



National Nuclear Security Administration

Sandia Site Office

P.O. Box 5400

Albuquerque, New Mexico 87185-5400



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MAR 05 2008

Mr. James Bearzi
Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Road East Building E
Santa Fe, New Mexico 87505

Dear Mr. Bearzi:

On behalf of the Department of Energy (DOE) and Sandia Corporation (Sandia), DOE is submitting the Mixed Waste Landfill (MWL) Annual Groundwater Monitoring Report, Spring 2007 Sampling Event. This report presents the groundwater monitoring data from the annual sampling event conducted at the MWL in the spring of 2007. The results of the groundwater monitoring showed constituent concentrations within the historical ranges for the MWL.

If you have any questions regarding this submittal, please contact me at (505) 845-6036, or Dan Pellegrino of my staff, at (505) 845-5398.

Sincerely,

Patty Wagner
Manager

Enclosure

cc w/enclosure:

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CERTIFICATION STATEMENT FOR APPROVAL AND FINAL RELEASE OF DOCUMENTS

Document title: Mixed Waste Landfill Annual Groundwater Monitoring Report
Spring 2007 Sampling Event

Document authors: Stacy Griffith, Department 6765

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Fran B. Nimick

Deputy Director to the

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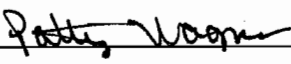
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1/28/08

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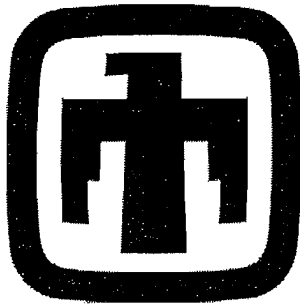
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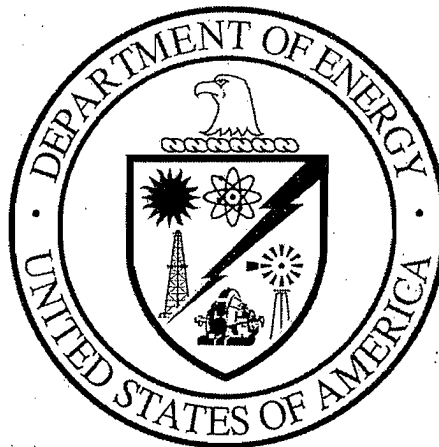
Date



Sandia National Laboratories/New Mexico
Environmental Restoration Project

**MIXED WASTE LANDFILL
ANNUAL GROUNDWATER MONITORING REPORT
SPRING 2007 SAMPLING EVENT**

January 2008



United States Department of Energy
Sandia Site Office

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

EXECUTIVE SUMMARY

Annual groundwater sampling was conducted at the Sandia National Laboratories Mixed Waste Landfill (MWL) during Spring (April and June) 2007. Six of the seven monitoring wells were sampled using a Bennett™ pump in accordance with the MWL Groundwater Monitoring Mini-Sampling and Analysis Plan for Fiscal 2007 Annual Sampling (SNL/NM April 2007a). The background monitoring well was not sampled due to an insufficient amount of water. The samples were analyzed at off-site laboratories for a broad suite of chemical parameters and radionuclides, and the results are presented in this report. The results show that constituent concentrations are within the historical ranges for the site.

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- A Summary Tables of Field Measurements and Analytical Results

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ACRONYMS AND ABBREVIATIONS

AOP	Administrative Operating Procedure
COC	constituent of concern
DO	dissolved oxygen
DOE	U.S. Department of Energy
EB	equipment blank
EPA	U.S. Environmental Protection Agency
FOP	Field Operating Procedure
GEL	General Engineering Laboratories, Inc.
L	liter(s)
LTES	Long-Term Environmental Stewardship
MCL	maximum contaminant level
MDA	minimum detectable activity
MDL	method detection limit
mg	milligram(s)
MWL	Mixed Waste Landfill
NMED	New Mexico Environment Department
ORP	oxidation/reduction potential
P&A	Plug and Abandonment
pCi	picocurie(s)
pH	potential of hydrogen
PQL	practical quantitation limit
PVC	polyvinyl chloride
QC	quality control
RPD	relative percent difference
Sandia	Sandia Corporation
SNL/NM	Sandia National Laboratories/New Mexico
SWMU	Solid Waste Management Unit
TA	Technical Area
TAL	target analyte list
TB	trip blank
USGS	U.S. Geological Society
VOC	volatile organic compound

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1.0 INTRODUCTION

The Mixed Waste Landfill (MWL) is located on Kirtland Air Force Base 4 miles south of Sandia National Laboratories/New Mexico (SNL/NM) Technical Area (TA)-I facilities, and 5 miles southeast of Albuquerque International Sunport. The landfill is a 2.6-acre site in the north-central portion of TA-III (Figure 1-1). The MWL was established in 1959 as a disposal area for low-level radioactive and mixed waste generated by SNL/NM research facilities. The landfill accepted low-level radioactive and minor amounts of mixed waste from March 1959 through December 1988. Approximately 100,000 cubic feet of low-level radioactive and mixed waste containing approximately 6,300 curies (at the time of disposal) of activity were disposed of in the landfill.

Groundwater in the area of the MWL has been extensively characterized since 1990 for major ion chemistry, volatile organic compounds (VOCs), nitrate, metals, radionuclides, and perchlorate. Sixteen years of data indicate that groundwater has not been contaminated by releases from the MWL (Goering et al. 2002; SNL/NM July 2001, November 2001, January 2002, April 2002, July 2002, October 2002, April 2003, September 2003, April 2004; Lyon and Goering April 2005; SNL/NM April 2006).

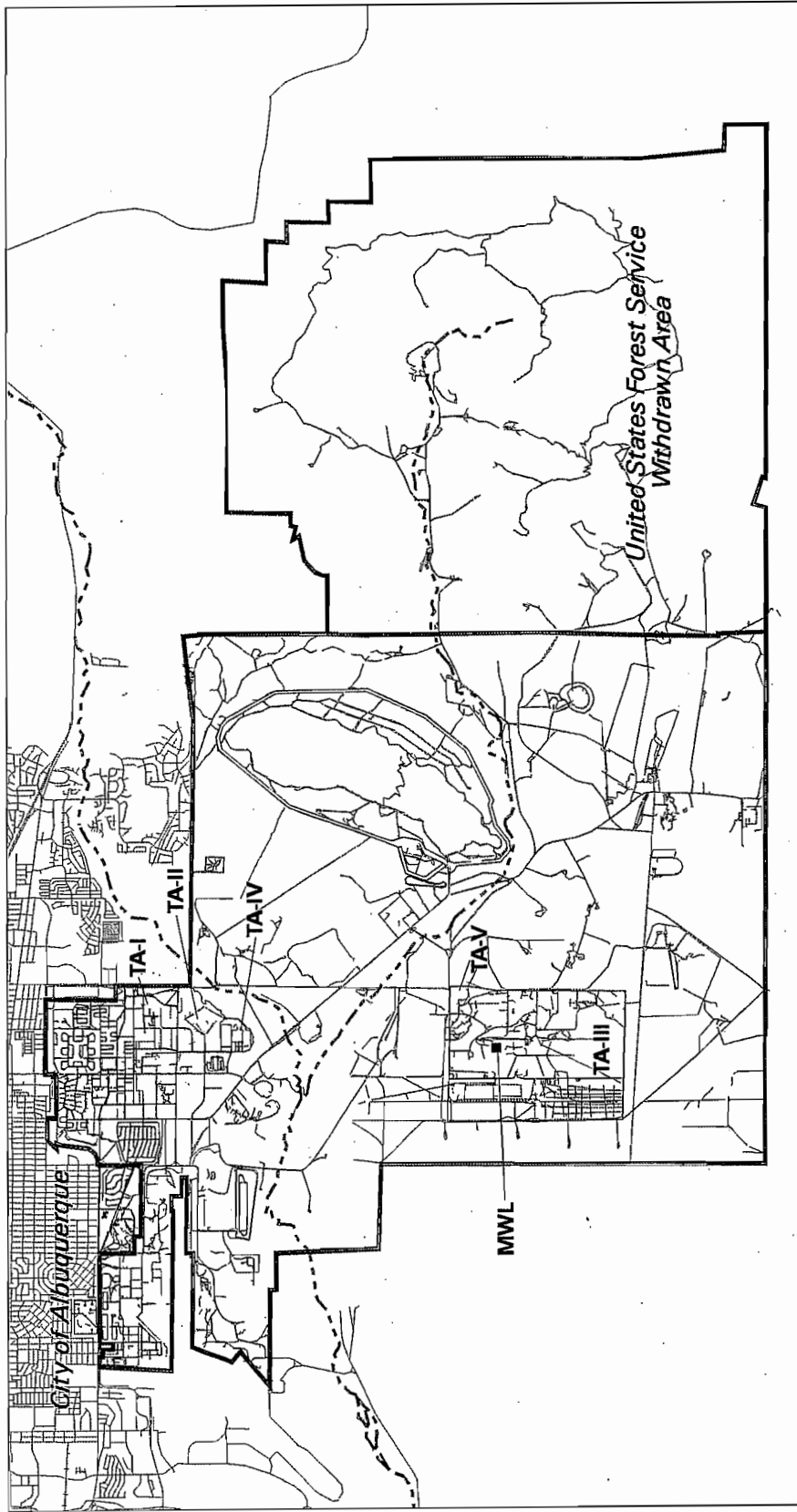
The MWL monitoring well network consists of seven wells completed within interfingering, fine-grained alluvial fan deposits and coarse-grained Ancestral Rio Grande deposits (Goering et al. 2002). This network includes one background well (MWL-BW1), one on-site well (MWL-MW4), and five downgradient or cross-gradient wells (MWL-MW1, MWL-MW2, MWL-MW3, MWL-MW5, and MWL-MW6). All seven wells are constructed of 5-inch, Schedule 80 polyvinyl chloride (PVC) casing. Wells MWL-BW1, MWL-MW1, MWL-MW2, and MWL-MW3 have screens composed of slotted Type 304 stainless steel. Wells MWL-MW4, MWL-MW5, and MWL-MW6 have screens composed of slotted Schedule 80 PVC. Table A-1 presents well completion information and recent water levels.

