | 0.880 | 4mrem/yr | | J | 093342-034 | EPA 900.0 |
| | Uranium-233/234 | 1.72 ± 0.314 | 0.160 | 0.0714 | NE | | | 093342-035 | HASL-300 |
| | Uranium-235/236 | -0.024 ± 0.052 | 0.0905 | 0.0344 | NE | U | BD | 093342-035 | HASL-300 |
| | Uranium-238 | 0.667 ± 0.158 | 0.067 | 0.0247 | NE | | | 093342-035 | HASL-300 |
| **CCBA-MW2** | Americium-241 | 0.904 ± 7.09 | 10.4 | 5.09 | NE | U | BD | 093336-033 | EPA 901.1 |
| 15-Jan-13 | Cesium-137 | -0.97 ± 2.21 | 3.08 | 1.49 | NE | U | BD | 093336-033 | EPA 901.1 |
| | Cobalt-60 | 0.836 ± 1.73 | 3.12 | 1.48 | NE | U | BD | 093336-033 | EPA 901.1 |
| | Potassium-40 | -19 ± 34.4 | 44.3 | 21.4 | NE | U | BD | 093336-033 | EPA 901.1 |
| | Gross Alpha | 0.15 | NA | NA | 15 pCi/L | NA | None | 093336-034 | EPA 900.0 |
| | Gross Beta | 5.00 ± 1.97 | 2.81 | 1.37 | 4mrem/yr | | J | 093336-034 | EPA 900.0 |
| | Uranium-233/234 | 7.02 ± 0.969 | 0.132 | 0.0586 | NE | | | 093336-035 | HASL-300 |
| | Uranium-235/236 | 0.151 ± 0.0671 | 0.0742 | 0.0282 | NE | | J | 093336-035 | HASL-300 |
| | Uranium-238 | 1.70 ± 0.286 | 0.055 | 0.0203 | NE | | | 093336-035 | HASL-300 |

Refer to footnotes on page 8A-33.

**Table 8A-10** *(Continued)*
**Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results,**
**Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW1** | Americium-241 | 9.60 ± 11.3 | 16.3 | 8.03 | NE | U | BD | 093873-033 | EPA 901.1 |
| 24-Apr-13 | Cesium-137 | 1.10 ± 2.09 | 3.11 | 1.50 | NE | U | BD | 093873-033 | EPA 901.1 |
| | Cobalt-60 | -1.13 ± 2.90 | 3.43 | 1.63 | NE | U | BD | 093873-033 | EPA 901.1 |
| | Potassium-40 | -8.14 ± 33.2 | 42.7 | 20.3 | NE | U | BD | 093873-033 | EPA 901.1 |
| | Gross Alpha | 2.11 | NA | NA | 15 pCi/L | NA | None | 093873-034 | EPA 900.0 |
| | Gross Beta | 4.68 ± 1.33 | 1.62 | 0.788 | 4mrem/yr | | J | 093873-034 | EPA 900.0 |
| | Uranium-233/234 | 2.21 ± 0.385 | 0.179 | 0.0794 | NE | | | 093873-035 | HASL-300 |
| | Uranium-235/236 | 0.0721 ± 0.0566 | 0.110 | 0.0426 | NE | U | BD | 093873-035 | HASL-300 |
| | Uranium-238 | 0.663 ± 0.166 | 0.100 | 0.0402 | NE | | | 093873-035 | HASL-300 |
| **CCBA-MW2** | Americium-241 | -1.55 ± 17.3 | 26.2 | 12.8 | NE | U | BD | 093878-033 | EPA 901.1 |
| 25-Apr-13 | Cesium-137 | 0.876 ± 1.99 | 3.13 | 1.50 | NE | U | BD | 093878-033 | EPA 901.1 |
| | Cobalt-60 | -0.74 ± 2.87 | 3.20 | 1.50 | NE | U | BD | 093878-033 | EPA 901.1 |
| | Potassium-40 | -22.7 ± 33.0 | 42.0 | 20.0 | NE | U | BD | 093878-033 | EPA 901.1 |
| | Gross Alpha | 1.44 | NA | NA | 15 pCi/L | NA | None | 093878-034 | EPA 900.0 |
| | Gross Beta | 4.72 ± 1.24 | 1.37 | 0.663 | 4mrem/yr | | J | 093878-034 | EPA 900.0 |
| | Uranium-233/234 | 7.73 ± 1.03 | 0.0849 | 0.0377 | NE | | | 093878-035 | HASL-300 |
| | Uranium-235/236 | 0.124 ± 0.0507 | 0.0521 | 0.0203 | NE | | J | 093878-035 | HASL-300 |
| | Uranium-238 | 1.91 ± 0.290 | 0.0476 | 0.0191 | NE | | | 093878-035 | HASL-300 |
| **CCBA-MW2** (Duplicate) | Americium-241 | 4.70 ± 11.7 | 18.6 | 9.09 | NE | U | BD | 093879-033 | EPA 901.1 |
| 25-Apr-13 | Cesium-137 | -2.28 ± 2.14 | 2.97 | 1.42 | NE | U | BD | 093879-033 | EPA 901.1 |
| | Cobalt-60 | -0.803 ± 1.84 | 3.03 | 1.42 | NE | U | BD | 093879-033 | EPA 901.1 |
| | Potassium-40 | -25.5 ± 38.8 | 43.2 | 20.6 | NE | U | BD | 093879-033 | EPA 901.1 |
| | Gross Alpha | 6.70 | NA | NA | 15 pCi/L | NA | None | 093879-034 | EPA 900.0 |
| | Gross Beta | 2.80 ± 1.03 | 1.40 | 0.679 | 4mrem/yr | | J | 093879-034 | EPA 900.0 |
| | Uranium-233/234 | 7.87 ± 1.07 | 0.0964 | 0.0429 | NE | | | 093879-035 | HASL-300 |
| | Uranium-235/236 | 0.151 ± 0.0581 | 0.0592 | 0.023 | NE | | J | 093879-035 | HASL-300 |
| | Uranium-238 | 1.78 ± 0.282 | 0.0541 | 0.0217 | NE | | | 093879-035 | HASL-300 |

Refer to footnotes on page 8A-33.

**Table 8A-10** *(Continued)*
**Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results,**
**Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW1** | Americium-241 | 4.75 ± 9.29 | 14.0 | 6.86 | NE | U | BD | 094376-033 | EPA 901.1 |
| 16-Jul-13 | Cesium-137 | 1.66 ± 1.77 | 2.86 | 1.38 | NE | U | BD | 094376-033 | EPA 901.1 |
| | Cobalt-60 | 0.201 ± 1.52 | 2.70 | 1.27 | NE | U | BD | 094376-033 | EPA 901.1 |
| | Potassium-40 | -0.298 ± 33.0 | 40.1 | 19.3 | NE | U | BD | 094376-033 | EPA 901.1 |
| | Gross Alpha | -0.58 | NA | NA | 15 pCi/L | NA | None | 094376-034 | EPA 900.0 |
| | Gross Beta | 3.93 ± 1.21 | 1.52 | 0.736 | 4mrem/yr | | J | 094376-034 | EPA 900.0 |
| | Uranium-233/234 | 2.32 ± 0.351 | 0.0845 | 0.037 | NE | | | 094376-035 | HASL-300 |
| | Uranium-235/236 | 0.0529 ± 0.0347 | 0.0518 | 0.0194 | NE | | J | 094376-035 | HASL-300 |
| | Uranium-238 | 0.720 ± 0.140 | 0.0733 | 0.0314 | NE | | | 094376-035 | HASL-300 |
| **CCBA-MW1** (Duplicate) | Americium-241 | 8.04 ± 16.2 | 24.6 | 12.0 | NE | U | BD | 094377-033 | EPA 901.1 |
| 16-Jul-13 | Cesium-137 | 1.55 ± 1.85 | 2.91 | 1.39 | NE | U | BD | 094377-033 | EPA 901.1 |
| | Cobalt-60 | -0.72 ± 1.83 | 3.05 | 1.43 | NE | U | BD | 094377-033 | EPA 901.1 |
| | Potassium-40 | 10.9 ± 32.2 | 45.5 | 21.8 | NE | U | BD | 094377-033 | EPA 901.1 |
| | Gross Alpha | -0.81 | NA | NA | 15 pCi/L | NA | None | 094377-034 | EPA 900.0 |
| | Gross Beta | 4.63 ± 1.09 | 1.02 | 0.488 | 4mrem/yr | | J | 094377-034 | EPA 900.0 |
| | Uranium-233/234 | 2.30 ± 0.355 | 0.0908 | 0.0397 | NE | | | 094377-035 | HASL-300 |
| | Uranium-235/236 | 0.0465 ± 0.0342 | 0.0556 | 0.0208 | NE | U | BD | 094377-035 | HASL-300 |
| | Uranium-238 | 0.745 ± 0.146 | 0.0788 | 0.0337 | NE | | | 094377-035 | HASL-300 |
| **CCBA-MW2** | Americium-241 | -3.57 ± 6.02 | 9.53 | 4.66 | NE | U | BD | 094371-033 | EPA 901.1 |
| 15-Jul-13 | Cesium-137 | -0.387 ± 2.51 | 2.76 | 1.32 | NE | U | BD | 094371-033 | EPA 901.1 |
| | Cobalt-60 | -0.0207 ± 2.93 | 2.70 | 1.27 | NE | U | BD | 094371-033 | EPA 901.1 |
| | Potassium-40 | 4.44 ± 30.8 | 25.7 | 12.0 | NE | U | BD | 094371-033 | EPA 901.1 |
| | Gross Alpha | -1.03 | NA | NA | 15 pCi/L | NA | None | 094371-034 | EPA 900.0 |
| | Gross Beta | 2.87 ± 1.18 | 1.69 | 0.820 | 4mrem/yr | | J | 094371-034 | EPA 900.0 |
| | Uranium-233/234 | 7.80 ± 1.06 | 0.110 | 0.0432 | NE | | | 094371-035 | HASL-300 |
| | Uranium-235/236 | 0.113 ± 0.0594 | 0.0674 | 0.0252 | NE | | J | 094371-035 | HASL-300 |
| | Uranium-238 | 1.71 ± 0.284 | 0.0956 | 0.0409 | NE | | | 094371-035 | HASL-300 |

Refer to footnotes on page 8A-33.

**Table 8A-10** *(Concluded)*
**Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results, Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CCBA-MW1** | Americium-241 | 7.67 ± 12.8 | 19.5 | 9.54 | NE | U | BD | 094774-033 | EPA 901.1 |
| 10-Oct-13 | Cesium-137 | 0.377 ± 3.88 | 4.06 | 1.95 | NE | U | BD | 094774-033 | EPA 901.1 |
| | Cobalt-60 | -1.7 ± 2.51 | 4.08 | 1.91 | NE | U | BD | 094774-033 | EPA 901.1 |
| | Potassium-40 | 1.15 ± 40.9 | 56.1 | 26.8 | NE | U | BD | 094774-033 | EPA 901.1 |
| | Gross Alpha | 1.98 | NA | NA | 15 pCi/L | NA | None | 094774-034 | EPA 900.0 |
| | Gross Beta | 5.38 ± 1.56 | 1.98 | 0.965 | 4mrem/yr | | J | 094774-034 | EPA 900.0 |
| | Uranium-233/234 | 2.04 ± 0.334 | 0.125 | 0.0554 | NE | | | 094774-035 | HASL-300 |
| | Uranium-235/236 | 0.00 ± 0.0404 | 0.0598 | 0.0211 | NE | U | BD | 094774-035 | HASL-300 |
| | Uranium-238 | 0.637 ± 0.146 | 0.105 | 0.0451 | NE | | | 094774-035 | HASL-300 |
| **CCBA-MW2** | Americium-241 | 5.75 ± 16.8 | 25.7 | 12.6 | NE | U | BD | 094779-033 | EPA 901.1 |
| 14-Oct-13 | Cesium-137 | 0.515 ± 1.73 | 3.11 | 1.49 | NE | U | BD | 094779-033 | EPA 901.1 |
| | Cobalt-60 | 0.0218 ± 1.67 | 2.94 | 1.37 | NE | U | BD | 094779-033 | EPA 901.1 |
| | Potassium-40 | 26.7 ± 39.7 | 29.2 | 13.6 | NE | U | BD | 094779-033 | EPA 901.1 |
| | Gross Alpha | -0.55 | NA | NA | 15 pCi/L | NA | None | 094779-034 | EPA 900.0 |
| | Gross Beta | 3.69 ± 1.31 | 1.82 | 0.890 | 4mrem/yr | | J | 094779-034 | EPA 900.0 |
| | Uranium-233/234 | 7.82 ± 1.03 | 0.0787 | 0.0349 | NE | | | 094779-035 | HASL-300 |
| | Uranium-235/236 | 0.127 ± 0.0526 | 0.0376 | 0.0133 | NE | | | 094779-035 | HASL-300 |
| | Uranium-238 | 1.62 ± 0.249 | 0.0658 | 0.0284 | NE | | | 094779-035 | HASL-300 |
| **CCBA-MW2** (Duplicate) | Americium-241 | 4.39 ± 11.7 | 18.5 | 9.05 | NE | U | BD | 094780-033 | EPA 901.1 |
| 14-Oct-13 | Cesium-137 | 0.835 ± 1.74 | 2.96 | 1.42 | NE | U | BD | 094780-033 | EPA 901.1 |
| | Cobalt-60 | 2.17 ± 2.04 | 3.49 | 1.65 | NE | U | BD | 094780-033 | EPA 901.1 |
| | Potassium-40 | -15.2 ± 38.3 | 43.6 | 20.9 | NE | U | BD | 094780-033 | EPA 901.1 |
| | Gross Alpha | 2.82 | NA | NA | 15 pCi/L | NA | None | 094780-034 | EPA 900.0 |
| | Gross Beta | 2.87 ± 1.25 | 1.83 | 0.894 | 4mrem/yr | | J | 094780-034 | EPA 900.0 |
| | Uranium-233/234 | 7.16 ± 0.933 | 0.0699 | 0.031 | NE | | | 094780-035 | HASL-300 |
| | Uranium-235/236 | 0.269 ± 0.0713 | 0.0334 | 0.0118 | NE | | | 094780-035 | HASL-300 |
| | Uranium-238 | 1.45 ± 0.222 | 0.0585 | 0.0252 | NE | | | 094780-035 | HASL-300 |

Refer to footnotes on page 8A-33.

## Table 8A-11
## Summary of Field Water Quality Measurements[h],
## Solid Waste Management Units 8/58 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Sample Date | Temperature (°C) | Specific Conductivity (µmhos/cm) | Oxidation Reduction Potential (mV) | pH | Turbidity (NTU) | Dissolved Oxygen (% Sat) | Dissolved Oxygen (mg/L) |
|---|---|---|---|---|---|---|---|---|
| **CCBA-MW1** | 16-Jan-13 | 13.20 | 494 | 211.7 | 6.34 | 0.57 | 30.3 | 3.17 |
| **CCBA-MW2** | 15-Jan-13 | 12.34 | 573 | 178.3 | 7.28 | 0.40 | 57.4 | 6.13 |
| | | | | | | | | |
| **CCBA-MW1** | 24-Apr-13 | 14.31 | 493 | 230.0 | 6.44 | 1.15 | 32.0 | 3.24 |
| **CCBA-MW2** | 25-Apr-13 | 15.53 | 572 | 252.1 | 7.35 | 0.22 | 62.8 | 6.23 |
| | | | | | | | | |
| **CCBA-MW1** | 16-Jul-13 | 17.72 | 490 | 142.0 | 6.75 | 0.70 | 33.4 | 3.17 |
| **CCBA-MW2** | 15-Jul-13 | 17.13 | 579 | 130.3 | 7.70 | 0.36 | 65.7 | 6.32 |
| | | | | | | | | |
| **CCBA-MW1** | 10-Oct-13 | 16.83 | 579 | 171.7 | 6.61 | 0.56 | 33.7 | 3.26 |
| **CCBA-MW2** | 14-Oct-13 | 16.82 | 670 | 160.0 | 7.54 | 0.42 | 65.3 | 6.32 |

Refer to footnotes on page 8A-33.

## *Footnotes for Solid Waste Management Units 8/58 Analytical Results Tables*

% = percent.
CFR = Code of Federal Regulations.
EPA = U.S. Environmental Protection Agency.
HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
ID = Identifier.
µg/L = micrograms per liter.
mg/L = milligrams per liter.
mrem/yr = millirem per year.
No. = Number.
pCi/L = picocuries per liter.
RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine.
Tetryl = methyl-2,4,6-trinitrophenylnitramine.

**[a]Result**

Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 1-4).

**Bold** = Value exceeds the established MCL.
ND = not detected (at MDL). Activities of zero or less are considered to be not detected.

**[b]MDL or MDA**

The MDL applies to Table 8A-1 through 8A-11. MDA applies to Table 8A-10.

MDA = The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.
MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA = Not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

**[c]PQL or Critical Level**

The PQL applies to Table 8A-1 through 8A-11. Critical level applies to Table 8A-10.

Critical level = The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA = Not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

**[d]MCL**

MCL = Maximum contaminant level. MCLs were established by the EPA Office of Water, National Primary Water Regulations (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- Gross Alpha particle activity, excluding total uranium = 15 pCi/L (40 CFR Parts 9, 141, and 142, Table 1-4).
- Any combination of Beta and/or Gamma emitting radionuclides = 4 mrem/yr (as dose rate).

NE = not established.

**[e]Lab Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

B = The analyte was detected in the blank above the effective MDL.
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
N = Results associated with a spike analysis that was outside control limits.
NA = Not applicable.
U = Analyte is absent or below the MDL.

## *Footnotes for Solid Waste Management Units 8/58 Analytical Results Tables (Concluded)*

**[f]Validation Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = The associated value is an estimated quantity.
J+ = The associated numerical value is an estimated quantity with a suspected positive bias.
None = No data validation for corrected gross alpha activity.
U = The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
UJ = The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

**[g]Analytical Method**

Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.
DOE, 1990, "Environmental Measurements Laboratory Procedures Manual," 27th ed., Vol. 1, Rev. 1992, HASL-300.
EPA, 1999 (and updates), "Perchlorate in Drinking Water Using Ion Chromatography," EPA 815/R-00-014.
EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.
EPA, 1984, "Methods for Chemical Analysis of Water and Wastes." EPA 600-4-79-020.
EPA, 1980, "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.

DOE = U.S. Department of Energy.
HASL = Health and Safety Laboratory.
SM = Standard Method.

**[h]Field Water Quality Measurements**

Field measurements collected prior to sampling.

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

# Attachment 8B
# Solid Waste Management Units 8/58
# Plots

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# Attachment 8B Plots

8B-1 Fluoride Concentrations, CCBA-MW1 ..... 8B-5

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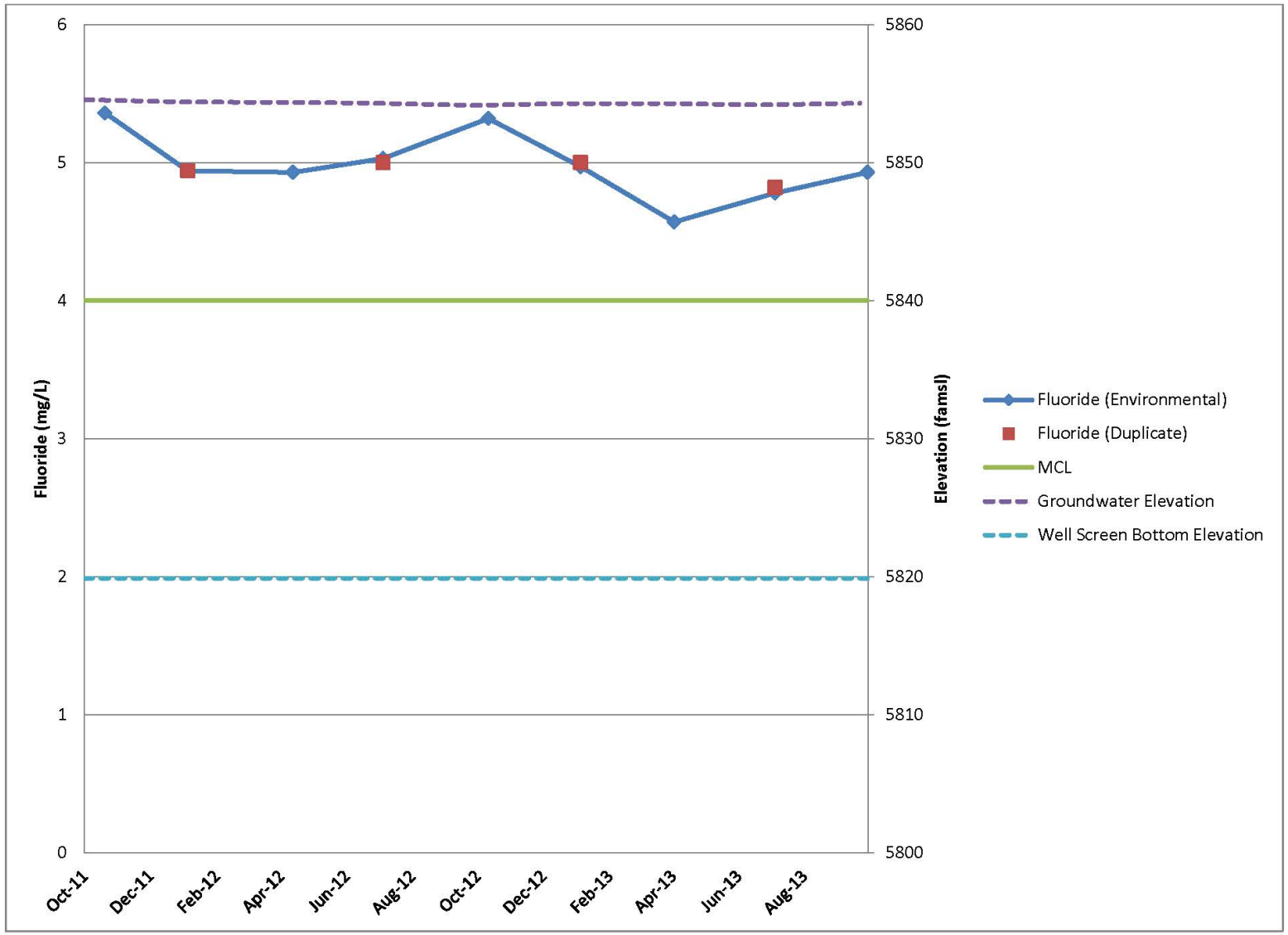


**Figure 8B-1. Fluoride Concentrations, CCBA-MW1**

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# Attachment 8C
# Solid Waste Management Units 8/58
# Hydrographs

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# Attachment 8C Hydrographs

8C-1 SWMUs 8/58 Study Area Wells ..... 8C-5

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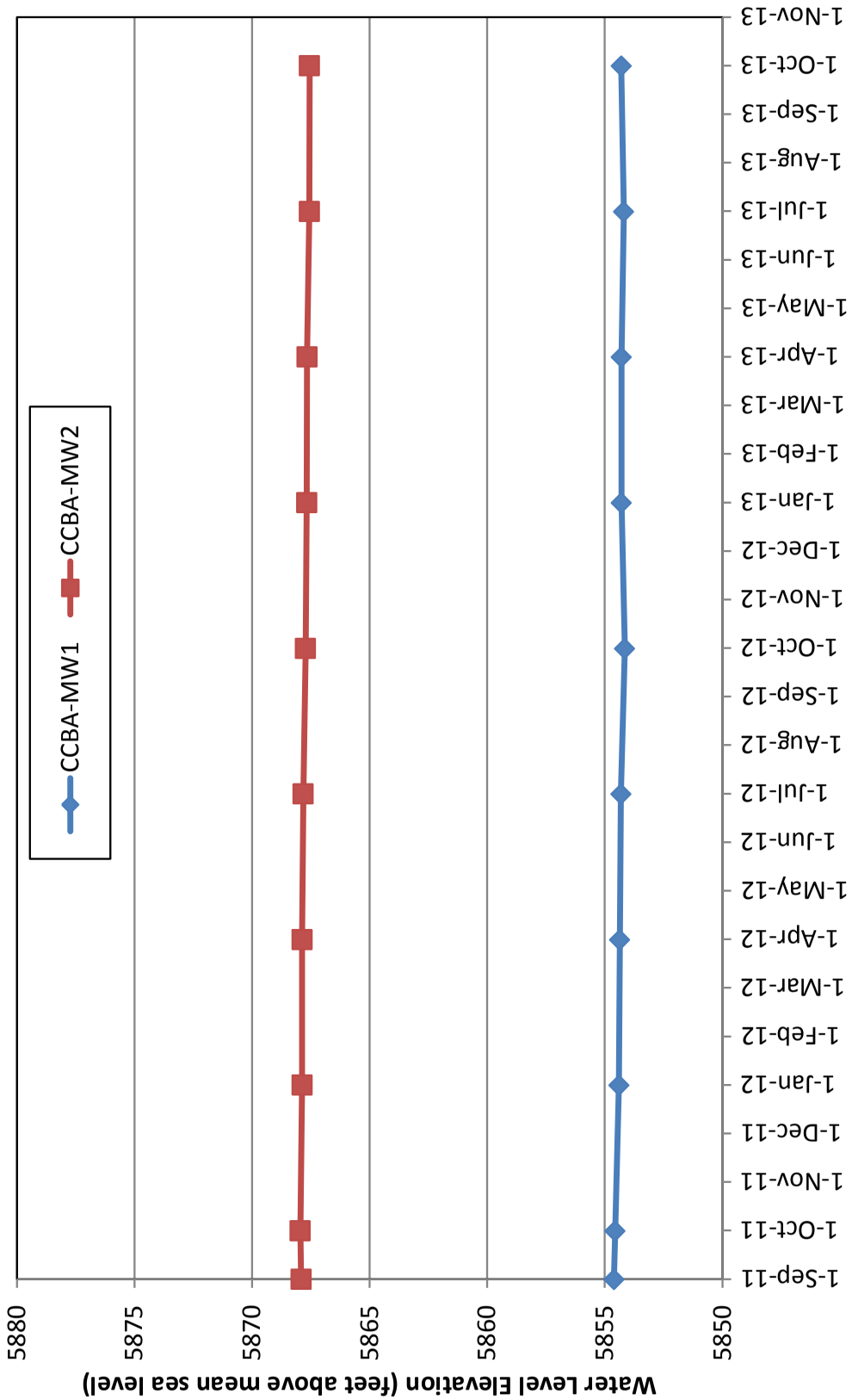


**Figure 8C-1. SWMUs 8/58 Study Area Wells**

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# 9.0 Solid Waste Management Unit 49

## 9.1 Introduction

Drain and Septic System (DSS) Solid Waste Management Unit (SWMU) 49 is located in Lurance Canyon of the Manzanita Mountains (Figure 9-1). Results for groundwater samples from the fractured bedrock have historically been reported as nondetected, or were detected at background concentrations for the constituents of concern (COCs).

### 9.1.1 Location

The Coyote Canyon Test Area at Sandia National Laboratories, New Mexico (SNL/NM) is located in the eastern portion of Kirtland Air Force Base (KAFB). The SNL/NM facility is a government-owned, contractor-operated, multi-program laboratory overseen by the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) through the Sandia Field Office in Albuquerque, New Mexico. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM under Contract DE-AC04-94AL85000.

SWMU 49, the Building 9820 Drains, is located within the boundaries of the U.S. Forest Service Withdrawn Area on federally owned land controlled by KAFB and permitted to the DOE/NNSA. The site is located in Lurance Canyon, one of three canyons that are located on the eastern edge of the Coyote Canyon Test Area and within the Manzanita Mountains. Two other canyons, Madera Canyon and Sol se Mete Canyon, intersect Lurance Canyon to the east of SWMU 49. These three canyons form the headwaters of Arroyo del Coyote. The Manzanita Mountains border the eastern margin of the Albuquerque Basin, and the terrain near the site is characterized by large topographic relief exceeding 500 feet (ft). Lurance Canyon, deeply incised into Paleozoic and Precambrian rocks, provides local westward drainage of ephemeral surface-water flows to Arroyo del Coyote.

### 9.1.2 Site History

SWMU 49 consists of two former ground-surface discharge areas that cover a combined 1,584 square feet (approximately 0.04 acres) near inactive Building 9820 (Figure 9-1). The first area (SWMU 49A) is located on the west side of the building where a former trailer was used as a darkroom. Photo-processing chemicals may have been discharged there. The second area (SWMU 49B) is located approximately 80 ft south of the building where a drainpipe discharged. Wastewater from the building floor drains and a sink discharged there. Building 9820 was constructed in 1958 and used until 1988 (Table 9-1) (SNL June 1996). Due to its remote location, Building 9820 was not connected to the base-wide water supply or sanitary waste systems. A tanker truck was used to haul nonpotable water to a 1,000-gallon storage tank at the building.

Environmental concern about SWMU 49 is based on the potential release of COCs in wastewater discharged to the ground surface at the trailer and the drainpipe outfall. The site is located in a side canyon that slopes to the northwest and drains into the ephemeral channel of Lurance Canyon approximately 1,750 ft north of the site. Coyote Springs is located approximately 6,000 ft west of the site. The surrounding area is unpaved and sparsely vegetated by bunch grasses, cacti, junipers, and pine trees. No storm sewers are used to direct surface water away from the site.

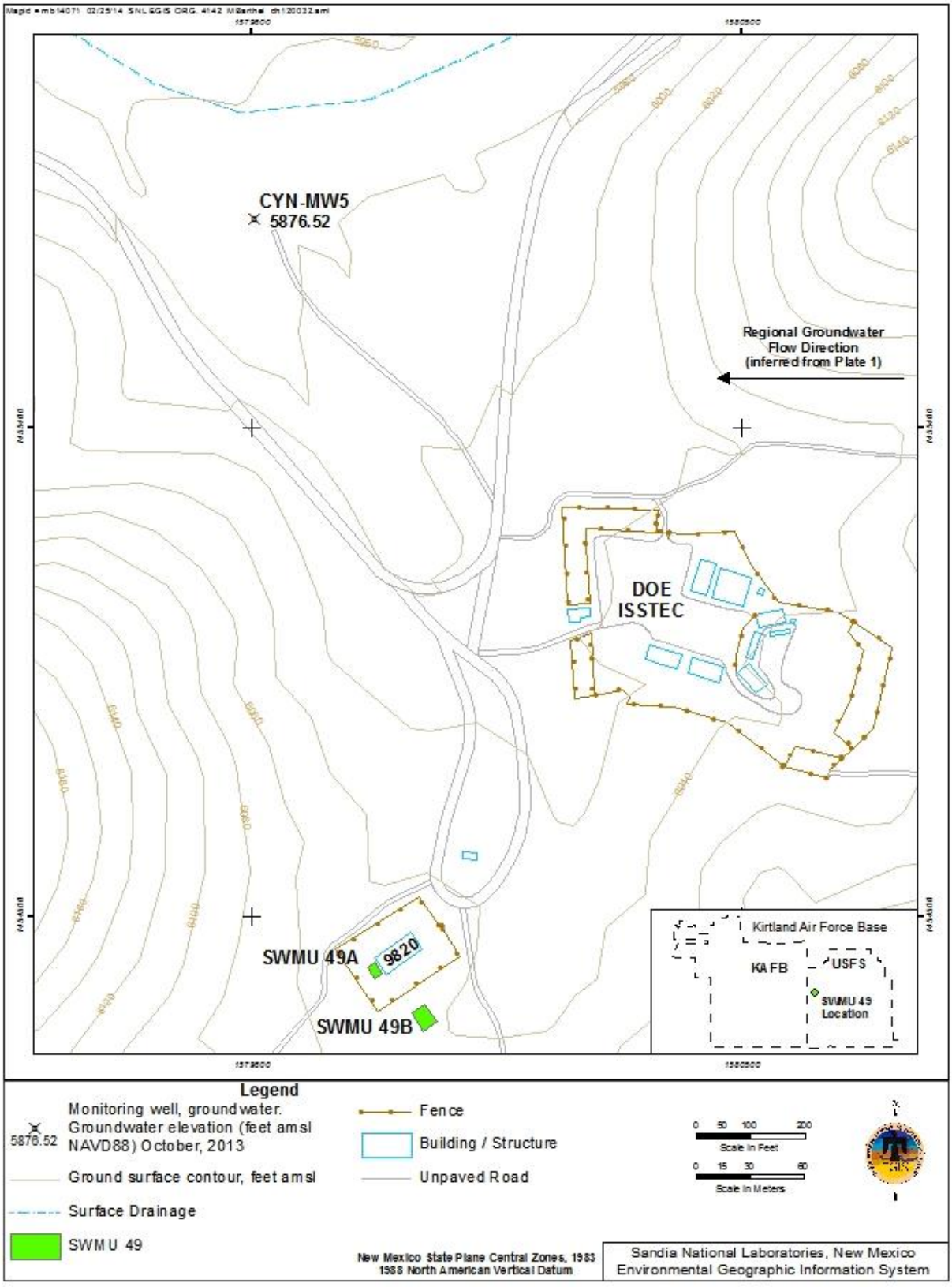


**Figure 9-1. Location and Groundwater Elevation at SWMU 49**

**Table 9-1. Historical Timeline of SWMU 49**

| Month | Year | Event | Reference |
|---|---|---|---|
| -- | 1958 | Building 9820 and drainpipe constructed. | SNL June 1996 |
| September | 1987 | DSS SWMU 49 first identified as a potential release site in the September 1987 Comprehensive Environmental Assessment and Response Program Report. | SNL June 1996 |
| -- | 1988 | Use of Building 9820 discontinued. | SNL June 1996 |
| March | 1993 | Septic Tanks and Drainfields (OU 1295) RCRA Facility Investigation Work Plan submitted to the EPA. | SNL March 1993 |
| -- | 1993 -1995 | Field Investigations completed at SWMU 49. | SNL June 1996 |
| June | 1996 | NFA proposal for SWMU 49 submitted to the NMED. | SNL June 1996 |
| June | 1998 | NMED responded with an RSI on the SWMU 49 NFA proposal. | NMED June 1998 |
| November | 1998 | Response submitted to the first NMED RSI for SWMU 49. | SNL November 1998 |
| October | 1998 | A SAP describing technical procedures to be used to complete environmental investigations at the SWMU and AOC sites submitted to the NMED. | SNL October 1999 |
| January | 2000 | October 1999 SAP approved by the NMED. | NMED January 2000 |
| June | 2000 | NMED issued a second RSI on the SWMU 49 NFA proposal and submitted the first response for SWMU 49. | NMED June 2000 |
| September | 2000 | Response submitted to the second NMED RSI for SWMU 49. | SNL September 2000 |
| August | 2001 | Groundwater monitoring well CYN-MW5 is installed downslope of SWMU 49. | SNL June 2005 |
| November | 2001 | FIP documenting specific investigation procedures to be completed at DSS AOC sites submitted to the NMED. | SNL November 2001 |
| February | 2002 | The DSS FIP approved by the NMED. | NMED February 2002 |
| April | 2004 | Completion of eight quarters of groundwater sampling for monitoring well CYN-MW5. | SNL June 2005 |
| May | 2004 | Well CYN-MW5 incorporated into the Burn Site Groundwater Study Area. | SNL October 2005 |
| June | 2005 | A third RSI response submitted to the NMED that included the results of fieldwork completed at SWMU 49 since the June 1996 NFA report and an updated risk assessment. | SNL June 2005 |
| September | 2005 | NMED issues Certificate of Completion for CAC without Controls for SWMU 49. | NMED September 2005 |
| March | 2006 | Request for Class III Permit Modification submitted. Public Notice meeting published. Documents supporting NFA (CAC) for DSS SWMU 49 compiled. | SNL March 2006 |
| February | 2005 | NMED states that well CYN-MW5 is too distant to be considered part of the Burn Site Groundwater Study Area. Groundwater sampling discontinued. | NMED February 2005 |

**Table 9-1. Historical Timeline of SWMU 49** *(Concluded)*

| Month | Year | Event | Reference |
|---|---|---|---|
| April | 2010 | NMED requires that well CYN-MW5 be sampled annually as part of LTS requirements for SWMU 49. | NMED April 2010 |
| March | 2011 | Well CYN-MW5 sampled as part of LTS. | SNL February 2011 |
| January | 2012 | Well CYN-MW5 sampled as part of LTS. | SNL January 2012 |
| January | 2013 | Well CYN-MW5 sampled as part of LTS. | SNL December 2012 |

**NOTES:**
AOC = Area of Concern.
CAC = Corrective Action Complete.
CYN = Canyons.
DSS = Drain and Septic System.
EPA = U.S. Environmental Protection Agency.
FIP = Field Implementation Plan.
LTS = Long-Term Stewardship.
MW = Monitoring Well.
NFA = No Further Action.
NMED = New Mexico Environment Department.
OU = Operable Unit.
RCRA = Resource Conservation and Recovery Act.
RSI = Request for Supplemental Information.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories.
SWMU = Solid Waste Management Unit.

Building 9820 is a small, one-story building that was used for the synthesis of high explosive (HE) compounds, photo-processing, woodworking, and metal machining in support of weapons testing. Five floor drains and a hand sink were connected to a 4-inch diameter drain line. The machine shop opened in the mid-1960s and may have discharged solvents into the floor drains. Small quantities of photographic film were processed from the mid-1970s to 1988 inside the building and also in the darkroom trailer. Occasional washing of nickel-cadmium batteries with dilute acetic acid may have discharged up to 1 gallon of wastewater into the building floor drains or sink. Based on the activities performed at the building and trailer, the primary COCs for SWMU 49 are HE compounds (e.g., Baratol), photo-processing chemicals (e.g., fixers and developers), various metals (i.e., cadmium, hexavalent chromium, cyanide, and silver), and volatile organic compounds (VOCs; e.g., methanol, toluene, and trichloroethene).

Groundwater monitoring well CYN-MW5 is located approximately 1,350 ft to the north and downslope of Building 9820. The ground surface at the wellhead is approximately 60 ft lower than the elevation near the building. The well is located near a small arroyo that directs storm water from the site into the channel in Lurance Canyon. The well is screened in fractured Precambrian quartzite at a depth of 135 to 155 ft below ground surface (bgs) (SNL June 2005). The primary channel of the Lurance Canyon arroyo is located about 350 ft to the north of the well.

### 9.1.3 Monitoring History

Groundwater monitoring well CYN-MW5 was installed in August 2001 as part of the DSS investigation of SWMU 49. Eight sampling events occurred during the initial DSS investigation (July 2002 through April 2004) and the results were submitted to the New Mexico Environment Department (NMED) in the SNL/NM Environmental Restoration (ER) Project's response to the third Request for Supplemental Information (SNL June 2005). The well has been sampled sporadically since then.

Following the April 2004 sampling event, monitoring well CYN-MW5 was incorporated into the Burn Site Groundwater (BSG) monitoring network as a downgradient well. The analytical results for monitoring well CYN-MW5 were reported in the BSG chapter of the Annual Groundwater Monitoring Reports for several years (SNL April 2004). However, in its February 2005 letter, the NMED stated that it "will not consider monitoring well CYN-MW5 as a downgradient well because it is located over two miles away from the Burn Site" (NMED February 2005). Based on the NMED determination, monitoring well CYN-MW5 has not been sampled as part of the BSG investigation since June 2005. Most recently, sampling at monitoring well CYN-MW5 has been incorporated into the SNL/NM Long-Term Stewardship groundwater sampling program in response to other NMED requirements (NMED April 2010).

### 9.1.4 Current Monitoring Network

Monitoring well CYN-MW5 is the only groundwater monitoring well in the SWMU 49 study area. This well was installed in August 2001 and is screened from 135 to 155 ft bgs in fractured Precambrian quartzite.

### 9.1.5 Summary of Calendar Year 2013 Activities

The following activities took place for the SWMU 49 investigation during Calendar Year (CY) 2013 (January through December 2013):

- Annual groundwater sampling was conducted at monitoring well CYN-MW5 in January 2013.
- Periodic groundwater elevation data were obtained from monitoring well CYN-MW5.
- Tables of analytical results (Attachment 9A) and a hydrograph (Attachment 9B) were prepared in support of this report.

### 9.1.6 Summary of Future Activities

The following activities are planned for SWMU 49 during CY 2014:

- Annual groundwater sampling will be conducted at monitoring well CYN-MW5.
- Periodic groundwater elevation data will be obtained from monitoring well CYN-MW5.

### 9.1.7 Current Conceptual Model

The following sections present an updated discussion of the hydrogeologic regime, conceptual site model, and contaminant findings for SWMU 49.

#### 9.1.7.1 Regional Hydrogeologic Conditions

SWMU 49 is located in a side canyon on the south side of Lurance Canyon (Plate 1). Alluvium covers the canyon floor. The surrounding ridges consist of Precambrian outcrops (e.g., granite, gneiss, and quartzite) and Paleozoic outcrops (e.g., limestone, sandstone, and conglomerate). The outcrops are sporadically covered by colluvium. The base-wide potentiometric surface map (Plate 1) shows that groundwater flow in fractured bedrock is generally toward the west. The regional groundwater flow direction is depicted in Figure 9-1. No potable water-supply wells are located within 5 miles of the site.

### 9.1.7.2 Hydrogeologic Conditions at SWMU 49

SWMU 49 consists of two small areas (SWMUs 49A and 49B) near Building 9820 where wastewater discharged from 1958 to 1988 (Figure 9-1). The site is covered by colluvium that is underlain by bedrock. Building 9820 is situated at an elevation of approximately 6,040 ft above mean sea level (amsl). Overall, the terrain slopes northwest and west. No perennial surface-water features such as springs are located within 1 mile of SWMU 49. Monitoring well CYN-MW5 is located approximately 1,350 ft to the north and downslope of Building 9820. The ground surface at the wellhead is approximately 60 ft lower than at the building.

The amount of precipitation available for groundwater recharge at SWMU 49 is minimal due to scant rainfall and high evapotranspiration rates. Summer (monsoonal) thunderstorms are responsible for the majority of rainfall. The average rainfall, as measured at the nearest active rain gauge (the National Weather Service station at the Albuquerque International Sunport) during the period from 1915 through 2005 was 8.67 inches per year (WRCC-DRI 2012). The station is located 10 miles northwest of SWMU 49 at an elevation of 5,310 ft amsl. By extrapolation of the precipitation model presented in SNL/NM conceptual model of groundwater flow and contaminant transport at the canyon area (SNL May 2004), the average annual precipitation for SWMU 49, where the elevation is approximately 6,040 ft amsl, is estimated to be approximately 11.5 inches per year. Intense sunlight and low humidity throughout much of the year creates high rates of evapotranspiration. Estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL February 1998).

In 2001, a location downslope of SWMU 49 was agreed on by NMED, DOE/NNSA and Sandia for the installation of groundwater monitoring well CYN-MW5. The well was installed in August 2001 using the air-rotary casing hammer technique, and the borehole was temporarily cased to 50 ft bgs. Dry alluvium consisting of silty sand and fine-to-coarse gravel was encountered from the ground surface to 90 ft bgs. Fractured Precambrian quartzite was encountered from 90 ft bgs to the borehole total depth of 190 ft bgs. During drilling, groundwater was encountered at a depth of 140 ft bgs. The most productive zone in the borehole was 140 to 160 ft bgs and corresponded to the most highly fractured interval. The borehole was blown dry and allowed to recover overnight. The water level was at 102 ft bgs on the following morning, which indicates that groundwater in the area is mostly likely under confined condition. The well was screened from 135 to 155 ft bgs in fractured quartzite (Table 9-2).

**Table 9-2. Lithologic and Hydrogeologic Elevation Data for Monitoring Well CYN-MW5 at SWMU 49**

| Monitoring Well | Ground Surface Elevation (ft amsl) | Depth of Screened Interval (ft bgs) | Elevation for Top of Screen (ft amsl) | Potentiometric Surface, October 2013 (ft amsl) | Mid-Point Screen Elevation (ft amsl) | Approximate Pressure Head (ft[a]) |
|---|---|---|---|---|---|---|
| CYN-MW5 | 5981.30 | 135 – 155 | 5846.30 | 5876.52 | 5836.30 | 40 |

**NOTES:**
[a]From mid-point of screen.
amsl = Above mean sea level.
bgs = Below ground surface.
CYN = Canyons.
ft = Foot (feet).
MW = Monitoring Well.
SWMU = Solid Waste Management Unit.

The October 2013 groundwater elevation at monitoring well CYN-MW5 was 5876.52 ft amsl. Compared to the mid-point elevation of the screen, the pressure head was approximately 40 ft and indicative of confined conditions. Groundwater flows to the west through a fractured bedrock system. Based on the potentiometric surface depicted on Plate 1, the horizontal gradient is approximately 0.01 feet per foot.

During sampling, the drawdown in monitoring well CYN-MW5 is not excessive and the quantity of water produced is clearly adequate for low-flow sampling purposes. Groundwater samples are collected using pneumatic (nitrogen gas activated) Bennett™ piston pumps.

The conceptual hydrogeologic model for SWMU 49 is based on data and findings obtained from monitoring well CYN-MW5, several nearby monitoring wells located upgradient and downgradient in Lurance Canyon (Plate 1), and hydrogeologic investigations conducted at the Burn Site (SNL May 2004) and at SWMU 58 (Chapter 8.0). Groundwater in the SWMU 49 area occurs in a fractured bedrock system under confined conditions. The depth to groundwater at monitoring well CYN-MW5 is approximately 140 ft bgs in a fractured interval of Precambrian quartzite. Groundwater in the bedrock predominantly moves through a confined low-permeability fracture system. A series of naturally filled fractures in the upper bedrock probably serves as a confining unit. The potentiometric surface at monitoring well CYN-MW5 in October 2013 has an elevation of approximately 5,876 ft amsl. The amount of precipitation available for groundwater recharge at SWMU 49 is minimal due to the scant rainfall and high evapotranspiration. Historical water level data indicate that seasonal effects, primarily due to thunderstorms, rarely occur. The hydrograph (Figure 9B-1) shows that significant water level increases only occurred twice in the last 10 years. During 2002 through 2013, the overall trend has been downward. For the last five years, the water level in monitoring well CYN-MW5 has declined at approximately 0.3 feet per year. Groundwater underflow along Lurance Canyon probably discharges to the unconsolidated basin-fill deposits (primarily the Santa Fe Group) of the Albuquerque Basin after crossing the Tijeras and Sandia faults. The hydraulic gradient is approximately 0.01 feet per foot near the well. No potable water supply wells are located within 5 miles of the site.

#### 9.1.7.3 Contaminant Sources

From 1958 to 1988, wastewater discharged to the ground surface at two locations at SWMU 49. The water possibly contained photo-processing chemicals, HE compounds, and VOCs. The areas around the discharge points were characterized by soil sampling as part of the DSS investigation.

#### 9.1.7.4 Contaminant Distribution and Transport in Groundwater

No COCs exceed the applicable U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) (EPA 2009) in the CY 2013 groundwater samples collected from monitoring well CYN-MW5. No groundwater contamination is suspected at SWMU 49.

### 9.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM ER Operations (formerly ER Project) as well as implements and enforces federal regulations mandated by the Resource Conservation and Recovery Act (RCRA). All ER Operations SWMUs and Areas of Concern (AOCs) are listed in Module IV of the SNL/NM RCRA Permit, *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518* (NMED 1993). All corrective action requirements pertaining to SWMUs and AOCs are contained in the Compliance Order on Consent (the Order) (NMED April 2004) between the DOE, Sandia, and NMED.

The DOE/NNSA and Sandia received a letter from the NMED on April 14, 2010, entitled *Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008), Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001* (NMED April 2010). The NMED letter lists SWMU 49 under the heading of "SWMUs/AOCs to be Subject to Groundwater Monitoring Controls" and further stated that pursuant to Section III.W.3.b of the Order (NMED April 2004), SWMU 49 requires long-term monitoring of groundwater on an annual basis as a site control. The NMED specified that for SWMU 49, the analytes to be monitored include general chemistry, VOCs, HE compounds, perchlorate, metals, cyanide, nitrate plus nitrite (NPN), gross alpha/beta activity, and radionuclides by gamma spectroscopy.

In this report SWMU 49 groundwater monitoring data are presented for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (i.e., gamma spectroscopy and gross alpha/beta activity) are provided voluntarily by the DOE/NNSA and Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Order, as specified in Section III.A of the Order (NMED April 2004).

## 9.3 Scope of Activities

The activities conducted for SWMU 49 during this reporting period are listed in Section 9.1.5 and involved groundwater monitoring that consisted of water level measurements and sampling and analysis as summarized in Table 9-3.

**Table 9-3. Groundwater Monitoring Well Network and Sampling Date for SWMU 49, Calendar Year 2013**

| Date of Sampling Event | Wells Sampled | SAP |
|---|---|---|
| January 2013 | CYN-MW5 | *SWMU 49 and 116 Groundwater Monitoring, Mini-SAP for Fiscal Year 2013 Annual Sampling* (SNL December 2012) |

**NOTES:**
CYN = Canyons.
MW = Monitoring Well.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories.
SWMU = Solid Waste Management Unit.

The analytical parameters are listed in Table 9-4. Quality control (QC) samples are collected in the field at the time of environmental sample collection. Field QC samples may include duplicate environmental, split, equipment blank (EB), and trip blank (TB) samples.

**Table 9-4. Parameters Sampled at SWMU 49**

| Parameter | January 2013 |
|---|---|
| Alkalinity (total, bicarbonate, carbonate) | CYN-MW5 |
| Anions | CYN-MW5 (duplicate) |
| Cations | |
| Gamma Spec* | |
| Gross Alpha Activity | |
| Gross Beta Activity | |
| High Explosive Compounds | |
| NPN | |
| Perchlorate | |
| TAL Metals, plus Total Uranium | |
| Total Cyanide | |
| VOCs | |

**NOTES:**

CYN = Canyons.
Gamma Spec* = Gamma spectroscopy short list (americium-241, cesium-137, cobalt-60, and potassium-40).
MW = Monitoring well.
NPN = Nitrate plus nitrate (reported as nitrogen).
SWMU = Solid Waste Management Unit.
TAL = Target Analyte List.
VOC = Volatile organic compound.

## 9.4 Field Methods and Measurements

The monitoring procedures conducted for SWMU 49 groundwater monitoring are described in detail in Section 1.3. The groundwater elevation is shown on Figure 9-1 and depicted on the hydrograph presented on Figure 9B-1 (Attachment 9B).

## 9.5 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using EPA-specified protocols described in Section 1.3.2 (Tables 1-5 and 1-6).

## 9.6 Summary of Analytical Results

This section discusses analytical results, exceedances of regulatory standards, and pertinent trends in COC concentrations. The analytical results and field measurements for the CY 2013 SWMU 49 sampling event are presented in Tables 9A-1 through 9A-8 (Attachment 9A). Data qualifiers are explained in the footnotes following Table 9A-8.

No VOCs were detected. The method detection limits (MDLs) for all analyzed VOCs are listed in Table 9A-1 (Attachment 9A).

No HE compounds were detected. The MDLs for all analyzed HE compounds are listed in Table 9A-2 (Attachment 9A).

The analytical results for NPN (reported as nitrogen) are presented in Table 9A-3 (Attachment 9A). No NPN results exceed the MCL of 10 milligrams per liter (mg/L). The NPN concentration in the environmental sample was 1.79 mg/L, and the concentration in the environmental duplicate sample was 1.89 mg/L

The results for alkalinity, anion, cation, and total cyanide results are provided in Table 9A-4 (Attachment 9A). No detections of these constituents exceed MCLs, where established.

The analytical results for perchlorate are presented in Table 9A-5 (Attachment 9A). There were no detections of perchlorate. Currently, no MCL is established for perchlorate. Perchlorate results do not exceed the NMED-specified screening level/MDL of 4 micrograms per liter (NMED April 2004).

Total metal results are presented in Table 9A-6 (Attachment 9A). No metals exceed established MCLs.

Groundwater samples were analyzed for gross alpha/beta activity and radionuclides by gamma spectroscopy. The results are presented in Table 9A-7 (Attachment 9A). All gross alpha/beta activity results are below MCLs, where established. Gross alpha activity is measured as a screening tool and according to 40 Code of Federal Regulations Parts 9, 141, and 142, Table I-4, does not include uranium, which is measured independently. Therefore, the gross alpha activity measurement is corrected by subtracting out the uranium activity. Radiological results are further reviewed by an SNL/NM Certified Health Physicist to assure that the samples are nonradioactive. Gamma spectroscopy analysis detected no isotopes above the associated minimum detectable activity.

Field water quality parameters are measured during purging of the well prior to sampling and include temperature, specific conductance, oxidation-reduction potential, pH, turbidity, and dissolved oxygen. Parameter measurements obtained immediately prior to sample collection are presented in Table 9A-8 (Attachment 9A).

## 9.7 Quality Control Results

Field and laboratory QC samples were collected and prepared as described in Section 1.3. Data validation qualifiers are presented with the analytical results in Tables 9A-3 through 9A-7 (Attachment 9A). The results of QC samples and the impact on data quality for the SWMU 49 sampling event are discussed in the following sections.

All reported values for any QC sample did not exceed established MCLs.

Duplicate environmental sample results show good correlation. Relative percent difference for inorganic detections are less than 35, except for aluminum. The relative percent difference for aluminum is an estimated value because the analytical results are reported at concentrations of less than the laboratory practical quantitation limit. The analytical results for the organic compounds were all nondect; therefore, no relative percent difference can be calculated. The metals antimony, chromium, and copper were qualified as nondect during data validation. All three metals were detected in the associated laboratory method blank sample at concentrations greater than the environmental sample values.

An EB sample was collected at monitoring well CYN-MW5 during the CY 2013 sampling event. VOC detections are not applicable because there were no VOCs detected in the associated environmental sample. There were no issues with detected inorganics because detections were qualified as nondetect due to laboratory method blanks detections or reported concentrations are less than 5 times than environmental sample results.

No VOCs were detected above laboratory MDLs in any TB sample.

Laboratory data qualifiers are provided with the analytical results in Tables 9A-3 through 9A-7 (Attachment 9A).

## 9.8 Variances and Nonconformances

No variances or nonconformances from field or sampling requirements as specified in the SWMU 49 groundwater monitoring Mini-Sampling and Analysis Plan (SNL December 2012) occurred during CY 2013 sampling activities.

Although some analytical results were qualified during the data validation process, no significant data quality problems were noted. Data validation qualifiers are provided with the analytical results in Tables 9A-3 through 9A-7 (Attachment 9A).

## 9.9 Summary and Conclusions

This section provides a brief summary of activities, discussion of COCs, if any, that exceed standards, trends of concentrations versus time, the current conceptual site model, and plans for studies to be completed during CY 2014 at SWMU 49.

SWMU 49 is located in western Lurance Canyon. The DSS groundwater investigation was initiated in 2001 at the request of the NMED to evaluate the discharge areas associated with Building 9820. The one groundwater monitoring well in the study area (CYN-MW5) is located downgradient of the site and was sampled in January 2013. The samples were analyzed for alkalinity (total, bicarbonate, carbonate), anions, cations, HE compounds, NPN, perchlorate, Target Analyte List metals (plus total uranium), total cyanide, VOCs, gross alpha/beta activity, and radionuclides by gamma spectroscopy. Analytical results were compared with EPA MCL guidelines for drinking water (EPA 2009). No parameters were detected above established MCLs in the groundwater samples.

The analytical results for this reporting period are consistent with historical concentrations. The conceptual model described in Section 9.1.7 does not require modification based on the analytical results for this reporting period.

Annual groundwater sampling will be conducted at monitoring well CYN-MW5 during the first quarter of CY 2014, subject to scheduling. Periodic monitoring of groundwater elevations will also be completed during the year.

## 9.10 References


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

**NMED April 2010** New Mexico Environment Department (NMED), April 2010. *Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008), Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001*. New Mexico Environment Department, Santa Fe, New Mexico.

**NMED September 2005** New Mexico Environment Department (NMED), September 2005. *RE: Notice of Approval/Disapproval: Responses to Request for Supplemental Information for Proposals for Corrective Action Complete, Drain and Septic Systems SWMUs 49, 101, 116, 138, 149, 154, and 161, June 2005, Sandia National Laboratories EPA ID# NM5890110518 HWB-SNL-99-008, HWB-SNL-99-012*, New Mexico Environment Department, Santa Fe, New Mexico.

**NMED February 2005** New Mexico Environment Department (NMED), February 2005. *RE: Current Conceptual Model for the Sandia National Laboratories Canyons Area (Burn Site), June 2004: Requirement to Conduct Additional Site Characterization and Interim Measures, Sandia National Laboratories NM5890110518, HWB-SNL-04-039,* New Mexico Environment Department, Santa Fe, New Mexico.

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

**NMED February 2002** New Mexico Environment Department (NMED), February 2002. *Approval of Field Implementation Plan, Characterization of Non Environmental Restoration Drain and Septic Systems Submittal Dated November 2001, Sandia National Laboratories, NM5890110518-1, HWB-SNL-02-009,* New Mexico Environment Department, Santa Fe, New Mexico.

**NMED June 2000** New Mexico Environment Department (NMED), June 2000. *Request for Supplemental Information: Sandia National Laboratories, New Mexico, Environmental Restoration Project Responses to NMED Request for Supplemental Information: No Further Action Proposals (4th Round), Dated June 1996, Sandia National Laboratories, EPA ID# NM5890110518, HRMB-SNL-99-008,* New Mexico Environment Department, Santa Fe, New Mexico.

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# Attachment 9A
# Solid Waste Management Unit 49
# Analytical Results Tables

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# Attachment 9A Tables


9A-1 Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B), Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 9A-5

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## Table 9A-1
## Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B),
## Solid Waste Management Unit 49 Groundwater Monitoring,
## Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Analyte | MDL[b] (µg/L) | Analyte | MDL[b] (µg/L) |
|---|---|---|---|
| 1,1,1-Trichloroethane | 0.300 | Chlorobenzene | 0.300 |
| 1,1,2,2-Tetrachloroethane | 0.300 | Chloroethane | 0.300 |
| 1,1,2-Trichloroethane | 0.300 | Chloroform | 0.300 |
| 1,1-Dichloroethane | 0.300 | Chloromethane | 0.300 |
| 1,1-Dichloroethene | 0.300 | Cyclohexane | 0.300 |
| 1,2,3-Trichlorobenzene | 0.300 | Dibromochloromethane | 0.300 |
| 1,2,4-Trichlorobenzene | 0.300 | Dichlorodifluoromethane | 0.300 |
| 1,2-Dibromo-3-chloropropane | 0.300 | Ethyl benzene | 0.300 |
| 1,2-Dibromoethane | 0.300 | Isopropylbenzene | 0.300 |
| 1,2-Dichlorobenzene | 0.300 | Methyl acetate | 1.50 |
| 1,2-Dichloroethane | 0.300 | Methylcyclohexane | 3.00 |
| 1,2-Dichloropropane | 0.300 | Methylene chloride | 3.00 |
| 1,3-Dichlorobenzene | 0.300 | Styrene | 0.300 |
| 1,4-Dichlorobenzene | 0.300 | Tert-butyl methyl ether | 0.300 |
| 2,2-trifluoroethane, 1,1,2-Trichloro-1 | 1.50 | Tetrachloroethene | 0.300 |
| 2-Butanone | 2.00 | Toluene | 0.300 |
| 2-Hexanone | 2.20 | Trichloroethene | 0.300 |
| 4-methyl-, 2-Pentanone | 1.50 | Trichlorofluoromethane | 0.300 |
| Acetone | 3.00 | Vinyl chloride | 0.300 |
| Benzene | 0.300 | Xylene | 0.300 |
| Bromochloromethane | 0.300 | cis-1,2-Dichloroethene | 0.300 |
| Bromodichloromethane | 0.300 | cis-1,3-Dichloropropene | 0.300 |
| Bromoform | 0.300 | m-, p-Xylene | 0.300 |
| Bromomethane | 0.300 | o-Xylene | 0.300 |
| Carbon disulfide | 1.50 | trans-1,2-Dichloroethene | 0.300 |
| Carbon tetrachloride | 0.300 | trans-1,3-Dichloropropene | 0.300 |

Refer to footnotes on page 9A-15.

## Table 9A-2
## Method Detection Limits for High Explosive Compounds (EPA Method[g] SW846-8321A), Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Analyte | MDL[b] (µg/L) |
|---|---|
| 1,3,5-Trinitrobenzene | 0.0842 – 0.0860 |
| 1,3-Dinitrobenzene | 0.0842 – 0.0860 |
| 2,4,6-Trinitrotoluene | 0.0842 – 0.0860 |
| 2,4-Dinitrotoluene | 0.0842 – 0.0860 |
| 2,6-Dinitrotoluene | 0.0842 – 0.0860 |
| 2-Amino-4,6-dinitrotoluene | 0.0842 – 0.0860 |
| 2-Nitrotoluene | 0.0863 – 0.0882 |
| 3-Nitrotoluene | 0.0842 – 0.0860 |
| 4-Amino-2,6-dinitrotoluene | 0.0842 – 0.0860 |
| 4-Nitrotoluene | 0.158 – 0.161 |
| HMX | 0.0842 – 0.0860 |
| Nitro-benzene | 0.0842 – 0.0860 |
| Pentaerythritol tetranitrate | 0.105 – 0.108 |
| RDX | 0.0842 – 0.0860 |
| Tetryl | 0.0842 – 0.0860 |

Refer to footnotes on page 9A-15.

## Table 9A-3
## Summary of Nitrate plus Nitrite Results,
## Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW5** 24-Jan-13 | Nitrate plus nitrite | 1.79 | 0.085 | 0.250 | 10.0 | | | 093356-018 | EPA 353.2 |
| **CYN-MW5** (Duplicate) 24-Jan-13 | Nitrate plus nitrite | 1.89 | 0.085 | 0.250 | 10.0 | | | 093357-018 | EPA 353.2 |

Refer to footnotes on page 9A-15.

## Table 9A-4
## Summary of Alkalinity, Anion, Cation, and Total Cyanide Results,
## Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW5** | Bicarbonate Alkalinity | 153 | 0.725 | 1.00 | NE | | | 093356-022 | SM2320B |
| 24-Jan-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093356-022 | SM2320B |
| | Bromide | 0.196 | 0.067 | 0.200 | NE | J | J- | 093356-016 | SW846 9056 |
| | Chloride | 17.8 | 0.067 | 0.200 | NE | | | 093356-016 | SW846 9056 |
| | Fluoride | 0.331 | 0.033 | 0.100 | 4.0 | | | 093356-016 | SW846 9056 |
| | Sulfate | 27.4 | 0.133 | 0.400 | NE | | | 093356-016 | SW846 9056 |
| | Calcium | 49.9 | 0.060 | 0.200 | NE | | | 093356-017 | SW846 6020 |
| | Magnesium | 9.80 | 0.010 | 0.030 | NE | | | 093356-017 | SW846 6020 |
| | Potassium | 2.14 | 0.080 | 0.300 | NE | | | 093356-017 | SW846 6020 |
| | Sodium | 14.2 | 0.080 | 0.250 | NE | | | 093356-017 | SW846 6020 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | | 093356-027 | SW846 9012A |
| **CYN-MW5** (Duplicate) | Bicarbonate Alkalinity | 154 | 0.725 | 1.00 | NE | | | 093357-022 | SM2320B |
| 24-Jan-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093357-022 | SM2320B |
| | Bromide | 0.162 | 0.067 | 0.200 | NE | J | J- | 093357-016 | SW846 9056 |
| | Chloride | 17.7 | 0.067 | 0.200 | NE | | | 093357-016 | SW846 9056 |
| | Fluoride | 0.331 | 0.033 | 0.100 | 4.0 | | | 093357-016 | SW846 9056 |
| | Sulfate | 27.5 | 0.133 | 0.400 | NE | | | 093357-016 | SW846 9056 |
| | Calcium | 55.4 | 0.300 | 1.00 | NE | | | 093357-017 | SW846 6020 |
| | Magnesium | 10.0 | 0.010 | 0.030 | NE | | | 093357-017 | SW846 6020 |
| | Potassium | 2.26 | 0.080 | 0.300 | NE | | | 093357-017 | SW846 6020 |
| | Sodium | 14.9 | 0.080 | 0.250 | NE | | | 093357-017 | SW846 6020 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | | 093357-027 | SW846 9012A |

Refer to footnotes on page 9A-15.

## Table 9A-5
## Summary of Perchlorate Results,
## Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Perchlorate Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|
| **CYN-MW5** 24-Jan-13 | ND | 0.004 | 0.012 | NE | U | | 093356-020 | EPA 314.0 |
| **CYN-MW5** (Duplicate) 24-Jan-13 | ND | 0.004 | 0.012 | NE | U | | 093357-020 | EPA 314.0 |

Refer to footnotes on page 9A-15.

## Table 9A-6
## Summary of Target Analyte List Metals and Uranium Results,
## Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW5** | Aluminum | 0.0397 | 0.015 | 0.050 | NE | J | | 093356-009 | SW846 6020 |
| 24-Jan-13 | Antimony | 0.00101 | 0.001 | 0.003 | 0.006 | B, J | 0.011U | 093356-009 | SW846 6020 |
| | Arsenic | 0.00546 | 0.0017 | 0.005 | 0.010 | | | 093356-009 | SW846 6020 |
| | Barium | 0.177 | 0.0006 | 0.002 | 2.00 | | | 093356-009 | SW846 6020 |
| | Beryllium | 0.000207 | 0.0002 | 0.0005 | 0.004 | J | | 093356-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093356-009 | SW846 6020 |
| | Calcium | 64.0 | 0.300 | 1.00 | NE | | J | 093356-009 | SW846 6020 |
| | Chromium | 0.00272 | 0.002 | 0.010 | 0.100 | B, J | 0.011U | 093356-009 | SW846 6020 |
| | Cobalt | 0.0001 | 0.0001 | 0.001 | NE | J | | 093356-009 | SW846 6020 |
| | Copper | 0.00186 | 0.00035 | 0.001 | NE | B | 0.003U | 093356-009 | SW846 6020 |
| | Iron | 0.174 | 0.033 | 0.100 | NE | | | 093356-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093356-009 | SW846 6020 |
| | Magnesium | 10.6 | 0.010 | 0.030 | NE | | | 093356-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093356-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093356-009 | SW846 7470 |
| | Nickel | 0.00276 | 0.0005 | 0.002 | NE | | | 093356-009 | SW846 6020 |
| | Potassium | 2.19 | 0.080 | 0.300 | NE | | | 093356-009 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | U | | 093356-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093356-009 | SW846 6020 |
| | Sodium | 14.0 | 0.080 | 0.250 | NE | | | 093356-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093356-009 | SW846 6020 |
| | Uranium | 0.000803 | 0.000067 | 0.0002 | 0.03 | | | 093356-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | | 093356-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093356-009 | SW846 6020 |

Refer to footnotes on page 9A-15.