Monitoring Well MWL-MW4 was installed in 1993 directly beneath a disposal trench in which 204,000 gallons of coolant wastewater from the SNL/NM Engineering Reactor Facility were disposed of in 1967 (Peace et al. September 2002). MWL-MW4 was completed at an angle of 6 degrees from vertical and is screened at two discrete intervals 20 feet apart to evaluate vertical anisotropy, vertical potentiometric gradients, and changes in aquifer parameters with depth. The approximate horizontal extent of MWL-MW4 is shown in Figure 1-2. An inflatable packer separates the screened intervals, and pressure is maintained in the packer to prevent mixing water from the two screened sections of the aquifer.

Six of the seven wells were sampled during the Spring 2007 monitoring event according to the MWL Mini-Sampling and Analysis Plan for Fiscal 2007 Annual Sampling (SNL/NM April 2007a). The background monitoring well, MWL-BW1, was not sampled due to an insufficient amount of water in the well as a result of declining water levels in the regional aquifer.

The monitoring well network is being updated for long-term monitoring at the MWL. A Long-Term Monitoring and Maintenance Plan has been prepared and submitted to the New Mexico Environment Department (NMED) (SNL/NM September 2007) that provides specific information about groundwater monitoring at the MWL. The four oldest wells, MWL-BW1, MWL-MW1, MWL-MW2, and MWL-MW3, were installed in 1988 and 1989, and although they have provided data of excellent quality over the years, these wells are becoming increasingly problematic.

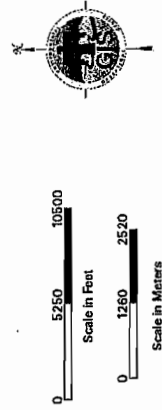
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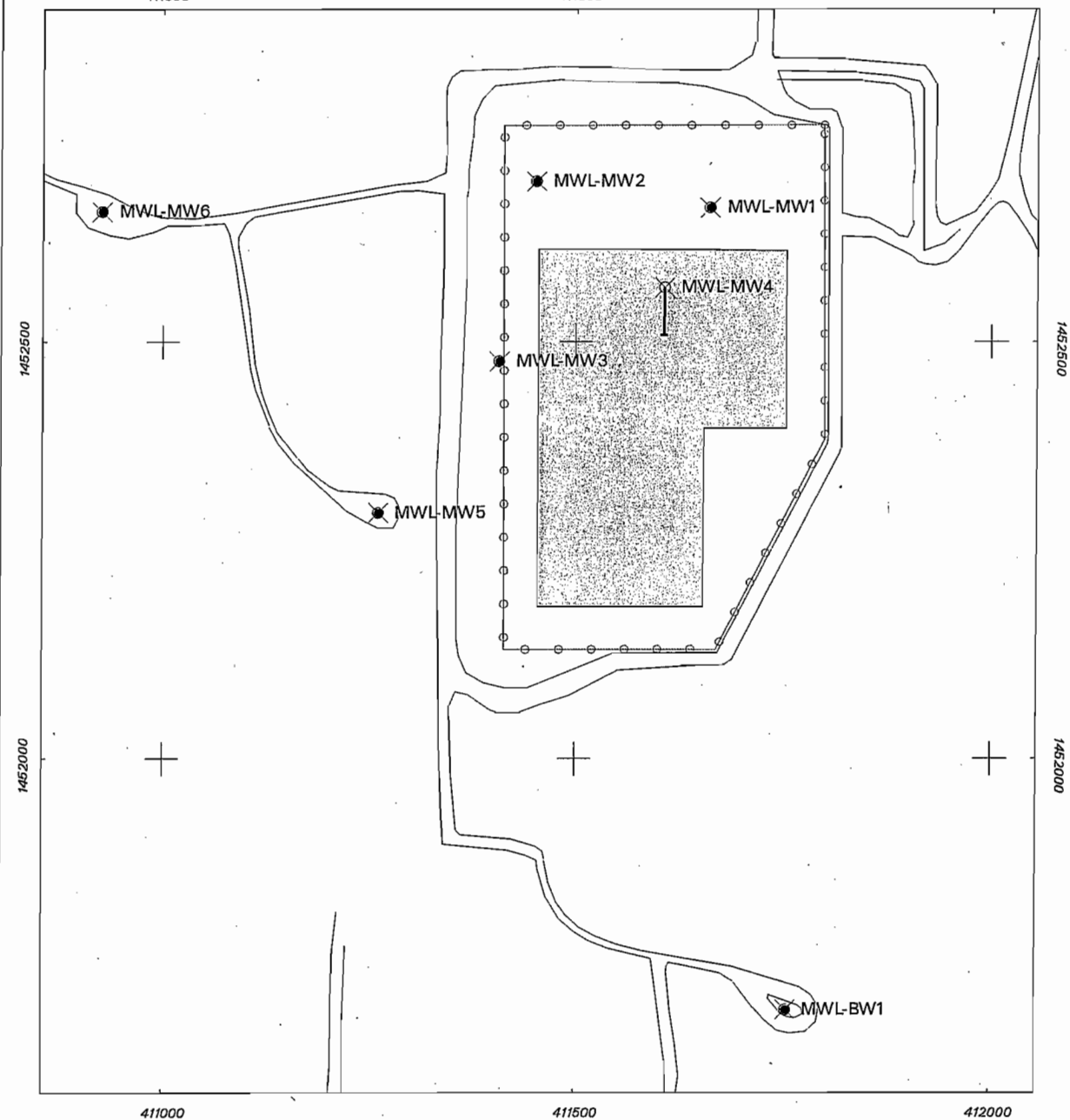
- MWL-Mixed Waste Landfill
- Paved and Unpaved Road
- - - Arroyo
- Kirtland Air Force Base Boundary
- Technical Area (TA) [DOE Owned]

Sandia National Laboratories, New Mexico
Environmental Geographic Information System



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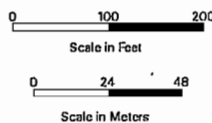
Figure 1-1 Location of Sandia National Laboratories and Kirtland Air Force Base



Legend

-  Angled Monitoring Well (showing horizontal extent)
-  Groundwater Monitoring Well
-  Road
-  Fence
-  MWL Extent

**Figure 1-2
Mixed Waste Landfill
Groundwater Monitoring Wells**



Sandia National Laboratories, New Mexico
Environmental Geographic Information System

Two of these wells, MWL-BW1 and MWL-MW3, are nearly dry due to declining water levels in the regional aquifer. Groundwater levels beneath the MWL declined at an average rate of 0.5 feet/year between April 2001 and October 2006. As of April 2007, approximately 1 foot of water remained above the well screen in MWL-BW1, and approximately 3 feet of water remained above the well screen in MWL-MW3.

In March 2007, the NMED requested that MWL-BW1 be plugged and abandoned and replaced (Bearzi March 2007). A Monitoring Well Plug and Abandonment (P&A) Plan and Replacement Well Construction Plan for MWL-BW1 was submitted to the NMED on April 17, 2007 (SNL/NM April 2007b). However, the NMED submitted a Notice of Disapproval regarding this plan in June 2007 (Bearzi June 2007), and the U.S. Department of Energy and Sandia Corporation (DOE/Sandia) resubmitted a P&A and Replacement Well Construction Plan for MWL-BW1 in July 2007 (SNL/NM July 2007a).

On July 2, 2007, the NMED requested replacement of monitoring wells MWL-MW1 and MWL-MW3 because of low water levels in MWL-MW3 and problems with corrosion of the stainless-steel screens in both these wells (Bearzi July 2007). The DOE/Sandia submitted a P&A and Replacement Well Construction Plan for both of these wells in July 2007 (SNL/NM July 2007b).

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2.0 REGULATORY CRITERIA

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

The NMED issued the Compliance Order on Consent (the Consent Order) in April 2004, which transferred the regulatory authority for groundwater sampling at the MWL to the Consent Order (NMED April 2004). Although this report is not a deliverable under the Consent Order, it has been formatted to address the content criteria set forth in the Consent Order for Periodic Monitoring Reports. The following crosswalk lists the required elements from the Consent Order and the corresponding section(s) in which these elements are addressed in this report.