**Table 9A-6** *(Concluded)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW5** (Duplicate) | Aluminum | 0.0231 | 0.015 | 0.050 | NE | J | | 093357-009 | SW846 6020 |
| 24-Jan-13 | Antimony | 0.00114 | 0.001 | 0.003 | 0.006 | B, J | 0.011U | 093357-009 | SW846 6020 |
| | Arsenic | 0.00439 | 0.0017 | 0.005 | 0.010 | J | | 093357-009 | SW846 6020 |
| | Barium | 0.172 | 0.0006 | 0.002 | 2.00 | | | 093357-009 | SW846 6020 |
| | Beryllium | 0.000252 | 0.0002 | 0.0005 | 0.004 | J | | 093357-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093357-009 | SW846 6020 |
| | Calcium | 56.4 | 0.300 | 1.00 | NE | | J | 093357-009 | SW846 6020 |
| | Chromium | 0.00292 | 0.002 | 0.010 | 0.100 | B, J | 0.011U | 093357-009 | SW846 6020 |
| | Cobalt | 0.000105 | 0.0001 | 0.001 | NE | J | | 093357-009 | SW846 6020 |
| | Copper | 0.00136 | 0.00035 | 0.001 | NE | B | 0.003U | 093357-009 | SW846 6020 |
| | Iron | 0.185 | 0.033 | 0.100 | NE | | | 093357-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093357-009 | SW846 6020 |
| | Magnesium | 10.6 | 0.010 | 0.030 | NE | | | 093357-009 | SW846 6020 |
| | Manganese | 0.00106 | 0.001 | 0.005 | NE | J | | 093357-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093357-009 | SW846 7470 |
| | Nickel | 0.00271 | 0.0005 | 0.002 | NE | | | 093357-009 | SW846 6020 |
| | Potassium | 2.09 | 0.080 | 0.300 | NE | | | 093357-009 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | U | | 093357-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093357-009 | SW846 6020 |
| | Sodium | 13.6 | 0.080 | 0.250 | NE | | | 093357-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093357-009 | SW846 6020 |
| | Uranium | 0.000774 | 0.000067 | 0.0002 | 0.03 | | | 093357-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | | 093357-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093357-009 | SW846 6020 |

Refer to footnotes on page 9A-15.

## Table 9A-7
## Summary of Gamma Spectroscopy, Gross Alpha, and Gross Beta Results,
## Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW5** | Americium-241 | 8.09 ± 7.16 | 10.3 | 5.06 | NE | U | BD | 093356-033 | EPA 901.1 |
| 24-Jan-13 | Cesium-137 | -0.507 ± 2.56 | 2.97 | 1.43 | NE | U | BD | 093356-033 | EPA 901.1 |
| | Cobalt-60 | -0.662 ± 1.65 | 2.84 | 1.33 | NE | U | BD | 093356-033 | EPA 901.1 |
| | Potassium-40 | -14.3 ± 30.3 | 36.6 | 17.5 | NE | U | BD | 093356-033 | EPA 901.1 |
| | Gross Alpha | 1.47 | NA | NA | 15 pCi/L | NA | None | 093356-034 | EPA 900.0 |
| | Gross Beta | 4.55 ± 1.05 | 1.00 | 0.482 | 4mrem/yr | | J | 093356-034 | EPA 900.0 |
| **CYN-MW5** (Duplicate) | Americium-241 | -2.71 ± 7.09 | 12.0 | 5.86 | NE | U | BD | 093357-033 | EPA 901.1 |
| 24-Jan-13 | Cesium-137 | -0.50 ± 2.39 | 4.21 | 2.00 | NE | U | BD | 093357-033 | EPA 901.1 |
| | Cobalt-60 | 0.538 ± 2.69 | 4.94 | 2.29 | NE | U | BD | 093357-033 | EPA 901.1 |
| | Potassium-40 | -37.7 ± 67.1 | 58.4 | 27.4 | NE | U | BD | 093357-033 | EPA 901.1 |
| | Gross Alpha | 2.20 | NA | NA | 15 pCi/L | NA | None | 093357-034 | EPA 900.0 |
| | Gross Beta | 3.99 ± 0.999 | 0.996 | 0.477 | 4mrem/yr | | J | 093357-034 | EPA 900.0 |

Refer to footnotes on page 9A-15.

## Table 9A-8
## Summary of Field Water Quality Measurements[h],
## Solid Waste Management Unit 49 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Sample Date | Temperature (°C) | Specific Conductivity (µmhos/cm) | Oxidation Reduction Potential (mV) | pH | Turbidity (NTU) | Dissolved Oxygen (% Sat) | Dissolved Oxygen (mg/L) |
|---|---|---|---|---|---|---|---|---|
| **CYN-MW5** | 24-Jan-13 | 16.18 | 347 | 230.0 | 5.71 | 0.87 | 48.0 | 4.71 |

Refer to footnotes on page 9A-15.

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## *Footnotes for Solid Waste Management Unit 49 Analytical Results Tables*

| | |
|---|---|
| % | = percent. |
| μg/L | = micrograms per liter. |
| CFR | = Code of Federal Regulations. |
| EPA | = U.S. Environmental Protection Agency. |
| HMX | = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine. |
| ID | = Identifier. |
| mg/L | = milligrams per liter. |
| mrem/yr | = millirem per year. |
| No. | = Number. |
| pCi/L | = picocuries per liter. |
| RDX | = hexahydro-1,3,5-trinitro-1,3,5-triazine. |
| Tetryl | = methyl-2,4,6-trinitrophenylnitramine. |

**[a]Result**

Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 2A- 1-4).

**Bold** = Indicates the value exceeds the established MCL and/or MAC.

ND = not detected (at method detection limit). Activities of zero or less are considered to be not detected.

**[b]MDL or MDA**

MDL applies to the data listed in Tables 9A-1 through 9A-6. MDA applies to radiological data in Table 9A-7.

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

MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

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

**[c]PQL or Critical Level**

The PQL applies to Tables 9A-3 through 9A-6. Critical Level applies to Table 9A-7.

Critical Level = The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

NA = Not Applicable (for gross alpha activities). The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

**[d]MCL**

MCL = Maximum contaminant level. MCLs were established by the EPA Office of Water, National Primary Water Regulations (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- Gross alpha particle activity, excluding total uranium = 15 pCi/L (40 CFR Parts 9, 141, and 142,
- Table 2A-1-4).
- Beta and/or Gamma-emitting radionuclides (any combination) = 4 mrem/yr (as dose rate).
- Combined radium-226 and radium-228 MAC = 30 pCi/L.
- Combined radium-226 and radium-228 MCL = 5 pCi/L.

NE = Not Established.

## *Footnotes for Solid Waste Management Unit 49 Groundwater Analytical Results Tables (Concluded)*

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**[e]Lab Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

B = Analyte was detected in the blank above the effective MDL.
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
NA = Not Applicable.
U = Analyte is absent or below the method detection limit.

**[f]Validation Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = Associated value is an estimated quantity.
J- = Associated numerical value is an estimated quantity with a suspected negative bias.
None = No data validation for corrected gross alpha activity.
U = Analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.

**[g]Analytical Method**

Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.

DOE, 1990, "EML [Environmental Measurements Laboratory] Procedures Manual," 27th ed., Vol. 1, Rev. 1992, HASL-300.

EPA, 1999 (and updates), "Perchlorate in Drinking Water Using Ion Chromatography," EPA 815/R-00-014.

EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.

EPA, 1984, "Methods for Chemical Analysis of Water and Wastes." EPA 600-4-79-020.

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

DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
HASL = Health and Safety Laboratory.
SM = Standard Method.

**[h]Field Water Quality Measurements**

Field measurements collected prior to sampling.

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

# Attachment 9B
# Solid Waste Management Unit 49
# Hydrographs

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# Attachment 9B Hydrographs

9B-1 SWMU 49 Study Area Well ..... 9B-5

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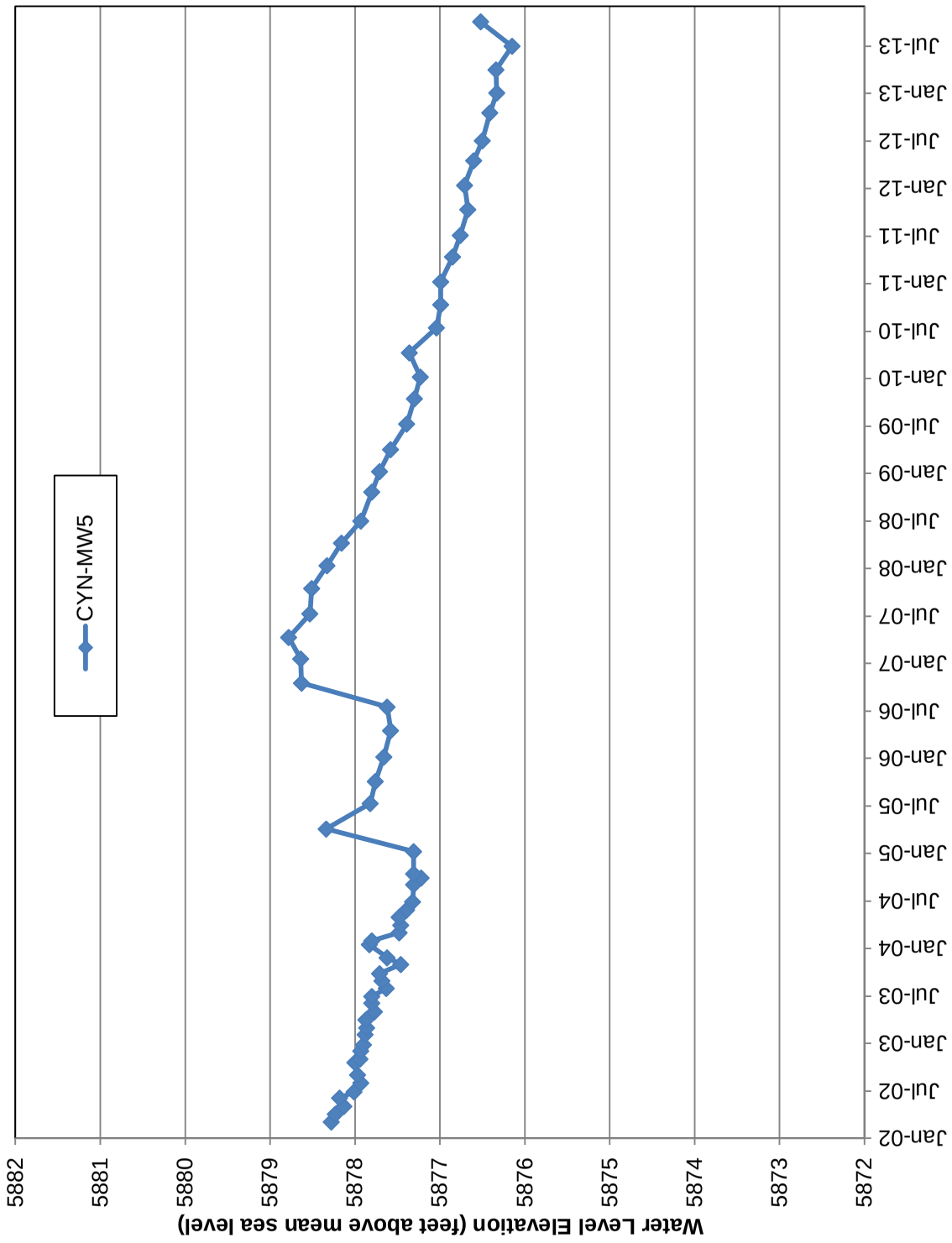


**Figure 9B-1. SWMU 49 Study Area Well**

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# 10.0 Solid Waste Management Unit 68

## 10.1 Introduction

This chapter summarizes the Calendar Year (CY) 2013 quarterly groundwater sampling events for Old Burn Site monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3, located within Solid Waste Management Unit (SWMU) 68 at Sandia National Laboratories, New Mexico (SNL/NM). The SNL/NM facility is a government-owned, contractor-operated, multi-program laboratory overseen by the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) through the Sandia Field Office in Albuquerque, New Mexico. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM under Contract DE-AC04-94AL85000.

Monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 were installed at SWMU 68 in August 2011. The installation report was approved by NMED in April 2012 (NMED April 2012). The installation and monitoring of these wells are designed to address the requirements of Section VII.D.6 of the Compliance Order on Consent (the Order) (NMED April 2004) between the New Mexico Environment Department (NMED), DOE, and Sandia, and the NMED letter dated April 8, 2010, from the NMED Hazardous Waste Bureau requiring additional corrective action at SWMU 68 (NMED April 2010).

Monitoring well OBS-MW1 was sampled on January 22, 2013; April 18, 2013; July 9, 2013; and October 8, 2013. Monitoring well OBS-MW2 was sampled on January 21, 2013; April 22, 2013; July 10, 2013; and October 7, 2013. Monitoring well OBS-MW3 was sampled on January 23, 2013; April 23, 2013; July 11, 2013; and October 09, 2013. The groundwater samples were collected in accordance with the NMED-approved Groundwater Characterization Work Plan (SNL September 2010) and Mini-Sampling and Analysis Plans (SAPs) (SNL December 2012, April 2013, June 2013, and September 2013a). The groundwater samples from each well were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), high explosive (HE) compounds, nitrate plus nitrite (NPN), major anions (as bromide, chloride, fluoride, and sulfate), major cations (as calcium, magnesium, potassium, and sodium), alkalinity, Target Analyte List (TAL) metals plus uranium, perchlorate, total cyanide, hexavalent chromium, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium.

Analytical results for the CY 2013 groundwater samples were compared with the U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) for drinking water (EPA 2009). No parameters were detected above established MCLs.

The eighth and final quarter of required groundwater sampling (NMED April 2010) was conducted in July 2013. During CY 2014, quarterly groundwater sampling and reporting will continue for the SWMU 68 groundwater monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 until NMED provides additional guidance.

### 10.1.1 Location

SWMU 68 is located in the Coyote Test Field, approximately 0.8 miles north of the southern boundary of Kirtland Air Force Base (KAFB), and approximately 0.6 miles to the west of the U.S. Forest Service Withdrawn Area (Figure 10-1). SWMU 68 encompasses approximately 6.5 acres of generally flat and gently westerly sloping terrain at an average elevation of approximately 5,860 feet (ft) above mean sea level (amsl).

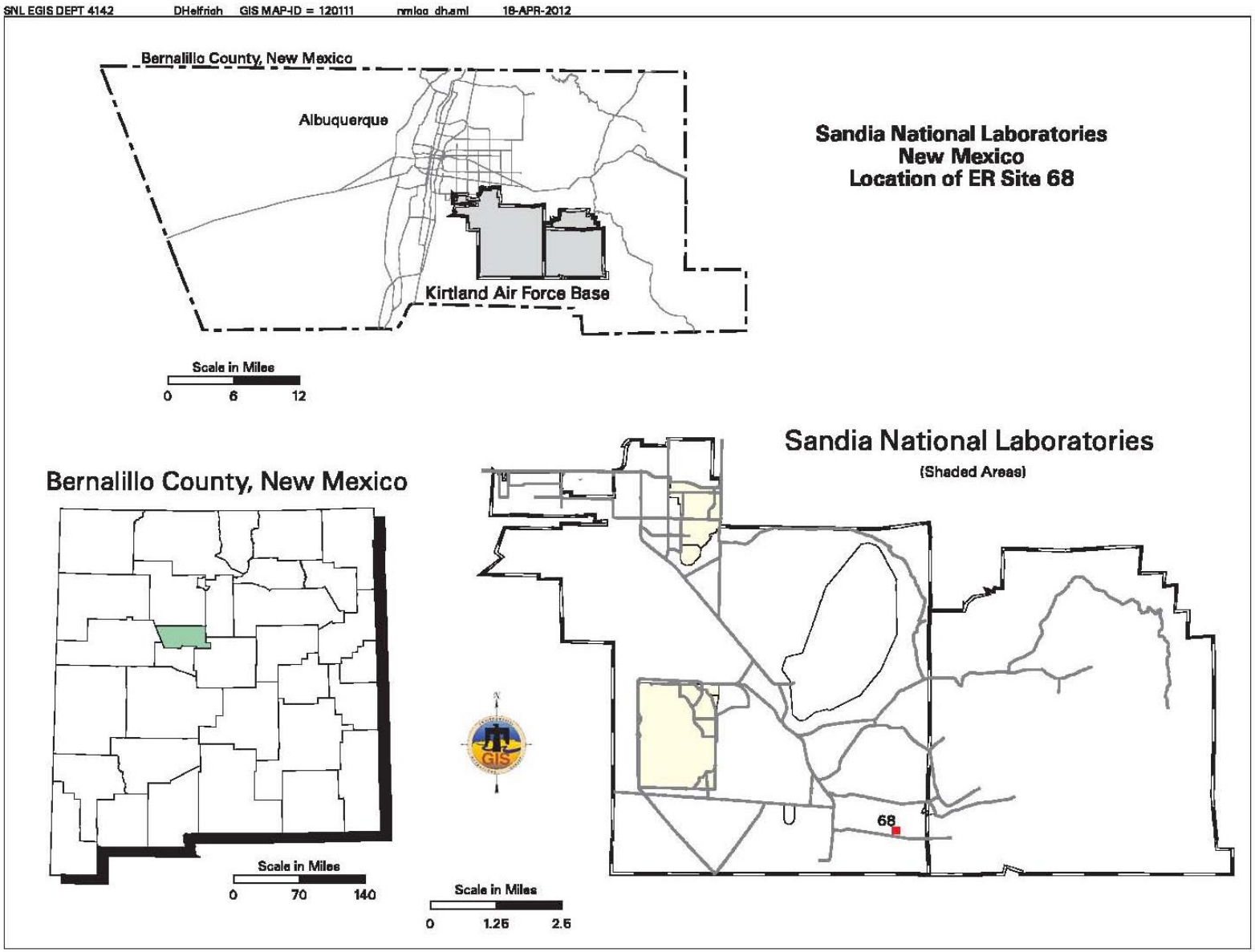


**Figure 10-1. Location of SWMU 68**

### 10.1.2 Site History

From 1965 to 1978, pool fire tests were conducted at SWMU 68 to study the effects of fire on weapons components and to determine the potential for release of radioactive material in case of a transportation (air, truck, and rail) accident. The primary fuel used for the pool fire tests was jet fuel. Prior to investigative and remedial activities that were completed in 2004 (Table 10-1), SWMU 68 consisted of an aboveground, approximately 3-ft deep, steel burn pool; a drainage ditch; an overflow basin; a rectangular burn pit that was once lined with plastic; three debris piles; and two irregularly shaped borrow pits.

From 1995 to 2004, multiple surveys and remediation projects were conducted at SWMU 68 to identify and remove nonhazardous and hazardous materials from the site. Wastes removed from SWMU 68 included soil contaminated with radionuclides and metals (primarily lead), assorted metal fragments, scrap metal, concrete, wire, scrap wood, cardboard, plastic fencing, and burn debris. All testing materials and features were removed. As a final measure, the disturbed areas were graded and reseeded in 2004.

A total of 499 confirmatory soil samples were collected at SWMU 68 from 1996 to 2004. Soil samples were collected from the plastic-lined pit, the overflow basin, the drainage ditch running from the burn pan to the overflow basin, the soil underneath the burn pan, and other remediated areas of the site. The sample results were used in the final risk assessment for SWMU 68.

In April 2004, the Order (NMED April 2004) specifically identified SWMU 68 as requiring additional investigation. All corrective action requirements pertaining to SWMUs are contained in the Order (NMED April 2004). Additional soil samples were collected in January 2005.

In September 2005, DOE/NNSA and Sandia submitted a letter to the NMED requesting a Corrective Action Complete (CAC) status determination for SWMU 68 (SNL September 2005). The NMED approved SWMU 68 as CAC without controls in October 2005 (NMED October 2005).

In March 2006, DOE/NNSA and Sandia submitted a letter to the NMED justifying a Class III Permit Modification Request for SWMU 68 (SNL March 2006). In April 2010, the NMED responded to the SNL/NM Permit Modification Request, stating that SWMU 68 required additional site characterization work, including the installation of three groundwater monitoring wells. The wells were required to be installed near the former locations of the burn pan and associated ditch/surface impoundment (Figure 10-2). The NMED also required the submittal of a well installation work plan (NMED April 2010).

DOE/NNSA and Sandia submitted a groundwater characterization work plan for the installation of three monitoring wells at SWMU 68 (SNL September 2010), which was approved by the NMED (January 2011). Three groundwater monitoring wells (OBS-MW1, OBS-MW2, and OBS-MW3) were installed at SWMU 68 in August 2011 (SNL November 2011) and the first quarterly groundwater sampling event occurred in October 2011.

## Table 10-1. Historical Timeline of SWMU 68

| Month | Year | Event | Reference |
|---|---|---|---|
| | Mid 1950s | The site was used for pool fire tests. Features at this testing site consisted of an aboveground earthen-bermed burn pan, drainage ditch and overflow basin, rectangular burn pit once lined with plastic, three debris piles, and two irregularly shaped borrow pits. Constituents of concern are metals, VOCs, SVOCs, and radionuclides. | SNL September 2005 |
| | 1981 & 1983 | Cultural resources surveys were conducted at SWMU 68 in 1981 and again in 1983. No cultural resources were identified in either survey. | SNL February 1995 |
| April | 1987 | SWMU 68 identified in the RCRA Facility Assessment Report. | EPA 1987 |
| September | 1987 | SWMU 68 discussed in the Comprehensive Environmental Assessment and Response Program report. | DOE September 1987 |
| September | 1992 | SWMU 68 added to Hazardous and Solid Waste Amendments module of the RCRA permit. | SNL September 1992 |
| November | 1993 | KAFB EOD personnel conducted a visual survey for UXO/HE materials. No live ordnance found; only empty shells and shell fragments were found. | SNL September 1994 |
| | 1993-1994 | Phase I surface radiation survey was conducted at SWMU 68. Gamma anomalies were identified and attributed to fragments of radioactive material buried just beneath the soil surface. | RUST Geotech, Inc. 1994 |
| | 1993-1994 | Los Alamos National Laboratory conducts alpha radiation survey at SWMU 68. No readings above background detected. | Bounds 1994 |
| June | 1994 | Sensitive species survey performed. No sensitive species were found. | IT Corporation 1995 |
| October | 1994 | Draft RFI Work Plan submitted to NMED. | SNL October 1994 |
| January-March | 1995 | Surface radiological VCM remediation conducted at SWMU 68**.** Point and small area sources identified during the 1993 Phase I survey were removed. | RUST Geotech, Inc. 1994 |
| March | 1995 | NMED comments on RFI Work Plan received. | NMED March 1995 |
| May | 1995 | DOE and SNL/NM ER responded to NMED comments on RFI Work Plan. | SNL May 1995 |
| June | 1995 | SWMU 68 investigated as part of a site-wide scoping sampling program | Chain of custody |
| October | 1995 | DOE and SNL/NM ER performed a Housekeeping VCM and removed steel test stands and piping from the site and conducted screening of three debris mounds. | SNL November 1995 |
| November | 1995 | EPA's NOD on Work Plan received. Additional sampling required at SWMU 68; consisting of sampling beneath debris piles for total constituents (metals and SVOCs); and collecting VOC samples at 3 ft beneath the overflow basin and plastic lined pit. | EPA 1995 |
| January-March | 1996 | Resurveying of SWMU 68 performed. Point and area sources identified during this survey were removed during cleanup activities. | Lambert et al. 1997 |
| February | 1996 | Response to EPA NOD on RFI Work Plan submitted. | SNL February 1996 |
| August | 1996 | DOE and SNL/NM ER conducted RFI sampling. A buried concrete slab is discovered while trenching across the overflow basin. No elevated readings are measured on its surface. A large mound (68A Mound) is discovered. | Field logs |

**Table 10-1. Historical Timeline of SWMU 68** *(Continued)*

| Month | Year | Event | Reference |
|---|---|---|---|
| August | 1997 | NMED issues RSI on the Work Plan. Additional soil sampling for VOCs, SVOCs, total metals, gross alpha/beta, and gamma spectroscopy needed at and below various features including below a shallow arroyo channel. The newly discovered mound, 68A, was administratively added as a subsite of SWMU 68. | NMED August 1997 |
| November | 1997 | RSI responses submitted to NMED, agreeing to conduct additional soil and sediment sampling. | SNL November 1997 |
| February | 1998 | Site-Wide Hydrological Characterization Project, Calendar Year 1995 Annual Report (SNL/NM December 1995) containing a description of SWMU 68 hydrogeology submitted to NMED. | SNL February 1998 |
| March | 1998 | NMED issues NOD on the Work Plan. Additional soil sampling must be conducted and the large debris mound (68A) must be investigated. | NMED March 1998 |
| May-June | 1998 | Surface radiological VCM activities continued to complete remediation of three area source anomalies. During the remediation a single area source, buried debris, and other materials were discovered. An area approximately 30 by 36 feet wide and 4 feet deep was excavated. | SNL July 1998 |
| July | 1998 | Responses submitted to NMED on the Work Plan NOD. | SNL July 1998 |
| August | 1998 | Soil vapor survey conducted at SWMU 68. Insignificant, trace concentrations of VOCs in soil vapor were detected. | |
| November/ December | 1998 | Geophysical surveys conducted at SWMU 68 around the burn pan and surrounding area to detect possible locations of additional buried waste; 68A Mound also surveyed. No anomalies indicative of buried waste were identified at either site. | Hyndman 1998 |
| December | 1998 | Soil sampling conducted at SWMU 68. Additional sampling specified in the NOD is performed. | NMED March 1998 |
| February | 1999 | Another soil mound discovered; this mound was trenched and sampled. No evidence for waste disposal was detected with field screening instruments or visually observed. No contamination was detected in the soil samples. Following regulator inspection and approval, the mound was leveled and the area graded. | Chain of Custody |
| August | 2001 | The soil piles and scrap materials were removed from the site and disposed of at appropriate off-site facilities. | Photos |
| April | 2004 | The Compliance Order on Consent identified SWMU 68 as requiring investigation. | NMED April 2004 |
| May | 2004 | DOE/NNSA and SNL/NM ER requested radiological restrictions be removed from SWMU 68. | SNL May 2004a |
| July | 2004 | Removal of radiological restrictions approved by Sandia Field Office. | NNSA July 2004 |
| October | 2004 | VCA Plan for SWMU 68; excavation of lead-contaminated soil. Conducted confirmatory sampling and removed debris from other areas at SWMU 68. | SNL October 2004 |
| January | 2005 | Soil sampling of the earthen berm was conducted. The soil used to create the earthen berm surrounding the burn pan assembly at SWMU 68 was the last remaining area at the site with the potential for radiological contamination. Removal of the earthen berm completed in order to remove the burn pan assembly and restore the site to acceptable conditions for closure. | SNL January 2005 |
| September | 2005 | Final investigation report and proposal for CAC submitted to NMED. | SNL September 2005 |
| October | 2005 | Letter received approving CAC without controls for SWMU 68. | NMED October 2005 |

**Table 10-1. Historical Timeline of SWMU 68** *(Concluded)*

| Month | Year | Event | Reference |
|---|---|---|---|
| March | 2006 | Request for Class III Permit Modification submitted. | SNL March 2006 |
| June | 2009 | NMED decision to remove SWMU 68 from the CAC process. | SNL June 2009 |
| April | 2010 | Letter from NMED formally stating requirements for corrective action at SWMU 68. | NMED April 2010 |
| September | 2010 | SWMU 68 Groundwater Characterization Work Plan submitted to NMED (in response to April 8, 2010 letter). | SNL September 2010 |
| January | 2011 | NMED approves SWMU 68 Work Plan. | NMED January 2011 |
| June | 2011 | Request for Extension to Complete the Well Installation Report for SWMUs 8/58 and 68 submitted. | SNL June 2011 |
| August | 2011 | Monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 installed. | SNL November 2011 |
| August | 2011 | NMED approves the Request for Extension to complete the Well Installation Report for SWMUs 8/58 and 68. | NMED August 2011 |
| October | 2011 | First quarterly sampling event for monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 at SWMU 68 conducted. | SNL September 2012 |
| November | 2011 | Well Installation Report for SWMU 68 submitted. | SNL November 2011 |
| January | 2012 | Slug tests performed on monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3. | SNL June 2012 |
| April | 2012 | NMED approved the Well Installation Report for SWMUs 8/58 and 68 | NMED April 2012 |
| June | 2012 | Hydraulic conductivity calculated for monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3. | SNL June 2012 |
| July | 2013 | The eighth and final sampling event required by NMED for monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 was completed. | SNL June 2013 |

**NOTES:**
CAC = Corrective Action Complete.
DOE = U.S. Department of Energy.
EOD = Explosive Ordnance Disposal.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
HE = High explosive.
KAFB = Kirtland Air Force Base.
NMED = New Mexico Environment Department.
NNSA = National Nuclear Security Administration.
NOD = Notice of Disapproval.
OBS = Old Burn Site.
RCRA = Resource Conservation and Recovery Act.
RFI = RCRA Facility Investigation.
RSI = Request for Supplemental Information.
SNL = Sandia National Laboratories.
SNL/NM = Sandia National Laboratories, New Mexico.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.
UXO = Unexploded ordnance.
VCA = Voluntary Corrective Action.
VCM = Voluntary Corrective Measure.
VOC = Volatile organic compound.

### 10.1.3 Monitoring History

In 2011, SNL/NM personnel installed three groundwater monitoring wells at SWMU 68 (SNL November 2011) as shown in Figure 10-2. These three monitoring wells were sampled for the first time in October 2011 as described in Section 10.1 and have been sampled quarterly since then.

### 10.1.4 Current Monitoring Network

Currently there are three groundwater monitoring wells at SWMU 68 (Figure 10-2). Monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 are monitored quarterly for VOCs, SVOCs, HE compounds, NPN, major anions (as bromide, chloride, fluoride, and sulfate), major cations (as calcium, magnesium, potassium, and sodium), alkalinity, TAL metals plus uranium, perchlorate, total cyanide, hexavalent chromium, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium.

### 10.1.5 Summary of Calendar Year 2013 Activities

The following activities occurred for SWMU 68 in CY 2013:

- Quarterly groundwater sampling was conducted at monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 in January, April, July and October 2013 (SNL December 2012, April 2013, June 2013, and September 2013a).
- Quarterly reporting of analytical results from monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 was conducted.
- Tables of analytical results (Attachment 10A) and hydrographs (Attachment 10B) were prepared in support of this report.

### 10.1.6 Summary of Future Activities

The following activities are anticipated for SWMU 68 during CY 2014:

- Quarterly groundwater sampling at monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 will continue in CY 2014 unless additional guidance is provided by NMED.
- Quarterly and annual reporting of chemical analyses for monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 groundwater samples will be performed.

### 10.1.7 Current Conceptual Model

This section presents a comprehensive discussion of the hydrogeologic regime, conceptual site model, and previous contaminant findings for SWMU 68.

#### 10.1.7.1 Regional Hydrogeologic Conditions

SWMU 68 is located in the central portion of the Coyote Test Field, approximately 7 miles southeast of Technical Area I and 0.5 miles southwest of the Starfire Optical Range. SWMU 68 covers approximately 6.5 acres of generally flat and gently westerly sloping terrain at an average elevation of approximately 5,860 ft amsl. The site is sparsely vegetated by bunch grasses, cacti, and a few junipers. No perennial surface water features such as springs are located within 1 mile of SWMU 68. A minor arroyo is located approximately 300 ft north of SWMU 68, but trends from east to west and does not cross the site.

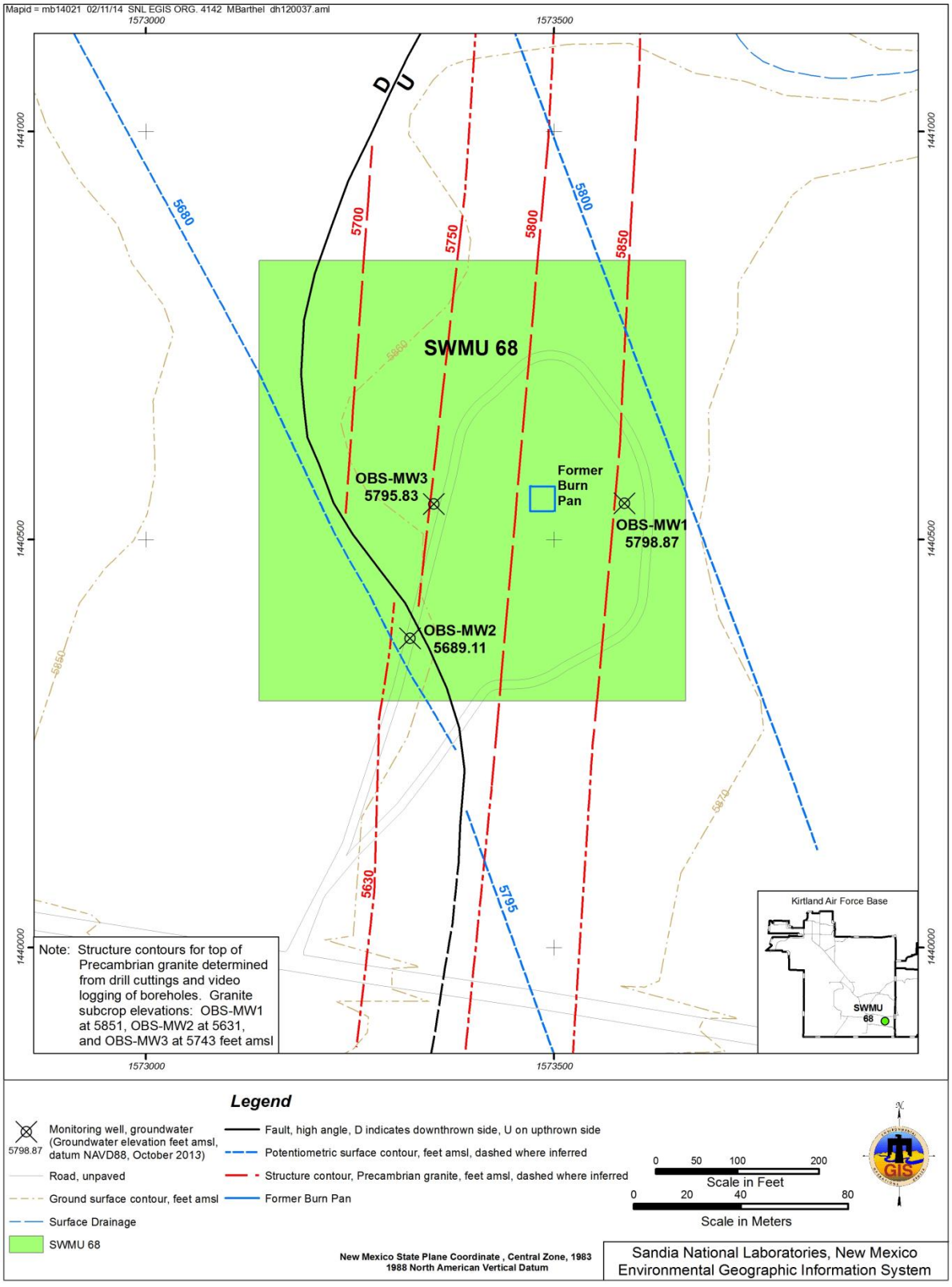


**Figure 10-2. Groundwater Monitoring Wells OBS-MW1, OBS-MW2, and OBS-MW3 Installed at SWMU 68**

In the mid-1990s, the Site-Wide Hydrogeologic Characterization Project conducted extensive mapping of the surface geology in the Coyote Test Field (GRAM and Lettis 1995). SWMU 68 is located approximately 1 to 2 miles to the west of the mountain front that undulates along the western edge of the Manzanita Mountains. The mountain front is defined as the slope break between the nearly horizontal alluvial fan sediments and the bedrock outcrops that comprise the mountains. Most of SWMU 68 is covered with a thin veneer of soil and unconsolidated alluvial fan sediments that have a combined maximum thickness of approximately 5 ft. Paleozoic limestone of the Madera Group outcrops at the northwest portion of the site. The Coyote Fault trends north to south across the eastern edge of the site and is buried by soil and sediment. At KAFB, the Coyote Fault consists of a series of high-angle faults and splays with a composite down to the west displacement of approximately 700 to 1,000 ft.

The regional potentiometric surface map (Plate 1) shows that groundwater flow is generally toward the west in the vicinity of SWMU 68. Topographic features and faults modify the flow direction at various locations. Faults to the west of the site may serve as hydraulic barriers or conduits depending on the type and amount of fault gouge.

#### 10.1.7.2 Hydrogeologic Conditions at SWMU 68

The amount of precipitation available for groundwater recharge is minimal due to scant rainfall and high evapotranspiration. Summer (monsoonal) thunderstorms are responsible for the majority of rainfall. The average rainfall, as measured at the nearest active rain gauge (the National Weather Service station at the Albuquerque International Sunport), during the period from 1915 through 2005 was 8.67 inches per year (in/yr) (WRCC-DRI 2012). The station is located 10 miles northwest of SWMU 68 at an elevation of 5,310 ft amsl. By extrapolation of the precipitation model presented in SNL/NM conceptual model of groundwater flow and contaminant transport for Lurance Canyon (SNL May 2004b), the average annual precipitation for SWMU 68, where the elevation averages approximately 5,860 ft amsl, is estimated to be approximately 11 in/yr. Intense sunlight and low humidity throughout much of the year creates high rates of evapotranspiration. Estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL February 1998).

Three monitoring wells (OBS-MW1, OBS-MW2, and OBS-MW3) were installed at SWMU 68 using the air-rotary casing hammer drilling method in August 2011 (SNL November 2011). No petroleum odors, stains, or sheens were observed on the cuttings or groundwater samples. During drilling of the three boreholes, groundwater was encountered at depths ranging from approximately 135 to 240 ft below ground surface (bgs), and was dependent on the depth of the uppermost water-bearing fracture at a particular borehole (Table 10-2). Monitoring wells OBS-MW1 and OBS-MW3 are located closest to the former location of the burn pan and are most similar. Therefore, these two wells are discussed first as follows.

At the monitoring well OBS-MW1 borehole, poorly sorted sand was encountered from the ground surface to a depth of approximately 3 ft bgs. Hard limestone, most likely of the Sandia Formation, was encountered from 3 to 18 ft bgs. The Precambrian granite contact was at 18 ft bgs. Saturated granitic cuttings were encountered at 135 ft bgs, and monitoring well OBS-MW1 was screened in granite at 135 to 155 ft bgs (Table 10-2).

At the monitoring well OBS-MW3 borehole, soil and silty gravelly sand were encountered from the ground surface to a depth of approximately 2 ft bgs. Hard cherty limestone, most likely of the Madera Group, was encountered from 2 to 102 ft bgs. A conglomerate layer extended from 102 to 105 ft bgs. A sequence of the Sandia Formation consisting of coarse sandstone, claystone, black shale, and limestone was encountered from 105 to 120 ft bgs. The Precambrian granite contact was at 120 ft bgs. Saturated granitic cuttings were encountered at 190 ft bgs. Monitoring well OBS-MW3 was screened in Precambrian granite at an interval of 190 to 210 ft bgs (Table 10-2).

## Table 10-2. Lithologic and Hydrogeologic Elevation Data for Monitoring Wells at SWMU 68

| Monitoring Well | Ground Surface Elevation (ft amsl) | Depth to Granite (ft bgs) | Top Granite Elevation (ft amsl) | Depth to Uppermost Saturated Fracture (ft bgs[a]) | Elevation of Uppermost Saturated Fracture (ft amsl[a]) | Depth of Screened Interval (ft bgs) | Potentiometric Surface October 2013 (ft amsl) | Mid-Point Screen Elevation (ft amsl) | Pressure Head (ft[b]) |
|---|---|---|---|---|---|---|---|---|---|
| OBS-MW1 | 5869.08 | 18 | 5851 | 135 | 5734 | 135 - 155 | 5798.87 | 5724.10 | 75 |
| OBS-MW2 | 5860.75 | 230 | 5631 | 240 | 5621 | 234 - 254 | 5689.11 | 5616.80 | 72 |
| OBS-MW3 | 5863.31 | 120 | 5743 | 190 | 5673 | 190 - 210 | 5795.83 | 5663.30 | 133 |

**NOTES:**
[a]Observed during drilling.
[b]From mid-point of screen.
amsl = Above mean sea level.
bgs = Below ground surface.
ft = Foot (feet).
MW = Monitoring Well.
OBS = Old Burn Site.
SWMU = Solid Waste Management Unit.

At the monitoring well OBS-MW2 borehole, poorly sorted sand was encountered from the ground surface to a depth of approximately 3 ft bgs. Hard cherty limestone, most likely of the Madera Group, was encountered from 3 to 184 ft bgs. From 184 to 190 ft bgs, sandstone of the Sandia Formation was encountered. Limestone was encountered from 190 to 205 ft bgs. No drill cuttings were returned from 205 to 305 ft bgs where the borehole apparently intercepted a splay of the Coyote Fault. Saturated granitic cuttings were returned starting at 305 ft bgs. Video logging of the borehole was used for selecting the screen depth. The flowing groundwater visible on the video log from approximately 240 to 250 ft bgs represents the uppermost saturated fracture zone. The well was screened across the flowing zone at 234 to 254 ft bgs.

Because cloudy water obscured the borehole lithology below a depth of 182 ft bgs and no drill cuttings were returned from 205 to 305 ft bgs at monitoring well OBS-MW2 borehole, the lithology of the screened interval has been inferred using the geochemical composition of water samples that were collected during CY 2013. As shown on the Piper diagram (Figure 10-3), the geochemical composition is similar, nearly identical, for groundwater samples collected from all three of the wells. The similar geochemical signature is indicative of a single water source and hydrofacies. The CY 2013 Piper diagram and interpretation of a single water source is consistent with the data and interpretation provided in the Calendar Year 2011 and 2012 Annual Groundwater Reports (SNL September 2012, September 2013b) Because the completion zones are well known for monitoring wells OBS-MW1 and OBS-MW3, it is postulated that monitoring well OBS-MW2 is also screened in fractured granite. The groundwater composition for all three wells is of the bicarbonate type and dominated by calcium.

An unusually large volume of sand pack was required for building monitoring well OBS-MW2. A total of 125 bags of sand were used to fill the annulus from the bottom of the sump to the required height above the screen. A monitoring well of similar design would typically be expected to require approximately 25 bags of sand. The large annular volume for monitoring well OBS-MW2 indicates that a borehole with a much larger than normal diameter was created during the drilling process and/or a void exists along the fault zone. The large amount of sand pack was considered when slug tests were interpreted.

Structure contours for the granite subcrop are shown in Figure 10-4 with the corresponding elevations listed in Table 10-2. The amount of throw on the fault splay is estimated to be approximately 110 ft. The orientation of the fault splay and the structure contours are interpreted to mimic the north-south structural grain of the Manzanita Mountains and associated faults. The fault splay is probably high-angle with a down to the west offset.

The potentiometric surface contours for SWMU 68 are shown in Figure 10-4. The water-level elevation in monitoring well OBS-MW1 was 3.04 ft higher than monitoring well OBS-MW3 in October 2013. The distance between the two wells is 248 ft. The horizontal gradient between monitoring wells OBS-MW1 and OBS-MW3 is approximately 0.01 feet per foot to the west. The groundwater elevation at monitoring well OBS-MW2 is much lower by approximately 110 ft and indicates that the fault splay is a hydraulic barrier between monitoring well OBS-MW2 and the other two monitoring wells (OBS-MW1 and OBS-MW3). The potentiometric surface at each well is above the top of each respective screen and is indicative of semi-confined or confined conditions in the SWMU 68 area.

During sampling, the drawdown in each of the three wells was not excessive. The quantity of water produced by each well was clearly adequate for typical groundwater sampling. Groundwater samples were collected using pneumatic (nitrogen gas) Bennett™ piston pumps. Slug tests were performed on monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 in January 2012. Calculated hydraulic conductivity values for the three monitoring wells varied from $3.02 \times 10^{-4}$ to $5.22 \times 10^{-2}$ feet per minute (SNL June 2012). It should be noted that the slug test analyses were developed for use in

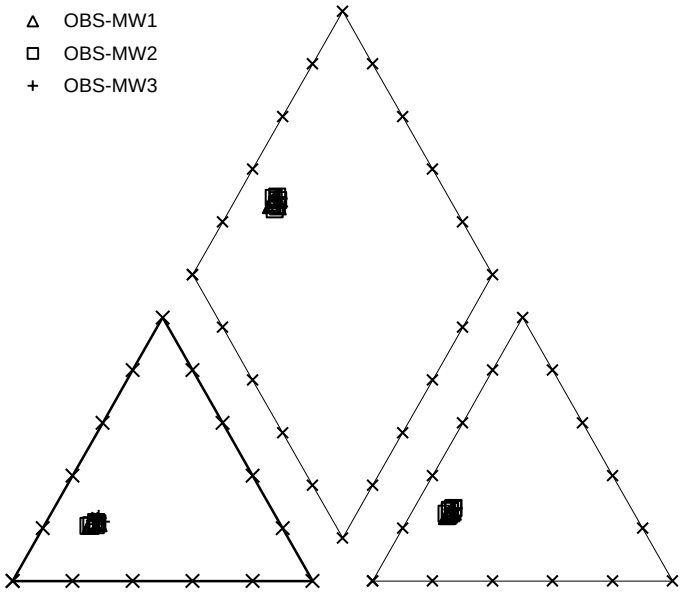


**Figure 10-3. Piper Trilinear Diagram of Major Ion Chemistry for Monitoring Wells OBS-MW1, OBS-MW2, and OBS-MW3 at SWMU 68, CY 2013**

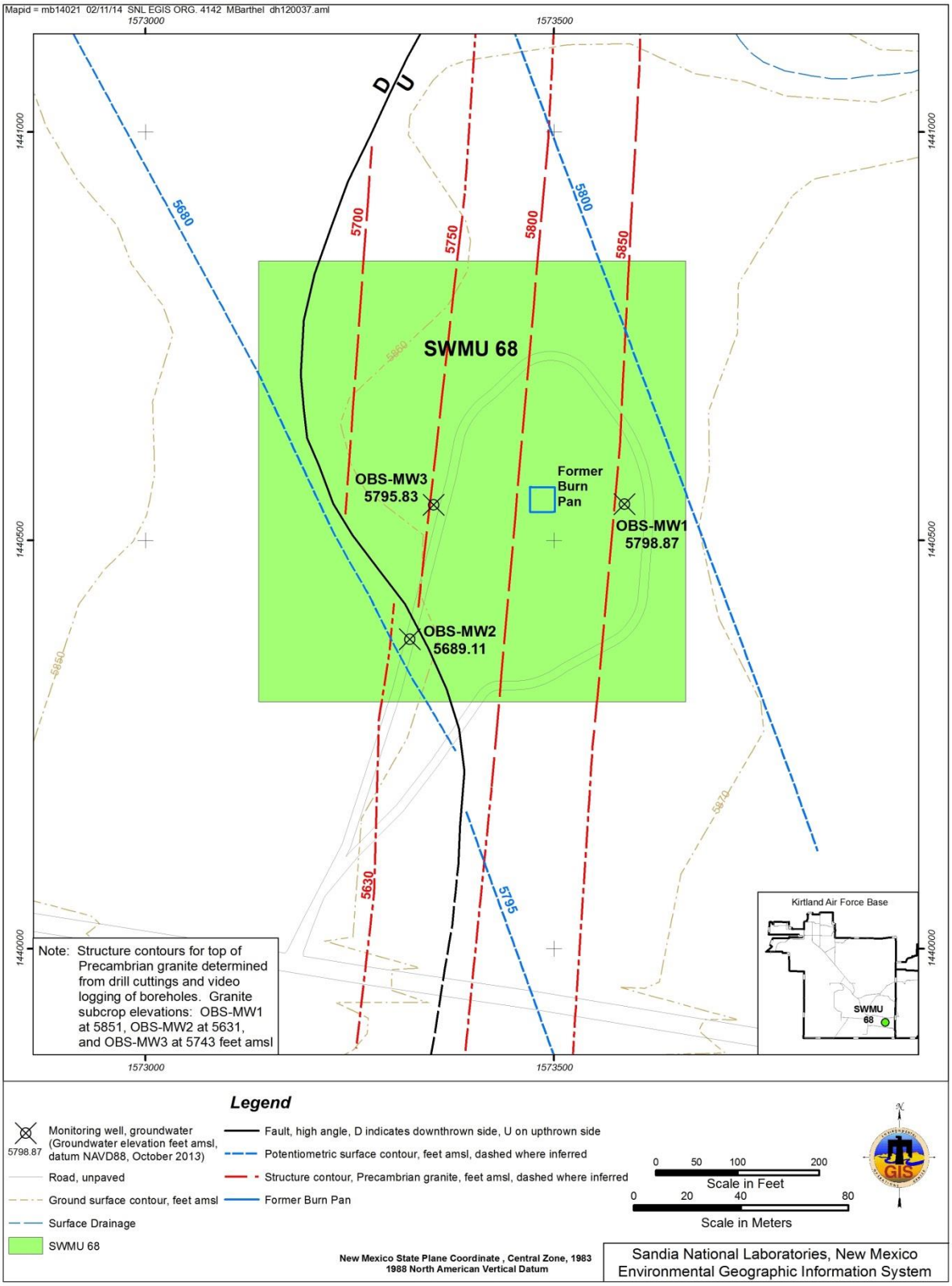


**Figure 10-4. SWMU 68 Potentiometric Surface Map (October 2013)**

unconsolidated deposits and analyses of bedrock aquifers are dominated by fracture flow. The results for monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 are within the range of conductivities ($10^{-5}$ to $10^{-2}$ feet per minute) determined for the regional aquifer within the unconsolidated Santa Fe Group sediments west of SWMUs 8/58 and SWMU 68 (SNL March 1999). This qualitatively suggests that fracture flow at the SWMU 68 wells is capable of moving significant amounts of groundwater.

#### 10.1.7.3 Conceptual Site Model for SWMU 68

The conceptual site model for SWMU 68 is based on the findings from three on-site monitoring wells (OBS-MW1, OBS-MW2, and OBS-MW3), several nearby monitoring wells located across the Coyote Test Field (Plate 1), and extensive field mapping conducted by the Site-Wide Hydrogeologic Characterization Project (GRAM and Lettis 1995). The site is relatively flat and slopes gently to the west. No arroyos or perennial surface water bodies are located near the site. The infrequent storm water drains westward across the site and typically dissipates nearby on the flat terrain. Most of the site is covered by a thin layer of soil. Madera Group limestone outcrops at the northwest corner of the site.

The August 2011 drilling encountered Paleozoic units (limestone, sandstone, claystone, and shale) overlying Precambrian granite. Groundwater was encountered in fractured granite at depths ranging from approximately 135 to 240 ft bgs, and was dependent on the depth of the uppermost water-bearing fracture at a particular borehole. Groundwater in the SWMU 68 area occurs in a fractured bedrock system under semi-confined or confined conditions. The geochemical signature is of the bicarbonate type dominated by calcium.

The overlying granitic bedrock with naturally filled fractures probably serves as the confining layer. A buried splay of the Coyote Fault trends across the western side of the site and restricts the migration rate of groundwater. The amount of throw is estimated to be 110 ft. The hydraulic gradient on the east side of the fault is approximately 0.01 feet per foot to the west. The amount of precipitation available for groundwater recharge is minimal due to the scant rainfall (approximately 9 in/yr) and high evapotranspiration rates. Seasonal effects probably do not influence groundwater levels near the site. Groundwater from the site probably discharges to the unconsolidated basin fill deposits (primarily the Santa Fe Group) of the Albuquerque Basin after crossing the Sandia and Tijeras faults (SNL February 1998). No potable water supply wells are located within 6 miles of the site.

#### 10.1.7.4 Contaminant Sources

At SWMU 68, soil contamination was suspected at the burn pan, the overflow basin, a plastic-lined pit, and three shallow earthen pits. During 1995 to 2004, radiological and ordnance surveys were conducted and hazardous materials were removed. Additional remedial activities were conducted in 2004, and all the testing features were removed. Approximately 425 cubic yards of lead-contaminated soil and 3 cubic ft of radiologically contaminated soil were removed along with approximately 120 cubic yards of construction debris. Confirmatory soil sampling was conducted in 2004 to validate the results of the soil removal activities. Human health and ecological risk assessments show that the remaining constituents of concern concentrations in soil are acceptable for both industrial and residential land use scenarios.

#### 10.1.7.5 Contaminant Distribution and Transport in Groundwater

Three groundwater monitoring wells were installed at SWMU 68 in August 2011. During CY 2013 groundwater samples were collected from monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3. Analytical parameters included VOCs, SVOCs, HE compounds, NPN, major anions, major cations, alkalinity, TAL metals plus uranium, hexavalent chromium, perchlorate, total cyanide, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium. No parameters were detected above established MCLs.

## 10.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM Environmental Restoration (ER) Operations (formerly ER Project) and implements and enforces federal regulations mandated by the Resource Conservation and Recovery Act (RCRA). All ER Operations SWMUs are listed in Module IV of the SNL/NM RCRA Permit, *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518* (NMED 1993).

In April 2004, the Order (NMED April 2004) specifically identified SWMU 68 as requiring investigation. All corrective action requirements pertaining to SWMU 68 are contained in the Order (NMED April 2004).

In September 2005, DOE/NNSA and Sandia submitted a letter to the NMED requesting a CAC status determination for SWMU 68 (SNL September 2005). The NMED approved SWMU 68 as CAC without controls in October 2005 (NMED October 2005).

On March 1, 2006, DOE/NNSA and Sandia submitted a letter to the NMED justifying a Class III Permit Modification Request for SWMU 68 (SNL March 2006). On April 8, 2010, the NMED responded to the Permit Modification request, stating that SWMU 68 required additional site characterization work, including the installation of three groundwater monitoring wells near the previous locations of the burn pan and associated ditch/surface impoundment. The NMED also required the submittal of a well installation work plan (NMED April 2010). On September 23, 2010, DOE/NNSA and Sandia responded to the NMED by submitting a groundwater characterization work plan for the installation of three monitoring wells at SWMU 68 (SNL September 2010). The NMED responded to the SNL/NM September 2010 submittal in January 2011, and approved the SWMU 68 well installation work plan (NMED January 2011).

Monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 were installed in August 2011 and quarterly sampling began in October 2011. The well installation report describing field activities was submitted to NMED in November 2011. The eighth and final sampling event required by NMED for monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 was completed in July 2013.

In this report, monitoring data for SWMU 68 are presented for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (gamma spectroscopy, gross alpha/beta activity, and tritium) are provided voluntarily by the DOE/NNSA and Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Order, as specified in Section III.A of the Order (NMED April 2004).

## 10.3 Scope of Activities

The field activity discussed in this section is groundwater monitoring sampling and analysis during CY 2013 sampling events (Table 10-3). The analytical parameters for monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 for each sampling event are listed in Table 10-4.

## Table 10-3. Groundwater Monitoring Well Network and Sampling Dates for SWMU 68, Calendar Year 2013

| Date of Sampling Event | Monitoring Wells Sampled | SAP |
|---|---|---|
| January 2013 | OBS-MW1<br>OBS-MW2<br>OBS-MW3 | *SWMU 68 Groundwater Monitoring Mini-SAP for Second Quarter Fiscal Year 2013* (SNL December 2012) |
| April 2013 | OBS-MW1<br>OBS-MW2<br>OBS-MW3 | *SWMU 68 Groundwater Monitoring Mini-SAP for Third Quarter Fiscal Year 2013* (SNL April 2013) |
| July 2013 | OBS-MW1<br>OBS-MW2<br>OBS-MW3 | *SWMU 68 Groundwater Monitoring Mini-SAP for Fourth Quarter Fiscal Year 2013* (SNL June 2013) |
| October 2013 | OBS-MW1<br>OBS-MW2<br>OBS-MW3 | *SWMU 68 Groundwater Monitoring Mini-SAP for First Quarter Fiscal Year 2014* (SNL September 2013a) |

**NOTES:**
MW = Monitoring well.
OBS = Old Burn Site.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories.
SWMU = Solid Waste Management Unit.

## Table 10-4. Parameters Sampled at SWMU 68 for Each Sampling Event, Calendar Year 2013

| Parameter | Sampling Period | |
|---|---|---|
| Anions | **January 2013** | **April 2013** |
| Alkalinity | OBS-MW1 | OBS-MW1 |
| Filtered Cations | OBS-MW1 (dup) | OBS-MW2 |
| Gamma Spec* | OBS-MW2 | OBS-MW3 |
| Gross Alpha | OBS-MW3 | OBS-MW3 (dup) |
| Gross Beta | | |
| HE compounds | | |
| Hexavalent Chromium | **July 2013** | **October 2013** |
| Isotopic Uranium | OBS-MW1 | OBS-MW1 |
| NPN | OBS-MW2 | OBS-MW1 (dup) |
| Perchlorate | OBS-MW2 (dup) | OBS-MW2 |
| SVOCs | OBS-MW3 | OBS-MW3 |
| TAL Metals, plus Total Uranium | | |
| Total Cyanide | | |
| VOCs | | |

**NOTES:**
Dup = Duplicate sample.
Gamma Spec* = Gamma spectroscopy short list (Americium-241, Cesium-137, Cobalt-60, and Potassium-40).
HE = High explosive.
NPN = Nitrate plus nitrate (reported as nitrogen).
SVOC = Semivolatile organic compound.
TAL = Target Analyte List.
VOC = Volatile organic compound.

## 10.4 Field Methods and Measurements

According to the requirements of Section VII.D.6 of the Order (NMED April 2004) and the NMED letter of April 8, 2010 (NMED April 2010), groundwater sampling was performed at SWMU 68. The CY 2013 sampling events were conducted in conformance with appropriate SNL/NM Field Operating Procedures for groundwater sampling activities, the SWMU 68 site-specific SAP (SNL/NM September 2010), and the SWMU 68 site-specific Mini-SAPs (SNL December 2012, April 2013, June 2013, and September 2013a).

Groundwater samples were collected from monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 in January, April, July, and October 2013. Samples were submitted to GEL Laboratories, LLC for all chemical analyses. All samples were analyzed for VOCs, SVOCs, HE compounds, NPN, major anions (as bromide, chloride, fluoride, and sulfate), major cations (as calcium, magnesium, potassium, and sodium), alkalinity, TAL metals plus uranium, hexavalent chromium, perchlorate, total cyanide, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium.

The monitoring procedures for SWMU 68 are consistent with the procedures identified in the EPA technical enforcement guidance document (EPA 1986) and are described in detail in Section 1.3.

The NMED DOE Oversight Bureau collected split samples with Sandia during April and July 2013 sampling events. The NMED DOE Oversight Bureau analytical results are not reported in this document, but are available through the DOE NNSA Sandia Field Office.

## 10.5 Groundwater Elevation

During the quarterly CY 2013 sampling, water level measurements were obtained to determine groundwater flow directions, hydraulic gradients, and changes in potentiometric surface elevations. The CY 2013 water level information was used to create the base-wide potentiometric surface map discussed in Section 2.6.2.2 and shown in Plate 1. The potentiometric surface contours presented in Figure 10-4 are derived from the base-wide potentiometric surface map. The hydrograph for SWMU 68 monitoring wells is shown in Figures 10B-1 (Attachment 10B).

## 10.6 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using EPA- and DOE-specified protocols described in Section 1.3.2 (Tables 1-5 and 1-6). Parameters analyzed and sampling periods in CY 2013 are presented in Table 10-4.

## 10.7 Summary of Analytical Results

This section discusses analytical results and field measurements for the CY 2013 SWMU 68 sampling events. Data are presented in Tables 10A-1 through 10A-11 (Attachment 10A). Data qualifiers are explained in the footnotes following Table 10A-11. Analytical reports, including certificates of analyses, analytical methods, method detection limits (MDLs), practical quantitation limits (PQLs), dates of analyses, results of quality control (QC) analyses, and data validation findings are filed in the SNL/NM Records Center.

The analytical data were reviewed and qualified in accordance with SNL/NM Administrative Operating Procedure 00-03 (SNL May 2011). No problems were identified with the analytical data that resulted in qualification of the data as unusable. The data are acceptable and reported QC measures are adequate.

In CY 2013 no SWMU 68 groundwater samples detected any VOCs, SVOCs, or HE compounds above laboratory MDLs. Table 10A-1 lists the MDLs for associated VOCs, Table 10A-2 the MDLs for SVOCs, and Table 10A-3 the MDLs for HE compounds.

Table 10A-4 (Attachment 10A) summarizes NPN results. NPN values were compared with the nitrate MCL of 10 mg/L. NPN was not detected above the MCL in any groundwater sample. NPN concentrations range from 1.21 to 1.95 mg/L.

Table 10A-5 (Attachment 10A) summarizes alkalinity, major anion (as bromide, chloride, fluoride, and sulfate) and total cyanide results. No parameters were detected above established MCLs.

Perchlorate was not detected above the screening level/MDL of 0.004 mg/L (NMED April 2004) in any of the SWMU 68 groundwater sample. Table 10A-6 (Attachment 10A) presents the perchlorate results.

Hexavalent chromium results are summarized in Table 10A-7 (Attachment 10A). No hexavalent chromium was detected above laboratory MDLs. No MCL is established for hexavalent chromium.

TAL metals plus uranium were analyzed in samples from all SWMU 68 monitoring wells. No metal parameters were detected above established regulatory limits in any groundwater sample. Metal results are summarized in Table 10A-8 (Attachment 10A).

Filtered fractions for major cations as calcium, magnesium, potassium, and sodium were analyzed in all SWMU 68 samples. The results are summarized in Table 10A-9 (Attachment 10A). No MCLs are established for these analytes.

The results for gamma spectroscopy, gross alpha, gross beta, and isotopic uranium are presented in Table 10A-10 (Attachment 10A). Gross alpha activity is measured as a screening tool and in accordance with 40 Code of Federal Regulations, Parts 9, 141, and 142, Table I-4 does not include uranium, which is measured independently. Therefore, gross alpha activity measurements were corrected by subtracting the total uranium activity. Radiological results are further reviewed by an SNL/NM Certified Health Physicist to assure that the samples are nonradioactive. All radionuclide activity results are below MCLs, where established.

Table 10A-11 (Attachment 10A) summarizes field water quality measurements collected prior to sampling. Field water quality measurements include turbidity, pH, temperature, specific conductance, oxidation-reduction potential, and dissolved oxygen.

## 10.8 Quality Control Results

Field and laboratory QC samples were prepared to determine the accuracy of the methods used and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process. The results for each QC sample and the impact on data quality for the SWMU 68 quarterly sampling events are discussed in the following sections.

### 10.8.1 Field Quality Control Samples

Field QC samples included duplicate environmental samples, field blanks (FBs), trip blanks (TBs), and equipment blanks (EBs). The following sections discuss the analytical results for each QC sample type.

#### 10.8.1.1 Duplicate Environmental Samples

Duplicate environmental samples were analyzed to estimate the overall reproducibility of the sampling and analytical process. Relative percent difference (RPD) calculations, between duplicate samples, were performed for detected chemical analytes. Duplicate environmental samples were collected and analyzed in January, April, July, and October 2013 (Table 10-4). Results show good agreement (RPD values less than 20 percent for organic compounds and less than 35 for inorganic analyses), with the following exceptions:

- **April 2013 Sampling Event—**The RPD for aluminum was calculated at 53 and is an estimated value as aluminum was reported below the PQL in both the environmental and environmental duplicate.

- **July 2013 Sampling Event—**The RPD for nickel was calculated at 47 and is an estimated value as nickel was reported at below the PQL in both the environmental and environmental duplicate.

#### 10.8.1.2 Equipment Blank Samples

EB or rinsate samples are collected to verify the equipment decontamination process. The results for EB analyses are as follows:

- **January 2013 Sampling Event**—An EB or rinsate sample was collected prior to sampling monitoring well OBS-MW1 and submitted for all analyses. Alkalinity, bromodichloromethane, bromoform, calcium, chloroform, chloride, copper, dibromochloromethane, and sodium were detected above laboratory MDLs. No corrective action was necessary because these analytes were not detected in environmental samples, nor were detected in environmental samples at concentrations greater than five times the EB result, except for copper. Copper was detected in the EB sample at concentration higher than values reported for the associated environmental samples. Therefore, copper was qualified as not detected during data validation for both environmental and duplicate environmental samples.

- **April 2013 Sampling Event**—An EB or rinsate sample was collected prior to sampling monitoring well OBS-MW3 and submitted for all analyses. Barium, bromodichloromethane, bromoform, chloroform, chloride, copper, dibromochloromethane, and sodium were detected above laboratory MDLs. No correction was necessary because these analytes were not detected in environmental samples, nor were detected in environmental samples at concentrations greater than five times the EB result, except for copper. Copper was detected in the EB sample at concentration higher than values reported for the associated environmental samples. Therefore, copper was qualified as not detected during data validation in both environmental and duplicate environmental samples.

- **July 2013 Sampling Event—**An EB or rinsate sample was collected prior to sampling monitoring well OBS-MW2 and submitted for all analyses. Acetone, chloroform, and copper were detected above laboratory MDLs. No correction was necessary because these analytes were not detected in environmental samples, except for copper. Copper was detected in the EB sample at concentration higher than values reported for the associated environmental samples. Therefore, copper was qualified as not detected during data validation in both environmental and duplicate environmental samples.

- **October 2013 Sampling Event**—An EB or rinsate sample was collected prior to sampling monitoring well OBS-MW1 and submitted for all analyses. Acetone, barium, chloroform, copper, dibromochloromethane, and zinc were detected above laboratory MDLs. No correction was necessary because these compounds were not detected in environmental samples, nor detected in environmental samples at concentrations greater than five times the EB result, except for copper and zinc. Copper and zinc were detected in the EB sample at concentrations similar to values reported for the associated environmental samples. Therefore, copper and zinc were qualified as not detected during data validation in OBS-MW1 environmental and duplicate environmental samples.

#### 10.8.1.3 Trip Blank Samples

TB samples are submitted whenever samples are collected for VOC analyses to assess whether contamination of the samples had occurred during shipment and storage. A total of 16 TB samples were submitted in CY 2013 with four submitted for each sampling event in January, April, July, and October. No VOCs were detected above the associated laboratory MDLs in any TB sample.

#### 10.8.1.4 Field Blank Samples

A FB sample was collected for VOCs to assess whether contamination of the samples resulted from ambient field conditions.

- **January 2013 Sampling Event—**Analysis of the monitoring well OBS-MW3 FB sample detected the VOC compounds bromodichloromethane, bromoform, chloroform, and dibromochloromethane above laboratory MDL. No correction was necessary, because these compounds were not detected in the associated environmental samples.

- **April 2013 Sampling Event—**Analysis of the monitoring well OBS-MW2 FB sample detected the VOC compounds bromodichloromethane, bromoform, chloroform, and dibromochloromethane above laboratory MDL. No correction was necessary, because these compounds were not detected in the associated environmental samples.

- **July 2013 Sampling Event—**Analysis of the monitoring well OBS-MW2 FB sample detected the VOC compound chloroform above laboratory MDL. No correction was necessary, because the compound was not detected in the associated environmental samples.

- **October 2013 Sampling Event**—Analysis of the monitoring well OBS-MW3 FB sample detected the VOC compound chloroform above laboratory MDLs. No correction was necessary because the compound was not detected in the associated environmental samples.

### 10.8.2 Laboratory Control Samples

Internal laboratory QC samples, including method blanks and duplicate laboratory control samples, were analyzed concurrently with all groundwater samples. Some analytical results were qualified during the data validation process, but no significant data quality problems were noted in CY 2013**.**

## 10.9 Variances and Nonconformances

No variances or nonconformances from requirements specified in the SWMU 68 Groundwater Monitoring Mini-SAPs (SNL December 2012, April 2013, June 2013, and September 2013a) were noted during sampling activities

## 10.10 Summary and Conclusions

Three groundwater monitoring wells were installed at SWMU 68 in August 2011. In January, April, July, and October 2013, groundwater samples were collected from monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3. Analytical parameters included VOCs, SVOCs, HE compounds, NPN, major anions, major cations, alkalinity, TAL metals plus uranium, hexavalent chromium, perchlorate, total cyanide, gross alpha beta activity, radionuclides by gamma spectroscopy, and isotopic uranium. No parameters were detected above established MCLs.

The current conceptual model described in Section 10.1.7 does not require modification based on the analytical results for this reporting period.

During CY 2014, quarterly groundwater sampling and reporting will continue at the SWMU 68 groundwater monitoring wells (OBS-MW1, OBS-MW2, and OBS-MW3). The eighth and final quarterly groundwater sampling event was completed in July 2013. Quarterly groundwater sampling and reporting will continue until additional guidance is provided by NMED.

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# Attachment 10A
# Solid Waste Management Unit 68
# Analytical Results Tables

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# Attachment 10A Tables


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## Table 10A-1
## Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B), Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Analyte | MDL[b] (µg/L) | Analyte | MDL[b] (µg/L) |
|---|---|---|---|
| 1,1,1-Trichloroethane | 0.300 | Chlorobenzene | 0.300 |
| 1,1,2,2-Tetrachloroethane | 0.300 | Chloroethane | 0.300 |
| 1,1,2-Trichloroethane | 0.300 | Chloroform | 0.300 |
| 1,1-Dichloroethane | 0.300 | Chloromethane | 0.300 |
| 1,1-Dichloroethene | 0.300 | Cyclohexane | 0.300 |
| 1,2,3-Trichlorobenzene | 0.300 | Dibromochloromethane | 0.300 |
| 1,2,4-Trichlorobenzene | 0.300 | Dichlorodifluoromethane | 0.300 |
| 1,2-Dibromo-3-chloropropane | 0.300 | Ethyl benzene | 0.300 |
| 1,2-Dibromoethane | 0.300 | Isopropylbenzene | 0.300 |
| 1,2-Dichlorobenzene | 0.300 | Methyl acetate | 1.50 |
| 1,2-Dichloroethane | 0.300 | Methylcyclohexane | 3.00 |
| 1,2-Dichloropropane | 0.300 | Methylene chloride | 3.00 |
| 1,3-Dichlorobenzene | 0.300 | Styrene | 0.300 |
| 1,4-Dichlorobenzene | 0.300 | Tert-butyl methyl ether | 0.300 |
| 2,2-trifluoroethane, 1,1,2-Trichloro-1 | 1.50 | Tetrachloroethene | 0.300 |
| 2-Butanone | 2.00 | Toluene | 0.300 |
| 2-Hexanone | 2.20 | Trichloroethene | 0.300 |
| 4-methyl-, 2-Pentanone | 1.50 | Trichlorofluoromethane | 0.300 |
| Acetone | 3.00 | Vinyl chloride | 0.300 |
| Benzene | 0.300 | Xylene | 0.300 |
| Bromochloromethane | 0.300 | cis-1,2-Dichloroethene | 0.300 |
| Bromodichloromethane | 0.300 | cis-1,3-Dichloropropene | 0.300 |
| Bromoform | 0.300 | m-, p-Xylene | 0.300 |
| Bromomethane | 0.300 | o-Xylene | 0.300 |
| Carbon disulfide | 1.50 | trans-1,2-Dichloroethene | 0.300 |
| Carbon tetrachloride | 0.300 | trans-1,3-Dichloropropene | 0.300 |

Refer to footnotes on page 10A-39.

## Table 10A-2
## Method Detection Limits for Semivolatile Organic Compounds (EPA Method[g] SW846-8270C), Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Analyte | MDL[b] (µg/L) | Analyte | MDL[b] (µg/L) |
|---|---|---|---|
| 1'-Biphenyl 1 | 2.94 - 3.26 | Butylbenzyl phthalate | 2.94 - 3.26 |
| 1,2,4-Trichlorobenzene | 2.94 - 3.26 | Caprolactam | 2.94 - 3.26 |
| 2,4,5-Trichlorophenol | 2.94 - 3.26 | Carbazole | 0.294 - 0.326 |
| 1,4-Dioxane | 2.94 - 3.26 | Chrysene | 0.294 - 0.326 |
| 2,4,6-Trichlorophenol | 2.94 - 3.26 | Di-n-butyl phthalate | 2.94 - 3.26 |
| 2,4-Dichlorophenol | 2.94 - 3.26 | Di-n-octyl phthalate | 2.94 - 3.26 |
| 2,4-Dimethylphenol | 2.94 - 3.26 | Dibenz[a,h]anthracene | 0.294 - 0.326 |
| 2,4-Dinitrophenol | 4.90 - 5.43 | Dibenzofuran | 2.94 - 3.26 |
| 2,4-Dinitrotoluene | 2.94 - 3.26 | Diethylphthalate | 2.94 - 3.26 |
| 2,6-Dinitrotoluene | 2.94 - 3.26 | Dimethylphthalate | 2.94 - 3.26 |
| 2-Chloronaphthalene | 0.294 - 0.446 | Dinitro-o-cresol | 2.94 - 3.26 |
| 2-Chlorophenol | 2.94 - 3.26 | Diphenyl amine | 2.94 - 3.26 |
| 2-Methylnaphthalene | 0.294 - 0.326 | Fluoranthene | 0.294 - 0.326 |
| 2-Nitroaniline | 2.94 - 3.26 | Fluorene | 0.294 - 0.326 |
| 2-Nitrophenol | 2.94 - 3.26 | Hexachlorobenzene | 2.94 - 3.26 |
| 3,3'-Dichlorobenzidine | 2.94 - 3.26 | Hexachlorobutadiene | 2.94 - 3.26 |
| 3-Nitroaniline | 2.94 - 3.26 | Hexachlorocyclopentadiene | 2.94 - 3.26 |
| 4-Bromophenyl phenyl ether | 2.94 - 3.26 | Hexachloroethane | 2.94 - 3.26 |
| 4-Chloro-3-methylphenol | 2.94 - 3.26 | Indeno(1,2,3-c,d)pyrene | 0.294 - 0.326 |
| 4-Chlorobenzenamine | 3.24 - 3.56 | Isophorone | 2.94 - 3.80 |
| 4-Chlorophenyl phenyl ether | 2.94 - 3.26 | Naphthalene | 0.294 - 0.313 |
| 4-Nitroaniline | 2.94 - 3.26 | Nitro-benzene | 2.94 - 3.26 |
| 4-Nitrophenol | 2.94 - 3.26 | Pentachlorophenol | 2.94 - 3.26 |
| Acenaphthene | 0.294 - 0.326 | Phenanthrene | 0.294 - 0.326 |
| Acenaphthylene | 0.294 - 0.326 | Phenol | 2.94 - 3.26 |
| Acetophenone | 2.94 - 3.26 | Pyrene | 0.294 - 0.326 |
| Anthracene | 0.294 - 0.326 | bis(2-Chloroethoxy)methane | 2.94 - 3.26 |
| Atrazine | 2.94 - 3.26 | bis(2-Chloroethyl)ether | 2.94 - 3.26 |
| Benzaldehyde | 3.00 - 5.38 | bis(2-Chloroisopropyl)ether | 2.94 - 3.26 |
| Benzo(a)anthracene | 0.294 - 0.326 | bis(2-Ethylhexyl)phthalate | 2.94 - 3.26 |
| Benzo(a)pyrene | 0.300 - 0.473 | m,p-Cresol | 2.94 - 4.02 |
| Benzo(b)fluoranthene | 0.294 - 0.326 | n-Nitrosodipropylamine | 2.94 - 3.26 |
| Benzo(ghi)perylene | 0.294 - 0.326 | o-Cresol | 2.94 - 3.26 |
| Benzo(k)fluoranthene | 0.294 - 0.326 | | |

Refer to footnotes on page 10A-39.

## Table 10A-3
## Method Detection Limits for High Explosive Compounds (EPA Method[g] SW846-8321A), Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Analyte | MDL[b] (µg/L) |
|---|---|
| 1,3,5-Trinitrobenzene | 0.0812 – 0.0874 |
| 1,3-Dinitrobenzene | 0.0812 – 0.0874 |
| 2,4,6-Trinitrotoluene | 0.0812 – 0.0874 |
| 2,4-Dinitrotoluene | 0.0812 – 0.0874 |
| 2,6-Dinitrotoluene | 0.0812 – 0.0874 |
| 2-Amino-4,6-dinitrotoluene | 0.0812 – 0.0874 |
| 2-Nitrotoluene | 0.0832 – 0.0896 |
| 3-Nitrotoluene | 0.0812 – 0.0874 |
| 4-Amino-2,6-dinitrotoluene | 0.0812 – 0.0874 |
| 4-Nitrotoluene | 0.152 – 0.164 |
| HMX | 0.0812 – 0.0874 |
| Nitro-benzene | 0.0812 – 0.0874 |
| Pentaerythritol tetranitrate | 0.102 – 0.109 |
| RDX | 0.0812 – 0.0874 |
| Tetryl | 0.0812 – 0.0874 |

Refer to footnotes on page 10A-39.

## Table 10A-4
## Summary of Nitrate plus Nitrite Results,
## Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW1** 22-Jan-13 | Nitrate plus nitrite | 1.87 | 0.085 | 0.250 | 10.0 | | | 093349-018 | EPA 353.2 |
| **OBS-MW1** (Duplicate) 22-Jan-13 | Nitrate plus nitrite | 1.84 | 0.085 | 0.250 | 10.0 | | | 093350-018 | EPA 353.2 |
| **OBS-MW2** 21-Jan-13 | Nitrate plus nitrite | 1.55 | 0.085 | 0.250 | 10.0 | | | 093344-018 | EPA 353.2 |
| **OBS-MW3** 23-Jan-13 | Nitrate plus nitrite | 1.70 | 0.085 | 0.250 | 10.0 | | | 093352-018 | EPA 353.2 |
| | | | | | | | | | |
| **OBS-MW1** 18-Apr-13 | Nitrate plus nitrite | 1.21 | 0.085 | 0.250 | 10.0 | | | 093863-018 | EPA 353.2 |
| **OBS-MW2** 22-Apr-13 | Nitrate plus nitrite | 1.57 | 0.085 | 0.250 | 10.0 | | | 093866-018 | EPA 353.2 |
| **OBS-MW3** 23-Apr-13 | Nitrate plus nitrite | 1.78 | 0.085 | 0.250 | 10.0 | | | 093870-018 | EPA 353.2 |
| **OBS-MW3** (Duplicate) 23-Apr-13 | Nitrate plus nitrite | 1.72 | 0.085 | 0.250 | 10.0 | | | 093871-018 | EPA 353.2 |
| | | | | | | | | | |
| **OBS-MW1** 09-Jul-13 | Nitrate plus nitrite | 1.95 | 0.085 | 0.250 | 10.0 | | | 094361-018 | EPA 353.2 |
| **OBS-MW2** 10-Jul-13 | Nitrate plus nitrite | 1.60 | 0.085 | 0.250 | 10.0 | | | 094365-018 | EPA 353.2 |
| **OBS-MW2** (Duplicate) 10-Jul-13 | Nitrate plus nitrite | 1.58 | 0.085 | 0.250 | 10.0 | | | 094366-018 | EPA 353.2 |
| **OBS-MW3** 11-Jul-13 | Nitrate plus nitrite | 1.73 | 0.085 | 0.250 | 10.0 | | | 094368-018 | EPA 353.2 |
| | | | | | | | | | |
| **OBS-MW1** 08-Oct-13 | Nitrate plus nitrite | 1.85 | 0.170 | 0.500 | 10.0 | | | 094767-018 | EPA 353.2 |
| **OBS-MW1** (Duplicate) 08-Oct-13 | Nitrate plus nitrite | 1.85 | 0.170 | 0.500 | 10.0 | | | 094768-018 | EPA 353.2 |
| **OBS-MW2** 07-Oct-13 | Nitrate plus nitrite | 1.59 | 0.170 | 0.500 | 10.0 | | | 094762-018 | EPA 353.2 |
| **OBS-MW3** 09-Oct-13 | Nitrate plus nitrite | 1.80 | 0.170 | 0.500 | 10.0 | | | 094771-018 | EPA 353.2 |

Refer to footnotes on page 10A-39.

## Table 10A-5
## Summary of Alkalinity, Anions, and Total Cyanide Results,
## Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW1** | Bicarbonate Alkalinity | 186 | 0.725 | 1.00 | NE | | | 093349-022 | SM2320B |
| 22-Jan-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093349-022 | SM2320B |
| | Bromide | 0.336 | 0.067 | 0.200 | NE | | | 093349-016 | SW846 9056 |
| | Chloride | 22.1 | 0.335 | 1.00 | NE | | | 093349-016 | SW846 9056 |
| | Fluoride | 2.13 | 0.033 | 0.100 | 4.00 | | | 093349-016 | SW846 9056 |
| | Sulfate | 76.5 | 0.665 | 2.00 | NE | | | 093349-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | | 093349-027 | SW846 9012B |
| **OBS-MW1** (Duplicate) | Bicarbonate Alkalinity | 186 | 0.725 | 1.00 | NE | | | 093350-022 | SM2320B |
| 22-Jan-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093350-022 | SM2320B |
| | Bromide | 0.345 | 0.067 | 0.200 | NE | | | 093350-016 | SW846 9056 |
| | Chloride | 22.7 | 0.335 | 1.00 | NE | | | 093350-016 | SW846 9056 |
| | Fluoride | 2.11 | 0.033 | 0.100 | 4.00 | | | 093350-016 | SW846 9056 |
| | Sulfate | 78.4 | 0.665 | 2.00 | NE | | | 093350-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | | 093350-027 | SW846 9012B |
| **OBS-MW2** | Bicarbonate Alkalinity | 179 | 0.725 | 1.00 | NE | | | 093344-022 | SM2320B |
| 21-Jan-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093344-022 | SM2320B |
| | Bromide | 0.322 | 0.067 | 0.200 | NE | | | 093344-016 | SW846 9056 |
| | Chloride | 21.3 | 0.335 | 1.00 | NE | | | 093344-016 | SW846 9056 |
| | Fluoride | 2.21 | 0.033 | 0.100 | 4.00 | | | 093344-016 | SW846 9056 |
| | Sulfate | 83.0 | 0.0665 | 2.00 | NE | | | 093344-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | | 093344-027 | SW846 9012B |
| **OBS-MW3** | Bicarbonate Alkalinity | 178 | 0.725 | 1.00 | NE | | | 093352-022 | SM2320B |
| 23-Jan-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093352-022 | SM2320B |
| | Bromide | 0.344 | 0.067 | 0.200 | NE | | | 093352-016 | SW846 9056 |
| | Chloride | 22.1 | 0.335 | 1.00 | NE | | | 093352-016 | SW846 9056 |
| | Fluoride | 2.23 | 0.033 | 0.100 | 4.00 | | | 093352-016 | SW846 9056 |
| | Sulfate | 83.3 | 0.665 | 2.00 | NE | | | 093352-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | | 093352-027 | SW846 9012B |

Refer to footnotes on page 10A-39.

**Table 10A-5** *(Continued)*
**Summary of Alkalinity, Anions, and Total Cyanide Results,**
**Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW1** | Bicarbonate Alkalinity | 184 | 0.725 | 1.00 | NE | | | 093863-022 | SM2320B |
| 18-Apr-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093863-022 | SM2320B |
| | Bromide | 0.324 | 0.067 | 0.200 | NE | | | 093863-016 | SW846 9056 |
| | Chloride | 21.4 | 0.670 | 2.00 | NE | H | | 093863-016 | SW846 9056 |
| | Fluoride | 2.04 | 0.033 | 0.100 | 4.00 | | | 093863-016 | SW846 9056 |
| | Sulfate | 74.5 | 1.33 | 4.00 | NE | H | | 093863-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | UJ | 093863-027 | SW846 9012B |
| **OBS-MW2** | Bicarbonate Alkalinity | 180 | 0.725 | 1.00 | NE | B | | 093866-022 | SM2320B |
| 22-Apr-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093866-022 | SM2320B |
| | Bromide | 0.370 | 0.067 | 0.200 | NE | | | 093866-016 | SW846 9056 |
| | Chloride | 23.2 | 0.670 | 2.00 | NE | | | 093866-016 | SW846 9056 |
| | Fluoride | 2.32 | 0.033 | 0.100 | 4.00 | | | 093866-016 | SW846 9056 |
| | Sulfate | 86.0 | 1.33 | 4.00 | NE | | | 093866-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | UJ | 093866-027 | SW846 9012B |
| **OBS-MW3** | Bicarbonate Alkalinity | 178 | 0.725 | 1.00 | NE | B | | 093870-022 | SM2320B |
| 23-Apr-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093870-022 | SM2320B |
| | Bromide | 0.359 | 0.067 | 0.200 | NE | | | 093870-016 | SW846 9056 |
| | Chloride | 23.9 | 0.670 | 2.00 | NE | | | 093870-016 | SW846 9056 |
| | Fluoride | 2.32 | 0.033 | 0.100 | 4.00 | | | 093870-016 | SW846 9056 |
| | Sulfate | 87.2 | 1.33 | 4.00 | NE | | | 093870-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | UJ | 093870-027 | SW846 9012B |
| **OBS-MW3** (Duplicate) | Bicarbonate Alkalinity | 180 | 0.725 | 1.00 | NE | B | | 093871-022 | SM2320B |
| 23-Apr-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093871-022 | SM2320B |
| | Bromide | 0.372 | 0.067 | 0.200 | NE | | | 093871-016 | SW846 9056 |
| | Chloride | 24.5 | 0.670 | 2.00 | NE | | | 093871-016 | SW846 9056 |
| | Fluoride | 2.37 | 0.033 | 0.100 | 4.00 | | | 093871-016 | SW846 9056 |
| | Sulfate | 87.5 | 1.33 | 4.00 | NE | | | 093871-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | UJ | 093871-027 | SW846 9012B |

Refer to footnotes on page 10A-39.

**Table 10A-5** *(Continued)*
**Summary of Alkalinity, Anions, and Total Cyanide Results,**
**Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW1** | Bicarbonate Alkalinity | 184 | 0.725 | 1.00 | NE | | | 094361-022 | SM2320B |
| 09-Jul-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094361-022 | SM2320B |
| | Bromide | 0.356 | 0.067 | 0.200 | NE | | | 094361-016 | SW846 9056 |
| | Chloride | 23.5 | 1.34 | 4.00 | NE | | | 094361-016 | SW846 9056 |
| | Fluoride | 2.17 | 0.033 | 0.100 | 4.00 | | | 094361-016 | SW846 9056 |
| | Sulfate | 81.3 | 2.66 | 8.00 | NE | | | 094361-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | N, U | UJ | 094361-027 | SW846 9012B |
| **OBS-MW2** | Bicarbonate Alkalinity | 194 | 0.725 | 1.00 | NE | | | 094365-022 | SM2320B |
| 10-Jul-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094365-022 | SM2320B |
| | Bromide | 0.391 | 0.067 | 0.200 | NE | | | 094365-016 | SW846 9056 |
| | Chloride | 13.6 | 1.34 | 4.00 | NE | | | 094365-016 | SW846 9056 |
| | Chloride (reanalysis) | 21.6 | 1.34 | 4.00 | NE | H | J | 094365-R16 | SW846 9056 |
| | Fluoride | 2.32 | 0.033 | 0.100 | 4.00 | | | 094365-016 | SW846 9056 |
| | Sulfate | 51.6 | 2.66 | 8.00 | NE | | | 094365-016 | SW846 9056 |
| | Sulfate (reanalysis) | 82.5 | 2.66 | 8.00 | NE | H | J | 094365-R16 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | N, U | UJ | 094365-027 | SW846 9012B |
| **OBS-MW2** (Duplicate) | Bicarbonate Alkalinity | 180 | 0.725 | 1.00 | NE | B | | 094366-022 | SM2320B |
| 10-Jul-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094366-022 | SM2320B |
| | Bromide | 0.313 | 0.067 | 0.200 | NE | | | 094366-016 | SW846 9056 |
| | Chloride | 21.5 | 1.34 | 4.00 | NE | | | 094366-016 | SW846 9056 |
| | Fluoride | 2.34 | 0.033 | 0.100 | 4.00 | | | 094366-016 | SW846 9056 |
| | Sulfate | 81.9 | 2.66 | 8.00 | NE | | | 094366-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | N, U | UJ | 094366-027 | SW846 9012B |
| **OBS-MW3** | Bicarbonate Alkalinity | 179 | 0.725 | 1.00 | NE | B | | 094368-022 | SM2320B |
| 11-Jul-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094368-022 | SM2320B |
| | Bromide | 0.317 | 0.067 | 0.200 | NE | | | 094368-016 | SW846 9056 |
| | Chloride | 22.7 | 1.34 | 4.00 | NE | | | 094368-016 | SW846 9056 |
| | Fluoride | 2.37 | 0.033 | 0.100 | 4.00 | | | 094368-016 | SW846 9056 |
| | Sulfate | 83.4 | 2.66 | 8.00 | NE | | | 094368-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | N, U | UJ | 094368-027 | SW846 9012B |

Refer to footnotes on page 10A-39.

**Table 10A-5** *(Concluded)*
**Summary of Alkalinity, Anions, and Total Cyanide Results,**
**Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW1** | Bicarbonate Alkalinity | 181 | 0.725 | 1.00 | NE | | | 094767-022 | SM2320B |
| 08-Oct-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094767-022 | SM2320B |
| | Bromide | 0.373 | 0.067 | 0.200 | NE | | | 094767-016 | SW846 9056 |
| | Chloride | 24.0 | 0.670 | 2.00 | NE | | | 094767-016 | SW846 9056 |
| | Fluoride | 2.17 | 0.033 | 0.100 | 4.00 | | | 094767-016 | SW846 9056 |
| | Sulfate | 82.0 | 1.33 | 4.00 | NE | | | 094767-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | UJ | 094767-027 | SW846 9012B |
| **OBS-MW1** (Duplicate) | Bicarbonate Alkalinity | 185 | 0.725 | 1.00 | NE | | | 094768-022 | SM2320B |
| 08-Oct-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094768-022 | SM2320B |
| | Bromide | 0.395 | 0.067 | 0.200 | NE | | | 094768-016 | SW846 9056 |
| | Chloride | 23.9 | 0.670 | 2.00 | NE | | | 094768-016 | SW846 9056 |
| | Fluoride | 2.18 | 0.033 | 0.100 | 4.00 | | | 094768-016 | SW846 9056 |
| | Sulfate | 81.3 | 1.33 | 4.00 | NE | | | 094768-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | UJ | 094768-027 | SW846 9012B |
| **OBS-MW2** | Bicarbonate Alkalinity | 172 | 0.725 | 1.00 | NE | | | 094762-022 | SM2320B |
| 07-Oct-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094762-022 | SM2320B |
| | Bromide | 0.388 | 0.067 | 0.200 | NE | | | 094762-016 | SW846 9056 |
| | Chloride | 22.3 | 0.670 | 2.00 | NE | | | 094762-016 | SW846 9056 |
| | Fluoride | 2.30 | 0.033 | 0.100 | 4.00 | | | 094762-016 | SW846 9056 |
| | Sulfate | 83.6 | 1.33 | 4.00 | NE | | | 094762-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | UJ | 094762-027 | SW846 9012B |
| **OBS-MW3** | Bicarbonate Alkalinity | 176 | 0.725 | 1.00 | NE | | | 094771-022 | SM2320B |
| 09-Oct-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094771-022 | SM2320B |
| | Bromide | 0.370 | 0.067 | 0.200 | NE | | | 094771-016 | SW846 9056 |
| | Chloride | 22.8 | 0.670 | 2.00 | NE | | | 094771-016 | SW846 9056 |
| | Fluoride | 2.33 | 0.033 | 0.100 | 4.00 | | | 094771-016 | SW846 9056 |
| | Sulfate | 84.2 | 1.33 | 4.00 | NE | | | 094771-016 | SW846 9056 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | UJ | 094771-027 | SW846 9012B |

Refer to footnotes on page 10A-39.

## Table 10A-6
## Summary of Perchlorate Results,
## Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Perchlorate Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|
| **OBS-MW1** 22-Jan-13 | ND | 0.004 | 0.012 | NE | U | | 093349-020 | EPA 314.0 |
| **OBS-MW1** (Duplicate) 22-Jan-13 | ND | 0.004 | 0.012 | NE | U | | 093350-020 | EPA 314.0 |
| **OBS-MW2** 21-Jan-13 | ND | 0.004 | 0.012 | NE | U | | 093344-020 | EPA 314.0 |
| **OBS-MW3** 23-Jan-13 | ND | 0.004 | 0.012 | NE | U | | 093352-020 | EPA 314.0 |
| | | | | | | | | |
| **OBS-MW1** 18-Apr-13 | ND | 0.004 | 0.012 | NE | U | | 093863-020 | EPA 314.0 |
| **OBS-MW2** 22-Apr-13 | ND | 0.004 | 0.012 | NE | U | | 093866-020 | EPA 314.0 |
| **OBS-MW3** 23-Apr-13 | ND | 0.004 | 0.012 | NE | U | | 093870-020 | EPA 314.0 |
| **OBS-MW3** (Duplicate) 23-Apr-13 | ND | 0.004 | 0.012 | NE | U | | 093871-020 | EPA 314.0 |
| | | | | | | | | |
| **OBS-MW1** 09-Jul-13 | ND | 0.004 | 0.012 | NE | U | | 094361-020 | EPA 314.0 |
| **OBS-MW2** 10-Jul-13 | ND | 0.004 | 0.012 | NE | U | | 094365-020 | EPA 314.0 |
| **OBS-MW2** (Duplicate) 10-Jul-13 | ND | 0.004 | 0.012 | NE | U | | 094366-020 | EPA 314.0 |
| **OBS-MW3** 11-Jul-13 | ND | 0.004 | 0.012 | NE | U | | 094368-020 | EPA 314.0 |
| | | | | | | | | |
| **OBS-MW1** 08-Oct-13 | ND | 0.004 | 0.012 | NE | U | | 094767-020 | EPA 314.0 |
| **OBS-MW1** (Duplicate) 08-Oct-13 | ND | 0.004 | 0.012 | NE | U | | 094768-020 | EPA 314.0 |
| **OBS-MW2** 07-Oct-13 | ND | 0.004 | 0.012 | NE | U | | 094762-020 | EPA 314.0 |
| **OBS-MW3** 09-Oct-13 | ND | 0.004 | 0.012 | NE | U | | 094771-020 | EPA 314.0 |

Refer to footnotes on page 10A-39.

## Table 10A-7
## Summary of Hexavalent Chromium Results,
## Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Hexavalent Chromium Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|
| **OBS-MW1** 22-Jan-13 | ND | 0.0033 | 0.010 | NE | U | | 093349-014 | SW846 7196A |
| **OBS-MW1** (Duplicate) 22-Jan-13 | ND | 0.0033 | 0.010 | NE | U | | 093350-014 | SW846 7196A |
| **OBS-MW2** 21-Jan-13 | ND | 0.0033 | 0.010 | NE | U | | 093344-014 | SW846 7196A |
| **OBS-MW3** 23-Jan-13 | ND | 0.0033 | 0.010 | NE | U | | 093352-014 | SW846 7196A |
| | | | | | | | | |
| **OBS-MW1** 18-Apr-13 | ND | 0.0033 | 0.010 | NE | U | | 093863-014 | SW846 7196A |
| **OBS-MW2** 22-Apr-13 | ND | 0.0033 | 0.010 | NE | U | | 093866-014 | SW846 7196A |
| **OBS-MW3** 23-Apr-13 | ND | 0.0033 | 0.010 | NE | U | | 093870-014 | SW846 7196A |
| **OBS-MW3** (Duplicate) 23-Apr-13 | ND | 0.0033 | 0.010 | NE | U | | 093871-014 | SW846 7196A |
| | | | | | | | | |
| **OBS-MW1** 09-Jul-13 | ND | 0.0033 | 0.010 | NE | U | | 094361-014 | SW846 7196A |
| **OBS-MW2** 10-Jul-13 | ND | 0.0033 | 0.010 | NE | U | | 094365-014 | SW846 7196A |
| **OBS-MW2** (Duplicate) 10-Jul-13 | ND | 0.0033 | 0.010 | NE | U | | 094366-014 | SW846 7196A |
| **OBS-MW3** 11-Jul-13 | ND | 0.0033 | 0.010 | NE | U | | 094368-014 | SW846 7196A |
| | | | | | | | | |
| **OBS-MW1** 08-Oct-13 | ND | 0.0033 | 0.010 | NE | U | | 094767-014 | SW846 7196A |
| **OBS-MW1** (Duplicate) 08-Oct-13 | ND | 0.0033 | 0.010 | NE | U | | 094768-014 | SW846 7196A |
| **OBS-MW2** 07-Oct-13 | ND | 0.0033 | 0.010 | NE | U | | 094762-014 | SW846 7196A |
| **OBS-MW3** 09-Oct-13 | ND | 0.0033 | 0.010 | NE | U | | 094771-014 | SW846 7196A |

Refer to footnotes on page 10A-39.

## Table 10A-8
## Summary of Target Analyte List Metals and Uranium Results,
## Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW1** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093349-009 | SW846 6020 |
| 22-Jan-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093349-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093349-009 | SW846 6020 |
| | Barium | 0.0182 | 0.0006 | 0.002 | 2.00 | | | 093349-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093349-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093349-009 | SW846 6020 |
| | Calcium | 78.3 | 0.300 | 1.00 | NE | | | 093349-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093349-009 | SW846 6020 |
| | Cobalt | 0.000133 | 0.0001 | 0.001 | NE | J | | 093349-009 | SW846 6020 |
| | Copper | 0.000494 | 0.00035 | 0.001 | NE | J | 0.0064U | 093349-009 | SW846 6020 |
| | Iron | 0.260 | 0.033 | 0.100 | NE | | | 093349-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093349-009 | SW846 6020 |
| | Magnesium | 17.6 | 0.010 | 0.030 | NE | | | 093349-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093349-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093349-009 | SW846 7470 |
| | Nickel | 0.00255 | 0.0005 | 0.002 | NE | | | 093349-009 | SW846 6020 |
| | Potassium | 1.66 | 0.080 | 0.300 | NE | | | 093349-009 | SW846 6020 |
| | Selenium | 0.00342 | 0.0015 | 0.005 | 0.050 | J | | 093349-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093349-009 | SW846 6020 |
| | Sodium | 22.9 | 0.080 | 0.250 | NE | | | 093349-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093349-009 | SW846 6020 |
| | Uranium | 0.00987 | 0.000067 | 0.0002 | 0.03 | | | 093349-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | | 093349-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093349-009 | SW846 6020 |

Refer to footnotes on page 10A-39.

**Table 10A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW1** (Duplicate) | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093350-009 | SW846 6020 |
| 22-Jan-13 | Antimony | 0.00108 | 0.001 | 0.003 | 0.006 | J | | 093350-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093350-009 | SW846 6020 |
| | Barium | 0.0188 | 0.0006 | 0.002 | 2.00 | | | 093350-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093350-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093350-009 | SW846 6020 |
| | Calcium | 84.5 | 0.300 | 1.00 | NE | | | 093350-009 | SW846 6020 |
| | Chromium | 0.00234 | 0.002 | 0.010 | 0.100 | B, J | 0.013U | 093350-009 | SW846 6020 |
| | Cobalt | 0.000157 | 0.0001 | 0.001 | NE | J | | 093350-009 | SW846 6020 |
| | Copper | 0.000832 | 0.00035 | 0.001 | NE | J | 0.0064U | 093350-009 | SW846 6020 |
| | Iron | 0.294 | 0.033 | 0.100 | NE | | | 093350-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093350-009 | SW846 6020 |
| | Magnesium | 17.5 | 0.010 | 0.030 | NE | | | 093350-009 | SW846 6020 |
| | Manganese | 0.00127 | 0.001 | 0.005 | NE | J | | 093350-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093350-009 | SW846 7470 |
| | Nickel | 0.0027 | 0.0005 | 0.002 | NE | | | 093350-009 | SW846 6020 |
| | Potassium | 1.65 | 0.080 | 0.300 | NE | | | 093350-009 | SW846 6020 |
| | Selenium | 0.00425 | 0.0015 | 0.005 | 0.050 | J | | 093350-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093350-009 | SW846 6020 |
| | Sodium | 26.7 | 0.080 | 0.250 | NE | | | 093350-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093350-009 | SW846 6020 |
| | Uranium | 0.0102 | 0.000067 | 0.0002 | 0.03 | | | 093350-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | | 093350-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093350-009 | SW846 6020 |

Refer to footnotes on page 10A-39.

**Table 10A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW2** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093344-009 | SW846 6020 |
| 21-Jan-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093344-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093344-009 | SW846 6020 |
| | Barium | 0.0196 | 0.0006 | 0.002 | 2.00 | | | 093344-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093344-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093344-009 | SW846 6020 |
| | Calcium | 79.6 | 0.300 | 1.00 | NE | | | 093344-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093344-009 | SW846 6020 |
| | Cobalt | 0.000146 | 0.0001 | 0.001 | NE | J | | 093344-009 | SW846 6020 |
| | Copper | 0.000427 | 0.00035 | 0.001 | NE | J | NJ- | 093344-009 | SW846 6020 |
| | Iron | 0.253 | 0.033 | 0.100 | NE | | | 093344-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093344-009 | SW846 6020 |
| | Magnesium | 17.0 | 0.010 | 0.030 | NE | | | 093344-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093344-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093344-009 | SW846 7470 |
| | Nickel | 0.00267 | 0.0005 | 0.002 | NE | | | 093344-009 | SW846 6020 |
| | Potassium | 1.54 | 0.080 | 0.300 | NE | | | 093344-009 | SW846 6020 |
| | Selenium | 0.00399 | 0.0015 | 0.005 | 0.050 | J | | 093344-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093344-009 | SW846 6020 |
| | Sodium | 22.4 | 0.080 | 0.250 | NE | | | 093344-009 | SW846 6020 |
| | Thallium | 0.000468 | 0.00045 | 0.002 | 0.002 | J | | 093344-009 | SW846 6020 |
| | Uranium | 0.0132 | 0.000067 | 0.0002 | 0.03 | | | 093344-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | | 093344-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093344-009 | SW846 6020 |

Refer to footnotes on page 10A-39.

**Table 10A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW3** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093352-009 | SW846 6020 |
| 23-Jan-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093352-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093352-009 | SW846 6020 |
| | Barium | 0.0261 | 0.0006 | 0.002 | 2.00 | | | 093352-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093352-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093352-009 | SW846 6020 |
| | Calcium | 80.3 | 0.300 | 1.00 | NE | | | 093352-009 | SW846 6020 |
| | Chromium | 0.00213 | 0.002 | 0.010 | 0.100 | B, J | 0.013U | 093352-009 | SW846 6020 |
| | Cobalt | 0.000148 | 0.0001 | 0.001 | NE | J | | 093352-009 | SW846 6020 |
| | Copper | 0.00042 | 0.00035 | 0.001 | NE | J | NJ- | 093352-009 | SW846 6020 |
| | Iron | 0.255 | 0.033 | 0.100 | NE | | | 093352-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093352-009 | SW846 6020 |
| | Magnesium | 16.2 | 0.010 | 0.030 | NE | | | 093352-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093352-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093352-009 | SW846 7470 |
| | Nickel | 0.00267 | 0.0005 | 0.002 | NE | | | 093352-009 | SW846 6020 |
| | Potassium | 1.63 | 0.080 | 0.300 | NE | | | 093352-009 | SW846 6020 |
| | Selenium | 0.0041 | 0.0015 | 0.005 | 0.050 | J | | 093352-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093352-009 | SW846 6020 |
| | Sodium | 22.3 | 0.080 | 0.250 | NE | | | 093352-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093352-009 | SW846 6020 |
| | Uranium | 0.0119 | 0.000067 | 0.0002 | 0.03 | | | 093352-009 | SW846 6020 |
| | Vanadium | 0.001 | 0.001 | 0.005 | NE | J | | 093352-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093352-009 | SW846 6020 |

Refer to footnotes on page 10A-39.

**Table 10A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW1** | Aluminum | 0.279 | 0.015 | 0.050 | NE | | | 093863-009 | SW846 6020 |
| 18-Apr-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093863-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093863-009 | SW846 6020 |
| | Barium | 0.0236 | 0.0006 | 0.002 | 2.00 | | | 093863-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093863-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093863-009 | SW846 6020 |
| | Calcium | 81.3 | 0.300 | 1.00 | NE | B | | 093863-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093863-009 | SW846 6020 |
| | Cobalt | 0.000296 | 0.0001 | 0.001 | NE | J | | 093863-009 | SW846 6020 |
| | Copper | 0.00102 | 0.00035 | 0.001 | NE | | | 093863-009 | SW846 6020 |
| | Iron | 0.268 | 0.033 | 0.100 | NE | | | 093863-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093863-009 | SW846 6020 |
| | Magnesium | 17.8 | 0.050 | 0.015 | NE | | | 093863-009 | SW846 6020 |
| | Manganese | 0.0646 | 0.001 | 0.005 | NE | | | 093863-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093863-009 | SW846 7470 |
| | Nickel | 0.0025 | 0.0005 | 0.002 | NE | B | | 093863-009 | SW846 6020 |
| | Potassium | 1.97 | 0.080 | 0.300 | NE | | | 093863-009 | SW846 6020 |
| | Selenium | 0.00269 | 0.0015 | 0.005 | 0.050 | J | | 093863-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093863-009 | SW846 6020 |
| | Sodium | 21.4 | 0.080 | 0.250 | NE | | | 093863-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093863-009 | SW846 6020 |
| | Uranium | 0.0107 | 0.000067 | 0.0002 | 0.03 | | | 093863-009 | SW846 6020 |
| | Vanadium | 0.00116 | 0.001 | 0.005 | NE | J | | 093863-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093863-009 | SW846 6020 |

Refer to footnotes on page 10A-39.

**Table 10A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW2** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093866-009 | SW846 6020 |
| 22-Apr-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093866-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093866-009 | SW846 6020 |
| | Barium | 0.019 | 0.0006 | 0.002 | 2.00 | | | 093866-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093866-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093866-009 | SW846 6020 |
| | Calcium | 80.5 | 0.600 | 2.00 | NE | B, N | | 093866-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093866-009 | SW846 6020 |
| | Cobalt | 0.000103 | 0.0001 | 0.001 | NE | B, J | 0.00053U | 093866-009 | SW846 6020 |
| | Copper | 0.000506 | 0.00035 | 0.001 | NE | J | | 093866-009 | SW846 6020 |
| | Iron | 0.151 | 0.033 | 0.100 | NE | | | 093866-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093866-009 | SW846 6020 |
| | Magnesium | 18.3 | 0.010 | 0.030 | NE | | | 093866-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093866-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093866-009 | SW846 7470 |
| | Nickel | 0.00152 | 0.0005 | 0.002 | NE | J | | 093866-009 | SW846 6020 |
| | Potassium | 1.76 | 0.080 | 0.300 | NE | | | 093866-009 | SW846 6020 |
| | Selenium | 0.00328 | 0.0015 | 0.005 | 0.050 | J | | 093866-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093866-009 | SW846 6020 |
| | Sodium | 24.0 | 0.800 | 2.50 | NE | N | | 093866-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093866-009 | SW846 6020 |
| | Uranium | 0.0146 | 0.000067 | 0.0002 | 0.03 | B | | 093866-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | UJ | 093866-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093866-009 | SW846 6020 |

Refer to footnotes on page 10A-39.

**Table 10A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW3** | Aluminum | 0.028 | 0.015 | 0.050 | NE | J | | 093870-009 | SW846 6020 |
| 23-Apr-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093870-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093870-009 | SW846 6020 |
| | Barium | 0.0253 | 0.0006 | 0.002 | 2.00 | | | 093870-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093870-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093870-009 | SW846 6020 |
| | Calcium | 76.5 | 0.600 | 2.00 | NE | B, N | | 093870-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093870-009 | SW846 6020 |
| | Cobalt | 0.000275 | 0.0001 | 0.001 | NE | B, J | 0.00053U | 093870-009 | SW846 6020 |
| | Copper | 0.000694 | 0.00035 | 0.001 | NE | J | 0.018UJ | 093870-009 | SW846 6020 |
| | Iron | 0.165 | 0.033 | 0.100 | NE | | | 093870-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093870-009 | SW846 6020 |
| | Magnesium | 17.5 | 0.010 | 0.030 | NE | | | 093870-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093870-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093870-009 | SW846 7470 |
| | Nickel | 0.00199 | 0.0005 | 0.002 | NE | J | | 093870-009 | SW846 6020 |
| | Potassium | 1.70 | 0.080 | 0.300 | NE | | | 093870-009 | SW846 6020 |
| | Selenium | 0.0033 | 0.0015 | 0.005 | 0.050 | J | | 093870-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093870-009 | SW846 6020 |
| | Sodium | 23.6 | 0.800 | 2.50 | NE | N | | 093870-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093870-009 | SW846 6020 |
| | Uranium | 0.013 | 0.000067 | 0.0002 | 0.03 | B | | 093870-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | UJ | 093870-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093870-009 | SW846 6020 |

Refer to footnotes on page 10A-39.

**Table 10A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW3** (Duplicate) | Aluminum | 0.0162 | 0.015 | 0.050 | NE | J | | 093871-009 | SW846 6020 |
| 23-Apr-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093871-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093871-009 | SW846 6020 |
| | Barium | 0.025 | 0.0006 | 0.002 | 2.00 | | | 093871-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093871-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093871-009 | SW846 6020 |
| | Calcium | 79.9 | 0.600 | 2.00 | NE | B, N | | 093871-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093871-009 | SW846 6020 |
| | Cobalt | 0.000151 | 0.0001 | 0.001 | NE | B, J | 0.00053U | 093871-009 | SW846 6020 |
| | Copper | 0.000712 | 0.00035 | 0.001 | NE | J | 0.018UJ | 093871-009 | SW846 6020 |
| | Iron | 0.159 | 0.033 | 0.100 | NE | | | 093871-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093871-009 | SW846 6020 |
| | Magnesium | 18.0 | 0.010 | 0.030 | NE | | | 093871-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093871-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093871-009 | SW846 7470 |
| | Nickel | 0.00203 | 0.0005 | 0.002 | NE | | | 093871-009 | SW846 6020 |
| | Potassium | 1.85 | 0.080 | 0.300 | NE | | | 093871-009 | SW846 6020 |
| | Selenium | 0.00318 | 0.0015 | 0.005 | 0.050 | J | | 093871-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093871-009 | SW846 6020 |
| | Sodium | 24.6 | 0.800 | 2.50 | NE | N | | 093871-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093871-009 | SW846 6020 |
| | Uranium | 0.0135 | 0.000067 | 0.0002 | 0.03 | B | | 093871-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | UJ | 093871-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093871-009 | SW846 6020 |

Refer to footnotes on page 10A-39.

**Table 10A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW1** | Aluminum | 0.0442 | 0.015 | 0.050 | NE | J | | 094361-009 | SW846 6020 |
| 09-Jul-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094361-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094361-009 | SW846 6020 |
| | Barium | 0.0204 | 0.0006 | 0.002 | 2.00 | | J | 094361-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094361-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094361-009 | SW846 6020 |
| | Calcium | 74.5 | 0.300 | 1.00 | NE | | | 094361-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094361-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 094361-009 | SW846 6020 |
| | Copper | 0.00064 | 0.00035 | 0.001 | NE | J | | 094361-009 | SW846 6020 |
| | Iron | 0.116 | 0.033 | 0.100 | NE | | | 094361-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094361-009 | SW846 6020 |
| | Magnesium | 16.9 | 0.010 | 0.030 | NE | | | 094361-009 | SW846 6020 |
| | Manganese | 0.00714 | 0.001 | 0.005 | NE | | J | 094361-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094361-009 | SW846 7470 |
| | Nickel | 0.000971 | 0.0005 | 0.002 | NE | J | | 094361-009 | SW846 6020 |
| | Potassium | 1.76 | 0.080 | 0.300 | NE | | | 094361-009 | SW846 6020 |
| | Selenium | 0.00242 | 0.0015 | 0.005 | 0.050 | J | | 094361-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094361-009 | SW846 6020 |
| | Sodium | 23.3 | 0.080 | 0.250 | NE | | | 094361-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094361-009 | SW846 6020 |
| | Uranium | 0.0105 | 0.000067 | 0.0002 | 0.03 | | | 094361-009 | SW846 6020 |
| | Vanadium | 0.00165 | 0.001 | 0.005 | NE | J | | 094361-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094361-009 | SW846 6020 |

Refer to footnotes on page 10A-39.

**Table 10A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW2** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 094365-009 | SW846 6020 |
| 10-Jul-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094365-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094365-009 | SW846 6020 |
| | Barium | 0.0221 | 0.0006 | 0.002 | 2.00 | | J | 094365-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094365-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094365-009 | SW846 6020 |
| | Calcium | 76.6 | 0.300 | 1.00 | NE | | | 094365-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094365-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 094365-009 | SW846 6020 |
| | Copper | 0.000415 | 0.00035 | 0.001 | NE | J | 0.008U | 094365-009 | SW846 6020 |
| | Iron | 0.0947 | 0.033 | 0.100 | NE | J | | 094365-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094365-009 | SW846 6020 |
| | Magnesium | 16.4 | 0.010 | 0.030 | NE | | | 094365-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | UJ | 094365-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094365-009 | SW846 7470 |
| | Nickel | 0.000747 | 0.0005 | 0.002 | NE | J | | 094365-009 | SW846 6020 |
| | Potassium | 1.73 | 0.080 | 0.300 | NE | | | 094365-009 | SW846 6020 |
| | Selenium | 0.00241 | 0.0015 | 0.005 | 0.050 | J | | 094365-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094365-009 | SW846 6020 |
| | Sodium | 23.9 | 0.080 | 0.250 | NE | | | 094365-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094365-009 | SW846 6020 |
| | Uranium | 0.0139 | 0.000067 | 0.0002 | 0.03 | | | 094365-009 | SW846 6020 |
| | Vanadium | 0.00105 | 0.001 | 0.005 | NE | J | | 094365-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094365-009 | SW846 6020 |

Refer to footnotes on page 10A-39.

**Table 10A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW2** (Duplicate) | Aluminum | ND | 0.015 | 0.050 | NE | U | | 094366-009 | SW846 6020 |
| 10-Jul-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094366-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094366-009 | SW846 6020 |
| | Barium | 0.0223 | 0.0006 | 0.002 | 2.00 | | J | 094366-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094366-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094366-009 | SW846 6020 |
| | Calcium | 76.4 | 0.300 | 1.00 | NE | | | 094366-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094366-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 094366-009 | SW846 6020 |
| | Copper | 0.000463 | 0.00035 | 0.001 | NE | J | 0.008U | 094366-009 | SW846 6020 |
| | Iron | 0.120 | 0.033 | 0.100 | NE | | | 094366-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094366-009 | SW846 6020 |
| | Magnesium | 16.2 | 0.010 | 0.030 | NE | | | 094366-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | UJ | 094366-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094366-009 | SW846 7470 |
| | Nickel | 0.0012 | 0.0005 | 0.002 | NE | J | | 094366-009 | SW846 6020 |
| | Potassium | 1.65 | 0.080 | 0.300 | NE | | | 094366-009 | SW846 6020 |
| | Selenium | 0.00249 | 0.0015 | 0.005 | 0.050 | J | | 094366-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094366-009 | SW846 6020 |
| | Sodium | 22.4 | 0.080 | 0.250 | NE | | | 094366-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094366-009 | SW846 6020 |
| | Uranium | 0.014 | 0.000067 | 0.0002 | 0.03 | | | 094366-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | | 094366-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094366-009 | SW846 6020 |

Refer to footnotes on page 10A-39.

**Table 10A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW3** | Aluminum | 0.0587 | 0.015 | 0.050 | NE | | | 094368-009 | SW846 6020 |
| 11-Jul-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094368-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094368-009 | SW846 6020 |
| | Barium | 0.0299 | 0.0006 | 0.002 | 2.00 | | J | 094368-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094368-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094368-009 | SW846 6020 |
| | Calcium | 78.4 | 0.300 | 1.00 | NE | | | 094368-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094368-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 094368-009 | SW846 6020 |
| | Copper | 0.00089 | 0.00035 | 0.001 | NE | J | | 094368-009 | SW846 6020 |
| | Iron | 0.141 | 0.033 | 0.100 | NE | | | 094368-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094368-009 | SW846 6020 |
| | Magnesium | 16.2 | 0.010 | 0.030 | NE | | | 094368-009 | SW846 6020 |
| | Manganese | 0.00138 | 0.001 | 0.005 | NE | J | J | 094368-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094368-009 | SW846 7470 |
| | Nickel | 0.000888 | 0.0005 | 0.002 | NE | J | | 094368-009 | SW846 6020 |
| | Potassium | 1.77 | 0.080 | 0.300 | NE | | | 094368-009 | SW846 6020 |
| | Selenium | 0.00239 | 0.0015 | 0.005 | 0.050 | J | | 094368-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094368-009 | SW846 6020 |
| | Sodium | 22.0 | 0.080 | 0.250 | NE | | | 094368-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094368-009 | SW846 6020 |
| | Uranium | 0.0126 | 0.000067 | 0.0002 | 0.03 | | | 094368-009 | SW846 6020 |
| | Vanadium | 0.00111 | 0.001 | 0.005 | NE | J | | 094368-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094368-009 | SW846 6020 |

Refer to footnotes on page 10A-39.

**Table 10A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW1** | Aluminum | 0.0157 | 0.015 | 0.050 | NE | J | | 094767-009 | SW846 6020 |
| 08-Oct-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094767-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094767-009 | SW846 6020 |
| | Barium | 0.0183 | 0.0006 | 0.002 | 2.00 | | | 094767-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094767-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094767-009 | SW846 6020 |
| | Calcium | 80.4 | 0.600 | 2.00 | NE | | | 094767-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094767-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 094767-009 | SW846 6020 |
| | Copper | 0.000851 | 0.00035 | 0.001 | NE | J | 0.0019U | 094767-009 | SW846 6020 |
| | Iron | 0.112 | 0.033 | 0.100 | NE | | | 094767-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094767-009 | SW846 6020 |
| | Magnesium | 16.4 | 0.010 | 0.030 | NE | | | 094767-009 | SW846 6020 |
| | Manganese | 0.00202 | 0.001 | 0.005 | NE | J | | 094767-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 094767-009 | SW846 7470 |
| | Nickel | 0.00105 | 0.0005 | 0.002 | NE | J | | 094767-009 | SW846 6020 |
| | Potassium | 1.66 | 0.080 | 0.300 | NE | | | 094767-009 | SW846 6020 |
| | Selenium | 0.00372 | 0.0015 | 0.005 | 0.050 | J | | 094767-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094767-009 | SW846 6020 |
| | Sodium | 22.4 | 0.080 | 0.250 | NE | | | 094767-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094767-009 | SW846 6020 |
| | Uranium | 0.00983 | 0.000067 | 0.0002 | 0.03 | | | 094767-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | | 094767-009 | SW846 6010 |
| | Zinc | 0.00481 | 0.0035 | 0.010 | NE | J | 0.022U | 094767-009 | SW846 6020 |

Refer to footnotes on page 10A-39.

**Table 10A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW1** (Duplicate) | Aluminum | ND | 0.015 | 0.050 | NE | U | | 094768-009 | SW846 6020 |
| 08-Oct-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094768-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094768-009 | SW846 6020 |
| | Barium | 0.0184 | 0.0006 | 0.002 | 2.00 | | | 094768-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094768-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094768-009 | SW846 6020 |
| | Calcium | 84.1 | 0.600 | 2.00 | NE | | | 094768-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094768-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 094768-009 | SW846 6020 |
| | Copper | 0.00199 | 0.00035 | 0.001 | NE | | | 094768-009 | SW846 6020 |
| | Iron | 0.103 | 0.033 | 0.100 | NE | | | 094768-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094768-009 | SW846 6020 |
| | Magnesium | 15.9 | 0.010 | 0.030 | NE | | | 094768-009 | SW846 6020 |
| | Manganese | 0.00201 | 0.001 | 0.005 | NE | J | | 094768-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 094768-009 | SW846 7470 |
| | Nickel | 0.0011 | 0.0005 | 0.002 | NE | J | | 094768-009 | SW846 6020 |
| | Potassium | 1.61 | 0.080 | 0.300 | NE | | | 094768-009 | SW846 6020 |
| | Selenium | 0.00351 | 0.0015 | 0.005 | 0.050 | J | | 094768-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094768-009 | SW846 6020 |
| | Sodium | 21.6 | 0.080 | 0.250 | NE | | | 094768-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094768-009 | SW846 6020 |
| | Uranium | 0.00994 | 0.000067 | 0.0002 | 0.03 | | | 094768-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | | 094768-009 | SW846 6010 |
| | Zinc | 0.0039 | 0.0035 | 0.010 | NE | J | 0.022U | 094768-009 | SW846 6020 |

Refer to footnotes on page 10A-39.

**Table 10A-8** *(Continued)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW2** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 094762-009 | SW846 6020 |
| 07-Oct-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094762-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094762-009 | SW846 6020 |
| | Barium | 0.0199 | 0.0006 | 0.002 | 2.00 | | | 094762-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094762-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094762-009 | SW846 6020 |
| | Calcium | 76.8 | 0.300 | 1.00 | NE | | | 094762-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094762-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 094762-009 | SW846 6020 |
| | Copper | 0.000369 | 0.00035 | 0.001 | NE | J | | 094762-009 | SW846 6020 |
| | Iron | 0.104 | 0.033 | 0.100 | NE | | | 094762-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094762-009 | SW846 6020 |
| | Magnesium | 16.0 | 0.010 | 0.030 | NE | | | 094762-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 094762-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 094762-009 | SW846 7470 |
| | Nickel | 0.00119 | 0.0005 | 0.002 | NE | J | | 094762-009 | SW846 6020 |
| | Potassium | 1.60 | 0.080 | 0.300 | NE | | | 094762-009 | SW846 6020 |
| | Selenium | 0.00343 | 0.0015 | 0.005 | 0.050 | J | | 094762-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094762-009 | SW846 6020 |
| | Sodium | 22.0 | 0.080 | 0.250 | NE | | | 094762-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094762-009 | SW846 6020 |
| | Uranium | 0.0135 | 0.000067 | 0.0002 | 0.03 | | | 094762-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | | 094762-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094762-009 | SW846 6020 |

Refer to footnotes on page 10A-39.

**Table 10A-8** *(Concluded)*
**Summary of Target Analyte List Metals and Uranium Results,**
**Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW3** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 094771-009 | SW846 6020 |
| 09-Oct-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094771-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094771-009 | SW846 6020 |
| | Barium | 0.0269 | 0.0006 | 0.002 | 2.00 | | | 094771-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094771-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094771-009 | SW846 6020 |
| | Calcium | 80.7 | 0.600 | 2.00 | NE | | | 094771-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094771-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 094771-009 | SW846 6020 |
| | Copper | 0.000473 | 0.00035 | 0.001 | NE | J | | 094771-009 | SW846 6020 |
| | Iron | 0.113 | 0.033 | 0.100 | NE | | | 094771-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094771-009 | SW846 6020 |
| | Magnesium | 16.1 | 0.010 | 0.030 | NE | | | 094771-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 094771-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 094771-009 | SW846 7470 |
| | Nickel | 0.00116 | 0.0005 | 0.002 | NE | J | | 094771-009 | SW846 6020 |
| | Potassium | 1.64 | 0.080 | 0.300 | NE | | | 094771-009 | SW846 6020 |
| | Selenium | 0.00335 | 0.0015 | 0.005 | 0.050 | J | | 094771-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094771-009 | SW846 6020 |
| | Sodium | 22.6 | 0.080 | 0.250 | NE | | | 094771-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094771-009 | SW846 6020 |
| | Uranium | 0.0121 | 0.000067 | 0.0002 | 0.03 | | | 094771-009 | SW846 6020 |
| | Vanadium | 0.00112 | 0.001 | 0.005 | NE | J | | 094771-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 094771-009 | SW846 6020 |

Refer to footnotes on page 10A-39.

## Table 10A-9
## Summary of Cation Results,
## Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW1** | Calcium | 85.3 | 0.300 | 1.00 | NE | | | 093349-017 | SW846 6020 |
| 22-Jan-13 | Magnesium | 17.9 | 0.010 | 0.030 | NE | | J | 093349-017 | SW846 6020 |
| | Potassium | 1.74 | 0.080 | 0.300 | NE | | | 093349-017 | SW846 6020 |
| | Sodium | 23.0 | 0.080 | 0.250 | NE | | | 093349-017 | SW846 6020 |
| **OBS-MW1** (Duplicate) | Calcium | 87.1 | 0.300 | 1.00 | NE | | | 093350-017 | SW846 6020 |
| 22-Jan-13 | Magnesium | 19.0 | 0.010 | 0.030 | NE | | J | 093350-017 | SW846 6020 |
| | Potassium | 1.89 | 0.080 | 0.300 | NE | | | 093350-017 | SW846 6020 |
| | Sodium | 23.5 | 0.080 | 0.250 | NE | | | 093350-017 | SW846 6020 |
| **OBS-MW2** | Calcium | 83.9 | 0.300 | 1.00 | NE | | | 093344-017 | SW846 6020 |
| 21-Jan-13 | Magnesium | 16.4 | 0.010 | 0.030 | NE | | J | 093344-017 | SW846 6020 |
| | Potassium | 1.58 | 0.080 | 0.300 | NE | | | 093344-017 | SW846 6020 |
| | Sodium | 21.4 | 0.080 | 0.250 | NE | | | 093344-017 | SW846 6020 |
| **OBS-MW3** | Calcium | 81.2 | 0.300 | 1.00 | NE | | | 093352-017 | SW846 6020 |
| 23-Jan-13 | Magnesium | 18.2 | 0.010 | 0.030 | NE | | J | 093352-017 | SW846 6020 |
| | Potassium | 1.74 | 0.080 | 0.300 | NE | | | 093352-017 | SW846 6020 |
| | Sodium | 22.9 | 0.080 | 0.250 | NE | | | 093352-017 | SW846 6020 |
| | | | | | | | | | |
| **OBS-MW1** | Calcium | 79.6 | 0.300 | 1.00 | NE | B | | 093863-017 | SW846 6020 |
| 18-Apr-13 | Magnesium | 17.6 | 0.050 | 0.150 | NE | | | 093863-017 | SW846 6020 |
| | Potassium | 1.77 | 0.080 | 0.300 | NE | | | 093863-017 | SW846 6020 |
| | Sodium | 21.5 | 0.080 | 0.250 | NE | | | 093863-017 | SW846 6020 |
| **OBS-MW2** | Calcium | 80.9 | 0.600 | 2.00 | NE | B, N | | 093866-017 | SW846 6020 |
| 22-Apr-13 | Magnesium | 17.9 | 0.010 | 0.030 | NE | | | 093866-017 | SW846 6020 |
| | Potassium | 1.77 | 0.080 | 0.300 | NE | | | 093866-017 | SW846 6020 |
| | Sodium | 24.5 | 0.800 | 2.50 | NE | N | | 093866-017 | SW846 6020 |
| **OBS-MW3** | Calcium | 78.5 | 0.600 | 2.00 | NE | B, N | | 093870-017 | SW846 6020 |
| 23-Apr-13 | Magnesium | 18.1 | 0.010 | 0.030 | NE | | | 093870-017 | SW846 6020 |
| | Potassium | 1.82 | 0.080 | 0.300 | NE | | | 093870-017 | SW846 6020 |
| | Sodium | 24.2 | 0.800 | 2.50 | NE | N | | 093870-017 | SW846 6020 |
| **OBS-MW3** (Duplicate) | Calcium | 76.7 | 0.600 | 2.00 | NE | B, N | | 093871-017 | SW846 6020 |
| 23-Apr-13 | Magnesium | 18.6 | 0.010 | 0.030 | NE | | | 093871-017 | SW846 6020 |
| | Potassium | 1.89 | 0.080 | 0.300 | NE | | | 093871-017 | SW846 6020 |
| | Sodium | 23.9 | 0.800 | 2.50 | NE | N | | 093871-017 | SW846 6020 |

Refer to footnotes on page 10A-39.

**Table 10A-9** *(Concluded)*
**Summary of Cation Results,**
**Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW1** | Calcium | 75.0 | 0.300 | 1.00 | NE | | | 094361-017 | SW846 6020 |
| 09-Jul-13 | Magnesium | 16.4 | 0.010 | 0.030 | NE | | | 094361-017 | SW846 6020 |
| | Potassium | 1.81 | 0.080 | 0.300 | NE | | | 094361-017 | SW846 6020 |
| | Sodium | 24.4 | 0.080 | 0.250 | NE | | | 094361-017 | SW846 6020 |
| **OBS-MW2** | Calcium | 75.6 | 0.300 | 1.00 | NE | | | 094365-017 | SW846 6020 |
| 10-Jul-13 | Magnesium | 16.4 | 0.010 | 0.030 | NE | | | 094365-017 | SW846 6020 |
| | Potassium | 1.65 | 0.080 | 0.300 | NE | | | 094365-017 | SW846 6020 |
| | Sodium | 23.8 | 0.080 | 0.250 | NE | | | 094365-017 | SW846 6020 |
| **OBS-MW2** (Duplicate) | Calcium | 77.9 | 0.300 | 1.00 | NE | | | 094366-017 | SW846 6020 |
| 10-Jul-13 | Magnesium | 16.0 | 0.010 | 0.030 | NE | | | 094366-017 | SW846 6020 |
| | Potassium | 1.74 | 0.080 | 0.300 | NE | | | 094366-017 | SW846 6020 |
| | Sodium | 23.9 | 0.080 | 0.250 | NE | | | 094366-017 | SW846 6020 |
| **OBS-MW3** | Calcium | 72.1 | 0.300 | 1.00 | NE | | | 094368-017 | SW846 6020 |
| 11-Jul-13 | Magnesium | 16.5 | 0.010 | 0.030 | NE | | | 094368-017 | SW846 6020 |
| | Potassium | 1.61 | 0.080 | 0.300 | NE | | | 094368-017 | SW846 6020 |
| | Sodium | 25.2 | 0.080 | 0.250 | NE | | | 094368-017 | SW846 6020 |
| | | | | | | | | | |
| **OBS-MW1** | Calcium | 79.2 | 0.600 | 2.00 | NE | | | 094767-017 | SW846 6020 |
| 08-Oct-13 | Magnesium | 16.0 | 0.010 | 0.030 | NE | | | 094767-017 | SW846 6020 |
| | Potassium | 1.65 | 0.080 | 0.300 | NE | | | 094767-017 | SW846 6020 |
| | Sodium | 21.9 | 0.080 | 0.250 | NE | | | 094767-017 | SW846 6020 |
| **OBS-MW1** (Duplicate) | Calcium | 75.7 | 0.600 | 2.00 | NE | | | 094768-017 | SW846 6020 |
| 08-Oct-13 | Magnesium | 14.9 | 0.010 | 0.030 | NE | | | 094768-017 | SW846 6020 |
| | Potassium | 1.52 | 0.080 | 0.300 | NE | | | 094768-017 | SW846 6020 |
| | Sodium | 20.3 | 0.080 | 0.250 | NE | | | 094768-017 | SW846 6020 |
| **OBS-MW2** | Calcium | 78.5 | 0.600 | 2.00 | NE | | | 094762-017 | SW846 6020 |
| 07-Oct-13 | Magnesium | 15.8 | 0.010 | 0.030 | NE | | | 094762-017 | SW846 6020 |
| | Potassium | 1.55 | 0.080 | 0.300 | NE | | | 094762-017 | SW846 6020 |
| | Sodium | 21.6 | 0.080 | 0.250 | NE | | | 094762-017 | SW846 6020 |
| **OBS-MW3** | Calcium | 75.0 | 0.600 | 2.00 | NE | | | 094771-017 | SW846 6020 |
| 09-Oct-13 | Magnesium | 15.6 | 0.010 | 0.030 | NE | | | 094771-017 | SW846 6020 |
| | Potassium | 1.57 | 0.080 | 0.300 | NE | | | 094771-017 | SW846 6020 |
| | Sodium | 21.6 | 0.080 | 0.250 | NE | | | 094771-017 | SW846 6020 |

Refer to footnotes on page 10A-39.

## Table 10A-10
## Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results, Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW1** | Americium-241 | -13.9 ± 19.4 | 30.8 | 15.1 | NE | U | BD | 093349-033 | EPA 901.1 |
| 22-Jan-13 | Cesium-137 | 0.943 ± 2.87 | 3.78 | 1.82 | NE | U | BD | 093349-033 | EPA 901.1 |
| | Cobalt-60 | 1.04 ± 2.27 | 4.13 | 1.96 | NE | U | BD | 093349-033 | EPA 901.1 |
| | Potassium-40 | 15.6 ± 37.4 | 54.3 | 26.1 | NE | U | BD | 093349-033 | EPA 901.1 |
| | Gross Alpha | 7.00 | NA | NA | 15 pCi/L | | | 093349-034 | EPA 900.0 |
| | Gross Beta | 4.81 ± 1.18 | 1.08 | 0.517 | 4 mrem/yr | | J | 093349-034 | EPA 900.0 |
| | Uranium-233/234 | 16.7 ± 2.13 | 0.0749 | 0.0334 | NE | | | 093349-035 | HASL-300 |
| | Uranium-235/236 | 0.172 ± 0.057 | 0.0422 | 0.0161 | NE | | | 093349-035 | HASL-300 |
| | Uranium-238 | 3.03 ± 0.421 | 0.0313 | 0.0115 | NE | | | 093349-035 | HASL-300 |
| **OBS-MW1** (Duplicate) | Americium-241 | 2.22 ± 8.97 | 13.2 | 6.50 | NE | U | BD | 093350-033 | EPA 901.1 |
| 22-Jan-13 | Cesium-137 | 0.502 ± 2.90 | 3.42 | 1.66 | NE | U | BD | 093350-033 | EPA 901.1 |
| | Cobalt-60 | -0.0873 ± 2.04 | 3.62 | 1.73 | NE | U | BD | 093350-033 | EPA 901.1 |
| | Potassium-40 | -14.5 ± 32.1 | 40.7 | 19.5 | NE | U | BD | 093350-033 | EPA 901.1 |
| | Gross Alpha | 0.57 | NA | NA | 15 pCi/L | | | 093350-034 | EPA 900.0 |
| | Gross Beta | 5.67 ± 1.33 | 1.18 | 0.567 | 4 mrem/yr | | J | 093350-034 | EPA 900.0 |
| | Uranium-233/234 | 17.7 ± 2.26 | 0.0785 | 0.035 | NE | | | 093350-035 | HASL-300 |
| | Uranium-235/236 | 0.145 ± 0.0513 | 0.0443 | 0.0168 | NE | | | 093350-035 | HASL-300 |
| | Uranium-238 | 3.39 ± 0.470 | 0.0328 | 0.0121 | NE | | | 093350-035 | HASL-300 |
| **OBS-MW2** | Americium-241 | 14.9 ± 23.4 | 34.6 | 17.0 | NE | U | BD | 093344-033 | EPA 901.1 |
| 21-Jan-13 | Cesium-137 | -0.0433 ± 2.41 | 3.72 | 1.80 | NE | U | BD | 093344-033 | EPA 901.1 |
| | Cobalt-60 | 1.31 ± 2.35 | 4.06 | 1.93 | NE | U | BD | 093344-033 | EPA 901.1 |
| | Potassium-40 | 3.51 ± 33.2 | 50.6 | 24.3 | NE | U | BD | 093344-033 | EPA 901.1 |
| | Gross Alpha | 7.22 | NA | NA | 15 pCi/L | | | 093344-034 | EPA 900.0 |
| | Gross Beta | 5.54 ± 1.30 | 0.994 | 0.474 | 4 mrem/yr | | J | 093344-034 | EPA 900.0 |
| | Uranium-233/234 | 22.5 ± 2.87 | 0.114 | 0.0507 | NE | | | 093344-035 | HASL-300 |
| | Uranium-235/236 | 0.267 ± 0.0848 | 0.0642 | 0.0244 | NE | | | 093344-035 | HASL-300 |
| | Uranium-238 | 4.01 ± 0.567 | 0.0476 | 0.0176 | NE | | | 093344-035 | HASL-300 |
| **OBS-MW3** | Americium-241 | 10.5 ± 12.9 | 18.2 | 8.92 | NE | U | BD | 093352-033 | EPA 901.1 |
| 23-Jan-13 | Cesium-137 | 2.72 ± 3.53 | 3.67 | 1.78 | NE | U | BD | 093352-033 | EPA 901.1 |
| | Cobalt-60 | 1.22 ± 2.24 | 3.97 | 1.89 | NE | U | BD | 093352-033 | EPA 901.1 |
| | Potassium-40 | 78.2 ± 49.6 | 31.8 | 14.9 | NE | X | R | 093352-033 | EPA 901.1 |
| | Gross Alpha | 14.68 | NA | NA | 15 pCi/L | | | 093352-034 | EPA 900.0 |
| | Gross Beta | 5.85 ± 1.36 | 0.994 | 0.470 | 4 mrem/yr | | J | 093352-034 | EPA 900.0 |
| | Uranium-233/234 | 19.9 ± 2.59 | 0.0899 | 0.040 | NE | | | 093352-035 | HASL-300 |
| | Uranium-235/236 | 0.215 ± 0.0691 | 0.0507 | 0.0193 | NE | | | 093352-035 | HASL-300 |
| | Uranium-238 | 3.81 ± 0.537 | 0.0376 | 0.0139 | NE | | | 093352-035 | HASL-300 |

Refer to footnotes on page 10A-39.