Required Elements of the Consent Order (NMED April 2004)	MWL Groundwater Monitoring Report Spring 2007 Sampling Event
1. Title Page and Signature Block (for the name, title, and organization of the preparer and the responsible DOE and Sandia representative)	Title Page Signatures for full SNL/NM and DOE chain of command on the transmittal paperwork that accompanies the report from SNL/NM to the DOE to the NMED
2. Executive Summary (Abstract)	Executive Summary and Chapter 8.0
3. Table of Contents	Table of Contents
4. Introduction	Chapter 1.0 Introduction
5. Scope of Activities	Chapter 3.0 Scope of Activities
6. Regulatory Criteria	Chapter 2.0 Regulatory Criteria
7. Monitoring Results	Chapter 6.0 Summary of Analytical Results
8. Conclusions	Chapter 9.0 Summary and Conclusions
9. Tables	Appendix A
10. Figures	Chapter 1.0
11. Appendices	Appendix A at end of the report

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

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3.0 SCOPE OF ACTIVITIES

Annual groundwater sampling was conducted at the MWL located in TA-III at SNL/NM. Six of the seven monitoring wells at the MWL were sampled, including on-site monitoring well MWL-MW4 and downgradient monitoring wells MWL-MW1, MWL-MW2, MWL-MW3, MWL-MW5, and MWL-MW6. Sampling was conducted from April 2 through April 11, and on June 4 and June 5, 2007.

Although monitoring well MWL-MW4 is screened in two discrete intervals, only the upper interval was sampled, as this is the uppermost water-bearing interval beneath the MWL. References in this report to groundwater samples from MWL-MW4 refer to groundwater withdrawn from the upper interval. Maintenance was performed on the dedicated pump and packer in MWL-MW4 in May 2007. The pump and packer were brought to the surface and inspected. The air line and fittings (used to inflate the packer separating the two screened intervals) were replaced on the packer. The pump was reset into the well in the first (shallowest) screened interval. The packer was inflated to the appropriate pressure and sampling of this well was performed in June 2007.

Sampling was conducted in accordance with the MWL Groundwater Monitoring Mini-Sampling and Analysis Plan for Fiscal 2007 Annual Sampling (SNL/NM April 2007a). The chemical analytical parameters selected for monitoring included target analyte list (TAL) metals, total uranium, VOCs, nitrate plus nitrite, bromide, fluoride, chloride, sulfate, manganese II, total organic carbon, carbon dioxide, total dissolved solids, ferrous iron, and biochemical oxygen demand. Alkalinity titrations were performed in the field on groundwater collected at each well. Radiochemical analysis included gross alpha/beta radioactivity, tritium, and gamma-emitting radionuclides.

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

Field quality control (QC) samples submitted to GEL included one field duplicate sample for the full suite of analyses, three equipment blank (EB) samples for VOCs, TAL metals, total uranium, and uranium-235 and -238 analyses, and six trip blank (TB) samples for VOC analysis.

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4.0 FIELD METHODS AND MEASUREMENTS

Field measurements performed during annual groundwater sampling activities included groundwater elevation and water quality. The following sections present a more detailed discussion of field activities and methods.

4.1 Groundwater Elevation

Depth-to-groundwater measurements were obtained using a Solinst™ depth-to-water well sounder prior to purging activities. Depth-to-groundwater measurements were performed in accordance with the Field Operating Procedure (FOP) "Long-Term Environmental Stewardship (LTES) Groundwater Monitoring Well Sampling and Field Analytical Measurements," FOP 05-01 (SNL/NM August 2007a). Measurements were obtained from all monitoring wells. Table A-1 (Appendix A) presents groundwater elevations, static water heights, and monitoring well completion information.

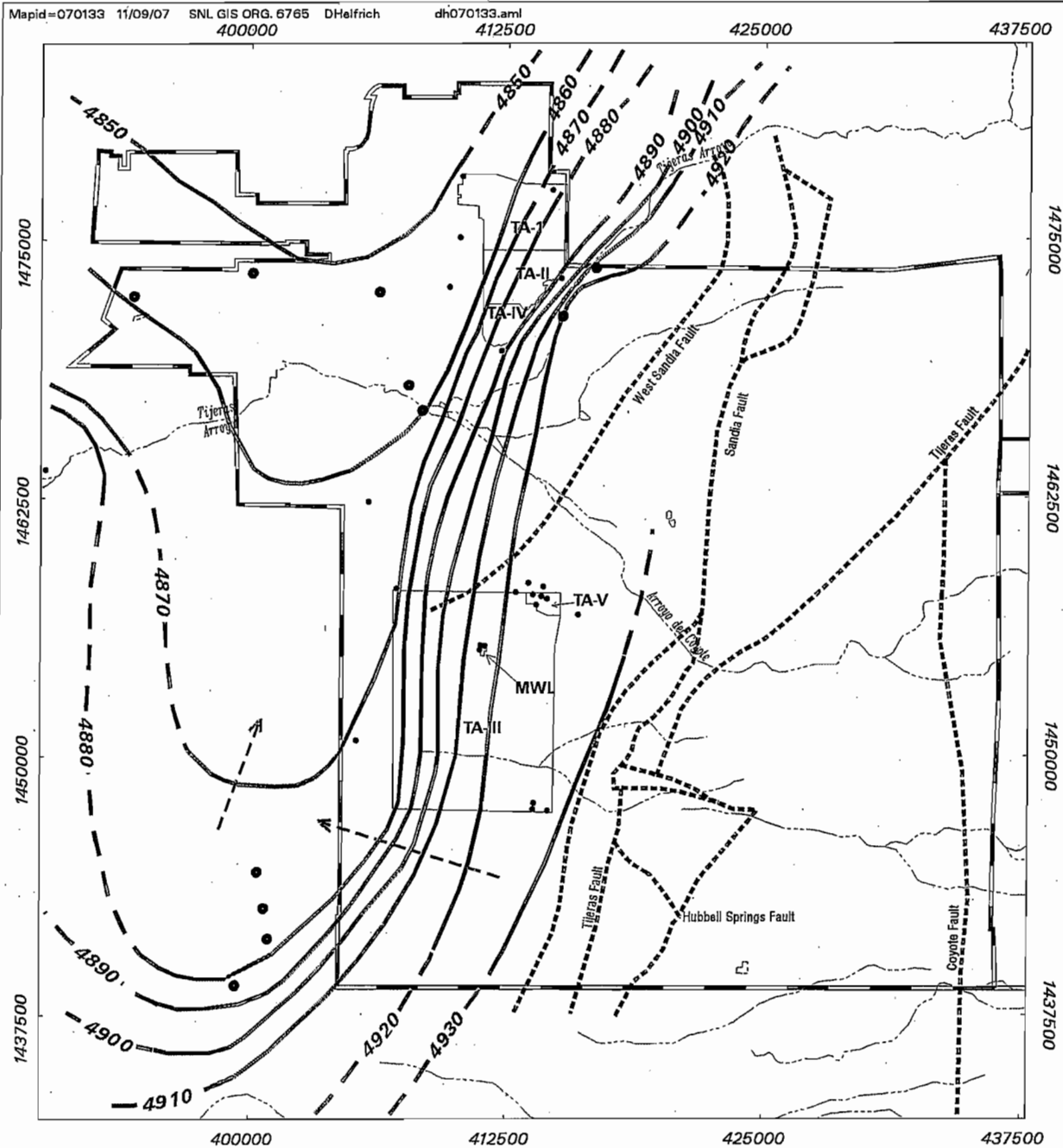
Groundwater occurs approximately 500 feet below ground surface within Santa Fe Group deposits (basin fill), in either fine-grained alluvial fan deposits or coarse-grained Ancestral Rio Grande deposits. Hydraulic conductivities average 1.64×10^{-2} feet/day in the alluvial fan deposits and 1.81 feet/day in the Ancestral Rio Grande deposits. Groundwater flows westward at an average velocity of 0.17 feet/year in the alluvial fan deposits and 18.5 feet/year in the Ancestral Rio Grande deposits. Figure 4.1-1 shows the regional potentiometric surface of the basin fill aquifer west of the Sandia fault complex. Figure 4.1-2 shows the localized potentiometric surface of the basin fill aquifer at TA-III. Groundwater levels beneath the MWL are declining at an average rate of 0.5 feet/year as a result of pumping from regional production wells.

4.2 Well Purging and Water Quality Measurements

Prior to sample collection, each monitoring well was purged to remove stagnant well casing water. Most MWL monitoring wells recharge slowly, and multiple days were required to purge and sample these wells. The monitoring wells were purged to dryness, allowed to recover, and then sampled to collect the most representative groundwater sample possible, given the low yields of these wells. The recovery period was based upon the recharge rate of the well and volume necessary for each sample. Total purge volumes presented in Table A-2 (Appendix A) are based upon measured volumes evacuated from each monitoring well prior to sample collection.

Field analytical measurements were collected in accordance with FOP 05-01 (SNL/NM August 2007a). Groundwater temperature, specific conductance, potential of hydrogen (pH), oxidation/reduction potential (ORP), and dissolved oxygen (DO) were measured using a YSI™ Model 6820 flow cell and multi-parameter water quality meter. Turbidity was measured with a Hach™ Model 2100P portable turbidity meter. In addition, a Hach™ field kit was used to perform alkalinity titrations. Water quality measurements were recorded on Field Measurement Log forms. Groundwater pH, temperature, specific conductance, turbidity, DO, and ORP were measured during purging, before sample collection. Table A-2 shows the final

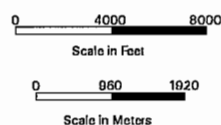
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Legend

- Monitoring Well used to construct potentiometric surface (measured Jan. - March 2007)
- Monitoring Well used to construct potentiometric surface (measured July 2006 and March 2007)
- Potentiometric Surface Contour (feet above mean sea level, dashed where approximate)
- Kirtland Air Force Base Boundary
- Direction of groundwater flow
- Surface Drainage
- Fault
- Technical Area
- MWL - Mixed Waste Landfill

Figure 4.1-1
Potentiometric Surface of
Basin Fill Aquifer
West of Fault Complex



Sandia National Laboratories, New Mexico
Environmental Geographic Information System

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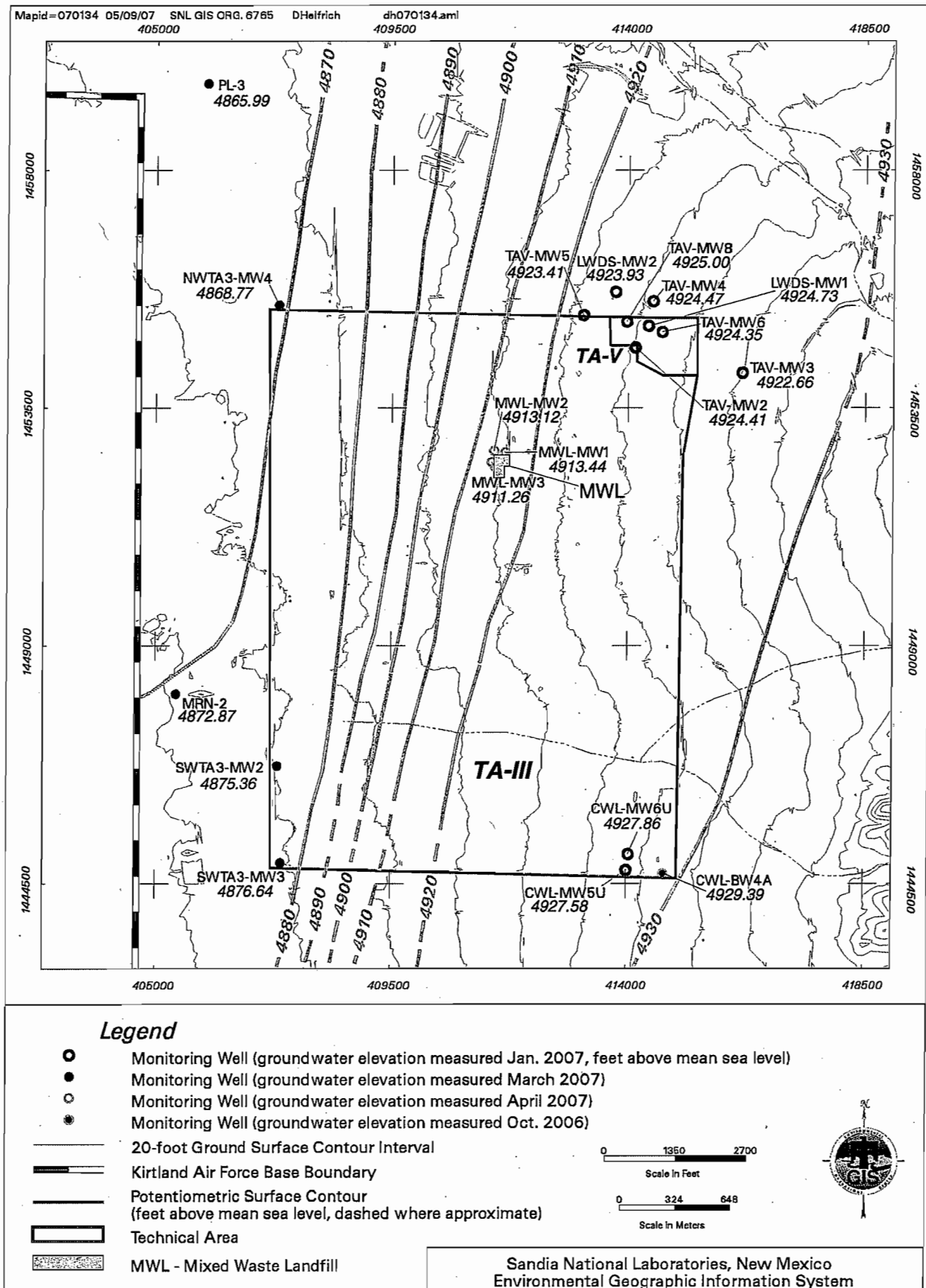


Figure 4.1-2 Localized Potentiometric Surface of Basin Fill Aquifer at Technical Area III

measurements taken before the samples were collected. Water quality parameter field measurements were not taken following sample collection.

4.3 Pump Decontamination

The Bennett™ pump and tubing bundle used to collect groundwater samples were decontaminated prior to installation in MWL monitoring wells according to "LTES Groundwater Sampling Equipment and Decontamination," FOP 05-03 (SNL/NM August 2007b). The EB samples were collected after decontamination to verify the effectiveness of the decontamination procedure. Three EB samples were collected during the Spring 2007 annual groundwater sampling event. The EB samples are discussed in Section 7.1.1.

4.4 Sample Collection

All groundwater samples were collected directly from the pump discharge tube into prepared laboratory-provided sample containers. Where appropriate for the requested analysis, chemical preservatives were added to the sample containers at the laboratory prior to shipment.

Two groundwater samples were collected from each monitoring well for metals analyses. One unfiltered sample was collected for total metals analyses. The other sample was filtered through a 0.45-micrometer filter for dissolved metals analyses.

4.5 Sample Handling and Shipment

Immediately after collection, all sample containers were custody-taped, sealed in plastic bags, and placed on cold packs in shipping containers. Analysis Request/Chain-of-Custody forms were completed at the time of collection. The samples for chemical and radiochemical analyses were shipped via the SNL/NM Sample Management Office to the contracted analytical laboratory. Sample management activities followed SNL/NM "Sample Management and Custody," Administrative Operating Procedure (AOP) 95-16 (SNL/NM February 2007).

4.6 Waste Management

All purge and decontamination water was managed according to "LTES Groundwater Monitoring Waste Management," FOP 05-04 (SNL/NM August 2007c) and was containerized on site pending the results of the analyses. Waste labels were placed on all drums, and the corresponding sample numbers were marked on the outside of the drum with a permanent marker. The wastes were recorded on a Daily Log of Wastes Generated form and submitted to the SNL/NM Environmental Restoration Project Waste Disposal Coordinator.

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5.0 ANALYTICAL METHODS

Table A-3 (Appendix A) specifies parameters, appropriate test methods, and target analyte quantitation limits for analytical parameters. The analytical methods are discussed in the following sections.

5.1 Chemical Analytical Methods

All chemical analyses were performed in accordance with the U.S. Environmental Protection Agency (EPA) test methods (EPA 1979, 1986, and 1988). Environmental samples were submitted to the following laboratories for the analyses listed:

- GEL:
 - VOCs by EPA Method 8260B
 - TAL metals by EPA Methods 6020 and 7470A (including total and isotopic uranium by EPA Method 6020)
 - Nitrate plus nitrite by EPA Method 353.2
 - Bromide, fluoride, chloride, and sulfate by EPA Method 9056
 - Total organic carbon by EPA Method 9060
 - Carbon dioxide by Laboratory-Specific Method SM 4500 CO₂ D
 - Total alkalinity as calcium carbonate by EPA Method 310.1
 - Total dissolved solids by EPA Method 160.1
- Hall Analytical:
 - Ferrous iron by Laboratory-Specific Method 3500M Fe²⁺
 - Biochemical oxygen demand by EPA Method 405.1
- Metro-Ohm Peak:
 - Manganese II by Laboratory-Specific Method C2-100 Mn²⁺

5.2 Radiochemical Analytical Methods

Radiochemical parameters and methods included gamma-emitting radionuclides by EPA Method 901.1, gross alpha/beta radioactivity by EPA Method 900.0, and tritium by EPA Method 906.0.

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6.0 SUMMARY OF ANALYTICAL RESULTS

Tables summarizing field measurements and analytical results are included in this report as Appendix A. Complete field and laboratory documentation are on file at the SNL/NM Customer-Funded Records Center.

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

6.1 General Chemistry Parameters

The general chemistry analytical results are presented in Table A-4 (Appendix A). No general chemistry parameters exceeded the MCLs (where established) in the groundwater samples. Nitrate plus nitrite (as nitrogen) and fluoride are the only two parameters that have established MCLs (10 milligrams [mg]/liter [L] and 4.0 mg/L, respectively). Nitrate plus nitrite (as nitrogen) concentrations ranged from 1.57 mg/L at MWL-MW6 to 5.21 mg/L at MWL-MW1. Fluoride was detected at concentrations ranging from 0.733 mg/L at MWL-MW5 to 1.04 mg/L at MWL-MW3.

6.2 Metals

Table A-5 (Appendix A) summarizes the metals results from all unfiltered groundwater samples collected during the annual groundwater sampling at the MWL. Samples were analyzed for total TAL metals. The chromium concentration in the sample from MWL-MW1 (0.426 mg/L) exceeded the EPA MCL of 0.1 mg/L. Chromium concentrations are attributed to corrosion of the Type 304 stainless-steel well screen (Oakley and Korte 1996, Goering et al. 2002).