**Table 10A-10** *(Continued)*
**Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results, Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW1** | Americium-241 | -2.64 ± 11.2 | 19.1 | 9.32 | NE | U | BD | 093863-033 | EPA 901.1 |
| 18-Apr-13 | Cesium-137 | -0.971 ± 2.17 | 3.61 | 1.73 | NE | U | BD | 093863-033 | EPA 901.1 |
| | Cobalt-60 | 1.97 ± 2.67 | 4.10 | 1.94 | NE | U | BD | 093863-033 | EPA 901.1 |
| | Potassium-40 | -1.48 ± 50.5 | 47.7 | 22.7 | NE | U | BD | 093863-033 | EPA 901.1 |
| | Gross Alpha | 7.44 | NA | NA | 15 pCi/L | NA | None | 093863-034 | EPA 900.0 |
| | Gross Beta | 5.43 ± 1.32 | 1.24 | 0.599 | 4 mrem/yr | | J | 093863-034 | EPA 900.0 |
| | Uranium-233/234 | 17.5 ± 2.29 | 0.124 | 0.055 | NE | | | 093863-035 | HASL-300 |
| | Uranium-235/236 | 0.262 ± 0.0876 | 0.0759 | 0.0295 | NE | | | 093863-035 | HASL-300 |
| | Uranium-238 | 3.30 ± 0.489 | 0.0694 | 0.0278 | NE | | | 093863-035 | HASL-300 |
| **OBS-MW2** | Americium-241 | -17.7 ± 11.0 | 12.3 | 6.04 | NE | U | BD | 093866-033 | EPA 901.1 |
| 22-Apr-13 | Cesium-137 | 1.63 ± 2.47 | 3.63 | 1.75 | NE | U | BD | 093866-033 | EPA 901.1 |
| | Cobalt-60 | 0.0269 ± 2.25 | 3.92 | 1.87 | NE | U | BD | 093866-033 | EPA 901.1 |
| | Potassium-40 | -59.9 ± 56.6 | 49.2 | 23.7 | NE | U | BD | 093866-033 | EPA 901.1 |
| | Gross Alpha | 9.60 | NA | NA | 15 pCi/L | NA | None | 093866-034 | EPA 900.0 |
| | Gross Beta | 5.63 ± 1.29 | 1.04 | 0.497 | 4 mrem/yr | | J | 093866-034 | EPA 900.0 |
| | Uranium-233/234 | 23.9 ± 3.12 | 0.0936 | 0.0416 | NE | | | 093866-035 | HASL-300 |
| | Uranium-235/236 | 0.288 ± 0.0822 | 0.0575 | 0.0223 | NE | | | 093866-035 | HASL-300 |
| | Uranium-238 | 4.51 ± 0.632 | 0.0525 | 0.0211 | NE | | | 093866-035 | HASL-300 |
| **OBS-MW3** | Americium-241 | 17.1 ± 18.4 | 26.4 | 12.9 | NE | U | BD | 093870-033 | EPA 901.1 |
| 23-Apr-13 | Cesium-137 | -1.25 ± 2.25 | 3.25 | 1.56 | NE | U | BD | 093870-033 | EPA 901.1 |
| | Cobalt-60 | -0.787 ± 1.96 | 3.40 | 1.60 | NE | U | BD | 093870-033 | EPA 901.1 |
| | Potassium-40 | -17.3 ± 50.0 | 46.4 | 22.1 | NE | U | BD | 093870-033 | EPA 901.1 |
| | Gross Alpha | 8.88 | NA | NA | 15 pCi/L | NA | None | 093870-034 | EPA 900.0 |
| | Gross Beta | 9.49 ± 1.96 | 1.34 | 0.649 | 4 mrem/yr | | J | 093870-034 | EPA 900.0 |
| | Uranium-233/234 | 21.3 ± 2.74 | 0.0847 | 0.0377 | NE | | | 093870-035 | HASL-300 |
| | Uranium-235/236 | 0.355 ± 0.0893 | 0.052 | 0.0202 | NE | | | 093870-035 | HASL-300 |
| | Uranium-238 | 3.87 ± 0.540 | 0.0475 | 0.0191 | NE | | | 093870-035 | HASL-300 |
| **OBS-MW3** (Duplicate) | Americium-241 | -1.03 ± 10.2 | 15.7 | 7.69 | NE | U | BD | 093871-033 | EPA 901.1 |
| 23-Apr-13 | Cesium-137 | 0.889 ± 3.21 | 3.43 | 1.65 | NE | U | BD | 093871-033 | EPA 901.1 |
| | Cobalt-60 | -1.35 ± 2.09 | 3.33 | 1.57 | NE | U | BD | 093871-033 | EPA 901.1 |
| | Potassium-40 | 35.6 ± 40.9 | 34.8 | 16.5 | NE | X | R | 093871-033 | EPA 901.1 |
| | Gross Alpha | 11.60 | NA | NA | 15 pCi/L | NA | None | 093871-034 | EPA 900.0 |
| | Gross Beta | 6.38 ± 1.40 | 0.978 | 0.466 | 4 mrem/yr | | J | 093871-034 | EPA 900.0 |
| | Uranium-233/234 | 19.5 ± 2.48 | 0.0758 | 0.0337 | NE | | | 093871-035 | HASL-300 |
| | Uranium-235/236 | 0.287 ± 0.0763 | 0.0465 | 0.0181 | NE | | | 093871-035 | HASL-300 |
| | Uranium-238 | 3.81 ± 0.522 | 0.0425 | 0.0171 | NE | | | 093871-035 | HASL-300 |

Refer to footnotes on page 10A-39.

**Table 10A-10** *(Continued)*
**Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results,**
**Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW1** | Americium-241 | 8.25 ± 8.00 | 11.3 | 5.56 | NE | U | BD | 094361-033 | EPA 901.1 |
| 09-Jul-13 | Cesium-137 | -0.29 ± 2.22 | 3.36 | 1.63 | NE | U | BD | 094361-033 | EPA 901.1 |
| | Cobalt-60 | -1.42 ± 2.40 | 3.32 | 1.59 | NE | U | BD | 094361-033 | EPA 901.1 |
| | Potassium-40 | -26.9 ± 42.4 | 44.5 | 21.5 | NE | U | BD | 094361-033 | EPA 901.1 |
| | Gross Alpha | 3.33 | NA | NA | 15 pCi/L | NA | None | 094361-034 | EPA 900.0 |
| | Gross Beta | 6.80 ± 1.55 | 1.46 | 0.708 | 4 mrem/yr | | | 094361-034 | EPA 900.0 |
| | Uranium-233/234 | 17.2 ± 2.15 | 0.0433 | 0.0188 | NE | | | 094361-035 | HASL-300 |
| | Uranium-235/236 | 0.273 ± 0.0633 | 0.0253 | 0.00915 | NE | | | 094361-035 | HASL-300 |
| | Uranium-238 | 3.30 ± 0.439 | 0.0349 | 0.0146 | NE | | | 094361-035 | HASL-300 |
| **OBS-MW2** | Americium-241 | -30.1 ± 24.3 | 32.7 | 16.1 | NE | U | BD | 094365-033 | EPA 901.1 |
| 10-Jul-13 | Cesium-137 | -1.26 ± 3.67 | 3.98 | 1.92 | NE | U | BD | 094365-033 | EPA 901.1 |
| | Cobalt-60 | -3.45 ± 4.40 | 4.55 | 2.17 | NE | U | BD | 094365-033 | EPA 901.1 |
| | Potassium-40 | -33 ± 44.9 | 51.3 | 24.6 | NE | U | BD | 094365-033 | EPA 901.1 |
| | Gross Alpha | -4.44 | NA | NA | 15 pCi/L | NA | None | 094365-034 | EPA 900.0 |
| | Gross Beta | 6.16 ± 1.55 | 1.64 | 0.797 | 4 mrem/yr | | | 094365-034 | EPA 900.0 |
| | Uranium-233/234 | 23.1 ± 2.93 | 0.0485 | 0.0211 | NE | | | 094365-035 | HASL-300 |
| | Uranium-235/236 | 0.283 ± 0.0687 | 0.0283 | 0.0103 | NE | | | 094365-035 | HASL-300 |
| | Uranium-238 | 4.26 ± 0.569 | 0.0391 | 0.0164 | NE | | | 094365-035 | HASL-300 |
| **OBS-MW2** (Duplicate) | Americium-241 | 7.39 ± 8.28 | 12.1 | 5.93 | NE | U | BD | 094366-033 | EPA 901.1 |
| 10-Jul-13 | Cesium-137 | 0.146 ± 2.37 | 3.63 | 1.76 | NE | U | BD | 094366-033 | EPA 901.1 |
| | Cobalt-60 | -1.18 ± 2.12 | 3.52 | 1.67 | NE | U | BD | 094366-033 | EPA 901.1 |
| | Potassium-40 | 1.15 ± 48.2 | 34.3 | 16.3 | NE | U | BD | 094366-033 | EPA 901.1 |
| | Gross Alpha | 2.51 | NA | NA | 15 pCi/L | NA | None | 094366-034 | EPA 900.0 |
| | Gross Beta | 6.24 ± 1.49 | 1.39 | 0.672 | 4 mrem/yr | | | 094366-034 | EPA 900.0 |
| | Uranium-233/234 | 22.1 ± 2.77 | 0.0437 | 0.019 | NE | | | 094366-035 | HASL-300 |
| | Uranium-235/236 | 0.268 ± 0.0627 | 0.0255 | 0.00922 | NE | | | 094366-035 | HASL-300 |
| | Uranium-238 | 4.22 ± 0.554 | 0.0352 | 0.0147 | NE | | | 094366-035 | HASL-300 |
| **OBS-MW3** | Americium-241 | -8.99 ± 11.2 | 17.6 | 8.58 | NE | U | BD | 094368-033 | EPA 901.1 |
| 11-Jul-13 | Cesium-137 | 1.18 ± 3.66 | 3.14 | 1.51 | NE | U | BD | 094368-033 | EPA 901.1 |
| | Cobalt-60 | -0.763 ± 1.86 | 3.16 | 1.48 | NE | U | BD | 094368-033 | EPA 901.1 |
| | Potassium-40 | 25.7 ± 42.9 | 31.8 | 15.0 | NE | U | BD | 094368-033 | EPA 901.1 |
| | Gross Alpha | -6.04 | NA | NA | 15 pCi/L | NA | None | 094368-034 | EPA 900.0 |
| | Gross Beta | 8.12 ± 1.67 | 1.15 | 0.557 | 4 mrem/yr | | | 094368-034 | EPA 900.0 |
| | Uranium-233/234 | 20.5 ± 2.59 | 0.0484 | 0.021 | NE | | | 094368-035 | HASL-300 |
| | Uranium-235/236 | 0.210 ± 0.0561 | 0.0283 | 0.0102 | NE | | | 094368-035 | HASL-300 |
| | Uranium-238 | 3.63 ± 0.488 | 0.039 | 0.0163 | NE | | | 094368-035 | HASL-300 |

Refer to footnotes on page 10A-39.

**Table 10A-10** *(Concluded)*
**Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results, Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **OBS-MW1** | Americium-241 | 5.32 ± 10.4 | 16.0 | 7.85 | NE | U | BD | 094767-033 | EPA 901.1 |
| 08-Oct-13 | Cesium-137 | -1.09 ± 3.51 | 3.83 | 1.85 | NE | U | BD | 094767-033 | EPA 901.1 |
| | Cobalt-60 | 1.61 ± 2.22 | 3.04 | 1.43 | NE | U | BD | 094767-033 | EPA 901.1 |
| | Potassium-40 | 26.0 ± 38.4 | 44.4 | 21.2 | NE | U | BD | 094767-033 | EPA 901.1 |
| | Gross Alpha | -5.17 | NA | NA | 15 pCi/L | NA | None | 094767-034 | EPA 900.0 |
| | Gross Beta | 7.48 ± 3.15 | 4.12 | 1.88 | 4 mrem/yr | | J | 094767-034 | EPA 900.0 |
| | Uranium-233/234 | 17.4 ± 2.24 | 0.108 | 0.0478 | NE | | | 094767-035 | HASL-300 |
| | Uranium-235/236 | 0.197 ± 0.0714 | 0.0516 | 0.0182 | NE | | | 094767-035 | HASL-300 |
| | Uranium-238 | 3.27 ± 0.473 | 0.0903 | 0.039 | NE | | | 094767-035 | HASL-300 |
| **OBS-MW1** (Duplicate) | Americium-241 | 2.53 ± 6.55 | 9.74 | 4.77 | NE | U | BD | 094768-033 | EPA 901.1 |
| 08-Oct-13 | Cesium-137 | 0.654 ± 1.53 | 2.71 | 1.30 | NE | U | BD | 094768-033 | EPA 901.1 |
| | Cobalt-60 | -0.336 ± 1.44 | 2.55 | 1.19 | NE | U | BD | 094768-033 | EPA 901.1 |
| | Potassium-40 | 62.1 ± 28.9 | 24.8 | 11.5 | NE | | J | 094768-033 | EPA 901.1 |
| | Gross Alpha | -3.56 | NA | NA | 15 pCi/L | NA | None | 094768-034 | EPA 900.0 |
| | Gross Beta | 4.38 ± 1.20 | 1.25 | 0.601 | 4 mrem/yr | | J | 094768-034 | EPA 900.0 |
| | Uranium-233/234 | 16.3 ± 2.08 | 0.0748 | 0.0332 | NE | | | 094768-035 | HASL-300 |
| | Uranium-235/236 | 0.203 ± 0.0625 | 0.0358 | 0.0126 | NE | | | 094768-035 | HASL-300 |
| | Uranium-238 | 2.96 ± 0.416 | 0.0626 | 0.027 | NE | | | 094768-035 | HASL-300 |
| **OBS-MW2** | Americium-241 | 6.72 ± 17.9 | 26.7 | 13.2 | NE | U | BD | 094762-033 | EPA 901.1 |
| 07-Oct-13 | Cesium-137 | -0.415 ± 3.44 | 4.25 | 2.07 | NE | U | BD | 094762-033 | EPA 901.1 |
| | Cobalt-60 | 0.114 ± 2.94 | 4.49 | 2.17 | NE | U | BD | 094762-033 | EPA 901.1 |
| | Potassium-40 | 29.4 ± 54.1 | 44.0 | 21.2 | NE | U | BD | 094762-033 | EPA 901.1 |
| | Gross Alpha | -1.53 | NA | NA | 15 pCi/L | NA | None | 094762-034 | EPA 900.0 |
| | Gross Beta | 8.29 ± 3.20 | 3.82 | 1.73 | 4 mrem/yr | | J | 094762-034 | EPA 900.0 |
| | Uranium-233/234 | 23.8 ± 3.14 | 0.137 | 0.0609 | NE | | | 094762-035 | HASL-300 |
| | Uranium-235/236 | 0.379 ± 0.115 | 0.0657 | 0.0232 | NE | | | 094762-035 | HASL-300 |
| | Uranium-238 | 4.65 ± 0.678 | 0.115 | 0.0496 | NE | | | 094762-035 | HASL-300 |
| **OBS-MW3** | Americium-241 | -1.85 ± 10.8 | 16.2 | 7.89 | NE | U | BD | 094771-033 | EPA 901.1 |
| 09-Oct-13 | Cesium-137 | -1.68 ± 3.30 | 3.53 | 1.71 | NE | U | BD | 094771-033 | EPA 901.1 |
| | Cobalt-60 | 0.707 ± 1.88 | 3.34 | 1.58 | NE | U | BD | 094771-033 | EPA 901.1 |
| | Potassium-40 | 5.80 ± 31.6 | 31.7 | 15.0 | NE | U | BD | 094771-033 | EPA 901.1 |
| | Gross Alpha | 0.46 | NA | NA | 15 pCi/L | NA | None | 094771-034 | EPA 900.0 |
| | Gross Beta | 4.39 ± 1.27 | 1.55 | 0.748 | 4 mrem/yr | | J | 094771-034 | EPA 900.0 |
| | Uranium-233/234 | 21.3 ± 2.77 | 0.0884 | 0.0392 | NE | | | 094771-035 | HASL-300 |
| | Uranium-235/236 | 0.244 ± 0.0749 | 0.0423 | 0.0149 | NE | | | 094771-035 | HASL-300 |
| | Uranium-238 | 4.00 ± 0.565 | 0.0739 | 0.0319 | NE | | | 094771-035 | HASL-300 |

Refer to footnotes on page 10A-39.

## Table 10A-11
## Summary of Field Water Quality Measurements[h],
## Solid Waste Management Unit 68 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Sample Date | Temperature (°C) | Specific Conductivity (µmhos/cm) | Oxidation Reduction Potential (mV) | pH | Turbidity (NTU) | Dissolved Oxygen (% Sat) | Dissolved Oxygen (mg/L) |
|---|---|---|---|---|---|---|---|---|
| **OBS-MW1** | 22-Jan-13 | 16.19 | 505 | 190.4 | 7.13 | 0.66 | 37.3 | 3.66 |
| **OBS-MW2** | 21-Jan-13 | 17.07 | 501 | 200.8 | 7.11 | 0.52 | 37.0 | 3.56 |
| **OBS-MW3** | 23-Jan-13 | 15.29 | 501 | 189.5 | 7.14 | 0.54 | 44.2 | 4.42 |
| | | | | | | | | |
| **OBS-MW1** | 18-Apr-13 | 14.54 | 503 | 252.5 | 7.27 | 0.56 | 36.2 | 3.69 |
| **OBS-MW2** | 22-Apr-13 | 18.11 | 501 | 250.3 | 7.14 | 0.25 | 38.0 | 3.58 |
| **OBS-MW3** | 23-Apr-13 | 16.74 | 501 | 240.9 | 7.24 | 0.52 | 45.5 | 4.41 |
| | | | | | | | | |
| **OBS-MW1** | 09-Jul-13 | 18.32 | 499 | 108.9 | 7.56 | 0.62 | 43.6 | 3.99 |
| **OBS-MW2** | 10-Jul-13 | 20.17 | 482 | 124.5 | 7.53 | 0.43 | 38.3 | 3.47 |
| **OBS-MW3** | 11-Jul-13 | 18.43 | 471 | 103.2 | 7.55 | 0.69 | 46.3 | 4.33 |
| | | | | | | | | |
| **OBS-MW1** | 08-Oct-13 | 16.77 | 592 | 166.1 | 7.46 | 0.55 | 38.8 | 3.74 |
| **OBS-MW2** | 07-Oct-13 | 18.12 | 588 | 175.1 | 7.29 | 0.43 | 36.5 | 3.44 |
| **OBS-MW3** | 09-Oct-13 | 17.37 | 587 | 159.2 | 7.43 | 0.47 | 47.8 | 4.58 |

Refer to footnotes on page 10A-39.

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## *Footnotes for Solid Waste Management Unit 68 Analytical Results Tables*

% = percent.
µg/L = micrograms per liter.
CFR = Code of Federal Regulations.
EPA = U.S. Environmental Protection Agency.
HMX = octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
ID = Identifier.
mg/L = milligrams per liter.
mrem/yr = millirem per year.
No. = Number.
pCi/L = picocuries per liter.
RDX = hexahydro-1,3,5-trinitro-1,3,5-triazineN
Tetryl = methyl-2,4,6-trinitrophenylnitramine.

**[a]Result**

Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 2A- 1-4).

**Bold** = Indicates the value exceed the established MCL.
ND = Not detected (at MDL). Activities of zero or less are considered to be not detected.

**[b]MDL or MDA**

MDL applies to the data listed in Tables 10A-1 through 10A-9. MDA applies to radiological data in Table 10A-10.

MDA = Minimum detectable activity. The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.
MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA = Not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

**[c]PQL or Critical Level**

The PQL applies to Tables 10A-1 through 10A-9. Critical level applies to Table 10A-10.

Critical level = The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA = Not applicable (for gross alpha activities). The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

**[d]MCL**

Regulatory limits: the MCL is listed first, followed by the MAC. A single value is listed when the MCL and MAC are equal (for example, nitrate plus nitrate). If no value exists, NE is used.

MCL = Maximum contaminant level. Established by the U.S. Environmental Protection Agency (EPA) Office of Water, National Primary Water Regulations (EPA May 2009).

The following are MCLs for gross alpha particles and beta particles in community water systems:

- Gross alpha particle activity, excluding total uranium = 15 pCi/L= (40 CFR Parts 9, 141, and 142, Table 10A- 1-4).
- Any combination of beta and/or gamma emitting radionuclides = 4 mrem/yr = (as dose rate).

NE = Not established.

## *Footnotes for Solid Waste Management Unit 68 Analytical Results Tables (Concluded)*

**[e]Lab Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

B = The analyte was detected in the blank above the effective MDL.
H = Analytical holding time was exceeded.
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
N = Results associated with a spike analysis that was outside control limits.
NA = Not applicable.
U = Analyte is absent or below the method detection limit.
X = Data rejected due to peak not meeting identification criteria.

**[f]Validation Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = The associated value is an estimated quantity.
NJ- = Presumptive evidence of the presence of the material at an estimated quantity with a suspected negative bias.
None = No data validation for corrected gross alpha activity.
U = The analyte was analyzed for but not detected. The associated numerical value is the sample quantitation limit.
UJ = The analyte was analyzed for but not detected. The associated value is an estimate and may be inaccurate or imprecise.
R = The data are unusable (compound may or may not be present). Resampling and reanalysis are for verification.

**[g]Analytical Method**

Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.

DOE, 1990, "EML [Environmental Measurements Laboratory] Procedures Manual," 27th ed., Vol. 1, Rev. 1992, HASL-300.

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

DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
HASL = Health and Safety Laboratory.
SM = Standard Method.

**[h]Field Water Quality Measurements**

Field measurements collected prior to sampling.

°C = Degrees Celsius.
% Sat = Percent saturation.
μmhos/cm = Micromhos per centimeter.
mg/L = Milligrams per liter.
mV = Millivolts.
NTU = Nephelometric turbidity units.
pH = Potential of hydrogen (negative logarithm of the hydrogen ion concentration).

# Attachment 10B
# Solid Waste Management Unit 68
# Hydrographs

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# Attachment 10B Hydrographs

10B-1 SWMU 68 Study Area Wells..... 10B-5

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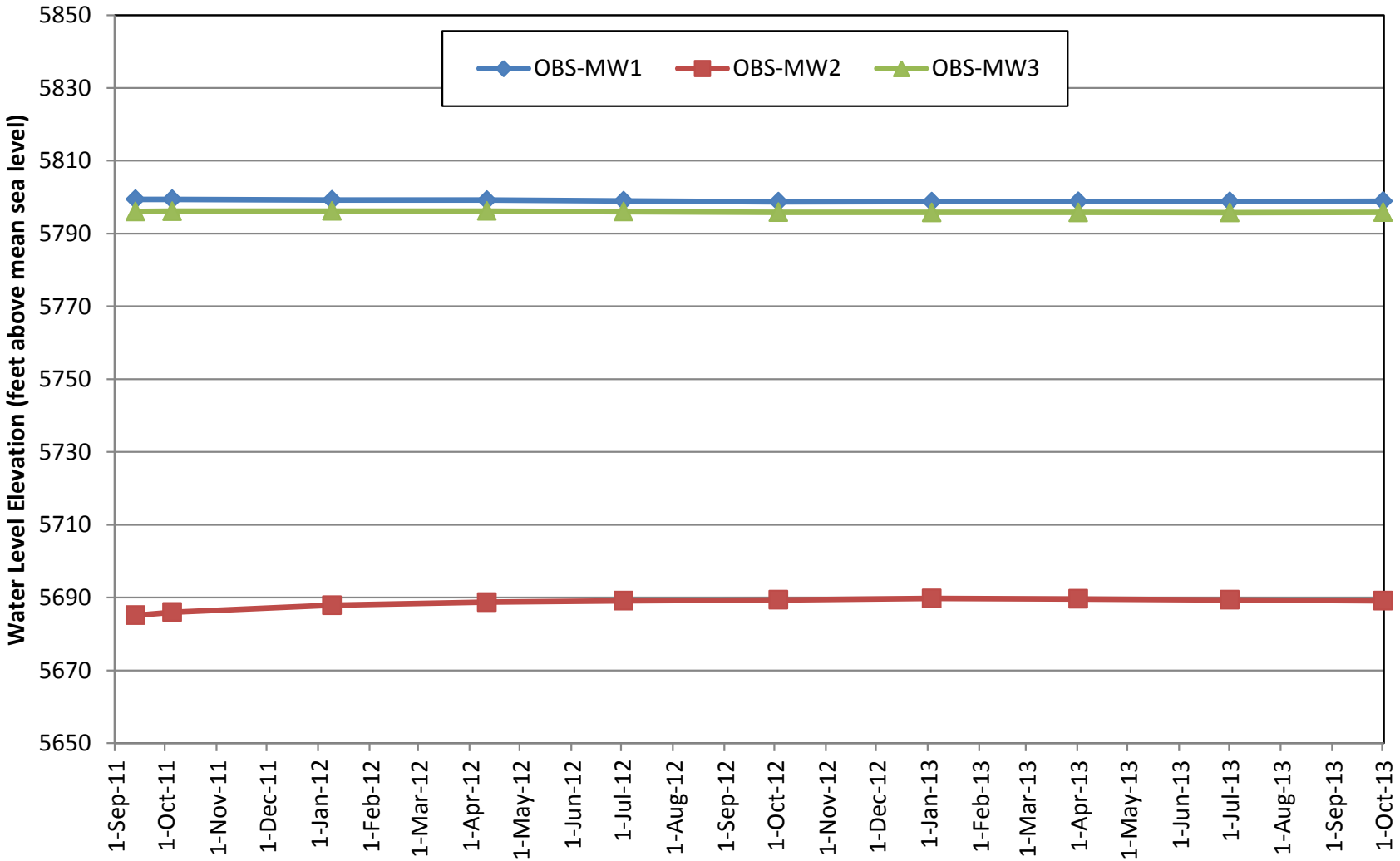


**Figure 10B-1. SWMU 68 Study Area Wells**

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# 11.0 Solid Waste Management Unit 116

## 11.1 Introduction

Drain and Septic System (DSS) Solid Waste Management Unit (SWMU) 116 is located in the Coyote Test Field on the western margin of the Manzanita Mountains. Analytical results for groundwater samples from the fractured bedrock have historically been reported as nondetected or detected at background concentrations for constituents of concern (COCs).

### 11.1.1 Location

The Coyote Canyon Test Area at Sandia National Laboratories, New Mexico (SNL/NM) is located in the eastern portion of Kirtland Air Force Base (KAFB). The SNL/NM facility is a government-owned, contractor-operated, multi-program laboratory overseen by the U.S. Department of Energy (DOE), National Nuclear Security Administration through the Sandia Field Office in Albuquerque, New Mexico. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM.

SWMU 116 is located on the western margin of the Manzanita Mountain foothills within the U.S. Forest Service Withdrawn Area. The site lies in a minor southwesterly-sloping tributary that drains to the alluvial fan along the mountain front. This short tributary drains mountainous terrain immediately north and east of the site. Outcrops in the immediate area include Precambrian granite, gneiss, metarhyolite, and amphibolites that are unconformably overlain by Pennsylvanian limestone, sandstone, and conglomerate (SNL March 1993). Recent sediments include a thin discontinuous veneer of stream-deposited alluvium along the floor of the tributary and also colluvium on nearby hillsides. Vegetation in the vicinity consists predominantly of sparse juniper and pinon woodlands, low-lying shrubs (including sand sage, winter fat, saltbush, and rabbitbush), cacti (e.g., cholla, pincushion, strawberry, and prickly pear), and bunch grasses (e.g., grama, muhly, dropseed, and galleta).

SWMU 116 contains five seepage pits on the south side of Building 9990. Four of the seepage pits were connected to a septic tank. A fifth seepage pit was connected directly to floor drains and a sink in the building. The site is located approximately 50 feet (ft) south of Building 9990 and covers 2,473 square feet (approximately 0.06 acres). The site elevation is 6,120 ft above mean sea level (amsl).

### 11.1.2 Site History

Building 9990, the Electroexplosive Research Facility, was constructed in 1969 and was used as an explosive test facility from 1969 to 1986 (Table 11-1). Explosive testing was discontinued in 1986 and no significant research activity has occurred there since 1994. Tests were conducted north of the building, and debris from the blasts, which often used depleted uranium, were dispersed over the nearby hillside.

Environmental concern about SWMU 116 is based on the potential release of COCs in sanitary waste or wastewater that discharged at the Building 9990 seepage pits. While in operation, the DSS is estimated to have discharged approximately 60 to 600 gallons per day of sanitary waste and wastewater. The DSS at SWMU 116 was removed from service in 1989, but remains in place. The 750-gallon septic tank is connected to a distribution box and four seepage pits, each 5 ft in diameter. Three of the four seepage pits are 13 ft deep, and the fourth is 11 ft deep. The septic system received sanitary waste from restrooms and possibly wastewater from floor drains (SNL March 1993).

## Table 11-1. Historical Timeline of SWMU 116

| Month | Year | Event | Reference |
|---|---|---|---|
| -- | 1969 | Building 9990 and septic system constructed. | SNL June 1996 |
| September | 1987 | SWMU 116 first identified as a potential release site. | SNL June 1996 |
| -- | 1989 | SWMU 116 septic tank pumped for the last time. | SNL June 1996 |
| June | 1992 | Waste characterization samples collected from SWMU 116 septic tank. | SNL June 1996 |
| March | 1993 | Septic Tanks and Drainfields (OU 1295), RCRA Facility Investigation Work Plan submitted to the EPA. | SNL March 1993 |
| March | 1994 | OU 1295 SAP prepared. | IT March 1994 |
| -- | 1993-1995 | Field Investigations and Voluntary Corrective Measures completed at SWMU 116. | SNL June 1996 |
| June | 1996 | NFA proposal for SWMU 116 submitted to the NMED. | SNL June 1996 |
| June | 1998 | NMED responded with an RSI on the SWMU 116 NFA proposal. | NMED June 1998 |
| November | 1998 | Response submitted to the first NMED RSI for SWMU 116. | SNL November 1998 |
| October | 1999 | A SAP describing technical procedures to be used for environmental investigations at DSS sites and AOCs submitted to the NMED. | SNL October 1999 |
| January | 2000 | October 1999 DSS SAP approved by the NMED. | NMED January 2000 |
| June | 2000 | NMED issued a second RSI on the SWMU 116 NFA proposal, and the first SNL/NM response for SWMU 116. | NMED June 2000 |
| September | 2000 | Response submitted to NMED for the second RSI for SWMU 116. | SNL September 2000 |
| August | 2001 | Groundwater monitoring well CTF-MW1 installed near SWMU 116. | SNL June 2005 |
| November | 2001 | Follow-up FIP documenting specific investigation procedures to be completed at DSS sites and AOCs submitted to the NMED. | SNL November 2001 |
| February | 2002 | The DSS FIP approved by the NMED. | NMED February 2002 |
| May | 2004 | Completion of eight quarters of groundwater sampling from monitoring well CTF-MW1. | SNL June 2005 |
| June | 2005 | A third RSI response submitted to the NMED describing the results of investigation work completed at SWMU 116 since the June 1996 NFA report that also included an updated risk assessment evaluation. | SNL June 2005 |
| September | 2005 | NMED issues Certificate of Completion for CAC without Controls for SWMU 116. | NMED September 2005 |
| March | 2006 | Request for Class III Permit Modification submitted. Public Notice meeting published. Documents supporting NFA (CAC) for SWMU 116 compiled. | SNL March 2006 |
| April | 2010 | NMED requires that monitoring well CTF-MW1 be sampled annually as part of LTS requirements for SWMU 116. | NMED April 2010 |
| March | 2011 | Monitoring well CTF-MW1 is sampled as part of LTS. | SNL September 2012 |
| February | 2012 | Monitoring well CTF-MW1 is sampled as part of LTS. | SNL January 2012 |
| January | 2013 | Well CYN-MW5 sampled as part of LTS. | SNL December 2012 |

**NOTES:**

AOC = Area of Concern.
CAC = Corrective Action Complete.
CTF = Coyote Test Field.
DSS = Drain and Septic System.
EPA = U.S. Environmental Protection Agency.
FIP = Field Implementation Plan.
LTS = Long-term Stewardship.
MW = Monitoring well.
NFA = No Further Action.
NMED = New Mexico Environment Department.
OU = Operable Unit.
RCRA = Resource Conservation and Recovery Act.
RSI = Request for Supplemental Information.
SAP = Sampling and Analysis Plan.
SNL/NM = Sandia National Laboratories, New Mexico.
SWMU = Solid Waste Management Unit.

A fifth seepage pit received wastewater from the upstairs darkroom sink and from floor drains on the west side of the building. This seepage pit probably received the largest volume of wastewater. The pit is 13 ft deep and received photo-processing chemicals from an upstairs sink. Floor drains connected to the fifth seepage pit may have received polychlorinated biphenyl-contaminated capacitor oil that leaked from a bank of 72 capacitors. Although undocumented, the floor drains may have also received methylene chloride that leaked from drums stored in the building, and small quantities of dilute copper sulfate from high-voltage water resistors may have been discharged to either the septic system or the fifth seepage pit.

### 11.1.3 Monitoring History

For the DSS investigation, groundwater monitoring well CTF-MW1 (Figure 11-1) was installed in 2001. The well is located approximately 500 ft to the south and downslope of Building 9990. The ground surface at the wellhead is approximately 40 ft lower than the elevation at the site. The well is located along a small arroyo that directs storm water southwestward from the site to an alluvial fan adjoining the mountain front. The well is screened in fractured Precambrian granite at a depth of 240 to 260 ft below ground surface (bgs) (SNL June 2005).

Monitoring well CTF-MW1 was sampled on a quarterly basis from July 2002 to May 2004 to acquire the eight quarters of groundwater data as required by the New Mexico Environment Department (NMED) in the June 2000 Request for Supplemental Information (NMED June 2000). No analytes exceeded maximum contaminant levels (MCLs) or other groundwater standards during the eight sampling events. After the eight quarters of data were collected, the well became part of the Groundwater Protection Program monitoring network and was sampled sporadically. Most recently, annual sampling at monitoring well CTF-MW1 has been reinstated based on NMED requirements (NMED April 2010).

### 11.1.4 Current Monitoring Network

Monitoring well CTF-MW1 is the only well in the SWMU 116 area. This monitoring well was installed in 2001 and monitors groundwater that migrates through fractured Precambrian granite.

### 11.1.5 Summary of Calendar Year 2013 Activities

The following activities were conducted for the SWMU 116 monitoring effort during Calendar Year (CY) 2013 (January through December 2013):

- Annual groundwater sampling was conducted at monitoring well CTF-MW1 in January 2013.
- Periodic groundwater elevation data were obtained from monitoring well CTF-MW1.
- Tables of analytical results (Attachment 11A) and a hydrograph (Attachment 11B) were prepared in support of this report.

### 11.1.6 Summary of Future Activities

The following activities are anticipated for SWMU 116 during CY 2014:

- Annual groundwater sampling will be conducted at monitoring well CTF-MW1.
- Periodic groundwater elevation data will be obtained from monitoring well CTF-MW1.

### 11.1.7 Current Conceptual Model

The following sections present an updated discussion of the hydrogeologic regime, conceptual model, and previous contaminant findings for SWMU 116.

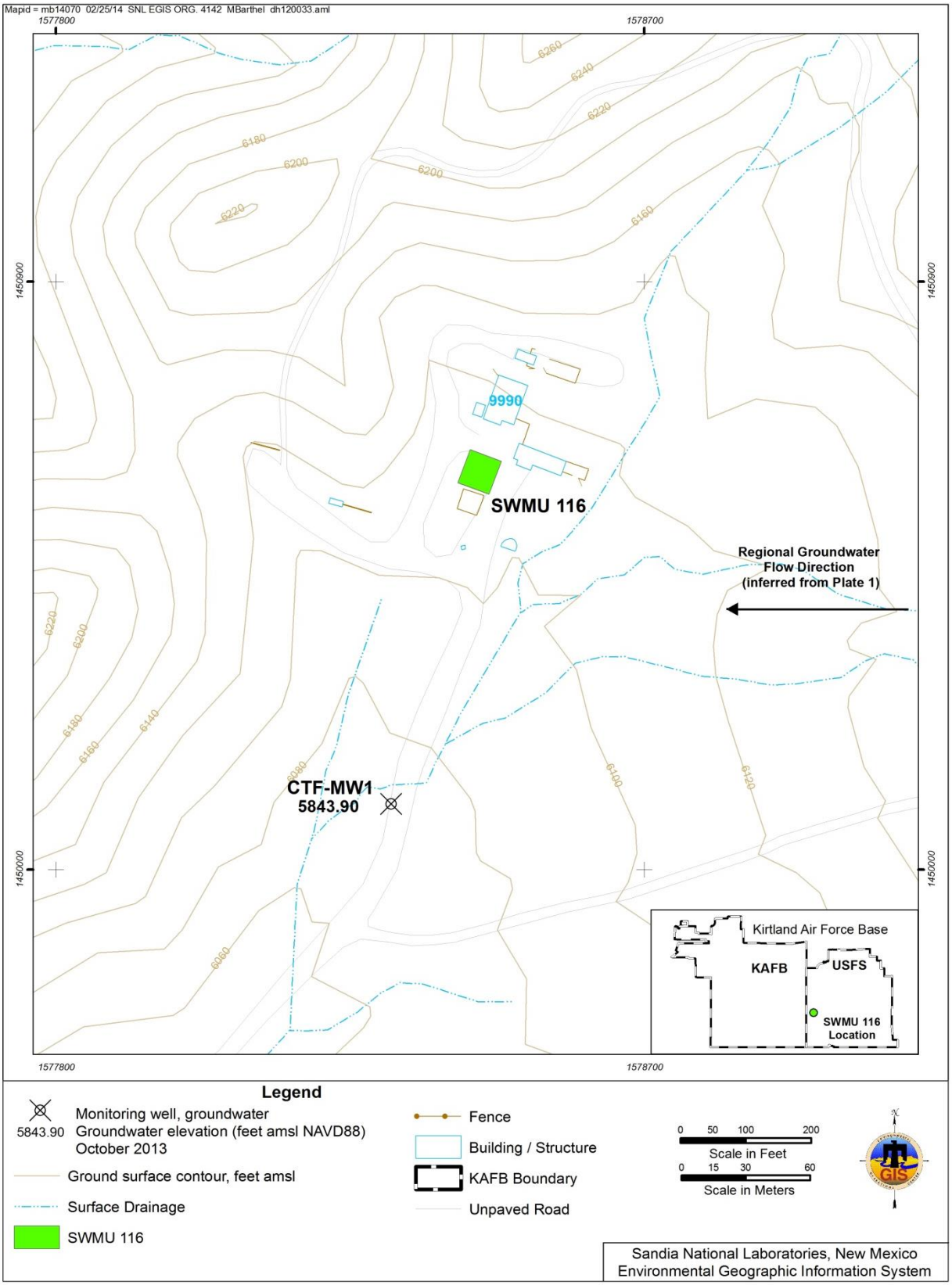


**Figure 11-1. Location and Groundwater Elevation at SWMU 116**

### 11.1.7.1 Regional Hydrogeologic Conditions

SWMU 116 is located on the western margin of the Manzanita Mountains (Figure 11-1). Alluvium covers the canyon floor where Building 9990 is located. The surrounding ridges consist of Precambrian outcrops (e.g., granite, gneiss, metarhyolite, and amphibolites) that are unconformably overlain by Paleozoic limestone, sandstone, and conglomerate. The outcrops are sporadically covered by colluvium. The base-wide potentiometric surface map (Plate 1) shows that groundwater flow in fractured bedrock is generally toward the west. The regional groundwater flow direction is depicted in Figure 11-1. No potable water-supply wells are located within 5 miles of the site.

### 11.1.7.2 Hydrogeologic Conditions at SWMU 116

SWMU 116 consists of five seepage pits near Building 9990 where sanitary waste and wastewater discharged from 1969 to 1989. The site is covered by colluvium that is underlain by bedrock. The site elevation is approximately 6,120 ft amsl (Figure 11-1). Overall, the terrain slopes to the southwest (Plate 1). No perennial surface water features, such as springs, are located within 1 mile of SWMU 116. Monitoring well CTF-MW1 is located approximately 500 ft downslope of Building 9990. The ground surface at the wellhead is approximately 40 ft lower than at the site.

The amount of precipitation available for groundwater recharge at SWMU 116 is minimal due to scant rainfall and high evapotranspiration rates. Summer (monsoonal) thunderstorms are responsible for the majority of rainfall. The average rainfall, as measured at the nearest active rain gauge (the National Weather Service station at the Albuquerque International Sunport) during the period from 1915 through 2005, was 8.67 inches per year (WRCC-DRI 2012). The station is located 10 miles northwest of the SWMU 116 at an elevation of 5,310 ft amsl. By extrapolation of the precipitation model presented in SNL/NM conceptual model of groundwater flow and contaminant transport at the canyon area (SNL May 2004), the average annual precipitation for SWMU 116, where the elevation is approximately 6,120 ft amsl, is estimated to be approximately 11.5 inches per year. Intense sunlight and low humidity throughout much of the year creates high rates of evapotranspiration. Estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL February 1998).

In 2001, a location downslope from SWMU 116, and agreed upon by NMED and SNL/NM, was selected for the installation of groundwater monitoring well CTF-MW1. The well was installed in August 2001 using the air rotary casing hammer drilling technique; the borehole was temporarily cased to 8 ft bgs. Dry alluvium consisting of silty sand and fine to medium gravel was encountered from the ground surface to 12 ft bgs. Competent (unfractured) Precambrian granite was encountered from 16 to 240 ft bgs. Groundwater was encountered at 240 ft bgs in slightly fractured granite. Water production increased steadily to the borehole total depth of 270 ft bgs. The well was screened from 240 to 260 ft bgs in fractured granite (Table 11-2).

**Table 11-2. Lithologic and Hydrogeologic Elevation Data for Monitoring Well CTF-MW1 at SWMU 116**

| Monitoring Well | Ground Surface Elevation (ft amsl) | Depth of Screened Interval (ft bgs) | Elevation for Top of Screen (ft amsl) | Potentiometric Surface, October 2013 (ft amsl) | Mid-Point Screen Elevation (ft amsl) | Approximate Pressure Head (ft[a]) |
|---|---|---|---|---|---|---|
| CTF-MW1 | 6079.70 | 240 – 260 | 5839.70 | 5843.90 | 5829.70 | 14 |

**NOTES:**
[a]From mid-point of screen.
amsl = Above mean sea level.
bgs = Below ground surface.
CTF = Coyote Test Field.
ft = Foot (feet).
MW = Monitoring Well.
SWMU = Solid Waste Management Unit.

The October 2013 groundwater elevation at monitoring well CTF-MW1 was 5,843.90 ft amsl. Compared to the mid-point elevation of the screen, the pressure head was approximately 14 ft and is indicative of confined conditions. Based on the potentiometric surface depicted on Plate 1, the horizontal gradient is steep and on the order of approximately 0.02 feet per foot near the monitoring well. Groundwater flows to the west through a fractured bedrock system.

During sampling, the drawdown in monitoring well CTF-MW1 is not excessive and the quantity of water produced is clearly adequate for low-flow sampling purposes. Groundwater samples are collected using a portable pneumatic (nitrogen-gas activated) Bennett™ piston pump.

#### 11.1.7.3 Local Direction of Flow

The conceptual hydrogeologic model for SWMU 116 is based on the findings for monitoring well CTF-MW1, other wells located along the mountain front (Plate 1), and extensive field mapping conducted by the Site-Wide Hydrogeologic Characterization Project (GRAM and Lettis 1995). Groundwater in the SWMU 116 area occurs in a fractured bedrock system under confined conditions. During drilling, the depth to groundwater at monitoring well CTF-MW1 was approximately 240 ft bgs in a fractured interval of Precambrian quartzite. Groundwater in the bedrock predominantly moves through a confined, low-permeability fracture system. A series of naturally filled fractures in the upper bedrock probably serves as a confining unit.

The amount of precipitation available for groundwater recharge at SWMU 116 is minimal due to the scant rainfall and high evapotranspiration rates. Historical water level data indicate that seasonal effects, primarily due to thunderstorms, rarely occur. The hydrograph (Figure 11B-1 from Attachment 11B) shows that significant water level increases occurred only twice in the last 10 years. During 2002 through 2013, the overall trend was downward. For the last five years, the water level in monitoring well CTF-MW1 has declined at approximately 0.4 foot per year. Groundwater probably discharges to the unconsolidated basin fill deposits (primarily the Santa Fe Group) of the Albuquerque Basin after crossing the Coyote, Tijeras, and Sandia Faults (SNL February 1998). No potable water supply wells are located within 5 miles of the site (Plate 1).

#### 11.1.7.4 Contaminant Sources

From 1969 to 1989, sanitary waste and wastewater discharged to five buried seepage pits near Building 9990. The sanitary waste and wastewater possibly contained sewage, photo-processing chemicals, high explosive (HE) compounds, and volatile organic compounds (VOCs). The areas around the seepage pits were characterized by soil sampling as part of the DSS investigation.

#### 11.1.7.5 Contaminant Distribution and Transport in Groundwater

No COCs exceeded applicable U.S. Environmental Protection Agency (EPA) MCLs (EPA 2009) in the CY 2013 groundwater samples collected from monitoring well CTF-MW1. No groundwater contamination is suspected at SWMU 116.

### 11.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM Environmental Restoration (ER) Operations (formerly ER Project), as well as implements and enforces federal regulations mandated by the Resource Conservation and Recovery Act (RCRA). All ER Operations SWMUs and Areas of Concern (AOCs) are listed in Module IV of the SNL/NM RCRA Permit, *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518* (NMED 1993). All corrective action requirements pertaining to SWMUs and AOCs are

contained in the Compliance Order on Consent (the Order) between the DOE, Sandia, and NMED (April 2004).

The DOE/National Nuclear Security Administration and Sandia received a letter from the NMED on April 14, 2010, entitled *Class 3 Permit Modification Requests for Granting Corrective Action Complete status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008), Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001* (NMED April 2010). The NMED's letter lists SWMU 116 under the heading of "SWMUs/AOCs to be Subject to Groundwater Monitoring Controls" and further states that pursuant to Section III.W.3.b of the Order (NMED April 2004), SWMU 116 requires long-term monitoring of groundwater on an annual basis as a site control. The NMED specified that the following analytes are to be monitored for SWMU 116 general chemistry parameters, VOCs, HE compounds, perchlorate, metals, cyanide, and nitrate plus nitrite (NPN).

## 11.3 Scope of Activities

The groundwater monitoring activities for SWMU 116 conducted during this reporting period consisted of the measurement of water levels and sampling and analysis as summarized in Table 11-3.

### Table 11-3. Groundwater Monitoring Well Network and Sampling Dates for SWMU 116, Calendar Year 2013

| Date of Sampling Event | Wells Sampled | SAP |
|---|---|---|
| January 2013 | CTF-MW1 | *SWMU 49 and 116 Groundwater Monitoring, Mini-SAP for Fiscal Year 2013 Annual Sampling* (SNL December 2012) |

**NOTES:**
CTF = Coyote Test Field.
MW = Monitoring Well.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories.
SWMU = Solid Waste Management Unit.

The analytical parameters are listed in Table 11-4. Quality control (QC) samples are collected in the field at the time of environmental sample collection. Field QC samples may include duplicate environmental, split, equipment blank (EB), and trip blank (TB) samples. No duplicate environmental or EB sample was collected at monitoring well CTF-MW1 during the CY 2013 sampling event.

## 11.4 Field Methods and Measurements

The monitoring procedures conducted for SWMU 116 groundwater monitoring are described in detail in Section 1.3.

The groundwater elevation is shown on Figure 11-1 and depicted in the hydrograph presented on Figure 11B-1 (Attachment 11B).

**Table 11-4. Parameters Sampled at SWMU 116**

| Parameter | January 2013 |
|---|---|
| Alkalinity (total, bicarbonate, carbonate)<br>Anions<br>Cations<br>High Explosive Compounds<br>NPN<br>Perchlorate<br>TAL Metals, plus Total Uranium<br>Total Cyanide<br>VOCs | CTF-MW1 |

**NOTES:**
CTF = Coyote Test Field.
MW = Monitoring Well.
NPN = Nitrate plus nitrate (reported as nitrogen).
SWMU = Solid Waste Management Unit.
TAL = Target Analyte List.
VOC = Volatile organic compound.

## 11.5 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using EPA-specified protocols described in Section 1.3.2 (Tables 1-5 and 1-6).

## 11.6 Summary of Analytical Results

This section discusses analytical results, exceedances of regulatory standards, and pertinent trends in COC concentrations. The analytical results and field measurements for the CY 2013 SWMU 116 sampling event are presented in Tables 11A-1 through 11A-9 (Attachment 11A). Data qualifiers are explained in the footnotes following Table 11A-9.

One VOC (1,1,2-trichloro-1,2,2-trifluoroethane) was detected in the CTF-MW1 sample at a concentration of 14.8 micrograms per liter, listed in Table 11A-1 (Attachment 11A). There is not an established MCL for this compound. The method detection limits (MDLs) for all analyzed VOCs are listed in Table 11A-2 (Attachment 11A). No HE compounds were detected. The MDLs for all analyzed HE compounds are listed in Table 11A-3.

The analytical result for NPN (reported as nitrogen) is presented in Table 11A-4 (Attachment 11A). No NPN result exceeded the MCL of 10 milligrams per liter (mg/L). For CY 2013, the NPN concentration was 7.29 mg/L.

The results for alkalinity, anion, cation, and total cyanide results are provided in Table 11A-5 (Attachment 11A). No detections of the constituents exceed applicable MCLs.

The analytical result for perchlorate is presented in Table 11A-6 (Attachment 11A). Currently, no MCL is established for perchlorate and perchlorate does not exceed the NMED-specified screening level/MDL of 4 micrograms per liter (NMED April 2004).

Total metal results are presented in Table 11A-7 (Attachment 11A). No metals exceed established MCLs.

Gross alpha activity is measured as a screening tool and in accordance with 40 Code of Federal Regulations, Parts 9, 141, and 142, Table I-4 does not include uranium, which is measured independently. Therefore, gross alpha activity measurements were corrected by subtracting the total uranium activity. Radiological results are further reviewed by an SNL/NM Certified Health Physicist to assure that the

samples are nonradioactive. Gamma spectroscopy (short list), gross alpha, gross beta, and isotopic uranium results are presented in Table 11A-8. None of the constituents exceeded the established MCLs.

Field water quality parameters are measured during purging of the well prior to sampling and include temperature, specific conductance, oxidation-reduction potential, pH, turbidity, and dissolved oxygen. The parameter measurements obtained immediately prior to sample collection are presented in Table 11A-9 (Attachment 11A).

## 11.7 Quality Control Results

Field and laboratory QC samples were collected and prepared as described in Section 1.3. Data validation qualifiers are presented with the analytical results in Tables 11A-4 through 11A-8 (Attachment 11A). The results of QC samples and the impact on data quality for the SWMU 116 sampling event are discussed in the following sections.

All reported values did not exceed established MCLs.

No VOCs were detected above laboratory MDLs in any TB sample.

The VOC detections in the FB are not applicable because VOCs were not detected in the associated environmental sample.

Laboratory data qualifiers are provided with the analytical results (Attachment 11A).

## 11.8 Variances and Nonconformances

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

### 11.8.1 Variances and Nonconformances

No variances or nonconformances from field or sampling requirements, as specified in the SWMU 116 groundwater monitoring Mini-Sampling and Analysis Plan (SNL December 2012), occurred during sampling activities.

### 11.8.2 Data Validation

Although some analytical results were qualified during the data validation process, no significant data quality problems were noted. Data validation qualifiers are provided with the analytical results in Tables 11A-3 through 11A-6 (Attachment 11A).

## 11.9 Summary and Conclusions

This section provides a brief summary of activities, discussion of COCs in relation to MCLs, trends of concentrations versus time, the current conceptual model, and plans for studies to be completed during CY 2014 at the SWMU 116.

SWMU 116 is located in the western Manzanita Mountains. Groundwater investigations were initiated in 2001 at the request of the NMED to evaluate the DSS associated with Building 9990. The one monitoring well at SWMU 116 (CTF-MW1) was sampled in January 2013, and the sample was analyzed for VOCs, HE compounds, NPN, alkalinity (total, bicarbonate, carbonate), anions, cations, perchlorate, Target Analyte List metals (plus total uranium), and total cyanide. Analytical results were compared with EPA MCL guidelines for drinking water (EPA 2009). No parameters were detected above established MCLs in the groundwater samples.

The analytical results for CY 2013 are consistent with historical concentrations. The conceptual model described in Section 11.1.7 does not require modification based on the analytical results for this reporting period.

During CY 2014, annual groundwater sampling will continue at monitoring well CTF-MW1 during the first quarter of CY 2014, subject to scheduling. Periodic monitoring of groundwater elevations will also be conducted.

## 11.10 References


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

**GRAM and Lettis 1995** GRAM and Lettis, 1995. *Conceptual Geologic Model of the Sandia National Laboratories and Kirtland Air Force Base,* prepared for Site Wide Hydrogeologic Characterization Project, Organization 7584, Environmental Restoration Program, Sandia National Laboratories, Albuquerque, New Mexico, December.

**IT March 1994** IT Corporation (IT), March 1994. *Sampling and Analysis Plan for Shallow Subsurface Soil Sampling, RCRA Facility Investigation of Septic Tanks and Drainfields (OU 1295)*, IT Corporation, Albuquerque, New Mexico.

**NMED April 2010** New Mexico Environment Department (NMED), April 2010. *Class 3 Permit Modification Requests for Granting Corrective Action Complete status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008), Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001*. New Mexico Environment Department, Santa Fe, New Mexico.

**NMED September 2005** New Mexico Environment Department (NMED), September 2005. *RE: Notice of Approval/Disapproval: Responses to Request for Supplemental Information for Proposals for Corrective Action Complete, Drain and Septic Systems SWMUs 49, 101, 116, 138, 149, 154, and 161, June 2005, Sandia National Laboratories EPA ID# NM5890110518 HWB-SNL-99-008, HWB-SNL-99-012,* New Mexico Environment Department, Santa Fe, New Mexico.

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

**NMED February 2002** New Mexico Environment Department (NMED), February 2002. *Approval of Field Implementation Plan, Characterization of Non Environmental Restoration Drain and Septic Systems Submittal Dated November 2001, Sandia National Laboratories, NM5890110518-1, HWB-SNL-02-009,* New Mexico Environment Department, Santa Fe, New Mexico.

**NMED June 2000** New Mexico Environment Department (NMED), June 2000. *Request for Supplemental Information: Sandia National Laboratories, New Mexico, Environmental Restoration Project Responses to NMED Request for Supplemental Information: No Further Action Proposals (4th Round), Dated June 1996, Sandia National Laboratories, EPA ID# NM5890110518, HRMB-SNL-99-008,* New Mexico Environment Department, Santa Fe, New Mexico.

**NMED January 2000** New Mexico Environment Department (NMED), January 2000. *Approval of Sampling and Analysis Plan for Characterizing and Assessing Potential Releases to the Environment from Septic and other Miscellaneous Drain Systems at Sandia National Laboratories/New Mexico, HRMB-SNL-00-002,* New Mexico Environment Department, Santa Fe, New Mexico.

**NMED June 1998** New Mexico Environment Department (NMED), June 1998. *Request for Supplemental Information: Proposal for No Further Action (4th Round), Environmental Restoration Project, Sandia National Laboratories, June 1996,* New Mexico Environment Department, Santa Fe, New Mexico.

**NMED 1993** New Mexico Environment Department (NMED), 1993. *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518,* New Mexico Environment Department, Santa Fe, New Mexico.

**SNL December 2012** Sandia National Laboratories, New Mexico (SNL/NM), December 2012. *SWMU 49 and 116 Groundwater Monitoring, Mini-SAP for Fiscal Year 2013 Annual Sampling.* Environmental Restoration Operations, Sandia National Laboratories, New Mexico, December 17.

**SNL September 2012** Sandia National Laboratories, New Mexico (SNL/NM), September 2012. *Annual Groundwater Monitoring Report Calendar Year 2011,* Sandia National Laboratories, Albuquerque, New Mexico.

**SNL January 2012** Sandia National Laboratories, New Mexico (SNL/NM), January 2012. *SWMU 49 and 116 Groundwater Monitoring, Mini-SAP for Fiscal Year 2012 Annual Sampling.* Environmental Restoration Operations, Sandia National Laboratories, New Mexico, January 3.

**SNL March 2006** Sandia National Laboratories, New Mexico (SNL/NM), March 2006. *Justification for Class III Permit Modification, March 2006, SWMU 116 Operable Unit 1295 Building 9990 Septic System (Technical Area III),* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

**SNL June 2005** Sandia National Laboratories, New Mexico (SNL/NM), June 2005. *Request for Supplemental Information Responses and Proposals for Corrective Action Complete, Drain and Septic Systems SWMUs 49, 101, 116, 138, 149, 154, and 161, Drain and Septic Systems Round 9,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

**SNL May 2004** Sandia National Laboratories, New Mexico (SNL/NM), May 2004. *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Canyon Area,* Sandia Report SAND2004-2673P, May 2004.

**SNL November 2001** Sandia National Laboratories, New Mexico (SNL/NM), November 2001. *Field Implementation Plan, Characterization of Non-Environmental Restoration Drain and Septic Systems,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

**SNL September 2000** Sandia National Laboratories, New Mexico (SNL/NM), September 2000. *Environmental Restoration Project Responses to NMED Request for Supplemental Information, No Further Action Proposals (4th Round) Dated June 1996,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

**SNL October 1999** Sandia National Laboratories, New Mexico (SNL/NM), October 1999. *Sampling and Analysis Plan (SAP) for Characterizing and Assessing Potential Releases to the Environment from Septic and Other Miscellaneous Drain Systems at Sandia National Laboratories/New Mexico,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

**SNL November 1998** Sandia National Laboratories, New Mexico (SNL/NM), November 1998. *Environmental Restoration Project Responses to NMED Request for Supplemental Information, No Further Action Proposals (4th Round), Dated June 1996,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

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

**SNL June 1996** Sandia National Laboratories, New Mexico (SNL/NM), June 1996. *Proposal for No Further Action, Environmental Restoration Site 116, Building 9990 Septic System, Operable Unit 1295,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

**SNL March 1993** Sandia National Laboratories, New Mexico (SNL/NM), March 1993, *Septic Tanks and Drainfields (ADS-1295) RCRA Facility Investigation Work Plan,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

**WRCC-DRI 2012** Western Regional Climate Center - Desert Research Institute, 2012. *Historical climate information for National Weather Service Cooperative Network Station 290234 – Albuquerque, New Mexico, Weather Service Forecast Office at the Albuquerque International Sunport for the period of 1914 through 2005*, http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?nmalbu. Accessed February 20, 2012.

# Attachment 11A
# Solid Waste Management Unit 116
# Analytical Results Tables

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# Attachment 11A Tables


11A-1 Summary of Detected Volatile Organic Compounds and High Explosive Compounds, Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 11A-5

11A-2 Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B), Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 11A-6

11A-3 Method Detection Limits for High Explosive Compounds (EPA Method[g] SW846-8321A), Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 11A-7

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11A-9 Summary of Field Water Quality Measurements[h], Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico, Calendar Year 2013 ..... 11A-13

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## Table 11A-1
## Summary of Detected Volatile Organic Compounds and High Explosive Compounds, Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW1** 28-Jan-13 | 1,1,2-Trichloro-1,2,2-trifluoroethane | 14.8 | 1.50 | 5.00 | NE | | | 093359-001 | SW846 8260B |

Refer to footnotes on page 11A-15.

## Table 11A-2
## Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B), Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Analyte | MDL[b] (µg/L) | Analyte | MDL[b] (µg/L) |
|---|---|---|---|
| 1,1,1-Trichloroethane | 0.300 | Chlorobenzene | 0.300 |
| 1,1,2,2-Tetrachloroethane | 0.300 | Chloroethane | 0.300 |
| 1,1,2-Trichloroethane | 0.300 | Chloroform | 0.300 |
| 1,1-Dichloroethane | 0.300 | Chloromethane | 0.300 |
| 1,1-Dichloroethene | 0.300 | Cyclohexane | 0.300 |
| 1,2,3-Trichlorobenzene | 0.300 | Dibromochloromethane | 0.300 |
| 1,2,4-Trichlorobenzene | 0.300 | Dichlorodifluoromethane | 0.300 |
| 1,2-Dibromo-3-chloropropane | 0.300 | Ethyl benzene | 0.300 |
| 1,2-Dibromoethane | 0.300 | Isopropylbenzene | 0.300 |
| 1,2-Dichlorobenzene | 0.300 | Methyl acetate | 1.50 |
| 1,2-Dichloroethane | 0.300 | Methylcyclohexane | 3.00 |
| 1,2-Dichloropropane | 0.300 | Methylene chloride | 3.00 |
| 1,3-Dichlorobenzene | 0.300 | Styrene | 0.300 |
| 1,4-Dichlorobenzene | 0.300 | Tert-butyl methyl ether | 0.300 |
| 2,2-trifluoroethane, 1,1,2-Trichloro-1 | 1.50 | Tetrachloroethene | 0.300 |
| 2-Butanone | 2.00 | Toluene | 0.300 |
| 2-Hexanone | 2.20 | Trichloroethene | 0.300 |
| 4-methyl-, 2-Pentanone | 1.50 | Trichlorofluoromethane | 0.300 |
| Acetone | 3.00 | Vinyl chloride | 0.300 |
| Benzene | 0.300 | Xylene | 0.300 |
| Bromochloromethane | 0.300 | cis-1,2-Dichloroethene | 0.300 |
| Bromodichloromethane | 0.300 | cis-1,3-Dichloropropene | 0.300 |
| Bromoform | 0.300 | m-, p-Xylene | 0.300 |
| Bromomethane | 0.300 | o-Xylene | 0.300 |
| Carbon disulfide | 1.50 | trans-1,2-Dichloroethene | 0.300 |
| Carbon tetrachloride | 0.300 | trans-1,3-Dichloropropene | 0.300 |

Refer to footnotes on page 11A-15.

## Table 11A-3
## Method Detection Limits for High Explosive Compounds (EPA Method[g] SW846-8321A), Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Analyte | MDL[b] (µg/L) |
|---|---|
| 1,3,5-Trinitrobenzene | 0.0847 |
| 1,3-Dinitrobenzene | 0.0847 |
| 2,4,6-Trinitrotoluene | 0.0847 |
| 2,4-Dinitrotoluene | 0.0847 |
| 2,6-Dinitrotoluene | 0.0847 |
| 2-Amino-4,6-dinitrotoluene | 0.0847 |
| 2-Nitrotoluene | 0.0868 |
| 3-Nitrotoluene | 0.0847 |
| 4-Amino-2,6-dinitrotoluene | 0.0847 |
| 4-Nitrotoluene | 0.159 |
| HMX | 0.0847 |
| Nitro-benzene | 0.0847 |
| Pentaerythritol tetranitrate | 0.106 |
| RDX | 0.0847 |
| Tetryl | 0.0847 |

Refer to footnotes on page 11A-15.

## Table 11A-4
## Summary of Nitrate plus Nitrite Result,
## Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW1**<br>28-Jan-13 | Nitrate plus nitrite as N | 7.29 | 0.170 | 0.500 | 10.0 | | | 093359-018 | EPA 353.2 |

Refer to footnotes on page 11A-15.

## Table 11A-5
## Summary of Alkalinity, Anion, Cation, and Total Cyanide Results,
## Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW1** | Bicarbonate Alkalinity | 196 | 0.725 | 1.00 | NE | | | 093359-022 | SM2320B |
| 28-Jan-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093359-022 | SM2320B |
| | Bromide | 0.713 | 0.067 | 0.200 | NE | | J- | 093359-016 | SW846 9056 |
| | Chloride | 41.2 | 0.670 | 2.00 | NE | | | 093359-016 | SW846 9056 |
| | Fluoride | 1.48 | 0.033 | 0.100 | 4.0 | | | 093359-016 | SW846 9056 |
| | Sulfate | 81.6 | 1.33 | 4.00 | NE | | | 093359-016 | SW846 9056 |
| | Calcium | 102 | 0.300 | 1.00 | NE | B | | 093359-017 | SW846 6020 |
| | Magnesium | 19.4 | 0.010 | 0.030 | NE | | | 093359-017 | SW846 6020 |
| | Potassium | 1.84 | 0.080 | 0.300 | NE | | | 093359-017 | SW846 6020 |
| | Sodium | 33.9 | 0.080 | 0.250 | NE | | | 093359-017 | SW846 6020 |
| | Total Cyanide | ND | 0.00167 | 0.005 | 0.200 | U | UJ | 093359-027 | SW846 9012A |

Refer to footnotes on page 11A-15.

## Table 11A-6
## Summary of Perchlorate Result,
## Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Perchlorate Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|
| **CTF-MW1**<br>28-Jan-13 | ND | 0.004 | 0.012 | NE | U | | 093359-020 | EPA 314.0 |

Refer to footnotes on page 11A-15.