Total uranium results from the Spring 2007 unfiltered samples were less than the MCL of 0.03 mg/L. The data are consistent with previous sampling events and are well within the range of total uranium concentrations established by the U.S. Geological Survey (USGS) for the Middle Rio Grande Basin (USGS 2002).

The uranium isotopes uranium-235 and uranium-238 were determined as mass concentrations during metals analysis on the inductively-coupled plasma mass spectrometer using EPA Method 6020. The isotopic mass concentrations are reported in units of mg/L and are included in Table A-5 with the other unfiltered samples analyzed by this method. No corresponding uranium-235 and -238 MCLs are established for comparison. Uranium-235 values ranged from 0.000034 mg/L in MWL-MW3 to 0.000069 mg/L in MWL-MW5. Uranium-238 values ranged from 0.00489 mg/L MWL-MW3 to 0.00954 mg/L in MWL-MW5. These values are consistent with past results.

Table A-6 (Appendix A) summarizes the results for TAL metals analysis for the filtered samples collected during the Spring 2007 monitoring event. No detections of any metal in the filtered samples exceed the respective MCLs.

6.3 Volatile Organic Compounds

Table A-7 (Appendix A) summarizes the detected VOC results, and Table A-8 (Appendix A) presents the method detection limits (MDLs) for VOCs. Groundwater samples from the MWL monitoring wells revealed detections of acetone and toluene greater than MDLs but less than or equal to the practical quantitation limits (PQLs), and some results are reported with data validation qualifiers. Acetone was detected in all samples above the MDL but these results were associated with laboratory blank contamination and qualified during data validation as not detected at the PQL. Toluene was detected above the MDL in samples collected from MWL-MW3 and MWL-MW4 but the results were below the PQL.

6.4 Radiochemistry

Groundwater samples from the MWL monitoring wells were analyzed for gamma-emitting radionuclides, gross alpha/beta activity, and tritium. The results for tritium and gross alpha/beta activity are presented in Table A-9 (Appendix A) and are compared with the established EPA MCLs. No radiological parameters were detected above established MCLs.

Gross alpha/beta activity levels were detected above laboratory reporting limits in all environmental samples. Gross alpha activity levels range from 5.56 ± 0.136 picocuries (pCi)/L in the MWL-MW3 sample to 12.0 ± 2.55 pCi/L in the MWL-MW6 sample. Gross beta activity levels range from 3.92 ± 1.16 pCi/L in the MWL-MW5 sample to 8.94 ± 1.21 pCi/L in the MWL-MW2 sample.

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

Although there were no detections of tritium above the MDA, the results are presented in Table A-9 (Appendix A) as tritium is considered a constituent of concern (COC) at the MWL. Because no gamma-emitting radionuclides were detected above the MDA, and none are considered COCs at the MWL, the gamma spectroscopy results (all less than the MDA) are not included in Table A-9.

7.0 QUALITY CONTROL RESULTS

QC samples were prepared in the field and in the laboratory in order to assess the quality of the data generated during the annual sampling activities. All data were reviewed in accordance with "Data Validation Procedure for Chemical and Radiochemical Data," AOP 00-03 (SNL/NM January 2003). The results for each QC analysis and the impact on data quality are discussed in the following sections.

7.1 Field Quality Control Samples

The QC samples collected in the field included EB samples, laboratory-prepared TB samples, and field duplicate samples. The following sections discuss each QC sample type.

7.1.1 Equipment Blank Samples

Three EB samples were collected during the annual sampling activities. The first EB sample, MWL-EB1, was collected on April 6, 2007, after sampling at MWL-MW1 on April 5, 2007, and prior to sampling MWL-MW2 on April 6, 2007. The second EB sample, MWL-EB2, was collected on April 10, 2007, after sampling MWL-MW3 and prior to sampling MWL-MW5 on April 10, 2007. The third EB sample, MWL-EB3, was collected on April 11, 2007, after sampling MWL-MW5 on April 10, 2007, and prior to purging and sampling MWL-MW6 on April 12, 2007. The EB samples were analyzed for VOCs and TAL metals (including total and isotopic uranium).

The common laboratory contaminant acetone was detected in all three EB samples, MWL-EB1, MWL-EB2, and MWL-EB3 at concentrations between the MDL and the PQL. However, due to laboratory blank contamination, these EB sample results were qualified as not detected at the PQL and do not affect other sample results. Other compounds were detected in various EB samples including bromodichloromethane, chloroform, dibromochloromethane, and toluene. These compounds were not detected in associated environmental samples.

In the metals analyses, calcium, copper, nickel, zinc, total uranium, and uranium-238 were detected in MWL-EB2 at concentrations greater than the MDL, but were qualified as estimated values due to laboratory blank contamination.

7.1.2 Trip Blank Samples

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

7.1.3 Field Duplicate Samples

Duplicate groundwater samples were collected at MWL-MW2. Relative percent difference (RPD) precision measurements for constituents detected above the PQL in both the environmental and duplicate samples are presented in Table A-10 (Appendix A). All calculated RPD measurements for chemical analyses are less than or equal to 10 (except for one sample), indicating acceptable precision.

7.2 Laboratory Quality Control Samples

Internal laboratory QC samples, including method blank samples and duplicate laboratory control samples, were analyzed concurrently with all groundwater samples. All laboratory data were reviewed and qualified in accordance with AOP 00-03 (SNL/NM January 2003). Data review findings and assigned qualifiers are contained in the data validation memoranda and spreadsheets on file at the SNL/NM Customer-Funded Records Center. Data validation qualifiers accompany the analytical results in the report tables provided in Appendix A. Data qualifiers were assigned to environmental samples as well as EB and TB samples based upon laboratory blank sample results or outlying QC sample results. Some data results were rejected in the data validation process due to calibration problems. However, all rejected values were nondetections for the respective analytes.

8.0 VARIANCES AND NONCONFORMANCES

All analytical and field methods met the requirements specified in the "MWL Groundwater Monitoring Mini-Sampling and Analysis Plan for Fiscal 2007 Annual Sampling" (SNL/NM April 2007a) and there were no variances from the plan.

During the data validation process, two nonconformance reports were issued. In both reports, corrections were made that removed "B2" blank contamination qualifiers from sample results, as the EB samples were incorrectly associated with these samples (the EB qualifiers did not apply to the filtered samples for the batch).

The maintenance performed on MWL-MW4 in May 2007 and described in Chapter 3.0 delayed the sampling of this well until June 2007. Representatives from the NMED Oversight Bureau were on site during the sampling of MWL-MW4. They collected samples for VOCs, perchlorate, filtered and unfiltered metals, tritium, gross alpha/beta activity, gamma-emitting radionuclides, and iso-radium.

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9.0 SUMMARY AND CONCLUSIONS

Annual groundwater sampling was conducted at the MWL during Spring 2007. Chromium was detected in the unfiltered sample from MWL-MW1 at a concentration of 0.426 mg/L, exceeding the EPA MCL of 0.1 mg/L. No other inorganic or organic parameters were detected above the corresponding MCLs in any of the groundwater samples.

Groundwater samples collected for the Spring 2007 sampling event from the MWL monitoring wells showed no detected organic compounds greater than the PQL after data validation and assignment of qualifiers. Toluene was detected at concentrations less than the PQL but greater than the MDL in two samples.

The only metals analytical result greater than the established MCL occurred for chromium in the unfiltered groundwater sample from MWL-MW1 for the Spring 2007 monitoring event. The chromium concentration is attributed to corrosion of the stainless-steel screen in the monitoring well (Oakley and Korte 1996, Goering et al. 2002). Total uranium results from the Spring 2007 samples were consistent with data from previous sampling events, and are well within the range of total uranium concentrations established by the USGS for the Middle Rio Grande Basin (USGS 2002).

No general chemistry parameters exceeded the established MCLs in any of the groundwater samples. The analytical results for radioactivity and radionuclides showed no levels greater than the corresponding MCLs. The results of the MWL Spring 2007 monitoring event show that constituent concentrations are within the historical ranges for the site.

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10.0 REFERENCES

Bearzi, J. (New Mexico Environment Department Hazardous Waste Bureau), March 2007. Letter to P. Wagner (U.S. Department of Energy) and F. Nimick (Sandia National Laboratories), "Replacement of Mixed Waste Landfill Groundwater Monitoring Well MWL-BW1, Sandia National Laboratories, EPA ID NM5890110518." March 26, 2007.

Bearzi, J. (New Mexico Environment Department Hazardous Waste Bureau), June 2007. Letter to P. Wagner (U.S. Department of Energy) and F. Nimick (Sandia National Laboratories), RE: Notice of Disapproval: Monitoring Well Plug and Abandonment Plan and Replacement Well Construction Plan, Decommissioning of Groundwater Monitoring Well MWL-BW1, Installation of Replacement Groundwater Monitoring Well MWL-BW2, April 9, 2007, Sandia National Laboratories, NM5890110518, HWB-SNL-07-014. June 19, 2007.

Bearzi, J. (New Mexico Environment Department Hazardous Waste Bureau), July 2007. Letter to P. Wagner (U.S. Department of Energy) and F. Nimick (Sandia National Laboratories), RE: Replacement of Mixed Waste Landfill Groundwater Monitoring Wells MWL-MW1 and MWL-MW3, Sandia National Laboratories, EPA ID NM5890110518. July 2, 2007.