## Table 11A-7
## Summary of Target Analyte List Metals and Uranium Results,
## Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW1** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093359-009 | SW846 6020 |
| 28-Jan-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093359-009 | SW846 6020 |
| | Arsenic | 0.00188 | 0.0017 | 0.005 | 0.010 | J | | 093359-009 | SW846 6020 |
| | Barium | 0.0458 | 0.0006 | 0.002 | 2.00 | | | 093359-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093359-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093359-009 | SW846 6020 |
| | Calcium | 98.7 | 0.300 | 1.00 | NE | B | | 093359-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093359-009 | SW846 6020 |
| | Cobalt | 0.000301 | 0.0001 | 0.001 | NE | J | | 093359-009 | SW846 6020 |
| | Copper | 0.0013 | 0.00035 | 0.001 | NE | B | 0.0023U | 093359-009 | SW846 6020 |
| | Iron | 0.275 | 0.033 | 0.100 | NE | | | 093359-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093359-009 | SW846 6020 |
| | Magnesium | 19.1 | 0.010 | 0.030 | NE | | | 093359-009 | SW846 6020 |
| | Manganese | 0.00127 | 0.001 | 0.005 | NE | J | | 093359-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 093359-009 | SW846 7470 |
| | Nickel | 0.00255 | 0.0005 | 0.002 | NE | | | 093359-009 | SW846 6020 |
| | Potassium | 1.89 | 0.080 | 0.300 | NE | | | 093359-009 | SW846 6020 |
| | Selenium | 0.00492 | 0.0015 | 0.005 | 0.050 | J | | 093359-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093359-009 | SW846 6020 |
| | Sodium | 33.3 | 0.080 | 0.250 | NE | | | 093359-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093359-009 | SW846 6020 |
| | Uranium | 0.0111 | 0.000067 | 0.0002 | 0.03 | | | 093359-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | | 093359-009 | SW846 6010 |
| | Zinc | ND | 0.0035 | 0.010 | NE | U | | 093359-009 | SW846 6020 |

Refer to footnotes on page 11A-15.

## Table 11A-8
## Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results, Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW1** | Americium-241 | 3.57 ± 13.2 | 22.3 | 10.9 | NE | U | BD | 093359-033 | EPA 901.1 |
| 28-Jan-13 | Cesium-137 | -0.155 ± 2.05 | 3.56 | 1.71 | NE | U | BD | 093359-033 | EPA 901.1 |
| | Cobalt-60 | -1.69 ± 2.15 | 3.31 | 1.54 | NE | U | BD | 093359-033 | EPA 901.1 |
| | Potassium-40 | -3.93 ± 38.9 | 48.6 | 23.2 | NE | U | BD | 093359-033 | EPA 901.1 |
| | Gross Alpha | 3.75 | NA | NA | 15 pCi/L | NA | None | 093359-034 | EPA 900.0 |
| | Gross Beta | 5.81 ± 1.54 | 1.72 | 0.837 | 4mrem/yr | | J | 093359-034 | EPA 900.0 |
| | Uranium-233/234 | 23.3 ± 2.96 | 0.101 | 0.0448 | NE | | | 093359-035 | HASL-300 |
| | Uranium-235/236 | 0.272 ± 0.084 | 0.0589 | 0.0221 | NE | | | 093359-035 | HASL-300 |
| | Uranium-238 | 3.38 ± 0.484 | 0.055 | 0.0215 | NE | | | 093359-035 | HASL-300 |

Refer to footnotes on page 11A-15.

## Table 11A-9
## Summary of Field Water Quality Measurements[h],
## Solid Waste Management Unit 116 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Sample Date | Temperature (°C) | Specific Conductivity (µmhos/cm) | Oxidation Reduction Potential (mV) | pH | Turbidity (NTU) | Dissolved Oxygen (% Sat) | Dissolved Oxygen (mg/L) |
|---|---|---|---|---|---|---|---|---|
| **CTF-MW1** | 28-Jan-13 | 15.24 | 614 | 211.9 | 7.08 | 0.66 | 68.5 | 6.85 |

Refer to footnotes on page 11A-15.

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## *Footnotes for Solid Waste Management Unit 116 Groundwater Monitoring Tables*

| | |
|---|---|
| % | = Percent. |
| CFR | = Code of Federal Regulations. |
| EPA | = U.S. Environmental Protection Agency. |
| HMX | = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine. |
| ID | = Identifier. |
| µg/L | = Micrograms per liter. |
| mg/L | = Milligrams per liter. |
| mrem/yr | = Millirem per year. |
| No. | = Number. |
| RDX | = Hexahydro-1,3,5-trinitro-1,3,5-triazine. |
| Tetryl | = Methyl-2,4,6-trinitrophenylnitramine. |
| pCi/L | = Pico curies per liter. |

**[a]Result**

Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 1-4).

**Bold** **=** Values in bold exceed the established MCL.

ND = Not detected (at method detection limit). Activities of zero or less are considered to be not detected.

**[b]MDL or MDA**

The MDL applies to Tables 11A-1 through 11A-7. The MDA applies to Table 11A-8.

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

MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

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

**[c]PQL or Critical Level**

The PQL applies to Tables 11A-1 through 11A-7. The critical level applies to Table 11A-8.

Critical level = The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

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

PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

**[d]MCL**

MCL = Maximum contaminant level. Established by the EPA Office of Water, National Primary Water Regulations (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- Gross Alpha particle activity, excluding total uranium = 15 pCi/L (40 CFR Parts 9, 141, and 142, Table 1-4).
- Any Combination of Beta and/or Gamma emitting radionuclides = 4 mrem/yr (as dose rate).

NE = Not established.

***Footnotes for Solid Waste Management Unit 116 Groundwater Monitoring Tables*** *(Concluded)*

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**[e]Lab Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

B = The analyte was detected in the blank above the effective MDL.
J = Estimated value; the analyte concentration fell above the effective MDL and below the effective PQL.
NA = Not applicable.
U = Analyte is absent or below the MDL.

**[f]Validation Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = The associated value is an estimated quantity.
J- = The associated numerical value is an estimated quantity with a suspected negative bias.
None = No data validation for corrected gross alpha activity.
U = The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
UJ = The analyte was analyzed for but not detected. The associated value is an estimate and may be inaccurate or imprecise.

**[g]Analytical Method**

Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.
DOE, 1990, "Environmental Measurements Laboratory Procedures Manual," 27th ed., Vol. 1, Rev. 1992, HASL-300.
EPA, 1999 (and updates), "Perchlorate in Drinking Water Using Ion Chromatography," EPA 815/R-00-014.
EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.
EPA, 1984, "Methods for Chemical Analysis of Water and Wastes." EPA 600-4-79-020.
EPA, 1980, "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.

**[h]Field Water Quality Measurements**

Field measurements collected prior to sampling.

°C = Degrees Celsius.
% Sat = Percent saturation.
μmhos/cm = Micromhos per centimeter.
mg/L = Milligrams per liter.
mV = Millivolts.
NTU = Nephelometric turbidity units.
pH = Potential of hydrogen (negative logarithm of the hydrogen ion concentration).

# Attachment 11B
# Solid Waste Management Unit 116
# Hydrographs

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# Attachment 11B Hydrographs

11B-1 SWMU 116 Study Area Well ..... 11B-5

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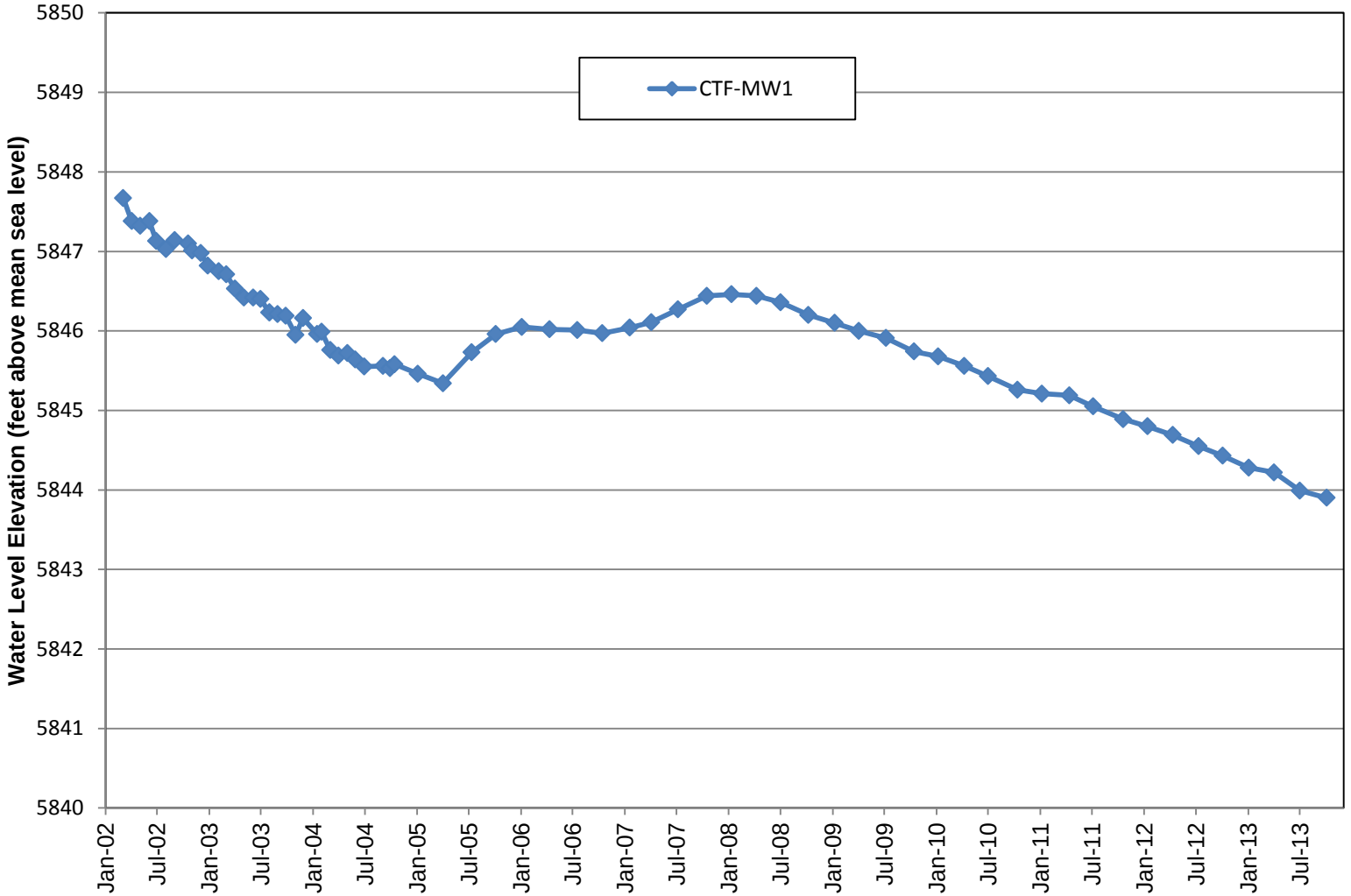


**Figure 11B-1. SWMU 116 Study Area Well**

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# 12.0 Solid Waste Management Unit 149

## 12.1 Introduction

This chapter summarizes Calendar Year (CY) 2013 quarterly groundwater sampling events for Coyote Test Field (CTF) monitoring well CTF-MW3, located near Solid Waste Management Unit (SWMU) 149 at Sandia National Laboratories, New Mexico (SNL/NM). The SNL/NM facility is a government-owned/contractor-operated laboratory. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM for the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA). The DOE/NNSA Sandia Field Office administers the contract and oversees contractor operations at the site.

This supplemental groundwater monitoring at monitoring well CTF-MW3 is designed to address the requirements of Section VII.D.6 of the Compliance Order on Consent (the Order) (NMED April 2004) and the letter dated April 8, 2010, from the New Mexico Environment Department (NMED) Hazardous Waste Bureau (NMED April 2010).

Monitoring well CTF-MW3 was sampled on March 22, June 28, and December 13, 2013. No groundwater samples were collected in September 2013 because both roads to monitoring well CTF-MW3 were impassible due to erosion caused by severe thunderstorms. In October 2013, the service road parallel to the monitoring well was repaired and additional repairs are being evaluated by facilities. The CY 2013 groundwater samples were collected in accordance with the NMED-approved Sampling and Analysis Plan (SAP) (SNL June 2010). The samples from monitoring well CTF-MW3 were analyzed for all required constituents, consisting of volatile organic compounds (VOCs), Target Analyte List (TAL) metals (including selenium), general chemistry parameters, perchlorate, and nitrate plus nitrite (NPN).

Analytical results for the CY 2013 groundwater samples were compared with the U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) for drinking water (EPA 2009). No analytical results for the monitoring well CTF-MW3 groundwater samples exceed the corresponding MCLs. Detailed results for all quarterly sampling events are discussed in Section 12.6.

The eighth and final quarter of required groundwater sampling (NMED April 2010) was conducted on December 14, 2012. Quarterly groundwater sampling will continue until NMED provides additional guidance.

### 12.1.1 Location

SWMU 149, the Building 9930 Septic System, is located in the CTF on federally-owned land controlled by Kirtland Air Force Base (KAFB) and permitted to the DOE/NNSA. Monitoring well CTF-MW3 (Figure 12-1) is located approximately 290 feet (ft) to the west and downgradient of SWMU 149 and is screened in Precambrian bedrock.

### 12.1.2 Site History

Building 9930 was constructed in 1961 (SNL March 1993), and it is assumed that the septic system was constructed at the same time. The building included a darkroom, laboratory and shop area, bathroom, and a compressor room. These areas were served by a septic system consisting of one 750-gallon septic tank and a 4-ft diameter seepage pit with a gravel bottom that is 7 ft below ground surface (bgs).

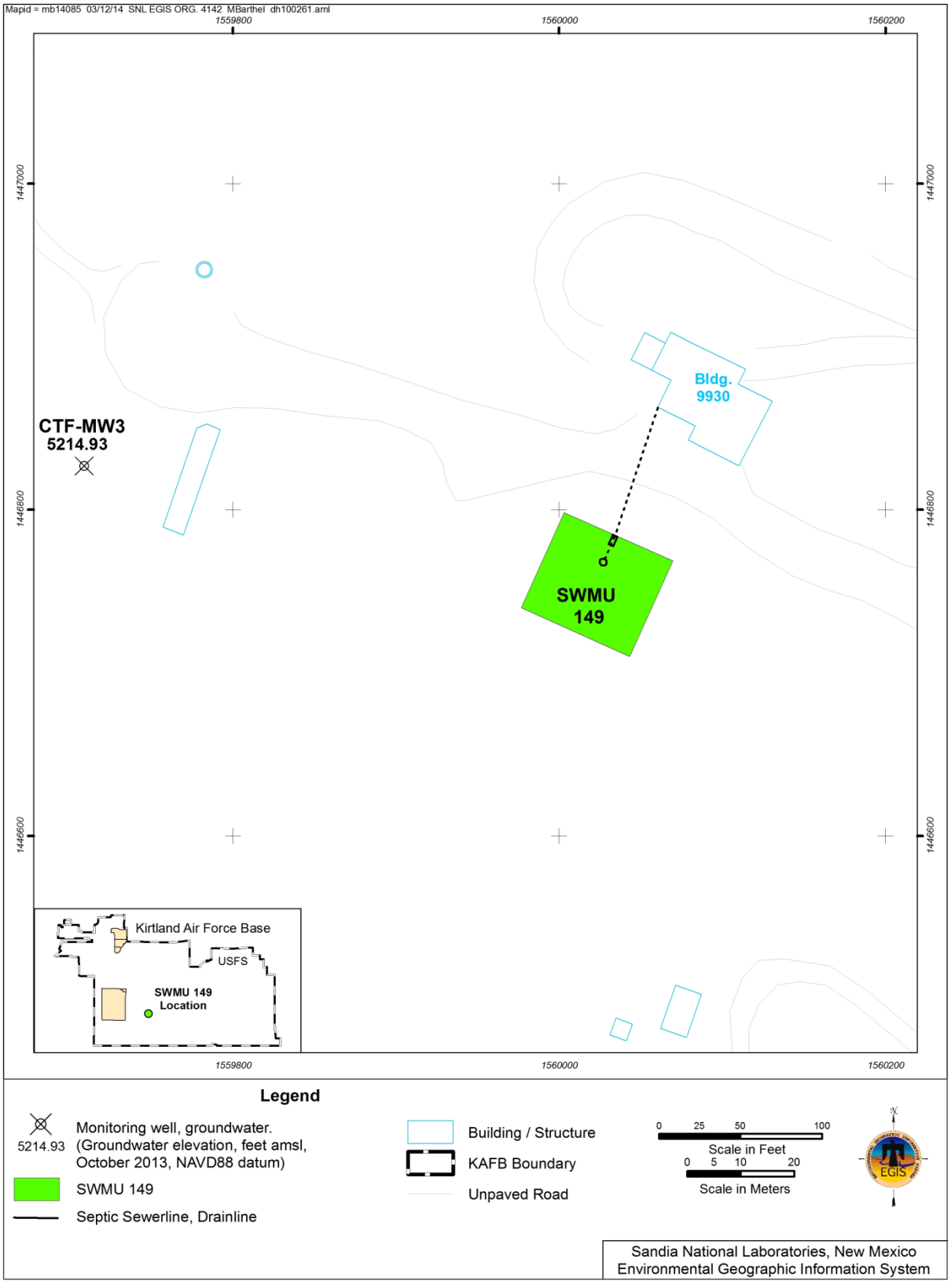


**Figure 12-1. Location of Monitoring Well CTF-MW3 near SWMU 149**

In the past, the following operations were conducted at Building 9930: photographic reproduction, explosives testing, and general laboratory operations. Water discharged to the septic system contained sanitary waste and waste water containing photographic chemicals, including alkaline-based developers, acetic acid, ammonium thiosulfate fixer, and small quantities of sulfuric acid associated with photographic reproduction. Testing of explosives was performed adjacent to the building in a concrete-bunkered area that contains no drains. SWMU 149 was first listed as a potential release site in 1987 (SNL June 1996) because sanitary and industrial wastes may have been discharged to septic tanks and drain fields during past operations.

By 1993, the septic system was connected to the City of Albuquerque sanitary sewer system (Jones July 1993). The old septic system line was disconnected, capped, and the system was abandoned in place (Romero September 2003). Waste in the septic tank was removed and managed according to SNL/NM policy. The empty and decontaminated septic tank was inspected by the NMED and a closure form was signed (SNL November 1995). The septic tank and seepage pit were then backfilled with clean, native soil from the area in early 1996 (Table 12-1).

In June 1996, a No Further Action proposal was submitted to the NMED for SWMU 149 (SNL June 1996) to which the NMED responded with a Request for Supplemental Information (RSI) (NMED June 1998). The general and site-specific comments were addressed in the Environmental Restoration (ER) Project Responses to the RSI in November 1998 (SNL November 1998). Negotiations were in process after the RSI response submittal, and a SAP (SNL October 1999) was prepared that documented investigations planned for SWMU 149. The SAP was approved by the NMED in January 2000 (NMED January 2000).

After the October 1999 SAP was submitted, the NMED issued a second RSI (NMED June 2000) that required the collection of additional samples for high explosive (HE) compound analysis. If samples could not be collected as specified in the SAP (SNL October 1999), a downgradient groundwater monitoring well would be required. The DOE/NNSA and Sandia responded to this second RSI (SNL September 2000) and agreed to collect additional samples for HE compound analysis, as well as install a groundwater monitoring well at a location agreed upon by the NMED. Groundwater samples would be collected from this well for a minimum of eight quarters and analyzed for VOCs, Resource Conservation and Recovery Act (RCRA) metals, cyanide, and HE compounds.

Technical details for soil sampling procedures, soil sampling locations, laboratory analytical methods, and passive soil vapor sampling requirements at SWMU 149 were specified in a follow-up Field Implementation Plan (SNL November 2001) that was approved by the NMED (February 2002).

Monitoring well CTF-MW3 was installed near SWMU 149 in August 2001 and sampled on a quarterly basis from July 2002 to June 2004 to acquire the eight quarters of groundwater data required by the NMED. Analytical results for these sampling events were included in a third RSI response and Corrective Action Complete (CAC) proposal submitted to the NMED (SNL June 2005).

In September 2005, the NMED issued a Certificate of Completion for CAC without Controls for SWMU 149 (NMED September 2005). In March 2006, DOE/NNSA and Sandia requested a Class III Permit Modification (SNL March 2006). In April 2010, the NMED responded to the Permit Modification Request with a letter requiring further corrective action at SWMU 149 (NMED April 2010) in the form of an additional eight quarters of groundwater monitoring at monitoring well CTF-MW3. In June 2010, DOE/NNSA and Sandia submitted a SAP for monitoring well CTF-MW3 (SNL June 2010), which the NMED approved (NMED December 2010). Quarterly groundwater sampling was resumed at monitoring well CTF-MW3 in March 2011 and continued through CY 2013. The CY 2013 analytical results are presented in Section 12.6.

**Table 12-1. Historical Timeline of SWMU 149**

| Month | Year | Event | Reference |
|---|---|---|---|
| | 1961 | Building 9930 was constructed, and it is assumed that the septic system was constructed at the same time. | SNL June 1996 |
| April | 1987 | SWMU 149 first identified as a potential release site. | SNL June 1996 |
| June | 1992 | Waste characterization samples collected from SWMU 149 septic tank. | SNL June 1996 |
| | 1993 | Building 9930 connected to the City of Albuquerque sanitary sewer system. The old septic system line was disconnected and capped, and the system was abandoned in place. Waste in the septic tank was removed and managed according to SNL/NM policy. | Jones July 1993, Romero September 2003, SNL June 1996 |
| March | 1993 | Septic Tanks and Drainfields (OU 1295) RCRA Facility Investigation Work Plan submitted. | SNL March 1993 |
| March | 1994 | OU 1295 SAP prepared. | IT March 1994 |
| April | 1994 | Additional waste characterization samples collected from SWMU 149 septic tank. | SNL June 1996 |
| July | 1994 | A PETREX$^{IM}$ passive soil vapor survey was completed on the septic system to identify any releases of VOCs and SVOCs from the seepage pit. | SNL June 1996 |
| September | 1994 | EPA provided comments on the March 1993 OU 1295 work plan as a NOD. | EPA September 1994 |
| October | 1994 | Backhoe used at SWMU 149 to determine depth to shallow bedrock at the site. | SNL June 1996 |
| November | 1994 | Response to the September 1994 EPA NOD submitted. | SNL November 1994 |
| November | 1994 | Additional waste characterization samples collected from SWMU 149 septic tank. | SNL June 1996 |
| January | 1995 | Confirmatory soil samples were collected from four boreholes next to the septic tank and seepage pit. | Field logs |
| November | 1995 | The empty and decontaminated septic tank was inspected by the NMED, and a closure form was signed. | SNL November 1995 |
| June | 1996 | Proposal for NFA ER Project Site 149, Building 9930 Septic System OU 1295 submitted. | SNL June 1996 |
| February | 1998 | Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report (SNL/NM December 1995) containing description of SWMU 149 hydrogeology submitted to NMED. | SNL February 1998 |
| June | 1998 | NMED responded with RSI on the SWMU 149 NFA proposal. | NMED June 1998 |
| November | 1998 | DOE and SNL/NM ER Project submitted the first response to the first NMED RSI for SWMU 149. | SNL November 1998 |
| October | 1999 | A SAP describing technical procedures to be used to complete environmental investigations at SWMU 149 submitted to the NMED. | SNL October 1999 |
| January | 2000 | SAP approved by NMED. | NMED January 2000 |
| June | 2000 | NMED issued a second RSI. | NMED June 2000 |
| September | 2000 | DOE/NNSA and SNL/NM ER Project response for the second RSI submitted to NMED. | SNL September 2000 |
| August | 2001 | Monitoring well CTF-MW3 installed near SWMU 149. | SNL June 2005 |
| November | 2001 | An FIP documenting specific investigation procedure to be completed at SWMU 149 submitted to the NMED. | SNL November 2001 |
| February | 2002 | The FIP approved by the NMED. | NMED February 2002 |
| | 2002-2004 | Monitoring well CTF-MW3 was sampled on a quarterly basis from July 2002 to June 2004 to acquire the eight quarters of groundwater data required by the NMED. | SNL June 2005 |
| October | 2002 | A soil sample collected from a borehole drilled beneath the former seepage pit was analyzed for HE compounds. | SNL June 2005 |
| June | 2005 | Third RSI response to RSI and CAC Proposal submitted to NMED. | SNL June 2005 |

**Table 12-1. Historical Timeline of SSWMU 149** *(Concluded)*

| Month | Year | Event | Reference |
|---|---|---|---|
| September | 2005 | NMED issues Certificate of Completion for CAC without Controls for SWMU 149. | NMED September 2005 |
| March | 2006 | Request for Class III Permit Modification submitted. | SNL March 2006 |
| April | 2010 | Letter from NMED requiring additional corrective action for SWMU 149. | NMED April 2010 |
| June | 2010 | SWMU 149 SAP submitted to NMED. | SNL June 2010 |
| December | 2010 | SAP approved by the NMED. | NMED December 2010 |
| March | 2011 | Quarterly sampling of monitoring well CTF-MW3 resumed. | SNL September 2012 |
| December | 2012 | Eight quarters of additional groundwater sampling of monitoring well CTF-MW3 completed. | SNL September 2013 |

**NOTES:**
CAC = Corrective Action Complete.
CTF = Coyote Test Field.
DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
FIP = Field Implementation Plan.
MW = Monitoring Well.
NFA = No Further Action.
NMED = New Mexico Environment Department.
NNSA = National Nuclear Security Administration.
NOD = Notice of Deficiency.
OU = Operable Unit.
RCRA = Resource Conservation and Recovery Act.
RSI = Request for Supplemental Information.
SAP = Sampling and Analysis Plan.
SNL/NM = Sandia National Laboratories, New Mexico.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.
VOC = Volatile organic compound.

### 12.1.3 Monitoring History

Monitoring well CTF-MW3 was installed in August 2001 and sampled on a quarterly basis from July 2002 to June 2004 to acquire the eight quarters of groundwater data required by the NMED. The groundwater samples were analyzed for VOCs, HE compounds, RCRA metals, and cyanide. Although not required by the NMED, additional samples were also collected and analyzed for NPN and anions and cations. These additional samples were collected to further characterize the general ion chemistry of groundwater in this well and for purge water waste characterization purposes. Results for the eight quarters of groundwater sampling are as follows:

- **VOCs:** Trace amounts of five VOCs were detected in the groundwater samples collected. Acetone was detected in the July 2002 sample. Bromodichloromethane was detected in two samples collected in March and June 2004. Dibromochloromethane was detected during three of the eight sampling events. Chloroform was detected in samples collected during six of the eight sampling events. Toluene was detected in the sample collected in June 2004 and the associated trip blank (TB) sample. No other VOCs were detected in the TB samples associated with these samples.

- **HE Compounds:** A trace amount of 2-amino-4,6-dinitrotoluene was detected in the sample collected in July 2002. No HE compounds were detected in any subsequent groundwater sample collected from this well.

- **RCRA Metals:** Selenium was detected in all eight groundwater samples, slightly above background levels. All other metal concentrations were below both background levels and regulatory limits.

- **Total Cyanide, NPN, Anions, and Cations:** Cyanide was detected in one of the eight groundwater samples collected. NPN was detected at concentrations slightly above background in the first five samples collected. Fluoride was reported at concentrations slightly above background. The fluoride detected is most likely naturally occurring. None of the known activities conducted at Building 9930 would have produced wastewater containing fluoride.

### 12.1.4 Current Monitoring Network

Currently, one groundwater monitoring well is installed at SWMU 149 (Figure 12-1). Monitoring well CTF-MW3 is being monitored quarterly for VOCs, TAL metals, general chemistry parameters, perchlorate, and NPN. The eighth and final quarter of required groundwater sampling (NMED April 2010) occurred on December 14, 2012. Quarterly groundwater sampling will continue until additional guidance is provided by NMED.

### 12.1.5 Summary of Calendar Year 2013 Activities

The following activities for monitoring well CTF-MW3 near SWMU 149 occurred during CY 2013 (January through December 2013):

- Quarterly groundwater sampling was conducted at monitoring well CTF-MW3 in March, June, and December 2013. Groundwater samples were not collected in September 2013 because both roads to monitoring well CTF-MW3 were impassible due to severe thunderstorms.

- Quarterly reporting of analytical results for monitoring well CTF-MW3 groundwater samples was conducted.

- Tables of analytical results (Attachment 12A) and a hydrograph (Attachment 12B) were prepared in support of this report.

### 12.1.6 Summary of Future Activities

The following activities are anticipated for monitoring well CTF-MW3 near SWMU 149 during CY 2014:

- Analytical results will be summarized and additional analysis may be performed and submitted to NMED to support resumption of the regulatory process for designating the site as CAC with No Further Action.

### 12.1.7 Current Conceptual Model

This section presents a revised discussion of the hydrogeologic regime, conceptual site model, and contaminant findings for SWMU 149.

#### 12.1.7.1 Regional Hydrogeologic Conditions

SWMU 149 is located in the Travertine Hills within the western portion of the CTF. The site is located between the Sandia and Tijeras faults. One splay of the Tijeras Fault is exposed about 800 ft south of the site. Nearby outcrops are composed of the Sandia Formation (carbonate cemented sandstone and conglomerate), Madera Group limestone, and Precambrian quartzite and granite (GRAM and Lettis

1995). The base-wide potentiometric surface map (Plate 1) shows that groundwater flow in the regional aquifer is generally toward the west. Faults in the vicinity of the site may serve as hydraulic barriers or conduits depending on the type and amount of fault gouge. No potable water-supply wells are located within 4 miles of the site.

#### 12.1.7.2 Hydrogeologic Conditions at SWMU 149

SWMU 149 covers 4,686 square feet (approximately 0.1 acres) and is located approximately 70 ft southwest of Building 9930 and approximately 0.8 miles east of Technical Area III. The site is covered with a layer of soil and colluvium approximately 12- to 16-ft thick that is underlain by caliche and bedrock. SWMU 149 consists of an inactive septic system that was used from 1961 to 1993. Building 9930 is located in a notch of the Travertine Hills at an elevation of approximately 5,520 ft above mean sea level (amsl). The surrounding area is moderately rugged and sparsely vegetated by bunch grasses, cacti, and a few junipers. Monitoring well CTF-MW3 is located approximately 290 ft west of the site on the floor of a shallow arroyo. The arroyo channel slopes down to the west. No perennial surface water features, such as springs, are located within one mile of SWMU 149.

The amount of precipitation available for groundwater recharge is minimal due to scant rainfall and high evapotranspiration. Summer (monsoonal) thunderstorms are responsible for the majority of rainfall. The average rainfall, as measured at the nearest active rain gauge (the National Weather Service station at the Albuquerque International Sunport), during the period from 1915 through 2005 was 8.67 inches per year (WRCC-DRI 2012). The station is located 7.2 miles northwest of the site at an elevation of 5,310 ft amsl, which is similar enough to the site elevation to infer that the annual rainfall at SWMU 149 is approximately 9 inches per year. Intense sunlight and low humidity throughout much of the year creates high rates of evapotranspiration. Estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL February 1998).

In 2001, a drilling location downgradient of SWMU 149 was selected for the installation of monitoring well CTF-MW3. The location was selected using the historical potentiometric surface for the regional aquifer. The well was installed in August 2001 using the air-rotary casing hammer drilling technique. Alluvium consisting of silty fine-grained sand was encountered from the ground surface to 28 ft bgs. Precambrian granite and gneiss were encountered from 28 to 345 ft bgs. From 345 ft bgs to the borehole total depth of 430 ft bgs, Precambrian quartzite was encountered. The drilling rate from 28 to 430 ft bgs was relatively consistent and no significantly fractured zones were encountered. Drilling was paused at several depths and the borehole blown dry and allowed to recover. However, due to the low yield of the borehole, the water-bearing zone was not initially apparent. Geophysical logging (temperature and neutron) and drilling observations were used to select the screen interval. The caliper log recorded a fairly consistent borehole diameter that did not reflect any significantly fractured intervals. The depth to groundwater was estimated to be approximately 345 ft bgs. The well was screened from 340 to 360 ft bgs in Precambrian quartzite (Table 12-2).

The October 2013 groundwater elevation was 5,214.93 ft amsl. Compared to the mid-point elevation of the screen, the pressure head was approximately 45 ft and indicative of confined conditions. Based on the potentiometric surface depicted on Plate 1, the horizontal gradient is steep and approximately 0.15 feet per foot westward in the vicinity of the well. Groundwater in the bedrock most likely migrates through a confined low-permeability fracture system. The groundwater composition is of the bicarbonate type and dominated by calcium.

During sampling, the drawdown in monitoring well CTF-MW3 is not excessive and the quantity of water produced is clearly adequate for typical groundwater sampling. Groundwater samples are collected using pneumatic (nitrogen gas) Bennett™ piston pumps.

**Table 12-2. Lithologic and Hydrogeologic Elevation Data for Monitoring Well CTF-MW3 near SWMU 149**

| Monitoring Well | Ground Surface Elevation (ft amsl) | Depth of Screened Interval (ft bgs) | Elevation for Top of Screen (ft amsl) | Potentiometric Surface, October 2013 (ft amsl) | Mid-Point Screen Elevation (ft amsl) | Pressure Head (ft[a]) |
|---|---|---|---|---|---|---|
| CTF-MW3 | 5519.80 | 340 – 360 | 5179.80 | 5214.93 | 5169.80 | 45 |

**NOTES:**
[a]From mid-point of screen.
amsl = Above mean sea level.
bgs = Below ground surface.
CTF = Coyote Test Field.
ft = Foot (feet).
MW = Monitoring Well.
SWMU = Solid Waste Management Unit.

The conceptual hydrogeologic model for SWMU 149 is based on information from monitoring well CTF-MW3, several nearby monitoring wells located across CTF (Plate 1), and extensive field mapping conducted by the Site-Wide Hydrogeologic Characterization Project (SNL February 1998). Groundwater in the SWMU 149 area occurs in the fractured bedrock system under confined conditions. The depth to groundwater at monitoring well CTF-MW3 at the time of installation was approximately 345 ft bgs in a slightly fractured interval of Precambrian quartzite. The overlying granite that has naturally filled fractures probably serves as the confining layer. The amount of precipitation available for groundwater recharge is minimal due to the scant rainfall and high evapotranspiration rates. Hydrographs of historical water level data (Figure 12B-1 in Attachment 12B) indicate that seasonal effects, primarily due to thunderstorms, do not influence groundwater levels near the site. Groundwater underflow from the site probably discharges to the unconsolidated basin fill deposits (primarily the Santa Fe Group) of the Albuquerque Basin after crossing the Sandia Fault. The steep hydraulic gradient, approximately 0.15 feet per foot near the well, indicates that the fault limits the rate of groundwater migration near the site. No potable water supply wells are located within 4 miles of the site.

#### 12.1.7.3 Contaminant Sources

From 1961 to 1993, wastewater from the SWMU 149 septic system discharged to the subsurface via a single seepage pit. The septic water contained photo processing chemicals and sanitary waste. The area around the seepage pit and septic tank was characterized using soil vapor samplers and soil samples collected from five boreholes.

#### 12.1.7.4 Contaminant Distribution and Transport in Groundwater

The first phase of quarterly groundwater sampling for monitoring well CTF-MW3 was conducted from July 2002 to June 2004. Trace amounts of VOCs, cyanide, nitrate, and one HE compound (2-amino-4,6-dinitrotoluene) were detected. Concentrations have decreased over time. Selenium and fluoride were reported at concentrations slightly above background and are mostly likely attributable to the local bedrock. The second phase of quarterly groundwater sampling began in March 2011. During CY 2013, no metals, VOCs, NPN, alkalinity, or major ions exceed the respective MCLs. Perchlorate was not detected.

### 12.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM ER Operations as well as implements and enforces federal regulations mandated by RCRA. All ER Operations SWMUs are listed in Module IV of the SNL/NM RCRA Permit, *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units to the RCRA Part B*

*Permit (Module IV), Sandia National Laboratories, NM5890110518* (NMED 1993). All corrective action requirements pertaining to SWMUs are contained in the Order (NMED April 2004). Quarterly groundwater monitoring will continue as part of the CAC process until additional guidance is provided by NMED. The analytical results for CY 2013 are presented in Section 12.6.

## 12.3 Scope of Activities

Groundwater monitoring sampling and analysis during CY 2013 is summarized in Table 12-3. The analytical parameters for monitoring well CTF-MW3 for each sampling event are listed in Table 12-4.

### Table 12-3. Sampling Dates and SAPs for Monitoring Well CTF-MW3 near SWMU 149, Calendar Year 2013

| Date of Sampling Event | SAP |
|---|---|
| March 22, 2013 | *SWMU 149 Groundwater Monitoring Mini-SAP for Second Quarter Fiscal Year 2013* (SNL March 2013) |
| June 28, 2013 | *SWMU 149 Groundwater Monitoring Mini-SAP for Third Quarter Fiscal Year 2013* (SNL June 2013) |
| December 13, 2013 | *SWMU 149 Groundwater Monitoring Mini-SAP for First Quarter Fiscal Year 2014* (SNL November 2013) |

**NOTES:**
CTF = Coyote Test Field.
MW = Monitoring Well.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories
SWMU = Solid Waste Management Unit.

### Table 12-4. Parameters Sampled at SWMU 149 for Each Sampling Event, Calendar Year 2013

| Parameter | Sampling Period | |
|---|---|---|
| Anions | **March 2013** | **June 2013** |
| Alkalinity | CTF-MW3 | CTF-MW3 |
| NPN | CTF-MW3 (dup) | |
| Perchlorate | | |
| TAL Metals | **December 2013** | |
| VOCs | CTF-MW3 | |

**NOTES:**
Dup = Duplicate sample.
NPN = Nitrate plus nitrate (reported as nitrogen).
SWMU = Solid Waste Management Unit.
TAL = Target Analyte List.
VOC = Volatile organic compound.

## 12.4 Field Methods and Measurements

According to the requirements of the Order (NMED April 2004) and the NMED letter of April 8, 2010 (NMED April 2010), groundwater sampling was performed at SWMU 149. The CY 2013 sampling events were conducted in conformance with appropriate SNL/NM Field Operating Procedures for groundwater sampling activities, the SWMU 149 site-specific SAP (SNL June 2010), and Mini-SAPs (SNL March 2013, June 2013, and November 2013).

Environmental groundwater samples were collected from monitoring well CTF-MW3. Samples were submitted to GEL Laboratories LLC for all chemical analyses. Groundwater samples were analyzed for VOCs, NPN, major anions (i.e., bromide, chloride, fluoride, and sulfate), alkalinity, TAL metals, and perchlorate.

The monitoring procedures are consistent with procedures identified in the EPA technical enforcement guidance document (EPA 1986) and are described in detail in Section 1.3.

## 12.5 Groundwater Elevation

Throughout CY 2013, water level measurements were obtained to determine groundwater flow directions, hydraulic gradients, and changes in water table elevations. The water level information used to create the base-wide potentiometric surface map discussed in Section 2.6.2.2 and shown in Plate 1. From the base-wide potentiometric surface map, the local groundwater flow direction was inferred and is presented in Figure 12-2. The hydrograph for monitoring well CTF-MW3 is provided in Figure 12B-1 (Attachment 12B).

## 12.6 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using EPA analytical methods and protocols described in Section 1.3.2 (Tables 1-5 and 1-6). Parameters analyzed and sampling periods in CY 2013 are presented in Table 12-4.

## 12.7 Summary of Analytical Results

This section discusses analytical results and field measurements for the CY 2013 SWMU 149 sampling events. Data are presented in Tables 12A-1 through 12A-8 (Attachment 12A). Groundwater sampling results are compared with established EPA MCLs for drinking water (EPA 2009). Data qualifiers are explained in the footnotes following Table 12A-8. Analytical reports, including certificates of analyses, analytical methods, method detection limits (MDLs), practical quantitation limits, dates of analyses, results of quality control (QC) analyses, and data validation findings are filed in the SNL/NM Records Center.

The analytical data were reviewed and qualified in accordance with SNL/NM Administrative Operating Procedure 00-03 (May 2011). No problems were identified with the analytical data that resulted in qualification of the data as unusable. The data are acceptable and reported QC measures are adequate.

No VOCs were detected at concentrations above established MCLs from any monitoring well CTF-MW3 groundwater sample. During CY 2013 the compounds bromodichloromethane, chloroform, and dibromochloromethane were detected at low concentrations above the laboratory MDL and are comparable to historical values. The March VOC results were qualified as not detected in during data validation, because all compounds were detected in associated blank samples. These compounds are all breakdown products of chlorine and their detection in both the groundwater and equipment decontamination samples suggests the source is the deionized water used for the decontamination of the sampling system. The June and December VOC results detected the same compounds at low concentrations above the laboratory MDLs and are comparable to historical values. These detections could not be qualified as not detected during data validation because equipment blank samples were not obtained. However, the source for these detections is most likely the deionized water used for decontamination. Table 12A-1 summarizes detected VOCs in environmental groundwater samples (Attachment 12A), and Table 12A-2 lists the MDLs for associated VOCs analyzed.

Table 12A-3 (Attachment 12A) summarizes NPN results. NPN values were compared with the nitrate MCL of 10 milligrams per liter. NPN was not detected above the MCL.

Table 12A-4 (Attachment 12A) summarizes alkalinity and major anion (i.e., bromide, chloride, fluoride, and sulfate) results. No parameters were detected above established MCLs.

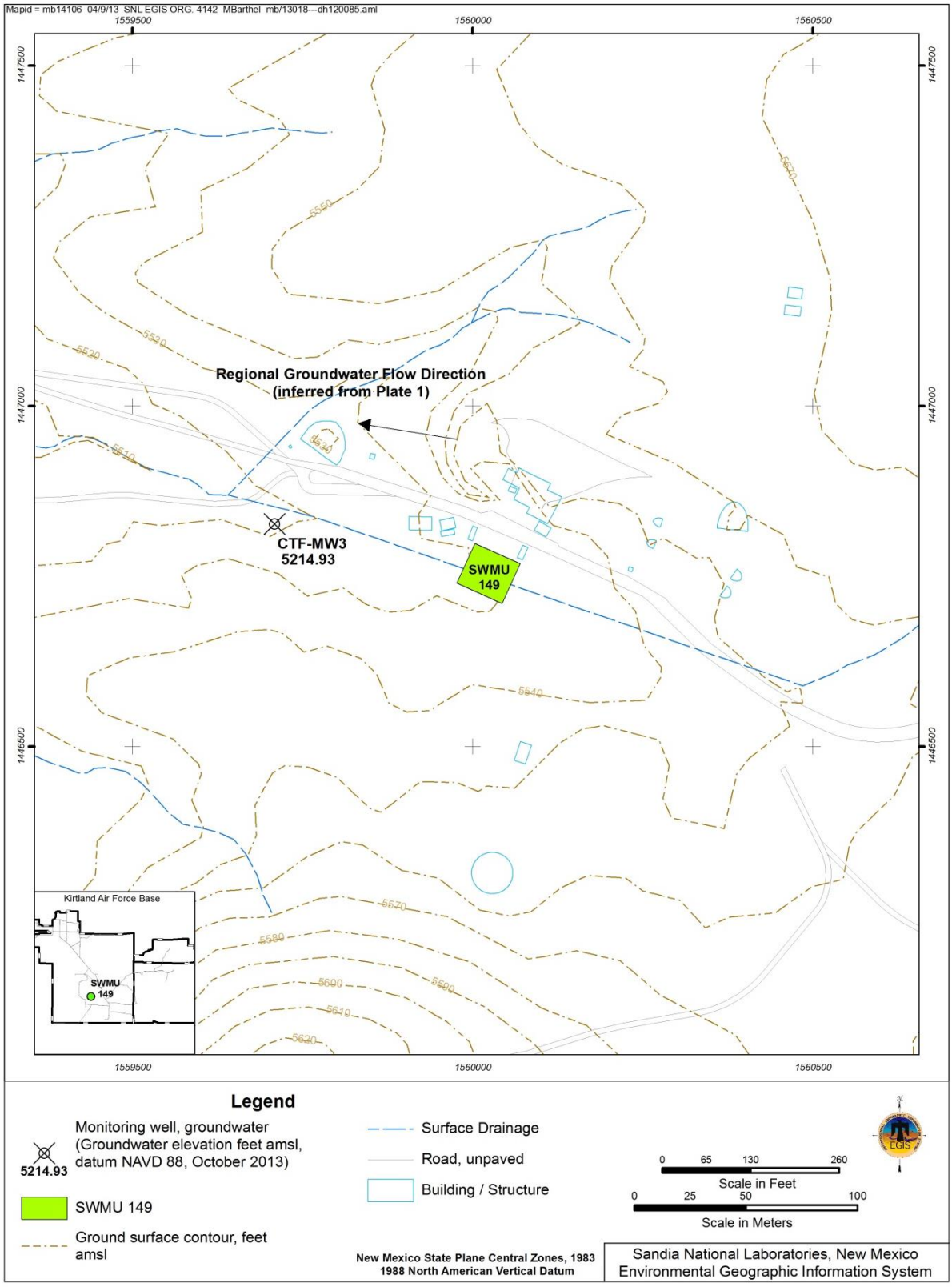


**Figure 12-2. SWMU 149 Groundwater Flow Direction (October 2013)**

Perchlorate was not detected in monitoring well CTF-MW3 samples. The NMED-specified screening level/MDL for perchlorate is 4 micrograms per liter; NMED April 2004). Table 12A-5 presents perchlorate results (Attachment 12A).

TAL metals, both in unfiltered and filtered fractions, were analyzed in monitoring well CTF-MW3 samples. No metal parameters were detected above established MCLs in any groundwater sample. Metal results for both unfiltered and filtered samples are summarized in Tables 12A-6 and 12A-7 (Attachment 12A), respectively.

Table 12A-8 (Attachment 12A) summarizes field water quality measurements collected prior to sampling. Field water quality measurements include turbidity, pH, temperature, specific conductance, oxidation-reduction potential, and dissolved oxygen.

## 12.8 Quality Control Results

Field and laboratory QC samples were prepared to determine the accuracy of the methods used, and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process. The results for each QC sample, and the impact on data quality for the SWMU 149 monitoring well CTF- MW3 quarterly sampling events, are discussed in the following sections.

### 12.8.1 Field Quality Control Samples

Field QC samples included duplicate environmental samples, field blanks (FBs), TBs, and equipment blanks (EBs). The following sections discuss the analytical results for each QC sample type.

#### 12.8.1.1 Duplicate Environmental Samples

Duplicate environmental samples were analyzed to estimate the overall reproducibility of the sampling and analytical process. Relative percent difference (RPD) calculations, between duplicate samples, were performed for detected chemical analytes. The March 2013 duplicate sample data results show good agreement (low RPD values < 20 percent for organic compounds and < 35 for inorganic analyses) for all calculated parameters.

#### 12.8.1.2 Equipment Blank Samples

EB or rinsate samples are collected to verify the equipment decontamination process. The March 2013 EB or rinsate sample was collected prior to sampling monitoring well CTF-MW3 and submitted for all analyses. Alkalinity, bromodichloromethane, bromoform, chloroform, chloride, copper, dibromochloromethane, iron, selenium, sodium, and zinc were all detected above laboratory MDLs in the EB sample. No corrective action was required because all reported values in the environmental sample are five times greater than the EB concentration.

#### 12.8.1.3 Trip Blank Samples

TB samples are submitted whenever samples are collected for VOC analyses to assess whether contamination of the samples had occurred during shipment and storage. A total of four TB samples were submitted during CY 2013. Two TBs were submitted for the March 2013 sampling event and one sample for June and December 2013. No VOCs were detected above the associated laboratory MDLs in all TB samples.

#### 12.8.1.4 Field Blank Samples

A FB sample was collected for VOCs to assess whether contamination of the samples resulted from ambient field conditions. The March 2013 FB sample from the monitoring well CTF-MW3 detected the VOC compounds bromodichloromethane, bromoform, chloroform, and dibromochloromethane. No

correction action was applied during data validation, because these compounds were also reported in the EB sample. These compounds are common by-products of the deionization water purification process.

### 12.8.2 Laboratory Control Samples

Internal laboratory QC samples, including method blanks and duplicate laboratory control samples were analyzed concurrently with all groundwater samples. No significant data quality problems were noted during the data validation process for all four quarters of CY 2013 sampling events.

## 12.9 Variances and Nonconformances

No variances or nonconformances from requirements in the SWMU 149 Groundwater Monitoring SAP (SNL June 2010) or Mini-SAPs (SNL March 2013, June 2013, and November 2013) were identified during any of the CY 2013 sampling events. However, project-specific issues identified during CY 2013 sampling activities are noted as follows:

- **September 2013 Sampling Event—**No groundwater samples were collected in September 2013 because severe thunderstorms eroded both roads to monitoring well CTF-MW3. In October 2013 the service road that parallels the monitoring well was repaired and the facilities drainage system repair plans are being evaluated.

## 12.10 Summary and Conclusions

Three quarterly sampling events occurred in CY 2013 at monitoring well CTF-MW3 near SWMU 149. Groundwater samples were collected in March, June, and December 2013. The September 2013 sampling event did not occur because both roads to monitoring well CTF-MW3 were impassible due to erosion caused by severe thunderstorms. Analytical parameters included VOCs, NPN, major anions, alkalinity, TAL total metals, and perchlorate. Results were compared with EPA MCL guidelines for drinking water (EPA 2009). No parameters were detected above established MCLs. The analytical results for this reporting period are consistent with historical concentrations. The current conceptual model described in Section 12.1.7 does not require modification based on the analytical results for this reporting period.

During CY 2014, analytical results will be summarized and additional analysis may be performed and submitted to NMED to support discussions of resuming the regulatory process for designating the site as CAC.

## 12.11 References


**EPA 2009** U.S. Environmental Protection Agency (EPA), 2009. *National Primary Drinking Water Standards*, 40 CFR 141.11, Subpart B, U.S. Environmental Protection Agency, Washington, D.C., May.

**EPA September 1994** U.S. Environmental Protection Agency (EPA), September 1994. *Notice of Deficiency, Sandia National Laboratories, Septic Tanks and Drainfields RFI Work Plan*, U.S. Environmental Protection Agency, Washington, D.C.

**EPA 1986** U.S. Environmental Protection Agency (EPA), 1986. *RCRA Ground-Water Monitoring Technical Enforcement Guidance Document* OSWER-9950.1, U.S. Environmental Protection Agency, Washington, D.C.

**GRAM and Lettis 1995** GRAM and Lettis, 1995. *Conceptual Geologic Model of the Sandia National Laboratories and Kirtland Air Force Base,* prepared for Site-Wide Hydrogeologic Characterization Project, Organization 7584, Environmental Restoration Program, Sandia National Laboratories, Albuquerque, New Mexico, December.

**IT March 1994** IT Corporation (IT), March 1994. *Sampling and Analysis Plan for Shallow Subsurface Soil Sampling, RCRA Facility Investigation of Septic Tanks and Drainfields (OU 1295),* IT Corporation, Albuquerque, New Mexico.

**Jones July 1993** Jones, J. (Sandia National Laboratories, New Mexico), July 1993. Internal Memorandum to B. Galloway listing the septic tanks that were removed from service with the construction of the Area III sanitary sewer system, July 26, 1993.

**NMED December 2010** New Mexico Environment Department (NMED), December 2010. *Approval with Modifications, Response to April 8, 2010 Letter, Groundwater Monitoring Plan for SWMUs 149 and 154,* New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico.

**NMED April 2010** New Mexico Environment Department (NMED), April 2010. *Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008), Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001,* New Mexico Environment Department, Santa Fe, New Mexico, April 8, 2010.

**NMED September 2005** New Mexico Environment Department (NMED), September 2005. *Notice of Approval/Disapproval: Sandia National Laboratories Environmental Restoration Project Request for Supplemental Information Responses and Proposals for Corrective Action Complete, Drain and Septic Systems SWMUs 49, 101, 116, 138, 149, 154, and 161,* New Mexico Environment Department, Santa Fe, New Mexico, September 13, 2005.

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**SNL September 2013** Sandia National Laboratories, New Mexico (SNL/NM), September 2013. *Annual Groundwater Monitoring Report, Calendar Year 2012 Groundwater Protection Program,* Environmental Management Department and Environmental Programs and Assurance, Sandia National Laboratories, Albuquerque, New Mexico

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**SNL March 2013** Sandia National Laboratories, New Mexico (SNL/NM), March 2013. *SWMU 149 Groundwater Monitoring Mini-SAP for Second Quarter Fiscal Year 2013,* Sandia National Laboratories, Albuquerque, New Mexico.

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**SNL October 1999** Sandia National Laboratories, New Mexico (SNL/NM), October 1999. *Sampling and Analysis Plan for Characterizing and Assessing Potential Releases to the Environment From Septic and Other Miscellaneous Drain Systems at Sandia National Laboratories/New Mexico,* Sandia National Laboratories, Albuquerque, New Mexico, October 19, 1999.

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**SNL June 1996** Sandia National Laboratories, New Mexico (SNL/NM), June 1996. *Proposal for Risk-Based No Further Action, Environmental Restoration Site 149 Building 9930 Septic System, Operable Unit 1295,* Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

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**SNL March 1993** Sandia National Laboratories, New Mexico (SNL/NM), March 1993. *Septic Tanks and Drainfields (ADS-1295) RCRA Facility Investigation Work Plan,* Sandia National Laboratories, Albuquerque, New Mexico.

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# Attachment 12A
# Solid Waste Management Unit 149
# Analytical Results Tables

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# Attachment 12A Tables


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## Table 12A-1
## Summary of Detected Volatile Organic Compounds,
## Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW3** | Bromodichloromethane | 0.540 | 0.300 | 1.00 | NE | J | 1.0U | 093717-001 | SW846 8260B |
| 22-Mar-13 | Chloroform | 0.780 | 0.300 | 1.00 | NE | J | 1.0U | 093717-001 | SW846 8260B |
| | Dibromochloromethane | 0.380 | 0.300 | 1.00 | NE | J | 1.0U | 093717-001 | SW846 8260B |
| **CTF-MW3** (Duplicate) | Bromodichloromethane | 0.520 | 0.300 | 1.00 | NE | J | 1.0U | 093718-001 | SW846 8260B |
| 22-Mar-13 | Chloroform | 0.690 | 0.300 | 1.00 | NE | J | 1.0U | 093718-001 | SW846 8260B |
| | Dibromochloromethane | 0.390 | 0.300 | 1.00 | NE | J | 1.0U | 093718-001 | SW846 8260B |
| | | | | | | | | | |
| **CTF-MW3** | Bromodichloromethane | 0.580 | 0.300 | 1.00 | NE | J | | 094044-001 | SW846 8260B |
| 28-Jun-13 | Chloroform | 0.830 | 0.300 | 1.00 | NE | J | | 094044-001 | SW846 8260B |
| | Dibromochloromethane | 0.380 | 0.300 | 1.00 | NE | J | | 094044-001 | SW846 8260B |
| | | | | | | | | | |
| **CTF-MW3** | Bromodichloromethane | 0.600 | 0.300 | 1.00 | NE | J | | 095084-001 | SW846 8260B |
| 13-Dec-13 | Chloroform | 0.680 | 0.300 | 1.00 | NE | J | | 095084-001 | SW846 8260B |
| | Dibromochloromethane | 0.450 | 0.300 | 1.00 | NE | J | | 095084-001 | SW846 8260B |

Refer to footnotes on page 12A-19.

## Table 12A-2
## Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260), Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Analyte | MDL[b] (µg/L) | Analyte | MDL[b] (µg/L) |
|---|---|---|---|
| 1,1,1-Trichloroethane | 0.300 | Chlorobenzene | 0.300 |
| 1,1,2,2-Tetrachloroethane | 0.300 | Chloroethane | 0.300 |
| 1,1,2-Trichloroethane | 0.300 | Chloroform | 0.300 |
| 1,1-Dichloroethane | 0.300 | Chloromethane | 0.300 |
| 1,1-Dichloroethene | 0.300 | Cyclohexane | 0.300 |
| 1,2,3-Trichlorobenzene | 0.300 | Dibromochloromethane | 0.300 |
| 1,2,4-Trichlorobenzene | 0.300 | Dichlorodifluoromethane | 0.300 |
| 1,2-Dibromo-3-chloropropane | 0.300 | Ethyl benzene | 0.300 |
| 1,2-Dibromoethane | 0.300 | Isopropylbenzene | 0.300 |
| 1,2-Dichlorobenzene | 0.300 | Methyl acetate | 1.50 |
| 1,2-Dichloroethane | 0.300 | Methylcyclohexane | 3.00 |
| 1,2-Dichloropropane | 0.300 | Methylene chloride | 3.00 |
| 1,3-Dichlorobenzene | 0.300 | Styrene | 0.300 |
| 1,4-Dichlorobenzene | 0.300 | Tert-butyl methyl ether | 0.300 |
| 2,2-trifluoroethane, 1,1,2-Trichloro-1 | 1.50 | Tetrachloroethene | 0.300 |
| 2-Butanone | 2.00 | Toluene | 0.300 |
| 2-Hexanone | 2.20 | Trichloroethene | 0.300 |
| 4-methyl-, 2-Pentanone | 1.50 | Trichlorofluoromethane | 0.300 |
| Acetone | 3.00 | Vinyl chloride | 0.300 |
| Benzene | 0.300 | Xylene | 0.300 |
| Bromochloromethane | 0.300 | cis-1,2-Dichloroethene | 0.300 |
| Bromodichloromethane | 0.300 | cis-1,3-Dichloropropene | 0.300 |
| Bromoform | 0.300 | m-, p-Xylene | 0.300 |
| Bromomethane | 0.300 | o-Xylene | 0.300 |
| Carbon disulfide | 1.50 | trans-1,2-Dichloroethene | 0.300 |
| Carbon tetrachloride | 0.300 | trans-1,3-Dichloropropene | 0.300 |

Refer to footnotes on page 12A-19.

## Table 12A-3
## Summary of Nitrate plus Nitrite Results,
## Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW3** 22-Mar-13 | Nitrate plus nitrite | 5.54 | 0.170 | 0.500 | 10.0 | | | 093717-018 | EPA 353.2 |
| **CTF-MW3** (Duplicate) 22-Mar-13 | Nitrate plus nitrite | 5.66 | 0.170 | 0.500 | 10.0 | | | 093718-018 | EPA 353.2 |
| | | | | | | | | | |
| **CTF-MW3** 28-Jun-13 | Nitrate plus nitrite | 5.94 | 0.170 | 0.500 | 10.0 | | | 094044-018 | EPA 353.2 |
| | | | | | | | | | |
| **CTF-MW3** 13-Dec-13 | Nitrate plus nitrite | 5.71 | 0.170 | 0.500 | 10.0 | | | 095084-018 | EPA 353.2 |

Refer to footnotes on page 12A-19.

## Table 12A-4
## Summary of Anion and Alkalinity Results,
## Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW3** | Bicarbonate Alkalinity | 331 | 0.725 | 1.00 | NE | | | 093717-022 | SM2320B |
| 22-Mar-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093717-022 | SM2320B |
| | Bromide | 1.15 | 0.067 | 0.200 | NE | | | 093717-016 | SW846 9056 |
| | Chloride | 118 | 1.68 | 5.00 | NE | | | 093717-016 | SW846 9056 |
| | Fluoride | 2.39 | 0.033 | 0.100 | 4.0 | | | 093717-016 | SW846 9056 |
| | Sulfate | 487 | 3.33 | 10.0 | NE | | | 093717-016 | SW846 9056 |
| **CTF-MW3** (Duplicate) | Bicarbonate Alkalinity | 333 | 0.725 | 1.00 | NE | | | 093718-022 | SM2320B |
| 22-Mar-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093718-022 | SM2320B |
| | Bromide | 1.14 | 0.067 | 0.200 | NE | | | 093718-016 | SW846 9056 |
| | Chloride | 120 | 1.68 | 5.00 | NE | | | 093718-016 | SW846 9056 |
| | Fluoride | 2.39 | 0.033 | 0.100 | 4.0 | | | 093718-016 | SW846 9056 |
| | Sulfate | 495 | 3.33 | 10.0 | NE | | | 093718-016 | SW846 9056 |
| | | | | | | | | | |
| **CTF-MW3** | Bicarbonate Alkalinity | 322 | 0.725 | 1.00 | NE | | | 094044-022 | SM2320B |
| 28-Jun-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094044-022 | SM2320B |
| | Bromide | 1.17 | 0.067 | 0.200 | NE | | | 094044-016 | SW846 9056 |
| | Chloride | 115 | 3.35 | 10.0 | NE | | | 094044-016 | SW846 9056 |
| | Fluoride | 2.49 | 0.033 | 0.100 | 4.0 | | | 094044-016 | SW846 9056 |
| | Sulfate | 497 | 6.65 | 20.0 | NE | | | 094044-016 | SW846 9056 |
| | | | | | | | | | |
| **CTF-MW3** | Bicarbonate Alkalinity | 334 | 0.725 | 1.00 | NE | | | 095084-022 | SM2320B |
| 13-Dec-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 095084-022 | SM2320B |
| | Bromide | 1.21 | 0.067 | 0.200 | NE | | | 095084-016 | SW846 9056 |
| | Chloride | 124 | 3.35 | 10.0 | NE | | | 095084-016 | SW846 9056 |
| | Fluoride | 2.47 | 0.033 | 0.100 | 4.0 | | | 095084-016 | SW846 9056 |
| | Sulfate | 511 | 6.65 | 20.0 | NE | | | 095084-016 | SW846 9056 |

Refer to footnotes on page 12A-19.

## Table 12A-5
## Summary of Perchlorate Results,
## Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Perchlorate Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|
| **CTF-MW3** 22-Mar-13 | ND | 0.004 | 0.012 | NE | U | | 093717-020 | EPA 314.0 |
| **CTF-MW3** (Duplicate) 22-Mar-13 | ND | 0.004 | 0.012 | NE | U | | 093718-020 | EPA 314.0 |
| | | | | | | | | |
| **CTF-MW3** 28-Jun-13 | ND | 0.004 | 0.012 | NE | U | | 094044-020 | EPA 314.0 |
| | | | | | | | | |
| **CTF-MW3** 13-Dec-13 | ND | 0.004 | 0.012 | NE | U | | 095084-020 | EPA 314.0 |

Refer to footnotes on page 12A-19.

## Table 12A-6
## Summary of Unfiltered Target Analyte List Metal Results,
## Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW3** | Aluminum | 0.0159 | 0.015 | 0.050 | NE | J | | 093717-009 | SW846 6020 |
| 22-Mar-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093717-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093717-009 | SW846 6020 |
| | Barium | 0.0316 | 0.0006 | 0.002 | 2.00 | | | 093717-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093717-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093717-009 | SW846 6020 |
| | Calcium | 194 | 0.300 | 1.00 | NE | | | 093717-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093717-009 | SW846 6020 |
| | Cobalt | 0.000289 | 0.0001 | 0.001 | NE | J | | 093717-009 | SW846 6020 |
| | Copper | 0.00221 | 0.00035 | 0.001 | NE | | 0.018UJ | 093717-009 | SW846 6020 |
| | Iron | 0.557 | 0.033 | 0.100 | NE | | | 093717-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093717-009 | SW846 6020 |
| | Magnesium | 46.8 | 0.010 | 0.030 | NE | | J | 093717-009 | SW846 6020 |
| | Manganese | 0.00197 | 0.001 | 0.005 | NE | J | | 093717-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093717-009 | SW846 7470 |
| | Nickel | 0.00369 | 0.0005 | 0.002 | NE | B | 0.027UJ | 093717-009 | SW846 6020 |
| | Potassium | 11.0 | 0.080 | 0.300 | NE | | | 093717-009 | SW846 6020 |
| | Selenium | 0.0307 | 0.0015 | 0.005 | 0.050 | | | 093717-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093717-009 | SW846 6020 |
| | Sodium | 166 | 0.400 | 1.25 | NE | | | 093717-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093717-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | | 093717-009 | SW846 6010 |
| | Zinc | 0.00552 | 0.0035 | 0.010 | NE | J | 0.034U | 093717-009 | SW846 6020 |

Refer to footnotes on page 12A-19.

**Table 12A-6** *(Continued)*
**Summary of Unfiltered Target Analyte List Metal Results,**
**Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW3** | Aluminum | 0.0168 | 0.015 | 0.050 | NE | J | | 093718-009 | SW846 6020 |
| 22-Mar-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093718-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093718-009 | SW846 6020 |
| | Barium | 0.0339 | 0.0006 | 0.002 | 2.00 | | | 093718-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093718-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 093718-009 | SW846 6020 |
| | Calcium | 198 | 0.300 | 1.00 | NE | | | 093718-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093718-009 | SW846 6020 |
| | Cobalt | 0.000296 | 0.0001 | 0.001 | NE | J | | 093718-009 | SW846 6020 |
| | Copper | 0.00266 | 0.00035 | 0.001 | NE | | 0.018UJ | 093718-009 | SW846 6020 |
| | Iron | 0.697 | 0.033 | 0.100 | NE | | | 093718-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093718-009 | SW846 6020 |
| | Magnesium | 46.7 | 0.010 | 0.030 | NE | | J | 093718-009 | SW846 6020 |
| | Manganese | 0.00198 | 0.001 | 0.005 | NE | J | | 093718-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093718-009 | SW846 7470 |
| | Nickel | 0.0037 | 0.0005 | 0.002 | NE | B | 0.027UJ | 093718-009 | SW846 6020 |
| | Potassium | 11.5 | 0.080 | 0.300 | NE | | | 093718-009 | SW846 6020 |
| | Selenium | 0.0265 | 0.0015 | 0.005 | 0.050 | | | 093718-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093718-009 | SW846 6020 |
| | Sodium | 167 | 0.400 | 1.25 | NE | | | 093718-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093718-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | | 093718-009 | SW846 6010 |
| | Zinc | 0.00761 | 0.0035 | 0.010 | NE | J | 0.034U | 093718-009 | SW846 6020 |

Refer to footnotes on page 12A-19.

**Table 12A-6** *(Continued)*
**Summary of Unfiltered Target Analyte List Metal Results,**
**Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW3** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 094044-009 | SW846 6020 |
| 28-Jun-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094044-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094044-009 | SW846 6020 |
| | Barium | 0.0284 | 0.0006 | 0.002 | 2.00 | | | 094044-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094044-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094044-009 | SW846 6020 |
| | Calcium | 189 | 0.600 | 2.00 | NE | | | 094044-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094044-009 | SW846 6020 |
| | Cobalt | 0.000344 | 0.0001 | 0.001 | NE | J | | 094044-009 | SW846 6020 |
| | Copper | 0.00194 | 0.00035 | 0.001 | NE | | J- | 094044-009 | SW846 6020 |
| | Iron | 0.351 | 0.033 | 0.100 | NE | | | 094044-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094044-009 | SW846 6020 |
| | Magnesium | 47.9 | 0.010 | 0.030 | NE | | | 094044-009 | SW846 6020 |
| | Manganese | 0.00117 | 0.001 | 0.005 | NE | J | | 094044-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094044-009 | SW846 7470 |
| | Nickel | 0.0055 | 0.0005 | 0.002 | NE | | J+ | 094044-009 | SW846 6020 |
| | Potassium | 11.3 | 0.080 | 0.300 | NE | | | 094044-009 | SW846 6020 |
| | Selenium | 0.0308 | 0.0015 | 0.005 | 0.050 | | | 094044-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094044-009 | SW846 6020 |
| | Sodium | 160 | 0.800 | 2.50 | NE | | | 094044-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094044-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | UJ | 094044-009 | SW846 6010 |
| | Zinc | 0.00553 | 0.0035 | 0.010 | NE | J | | 094044-009 | SW846 6020 |

Refer to footnotes on page 12A-19.

**Table 12A-6** *(Concluded)*
**Summary of Unfiltered Target Analyte List Metal Results,**
**Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW3** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 095084-009 | SW846 6020 |
| 13-Dec-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 095084-009 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 095084-009 | SW846 6020 |
| | Barium | 0.0301 | 0.0006 | 0.002 | 2.00 | | | 095084-009 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 095084-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 095084-009 | SW846 6020 |
| | Calcium | 212 | 0.300 | 1.00 | NE | B | | 095084-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 095084-009 | SW846 6020 |
| | Cobalt | 0.000156 | 0.0001 | 0.001 | NE | J | | 095084-009 | SW846 6020 |
| | Copper | 0.00156 | 0.00035 | 0.001 | NE | | J- | 095084-009 | SW846 6020 |
| | Iron | 0.252 | 0.033 | 0.100 | NE | | | 095084-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 095084-009 | SW846 6020 |
| | Magnesium | 44.5 | 0.010 | 0.030 | NE | | | 095084-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 095084-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 095084-009 | SW846 7470 |
| | Nickel | 0.00329 | 0.0005 | 0.002 | NE | | J- | 095084-009 | SW846 6020 |
| | Potassium | 10.8 | 0.080 | 0.300 | NE | | | 095084-009 | SW846 6020 |
| | Selenium | 0.0295 | 0.0015 | 0.005 | 0.050 | | | 095084-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 095084-009 | SW846 6020 |
| | Sodium | 182 | 0.400 | 1.25 | NE | | | 095084-009 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 095084-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | | 095084-009 | SW846 6010 |
| | Zinc | 0.0174 | 0.0035 | 0.010 | NE | | | 095084-009 | SW846 6020 |

Refer to footnotes on page 12A-19.

## Table 12A-7
## Summary of Filtered Target Analyte List Metal Results,
## Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW3** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093717-010 | SW846 6020 |
| 22-Mar-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093717-010 | SW846 6020 |
| | Arsenic | 0.00194 | 0.0017 | 0.005 | 0.010 | J | | 093717-010 | SW846 6020 |
| | Barium | 0.0325 | 0.0006 | 0.002 | 2.00 | | | 093717-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093717-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | UJ | 093717-010 | SW846 6020 |
| | Calcium | 196 | 1.20 | 4.00 | NE | | | 093717-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093717-010 | SW846 6020 |
| | Cobalt | 0.000427 | 0.0001 | 0.001 | NE | J | J | 093717-010 | SW846 6020 |
| | Copper | 0.00211 | 0.00035 | 0.001 | NE | | 0.0084UJ | 093717-010 | SW846 6020 |
| | Iron | 0.747 | 0.033 | 0.100 | NE | | J | 093717-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093717-010 | SW846 6020 |
| | Magnesium | 49.5 | 0.200 | 0.600 | NE | | J | 093717-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093717-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093717-010 | SW846 7470 |
| | Nickel | 0.00613 | 0.0005 | 0.002 | NE | | | 093717-010 | SW846 6020 |
| | Potassium | 11.4 | 0.080 | 0.300 | NE | | | 093717-010 | SW846 6020 |
| | Selenium | 0.0272 | 0.0015 | 0.005 | 0.050 | | | 093717-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093717-010 | SW846 6020 |
| | Sodium | 175 | 1.60 | 5.00 | NE | | | 093717-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093717-010 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | UJ | 093717-010 | SW846 6010 |
| | Zinc | 0.00521 | 0.0035 | 0.010 | NE | J | J | 093717-010 | SW846 6020 |

Refer to footnotes on page 12A-19.

**Table 12A-7** *(Continued)*
**Summary of Filtered Target Analyte List Metal Results,**
**Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW3** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 093718-010 | SW846 6020 |
| 22-Mar-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093718-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 093718-010 | SW846 6020 |
| | Barium | 0.0318 | 0.0006 | 0.002 | 2.00 | | | 093718-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 093718-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | UJ | 093718-010 | SW846 6020 |
| | Calcium | 193 | 1.20 | 4.00 | NE | | | 093718-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093718-010 | SW846 6020 |
| | Cobalt | 0.000424 | 0.0001 | 0.001 | NE | J | J | 093718-010 | SW846 6020 |
| | Copper | 0.00245 | 0.00035 | 0.001 | NE | | 0.0084UJ | 093718-010 | SW846 6020 |
| | Iron | 0.774 | 0.033 | 0.100 | NE | | J | 093718-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093718-010 | SW846 6020 |
| | Magnesium | 49.6 | 0.200 | 0.600 | NE | | J | 093718-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 093718-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093718-010 | SW846 7470 |
| | Nickel | 0.00619 | 0.0005 | 0.002 | NE | | | 093718-010 | SW846 6020 |
| | Potassium | 11.6 | 0.080 | 0.300 | NE | | | 093718-010 | SW846 6020 |
| | Selenium | 0.0273 | 0.0015 | 0.005 | 0.050 | | | 093718-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093718-010 | SW846 6020 |
| | Sodium | 168 | 1.60 | 5.00 | NE | | | 093718-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 093718-010 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | UJ | 093718-010 | SW846 6010 |
| | Zinc | 0.00547 | 0.0035 | 0.010 | NE | J | J | 093718-010 | SW846 6020 |

Refer to footnotes on page 12A-19.

**Table 12A-7** *(Continued)*
**Summary of Filtered Target Analyte List Metal Results,**
**Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW3** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 094044-010 | SW846 6020 |
| 28-Jun-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094044-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 094044-010 | SW846 6020 |
| | Barium | 0.0311 | 0.0006 | 0.002 | 2.00 | | | 094044-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 094044-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 094044-010 | SW846 6020 |
| | Calcium | 193 | 0.600 | 2.00 | NE | | | 094044-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094044-010 | SW846 6020 |
| | Cobalt | 0.000351 | 0.0001 | 0.001 | NE | J | | 094044-010 | SW846 6020 |
| | Copper | 0.00193 | 0.00035 | 0.001 | NE | | J- | 094044-010 | SW846 6020 |
| | Iron | 0.327 | 0.033 | 0.100 | NE | | | 094044-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094044-010 | SW846 6020 |
| | Magnesium | 47.5 | 0.010 | 0.030 | NE | | | 094044-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 094044-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094044-010 | SW846 7470 |
| | Nickel | 0.00527 | 0.0005 | 0.002 | NE | | J+ | 094044-010 | SW846 6020 |
| | Potassium | 11.1 | 0.080 | 0.300 | NE | | | 094044-010 | SW846 6020 |
| | Selenium | 0.0299 | 0.0015 | 0.005 | 0.050 | | | 094044-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094044-010 | SW846 6020 |
| | Sodium | 165 | 0.800 | 2.50 | NE | | | 094044-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 094044-010 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | UJ | 094044-010 | SW846 6010 |
| | Zinc | 0.00524 | 0.0035 | 0.010 | NE | J | | 094044-010 | SW846 6020 |

Refer to footnotes on page 12A-19.

**Table 12A-7** *(Concluded)*
**Summary of Filtered Target Analyte List Metal Results,**
**Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW3** | Aluminum | ND | 0.015 | 0.050 | NE | U | | 095084-010 | SW846 6020 |
| 13-Dec-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 095084-010 | SW846 6020 |
| | Arsenic | ND | 0.0017 | 0.005 | 0.010 | U | | 095084-010 | SW846 6020 |
| | Barium | 0.0301 | 0.0006 | 0.002 | 2.00 | | | 095084-010 | SW846 6020 |
| | Beryllium | ND | 0.0002 | 0.0005 | 0.004 | U | | 095084-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 095084-010 | SW846 6020 |
| | Calcium | 202 | 0.300 | 1.00 | NE | B | | 095084-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 095084-010 | SW846 6020 |
| | Cobalt | 0.000196 | 0.0001 | 0.001 | NE | J | | 095084-010 | SW846 6020 |
| | Copper | 0.00143 | 0.00035 | 0.001 | NE | | J- | 095084-010 | SW846 6020 |
| | Iron | 0.230 | 0.033 | 0.100 | NE | | | 095084-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 095084-010 | SW846 6020 |
| | Magnesium | 44.6 | 0.010 | 0.030 | NE | | | 095084-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 095084-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 095084-010 | SW846 7470 |
| | Nickel | 0.00325 | 0.0005 | 0.002 | NE | | J- | 095084-010 | SW846 6020 |
| | Potassium | 10.7 | 0.080 | 0.300 | NE | | | 095084-010 | SW846 6020 |
| | Selenium | 0.029 | 0.0015 | 0.005 | 0.050 | | | 095084-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 095084-010 | SW846 6020 |
| | Sodium | 175 | 0.400 | 1.25 | NE | | | 095084-010 | SW846 6020 |
| | Thallium | ND | 0.00045 | 0.002 | 0.002 | U | | 095084-010 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | | 095084-010 | SW846 6010 |
| | Zinc | 0.00432 | 0.0035 | 0.010 | NE | J | | 095084-010 | SW846 6020 |

Refer to footnotes on page 12A-19.

## Table 12A-8
## Summary of Field Water Quality Measurements[h],
## Solid Waste Management Unit 149 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Sample Date | Temperature (°C) | Specific Conductivity (µmhos/cm) | Oxidation Reduction Potential (mV) | pH | Turbidity (NTU) | Dissolved Oxygen (% Sat) | Dissolved Oxygen (mg/L) |
|---|---|---|---|---|---|---|---|---|
| **CTF-MW3** | 22-Mar-13 | 20.48 | 1557 | 228.9 | 6.72 | 0.70 | 84.5 | 7.56 |
| | | | | | | | | |
| **CTF-MW3** | 28-Jun-13 | 22.26 | 1799 | 172.2 | 6.83 | 0.78 | 92.7 | 8.04 |
| | | | | | | | | |
| **CTF-MW3** | 13-Dec-13 | 16.80 | 1570.6 | 326.4 | 7.10 | 0.21 | 86.5 | 8.37 |

Refer to footnotes on page 12A-19.

## *Footnotes for Solid Waste Management Unit 149 Analytical Results Tables*

| | |
|---|---|
| % | = Percent. |
| µg/L | = Micrograms per liter. |
| CFR | = Code of Federal Regulations. |
| EPA | = U.S. Environmental Protection Agency. |
| ID | = Identifier. |
| mg/L | = Milligrams per liter. |
| mrem/yr | = Millirem per year. |
| No. | = Number. |
| pCi/L | = Picocuries per liter. |

**[a]Result**

Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 2A- 1-4).

**Bold** indicates the value exceed the established MCL.

ND = Not detected (at MDL).

**[b]MDL**

MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

**[c]PQL**

PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

**[d]MCL**

MCL = Maximum contaminant level. MCLs were established by the EP) Office of Water, National Primary Water Regulations (EPA May 2009).

NE = Not established.

**[e]Lab Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

B = The analyte was detected in the blank above the effective MDL.

J = Amount detected is below the PQL.

U = Analyte is absent or below the MDL.

**[f]Validation Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

J = The associated value is an estimated quantity.

J+ = The associated numerical value is an estimated quantity with a suspected positive bias.

J- = The associated numerical value is an estimated quantity with a suspected negative bias.

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

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

**[g]Analytical Method**

Clesceri, Greenburg, and Eaton, 1998, Standard Methods for the Examination of Water and Wastewater, 20th ed., Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.

EPA, 1999 (and updates), "Perchlorate in Drinking Water Using Ion Chromatography," EPA 815/R-00-014.

EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.

EPA, 1983, "The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0," EPA-600/4-84-017.

## *Footnotes for Solid Waste Management Unit 149 Analytical Results Tables (Concluded)*

[h] **Field Water Quality Measurements**

Field measurements were collected prior to sampling.

| | |
|---|---|
| °C | = Degrees Celsius. |
| % sat | = Percent saturation. |
| µmhos/cm | = Micromhos per centimeter. |
| mg/L | = Milligrams per liter. |
| mV | = Millivolts. |
| NTU | = Nephelometric turbidity units. |
| pH | = Potential of hydrogen (negative logarithm of the hydrogen ion concentration). |

# Attachment 12B
# Solid Waste Management Unit 149
# Hydrographs

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# Attachment 12B Hydrographs

12B-1 SWMU 149 Study Area Well ..... 12B-5

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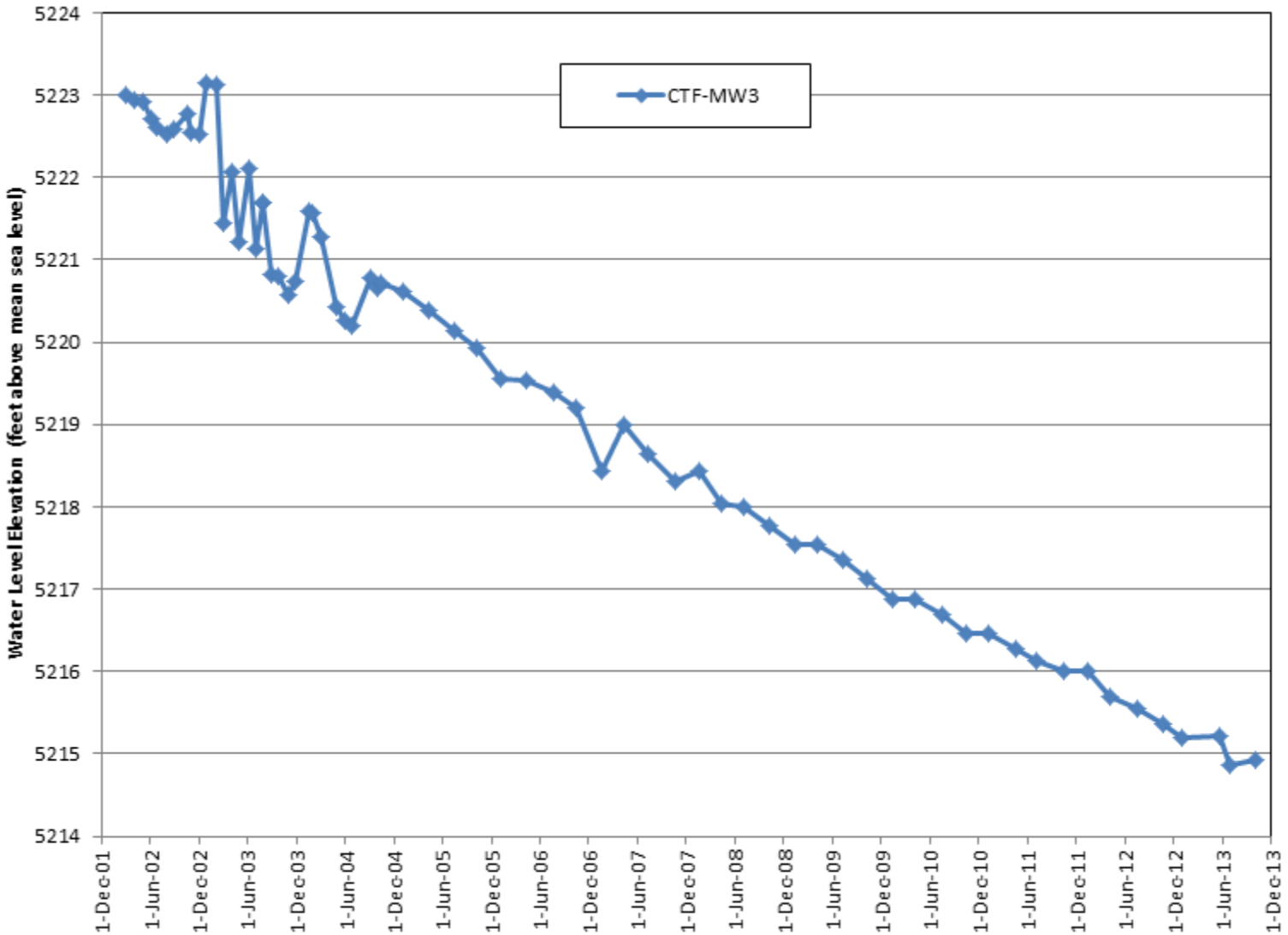


**Figure 12B-1. SWMU 149 Study Area Well**

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# 13.0 Solid Waste Management Unit 154

## 13.1 Introduction

This chapter summarizes Calendar Year (CY) 2013 quarterly groundwater sampling events for Coyote Test Field (CTF) monitoring well CTF-MW2, located near Solid Waste Management Unit (SWMU) 154 at Sandia National Laboratories, New Mexico (SNL/NM). The SNL/NM facility is a government-owned, contractor-operated laboratory. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM for the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA). The DOE/NNSA Sandia Field Office administers the contract and oversees contractor operations at the site.

Supplemental groundwater monitoring at SWMU 154 is designed to address the requirements of Section VII.D.6 of the Compliance Order on Consent (the Order) (NMED April 2004) and the letter dated April 8, 2010, from the New Mexico Environment Department (NMED) Hazardous Waste Bureau (NMED April 2010).

During CY 2013, four quarterly groundwater samples were collected from monitoring well CTF-MW2 on March 26, June 25, September 17, and December 17, 2013. The groundwater samples were collected in accordance with the NMED-approved Sampling and Analysis Plan (SAP) (SNL June 2010). Analytical parameters included volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), high explosive (HE) compounds, nitrate plus nitrite (NPN), major anions, alkalinity, Target Analyte List (TAL) metals plus uranium, perchlorate, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium.

Analytical results were compared with U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) for drinking water (EPA 2009). During all four quarters, arsenic was detected above the established MCL and is most likely attributable to naturally occurring background (geogenic source) because monitoring well CTF-MW2 is screened in a highly fractured interval of Precambrian granite and gneiss. Detailed results for all quarterly sampling events are discussed in Section 13.6.

The eighth and final quarter of the required groundwater sampling (NMED April 2010) was conducted on December 18, 2012. Supplemental quarterly groundwater sampling will continue until NMED provides additional guidance.

### 13.1.1 Location

SWMU 154, the Building 9960 Septic Systems, is located in the CTF on federally-owned land controlled by Kirtland Air Force Base (KAFB) and permitted to the DOE/NNSA. It is approximately 1.3 miles east of SNL/NM Technical Area III, 0.4 miles west of Lovelace Road, and 1.3 miles north of the Solar Power Tower, a prominent landmark in the area (Figure 13-1).

### 13.1.2 Site History

SWMU 154 was identified as a potential release site in 1987 (SNL August 1997; Table 13-1) and is composed of two adjacent, but separate systems. The east septic system (SWMU 154-B) is located north of Building 9960 and consists of a 900-gallon septic tank that discharged to a 5-foot (ft) diameter, 10-ft deep seepage pit. The west septic system (SWMU 154-A) consists of a pair of HE seepage pits located southwest of Building 9960 (Figure 13-2).

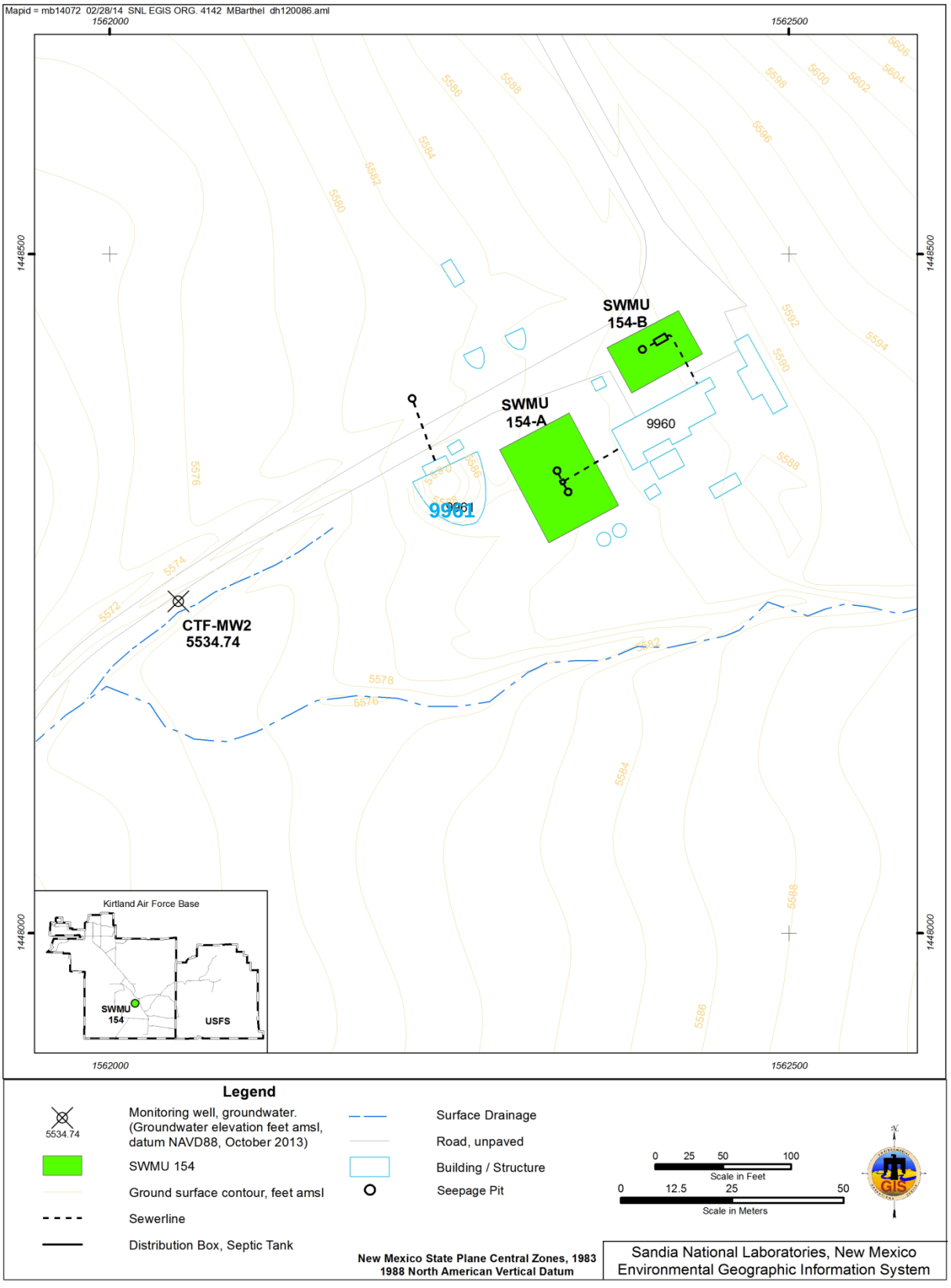


**Figure 13-1. Location of Monitoring Well CTF-MW2 near SWMU 154**

**Table 13-1. Historical Timeline of SWMU 154**

| Month | Year | Event | Reference |
|---|---|---|---|
| | 1965 | Building 9960 and 9961 are constructed. | SNL August 1997 |
| April | 1987 | SWMU 154 is identified as a potential release site. Building 9960 HE two seepage pits (SWMU 154A) and septic system (SWMU 154B). | SNL August 1997 |
| June | 1992 | Waste characterization samples collected from SWMU 154 septic tank. | SNL August 1997 |
| | 1993 | Building 9960 connected to the City of Albuquerque sanitary sewer system. | SNL August 1997 |
| March | 1993 | Septic Tanks and Drainfields (OU 1295) RCRA Facility Investigation Work Plan submitted. | SNL March 1993 |
| March | 1994 | OU 1295 SAP prepared. | IT March 1994 |
| | 1994 | Cultural Resources and Sensitive Species Surveys conducted at SMWU 154. | SNL August 1997 |
| May | 1994 | Additional waste characterization samples collected from SWMU 154 septic tank. | SNL August 1997 |
| May-June | 1994 | A PETREX™ passive soil vapor survey completed at the septic system area at SWMU 154. | SNL August 1997 |
| September | 1994 | EPA comments on the March 1993 OU 1295 work plan received as a NOD. | EPA September 1994 |
| November | 1994 | Response to the September 1994 EPA NOD submitted. | SNL November 1994 |
| October | 1994 | Confirmatory soil samples collected from SWMU 154. | SNL August 1997 |
| October | 1995 | A second round of soil samples collected from two boreholes next to the two HE seepage pits at SWMU 154. | Chain-of-Custody |
| January | 1996 | Remaining waste removed from SWMU 154 septic system septic tank, and the tank was decontaminated and backfilled in place with clean soil. The septic system seepage pit was also backfilled in place with clean fill. | SNL January 1996 |
| June-July | 1996 | A third round of soil samples collected from four previous and six new borehole locations around the HE seepage pits at SWMU 154. | Chain-of-Custody |
| March | 1997 | A fourth round of soil samples collected from four additional boring locations in the HE seepage pits area at SWMU 154. | Chain-of-Custody |
| August | 1997 | NFA proposal for SWMU 154 submitted to the NMED. | SNL August 1997 |
| January | 1998 | SWMU 154 was one of five OU 1295 SWMUs selected by the NMED for additional soil sampling through the center and beneath seepage pits. | NMED January 1998 |
| January | 1998 | SNL/NM collected samples down through the center of and beneath the two HE seepage pits at SWMU 154. | Chain-of-Custody |
| February | 1998 | Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report (SNL/NM 1995) containing description of SWMU 154 hydrogeology submitted to NMED. | SNL February 1998 |
| June | 1999 | The NMED responded with an RSI on the SWMU 154 NFA proposal. Installation of a groundwater monitoring well downgradient of SWMU 154 was requested. | NMED June 1999 |
| September | 1999 | First response submitted to the June 1999 NMED RSI for SWMU 154. | SNL September 1999a |
| October | 1999 | A SAP describing technical procedures to complete environmental investigations submitted to the NMED. | SNL September 1999b |
| January | 2000 | SAP approved by the NMED. | NMED January 2000 |
| August | 2001 | Groundwater monitoring well CTF-MW2 installed downgradient from SWMU 154. | SNL June 2005 |
| November | 2001 | A follow-up FIP documenting specific investigation procedure to be completed submitted to the NMED. | SNL November 2001 |

**Table 13-1. Historical Timeline of SWMU 154** *(Concluded)*

| Month | Year | Event | Reference |
|---|---|---|---|
| February | 2002 | The FIP approved by the NMED. | NMED February 2002 |
| June | 2004 | Completed eight quarters of sampling for groundwater monitoring well CTF-MW2 near SWMU 154. | SNL June 2005 |
| June | 2005 | A third RSI response submitted to the NMED. This document described the results of the investigations completed at SWMU 154 since the August 1997 NFA report was written and an updated risk assessment evaluation for the site. | SNL June 2005 |
| August | 2005 | As required by the NMED, additional soil samples were collected and analyzed from beneath a fourth seepage pit associated with Building 9961 near SWMU 154. | Chain-of-Custody |
| September | 2005 | The NMED issued a NOD requiring soil sampling at a Building 9961 seepage pit not located within the SWMU border. | NMED September 2005 |
| January | 2006 | Response to NOD submitted, consisting of a report summarizing results of soil sampling beneath the Building 9961 HE seepage pit. No significant contamination is detected in the soil samples. | SNL January 2006 |
| March | 2006 | The NMED issues a Certificate of Completion for CAC. | NMED March 2006 |
| March | 2006 | Request for Class III Permit Modification submitted. | SNL March 2006 |
| April | 2010 | NMED issues a letter requiring additional corrective action is needed at SWMU 154. It specifies eight additional quarters of groundwater monitoring at CTF-MW2. | NMED April 2010 |
| June | 2010 | SAP for SWMU 154 submitted to the NMED. | SNL June 2010 |
| December | 2010 | SAP approved by the NMED. | NMED December 2010 |
| March | 2011 | Quarterly sampling of CTF-MW2 resumed. | SNL September 2012 |
| December | 2012 | Eight quarters of additional groundwater sampling of CTF-MW2 completed. | SNL September 2013 |
| March | 2013 | Began voluntary quarterly groundwater sampling | |

**NOTES:**
CAC = Corrective Action Complete.
CTF = Coyote Test Field.
EPA = U.S. Environmental Protection Agency.
FIP = Field Implementation Plan.
HE = High explosive.
MW = Monitoring Well.
NFA = No Further Action.
NMED = New Mexico Environment Department.
NOD = Notice of Disapproval.
OU = Operable Unit.
RCRA = Resource Conservation and Recovery Act.
RSI = Request for Supplemental Information.
SAP = Sampling and Analysis Plan.
SNL/NM = Sandia National Laboratories, New Mexico.
SWMU = Solid Waste Management Unit.

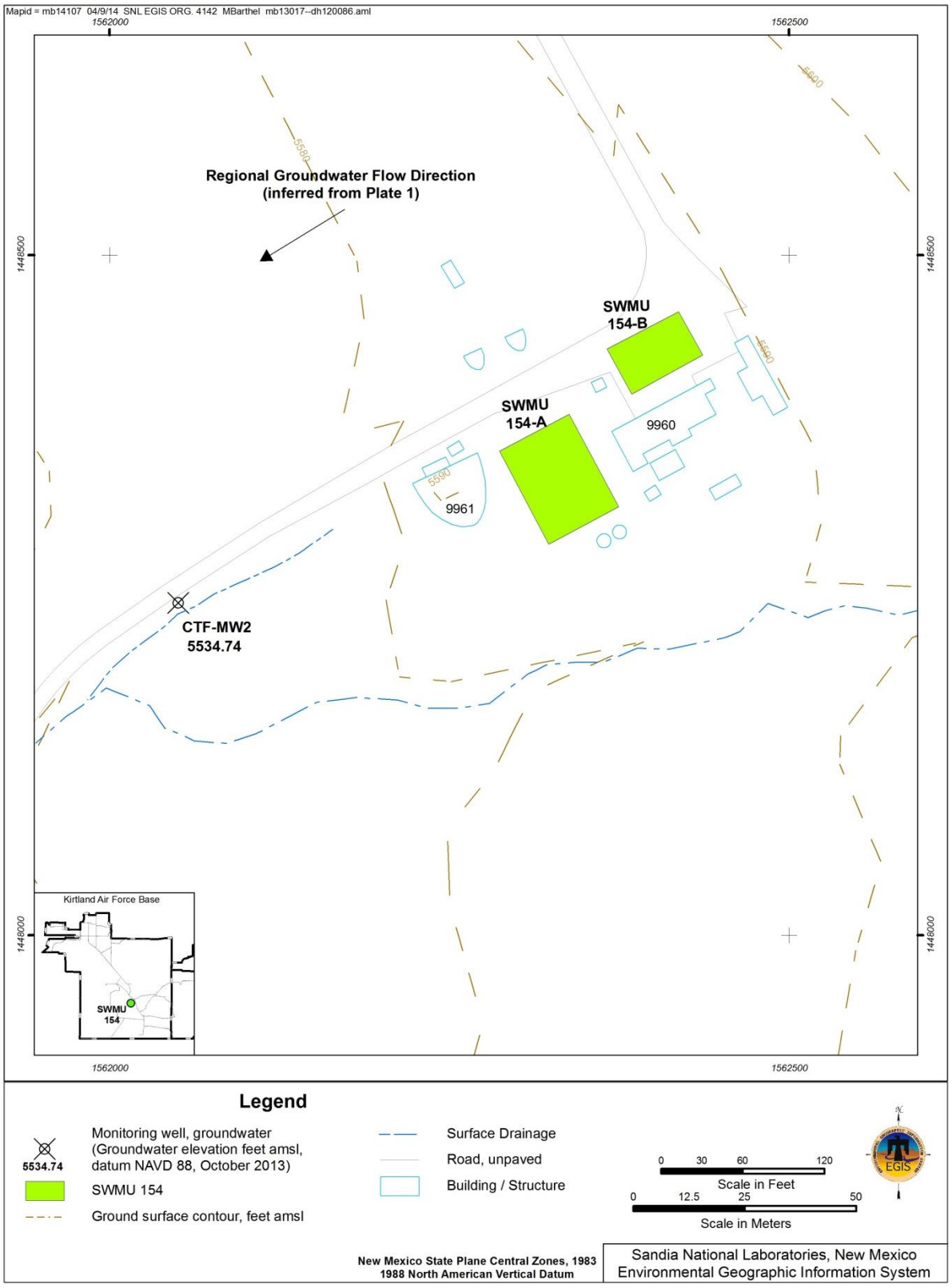


**Figure 13-2. SWMU 154 Groundwater Flow Direction (October 2013)**

The two HE compound seepage pits (SWMU 154A) are 5 ft in diameter and were installed to approximately 23 ft below ground surface (bgs). Combined, the two SWMU 154 septic systems encompass approximately 0.15 acres of essentially flat-lying land at an average mean elevation of 5,585 ft above mean sea level (amsl).

Available information indicates that Building 9960 was constructed in 1965, and it is assumed that the septic and HE drain systems were also constructed at that time. In 1993, the septic systems were connected to the City of Albuquerque sanitary sewer system (Jones July 1993). The obsolete septic system lines were disconnected and capped, and the system was abandoned in place (Romero September 2003). Waste in the SWMU 154B septic tank was removed and managed according to SNL/NM policy. The empty and decontaminated septic tank was inspected by the NMED on January 26, 1996, and a closure form was signed by the NMED (SNL January 1996). The septic tank and associated seepage pit were then backfilled with clean, native soil from the area in early 1996. The two SWMU 154A HE seepage pits are inactive and have not been backfilled. Rinse water from HE machining operations at the facility are currently directed to polypropylene tanks that are routinely analyzed and the contents properly disposed.

SWMU 154 environmental concerns are based upon the potential for the release of contaminants of concern (COCs) in effluent discharged to the environment via the septic and HE seepage pits. Because operational records were not available, the initial investigation was planned to be consistent with other Drain and Septic System site investigations, and to sample for possible COCs that may have been released during facility operations.

In August 1997, a No Further Action (NFA) proposal was submitted to the NMED for SWMU 154 (SNL August 1997). The NMED stated that the NFA proposal would not be approved without groundwater characterization. Subsequently, monitoring well CTF-MW2 was installed in August 2001, and groundwater samples were collected for the required minimum of eight quarters. Groundwater samples were analyzed for VOCs, Resource Conservation and Recovery Act (RCRA) metals, and HE compounds. Analytical results for these sampling events were presented in the third Request for Supplemental Information (RSI) responses and a Corrective Action Complete (CAC) proposal submitted to the NMED (SNL June 2005). In September 2005, the NMED issued a Notice of Disapproval (NOD) (NMED September 2005) requiring DOE/NNSA and Sandia to characterize an uninvestigated seepage pit associated with Building 9961 in accordance with the approved SAP (SNL October 1999). In January 2006, the NOD response summarizing the results of the soil sampling submitted (SNL January 2006), and the NMED then issued a Certificate of Completion for CAC (NMED March 2006).

In March 2006, a request for Class III Permit Modification was submitted to the NMED (SNL March 2006). In April 2010, the NMED responded to the Permit Modification Request with a letter requiring further corrective action at SWMU 154 (NMED April 2010), in the form of an additional eight quarters of groundwater monitoring at monitoring well CTF-MW2. In June 2010, the SAP for monitoring well CTF-MW2 was submitted (SNL June 2010), which was approved by the NMED (December 2010). Quarterly groundwater sampling was resumed at monitoring well CTF-MW2 in March 2011 and continued through CY 2013. The analytical results for CY 2013 are presented in Section 13.6.

### 13.1.3 Monitoring History

Monitoring well CTF-MW2 was installed in August 2001 and was sampled on a quarterly basis from July 2002 to June 2004 to acquire the eight quarters of groundwater data required by the NMED. The groundwater samples were analyzed for VOCs, HE compounds, and RCRA metals. Although not required by the NMED, additional samples were also collected and analyzed for NPN, anions, and cations. These additional samples were collected to further characterize the general geochemistry of

groundwater and for purge water waste characterization purposes. Results for these eight quarters of groundwater sampling are as follows:

- **VOCs:** Acetone was detected only in the first groundwater sample collected in July 2002 as well as in the August 2003 trip blank (TB) and equipment blank (EB) samples. Bromoform was detected only in the December 2003 EB sample and dibromochloromethane was detected in the February and April 2003 EB samples. Methylene chloride and toluene were detected only in TB samples.

- **HE Compounds:** The compound 1,3,5-trinitrobenzene was detected in the February 2003 groundwater sample. No other HE compounds were detected in the groundwater samples associated with this monitoring well. A trace of methyl 2,4,6-trinitrophenylnitramine (tetryl) and 4-amino-2,6-dinitrotoluene were detected in separate EB samples associated with sampling of this well.

- **RCRA Metals:** Arsenic exceeded the EPA MCL in all groundwater samples. SNL/NM personnel identified that the arsenic concentrations were greater than background values and promulgated limits, as well as explained that these concentrations were most likely naturally occurring and not caused by a release at SWMU 154 (SNL September 2002). All other metal concentrations were below regulatory limits.

- **NPN, Anions, and Cations:** Fluoride was detected in all eight primary and two duplicate environmental samples collected, but in all cases, were less than the MCL of 4.0 milligrams per liter (mg/L). The fluoride detected was most likely naturally occurring. None of the known activities conducted at Building 9960 would have produced wastewater containing fluoride.

- **Field Water Quality Parameters:** Compared to other monitoring wells in the same hydrogeologic region CTF-MW2 specific conductivity values were two to three times higher, oxidation and reduction potential values were much lower, and dissolved oxygen values were much lower.

### 13.1.4 Current Monitoring Network

Currently, one monitoring well (CTF-MW2) is located southwest of SWMU 154 (Figure 13-2). Monitoring well CTF-MW2 is monitored quarterly for VOCs, SVOCs, HE compounds, NPN, major anions, alkalinity, TAL total metals plus uranium, perchlorate, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium. The eighth and final quarter of required groundwater sampling (NMED April 2010) occurred on December 18, 2012. Quarterly groundwater sampling will continue until additional guidance is provided by NMED.

### 13.1.5 Summary of Calendar Year 2013 Activities

The following activities took place for monitoring well CTF-MW2 near SWMU 154 during CY 2013 (January through December 2013):

- Quarterly groundwater sampling was conducted at monitoring well CTF-MW2 in March, June, September, and December 2013.

- Quarterly reporting of analytical results for monitoring well CTF-MW2 groundwater samples was conducted.

- Tables of analytical results (Attachment 13A), arsenic concentration and gross alpha versus time plots for (Attachment 13B), and a hydrograph (Attachment 13C) were prepared in support of this report.

### 13.1.6 Summary of Future Activities

The following activities are anticipated for monitoring well CTF-MW2 near SWMU 154 during CY 2014:

- Analytical results will be summarized and additional analysis may be performed and submitted to NMED to support resumption of the regulatory process for designating the site as CAC with NFA.

### 13.1.7 Conceptual Model

For the resumption of quarterly groundwater sampling at monitoring well CTF-MW2, this section presents a revised discussion of the hydrogeologic regime, conceptual model, and contaminant findings for SWMU 154.

#### 13.1.7.1 Regional Hydrogeologic Conditions

SWMU 154 is located in the Travertine Hills within the western portion of CTF. The site is located approximately 1,000 ft east of the Tijeras Fault (Plate 1). Nearby outcrops are composed of the Sandia Formation (carbonate-cemented sandstone and conglomerate), Madera Group limestone, and Precambrian quartzite and granite (GRAM and Lettis 1995). The base-wide potentiometric surface map (Plate 1) shows that groundwater flow in the regional aquifer is generally towards the west. Faults in the vicinity of the site may serve as hydraulic barriers or conduits depending on the type and amount of fault gouge. No potable water supply wells are located within 4 miles of the site.

#### 13.1.7.2 Hydrogeologic Conditions at SWMU 154

SWMU 154 consists of two septic systems (SWMUs 154-A and 154-B) located near Building 9960. SWMU 154-A is located approximately 20 ft to the west of the building, and SWMU 154-B is located approximately 20 ft to the north of the building (Figure 13-2). The combined area of SWMU 154 comprises 6,710 square ft (approximately 0.15 acres). The site is covered by colluvium that is underlain by caliche and bedrock. The septic systems were used from 1965 to 1993. Building 9960 is located on the northeastern edge of the Travertine Hills at an elevation of approximately 5,585 ft amsl. The area surrounding Building 9960 consists of rolling hills and is sparsely vegetated by bunch grasses, cacti, and junipers. Overall, the terrain slopes gently to the southwest. No perennial surface-water features such as springs are located within 1 mile of SWMU 154. Monitoring well CTF-MW2 is located approximately 330 ft to the southwest and slightly downslope of Building 9960.

The amount of precipitation available for groundwater recharge is minimal due to scant rainfall and high evapotranspiration rates. Summer (monsoonal) thunderstorms are responsible for the majority of rainfall. The average rainfall, as measured at the nearest active rain gauge (the National Weather Service station at the Albuquerque International Sunport), during the period from 1915 through 2005 was 8.67 inches per year (WRCC-DRI 2012). The station is located 7.2 miles northwest of the site at an elevation of 5,310 ft amsl, which is similar enough to the site elevation to infer that the annual rainfall at SWMU 154 is approximately 9 inches. Intense sunlight and low humidity throughout much of the year creates high rates of evapotranspiration. Estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL February 1998).

In 2001, a location west of SWMU 154 was selected with NMED's approval for the installation of monitoring well CTF-MW2. The well was installed in August 2001 using the air rotary casing hammer

drilling technique. Alluvium consisting of silty fine- to medium-grained sand was encountered from the ground surface to 10 ft bgs. Silty gravel extended from 10 to 17 ft bgs. A hard layer of caliche with a gravel matrix was encountered from 17 to 32 ft bgs. From 32 to 44 ft bgs, the strata consisted of silty gravel and Abo Formation siltstone. Clayey fine gravel was encountered from 44 to 110 ft bgs. Fractured granite and gneiss was encountered from 110 ft bgs to the borehole total depth of 190 ft bgs. Groundwater was encountered at a depth of 120 ft bgs. Borehole sloughing, especially below 135 ft bgs, in the highly fractured Precambrian granite and gneiss made for difficult drilling. Fault breccia (indicated by manganese and iron cementation) was possibly encountered at 145 ft bgs. The most productive zone in the borehole was 120 to 135 ft bgs. The well was screened from 110 to 130 ft bgs in fractured Precambrian granite and gneiss (Table 13-2).

**Table 13-2. Lithologic and Hydrogeologic Elevation Data for Monitoring Well CTF-MW2 near SWMU 154**

| Monitoring Well | Ground Surface Elevation (ft amsl) | Depth of Screened Interval (ft bgs) | Elevation for Top of Screen (ft amsl) | Potentiometric Surface, October 2013 (ft amsl) | Mid-Point Screen Elevation (ft amsl) | Pressure Head (ft[a]) |
|---|---|---|---|---|---|---|
| CTF-MW2 | 5575.60 | 110 – 130 | 5465.60 | 5534.74 | 5455.60 | 79 |

**NOTES:**
[a]From mid-point of screen.
amsl = Above mean sea level.
bgs = Below ground surface.
CTF = Coyote Test Field.
ft = Foot (feet).
MW = Monitoring Well.
SWMU = Solid Waste Management Unit.

The October 2013 groundwater elevation was 5,534.74 ft amsl (Figure 13-2). Compared to the mid-point elevation of the screen, the pressure head was approximately 79 ft and indicative of confined conditions. Groundwater in the bedrock most likely migrates through a confined fracture system. The geochemical signature for monitoring well CTF-MW2 is of the bicarbonate type dominated by calcium.

During sampling, the drawdown in monitoring well CTF-MW2 is not excessive and the quantity of water produced is clearly adequate for low flow sampling purposes. Groundwater samples are collected using pneumatic (nitrogen-gas activated) Bennett™ piston pumps.

The conceptual hydrogeologic model for SWMU 154 is based on the findings for monitoring well CTF-MW2, several nearby monitoring wells located across the CTF (Plate 1), and extensive field mapping conducted by the Site-Wide Hydrogeologic Characterization Project (SNL February 1998). Groundwater in the SWMU 154 area occurs in the fractured bedrock system under confined conditions. The depth to groundwater at monitoring well CTF-MW2 at the time of installation was approximately 120 ft bgs in a severely fractured interval of Precambrian granite and gneiss. A thick sequence of clayey fine gravel overlying the fractured granite probably serves as the confining layer. The borehole possibly intercepted a splay of the Tijeras Fault at 145 ft bgs that yielded only a minor amount of groundwater.

The amount of precipitation available for groundwater recharge at SWMU 154 is minimal due to the scant rainfall, high evapotranspiration rates, and the shallow sequence of competent bedrock. Historical water level data indicate that seasonal effects, primarily due to thunderstorms, do not influence groundwater levels near the site. Groundwater underflow from the site probably discharges to the unconsolidated basin fill deposits (primarily the Santa Fe Group) of the Albuquerque Basin after crossing the Tijeras and Sandia faults (SNL February 1998). No potable water supply wells are located within 4 miles of the site.

#### 13.1.7.3 Contaminant Sources

From 1965 to 1993, water from the two SWMU 154 septic systems discharged to the subsurface via three seepage pits. The septic water contained photo-processing chemicals, HE compounds, and sanitary waste. The areas around the seepage pits and septic tanks were characterized using soil vapor samplers and soil samples collected from 14 boreholes.

#### 13.1.7.4 Contaminant Distribution and Transport in Groundwater

The first phase of quarterly groundwater sampling for monitoring well CTF-MW2 was conducted from July 2002 to June 2004. Trace amounts of VOCs and one HE compound (1,3,5-trinitrobenzene) were detected. Concentrations decreased over time. NPN and fluoride concentrations reported were less than the MCLs. Except for arsenic, no metals exceeded the MCLs. Arsenic exceeded the MCL in all of the first phase groundwater samples and was attributed to the natural sources, and not to research activities conducted at Building 9960.

The second phase of quarterly groundwater sampling began in March 2011. During CY 2013, four quarterly groundwater events were conducted at monitoring well CTF-MW2. The analytical parameters included VOCs, SVOCs, HE compounds, NPN, major anions, alkalinity, TAL total metals plus uranium, perchlorate, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium. Except for arsenic and gross alpha, no constituents exceed the respective MCLs. The occurrence of arsenic and gross alpha in groundwater samples from monitoring well CTF-MW2 is mostly likely attributable to natural sources. Analysis of trace gases and helium isotope data from groundwater samples collected from CTF-MW2 in December 2011 show that it is a mixture of shallow and upwelling endogenic (deeply derived) fluids (Williams, *et al*., October 2012). The elevated arsenic, uranium, and gross alpha values in samples from CTF-MW2 are consistent with and indicate that upwelling deeply derived fluids are the source.

### 13.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM Environmental Restoration (ER) Operations (formerly ER Project), as well as implements and enforces federal regulations mandated by RCRA. All ER Operations SWMUs are listed in Module IV of the SNL/NM RCRA Permit, *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units to the RCRA Part B Permit (Module IV), Sandia National Laboratories, NM5890110518* (NMED 1993). All corrective action requirements pertaining to SWMUs are contained in the Order (NMED April 2004).

In August 1997, an NFA proposal was submitted to the NMED for SWMU 154 (SNL August 1997). In January 1998, as part of a five site sampling comparison study required by the NMED (January 1998), additional samples were collected at SWMU 154 from boreholes drilled through the center of, and beneath, the two SWMU 154-A HE compound seepage pits. The analytical results were submitted to the NMED, and in June 1999, the NMED responded with an RSI on the NFA proposal (NMED June 1999). The NMED also stated that no septic system NFA proposals would be approved without groundwater characterization unless the NMED received assurance that such approvals would be protective of human health and the environment.

The general and site-specific comments were addressed in a response to the RSI submitted in September 1999 (SNL September 1999a). As specified in the subsequently approved SAP (SNL October 1999), DOE/NNSA and Sandia agreed to install a groundwater monitoring well. The SAP was approved by the NMED in January 2000 (NMED January 2000). Technical details for soil sampling procedures, soil sampling locations, laboratory analytical methods, and passive soil vapor sampling requirements at these sites were specified in a follow-up Field Implementation Plan (SNL November 2001), which was also

approved by the NMED (February 2002). DOE/NNSA and Sandia were required to collect groundwater samples for a minimum of eight quarters and analyze the samples for VOCs, RCRA metals, and HE compounds.

Analytical results for these sampling events were included in a third RSI response and the CAC proposal submitted to the NMED (SNL June 2005). In September 2005, the NMED issued a NOD (NMED September 2005) requiring DOE/NNSA and Sandia to characterize an uninvestigated seepage pit associated with Building 9961 in accordance with the approved SAP (SNL October 1999). In January 2006, a response summarizing the results of the soil sampling was submitted (SNL January 2006), and the NMED then issued a Certificate of Completion for CAC (NMED March 2006).

In March 2006, a Class III Permit Modification Request was submitted to the NMED (SNL March 2006). In April 2010, the NMED responded to the Permit Modification Request with a letter requiring further corrective action at SWMU 154 (NMED April 2010) in the form of an additional eight quarters of groundwater monitoring at monitoring well CTF-MW2. In June 2010, a SAP for monitoring well CTF-MW2 was submitted (SNL June 2010), which the NMED approved (NMED December 2010).

Quarterly groundwater sampling was resumed at monitoring well CTF-MW2 in CY 2011 and (NMED April 2010) and the eighth and final quarter required by NMED was completed in December 2012. Quarterly groundwater sampling will continue until additional guidance is provided by NMED and the analytical results for CY2013 are presented in Section 13.6.

In this report, SWMU 154 groundwater monitoring data are presented for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (gamma spectroscopy and gross alpha/beta activity) are provided voluntarily by the DOE/NNSA and Sandia. The voluntary inclusion of radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Order, as specified in Section III.A of the Order (NMED April 2004).

### 13.3 Scope of Activities

The field activity discussed in this section is for groundwater monitoring sampling and analysis conducted during CY 2013 sampling events (Table 13-3). The analytical parameters for monitoring well CTF-MW2 for each sampling event are listed in Table 13-4.

### 13.4 Field Methods and Measurements

According to the requirements of the Order (NMED April 2004) addressing Section VII.D.6 and the NMED letter of April 8, 2010 (NMED April 2010), SNL/NM personnel performed groundwater sampling at SWMU 154. The CY 2013 sampling events were conducted in conformance with appropriate SNL/NM Field Operating Procedures for groundwater sampling activities, the SWMU 154 site-specific SAP (SNL June 2010), and Mini-SAP (SNL March 2013, June 2013, August 2013, and November 2013).

Environmental groundwater samples were collected from monitoring well CTF-MW2. Samples were submitted to GEL Laboratories LLC for all analyses. Groundwater samples were analyzed for VOCs, SVOCs, HE compounds, NPN, major anions (i.e., bromide, chloride, fluoride, and sulfate), alkalinity, TAL metals plus uranium, perchlorate, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium.

**Table 13-3. Sampling Dates and SAPs for Monitoring Well CTF-MW2 near SWMU 154, Calendar Year 2013**

| Date of Sampling Event | SAP |
|---|---|
| March 26, 2013 | *SWMU 154 Groundwater Monitoring Mini-SAP for Second Quarter Fiscal Year 2013* (SNL March 2013) |
| June 25, 2013 | *SWMU 154 Groundwater Monitoring Mini-SAP for Third Quarter Fiscal Year 2013* (SNL June 2013) |
| September 17, 2013 | *SWMU 154 Groundwater Monitoring Mini-SAP for Fourth Quarter Fiscal Year 2013* (SNL August 2013) |
| December 17, 2013 | *SWMU 154 Groundwater Monitoring Mini-SAP for First Quarter Fiscal Year 2014* (SNL November 2013) |

**NOTES:**
CTF = Coyote Test Field.
MW = Monitoring Well.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories.
SWMU = Solid Waste Management Unit.

**Table 13-4. Parameters Sampled at SWMU 154 for Each Sampling Event, Calendar Year 2013**

| Parameter | Sampling Period | |
|---|---|---|
| Anions | **March 26, 2013** | **June 25, 2013** |
| Alkalinity | CTF-MW2 | CTF-MW2 |
| Gamma Spec* | CTF-MW2 (dup) | |
| Gross Alpha | | |
| Gross Beta | | |
| HE Compounds | **September 17, 2013** | **December 17, 2013** |
| Isotopic Uranium | CTF-MW2 | CTF-MW2 |
| NPN | | |
| Perchlorate | | |
| SVOCs | | |
| TAL Metals, plus Total Uranium | | |
| VOCs | | |

**NOTES:**
CTF = Coyote Test Field.
Dup = Duplicate sample.
Gamma Spec* = Gamma spectroscopy short list (Americium-241, Cesium-137, Cobalt-60, and Potassium-40).
HE = High explosive.
MW = Monitoring well.
NPN = Nitrate plus nitrite (reported as nitrogen).
SVOC = Semivolatile organic compound.
TAL = Target Analyte List.
VOC = Volatile organic compound.
SWMU = Solid Waste Management Unit.

The monitoring procedures are consistent with procedures identified in the EPA technical enforcement guidance document (EPA 1986) and are described in detail in Section 1.3.

### 13.5 Groundwater Elevation

Throughout CY 2013, water level measurements were obtained to determine groundwater flow directions, hydraulic gradients, and changes in water table elevations. The water level information was used to create the base-wide potentiometric surface map discussed in Section 2.6.2.2 and shown in Plate 1. The hydrograph for monitoring well CTF-MW2 is provided in Figure 13C-1 (Attachment 13C).

## 13.6 Analytical Methods

EPA and DOE analytical methods are discussed in Section 1.3.2. Parameters analyzed and sampling periods in CY 2013 are presented in Table 13-4.

## 13.7 Summary of Analytical Results

This section discusses analytical results, exceedances of standards, and field measurements for the CY 2013 SWMU 154 sampling events. Data are presented in Tables 13A-1 through 13A-11 (Attachment 13A). Groundwater sampling results are compared with established EPA MCLs for drinking water (EPA 2009). Concentration trend plots for parameters that exceed the MCLs are presented in Attachments 13B, Figure 13B-1, and Figure 13B-2. Data qualifiers are explained in the footnotes following Table 13A-11. Analytical reports, including certificates of analyses, analytical methods, method detection limits (MDLs), minimum detectable activity, critical level, practical quantitation limits (PQLs), dates of analyses, results of QC analyses, and data validation findings are filed in the SNL/NM Records Center.

The analytical data were reviewed and qualified in accordance with SNL/NM AOP 00-03 (SNL May 2011). No problems were identified with the analytical data that resulted in qualification of the data as unusable. The data are acceptable and reported QC measures are adequate.

No VOCs, SVOCs, or HE compounds were detected at concentrations exceeding established MCLs in any of the monitoring well CTF-MW2 groundwater samples. No SVOCs were reported above laboratory MDLs. Table 13A-1 summarizes detected VOCs, SVOCs, and HE compounds for monitoring well CTF-MW2 environmental groundwater samples (Attachment 13A). Table 13A-2 lists the MDLs for associated VOCs. Table 13A-3 lists the MDLs for associated SVOCs. The MDLs for HE compounds are presented in Table 13A-4. Detected compounds for the CY 2013 sampling events are summarized as follows:

- **March 2013 Sampling Event—**The HE compound RDX was detected in monitoring well CTF-MW2 environmental and duplicate environmental samples at concentrations of 0.354 and 0.352 micrograms per liter (µg/L), respectively.
- **June 2013 Sampling Event—**The HE compound RDX was detected at a concentration of 0.248 µg/L.
- **September 2013 Sampling Event—**The HE compound RDX was detected at a concentration of 0.357 µg/L.
- **December 2013 Sampling Event—**The HE compound RDX was detected at a concentration of 0.357 µg/L.

Table 13A-5 summarizes NPN results (Attachment 13A). NPN values were compared with the nitrate MCL of 10 mg/L. NPN was not detected above the established MCL in monitoring well CTF-MW2 samples for CY 2013.

Table 13A-6 summarizes major anion (i.e., bromide, chloride, fluoride, and sulfate) and alkalinity results (Attachment 13A). No parameters were detected above established MCLs in monitoring well CTF-MW2 samples for CY 2013.

Perchlorate was not detected above the NMED screening level/MDL of 4 µg/L in CY 2013 monitoring well CTF-MW2 samples. Table 13A-7 presents the perchlorate results (Attachment 13A).

Metal analysis includes two sets of analyses and results. Samples were collected as both filtered and unfiltered fractions. One sample was filtered, using an in-line disposable filter, to remove suspended solids. Unfiltered and filtered metal results are summarized in Tables 13A-8 and 13A-9, respectively (Attachment 13A). The only metal detected above established MCLs in monitoring well CTF-MW2 CY 2013 groundwater samples is arsenic, discussed as follows:

- **March 2013 Sampling Event—**Arsenic was detected above the MCL of 0.010 mg/L in both unfiltered and filtered environmental and duplicate environmental samples. Unfiltered arsenic was reported at concentrations of 0.0456 and 0.0444 mg/L, and filtered arsenic at 0.0496 and 0.0463 mg/L.

- **June 2013 Sampling Event—**Arsenic was detected above the MCL of 0.010 mg/L in both unfiltered and filtered groundwater samples. Unfiltered arsenic was reported at a concentration of 0.046 mg/L, and filtered arsenic at 0.0477 mg/L.

- **September 2013 Sampling Event—**Arsenic was detected above the MCL of 0.010 mg/L in both unfiltered and filtered groundwater samples. Unfiltered arsenic was reported at a concentration of 0.0438 mg/L, and filtered arsenic at 0.0448 mg/L.

- **December 2013 Sampling Event—**Arsenic was detected above the MCL of 0.010 mg/L in both unfiltered and filtered groundwater samples. Unfiltered arsenic was reported at a concentration of 0.039 mg/L, and filtered arsenic at 0.0366 mg/L.

Arsenic concentrations in groundwater samples collected since March 2002 are plotted on Figure 13B-1 (Attachment 13B).

The results for gamma spectroscopy, gross alpha/beta activity, and isotopic uranium analyses are presented in Table 13A-10 (Attachment 13A). Gross alpha activity is measured as a screening tool and in accordance with 40 Code of Federal Regulations, Parts 9, 141, and 142, Table I-4 does not include uranium, which is measured independently. Therefore, gross alpha activity measurements were corrected by subtracting the total uranium activity. Radiological results are further reviewed by an SNL/NM Certified Health Physicist to assure that the samples are nonradioactive. All radionuclide activity results are below the MCLs, where established, except for gross alpha, discussed as follows:

- **September 2013 Sampling Event—**The initial corrected gross alpha activity was reported above the MCL of 15 picocuries per liter (pCi/L) at an activity of 23.54 pCi/L and 26.94 pCi/L in the reanalysis. The reported activities are comparable to historic values and are likely due to deep upwelling waters.

- **December 2013 Sampling Event—**The corrected gross alpha activity was reported above the MCL of 15 pCi/L at an activity of 21.25 pCi/L. The reported activities are comparable to historic values and are likely due to deep upwelling waters. Corrected gross alpha activities are **plotted** on Figure 13B-2 (Attachment 13B.)

Table 13A-11 summarizes field water quality measurements collected prior to sampling (Attachment 13A). Field water quality measurements include turbidity, pH, temperature, specific conductance, oxidation-reduction potential, and dissolved oxygen.

## 13.8 Quality Control Results

Field and laboratory QC samples were prepared to determine the accuracy of the methods used and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process. The results for each QC sample and the impact on data quality for the SWMU 154 monitoring well CTF-MW2 quarterly sampling events are discussed in the following sections.

### 13.8.1 Field Quality Control Samples

Field QC samples included duplicate environmental samples, FBs, TBs, and EBs. The following sections discuss the analytical results for each QC sample type.

#### 13.8.1.1 Duplicate Environmental Samples

Duplicate environmental samples were analyzed to estimate the overall reproducibility of the sampling and analytical process. Relative percent difference (RPD) calculations, between duplicate samples, were performed for detected chemical analytes. The March 2013 duplicate sample data results show good agreement (low RPD values less than or equal to 20 percent for organic compounds and less than or equal to 35 for inorganic analyses) for all calculated parameters. The bromide RPD was calculated at 77, but is considered an estimated value because both results are reported below the laboratory practical quantitation limit.

#### 13.8.1.2 Equipment Blank Samples

EB (rinsate) samples are collected to verify the equipment decontamination process. The March 2013 EB, or rinsate, sample was collected prior to sampling monitoring well CTF-MW3 and submitted for all analyses. Aluminum, bromodichloromethane, bromoform, chloroform, chloride, copper, dibromochloromethane, nickel, sodium, and zinc were detected above laboratory MDLs. No corrective action was necessary, for parameters except aluminum and copper, because these analytes were not detected in environmental samples, nor were detected in environmental samples at concentrations greater than five times the EB result. Both aluminum and copper were detected in the EB sample at concentrations less than five times then the associated environmental samples. Therefore, aluminum and copper were qualified as not detected during data validation for both environmental and duplicate environmental samples.

#### 13.8.1.3 Trip Blank Samples

TB samples are submitted whenever samples are collected for VOC analyses to assess whether contamination of the samples had occurred during shipment and storage. A total of five TB samples were submitted during CY 2013. Two TBs were submitted for the March 2013 sampling event and one sample each for June, September, and December 2013. No VOCs were detected above the associated laboratory MDLs in any of the TB samples.

#### 13.8.1.4 Field Blank Samples

A FB sample was collected for VOCs to assess whether contamination of the samples resulted from ambient field conditions. The March 2013 FB sample from the monitoring well CTF-MW3 detected the VOCs bromodichloromethane, bromoform, chloroform, and dibromochloromethane. No correction action was applied during data validation, because these compounds were not detected in the environmental samples. These compounds are common by-products of the deionization water purification process.

### 13.8.2 Laboratory Control Samples

Internal laboratory QC samples, including method blanks and duplicate laboratory control samples, were analyzed concurrently with all groundwater samples. During the March 2013 sampling event, no significant data quality problems were noted during the data validation process. In June, September, and

December 2013 some analytical results were qualified during the data validation process; however, no significant data quality problems were noted for project COCs. All analytical data are acceptable and reported QC measures appear adequate.

### 13.9 Variances and Nonconformances

No variances or nonconformances from requirements in the SWMU 154 SAP (SNL June 2010) occurred during the CY 2013 sampling activities.

### 13.10 Summary and Conclusions

During CY 2013, four quarterly groundwater samples were collected from monitoring well CTF-MW2. Analytical parameters included VOCs, SVOCs, HE compounds, NPN, major anions, alkalinity, TAL total metals plus uranium, perchlorate, gross alpha/beta activity, radionuclides by gamma spectroscopy, and isotopic uranium. Results were compared with MCL guidelines for drinking water (EPA 2009) and are summarized as follows:

- **March 2013 Sampling Event—**No parameters were detected above established MCLs, except for arsenic. Arsenic exceeded the MCL of 0.010 mg/L in all monitoring well CTF-MW2 groundwater samples at concentrations ranging from 0.0456 to 0.0444 mg/L in unfiltered samples and ranging from 0.0496 to 0.0463 mg/L in filtered samples, respectively.

- **May 2013 Sampling Event—**No parameters were detected above established MCLs, except for arsenic. Arsenic exceeds the MCL of 0.010 mg/L in both unfiltered and filtered monitoring well CTF-MW2 groundwater samples at concentrations of 0.046 mg/L, and 0.0477 mg/L, respectively.

- **September 2013 Sampling Event—**No parameters were detected above established MCLs, except for arsenic and gross alpha. Arsenic exceeded the MCL of 0.010 mg/L in both unfiltered and filtered monitoring well CTF-MW2 groundwater samples. Unfiltered arsenic was reported at a concentration of 0.0438 mg/L, and filtered arsenic at 0.0448 mg/L. The initial corrected gross alpha activity was reported above the MCL of 15 pCi/L at an activity of 23.54 pCi/L and 26.94 pCi/L in the reanalysis. The reported activities are comparable to historic values and are likely due to deep upwelling waters.

- **December 2013 Sampling Event—**No parameters were detected above established MCLs, except for arsenic and gross alpha. Arsenic exceeded the MCL of 0.010 mg/L in both unfiltered and filtered monitoring well CTF-MW2 groundwater samples. Unfiltered arsenic was reported at a concentration of 0.039 mg/L, and filtered arsenic at 0.0366 mg/L. The corrected gross alpha activity was reported above the MCL of 15 pCi/L at an activity of 21.25 pCi/L. The reported activities are comparable to historic values and are likely due to deep upwelling waters.

The analytical results for this reporting period are consistent with historical concentrations. The current conceptual model described in Section 13.1.7 does not require modification based on the analytical results for this reporting period.

During CY 2014, analytical results will be summarized and additional analysis may be performed and submitted to NMED to support discussions of resuming the regulatory process for designating the site as CAC.

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# Attachment 13A
# Solid Waste Management Unit 154
# Analytical Results Tables

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# Attachment 13A Tables


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## Table 13A-1
## Summary of Detected Volatile Organic, Semivolatile Organic, and High Explosive Compounds, Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW2** 26-Mar-13 | RDX | 0.354 | 0.0889 | 0.278 | NE | | J+ | 093723-024 | SW846 8321A |
| **CTF-MW2** (Duplicate) 26-Mar-13 | RDX | 0.352 | 0.0879 | 0.275 | NE | | J+ | 093724-024 | SW846 8321A |
| | | | | | | | | | |
| **CTF-MW2** 25-Jun-13 | RDX | 0.248 | 0.087 | 0.272 | NE | J | | 094042-024 | SW846 8321A |
| | | | | | | | | | |
| **CTF-MW2** 17-Sep-13 | RDX | 0.357 | 0.0833 | 0.260 | NE | * | J | 094646-024 | SW846 8321A |
| | | | | | | | | | |
| **CTF-MW2** 17-Dec-13 | RDX | 0.357 | 0.0865 | 0.270 | NE | | | 095086-024 | SW846 8321A |

Refer to footnotes on page 13A-25.

## Table 13A-2
## Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B), Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Analyte | MDL[b] (µg/L) | Analyte | MDL[b] (µg/L) |
|---|---|---|---|
| 1,1,1-Trichloroethane | 0.300 | Chlorobenzene | 0.300 |
| 1,1,2,2-Tetrachloroethane | 0.300 | Chloroethane | 0.300 |
| 1,1,2-Trichloroethane | 0.300 | Chloroform | 0.300 |
| 1,1-Dichloroethane | 0.300 | Chloromethane | 0.300 |
| 1,1-Dichloroethene | 0.300 | Cyclohexane | 0.300 |
| 1,2,3-Trichlorobenzene | 0.300 | Dibromochloromethane | 0.300 |
| 1,2,4-Trichlorobenzene | 0.300 | Dichlorodifluoromethane | 0.300 |
| 1,2-Dibromo-3-chloropropane | 0.300 | Ethyl benzene | 0.300 |
| 1,2-Dibromoethane | 0.300 | Isopropylbenzene | 0.300 |
| 1,2-Dichlorobenzene | 0.300 | Methyl acetate | 1.50 |
| 1,2-Dichloroethane | 0.300 | Methylcyclohexane | 3.00 |
| 1,2-Dichloropropane | 0.300 | Methylene chloride | 3.00 |
| 1,3-Dichlorobenzene | 0.300 | Styrene | 0.300 |
| 1,4-Dichlorobenzene | 0.300 | Tert-butyl methyl ether | 0.300 |
| 2,2-trifluoroethane, 1,1,2-Trichloro-1 | 1.50 | Tetrachloroethene | 0.300 |
| 2-Butanone | 2.00 | Toluene | 0.300 |
| 2-Hexanone | 2.20 | Trichloroethene | 0.300 |
| 4-methyl-, 2-Pentanone | 1.50 | Trichlorofluoromethane | 0.300 |
| Acetone | 3.00 | Vinyl chloride | 0.300 |
| Benzene | 0.300 | Xylene | 0.300 |
| Bromochloromethane | 0.300 | cis-1,2-Dichloroethene | 0.300 |
| Bromodichloromethane | 0.300 | cis-1,3-Dichloropropene | 0.300 |
| Bromoform | 0.300 | m-, p-Xylene | 0.300 |
| Bromomethane | 0.300 | o-Xylene | 0.300 |
| Carbon disulfide | 1.50 | trans-1,2-Dichloroethene | 0.300 |
| Carbon tetrachloride | 0.300 | trans-1,3-Dichloropropene | 0.300 |

Refer to footnotes on page 13A-25.