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

EPA, see U.S. Environmental Protection Agency.

Goering, T.J., G.M. Haggerty, D. Van Hart, and J.L. Peace, 2002. "Mixed Waste Landfill Groundwater Report, 1990 through 2001, Sandia National Laboratories, Albuquerque, New Mexico," SAND2002-4098, Sandia National Laboratories, Albuquerque, New Mexico.

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

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

NMED, see New Mexico Environment Department.

Oakley, D., and N.E. Korte, 1996. "Nickel and Chromium in Ground Water Samples as Influenced by Well Construction and Sampling Methods," *Ground Water Monitoring Review*, Winter, pp. 93-99.

Peace, J.L., T.J. Goering, and M.D. McVey, September 2002. "Report of the Mixed Waste Landfill Phase 2 RCRA Facility Investigation, Sandia National Laboratories, Albuquerque, New Mexico," SAND Report SAND2002-2997, prepared by Sandia National Laboratories, Albuquerque, New Mexico for the U.S. Department of Energy under Contract DE-AC04-94AL85000.

Sandia National Laboratories/New Mexico (SNL/NM), July 2001. "Mixed Waste Landfill Quarterly Groundwater Monitoring Report for Monitoring Wells MWL-MW5 and MWL-MW6, July 2001," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), November 2001. "Mixed Waste Landfill Quarterly Groundwater Monitoring Report, MWL-MW4, MWL-MW5 and MWL-MW6, October/November 2001," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), January 2002. "Mixed Waste Landfill Quarterly Groundwater Monitoring Report, MWL-MW4, MWL-MW5 and MWL-MW6, January 2002," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), April 2002. "Mixed Waste Landfill Annual Groundwater Monitoring Report, April 2002," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), July 2002. "Mixed Waste Landfill Quarterly Groundwater Monitoring Report, MWL-MW5 and MWL-MW6, July 2002," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), October 2002. "Mixed Waste Landfill Quarterly Groundwater Monitoring Report, MWL-MW5 and MWL-MW6, October 2002," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), January 2003. "Data Validation Procedure for Chemical and Radiochemical Data," *AOP 00-03, Revision 01*, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), April 2003. "Mixed Waste Landfill Annual Groundwater Monitoring Report, April 2003," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), September 2003. "Mixed Waste Landfill Annual Groundwater Monitoring Report, April 2003, Addendum – Cadmium Verification Sampling, September 2003," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), April 2004. "Mixed Waste Landfill Annual Groundwater Monitoring Report, April 2004," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), April 2006. "Mixed Waste Landfill Annual Groundwater Monitoring Report, April 2006 Sampling Event, Sandia National Laboratories/New Mexico," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), February 2007. "Sample Management and Custody," *AOP 95-16, Revision 01*, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), April 2007a. "Mixed Waste Landfill Mini-Sampling and Analysis Plan for Fiscal 2007 Annual Sampling," Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), April 2007b. "Monitoring Well Plug and Abandonment Plan and Replacement Well Construction Plan; Decommissioning of Groundwater Monitoring Well MWL-BW1; Installation of Replacement Groundwater Monitoring Well MWL-BW2," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico, April 17, 2007.

Sandia National Laboratories/New Mexico (SNL/NM), July 2007a. "DOE/SNL Response to NMED's Notice of Disapproval: Monitoring Well Plug and Abandonment Plan and Replacement Well Construction Plan; Decommissioning of Groundwater Monitoring Well MWL-BW1, Installation of Replacement Groundwater Monitoring Well MWL-BW2, April 9 2007; and Revised Plan, July 2007," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), July 2007b. "Monitoring Well Plug and Abandonment Plan and Replacement Well Construction Plan; Decommissioning of Groundwater Monitoring Wells MWL-MW1 and MWL-MW3; Installation of Replacement Groundwater Monitoring Wells MWL-MW7 and MWL-MW8," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

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

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

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

Sandia National Laboratories/New Mexico (SNL/NM), September 2007. "Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill," Environmental Restoration Program, Sandia National Laboratories, New Mexico.

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

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

U.S. Environmental Protection Agency (EPA), 1986. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed., Rev. 1, U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1988. "User's Guide to the Contract Laboratory Program," U.S. Environmental Protection Agency, Washington, D.C.

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.

U.S. Geological Survey (USGS), 2002. "Preliminary Summary Statistics—All Ground-Water Sites, Middle Rio Grande Basin," prepared by Laura Bexfield, Water Resources Division, U.S. Geological Survey, Albuquerque, New Mexico.

USGS, see U.S. Geological Survey.

APPENDIX A
Summary Tables of Field Measurements and Analytical Results

Table A-1
Groundwater Elevations, Pump Setting Depths, and Monitoring Well Completion Information
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Well Number	Date of Measurement	Measurement Point Elevation (FAMSL ^a)	Depth to Water (FBTOC)	Groundwater Elevation (FAMSL ^a)	Total Well Depth ^b (FAMSL)	Static Water Height (feet)	Pump Setting Depth (FBTOC)
MWL-MW1	04-02-07	5381.54	468.10	4913.44	4901.12	12.32	477
MWL-MW2	04-02-07	5377.26	464.14	4913.12	4898.71	14.41	473
MWL-MW3	04-02-07	5381.32	470.06	4911.26	4902.67	8.59	473
MWL-MW4	04-02-07	5383.46	494.19	4891.98 ^c	4878.59 ^c	13.39 ^d	503 ^c
MWL-MW4	06-04-07	5383.46	494.36	4891.81 ^c	4878.59 ^c	13.22 ^d	503 ^c
MWL-MW5	04-02-07	5379.89	492.31	4887.58	4856.15	31.43	518
MWL-MW6	04-02-07	5372.64	486.25	4886.39	4839.46	46.93	528
MWL-BW1	04-02-07	5384.51	472.94	4911.57	4905.53	6.04	NA

^aMeasurement point is the top of well casing.

^bTotal well depth to bottom of sump.

^cElevation, well depth, and pump depth reflects well MWL-MW4 orientation of 6 degrees from vertical.

^dDepth to the bottom of the dedicated pump is 503.01 feet below ground surface.

BW = Background well.

FAMSL = Feet above mean sea level.

FBTOC = Feet below top of casing.

MW = Monitoring well.

MWL = Mixed Waste Landfill.

NA = Not applicable.

Table A-2
Summary of Purge Volumes and Purge Indicator Measurements
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Sample Attributes	Measurement Relative to Sampling	Purge Volume (gallons)	pH (at 25°C)	Temp (°C)	Specific Conductivity (µmhos/cm)	Turbidity (NTU)	ORP (mV)	DO (% Sat)
MWL-MW1 ^a Date purge began: 04-04-07 Date sampled: 04-05-07	Before sampling:	14	7.64	19.44	560	9.39	186.2	80.9
		15	7.62	19.36	560	11.0	188.4	68.6
		16	7.62	19.56	560	47.5	188.5	64.1
MWL-MW2 ^a Date purge began: 04-02-07 Date sampled: 04-06-07	Before sampling:	10	7.73	19.83	561	1.27	101.8	7.6
		11	7.58	18.50	564	1.36	255.8	45.6
		12	7.69	18.75	565	1.24	248.1	39.5
MWL-MW3 ^a Date purge began: 04-03-07 Date sampled: 04-11-07	Before sampling:	7	7.99	21.19	462	1.31	229.0	76.1
		8	6.85	14.15	459	1.86	328.5	86.9
		9	7.83	14.11	458	1.97	317.6	87.1
MWL-MW4 ^a Date purge began: 06-04-07 Date sampled: 06-05-07	Before sampling:	27	7.24	19.16	576	2.14	367.0	84.3
		28	7.20	19.59	577	0.52	367.4	31.6
		29	7.19	19.80	577	0.43	377.8	17.4
MWL-MW5 Date purged: 04-10-07 Date sampled: 04-10-07	Before sampling:	52	7.13	19.40	849	0.47	216.0	26.5
		54	7.13	19.47	849	0.51	215.8	26.7
		56	7.13	19.50	849	0.44	216.0	26.6

Refer to footnotes at end of table.

Table A-2 (Concluded)
 Summary of Purge Volumes and Purge Indicator Measurements
 Mixed Waste Landfill, Sandia National Laboratories/New Mexico
 Annual Groundwater Monitoring, Spring 2007

Sample Attributes	Measurement Relative to Sampling	Purge Volume (gallons)	pH (at 25°C)	Temp (°C)	Specific Conductivity (µmhos/cm)	Turbidity (NTU)	ORP (mV)	DO (% Sat)
MWL-MW6	Before sampling:	52	7.30	18.58	794	0.38	249.8	28.2
Date purge began: 04-12-07		54	7.30	18.62	793	0.40	249.0	28.1
Date sampled: 04-12-07		56	7.30	18.62	794	0.41	249.6	28.1

^aWells were purged to dryness. Purge volumes show total gallons removed prior to sampling.

°C = Degrees Celsius.
 DO = Dissolved oxygen.
 µmhos/cm = Micro-mhos per centimeter.
 mV = Millivolts.
 MW = Monitoring well.
 MWL = Mixed Waste Landfill.
 NTU = Nephelometric turbidity units.
 ORP = Oxidation/reduction potential.
 % Sat = Percent saturation.
 pH = Potential of hydrogen.
 Temp = Temperature.

Table A-3
Analytical Parameters, Test Methods, and Target Quantitation Limits
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Analytical Parameter	Test Method ^a	Target Quantitation Limit ^b
Total Metals TAL and Uranium	SW846-6020 SW846-7470A	0.00007–2.5 mg/L
Volatile Organic Compounds	SW846-8260B	1.0–5.0 µg/L
Nitrate plus Nitrite (as nitrogen)	EPA 353.2	0.50 mg/L
Major Anions Bromide, Fluoride, Chloride, and Sulfate	SW846-9056	0.100–4.0 mg/L
Total Organic Carbon	SW846-9060	1.0 mg/L
Carbon Dioxide	SM 4500 CO ₂ D ^c	1.0 mg/L
Total Alkalinity as Calcium Carbonate	EPA 310.1	1.0–2.0 mg/L
Total Dissolved Solids	EPA 160.1	10 mg/L
Ferrous Iron	3500M Fe ²⁺ ^c	0.01–0.10 mg/L
Biochemical Oxygen Demand	EPA 405.1	2.0–4.0 mg/L
Manganese II	C2-100 Mn ²⁺ ^c	0.320 mg/L
Radionuclides		
Gamma-Emitting Radionuclides	EPA 901.1 ^d	MDA is isotope-specific
Gross Alpha Activity	EPA 900.0 ^d	1.06–2.33 pCi/L
Gross Beta Activity	EPA 900.0 ^d	1.26–1.75 pCi/L
Tritium	EPA 906.0 ^d	159–198 pCi/L

^aAnalytical methods used are referenced to either U.S. Environmental Protection Agency, 1979.

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

^bFor target compounds only. Reporting limits may be elevated if an interfering component is present or if sample dilution is required.

^cLaboratory-specific analytical methods.

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

EPA = U.S. Environmental Protection Agency.

MDA = Minimum detectable activity.

µg/L = Microgram(s) per liter.

mg/L = Milligram(s) per liter.

pCi/L = Picocurie(s) per liter.

TAL = Target analyte list.

Table A-4
General Chemistry Analytical Results
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Well ID	Analyte	Result (mg/L)	MDL ^a (mg/L)	PQL ^b (mg/L)	MCL ^c (mg/L)	Laboratory Qualifier ^d	Validation Qualifier ^e	Sample No.	Analytical Method ^f
MWL-MW1 05-Apr-07	Alkalinity, Total	220	0.725	1.00	NE			084453-016	EPA 310.1
	Bromide	0.400	0.066	0.200	NE			084453-016	SW846-9056
	Chloride	33.0	0.330	1.00	NE			084453-016	SW846-9056
	Fluoride	0.845	0.033	0.100	4.00			084453-016	SW846-9056
	Sulfate	43.4	0.500	2.00	NE			084453-016	SW846-9056
	Nitrate plus Nitrite, as N	5.21	0.100	0.500	10.0			084453-018	EPA 353.2
	Total Organic Carbon, Average	0.738	0.330	1.00	NE	J		084453-004	SW846-9060
	Carbon Dioxide, Free	13.9	0.725	1.00	NE	B	B, J	084453-007	SM 4500 CO2 D ^g
	Carbon Dioxide, Total	207	0.725	1.00	NE	B		084453-007	SM 4500 CO2 D ^g
	Total Dissolved Solids	384	2.38	10.0	NE			084453-013	EPA 160.1
	Biochemical Oxygen Demand	ND	2.00	4.00	NE	U	None	084453-031	EPA 405.1
	Ferrous Iron	ND	0.028	0.100	NE	U	None	084453-012	3500M Fe2+ ^g
	Manganese II	ND	0.320	NR	NE	U	None	084453-011	C2-100 Mn2+ ^g
MWL-MW2 06-Apr-07	Alkalinity, field measurement	195	NA	1.00	NE	None	None	Field	HACH 8203
	Alkalinity, Total	233	1.45	2.00	NE			084455-016	EPA 310.1
	Bromide	0.418	0.066	0.200	NE			084455-016	SW846-9056
	Chloride	42.9	0.330	1.00	NE			084455-016	SW846-9056
	Fluoride	0.866	0.033	0.100	4.00			084455-016	SW846-9056
	Sulfate	38.0	0.500	2.00	NE			084455-016	SW846-9056
	Nitrate plus Nitrite, as N	3.49	0.100	0.500	10.0			084455-018	EPA 353.2
	Total Organic Carbon, Average	0.672	0.330	1.00	NE	J		084455-004	SW846-9060
	Carbon Dioxide, Free	6.52	0.725	1.00	NE	B	B, J	084455-007	SM 4500 CO2 D ^g
	Carbon Dioxide, Total	206	0.725	1.00	NE	B		084455-007	SM 4500 CO2 D ^g
	Total Dissolved Solids	359	2.38	10.0	NE			084455-013	EPA 160.1
	Biochemical Oxygen Demand	15.8	2.00	4.00	NE		None	084455-031	EPA 405.1
	Ferrous Iron	ND	0.028	0.100	NE	U	None	084455-012	3500M Fe2+ ^g
	Manganese II	ND	0.320	NR	NE	U	None	084455-011	C2-100 Mn2+ ^g
	Alkalinity, field measurement	199	NA	1.00	NE	None	None	Field	HACH 8203

Refer to footnotes at end of table.

Table A-4 (Continued)
General Chemistry Analytical Results
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Well ID	Analyte	Result (mg/L)	MDL ^a (mg/L)	PQL ^b (mg/L)	MCL ^c (mg/L)	Laboratory Qualifier ^d	Validation Qualifier ^e	Sample No.	Analytical Method ^f
MWL-MW2 (Duplicate) 06-Apr-07	Alkalinity, Total	229	0.725	1.00	NE			084456-016	EPA 310.1
	Bromide	0.487	0.066	0.200	NE			084456-016	SW846-9056
	Chloride	42.5	0.330	1.00	NE			084456-016	SW846-9056
	Fluoride	0.878	0.033	0.100	4.00			084456-016	SW846-9056
	Sulfate	37.6	0.500	2.00	NE			084456-016	SW846-9056
	Nitrate plus Nitrite, as N	3.16	0.100	0.500	10.0			084456-018	EPA 353.2
	Total Organic Carbon, Average	0.622	0.330	1.00	NE	J		084456-004	SW846-9060
	Carbon Dioxide, Free	9.16	0.725	1.00	NE	B	B, J	084456-007	SM 4500 CO2 D ^g
	Carbon Dioxide, Total	207	0.725	1.00	NE	B		084456-007	SM 4500 CO2 D ^g
	Total Dissolved Solids	379	2.38	10.0	NE			084456-013	EPA 160.1
MWL-MW3 11-Apr-07	Alkalinity, Total	190	0.725	1.00	NE	B		084458-016	EPA 310.1
	Bromide	0.251	0.066	0.200	NE		B, J	084458-016	SW846-9056
	Chloride	32.1	0.660	2.00	NE			084458-016	SW846-9056
	Fluoride	1.04	0.033	0.100	4.00			084458-016	SW846-9056
	Sulfate	35.5	1.00	4.00	NE			084458-016	SW846-9056
	Nitrate plus Nitrite, as N	3.75	0.100	0.500	10.0			084458-018	EPA 353.2
	Total Organic Carbon, Average	0.354	0.330	1.00	NE	J		084458-004	SW846-9060
	Carbon Dioxide, Free	3.97	0.725	1.00	NE			084458-007	SM 4500 CO2 D ^g
	Carbon Dioxide, Total	184	0.725	1.00	NE	B		084458-007	SM 4500 CO2 D ^g
	Total Dissolved Solids	308	2.38	10.0	NE			084458-013	EPA 160.1
MWL-MW4 05-Jun-07	Biochemical Oxygen Demand	ND	2.00	4.00	NE	U	None	084458-031	EPA 405.1
	Ferrous Iron	ND	0.028	0.100	NE	U	None	084458-012	3500M
	Manganese II	ND	0.320	NR	NE	U	None	084458-011	C2-100 Mn2+ ^g
	Alkalinity, field measurement	179	NA	1.00	NE	None	None	Field	HACH 8203
	Alkalinity, Total	208	1.45	2.00	NE	None		084460-016	EPA 310.1
	Bromide	0.329	0.066	0.200	NE	B		084460-016	SW846-9056
	Chloride	50.2	0.330	1.00	NE			084460-016	SW846-9056
	Fluoride	0.948	0.033	0.100	4.00			084460-016	SW846-9056
	Sulfate	35.3	0.100	0.400	NE			084460-016	SW846-9056
	Nitrate plus Nitrite, as N	2.27	0.100	0.500	10.0			084460-018	EPA 353.2
	Total Organic Carbon, Average	0.713	0.330	1.00	NE	J		084460-004	SW846-9060
	Carbon Dioxide, Free	10.7	0.725	1.00	NE	B	B, J	084460-007	SM 4500 CO2 D ^g
	Carbon Dioxide, Total	195	0.725	1.00	NE	B		084460-007	SM 4500 CO2 D ^g
	Total Dissolved Solids	396	2.38	10.0	NE			084460-013	EPA 160.1
	Biochemical Oxygen Demand	18.2	2.00	4.00	NE		None	084460-031	EPA 405.1
	Ferrous Iron	ND	0.028	0.100	NE	U	None	084460-012	3500M Fe2+ ^g
	Manganese II	ND	0.320	NR	NE	U	None	084460-011	C2-100 Mn2+ ^g

Refer to footnotes at end of table.