## Table 13A-3
## Method Detection Limits for Semivolatile Organic Compounds (EPA Method[g] SW846-8270D), Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Analyte | MDL[b] (µg/L) | Analyte | MDL[b] (µg/L) |
|---|---|---|---|
| 1'-Biphenyl 1 | 3.00 – 3.33 | Butylbenzyl phthalate | 3.00 – 3.33 |
| 1,4-Dioxane | 3.00 – 3.33 | Caprolactam | 3.00 – 3.33 |
| 1,2,4-Trichlorobenzene | 3.00 – 3.33 | Carbazole | 0.300 – 0.333 |
| 2,4,5-Trichlorophenol | 3.00 – 3.33 | Chrysene | 0.300 – 0.333 |
| 2,4,6-Trichlorophenol | 3.00 – 3.33 | Di-n-butyl phthalate | 3.00 – 3.33 |
| 2,4-Dichlorophenol | 3.00 – 3.33 | Di-n-octyl phthalate | 3.00 – 3.33 |
| 2,4-Dimethylphenol | 3.00 – 3.33 | Dibenz[a,h]anthracene | 0.300 – 0.333 |
| 2,4-Dinitrophenol | 5.00 – 5.56 | Dibenzofuran | 3.00 – 3.33 |
| 2,4-Dinitrotoluene | 3.00 – 3.33 | Diethylphthalate | 3.00 – 3.33 |
| 2,6-Dinitrotoluene | 3.00 – 3.33 | Dimethylphthalate | 3.00 – 3.33 |
| 2-Chloronaphthalene | 0.300 – 0.410 | Dinitro-o-cresol | 3.00 – 3.33 |
| 2-Chlorophenol | 3.00 – 3.33 | Diphenyl amine | 3.00 – 3.33 |
| 2-Methylnaphthalene | 0.300 – 0.333 | Fluoranthene | 0.300 – 0.333 |
| 2-Nitroaniline | 3.00 – 3.33 | Fluorene | 0.300 – 0.333 |
| 2-Nitrophenol | 3.00 – 3.33 | Hexachlorobenzene | 3.00 – 3.33 |
| 3,3'-Dichlorobenzidine | 3.00 – 3.33 | Hexachlorobutadiene | 3.00 – 3.33 |
| 3-Nitroaniline | 3.00 – 3.33 | Hexachlorocyclopentadiene | 3.00 – 3.33 |
| 4-Bromophenyl phenyl ether | 3.00 – 3.33 | Hexachloroethane | 3.00 – 3.33 |
| 4-Chloro-3-methylphenol | 3.00 – 3.33 | Indeno(1,2,3-c,d)pyrene | 0.300 – 0.333 |
| 4-Chlorobenzenamine | 3.30 – 3.67 | Isophorone | 3.00 – 3.50 |
| 4-Chlorophenyl phenyl ether | 3.00 – 3.33 | Naphthalene | 0.300 – 0.333 |
| 4-Nitroaniline | 3.00 – 3.33 | Nitro-benzene | 3.00 – 3.33 |
| 4-Nitrophenol | 3.00 – 3.33 | Pentachlorophenol | 3.00 – 3.33 |
| Acenaphthene | 0.300 – 0.333 | Phenanthrene | 0.300 – 0.333 |
| Acenaphthylene | 0.300 – 0.333 | Phenol | 3.00 – 3.33 |
| Acetophenone | 3.00 – 3.33 | Pyrene | 0.300 – 0.333 |
| Anthracene | 0.300 – 0.333 | bis(2-Chloroethoxy)methane | 3.00 – 3.33 |
| Atrazine | 3.00 – 3.33 | bis(2-Chloroethyl)ether | 3.00 – 3.33 |
| Benzaldehyde | 5.00 – 5.56 | bis(2-Chloroisopropyl)ether | 3.00 – 3.33 |
| Benzo(a)anthracene | 0.300 – 0.333 | bis(2-Ethylhexyl)phthalate | 3.00 – 3.33 |
| Benzo(a)pyrene | 0.300 – 0.489 | m,p-Cresol | 3.00 – 3.70 |
| Benzo(b)fluoranthene | 0.300 – 0.333 | n-Nitrosodipropylamine | 3.00 – 3.33 |
| Benzo(ghi)perylene | 0.300 – 0.333 | o-Cresol | 3.00 – 3.33 |
| Benzo(k)fluoranthene | 0.300 – 0.333 | | |

Refer to footnotes on page 13A-25.

## Table 13A-4
## Method Detection Limits for High Explosive Compounds (EPA Method[g] SW846-8321A), Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2013

| Analyte | MDL[b] (µg/L) |
|---|---|
| 1,3,5-Trinitrobenzene | 0.0833 – 0.0889 |
| 1,3-Dinitrobenzene | 0.0833 – 0.0889 |
| 2,4,6-Trinitrotoluene | 0.0833 – 0.0889 |
| 2,4-Dinitrotoluene | 0.0833 – 0.0889 |
| 2,6-Dinitrotoluene | 0.0833 – 0.0889 |
| 2-Amino-4,6-dinitrotoluene | 0.0833 – 0.0889 |
| 2-Nitrotoluene | 0.0854 – 0.0911 |
| 3-Nitrotoluene | 0.0833 – 0.0889 |
| 4-Amino-2,6-dinitrotoluene | 0.0833 – 0.0889 |
| 4-Nitrotoluene | 0.156 – 0.167 |
| HMX | 0.0833 – 0.0889 |
| Nitro-benzene | 0.0833 – 0.0889 |
| Pentaerythritol tetranitrate | 0.104 – 0.111 |
| RDX | 0.0833 – 0.0889 |
| Tetryl | 0.0833 – 0.0889 |

Refer to footnotes on page 13A-25.

## Table 13A-5
## Summary of Nitrate plus Nitrite Results,
## Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW2** 26-Mar-13 | Nitrate plus nitrite | ND | 0.085 | 0.250 | 10.0 | U | | 093723-018 | EPA 353.2 |
| **CTF-MW2** (Duplicate) 26-Mar-13 | Nitrate plus nitrite | ND | 0.085 | 0.250 | 10.0 | U | | 093724-018 | EPA 353.2 |
| | | | | | | | | | |
| **CTF-MW2** 25-Jun-13 | Nitrate plus nitrite | ND | 0.017 | 0.050 | 10.0 | U | | 094042-018 | EPA 353.2 |
| | | | | | | | | | |
| **CTF-MW2** 17-Sep-13 | Nitrate plus nitrite | ND | 0.017 | 0.050 | 10.0 | U | | 094646-018 | EPA 353.2 |
| | | | | | | | | | |
| **CTF-MW2** 17-Dec-13 | Nitrate plus nitrite | ND | 0.017 | 0.050 | 10.0 | U | | 095086-018 | EPA 353.2 |

Refer to footnotes on page 13A-25.

## Table 13A-6
## Summary of Anion and Alkalinity Results,
## Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW2** | Bicarbonate Alkalinity | 1580 | 0.725 | 1.00 | NE | | | 093723-022 | SM2320B |
| 26-Mar-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093723-022 | SM2320B |
| | Bromide | 1.64 | 0.670 | 2.00 | NE | J | | 093723-016 | SW846 9056 |
| | Chloride | 380 | 6.70 | 20.0 | NE | | | 093723-016 | SW846 9056 |
| | Fluoride | 2.28 | 0.033 | 0.100 | 4.0 | | | 093723-016 | SW846 9056 |
| | Sulfate | 130 | 1.33 | 4.00 | NE | | | 093723-016 | SW846 9056 |
| **CTF-MW2** (Duplicate) | Bicarbonate Alkalinity | 1580 | 0.725 | 1.00 | NE | | | 093724-022 | SM2320B |
| 26-Mar-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 093724-022 | SM2320B |
| | Bromide | 0.725 | 0.670 | 2.00 | NE | J | | 093724-016 | SW846 9056 |
| | Chloride | 414 | 6.70 | 20.0 | NE | | | 093724-016 | SW846 9056 |
| | Fluoride | 2.30 | 0.033 | 0.100 | 4.0 | | | 093724-016 | SW846 9056 |
| | Sulfate | 181 | 1.33 | 4.00 | NE | | | 093724-016 | SW846 9056 |
| | | | | | | | | | |
| **CTF-MW2** | Bicarbonate Alkalinity | 1560 | 0.725 | 1.00 | NE | | | 094042-022 | SM2320B |
| 25-Jun-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094042-022 | SM2320B |
| | Bromide | 1.69 | 0.134 | 0.400 | NE | | | 094042-016 | SW846 9056 |
| | Chloride | 437 | 6.70 | 20.0 | NE | | | 094042-016 | SW846 9056 |
| | Fluoride | 2.37 | 0.033 | 0.100 | 4.0 | | | 094042-016 | SW846 9056 |
| | Sulfate | 152 | 13.3 | 40.0 | NE | | | 094042-016 | SW846 9056 |
| | | | | | | | | | |
| **CTF-MW2** | Bicarbonate Alkalinity | 1480 | 0.725 | 1.00 | NE | | | 094646-022 | SM2320B |
| 17-Sep-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 094646-022 | SM2320B |
| | Bromide | 1.89 | 0.067 | 0.200 | NE | | | 094646-016 | SW846 9056 |
| | Chloride | 453 | 6.70 | 20.0 | NE | | | 094646-016 | SW846 9056 |
| | Fluoride | 2.22 | 0.033 | 0.100 | 4.0 | | | 094646-016 | SW846 9056 |
| | Sulfate | 150 | 13.3 | 40.0 | NE | | | 094646-016 | SW846 9056 |
| | | | | | | | | | |
| **CTF-MW2** | Bicarbonate Alkalinity | 1540 | 0.725 | 1.00 | NE | | | 095086-022 | SM2320B |
| 17-Dec-13 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 095086-022 | SM2320B |
| | Bromide | 1.48 | 0.268 | 0.800 | NE | H | J | 095086-016 | SW846 9056 |
| | Chloride | 437 | 6.70 | 20.0 | NE | | | 095086-016 | SW846 9056 |
| | Fluoride | 2.57 | 0.033 | 0.100 | 4.0 | | | 095086-016 | SW846 9056 |
| | Sulfate | 153 | 13.3 | 40.0 | NE | | | 095086-016 | SW846 9056 |

Refer to footnotes on page 13A-25.

## Table 13A-7
## Summary of Perchlorate Results,
## Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Perchlorate Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|
| **CTF-MW2** 26-Mar-13 | ND | 0.004 | 0.012 | NE | U | | 093723-020 | EPA 314.0 |
| **CTF-MW2** (Duplicate) 26-Mar-13 | ND | 0.004 | 0.012 | NE | U | | 093724-020 | EPA 314.0 |
| | | | | | | | | |
| **CTF-MW2** 25-Jun-13 | ND | 0.004 | 0.012 | NE | U | | 094042-020 | EPA 314.0 |
| | | | | | | | | |
| **CTF-MW2** 17-Sep-13 | ND | 0.004 | 0.012 | NE | U | | 094646-020 | EPA 314.0 |
| | | | | | | | | |
| **CTF-MW2** 17-Dec-13 | ND | 0.004 | 0.012 | NE | U | | 095086-020 | EPA 314.0 |

Refer to footnotes on page 13A-25.

## Table 13A-8
## Summary of Target Analyte List Metal Results,
## Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW2** | Aluminum | 0.0957 | 0.015 | 0.050 | NE | | 0.11U | 093723-009 | SW846 6020 |
| 26-Mar-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093723-009 | SW846 6020 |
| | Arsenic | **0.0456** | 0.0017 | 0.005 | 0.010 | | | 093723-009 | SW846 6020 |
| | Barium | 0.0797 | 0.0006 | 0.002 | 2.00 | | | 093723-009 | SW846 6020 |
| | Beryllium | 0.00228 | 0.0002 | 0.0005 | 0.004 | | | 093723-009 | SW846 6020 |
| | Cadmium | 0.000163 | 0.00011 | 0.001 | 0.005 | J | | 093723-009 | SW846 6020 |
| | Calcium | 366 | 2.40 | 8.00 | NE | | | 093723-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093723-009 | SW846 6020 |
| | Cobalt | 0.00872 | 0.0001 | 0.001 | NE | | J | 093723-009 | SW846 6020 |
| | Copper | 0.00155 | 0.00035 | 0.001 | NE | | 0.015UJ | 093723-009 | SW846 6020 |
| | Iron | 2.95 | 0.033 | 0.100 | NE | | J | 093723-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093723-009 | SW846 6020 |
| | Magnesium | 76.2 | 0.400 | 1.20 | NE | | J | 093723-009 | SW846 6020 |
| | Manganese | 2.97 | 0.040 | 0.200 | NE | | | 093723-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093723-009 | SW846 7470 |
| | Nickel | 0.0223 | 0.0005 | 0.002 | NE | | | 093723-009 | SW846 6020 |
| | Potassium | 44.9 | 0.080 | 0.300 | NE | | | 093723-009 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | U | | 093723-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093723-009 | SW846 6020 |
| | Sodium | 486 | 1.60 | 5.00 | NE | | | 093723-009 | SW846 6020 |
| | Thallium | 0.00109 | 0.00045 | 0.002 | 0.002 | J | | 093723-009 | SW846 6020 |
| | Uranium | 0.0242 | 0.000067 | 0.0002 | 0.03 | | | 093723-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | UJ | 093723-009 | SW846 6010 |
| | Zinc | 0.405 | 0.0035 | 0.010 | NE | | J | 093723-009 | SW846 6020 |

Refer to footnotes on page 13A-25.

**Table 13A-8** *(Continued)*
**Summary of Target Analyte List Metal Results,**
**Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW2** (Duplicate) | Aluminum | 0.0932 | 0.015 | 0.050 | NE | | 0.11U | 093724-009 | SW846 6020 |
| 26-Mar-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093724-009 | SW846 6020 |
| | Arsenic | **0.0444** | 0.0017 | 0.005 | 0.010 | | | 093724-009 | SW846 6020 |
| | Barium | 0.0805 | 0.0006 | 0.002 | 2.00 | | | 093724-009 | SW846 6020 |
| | Beryllium | 0.00224 | 0.0002 | 0.0005 | 0.004 | | | 093724-009 | SW846 6020 |
| | Cadmium | 0.000158 | 0.00011 | 0.001 | 0.005 | J | | 093724-009 | SW846 6020 |
| | Calcium | 365 | 2.40 | 8.00 | NE | | | 093724-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093724-009 | SW846 6020 |
| | Cobalt | 0.0088 | 0.0001 | 0.001 | NE | | J | 093724-009 | SW846 6020 |
| | Copper | 0.0017 | 0.00035 | 0.001 | NE | | 0.015UJ | 093724-009 | SW846 6020 |
| | Iron | 2.92 | 0.033 | 0.100 | NE | | J | 093724-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093724-009 | SW846 6020 |
| | Magnesium | 75.6 | 0.400 | 1.20 | NE | | J | 093724-009 | SW846 6020 |
| | Manganese | 2.94 | 0.040 | 0.200 | NE | | | 093724-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093724-009 | SW846 7470 |
| | Nickel | 0.0224 | 0.0005 | 0.002 | NE | | | 093724-009 | SW846 6020 |
| | Potassium | 45.1 | 0.080 | 0.300 | NE | | | 093724-009 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | U | | 093724-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093724-009 | SW846 6020 |
| | Sodium | 491 | 1.60 | 5.00 | NE | | | 093724-009 | SW846 6020 |
| | Thallium | 0.00105 | 0.00045 | 0.002 | 0.002 | J | | 093724-009 | SW846 6020 |
| | Uranium | 0.0234 | 0.000067 | 0.0002 | 0.03 | | | 093724-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | UJ | 093724-009 | SW846 6010 |
| | Zinc | 0.422 | 0.0035 | 0.010 | NE | | J | 093724-009 | SW846 6020 |

Refer to footnotes on page 13A-25.

**Table 13A-8** *(Continued)*
**Summary of Target Analyte List Metal Results,**
**Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW2** | Aluminum | 0.111 | 0.015 | 0.050 | NE | | | 094042-009 | SW846 6020 |
| 25-Jun-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094042-009 | SW846 6020 |
| | Arsenic | **0.046** | 0.0017 | 0.005 | 0.010 | | | 094042-009 | SW846 6020 |
| | Barium | 0.0766 | 0.0006 | 0.002 | 2.00 | | | 094042-009 | SW846 6020 |
| | Beryllium | 0.00292 | 0.0002 | 0.0005 | 0.004 | | | 094042-009 | SW846 6020 |
| | Cadmium | 0.000535 | 0.00011 | 0.001 | 0.005 | J | J+ | 094042-009 | SW846 6020 |
| | Calcium | 355 | 0.600 | 2.00 | NE | | | 094042-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094042-009 | SW846 6020 |
| | Cobalt | 0.0104 | 0.0001 | 0.001 | NE | | | 094042-009 | SW846 6020 |
| | Copper | 0.00149 | 0.00035 | 0.001 | NE | | J- | 094042-009 | SW846 6020 |
| | Iron | 2.41 | 0.033 | 0.100 | NE | | J | 094042-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094042-009 | SW846 6020 |
| | Magnesium | 83.0 | 0.100 | 0.300 | NE | | | 094042-009 | SW846 6020 |
| | Manganese | 2.81 | 0.010 | 0.050 | NE | | J | 094042-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094042-009 | SW846 7470 |
| | Nickel | 0.0228 | 0.0005 | 0.002 | NE | | | 094042-009 | SW846 6020 |
| | Potassium | 44.1 | 0.080 | 0.300 | NE | | J | 094042-009 | SW846 6020 |
| | Selenium | 0.00191 | 0.0015 | 0.005 | 0.050 | J | | 094042-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094042-009 | SW846 6020 |
| | Sodium | 449 | 0.800 | 2.50 | NE | | | 094042-009 | SW846 6020 |
| | Thallium | 0.00133 | 0.00045 | 0.002 | 0.002 | J | | 094042-009 | SW846 6020 |
| | Uranium | 0.0276 | 0.000067 | 0.0002 | 0.03 | | | 094042-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | UJ | 094042-009 | SW846 6010 |
| | Zinc | 0.280 | 0.0175 | 0.050 | NE | | J | 094042-009 | SW846 6020 |

Refer to footnotes on page 13A-25.

**Table 13A-8** *(Continued)*
**Summary of Target Analyte List Metal Results,**
**Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW2** | Aluminum | 0.118 | 0.075 | 0.250 | NE | J | | 094646-009 | SW846 6020 |
| 17-Sep-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | N, U | UJ | 094646-009 | SW846 6020 |
| | Arsenic | **0.0438** | 0.0017 | 0.005 | 0.010 | | | 094646-009 | SW846 6020 |
| | Barium | 0.080 | 0.0006 | 0.002 | 2.00 | | J | 094646-009 | SW846 6020 |
| | Beryllium | 0.00318 | 0.0002 | 0.0005 | 0.004 | | | 094646-009 | SW846 6020 |
| | Cadmium | ND | 0.00055 | 0.005 | 0.005 | U | | 094646-009 | SW846 6020 |
| | Calcium | 367 | 6.00 | 20.0 | NE | | | 094646-009 | SW846 6020 |
| | Chromium | ND | 0.010 | 0.050 | 0.100 | U | | 094646-009 | SW846 6020 |
| | Cobalt | 0.00968 | 0.0005 | 0.005 | NE | | | 094646-009 | SW846 6020 |
| | Copper | ND | 0.00175 | 0.005 | NE | U | | 094646-009 | SW846 6020 |
| | Iron | 2.44 | 0.165 | 0.500 | NE | | J | 094646-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094646-009 | SW846 6020 |
| | Magnesium | 75.8 | 0.050 | 0.150 | NE | | | 094646-009 | SW846 6020 |
| | Manganese | 2.93 | 0.005 | 0.025 | NE | | | 094646-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094646-009 | SW846 7470 |
| | Nickel | 0.0187 | 0.0025 | 0.010 | NE | | | 094646-009 | SW846 6020 |
| | Potassium | 47.4 | 0.400 | 1.50 | NE | | | 094646-009 | SW846 6020 |
| | Selenium | ND | 0.0075 | 0.025 | 0.050 | U | | 094646-009 | SW846 6020 |
| | Silver | ND | 0.001 | 0.005 | NE | U | | 094646-009 | SW846 6020 |
| | Sodium | 451 | 8.00 | 25.0 | NE | | | 094646-009 | SW846 6020 |
| | Thallium | 0.00115 | 0.00045 | 0.002 | 0.002 | J | | 094646-009 | SW846 6020 |
| | Uranium | 0.0255 | 0.000067 | 0.0002 | 0.03 | | | 094646-009 | SW846 6020 |
| | Vanadium | 0.00386 | 0.001 | 0.005 | NE | B, J | 0.018UJ | 094646-009 | SW846 6010 |
| | Zinc | 0.290 | 0.0175 | 0.050 | NE | N | J | 094646-009 | SW846 6020 |

Refer to footnotes on page 13A-25.

**Table 13A-8** *(Concluded)*
**Summary of Target Analyte List Metal Results,**
**Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW2** | Aluminum | 0.118 | 0.015 | 0.050 | NE | | | 095086-009 | SW846 6020 |
| 17-Dec-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 095086-009 | SW846 6020 |
| | Arsenic | **0.039** | 0.0017 | 0.005 | 0.010 | | | 095086-009 | SW846 6020 |
| | Barium | 0.0807 | 0.0006 | 0.002 | 2.00 | | | 095086-009 | SW846 6020 |
| | Beryllium | 0.00265 | 0.0002 | 0.0005 | 0.004 | | | 095086-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 095086-009 | SW846 6020 |
| | Calcium | 344 | 0.600 | 2.00 | NE | | | 095086-009 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 095086-009 | SW846 6020 |
| | Cobalt | 0.00898 | 0.0001 | 0.001 | NE | | J | 095086-009 | SW846 6020 |
| | Copper | 0.0013 | 0.00035 | 0.001 | NE | | J- | 095086-009 | SW846 6020 |
| | Iron | 2.22 | 0.033 | 0.100 | NE | | J | 095086-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 095086-009 | SW846 6020 |
| | Magnesium | 79.1 | 0.100 | 0.300 | NE | | J | 095086-009 | SW846 6020 |
| | Manganese | 3.01 | 0.010 | 0.050 | NE | | | 095086-009 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 095086-009 | SW846 7470 |
| | Nickel | 0.0188 | 0.0005 | 0.002 | NE | | | 095086-009 | SW846 6020 |
| | Potassium | 41.1 | 0.080 | 0.300 | NE | | J | 095086-009 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | U | UJ | 095086-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 095086-009 | SW846 6020 |
| | Sodium | 488 | 1.60 | 5.00 | NE | | | 095086-009 | SW846 6020 |
| | Thallium | 0.00117 | 0.00045 | 0.002 | 0.002 | J | | 095086-009 | SW846 6020 |
| | Uranium | 0.0291 | 0.000067 | 0.0002 | 0.03 | | | 095086-009 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | | 095086-009 | SW846 6010 |
| | Zinc | 0.202 | 0.0035 | 0.010 | NE | | J | 095086-009 | SW846 6020 |

Refer to footnotes on page 13A-25.

## Table 13A-9
## Summary of Filtered Target Analyte List Metal Results,
## Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW2** | Aluminum | 0.0933 | 0.015 | 0.050 | NE | | | 093723-010 | SW846 6020 |
| 26-Mar-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093723-010 | SW846 6020 |
| | Arsenic | **0.0496** | 0.0017 | 0.005 | 0.010 | | | 093723-010 | SW846 6020 |
| | Barium | 0.0849 | 0.0006 | 0.002 | 2.00 | | | 093723-010 | SW846 6020 |
| | Beryllium | 0.00233 | 0.0002 | 0.0005 | 0.004 | | | 093723-010 | SW846 6020 |
| | Cadmium | 0.000155 | 0.00011 | 0.001 | 0.005 | J | | 093723-010 | SW846 6020 |
| | Calcium | 372 | 2.40 | 8.00 | NE | | | 093723-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093723-010 | SW846 6020 |
| | Cobalt | 0.00921 | 0.0001 | 0.001 | NE | | J | 093723-010 | SW846 6020 |
| | Copper | 0.00141 | 0.00035 | 0.001 | NE | | 0.013UJ | 093723-010 | SW846 6020 |
| | Iron | 3.08 | 0.033 | 0.100 | NE | | J | 093723-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093723-010 | SW846 6020 |
| | Magnesium | 81.6 | 0.400 | 1.20 | NE | | J | 093723-010 | SW846 6020 |
| | Manganese | 3.02 | 0.040 | 0.200 | NE | | | 093723-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093723-010 | SW846 7470 |
| | Nickel | 0.0239 | 0.0005 | 0.002 | NE | | | 093723-010 | SW846 6020 |
| | Potassium | 47.2 | 0.080 | 0.300 | NE | | | 093723-010 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | U | | 093723-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093723-010 | SW846 6020 |
| | Sodium | 506 | 1.60 | 5.00 | NE | | | 093723-010 | SW846 6020 |
| | Thallium | 0.0011 | 0.00045 | 0.002 | 0.002 | J | | 093723-010 | SW846 6020 |
| | Uranium | 0.0241 | 0.000067 | 0.0002 | 0.03 | | | 093723-010 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | UJ | 093723-010 | SW846 6010 |
| | Zinc | 0.343 | 0.0035 | 0.010 | NE | | J | 093723-010 | SW846 6020 |

Refer to footnotes on page 13A-25.

**Table 13A-9** *(Continued)*
**Summary of Filtered Target Analyte List Metal Results,**
**Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW2** (Duplicate) | Aluminum | 0.0937 | 0.015 | 0.050 | NE | | | 093724-010 | SW846 6020 |
| 26-Mar-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 093724-010 | SW846 6020 |
| | Arsenic | **0.0463** | 0.0017 | 0.005 | 0.010 | | | 093724-010 | SW846 6020 |
| | Barium | 0.0813 | 0.0006 | 0.002 | 2.00 | | | 093724-010 | SW846 6020 |
| | Beryllium | 0.00241 | 0.0002 | 0.0005 | 0.004 | | | 093724-010 | SW846 6020 |
| | Cadmium | 0.000137 | 0.00011 | 0.001 | 0.005 | J | | 093724-010 | SW846 6020 |
| | Calcium | 298 | 2.40 | 8.00 | NE | | | 093724-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 093724-010 | SW846 6020 |
| | Cobalt | 0.00896 | 0.0001 | 0.001 | NE | | J | 093724-010 | SW846 6020 |
| | Copper | 0.00247 | 0.00035 | 0.001 | NE | | 0.013UJ | 093724-010 | SW846 6020 |
| | Iron | 3.06 | 0.033 | 0.100 | NE | | J | 093724-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 093724-010 | SW846 6020 |
| | Magnesium | 63.6 | 0.400 | 1.20 | NE | | J | 093724-010 | SW846 6020 |
| | Manganese | 2.44 | 0.040 | 0.200 | NE | | | 093724-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | UJ | 093724-010 | SW846 7470 |
| | Nickel | 0.0244 | 0.0005 | 0.002 | NE | | | 093724-010 | SW846 6020 |
| | Potassium | 43.9 | 0.080 | 0.300 | NE | | | 093724-010 | SW846 6020 |
| | Selenium | ND | 0.0015 | 0.005 | 0.050 | U | | 093724-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 093724-010 | SW846 6020 |
| | Sodium | 474 | 1.60 | 5.00 | NE | | | 093724-010 | SW846 6020 |
| | Thallium | 0.00106 | 0.00045 | 0.002 | 0.002 | J | | 093724-010 | SW846 6020 |
| | Uranium | 0.0238 | 0.000067 | 0.0002 | 0.03 | | | 093724-010 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | UJ | 093724-010 | SW846 6010 |
| | Zinc | 0.352 | 0.0035 | 0.010 | NE | | J | 093724-010 | SW846 6020 |

Refer to footnotes on page 13A-25.

**Table 13A-9** *(Continued)*
**Summary of Filtered Target Analyte List Metal Results,**
**Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW2** | Aluminum | 0.111 | 0.015 | 0.050 | NE | | | 094042-010 | SW846 6020 |
| 25-Jun-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 094042-010 | SW846 6020 |
| | Arsenic | **0.0477** | 0.0017 | 0.005 | 0.010 | | | 094042-010 | SW846 6020 |
| | Barium | 0.0776 | 0.0006 | 0.002 | 2.00 | | | 094042-010 | SW846 6020 |
| | Beryllium | 0.0029 | 0.0002 | 0.0005 | 0.004 | | | 094042-010 | SW846 6020 |
| | Cadmium | 0.000191 | 0.00011 | 0.001 | 0.005 | J | J+ | 094042-010 | SW846 6020 |
| | Calcium | 359 | 0.600 | 2.00 | NE | | | 094042-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 094042-010 | SW846 6020 |
| | Cobalt | 0.0103 | 0.0001 | 0.001 | NE | | | 094042-010 | SW846 6020 |
| | Copper | 0.00144 | 0.00035 | 0.001 | NE | | J- | 094042-010 | SW846 6020 |
| | Iron | 2.39 | 0.033 | 0.100 | NE | | J | 094042-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094042-010 | SW846 6020 |
| | Magnesium | 83.6 | 0.100 | 0.300 | NE | | | 094042-010 | SW846 6020 |
| | Manganese | 2.81 | 0.010 | 0.050 | NE | | J | 094042-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094042-010 | SW846 7470 |
| | Nickel | 0.0229 | 0.0005 | 0.002 | NE | | | 094042-010 | SW846 6020 |
| | Potassium | 43.7 | 0.080 | 0.300 | NE | | J | 094042-010 | SW846 6020 |
| | Selenium | 0.00183 | 0.0015 | 0.005 | 0.050 | J | | 094042-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 094042-010 | SW846 6020 |
| | Sodium | 471 | 1.60 | 5.00 | NE | | | 094042-010 | SW846 6020 |
| | Thallium | 0.00116 | 0.00045 | 0.002 | 0.002 | J | | 094042-010 | SW846 6020 |
| | Uranium | 0.0265 | 0.000067 | 0.0002 | 0.03 | | | 094042-010 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | UJ | 094042-010 | SW846 6010 |
| | Zinc | 0.302 | 0.0175 | 0.050 | NE | | J | 094042-010 | SW846 6020 |

Refer to footnotes on page 13A-25.

**Table 13A-9** *(Continued)*
**Summary of Filtered Target Analyte List Metal Results,**
**Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW2** | Aluminum | 0.106 | 0.075 | 0.250 | NE | J | | 094646-010 | SW846 6020 |
| 17-Sep-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | N, U | UJ | 094646-010 | SW846 6020 |
| | Arsenic | **0.0448** | 0.0085 | 0.025 | 0.010 | | | 094646-010 | SW846 6020 |
| | Barium | 0.085 | 0.0006 | 0.002 | 2.00 | | J | 094646-010 | SW846 6020 |
| | Beryllium | 0.00287 | 0.001 | 0.0025 | 0.004 | | | 094646-010 | SW846 6020 |
| | Cadmium | ND | 0.00055 | 0.005 | 0.005 | U | | 094646-010 | SW846 6020 |
| | Calcium | 378 | 6.00 | 20.0 | NE | | | 094646-010 | SW846 6020 |
| | Chromium | ND | 0.010 | 0.050 | 0.100 | U | | 094646-010 | SW846 6020 |
| | Cobalt | 0.00958 | 0.0005 | 0.005 | NE | | | 094646-010 | SW846 6020 |
| | Copper | ND | 0.00175 | 0.005 | NE | U | | 094646-010 | SW846 6020 |
| | Iron | 2.43 | 0.165 | 0.500 | NE | | J | 094646-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 094646-010 | SW846 6020 |
| | Magnesium | 73.8 | 0.050 | 0.150 | NE | | | 094646-010 | SW846 6020 |
| | Manganese | 2.84 | 0.005 | 0.025 | NE | | | 094646-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 094646-010 | SW846 7470 |
| | Nickel | 0.0192 | 0.0025 | 0.010 | NE | | | 094646-010 | SW846 6020 |
| | Potassium | 45.7 | 0.400 | 1.50 | NE | | | 094646-010 | SW846 6020 |
| | Selenium | ND | 0.0075 | 0.025 | 0.050 | U | | 094646-010 | SW846 6020 |
| | Silver | ND | 0.001 | 0.005 | NE | U | | 094646-010 | SW846 6020 |
| | Sodium | 473 | 8.00 | 25.0 | NE | | | 094646-010 | SW846 6020 |
| | Thallium | 0.00122 | 0.00045 | 0.002 | 0.002 | J | | 094646-010 | SW846 6020 |
| | Uranium | 0.0246 | 0.000067 | 0.0002 | 0.03 | | | 094646-010 | SW846 6020 |
| | Vanadium | 0.00409 | 0.001 | 0.005 | NE | B, J | 0.018UJ | 094646-010 | SW846 6010 |
| | Zinc | 0.291 | 0.0175 | 0.050 | NE | N | J | 094646-010 | SW846 6020 |

Refer to footnotes on page 13A-25.

**Table 13A-9** *(Concluded)*
**Summary of Filtered Target Analyte List Metal Results,**
**Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW2** | Aluminum | 0.104 | 0.015 | 0.050 | NE | | | 095086-010 | SW846 6020 |
| 17-Dec-13 | Antimony | ND | 0.001 | 0.003 | 0.006 | U | | 095086-010 | SW846 6020 |
| | Arsenic | **0.0366** | 0.0017 | 0.005 | 0.010 | | | 095086-010 | SW846 6020 |
| | Barium | 0.0815 | 0.0006 | 0.002 | 2.00 | | | 095086-010 | SW846 6020 |
| | Beryllium | 0.00255 | 0.0002 | 0.0005 | 0.004 | | | 095086-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 095086-010 | SW846 6020 |
| | Calcium | 352 | 0.600 | 2.00 | NE | | | 095086-010 | SW846 6020 |
| | Chromium | ND | 0.002 | 0.010 | 0.100 | U | | 095086-010 | SW846 6020 |
| | Cobalt | 0.00852 | 0.0001 | 0.001 | NE | | J | 095086-010 | SW846 6020 |
| | Copper | 0.00121 | 0.00035 | 0.001 | NE | | J- | 095086-010 | SW846 6020 |
| | Iron | 2.15 | 0.033 | 0.100 | NE | | J | 095086-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 095086-010 | SW846 6020 |
| | Magnesium | 79.9 | 0.100 | 0.300 | NE | | J | 095086-010 | SW846 6020 |
| | Manganese | 3.00 | 0.010 | 0.050 | NE | | | 095086-010 | SW846 6020 |
| | Mercury | ND | 0.000067 | 0.0002 | 0.002 | U | | 095086-010 | SW846 7470 |
| | Nickel | 0.0186 | 0.0005 | 0.002 | NE | | | 095086-010 | SW846 6020 |
| | Potassium | 42.9 | 0.080 | 0.300 | NE | | J | 095086-010 | SW846 6020 |
| | Selenium | 0.00158 | 0.0015 | 0.005 | 0.050 | J | J- | 095086-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 095086-010 | SW846 6020 |
| | Sodium | 508 | 1.60 | 5.00 | NE | | | 095086-010 | SW846 6020 |
| | Thallium | 0.00125 | 0.00045 | 0.002 | 0.002 | J | | 095086-010 | SW846 6020 |
| | Uranium | 0.0298 | 0.000067 | 0.0002 | 0.03 | | | 095086-010 | SW846 6020 |
| | Vanadium | ND | 0.001 | 0.005 | NE | U | | 095086-010 | SW846 6010 |
| | Zinc | 0.282 | 0.0035 | 0.010 | NE | | J | 095086-010 | SW846 6020 |

Refer to footnotes on page 13A-25.

## Table 13A-10
## Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results, Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW2** | Americium-241 | 6.95 ± 18.1 | 23.0 | 11.2 | NE | U | BD | 093723-033 | EPA 901.1 |
| 26-Mar-13 | Cesium-137 | 2.45 ± 2.69 | 4.51 | 2.17 | NE | U | BD | 093723-033 | EPA 901.1 |
| | Cobalt-60 | -1.77 ± 2.55 | 4.02 | 1.87 | NE | U | BD | 093723-033 | EPA 901.1 |
| | Potassium-40 | 17.9 ± 63.5 | 40.3 | 18.7 | NE | U | BD | 093723-033 | EPA 901.1 |
| | Gross Alpha | -13.42 | NA | NA | 15 pCi/L | NA | None | 093723-034 | EPA 900.0 |
| | Gross Beta | 58.9 ± 13.2 | 11.2 | 5.37 | 4mrem/yr | | | 093723-034 | EPA 900.0 |
| | Uranium-233/234 | 60.9 ± 8.15 | 0.905 | 0.402 | NE | | | 093723-035 | HASL 300 |
| | Uranium-235/236 | 0.822 ± 0.546 | 0.556 | 0.216 | NE | | J | 093723-035 | HASL 300 |
| | Uranium-238 | 10.9 ± 1.86 | 0.508 | 0.204 | NE | | | 093723-035 | HASL 300 |
| **CTF-MW2** (Duplicate) | Americium-241 | -28 ± 21.5 | 27.8 | 13.5 | NE | U | BD | 093724-033 | EPA 901.1 |
| 26-Mar-13 | Cesium-137 | 0.613 ± 2.12 | 3.86 | 1.83 | NE | U | BD | 093724-033 | EPA 901.1 |
| | Cobalt-60 | 1.56 ± 2.66 | 3.82 | 1.76 | NE | U | BD | 093724-033 | EPA 901.1 |
| | Potassium-40 | 83.8 ± 44.7 | 38.0 | 17.5 | NE | | J | 093724-033 | EPA 901.1 |
| | Gross Alpha | -39.77 | NA | NA | 15 pCi/L | NA | None | 093724-034 | EPA 900.0 |
| | Gross Beta | 35.2 ± 10.6 | 13.4 | 6.53 | 4mrem/yr | | J | 093724-034 | EPA 900.0 |
| | Uranium-233/234 | 58.6 ± 7.61 | 0.462 | 0.205 | NE | | | 093724-035 | HASL 300 |
| | Uranium-235/236 | 0.629 ± 0.266 | 0.284 | 0.110 | NE | | J | 093724-035 | HASL 300 |
| | Uranium-238 | 8.24 ± 1.29 | 0.259 | 0.104 | NE | | | 093724-035 | HASL 300 |
| | | | | | | | | | |
| **CTF-MW2** | Americium-241 | 7.09 ± 6.88 | 9.46 | 4.63 | NE | U | BD | 094042-033 | EPA 901.1 |
| 25-Jun-13 | Cesium-137 | 0.547 ± 1.58 | 2.79 | 1.34 | NE | U | BD | 094042-033 | EPA 901.1 |
| | Cobalt-60 | 1.01 ± 3.20 | 3.00 | 1.41 | NE | U | BD | 094042-033 | EPA 901.1 |
| | Potassium-40 | 29.7 ± 30.0 | 30.2 | 14.2 | NE | U | BD | 094042-033 | EPA 901.1 |
| | Gross Alpha | -32.6 | NA | NA | 15 pCi/L | NA | None | 094042-034 | EPA 900.0 |
| | Gross Beta | 51.1 ± 11.1 | 9.11 | 4.39 | 4mrem/yr | | | 094042-034 | EPA 900.0 |
| | Uranium-233/234 | 56.8 ± 7.56 | 0.152 | 0.0667 | NE | | | 094042-035 | HASL 300 |
| | Uranium-235/236 | 0.625 ± 0.167 | 0.118 | 0.0476 | NE | | | 094042-035 | HASL 300 |
| | Uranium-238 | 7.97 ± 1.15 | 0.0972 | 0.0392 | NE | | | 094042-035 | HASL 300 |

Refer to footnotes on page 13A-25.

**Table 13A-10** *(Concluded)*
**Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results, Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2013**

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW2** | Americium-241 | 10.1 ± 11.7 | 16.9 | 8.28 | NE | U | BD | 094646-033 | EPA 901.1 |
| 17-Sep-13 | Cesium-137 | 1.05 ± 2.05 | 3.51 | 1.68 | NE | U | BD | 094646-033 | EPA 901.1 |
| | Cobalt-60 | 0.396 ± 1.95 | 3.49 | 1.63 | NE | U | BD | 094646-033 | EPA 901.1 |
| | Potassium-40 | 64.2 ± 44.8 | 30.3 | 14.1 | NE | | J | 094646-033 | EPA 901.1 |
| | Gross Alpha | **23.54** | NA | NA | 15 pCi/L | NA | None | 094646-034 | EPA 900.0 |
| | Gross Alpha (Reanalysis) | **26.94** | NA | NA | 15 pCi/L | NA | None | 094646-R34 | EPA 900.0 |
| | Gross Beta | 44.7 ± 10.4 | 7.85 | 3.71 | 4mrem/yr | | | 094646-034 | EPA 900.0 |
| | Gross Beta (Reanalysis) | 89.3 ± 30.0 | 24.5 | 9.86 | 4mrem/yr | | | 094646-R34 | EPA 900.0 |
| | Uranium-233/234 | 57.3 ± 7.34 | 0.109 | 0.0477 | NE | | | 094646-035 | HASL 300 |
| | Uranium-235/236 | 0.536 ± 0.134 | 0.0677 | 0.0252 | NE | | | 094646-035 | HASL 300 |
| | Uranium-238 | 8.52 ± 1.16 | 0.088 | 0.037 | NE | | | 094646-035 | HASL 300 |
| | | | | | | | | | |
| **CTF-MW2** | Americium-241 | 9.17 ± 11.5 | 16.7 | 8.16 | NE | U | BD | 095086-033 | EPA 901.1 |
| 17-Dec-13 | Cesium-137 | 1.66 ± 4.49 | 2.80 | 1.35 | NE | U | BD | 095086-033 | EPA 901.1 |
| | Cobalt-60 | -0.435 ± 1.73 | 2.98 | 1.41 | NE | U | BD | 095086-033 | EPA 901.1 |
| | Potassium-40 | 2.60 ± 35.6 | 30.6 | 14.4 | NE | U | BD | 095086-033 | EPA 901.1 |
| | Gross Alpha | **21.25** | NA | NA | 15 pCi/L | NA | None | 095086-034 | EPA 900.0 |
| | Gross Beta | 73.9 ± 14.4 | 8.52 | 4.09 | 4mrem/yr | | | 095086-034 | EPA 900.0 |
| | Uranium-233/234 | 58.6 ± 7.87 | 0.0907 | 0.0354 | NE | | | 095086-035 | HASL 300 |
| | Uranium-235/236 | 0.479 ± 0.146 | 0.0817 | 0.0286 | NE | | | 095086-035 | HASL 300 |
| | Uranium-238 | 8.77 ± 1.26 | 0.0568 | 0.0185 | NE | | | 095086-035 | HASL 300 |

Refer to footnotes on page 13A-25.

## Table 13A-11
## Summary of Field Water Quality Measurements[h],
## Solid Waste Management Unit 154 Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2013

| Well ID | Sample Date | Temperature (°C) | Specific Conductivity (µmhos/cm) | Oxidation Reduction Potential (mV) | pH | Turbidity (NTU) | Dissolved Oxygen (% Sat) | Dissolved Oxygen (mg/L) |
|---|---|---|---|---|---|---|---|---|
| **CTF-MW2** | 26-Mar-13 | 16.46 | 3284 | 71.3 | 5.80 | 1.41 | 2.7 | 0.26 |
| | | | | | | | | |
| **CTF-MW2** | 25-Jun-13 | 20.30 | 3322 | 24.5 | 6.01 | 0.61 | 3.1 | 0.27 |
| | | | | | | | | |
| **CTF-MW2** | 17-Sep-13 | 20.30 | 3322 | 24.5 | 6.01 | 0.61 | 3.1 | 0.27 |
| | | | | | | | | |
| **CTF-MW2** | 17-Dec-13 | 15.16 | 3176.2 | 72.9 | 6.11 | 0.76 | 0.8 | 0.08 |

Refer to footnotes on page 13A-25.

## *Footnotes for Solid Waste Management Unit 154 Analytical Results Tables*

% = Percent.
µg/L = Micrograms per liter.
CFR = Code of Federal Regulations.
EPA = U.S. Environmental Protection Agency,
HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
ID = Identifier.
mg/L = Milligrams per liter.
No. = Number.
pCi/L = Picocuries per liter.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
Tetryl = Methyl-2,4,6-trinitrophenylnitramine.

**[a]Result**

Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 2A- 1-4).

**Bold** = Indicates the value exceed the established MCL.
ND = Not detected (at MDL). Activities of zero or less are considered to be not detected.

**[b]MDL or MDA**

MDL applies to the data listed in Tables 13A-1 through 13A-9. MDA applies to radiological data in Table 13A-10.

MDA = Minimum detectable activity. The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.
MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA = Not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

**[c]PQL or Critical Level**

The PQL applies to Tables 13A-1 through 13A-9. Critical level applies to Table 13A-10.

Critical level = The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA = Not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

**[d]MCL**

MCL = Maximum contaminant level. MCLs were established by the EPA Office of Water, National Primary Water Regulations (EPA May 2009).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- Gross alpha particle activity, excluding total uranium = 15 pCi/L (40 CFR Parts 9, 141, and 142, Table 2A-1-4).
- Beta and/or Gamma-emitting radionuclides (any combination) = 4 mrem/yr (as dose rate).
- Combined radium-226 and radium-228 MAC = 30 pCi/L.
- Combined radium-226 and radium-228 MCL = 5 pCi/L.

NE = Not established.

## *Footnotes for Solid Waste Management Unit 154 Analytical Results Tables (Concluded)*

**[e]Lab Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

* = Recovery of percent recovery not within acceptance limits and/or spike amount not compatible with the sample or the duplicate relative percent differences are not applicable.
B = The analyte was found in the blank above the effective MDL.
H = Analytical holding time was exceeded.
J = Estimated value; the analyte concentration fell above the effective MDL and below the effective PQL.
N = Results associated with a spike analysis that was outside control limits.
NA = Not applicable.
U = Analyte is absent or below the MDL.

**[f]Validation Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = The associated value is an estimated quantity.
J+ = The associated numerical value is an estimated quantity with a suspected positive bias.
J- = The associated numerical value is an estimated quantity with a suspected negative bias.
None = No data validation for corrected gross alpha activity.
U = The analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
UJ = The analyte was analyzed for, but not detected. The associated value is an estimate and may be inaccurate or imprecise.

**[g]Analytical Method**

Clesceri, Greenburg, and Eaton, 1998, Standard Methods for the Examination of Water and Wastewater, 20th ed., Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.
DOE, 1990, "Environmental Measurements Laboratory Procedures Manual," 27th ed., Vol. 1, Rev. 1992, HASL-300.
EPA, 1999 (and updates), "Perchlorate in Drinking Water Using Ion Chromatography," EPA 815/R-00-014.
EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.
EPA, 1984, "Methods for Chemical Analysis of Water and Wastes." EPA 600-4-79-020.
EPA, 1980, "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.

DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
HASL = Health and Safety Laboratory.
SM = Standard Method.

**[h]Field Water Quality Measurements**

Field measurements were collected prior to sampling.

°C = Degrees Celsius.
% Sat = Percent saturation.
μmhos/cm = Micromhos per centimeter.
mg/L = Milligrams per liter.
mV = Millivolts.
NTU = Nephelometric turbidity units.
pH = Potential of hydrogen (negative logarithm of the hydrogen ion concentration).

# Attachment 13B
# Solid Waste Management Unit 154
# Plots

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# Attachment 13B Plots

13B-1 Arsenic Concentrations, CTF-MW2 ..... 13B-5

13B-2 Gross Alpha Activities, CTF-MW2 ..... 13B-6

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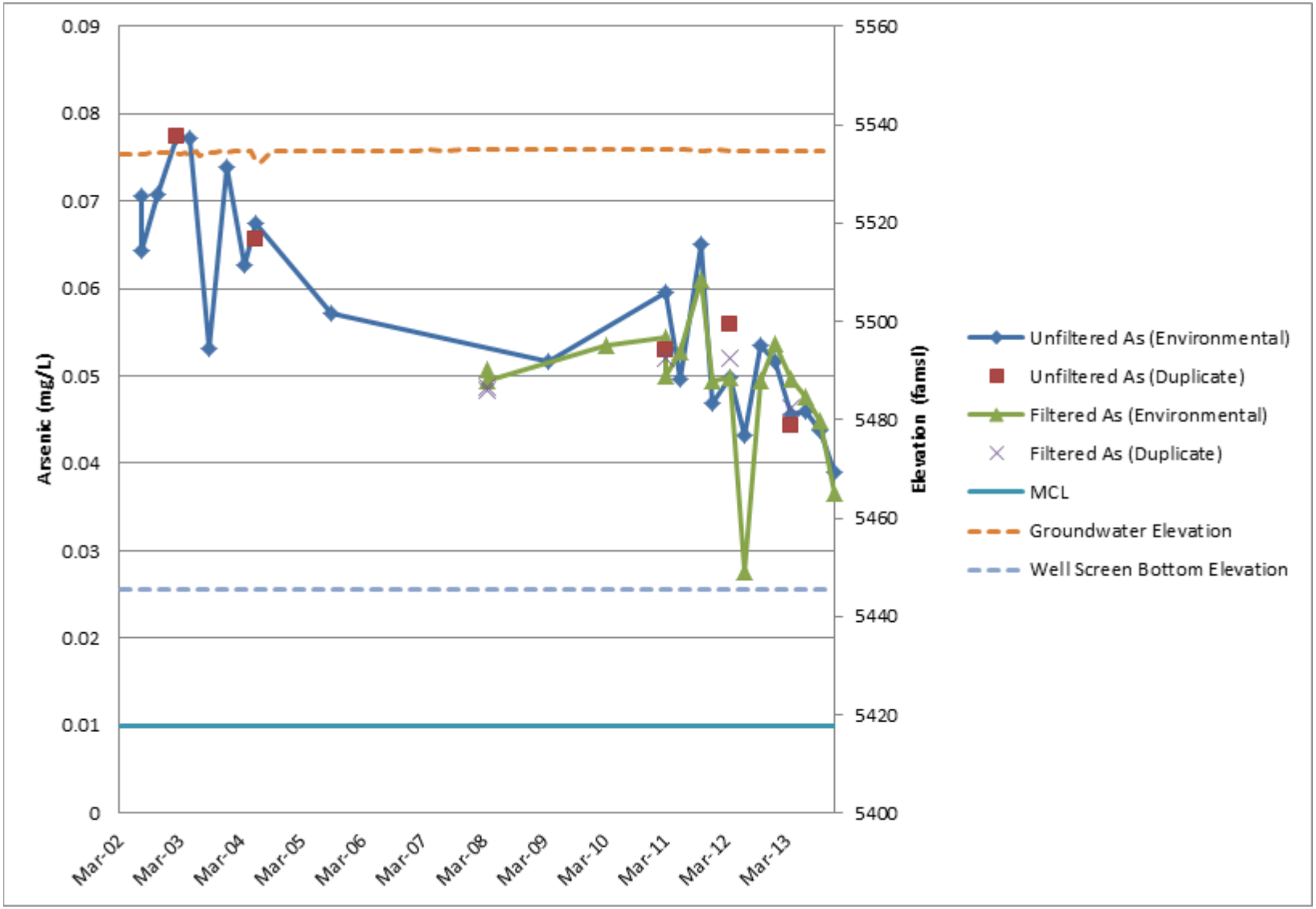


**Figure 13B-1. Arsenic Concentrations, CTF-MW2**

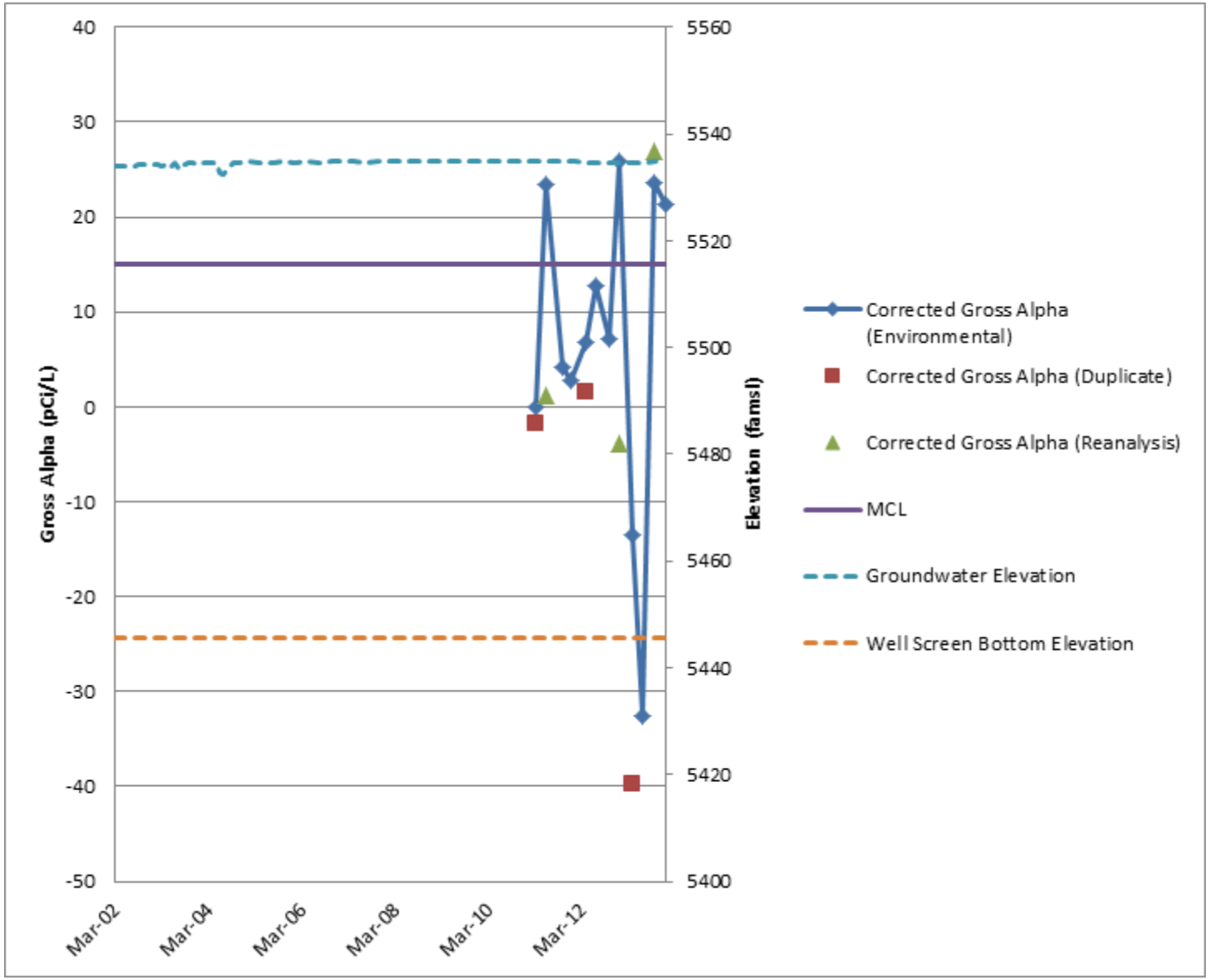


**Figure 13B-2. Gross Alpha Activities, CTF-MW2**

# Attachment 13C
# Solid Waste Management Unit 154
# Hydrographs

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# Attachment 13C Hydrographs

13C-1 SWMU 154 Study Area Well ..... 13C-5

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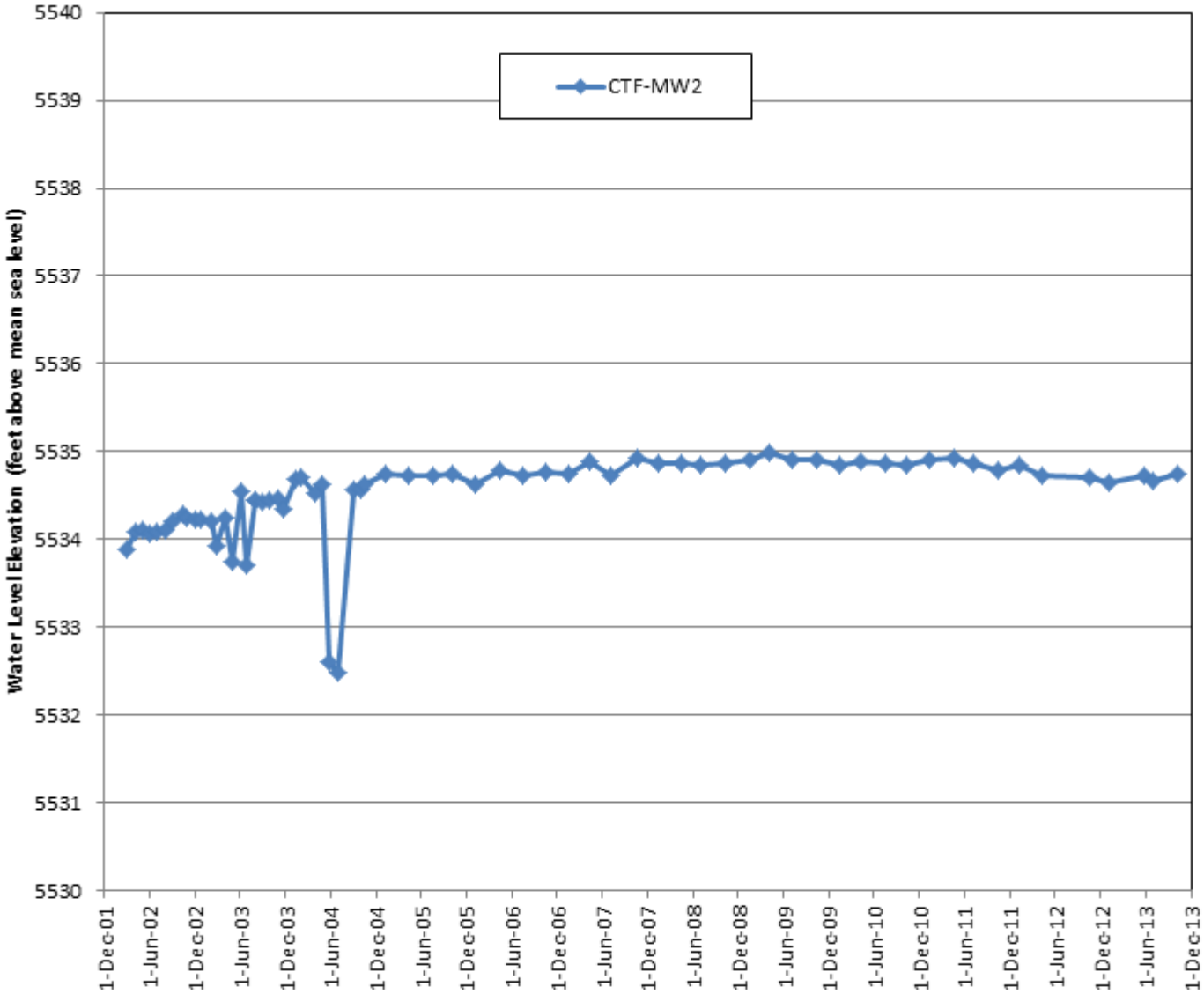


**Figure 13C-1. SWMU 154 Study Area Well**

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**Table 1. Inventory of Groundwater Monitoring Wells Located at SNL/NM and Surrounding Areas, updated 3 March 2014, AGMR CY2013**

| Well | Measuring Point (feet amsl) | Ground Surface (feet amsl) | Top of Screen (feet bgs) | Bottom of Screen (feet bgs) | Top of Screen (feet amsl) | Bottom of Screen (feet amsl) | Casing Total Depth (feet bgs) | Casing, Inner Diameter (inches) | Casing Material | Lithology of Screened Interval | Installation Date | P&A Date, If Applicable |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chemical Waste Landfill and Vicinity** | | | | | | | | | | | | |
| CWL-BW1 | 5437.95 | 5436.0 | 445.0 | 495.0 | 4991.0 | 4941.0 | 495.0 | 2.1 | SS | Santa Fe Group sediments | 8-Jul-85 | Aug-03 |
| CWL-BW2 | 5436.21 | 5434.3 | 490.0 | 980.0 | 4944.3 | 4454.3 | 980.0 | 5.6 | CS/SS | Santa Fe Group sediments | 17-Sep-85 | 2003 |
| CWL-BW3 | 5432.76 | 5431.6 | 485.0 | 505.0 | 4946.6 | 4926.6 | 507.5 | 4.8 | PVC | Santa Fe Group sediments | 22-Sep-88 | 12-Nov-12 |
| CWL-BW4 | 5427.67 | 5431.7 | 485.0 | 505.0 | 4946.7 | 4926.7 | 510.0 | 4.8 | PVC | Santa Fe Group sediments | 6-May-1994 | Jan-97 |
| CWL-BW4A | 5434.03 | 5431.84** | 485.0 | 505.0 | 4946.8 | 4926.8 | 510.0 | 4.8 | PVC | Santa Fe Group sediments | 16-May-94 | 14-Apr-10 |
| CWL-BW5 | 5434.79 | 5432.2 | 500.0 | 520.0 | 4932.2 | 4912.2 | 525.0 | 4.8 | PVC | Santa Fe Group sediments | 11-May-10 | |
| CWL-MW1 | 5425.88 | 5423.7 | 535.0 | 575.0 | 4888.7 | 4848.7 | 610.0 | 2.1 | SS | Santa Fe Group sediments | 1-Sep-85 | Sep-97 |
| CWL-MW1A | 5424.16 | 5423.1 | 474.0 | 494.0 | 4949.1 | 4929.1 | 495.0 | 4.8 | PVC | Santa Fe Group sediments | 31-Jul-88 | 11-Nov-12 |
| CWL-MW2 | 5421.22 | 5419.1 | 520.0 | 650.0 | 4899.1 | 4769.1 | 650.0 | 2.1 | SS | Santa Fe Group sediments | 22-Sep-85 | Sep-97 |
| CWL-MW2A | 5421.25 | 5419.8 | 473.0 | 493.0 | 4946.8 | 4926.8 | 495.0 | 5.0 | PVC | Santa Fe Group sediments | 1-Aug-88 | Jun-04 |
| CWL-MW2BL | 5421.85 | 5420.1 | 532.5 | 552.5 | 4887.6 | 4867.6 | 557.5 | 4.8 | PVC | Santa Fe Group sediments | 5-Jun-94 | 10-Nov-12 |
| CWL-MW2BU | 5421.88 | 5420.1 | 476.0 | 496.0 | 4944.1 | 4924.1 | 501.0 | 1.9 | PVC | Santa Fe Group sediments | 5-Jun-94 | 10-Nov-12 |
| CWL-MW3 | 5421.50 | 5419.5 | 525.0 | 565.0 | 4894.5 | 4854.5 | 615.0 | 2.1 | SS | Santa Fe Group sediments | 26-Sep-85 | Sep-97 |
| CWL-MW3A | 5420.45 | 5419.1 | 470.0 | 490.0 | 4949.1 | 4929.1 | 492.0 | 4.8 | PVC/SS | Santa Fe Group sediments | 11-Aug-88 | 10-Nov-12 |
| CWL-MW4 | 5423.00 | 5420.99** | 478.0 | 498.0 | 4943.0 | 4923.0 | 503.0 | 3.8 | PVC/SS | Santa Fe Group sediments | 4-May-90 | 14-Apr-10 |
| CWL-MW5L | 5418.47 | 5416.7 | 533.0 | 553.0 | 4883.7 | 4863.7 | 558.0 | 1.9 | PVC | Santa Fe Group sediments | 19-Apr-94 | 14-Apr-10 |
| CWL-MW5U | 5418.68 | 5416.7 | 477.0 | 497.0 | 4939.7 | 4919.7 | 502.0 | 4.8 | PVC | Santa Fe Group sediments | 19-Apr-94 | 14-Apr-10 |
| CWL-MW6L | 5419.80 | 5417.3 | 539.0 | 559.0 | 4878.3 | 4858.3 | 564.0 | 1.9 | PVC | Santa Fe Group sediments | 4-May-94 | 14-Apr-10 |
| CWL-MW6U | 5419.45 | 5417.3 | 477.0 | 497.0 | 4940.3 | 4920.3 | 502.0 | 4.8 | PVC | Santa Fe Group sediments | 4-May-94 | 14-Apr-10 |
| CWL-MW7 | 5421.98 | 5419.9 | 618.0 | 638.0 | 4801.9 | 4781.9 | 643.0 | 4.8 | PVC | Santa Fe Group sediments | 20-Mar-03 | 12-Nov-12 |
| CWL-MW8 | 5421.71 | 5419.8 | 612.0 | 632.0 | 4807.8 | 4787.8 | 637.0 | 4.8 | PVC | Santa Fe Group sediments | 2-Apr-03 | 12-Nov-12 |
| CWL-MW9 | 5426.12 | 5423.5 | 495.0 | 515.0 | 4928.5 | 4908.5 | 520.0 | 4.8 | PVC | Santa Fe Group sediments | 13-May-10 | |
| CWL-MW10 | 5424.58 | 5422.2 | 493.0 | 513.0 | 4929.2 | 4909.2 | 518.0 | 4.8 | PVC | Santa Fe Group sediments | 27-May-10 | |
| CWL-MW11 | 5423.24 | 5420.8 | 491.0 | 511.0 | 4929.8 | 4909.8 | 516.0 | 4.8 | PVC | Santa Fe Group sediments | 27-May-10 | |
| MRN-1 | 5308.54 | 5306.4 | 546.7 | 586.7 | 4759.7 | 4719.7 | 606.7 | 4.8 | SS | Santa Fe Group sediments | 22-Jan-95 | Aug-01 |
| MRN-2 | 5308.18 | 5306.2 | 410.0 | 440.0 | 4896.2 | 4866.2 | 450.0 | 3.7 | PVC | Santa Fe Group sediments | 28-Jan-95 | |
| MRN-3D | 5309.34 | 5306.8 | 660.3 | 680.3 | 4646.5 | 4626.5 | 685.3 | 4.8 | PVC | Santa Fe Group sediments | 20-Jul-03 | |
| SWTA-3 | 5323.24 | 5321.6 | 407.2 | 427.2 | 4914.4 | 4894.4 | 432.2 | 4.8 | PVC/SS | Santa Fe Group sediments | 6-Sep-89 | Apr-98 |
| SWTA3-MW2 | 5325.60 | 5323.2 | 455.0 | 475.0 | 4868.2 | 4848.2 | 480.0 | 4.8 | PVC | Santa Fe Group sediments | 7-May-02 | |
| SWTA3-MW3 | 5323.94 | 5321.4 | 619.0 | 639.0 | 4702.4 | 4682.4 | 659.4 | 4.8 | PVC | Santa Fe Group sediments | 20-Feb-04 | |
| SWTA3-MW4 | 5324.81 | 5322.3 | 430.0 | 450.0 | 4892.3 | 4872.3 | 460.0 | 4.7 | PVC | Santa Fe Group sediments | 26-Aug-05 | |
| **Lurance Canyon and Vicinity** | | | | | | | | | | | | |
| CCBA-MW1 | 5902.34 | 5899.9 | 60.0 | 80.0 | 5839.9 | 5819.9 | 85.0 | 4.7 | PVC | Alluvium and bedrock (granite) | 1-Sep-11 | |
| CCBA-MW2 | 5939.28 | 5937.0 | 98.0 | 118.0 | 5839.0 | 5819.0 | 123.0 | 4.7 | PVC | Bedrock (granite) | 31-Aug-11 | |
| Burn Site Well | 6374.52 | 6373.7** | 231.0 | 341.0 | 6142.7 | 6032.7 | 341.0 | 4.0 | PVC | Bedrock (schist and granite) | 20-Feb-86 | |
| CYN-MW1D | 6239.59 | 6236.7 | 372.0 | 382.0 | 5864.7 | 5854.7 | 392.0 | 5.1 | CS | Bedrock (granitic gneiss) | 22-Dec-97 | 15-Nov-02 |
| CYN-MW2S | 6239.41 | 6236.7 | 23.6 | 28.6 | 6213.1 | 6208.1 | 34.2 | 4.0 | PVC | Alluvium and bedrock (granitic gneiss) | 22-Dec-97 | 15-Nov-02 |
| CYN-MW3 | 6313.26 | 6311.9 | 120.0 | 130.0 | 6191.9 | 6181.9 | 135.0 | 5.0 | PVC | Bedrock (metamorphics) | 18-Jun-99 | |
| CYN-MW4 | 6455.48 | 6454.7 | 260.0 | 280.0 | 6194.7 | 6174.7 | 290.0 | 5.0 | PVC | Bedrock (quartzite) | 18-Jun-99 | |
| CYN-MW5 | 5984.23 | 5981.3 | 135.0 | 155.0 | 5846.3 | 5826.3 | 160.0 | 5.0 | PVC | Bedrock (quartzite) | 15-Aug-01 | |
| CYN-MW6 | 6343.37 | 6340.5 | 141.5 | 161.3 | 6199.0 | 6179.2 | 161.7 | 5.0 | PVC | Bedrock (metamorphics) | 9-Dec-05 | |
| CYN-MW7 | 6216.35 | 6213.7 | 315.0 | 334.2 | 5898.7 | 5879.5 | 339.9 | 5.0 | PVC | Bedrock (granitic gneiss) | 6-Dec-05 | |
| CYN-MW8 | 6230.11 | 6227.8 | 338.5 | 358.3 | 5889.3 | 5869.5 | 363.4 | 5.0 | PVC | Bedrock (granitic gneiss) | 12-Jan-06 | |
| CYN-MW9 | 6360.67 | 6358.5 | 175.8 | 195.8 | 6182.7 | 6162.7 | 200.8 | 4.8 | PVC | Bedrock (metamorphics) | 27-Jul-10 | |
| CYN-MW10 | 6345.45 | 6342.8 | 150.4 | 170.4 | 6192.4 | 6172.4 | 175.4 | 4.8 | PVC | Bedrock (metamorphics) | 28-Jul-10 | |
| CYN-MW11 | 6374.41 | 6371.9 | 229.8 | 249.8 | 6142.1 | 6122.1 | 254.8 | 4.8 | PVC | Bedrock (metamorphics) | 29-Jul-10 | |
| CYN-MW12 | 6345.16 | 6342.9 | 252.5 | 272.5 | 6090.4 | 6070.4 | 277.5 | 4.8 | PVC | Bedrock (metamorphics) | 29-Jul-10 | |
| CYN-MW13 | 6237.79 | 6236.03 | 376.8 | 396.8 | 5859.2 | 5839.2 | 402.2 | 4.8 | PVC | Bedrock (granitic gneiss) | 5-Dec-2012 | |
| Greystone Well | 5822.87 | 5820.8 | 44.0 | 54.0 | 5776.8 | 5766.8 | 54.0 | 4.0 | PVC/CS | Alluvium | 1-Jan-02 | 12-Sep-02 |
| Greystone-MW2 | 5814.20 | 5811.4 | 60.0 | 80.0 | 5751.4 | 5731.4 | 85.0 | 4.8 | PVC | Alluvium | 25-Apr-02 | |
| HERTF | | 6229.7 | 449.0* | 500.0* | 5780.7* | 5729.7* | 449.0?* | 5.0 | OH? | Bedrock (granite) | 13-Jul-1990 | |
| TSA-1 | 6063.68 | 6060.2 | 190.0 | 210.0 | 5870.2 | 5850.2 | 300.0 | 6.0 | CS | Bedrock (metamorphics) | 10-Nov-87 | Aug-01 |

**Table 1. Inventory of Groundwater Monitoring Wells Located at SNL/NM and Surrounding Areas, updated 3 March 2014, AGMR CY2013** *(Continued)*

| Well | Measuring Point (feet amsl) | Ground Surface (feet amsl) | Top of Screen (feet bgs) | Bottom of Screen (feet bgs) | Top of Screen (feet amsl) | Bottom of Screen (feet amsl) | Casing Total Depth (feet bgs) | Casing, Inner Diameter (inches) | Casing Material | Lithology of Screened Interval | Installation Date | P&A Date, If Applicable |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mixed Waste Landfill and Vicinity** | | | | | | | | | | | | |
| MWL-BW1 | 5387.18 | 5385.4 | 452.2 | 472.2 | 4933.2 | 4913.2 | 477.2 | 5.0 | PVC | Santa Fe Group sediments | 1-Jul-89 | 24-Jan-08 |
| MWL-BW2 | 5391.02 | 5388.7 | 467.0 | 497.0 | 4921.7 | 4891.7 | 502.0 | 4.8 | PVC | Santa Fe Group sediments | 22-Jan-08 | |
| MWL-MW1 | 5384.21 | 5381.8 | 456.0 | 476.0 | 4925.8 | 4905.8 | 478.0 | 5.0 | PVC/CS | Santa Fe Group sediments | 1-Oct-88 | Jul-08 |
| MWL-MW2 | 5379.93 | 5378.4 | 452.0 | 472.0 | 4926.4 | 4906.4 | 477.0 | 5.0 | PVC/SS | Santa Fe Group sediments | 1-Aug-89 | Jul-08 |
| MWL-MW3 | 5383.99 | 5381.7 | 451.3 | 471.3 | 4930.4 | 4910.4 | 476.3 | 4.8 | PVC/SS | Santa Fe Group sediments | 22-Aug-89 | Jul-08 |
| MWL-MW4 | 5391.70 | 5390.2 | 488.4 | 508.4 | 4901.8 | 4881.8 | 553.9 | 4.8 | PVC | Santa Fe Group sediments | 10-Feb-93 | |
| MWL-MW5 | 5382.56 | 5380.4 | 496.5 | 516.5 | 4883.9 | 4863.9 | 521.5 | 4.8 | PVC | Santa Fe Group sediments | 19-Nov-00 | |
| MWL-MW6 | 5375.31 | 5372.7 | 505.5 | 525.5 | 4867.2 | 4847.2 | 505.5 | 4.8 | PVC | Santa Fe Group sediments | 19-Oct-00 | |
| MWL-MW7 | 5383.30 | 5380.9 | 464.7 | 494.0 | 4916.2 | 4886.9 | 498.8 | 4.8 | PVC | Santa Fe Group sediments | 24-Jun-08 | |
| MWL-MW8 | 5384.67 | 5382.4 | 465.0 | 495.0 | 4917.4 | 4887.4 | 500.0 | 4.8 | PVC | Santa Fe Group sediments | 26-Jun-08 | |
| MWL-MW9 | 5381.91 | 5379.3 | 465.0 | 495.0 | 4914.3 | 4884.3 | 500.0 | 4.8 | PVC | Santa Fe Group sediments | 30-Jun-08 | |
| NWTA3-MW1 | 5336.48 | 5332.9 | 434.9 | 454.9 | 4898.0 | 4878.0 | 460.4 | 4.8 | PVC | Santa Fe Group sediments | 20-Sep-89 | 12-Sep-02 |
| NWTA3-MW2 | 5337.49 | 5335.5 | 455.0 | 475.0 | 4880.5 | 4860.5 | 505.0 | 4.8 | PVC | Santa Fe Group sediments | 25-Aug-00 | |
| NWTA3-MW3D | 5340.80 | 5335.7 | 654.4 | 674.4 | 4681.3 | 4661.3 | 679.4 | 4.8 | PVC | Santa Fe Group sediments | 9-Jul-03 | |
| PL-1 | 5334.99 | 5333.4 | 440.0 | 470.0 | 4893.4 | 4863.4 | 480.0 | 2.0 | PVC | Santa Fe Group sediments | 28-Oct-94 | 12-Sep-09 |
| PL-2 | 5336.01 | 5333.0 | 577.0 | 597.0 | 4756.0 | 4736.0 | 617.0 | 4.8 | SS | Santa Fe Group sediments | 18-Nov-94 | |
| PL-3 | 5334.64 | 5332.8 | 445.0 | 465.0 | 4887.8 | 4867.8 | 475.0 | 3.8 | PVC | Santa Fe Group sediments | 4-Dec-94 | 12-Sep-09 |
| PL-4 | 5334.98 | 5332.7 | 464.0 | 494.0 | 4868.7 | 4838.7 | 499.0 | 4.8 | PVC | Santa Fe Group sediments | 28-Sep-09 | |
| **Coyote Test Field and Vicinity** | | | | | | | | | | | | |
| OBS-MW1 | 5871.42 | 5869.1 | 135.0 | 155.0 | 5734.1 | 5714.1 | 160.0 | 4.7 | PVC | Bedrock (granite) | 31-Aug-11 | |
| OBS-MW2 | 5863.16 | 5860.8 | 234.0 | 254.0 | 5626.8 | 5606.8 | 259.0 | 4.7 | PVC | Bedrock (granite) | 30-Aug-11 | |
| OBS-MW3 | 5865.50 | 5863.3 | 190.0 | 210.0 | 5673.3 | 5653.3 | 215.0 | 4.7 | PVC | Bedrock (granite) | 30-Aug-11 | |
| CTF-MW1 | 6082.63 | 6079.7 | 240.0 | 260.0 | 5839.7 | 5819.7 | 265.0 | 5.0 | PVC | Bedrock (granite) | 16-Aug-01 | |
| CTF-MW2 | 5578.60 | 5575.6 | 110.0 | 130.0 | 5465.6 | 5445.6 | 135.0 | 5.0 | PVC | Bedrock (granite) | 18-Aug-01 | |
| CTF-MW3 | 5522.82 | 5519.8 | 340.0 | 360.0 | 5179.8 | 5159.8 | 365.0 | 5.0 | PVC | Bedrock (granite) | 21-Aug-01 | |
| LMF-1 | 5628.60 | 5626.5 | 310.0 | 350.0 | 5316.5 | 5276.5 | 360.0 | 4.1 | PVC | Bedrock (limestone) | 11-Aug-95 | Yes |
| School House Well | 5796.33 | 5799.0 | 103.0* | 107.0* | 5696.0* | 5692.0* | 103.0* | 6.0 | CS | Bedrock (Sandia Formation) | | |
| SFR-1D | 5399.13 | 5396.9 | 348.0 | 368.0 | 5048.9 | 5028.9 | 378.0 | 3.8 | PVC | Santa Fe Group sediments | 6-Aug-92 | |
| SFR-1S | 5399.16 | 5396.9 | 152.0 | 172.0 | 5244.9 | 5224.9 | 182.0 | 1.9 | PVC | Santa Fe Group sediments | 8-Aug-92 | |
| SFR-2S | 5432.77 | 5430.3 | 97.0 | 117.0 | 5333.3 | 5313.3 | 122.0 | 3.8 | PVC | Santa Fe Group sediments | 20-Aug-92 | |
| SFR-3D | 5497.94 | 5496.1 | 311.5 | 351.5 | 5184.6 | 5144.6 | 361.5 | 1.9 | PVC | Santa Fe Group sediments | 5-Nov-92 | |
| SFR-3P | 5499.63 | 5497.2 | 175.0 | 195.0 | 5322.2 | 5302.2 | 205.0 | 3.8 | PVC | Santa Fe Group sediments | 12-Jul-93 | |
| SFR-3S | 5498.24 | 5496.1 | 182.0 | 212.0 | 5314.1 | 5284.1 | 222.0 | 1.9 | PVC | Santa Fe Group sediments | 10-Nov-92 | |
| SFR-3T | 5498.66 | 5496.9 | 713.0 | 733.0 | 4783.9 | 4763.9 | 753.0 | 5.4 | SS | Bedrock (sandstone) | 23-Sep-93 | |
| SFR-4P | 5573.33 | 5571.3 | 344.0 | 354.0 | 5227.3 | 5217.3 | 364.0 | 1.9 | PVC | Bedrock (sandstone) | 29-Jul-93 | |
| SFR-4T | 5573.95 | 5572.4 | 340.0 | 360.0 | 5232.4 | 5212.4 | 380.0 | 4.8 | PVC/SS | Bedrock (sandstone) | 30-Sep-93 | |
| STW-1 | 5535.53 | 5533.3 | 149.8 | 169.8 | 5383.5 | 5363.5 | 179.8 | 4.3 | PVC | Santa Fe Group sediments | 18-Jun-95 | Yes |
| TRE-1 | 5497.25 | 5495.2 | 255.0 | 295.0 | 5240.2 | 5200.2 | 305.0 | 4.3 | PVC | Santa Fe Group sediments | 31-Jul-95 | |
| TRE-2 | 5497.20 | 5495.2 | 150.0 | 170.0 | 5345.2 | 5325.2 | 190.0 | 2.0 | PVC | Santa Fe Group sediments | 31-Jul-95 | |
| TRN-1 | 5735.62 | 5733.6 | 320.0 | 340.0 | 5413.6 | 5393.6 | 350.0 | 3.8 | PVC | Bedrock (sandstone) | 12-Oct-94 | |
| TRS-1 | 5780.18 | 5777.5 | 134.0* | 500.0* | 5643.5* | 5277.5* | 134.0 | 6.4 | OH | Bedrock (limestone) | 4-Sep-94 | converted |
| TRS-1D | 5779.80 | 5777.5 | 266.4 | 306.4 | 5511.1 | 5471.1 | 316.4 | 1.9 | PVC | Bedrock (limestone) | 6-Sep-95 | |
| TRS-1S | 5780.07 | 5777.5 | 164.0 | 204.0 | 5613.5 | 5573.5 | 214.8 | 1.9 | PVC | Bedrock (limestone) | 6-Sep-95 | |
| TRS-2 | 5780.76 | 5778.3 | 165.0 | 205.0 | 5613.3 | 5573.3 | 210.0 | 4.5 | CS | Bedrock (limestone) | 9-Sep-95 | |

**Table 1. Inventory of Groundwater Monitoring Wells Located at SNL/NM and Surrounding Areas, updated 3 March 2014, AGMR CY2013** *(Continued)*

| Well | Measuring Point (feet amsl) | Ground Surface (feet amsl) | Top of Screen (feet bgs) | Bottom of Screen (feet bgs) | Top of Screen (feet amsl) | Bottom of Screen (feet amsl) | Casing Total Depth (feet bgs) | Casing, Inner Diameter (inches) | Casing Material | Lithology of Screened Interval | Installation Date | P&A Date, If Applicable |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Tijeras Arroyo Groundwater** | | | | | | | | | | | | |
| TA1-W-01 | 5403.82 | 5401.8 | 575.0 | 595.0 | 4826.8 | 4806.8 | 600.0 | 4.8 | PVC | Santa Fe Group sediments | 22-Mar-97 | |
| TA1-W-02 | 5416.62 | 5416.9 | 540.0 | 560.0 | 4876.9 | 4856.9 | 565.6 | 5.0 | PVC | Santa Fe Group sediments | 27-Feb-98 | |
| TA1-W-03 | 5457.03 | 5454.9 | 337.0 | 357.0 | 5117.9 | 5097.9 | 362.6 | 5.0 | PVC | Santa Fe Group sediments | 27-Jan-98 | |
| TA1-W-04 | 5460.98 | 5458.3 | 576.0 | 596.0 | 4882.3 | 4862.3 | 601.7 | 5.0 | PVC | Santa Fe Group sediments | 6-Oct-98 | |
| TA1-W-05 | 5433.84 | 5434.2 | 597.5 | 617.5 | 4836.7 | 4816.7 | 623.2 | 5.0 | PVC | Santa Fe Group sediments | 16-Nov-98 | |
| TA1-W-06 | 5417.10 | 5417.4 | 300.0 | 320.0 | 5117.4 | 5097.4 | 325.6 | 5.0 | PVC | Santa Fe Group sediments | 27-Feb-98 | |
| TA1-W-07 | 5404.92 | 5402.8 | 268.6 | 288.6 | 5134.2 | 5114.2 | 289.1 | 5.0 | PVC | Santa Fe Group sediments | 13-Aug-98 | |
| TA1-W-08 | 5434.19 | 5434.7 | 302.0 | 322.0 | 5132.7 | 5112.7 | 327.0 | 4.5 | PVC | Santa Fe Group sediments | 3-Aug-01 | |
| TA2-NW1-325 | 5421.94 | 5420.0 | 295.0 | 325.0 | 5125.0 | 5095.0 | 330.3 | 4.8 | PVC | Santa Fe Group sediments | 1-Apr-93 | |
| TA2-NW1-595 | 5421.26 | 5420.0 | 535.0 | 555.0 | 4885.0 | 4865.0 | 598.0 | 4.8 | PVC | Santa Fe Group sediments | 27-Jul-93 | |
| TA2-SW1-320 | 5411.85 | 5410.1 | 299.6 | 319.6 | 5110.5 | 5090.5 | 324.6 | 3.8 | PVC | Santa Fe Group sediments | 30-Nov-92 | |
| TA2-W-01 | 5419.99 | 5417.4 | 312.0 | 332.0 | 5105.4 | 5085.4 | 332.0 | 4.8 | PVC | Santa Fe Group sediments | 27-Jun-94 | |
| TA2-W-19 | 5351.21 | 5349.0 | 265.9 | 285.9 | 5083.1 | 5063.1 | 285.9 | 4.8 | PVC | Santa Fe Group sediments | 9-Nov-95 | |
| TA2-W-24 | 5363.66 | 5361.8 | 465.0 | 485.0 | 4896.8 | 4876.8 | 490.6 | 5.0 | PVC | Santa Fe Group sediments | 9-Feb-98 | |
| TA2-W-25 | 5374.86 | 5372.5 | 492.0 | 512.0 | 4880.5 | 4860.5 | 517.8 | 4.8 | PVC | Santa Fe Group sediments | 1-Apr-97 | |
| TA2-W-26 | 5375.77 | 5373.8 | 276.0 | 296.0 | 5097.8 | 5077.8 | 301.6 | 5.0 | PVC | Santa Fe Group sediments | 19-Jan-98 | |
| TA2-W-27 | 5362.85 | 5360.8 | 275.0 | 295.0 | 5085.8 | 5065.8 | 300.6 | 5.0 | PVC | Santa Fe Group sediments | 9-Feb-98 | |
| TJA-2 | 5353.20 | 5351.3 | 275.0 | 295.0 | 5076.3 | 5056.3 | 305.0 | 3.8 | PVC | Santa Fe Group sediments | 12-Jul-94 | |
| TJA-3 | 5390.56 | 5387.8 | 496.0 | 516.0 | 4891.8 | 4871.8 | 521.7 | 5.0 | PVC | Santa Fe Group sediments | 31-Aug-98 | |
| TJA-4 | 5341.16 | 5338.5 | 360.0 | 380.0 | 4978.5 | 4958.5 | 385.7 | 5.0 | PVC | Santa Fe Group sediments | 4-Aug-98 | |
| TJA-5 | 5341.33 | 5338.5 | 267.0 | 287.0 | 5071.5 | 5051.5 | 292.7 | 5.0 | PVC | Santa Fe Group sediments | 7-Aug-98 | |
| TJA-6 | 5343.16 | 5340.6 | 454.9 | 474.9 | 4885.7 | 4865.7 | 480.7 | 5.0 | PVC | Santa Fe Group sediments | 4-Feb-01 | |
| TJA-7 | 5391.27 | 5388.4 | 290.5 | 310.5 | 5097.9 | 5077.9 | 316.3 | 5.0 | PVC | Santa Fe Group sediments | 7-Mar-01 | |
| WYO-1 | 5392.50 | 5390.4 | 510.0 | 560.0 | 4880.4 | 4830.4 | 570.0 | 4.3 | PVC | Santa Fe Group sediments | 27-Aug-95 | Jul-01 |
| WYO-2 | 5392.50 | 5390.4 | 265.0 | 285.0 | 5125.4 | 5105.4 | 295.0 | 2.0 | PVC | Santa Fe Group sediments | 27-Aug-95 | Jul-01 |
| WYO-3 | 5392.09 | 5390.0 | 520.0 | 540.0 | 4870.0 | 4850.0 | 545.0 | 4.5 | PVC | Santa Fe Group sediments | 31-Jul-01 | |
| WYO-4 | 5392.57 | 5390.2 | 275.0 | 295.0 | 5115.2 | 5095.2 | 300.0 | 4.5 | PVC | Santa Fe Group sediments | 22-Jul-01 | |
| PGS-1 | 5407.41 | 5407.9 | 503.0 | 513.0 | 4904.9 | 4894.9 | 538.0 | 5.0 | SS | Santa Fe Group sediments | 9-Aug-94 | Apr-98 |
| PGS-2 | 5408.29 | 5407.9 | 535.0 | 565.0 | 4872.9 | 4842.9 | 655.0 | 5.0 | SS | Santa Fe Group sediments | 22-Sep-95 | |
| **Technical Area V** | | | | | | | | | | | | |
| AVN-1 | 5443.00 | 5440.2 | 570.0 | 590.0 | 4870.2 | 4850.2 | 600.0 | 5.0 | SS | Santa Fe Group sediments | 23-May-95 | |
| AVN-2 | 5442.39 | 5440.6 | 495.0 | 515.0 | 4945.6 | 4925.6 | 520.0 | 3.8 | PVC | Santa Fe Group sediments | 5-Jun-95 | |
| TAV-MW1 | 5437.81 | 5435.2 | 489.5 | 509.5 | 4945.7 | 4925.7 | 509.5 | 5.0 | PVC | Santa Fe Group sediments | 28-Feb-95 | 5-Feb-08 |
| TAV-MW2 | 5427.33 | 5424.3 | 497.0 | 513.5 | 4927.3 | 4910.8 | 513.5 | 4.8 | PVC | Santa Fe Group sediments | 30-Mar-95 | |
| TAV-MW3 | 5464.26 | 5461.6 | 532.0 | 552.0 | 4929.6 | 4909.6 | 557.7 | 4.8 | PVC | Santa Fe Group sediments | 11-Apr-97 | |
| TAV-MW4 | 5427.89 | 5425.4 | 495.0 | 515.0 | 4930.4 | 4910.4 | 520.7 | 4.8 | PVC | Santa Fe Group sediments | 18-Apr-97 | |
| TAV-MW5 | 5408.71 | 5406.6 | 487.0 | 507.0 | 4919.6 | 4899.6 | 512.7 | 4.8 | PVC | Santa Fe Group sediments | 26-Apr-97 | |
| TAV-MW6 | 5431.17 | 5431.5** | 507.0 | 527.0 | 4924.5 | 4904.5 | 532.0 | 4.8 | PVC | Santa Fe Group sediments | 24-Apr-01 | |
| TAV-MW7 | 5430.40 | 5430.9** | 597.0 | 617.0 | 4833.9 | 4813.9 | 622.0 | 4.8 | PVC | Santa Fe Group sediments | 6-Apr-01 | |
| TAV-MW8 | 5417.00 | 5417.4** | 491.0 | 511.0 | 4926.4 | 4906.4 | 516.0 | 4.8 | PVC | Santa Fe Group sediments | 11-Apr-01 | |
| TAV-MW9 | 5416.27 | 5416.9** | 582.0 | 602.0 | 4834.9 | 4814.9 | 607.0 | 4.8 | PVC | Santa Fe Group sediments | 17-Mar-01 | |
| TAV-MW10 | 5437.03 | 5434.7 | 508.0 | 528.0 | 4926.7 | 4906.7 | 533.0 | 4.8 | PVC | Santa Fe Group sediments | 6-Feb-08 | |
| TAV-MW11 | 5440.12 | 5440.4** | 512.0 | 532.0 | 4928.4 | 4908.4 | 537.0 | 4.8 | PVC | Santa Fe Group sediments | 19-Nov-10 | |
| TAV-MW12 | 5435.72 | 5432.9 | 507.0 | 527.0 | 4925.9 | 4905.9 | 532.0 | 4.8 | PVC | Santa Fe Group sediments | 16-Nov-10 | |
| TAV-MW13 | 5409.02 | 5406.0 | 525.0 | 545.0 | 4881.0 | 4861.0 | 550.0 | 4.8 | PVC | Santa Fe Group sediments | 12-Nov-10 | |
| TAV-MW14 | 5441.52 | 5438.6 | 512.0 | 532.0 | 4926.6 | 4906.6 | 538.0 | 4.8 | PVC | Santa Fe Group sediments | 9-Nov-10 | |
| LWDS-MW1 | 5423.83 | 5424.5** | 495.0 | 515.0 | 4929.5 | 4909.5 | 520.3 | 3.9 | PVC | Santa Fe Group sediments | 3-May-93 | |
| LWDS-MW2 | 5412.41 | 5411.5 | 506.0 | 526.0 | 4905.5 | 4885.5 | 531.0 | 3.9 | PVC | Santa Fe Group sediments | 30-Oct-92 | |

**Table 1. Inventory of Groundwater Monitoring Wells Located at SNL/NM and Surrounding Areas, updated 3 March 2014, AGMR CY2013** *(Continued)*

| Well | Measuring Point (feet amsl) | Ground Surface (feet amsl) | Top of Screen (feet bgs) | Bottom of Screen (feet bgs) | Top of Screen (feet amsl) | Bottom of Screen (feet amsl) | Casing Total Depth (feet bgs) | Casing, Inner Diameter (inches) | Casing Material | Lithology of Screened Interval | Installation Date | P&A Date, If Applicable |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Inhalation Toxicology Research Institute** | | | | | | | | | | | | |
| ITRI MW-4 | 5624.47 | 5622.7 | 100.0 | 110.0 | 5522.7 | 5512.7 | 110.0 | 4.0 | SS | Santa Fe Group sediments | 1-May-88 | 2013 |
| ITRI MW-16 | 5668.84 | 5667.6 | 100.0 | 120.0 | 5567.6 | 5547.6 | 120.0 | 4.0 | PVC | Bedrock (sandstone) | 13-Jan-93 | |
| ITRI MW-17 | 5615.11 | 5613.7 | 88.6 | 108.6 | 5525.1 | 5505.1 | 109.0 | 4.0 | PVC | Santa Fe Group sediments | 28-Jul-94 | 2013 |
| ITRI MW-19 | 5652.08 | 5648.9 | 115.1 | 125.1 | 5533.8 | 5523.8 | 125.5 | 4.0 | PVC | Santa Fe Group sediments | 2-Aug-94 | 2013 |
| IP-1 | 5622.18 | 5620.7 | 78.0 | 98.0 | 5542.7 | 5422.7 | 98.0 | 2.0 | PVC | Santa Fe Group Sediments | 18-Jul-94 | |
| NMED-1 | 5623.44 | 5620.7 | 90.0 | 110.0 | 5530.7 | 5510.7 | 115.0 | 4.0 | PVC | Santa Fe Group Sediments | 13-Jul-95 | |
| **Albuquerque Bernalillo County Water Utility Authority** | | | | | | | | | | | | |
| MESA DEL SOL - S | 5302.67 | 5302.7 | 420.0 | 520.0 | 4882.7 | 4782.7 | 525.0 | 2.2 | PVC | Santa Fe Group sediments | 14-May-97 | |
| MONTESSA PARK - S | 5102.67 | 5102.7 | 260.0 | 320.0 | 4842.7 | 4782.7 | 330.0 | 2.2 | PVC | Santa Fe Group sediments | 10-Sep-97 | |
| YALE-MW9 | 5271.06 | | 382.0 | 422.0 | | | 427.0 | 4.0 | PVC | Santa Fe Group sediments | 19-May-97 | |
| EUBANK-1 | 5460.02 | 5458.1 | 550.0 | 610.0 | 4908.1 | 4848.1 | 615.0 | 4.0 | SS | Santa Fe Group sediments | 16-Jul-88 | |
| EUBANK-2 | 5474.39 | | 552.0 | 592.0 | | | 597.0 | 4.0 | PVC | Santa Fe Group sediments | 15-Nov-96 | |
| EUBANK-3 | 5498.73 | | 590.0 | 650.0 | | | 655.0 | 4.0 | PVC | Santa Fe Group sediments | 15-Nov-96 | |
| EUBANK-4 | | | 454.0 | 514.0 | | | 519.0 | 4.0 | PVC | Santa Fe Group sediments | 15-Nov-96 | Yes |
| EUBANK-5 | 5507.40 | | 605.0 | 665.0 | | | 670.0 | 4.0 | PVC | Santa Fe Group sediments | | |
| MVMWJ | 5118.04 | 5118.6 | 200.0 | 220.0 | 4918.6 | 4898.6 | 225.0 | 2.0 | PVC | Santa Fe Group sediments | 1-Oct-88 | |
| **Kirtland Air Force Base** | | | | | | | | | | | | |
| EOD | 5829.70 | 5828.7 | 206.0* | 247.0* | 5622.7* | 5581.7* | 206.0* | 6.0 | OH | Bedrock (granite) | 1970? | |
| KAFB-0119 | | | | | | | 482.0 | | | Santa Fe Group sediments | | |
| KAFB-0120 | 5292.29 | 5288.7 | 429.0 | 459.0 | 4859.7 | 4829.7 | 461.5 | 4.0 | PVC | Santa Fe Group sediments | | |
| KAFB-0213 | 5282.00 | 5297.3 | 378.0 | 428.0 | 4919.3 | 4869.3 | 438.0 | | PVC | Santa Fe Group sediments | | |
| KAFB-0307 | 5364.53 | 5362.7 | 405.0 | 450.0 | 4957.7 | 4912.7 | 460.0 | 3.8 | PVC | Santa Fe Group sediments | | |
| KAFB-0308 | 5381.65 | 5380.7 | 463.0 | 488.0 | 4917.7 | 4892.7 | 498.0 | 3.8 | PVC | Santa Fe Group sediments | | |
| KAFB-0309 | 5411.80 | 5410.7 | 500.0 | 525.0 | 4910.7 | 4885.7 | 535.0 | 3.8 | PVC | Santa Fe Group sediments | | |
| KAFB-0311 | 5353.29 | 5351.7 | 433.0 | 458.0 | 4918.7 | 4893.7 | 468.0 | 3.8 | PVC | Santa Fe Group sediments | | |
| KAFB-0312 | 5432.17 | 5430.2 | 503.0 | 528.0 | 4927.2 | 4902.2 | 533.0 | 4.5 | PVC | Santa Fe Group sediments | | |
| KAFB-0314 | 5455.75 | 5453.9 | 428.0 | 448.0 | 5025.9 | 5005.9 | 453.0 | 4.5 | PVC | Santa Fe Group sediments | | |
| KAFB-0315 | 5466.11 | 5464.1 | 447.0 | 472.0 | 5017.1 | 4992.1 | 477.0 | 4.5 | PVC | Santa Fe Group sediments | | |
| KAFB-0417 | 5313.07 | | 430.0 | 455.0 | | | 465.0 | 3.8 | PVC | Santa Fe Group sediments | | |
| KAFB-0505 | 5362.81 | 5360.8 | 495.4 | 520.5 | 4865.4 | 4840.3 | 521.3 | 4.5 | PVC | Santa Fe Group sediments | | |
| KAFB-0507 | 5358.82 | | 482.3 | 507.3 | | | 512.3 | 3.5 | PVC | Santa Fe Group sediments | | |
| KAFB-0508 | 5351.88 | | 481.0 | 506.0 | | | 507.0 | 3.5 | PVC | Santa Fe Group sediments | | |
| KAFB-0510 | 5367.10 | | 511.0 | 536.0 | | | 537.0 | 3.5 | PVC | Santa Fe Group sediments | | |
| KAFB-0512 | 5304.07 | 5301.1 | 424.0 | 449.0 | 4877.1 | 4852.1 | 450.0 | 3.5 | PVC | Santa Fe Group sediments | | |
| KAFB-0514 | 5206.41 | | 340.0 | 365.0 | | | 366.0 | 3.5 | PVC | Santa Fe Group sediments | | |
| KAFB-0516 | 5205.64 | | 332.0 | 357.0 | | | 358.0 | 3.5 | PVC | Santa Fe Group sediments | | |
| KAFB-0517 | 5197.10 | | 325.0 | 350.0 | | | 352.0 | 4.0 | PVC | Santa Fe Group sediments | | |
| KAFB-0520 | 5247.90 | 5246.2 | 379.5 | 404.5 | 4866.7 | 4841.7 | 410.0 | 4.0 | PVC | Santa Fe Group sediments | | |
| KAFB-0522 | 5267.48 | 5265.7 | 405.0 | 430.0 | 4860.7 | 4835.7 | 432.5 | 4.0 | PVC | Santa Fe Group sediments | | |
| KAFB-0523 | 5352.62 | 5350.5 | | | | | 625.0 | | | Santa Fe Group sediments | | |
| KAFB-0608 | 5361.17 | 5359.9 | 307.0 | 327.0 | 5052.9 | 5032.9 | 338.0 | 4.0 | PVC | Santa Fe Group sediments | | |
| KAFB-0609 | 5365.87 | 5364.7 | 316.0 | 336.0 | 5048.7 | 5028.7 | 345.0 | 4.0 | PVC/SS | Santa Fe Group sediments | | |
| KAFB-0610 | 5359.47 | 5357.3 | 333.0 | 353.0 | 5024.3 | 5004.3 | 363.0 | 4.0 | PVC/SS | Santa Fe Group sediments | | |
| KAFB-0611 | 5386.09 | | 498.0 | 508.0 | | | 513.0 | 4.0 | PVC | Santa Fe Group sediments | | |
| KAFB-0615 | 5638.43 | | 300.0 | 325.0 | | | 327.0 | 4.0 | PVC | Bedrock (granite) | | |
| KAFB-0616 | 5481.07 | | 472.0 | 497.0 | | | 499.0 | 4.0 | PVC | Santa Fe Group sediments | | |
| KAFB-0617 | 5505.78 | 5503.3 | 565.0 | 590.0 | 4938.3 | 4913.3 | 592.0 | 4.0 | PVC | Santa Fe Group sediments | | |
| KAFB-0619 | 5410.78 | 5409.0 | 389.0 | 404.0 | 5020.0 | 5005.0 | 406.0 | 4.0 | PVC | Santa Fe Group sediments | | |
| KAFB-0620 | 5334.64 | 5332.0 | 447.0 | 472.0 | 4885.0 | 4860.0 | 474.5 | | PVC | Santa Fe Group sediments | | |
| KAFB-0621 | 5569.89 | 5568.0 | 624.0 | 649.0 | 4944.0 | 4919.0 | 650 | 4.0 | PVC | Santa Fe Group sediments | | |
| KAFB-0622 | 5488.64 | 5486.2 | 529.0 | 554.0 | 4957.2 | 4932.2 | 555.0 | 4.0 | PVC | Santa Fe Group sediments | | |
| KAFB-0624 | 5676.45 | 5671.1 | 765.0 | 790.0 | 4906.1 | 4881.1 | 792.5 | 3.8 | PVC | Santa Fe Group sediments | | |

**Table 1. Inventory of Groundwater Monitoring Wells Located at SNL/NM and Surrounding Areas, updated 3 March 2014, AGMR CY2013** *(Concluded)*

| Well | Measuring Point (feet amsl) | Ground Surface (feet amsl) | Top of Screen (feet bgs) | Bottom of Screen (feet bgs) | Top of Screen (feet amsl) | Bottom of Screen (feet amsl) | Casing Total Depth (feet bgs) | Casing, Inner Diameter (inches) | Casing Material | Lithology of Screened Interval | Installation Date | P&A Date, If Applicable |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Kirtland Air Force Base (Continued)** | | | | | | | | | | | | |
| KAFB-0901 | 5390.07 | 5389.8 | 465.0 | 527.0 | 4924.8 | 4862.8 | 537.0 | 4.0 | PVC | Santa Fe Group sediments | | |
| KAFB-1006 | 5257.01 | 5257.0 | 363.0 | 383.0 | 4894.0 | 4874.0 | 383.0 | 4.0 | SS | Santa Fe Group sediments | | |
| KAFB-1007 | 5260.11 | 5260.1 | 362.0 | 382.0 | 4898.1 | 4878.1 | 382.0 | 4.0 | SS | Santa Fe Group sediments | | |
| KAFB-1063 | 5339.52 | | | | | | 501.0 | | | Santa Fe Group sediments | | |
| KAFB-1901 | 5751.58 | 5748.7 | 79.0 | 104.0 | 5669.7 | 5644.7 | 114 | 4 | PVC/SS | Santa Fe Group sediments | 1-Jul-1992 | |
| KAFB-2005 | 5624.27 | 5624.6 | 126.0 | 156.0 | 5498.6 | 5468.6 | 158.5 | 4.0 | PVC | Santa Fe Group sediments | | |
| KAFB-2007 | 5567.18 | 5564.8 | 273.0 | 303.0 | 5291.8 | 5261.8 | 305.5 | 4.0 | PVC | Santa Fe Group sediments | | |
| KAFB-3392 | 5394.51 | 5393.4 | 536.0 | 561.0 | 4857.4 | 4832.4 | 562.0 | 4.0 | PVC | Santa Fe Group sediments | | |
| KAFB-3411 | 5342.81 | 5340.5 | 477.0 | 502.0 | 4863.5 | 4838.5 | 503.0 | | PVC | Santa Fe Group sediments | | |
| KAFB-6301 | 5459.64 | 5457.3 | 535.0 | 560.0 | 4922.3 | 4897.3 | 561.0 | 3.5 | PVC | Santa Fe Group sediments | | |
| KAFB-8351 | 5325.51 | | 474.0 | 499.0 | | | 500.0 | 4.0 | PVC | Santa Fe Group sediments | | |
| Optical Range Well | 5965.70 | 5965.7 | 160.0 | 320.0 | 5805.7 | 5645.7 | 320.0 | 5.0 | PVC | Bedrock (metarhyolite) | 19-Aug-1987 | |

**Notes:**

Measuring point is the top of casing elevation used for calculating groundwater elevations.

Survey coordinates are relative to the North American Datum of 1983 (NAD83), New Mexico State Plane Coordinate System, Central Zone. Previously reported data were converted as necessary.

Elevations are relative to the North American Vertical Datum of 1988 (NAVD88), New Mexico State Plane Coordinate System, Central Zone. Previously reported data were converted as necessary. Conversion was 2.672 feet.

**Acronyms**

*blank cell* = Indicates that the corresponding data were either not available or not applicable.
* = Indicates that depth or elevation corresponds to open hole completion, no screen is present.
** = Indicates elevation of concrete pad.
AGMR = Annual Groundwater Monitoring Report.
amsl = Above mean sea level.
AVN = Area V (North).
bgs = Below ground surface.
BW = Background well.
CCBA = Coyote Canyon Blast Area,
CS = Carbon steel.
CS/SS = Composition of blank well casing is carbon steel and composition of well screen is stainless steel.
CTF = Coyote Test Field.
CWL = Chemical Waste Landfill.
CY = Calendar year.
CYN = Lurance Canyon.
EOD = Explosive Ordnance Disposal.
HERTF = High Energy Research Test Facility.
IP = Isleta Pueblo.
ITRI = Inhalation Toxicology Research Institute.
KAFB = Kirtland Air Force Base.
L = Lower.
LMF = Large Melt Facility.
LWDS = Liquid Waste Disposal System.
MRN = Magazine Road North.
MVMW = Mountain View Monitoring Well.
MW = Monitoring well.
MWL = Mixed Waste Landfill.
NMED = New Mexico Environment Department.
NWTA3 = Northwest Technical Area III.
OBS = Old Burn Site.
OH = Open hole completion (no well screen).
P&A = Plugged and abandoned.
PGS = Parade Ground South.
PL = Power Line Road, west of TA-III.
PVC = Polyvinyl chloride.
PVC/CS = Composition of blank well casing is PVC and composition of well screen is carbon steel.
PVC/SS = Composition of blank well casing is PVC and composition of well screen is stainless steel.
SFR = South Fence Road.
SNL/NM = Sandia National Laboratories, New Mexico.
SS = Stainless steel.
STW = Solar Tower (West).
SWTA = Southwest Technical Area III.
TA1-W = Technical Area I (Well).
TA2-NW = Technical Area II (Northwest).
TA2-SW = Technical Area II (Southwest).
TA2-W = Technical Area II (Well).
TAV = Technical Area V.
TJA = Tijeras Arroyo.
TRE = Thunder Road East.
TRN = Target Road North.
TRS = Target Road South.
TSA = Transportation Safeguards Academy.
U = Upper.
WYO = Wyoming.
Yes = Indicates that the well was plugged and abandoned, but the date is not known.

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**Table 2. Base-Wide Groundwater Levels 2013, updated 3 March 2014, AGMR CY2013**

| Well | Date Measured | Measurement Point (feet amsl) | Depth to Water (feet btoc) | Water Level Elevation (feet amsl) | Owner | Screened Unit |
|---|---|---|---|---|---|---|
| AVN-1 | 1-Oct-13 | 5443.00 | 524.07 | 4918.93 | SNL/NM | SFG - regional aquifer |
| CCBA-MW1 | 3-Oct-13 | 5902.34 | 48.04 | 5854.30 | SNL/NM | Alluvium and bedrock (granite) |
| CCBA-MW2 | 3-Oct-13 | 5939.28 | 71.73 | 5867.55 | SNL/NM | Bedrock (granite) |
| CTF-MW1 | 3-Oct-13 | 6082.63 | 238.73 | 5843.90 | SNL/NM | Bedrock (granite) |
| CTF-MW2 | 4-Oct-13 | 5578.60 | 43.86 | 5534.74 | SNL/NM | Bedrock (granite) |
| CTF-MW3 | 4-Oct-13 | 5522.82 | 307.89 | 5214.93 | SNL/NM | Bedrock (granite) |
| CWL-BW5 | 2-Oct-13 | 5434.79 | 510.76 | 4924.03 | SNL/NM | SFG - regional aquifer |
| CWL-MW9 | 2-Oct-13 | 5426.12 | 502.98 | 4923.14 | SNL/NM | SFG - regional aquifer |
| CWL-MW10 | 11-Oct-13 | 5424.58 | 499.98 | 4924.60 | SNL/NM | SFG - regional aquifer |
| CWL-MW11 | 2-Oct-13 | 5423.24 | 498.68 | 4924.56 | SNL/NM | SFG - regional aquifer |
| CYN-MW3 | 3-Oct-13 | 6313.26 | 137.66 | 6175.60 | SNL/NM | Bedrock (metamorphics) |
| CYN-MW4 | 3-Oct-13 | 6455.48 | 228.68 | 6226.80 | SNL/NM | Bedrock (quartzite) |
| CYN-MW5 | 3-Oct-13 | 5984.23 | 107.71 | 5876.52 | SNL/NM | Bedrock (quartzite) |
| CYN-MW6 | 3-Oct-13 | 6343.37 | 162.50 | 6180.87 | SNL/NM | Bedrock (metamorphics) |
| CYN-MW7 | 3-Oct-13 | 6216.35 | 302.74 | 5913.61 | SNL/NM | Bedrock (granitic gneiss) |
| CYN-MW8 | 3-Oct-13 | 6230.11 | 318.42 | 5911.69 | SNL/NM | Bedrock (granitic gneiss) |
| CYN-MW9 | 3-Oct-13 | 6360.67 | 174.34 | 6186.33 | SNL/NM | Bedrock (metamorphics) |
| CYN-MW10 | 3-Oct-13 | 6345.45 | 133.55 | 6211.90 | SNL/NM | Bedrock (metamorphics) |
| CYN-MW11 | 3-Oct-13 | 6374.41 | 109.12 | 6265.29 | SNL/NM | Bedrock (metamorphics) |
| CYN-MW12 | 3-Oct-13 | 6345.16 | 215.80 | 6129.36 | SNL/NM | Bedrock (metamorphics) |
| CYN-MW13 | 3-Oct-13 | 6237.79 | 324.66 | 5913.13 | SNL/NM | Bedrock (granitic gneiss) |
| GREYSTONE-MW2 | 3-Oct-13 | 5814.20 | 53.56 | 5760.64 | SNL/NM | Alluvium |
| LWDS-MW1 | 1-Oct-13 | 5423.83 | 501.81 | 4922.02 | SNL/NM | SFG - regional aquifer |
| LWDS-MW2 | 1-Oct-13 | 5412.41 | 490.75 | 4921.66 | SNL/NM | SFG - regional aquifer |
| MRN-2 | 1-Oct-13 | 5308.18 | 436.00 | 4872.18 | SNL/NM | SFG - regional aquifer |
| MRN-3D | 1-Oct-13 | 5309.34 | 436.44 | 4872.90 | SNL/NM | SFG - regional aquifer |
| MWL-BW2 | 2-Oct-13 | 5391.02 | 479.44 | 4911.58 | SNL/NM | SFG - regional aquifer |
| MWL-MW4 | 2-Oct-13 | 5391.70 | 498.78 | 4892.92 | SNL/NM | SFG - regional aquifer |
| MWL-MW5 | 2-Oct-13 | 5382.56 | 493.63 | 4888.93 | SNL/NM | SFG - regional aquifer |
| MWL-MW6 | 2-Oct-13 | 5375.31 | 487.51 | 4887.80 | SNL/NM | SFG - regional aquifer |
| MWL-MW7 | 2-Oct-13 | 5383.30 | 489.65 | 4893.65 | SNL/NM | SFG - regional aquifer |
| MWL-MW8 | 2-Oct-13 | 5384.67 | 491.34 | 4893.33 | SNL/NM | SFG - regional aquifer |
| MWL-MW9 | 2-Oct-13 | 5381.91 | 491.79 | 4890.12 | SNL/NM | SFG - regional aquifer |
| NWTA3-MW2 | 2-Oct-13 | 5337.49 | 468.37 | 4869.12 | SNL/NM | SFG - regional aquifer |
| NWTA3-MW3D | 2-Oct-13 | 5340.80 | 467.54 | 4873.26 | SNL/NM | SFG - regional aquifer |

**Table 2. Base-Wide Groundwater Levels 2013, updated 3 March 2014, AGMR CY2013** *(Continued)*

| Well ID | Date Measured | Measurement Point (feet amsl) | Depth to Water (feet btoc) | Water Level Elevation (feet amsl) | Owner | Screened Unit |
|---|---|---|---|---|---|---|
| OBS-MW1 | 1-Oct-13 | 5871.42 | 72.55 | 5798.87 | SNL/NM | Bedrock (granite) |
| OBS-MW2 | 1-Oct-13 | 5863.16 | 174.05 | 5689.11 | SNL/NM | Bedrock (granite) |
| OBS-MW3 | 1-Oct-13 | 5865.50 | 69.67 | 5795.83 | SNL/NM | Bedrock (granite) |
| PGS-2 | 2-Oct-13 | 5408.29 | 549.83 | 4858.46 | SNL/NM | SFG - regional aquifer |
| PL-2 | 1-Oct-13 | 5336.01 | 468.97 | 4867.04 | SNL/NM | SFG - regional aquifer |
| PL-4 | 1-Oct-13 | 5334.98 | 467.87 | 4867.11 | SNL/NM | SFG - regional aquifer |
| SFR-1D | 1-Oct-13 | 5399.13 | 139.47 | 5259.66 | SNL/NM | SFG - regional aquifer |
| SFR-1S | 1-Oct-13 | 5399.16 | 89.73 | 5309.43 | SNL/NM | SFG - regional aquifer |
| SFR-2S | 1-Oct-13 | 5432.77 | 100.32 | 5332.45 | SNL/NM | SFG - regional aquifer |
| SFR-3D | 1-Oct-13 | 5497.94 | 161.45 | 5336.49 | SNL/NM | SFG - regional aquifer |
| SFR-3P | 1-Oct-13 | 5499.63 | 161.61 | 5338.02 | SNL/NM | SFG - regional aquifer |
| SFR-3S | 1-Oct-13 | 5498.24 | 160.61 | 5337.63 | SNL/NM | Bedrock (sandstone) |
| SFR-3T | 1-Oct-13 | 5498.66 | 69.31 | 5429.35 | SNL/NM | Bedrock (sandstone) |
| SFR-4P | 1-Oct-13 | 5573.33 | 150.05 | 5423.28 | SNL/NM | Bedrock (sandstone) |
| SFR-4T | 1-Oct-13 | 5573.95 | 145.76 | 5428.19 | SNL/NM | Bedrock (sandstone) |
| SWTA3-MW2 | 2-Oct-13 | 5325.60 | 451.24 | 4874.36 | SNL/NM | SFG - regional aquifer |
| SWTA3-MW3 | 2-Oct-13 | 5323.94 | 448.51 | 4875.43 | SNL/NM | SFG - regional aquifer |
| SWTA3-MW4 | 2-Oct-13 | 5324.81 | 449.11 | 4875.70 | SNL/NM | SFG - regional aquifer |
| TA1-W-01 | 2-Oct-13 | 5403.82 | 542.24 | 4861.58 | SNL/NM | SFG - regional aquifer |
| TA1-W-02 | 2-Oct-13 | 5416.62 | 524.40 | 4892.22 | SNL/NM | SFG - regional aquifer |
| TA1-W-03 | 2-Oct-13 | 5457.03 | 350.24 | 5106.79 | SNL/NM | SFG - PGWS |
| TA1-W-04 | 2-Oct-13 | 5460.98 | 571.16 | 4889.82 | SNL/NM | SFG - regional aquifer |
| TA1-W-05 | 4-Oct-13 | 5433.84 | 571.39 | 4862.45 | SNL/NM | SFG - regional aquifer |
| TA1-W-06 | 2-Oct-13 | 5417.10 | 307.24 | 5109.86 | SNL/NM | SFG - PGWS |
| TA1-W-07 | 2-Oct-13 | 5404.92 | 285.90 | 5119.02 | SNL/NM | SFG - PGWS |
| TA1-W-08 | 4-Oct-13 | 5434.19 | 310.39 | 5123.80 | SNL/NM | SFG - PGWS |
| TA2-NW1-325 | 2-Oct-13 | 5421.94 | 317.64 | 5104.30 | SNL/NM | SFG - PGWS |
| TA2-NW1-595 | 2-Oct-13 | 5421.26 | 524.02 | 4897.24 | SNL/NM | SFG - regional aquifer |
| TA2-SW1-320 | 2-Oct-13 | 5411.85 | 318.00 | 5093.85 | SNL/NM | SFG - PGWS |
| TA2-W-01 | 2-Oct-13 | 5419.99 | 327.47 | 5092.52 | SNL/NM | SFG - PGWS |
| TA2-W-19 | 2-Oct-13 | 5351.21 | 271.24 | 5079.97 | SNL/NM | SFG - PGWS |
| TA2-W-24 | 2-Oct-13 | 5363.66 | 443.03 | 4920.63 | SNL/NM | SFG - intermediate |
| TA2-W-25 | 2-Oct-13 | 5374.86 | 470.25 | 4904.61 | SNL/NM | SFG - regional aquifer |
| TA2-W-26 | 2-Oct-13 | 5375.77 | 286.24 | 5089.53 | SNL/NM | SFG - PGWS |
| TA2-W-27 | 2-Oct-13 | 5362.85 | 279.34 | 5083.51 | SNL/NM | SFG - PGWS |

**Table 2. Base-Wide Groundwater Levels 2013, updated 3 March 2014, AGMR CY2013** *(Continued)*

| Well ID | Date Measured | Measurement Point (feet amsl) | Depth to Water (feet btoc) | Water Level Elevation (feet amsl) | Owner | Screened Unit |
|---|---|---|---|---|---|---|
| TAV-MW2 | 1-Oct-13 | 5427.33 | 506.01 | 4921.32 | SNL/NM | SFG - regional aquifer |
| TAV-MW3 | 1-Oct-13 | 5464.26 | 544.77 | 4919.49 | SNL/NM | SFG - regional aquifer |
| TAV-MW4 | 1-Oct-13 | 5427.89 | 506.18 | 4921.71 | SNL/NM | SFG - regional aquifer |
| TAV-MW5 | 1-Oct-13 | 5408.71 | 490.23 | 4918.48 | SNL/NM | SFG - regional aquifer |
| TAV-MW6 | 1-Oct-13 | 5431.17 | 509.80 | 4921.37 | SNL/NM | SFG - regional aquifer |
| TAV-MW7 | 1-Oct-13 | 5430.40 | 512.48 | 4917.92 | SNL/NM | SFG - regional aquifer |
| TAV-MW8 | 1-Oct-13 | 5417.00 | 494.88 | 4922.12 | SNL/NM | SFG - regional aquifer |
| TAV-MW9 | 1-Oct-13 | 5416.27 | 498.68 | 4917.59 | SNL/NM | SFG - regional aquifer |
| TAV-MW10 | 1-Oct-13 | 5437.03 | 515.70 | 4921.33 | SNL/NM | SFG - regional aquifer |
| TAV-MW11 | 1-Oct-13 | 5440.12 | 518.72 | 4921.40 | SNL/NM | SFG - regional aquifer |
| TAV-MW12 | 1-Oct-13 | 5435.72 | 515.20 | 4920.52 | SNL/NM | SFG - regional aquifer |
| TAV-MW13 | 1-Oct-13 | 5409.02 | 495.35 | 4913.67 | SNL/NM | SFG - regional aquifer |
| TAV-MW14 | 1-Oct-13 | 5441.52 | 521.86 | 4919.66 | SNL/NM | SFG - regional aquifer |
| TJA-2 | 4-Oct-13 | 5353.20 | 276.66 | 5076.54 | SNL/NM | SFG - PGWS |
| TJA-3 | 2-Oct-13 | 5390.56 | 499.08 | 4891.48 | SNL/NM | SFG - regional aquifer |
| TJA-4 | 4-Oct-13 | 5341.16 | 301.17 | 5039.99 | SNL/NM | SFG - intermediate |
| TJA-5 | 4-Oct-13 | 5341.33 | 269.49 | 5071.84 | SNL/NM | SFG - PGWS |
| TJA-6 | 2-Oct-13 | 5343.16 | 451.22 | 4891.94 | SNL/NM | SFG - regional aquifer |
| TJA-7 | 2-Oct-13 | 5391.27 | 303.07 | 5088.20 | SNL/NM | SFG - PGWS |
| TRE-1 | 1-Oct-13 | 5497.25 | 176.98 | 5320.27 | SNL/NM | SFG - regional aquifer |
| TRN-1 | 1-Oct-13 | 5735.62 | 91.68 | 5643.94 | SNL/NM | Bedrock (sandstone) |
| TRS-1D | 1-Oct-13 | 5779.80 | 127.34 | 5652.46 | SNL/NM | Bedrock (limestone) |
| TRS-1S | 1-Oct-13 | 5780.07 | 134.19 | 5645.88 | SNL/NM | Bedrock (limestone) |
| TRS-2 | 1-Oct-13 | 5780.76 | 134.76 | 5646.00 | SNL/NM | Bedrock (limestone) |
| WYO-3 | 2-Oct-13 | 5392.09 | 529.43 | 4862.66 | SNL/NM | SFG - regional aquifer |
| WYO-4 | 2-Oct-13 | 5392.57 | 291.44 | 5101.13 | SNL/NM | SFG - PGWS |
| **Non Sandia Wells** | | | | | | |
| EOD | 6-Nov-13 | 5829.70 | 142.88 | 5686.82 | KAFB | Bedrock (limestone and granite) |
| Eubank-1 | 2-Oct-13 | 5460.02 | 549.97 | 4910.05 | ABCWUA | SFG - regional aquifer |
| Eubank-2 | 15-Oct-13 | 5474.39 | 578.61 | 4895.78 | ABCWUA | SFG - regional aquifer |
| Eubank-3 | 15-Oct-13 | 5498.73 | 607.11 | 4891.62 | ABCWUA | SFG - regional aquifer |
| Eubank-5 | 15-Oct-13 | 5507.40 | 616.13 | 4891.27 | ABCWUA | SFG - regional aquifer |
| ITRI-MW16 | 11-Oct-13 | 5668.84 | 121.60 | 5547.24 | LRRI | Bedrock (sandstone) |
| KAFB-0213 | 8-Nov-13 | 5282.00 | 417.70 | 4864.30 | KAFB | SFG - regional aquifer |

**Table 2. Base-Wide Groundwater Levels 2013, updated 3 March 2014, AGMR CY2013** *(Continued)*

| Well ID | Date Measured | Measurement Point (feet amsl) | Depth to Water (feet btoc) | Water Level Elevation (feet amsl) | Owner | Screened Unit |
|---|---|---|---|---|---|---|
| KAFB-0307 | 6-Nov-13 | 5364.53 | 429.48 | 4935.05 | KAFB | SFG - regional aquifer |
| KAFB-0309 | 6-Nov-13 | 5411.8 | 478.91 | 4932.89 | KAFB | SFG - regional aquifer |
| KAFB-0312 | 6-Nov-13 | 5432.17 | 417.98 | 5014.19 | KAFB | SFG - regional aquifer |
| KAFB-0313 | 6-Nov-13 | 5418.98 | 350.03 | 5068.95 | KAFB | SFG - PGWS |
| KAFB-0314 | 6-Nov-13 | 5455.75 | 415.92 | 5039.83 | KAFB | SFG - regional aquifer |
| KAFB-0315 | 6-Nov-13 | 5466.11 | 438.65 | 5027.46 | KAFB | SFG - regional aquifer |
| KAFB-0505 | 8-Nov-13 | 5362.81 | 505.55 | 4857.26 | KAFB | SFG - regional aquifer |
| KAFB-0510 | 7-Nov-13 | 5367.10 | 510.73 | 4856.37 | KAFB | SFG - regional aquifer |
| KAFB-0516 | 8-Nov-13 | 5205.64 | 343.16 | 4862.48 | KAFB | SFG - regional aquifer |
| KAFB-0522 | 8-Nov-13 | 5267.48 | 407.31 | 4860.17 | KAFB | SFG - regional aquifer |
| KAFB-0611 | 6-Nov-13 | 5386.09 | 462.52 | 4923.57 | KAFB | SFG - regional aquifer |
| KAFB-0615 | 6-Nov-13 | 5638.43 | 201.83 | 5436.60 | KAFB | Bedrock (granite) |
| KAFB-0616 | 6-Nov-13 | 5481.07 | 442.76 | 5038.31 | KAFB | SFG - regional aquifer |
| KAFB-0617 | 6-Nov-13 | 5505.78 | 559.20 | 4946.58 | KAFB | SFG - regional aquifer |
| KAFB-0619 | 6-Nov-13 | 5410.78 | 386.52 | 5024.26 | KAFB | SFG - PGWS |
| KAFB-0620 | 8-Nov-13 | 5334.64 | 442.46 | 4892.18 | KAFB | SFG - regional aquifer |
| KAFB-0621 | 7-Nov-13 | 5569.89 | 627.35 | 4942.54 | KAFB | SFG - regional aquifer |
| KAFB-0622 | 6-Nov-13 | 5488.64 | 549.52 | 4939.12 | KAFB | SFG - regional aquifer |
| KAFB-1901 | 6-Nov-13 | 5757.58 | 85.74 | 5671.84 | KAFB | SFG - regional aquifer |
| KAFB-2007 | 6-Nov-13 | 5567.18 | 269.81 | 5297.37 | KAFB | SFG - regional aquifer |
| Mesa del Sol-S | 13-Nov-13 | 5302.67 | 423.09 | 4879.58 | ABCWUA | SFG - regional aquifer |
| Montessa Park - S | 14-Nov-13 | 5102.67 | 221.13 | 4881.54 | ABCWUA | SFG - regional aquifer |
| Optical Range Well | 6-Nov-13 | 5965.70 | 146.00 | 5819.70 | KAFB | Bedrock (metarhyolite) |

**NOTES:**

ABCWUA = Albuquerque Bernalillo County Water Utility Authority.
AGMR = Annual Groundwater Monitoring Report.
amsl = Above mean sea level.
AVN = Area V (North).
btoc = Below top of casing.
BW = Background well.
CCBA = Coyote Canyon Blast Area.
CTF = Coyote Test Field.
CWL = Chemical Waste Landfill.
CY = Calendar year.
CYN = Lurance Canyon.

**Table 2. Base-Wide Groundwater Levels 2013, updated 3 March 2014, AGMR CY2013** *(Concluded)*

**NOTES (continued):**

EOD = Explosive Ordnance Disposal.
ITRI = Inhalation Toxicology Research Institute.
KAFB = Kirtland Air Force Base.
LRRI = Lovelace Respiratory Research Institute.
LWDS = Liquid Waste Disposal System.
MRN = Magazine Road North.
MW = Monitoring well.
MWL = Mixed Waste Landfill.
NWTA3 = Northwest Technical Area III
OBS = Old Burn Site.
PGS = Parade Ground South.
PGWS = Perched groundwater system.
PL = Power Line Road, west of TA-III.
SFG = Santa Fe Group sediments.
SFR = South Fence Road.
SNL/NM = Sandia National Laboratories, New Mexico.
SWTA = Southwest Technical Area III.
TA1-W = Technical Area I (Well).
TA2-NW = Technical Area II (Northwest).
TA2-SW = Technical Area II (Well).
TA2-W = Technical Area II (Well).
TAV = Technical Area V.
TJA = Tijeras Arroyo.
TRE = Thunder Road East.
TRN = Target Road North.
TRS = Target Road South.
WYO = Wyoming.

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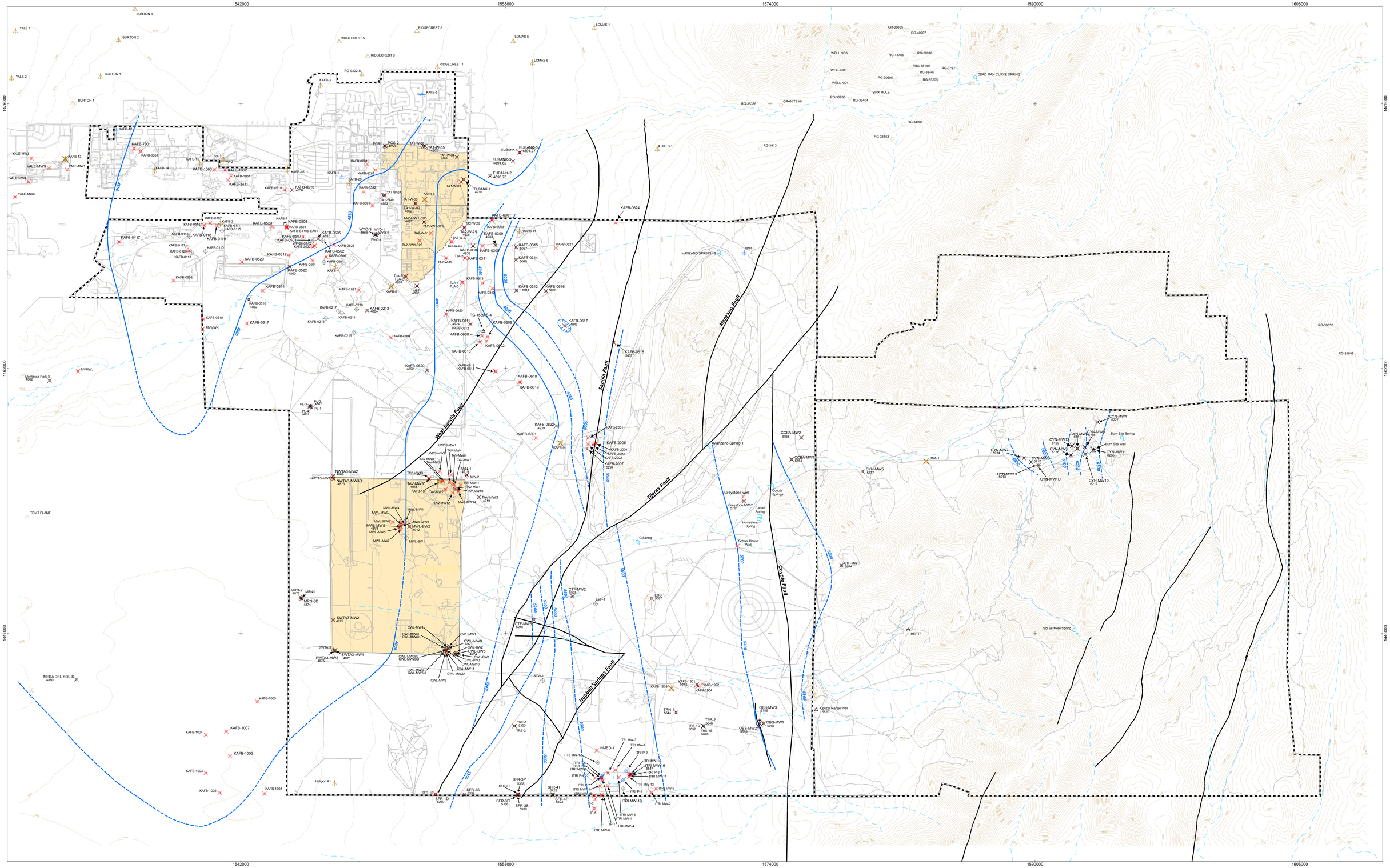


## Legend

- KAFB Boundary
- Topographic Contour, feet amsl (above mean sea level)
- Road
- Drainage Feature
- Fault (exposed or concealed)
- SNL/NM Technical Areas
- Potentiometric Surface Contour, feet amsl (dashed where inferred), hachured for inferred depression
- Monitoring Well - contoured
- Monitoring Well - not contoured
- Observation Well
- Test Well
- Production Well
- Production Well (Out of Commission)
- Production Well (Plugged and Abandoned)
- Production Well (Non-Potable)
- Monitoring Well (Plugged and Abandoned)
- Spring
- Off-base Well with Unknown Use

NOTE:
1. Contours for the potentiometric surface are shown using two intervals: below 5000 feet amsl the contour interval is 40 feet, and above 5000 feet amsl the contour interval is 100 feet.
2. Fault locations are from GRAM and Lettis (1995), Karlstrom et al., (2000), and Van Hart (2003). The West Sandia fault does not affect the alluvial-fan sediments at the water table.
3. West of the Sandia Fault, the regional aquifer is present within the unconsolidated Santa Fe Group sediments. Groundwater within and east of the Tijeras Fault Zone (bounded by the Sandia and Tijeras Faults) is primarily present in Paleozoic and Precambrian bedrock.
4. Water levels were measured in SNL/NM, USGS, COA, and ITRI wells in October 2013. Water levels in KAFB wells were measured in November 2013. Specific data are listed in Table 2.
5. Groundwater elevations are rounded to the nearest foot.

0 2,000 4,000 Scale in Feet
0 480 960 Scale in Meters
0 0.5 1 Scale in Kilometers
0 0.5 1 Scale in Miles

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

# Plate 1
# SNL/NM Monitoring Well Locations and Base-Wide Potentiometric Surface Map for the Kirtland Air Force Base Vicinity, October/November 2013

Transverse Mercator Projection, New Mexico State Plane Coordinate System, Central Zone, 1983 North American Horizontal Datum
1988 North American Vertical Datum

Mapid = mb14095 / mb13055 05/1/14 SNL EGIS ORG. 4142 MBarthel

May 1, 2014