Table A-4 (Continued)
General Chemistry Analytical Results
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Well ID	Analyte	Result (mg/L)	MDL ^a (mg/L)	PQL ^b (mg/L)	MCL ^c (mg/L)	Laboratory Qualifier ^d	Validation Qualifier ^e	Sample No.	Analytical Method ^f
MWL-MW5 10-Apr-07	Alkalinity, Total	363	1.45	2.00	NE	B		084462-016	EPA 310.1
	Bromide	0.466	0.066	0.200	NE			084462-016	SW846-9056
	Chloride	82.2	0.660	2.00	NE			084462-016	SW846-9056
	Fluoride	0.733	0.033	0.100	4.00			084462-016	SW846-9056
	Sulfate	51.5	1.00	4.00	NE			084462-016	SW846-9056
	Nitrate plus Nitrite, as N	1.67	0.100	0.500	10.0			084462-018	EPA 353.2
	Total Organic Carbon, Average	0.706	0.330	1.00	NE	J		084462-004	SW846-9060
	Carbon Dioxide, Free	11.3	0.725	1.00	NE			084462-007	SM 4500 CO2 D ^g
	Carbon Dioxide, Total	173	0.725	1.00	NE	B		084462-007	SM 4500 CO2 D ^g
	Total Dissolved Solids	545	2.38	10.0	NE			084462-013	EPA 160.1
MWL-MW6 12-Apr-07	Biochemical Oxygen Demand	ND	2.00	4.00	NE	U	None	084462-031	EPA 405.1
	Ferrous Iron	ND	0.028	0.100	NE	U	None	084462-012	3500M Fe2+ ^g
	Manganese II	ND	0.320	NR	NE	U	None	084462-011	C2-100 Mn2+ ^g
	Alkalinity, field measurement	298	NA	1.00	NE	None	None	Field	HACH 8203
	Alkalinity, Total	123	0.725	1.00	NE	B		084464-016	EPA 310.1
	Bromide	0.616	0.066	0.200	NE			084464-016	SW846-9056
	Chloride	75.8	0.660	2.00	NE			084464-016	SW846-9056
	Fluoride	0.751	0.033	0.100	4.00			084464-016	SW846-9056
	Sulfate	50.0	1.00	4.00	NE			084464-016	SW846-9056
	Nitrate plus Nitrite, as N	1.57	0.100	0.500	10.0			084464-018	EPA 353.2
	Total Organic Carbon, Average	0.418	0.330	1.00	NE	J		084464-004	SW846-9060
	Carbon Dioxide, Free	13.4	0.725	1.00	NE			084464-007	SM 4500 CO2 D ^g
	Carbon Dioxide, Total	168	0.725	1.00	NE	B		084464-007	SM 4500 CO2 D ^g
	Total Dissolved Solids	578	2.38	10.0	NE			084464-013	EPA 160.1
	Biochemical Oxygen Demand	ND	2.00	4.00	NE	U	None	084464-031	EPA 405.1
	Ferrous Iron	ND	0.028	0.100	NE	U	None	084464-012	3500M Fe2+ ^g
	Manganese II	ND	0.320	NR	NE	U	None	084464-011	C2-100 Mn2+ ^g
	Alkalinity, field measurement	290	NA	1.00	NE	None	None	Field	HACH 8203

^aMDL is the minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.

^bPQL is 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.

^cMCL is established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11[b]), and subsequent amendments or the New Mexico Environmental Improvement Board in Title 20, Chapter 7, Part 1 of the New Mexico Administrative Code (20 NMAC 7.1).

Table A-4 (Concluded)
General Chemistry Analytical Results
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

d₁ Laboratory Qualifiers:

- B = Analyte is detected in associated laboratory method blank.
- J = Amount detected is below the PQL.
- None = No qualifiers for field analysis.
- U = Analyte is absent or below the MDL.

e Validation Qualifiers (If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.):

- B = Method blank contamination at concentration greater than PQL.
- J = The associated value is an estimated quantity.
- None = Data was not validated.

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

g Laboratory-specific analytical methods.

- CFR = Code of Federal Regulations.
- EPA = U.S. Environmental Protection Agency.
- HACH = Hach Company.

- ID = Identification.
- MCL = Maximum contaminant level.

- MDL = Method detection limit.
- mg/L = Milligram(s) per liter.

- MW = Monitoring well.
- MWL = Mixed waste Landfill.

- N = Nitrogen.
- NA = Not applicable.

- ND = Not detected (at method detection limit).
- NE = Not established.

- NMAC = New Mexico Administrative Code.
- NR = Not reported.

- PQL = Practical quantitation limit.

Table A-5
Summary of Total Metals Results (Unfiltered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Well ID	Analyte	Result (mg/L)	MDL ^a (mg/L)	PQL ^b (mg/L)	MCL ^c (mg/L)	Laboratory Qualifier ^d	Validation Qualifier ^e	Sample No.	Analytical Method ^f
MWL-MW1 05-Apr-07	Aluminum	0.0469	0.005	0.015	NE			084453-009	SW846-6020
	Antimony	ND	0.0005	0.002	0.006	U		084453-009	SW846-6020
	Arsenic	0.00156	0.0015	0.005	0.010	B, J	B, J	084453-009	SW846-6020
	Barium	0.0792	0.0005	0.002	2.00			084453-009	SW846-6020
	Beryllium	ND	0.0001	0.0005	0.004	U		084453-009	SW846-6020
	Cadmium	0.000576	0.0001	0.001	0.005	J		084453-009	SW846-6020
	Calcium	50.0	0.100	0.500	NE	B		084453-009	SW846-6020
	Chromium	0.426	0.001	0.003	0.100	B		084453-009	SW846-6020
	Cobalt	0.00404	0.0001	0.001	NE			084453-009	SW846-6020
	Copper	0.0244	0.0002	0.001	NE			084453-009	SW846-6020
	Iron	6.10	0.010	0.025	NE	B		084453-009	SW846-6020
	Lead	ND	0.0005	0.002	NE	U		084453-009	SW846-6020
	Magnesium	18.4	0.025	0.075	NE			084453-009	SW846-6020
	Manganese	0.0586	0.001	0.005	NE			084453-009	SW846-6020
	Mercury	ND	0.00006	0.0002	0.002	U		084453-009	SW846-7470
	Nickel	0.436	0.0005	0.002	NE		J	084453-009	SW846-6020
	Potassium	3.13	0.080	0.300	NE			084453-009	SW846-6020
	Selenium	ND	0.0025	0.005	0.05	U		084453-009	SW846-6020
	Silver	0.000824	0.0002	0.001	NE	J		084453-009	SW846-6020
	Sodium	46.4	0.400	1.25	NE			084453-009	SW846-6020
	Thallium	0.000431	0.0004	0.001	0.002	J		084453-009	SW846-6020
	Uranium	0.00595	0.00005	0.0002	0.030	B		084453-009	SW846-6020
	Uranium-235	0.000044	0.00001	0.00007	NE	J		084453-009	SW846-6020
	Uranium-238	0.0059	0.00005	0.0002	NE	B		084453-009	SW846-6020
	Vanadium	ND	0.050	0.150	NE	U	A2, UJ	084453-009	SW846-6020
	Zinc	0.0178	0.002	0.010	NE			084453-009	SW846-6020

Refer to footnotes at end of table.

Table A-5 (Continued)
Summary of Total Metals Results (Unfiltered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Well ID	Analyte	Result (mg/L)	MDL ^a (mg/L)	PQL ^b (mg/L)	MCL ^c (mg/L)	Laboratory Qualifier ^d	Validation Qualifier ^e	Sample No.	Analytical Method ^f
MWL-MW2 06-Apr-07	Aluminum	0.0251	0.005	0.015	NE		B2, J	084455-009	SW846-6020
	Antimony	ND	0.0005	0.002	0.006	B, U		084455-009	SW846-6020
	Arsenic	0.00169	0.0015	0.005	0.010	B, J	B, J	084455-009	SW846-6020
	Barium	0.105	0.0005	0.002	2.00			084455-009	SW846-6020
	Beryllium	ND	0.0001	0.0005	0.004	U		084455-009	SW846-6020
	Cadmium	ND	0.0001	0.001	0.005	U		084455-009	SW846-6020
	Calcium	58.3	0.100	0.500	NE	B		084455-009	SW846-6020
	Chromium	0.013	0.001	0.003	0.100			084455-009	SW846-6020
	Cobalt	0.00051	0.0001	0.001	NE	J		084455-009	SW846-6020
	Copper	0.00156	0.0002	0.001	NE		B2, J	084455-009	SW846-6020
	Iron	0.351	0.010	0.025	NE	B		084455-009	SW846-6020
	Lead	ND	0.0005	0.002	NE	U		084455-009	SW846-6020
	Magnesium	20.9	0.005	0.015	NE			084455-009	SW846-6020
	Manganese	0.00342	0.001	0.005	NE	J		084455-009	SW846-6020
	Mercury	ND	0.00006	0.0002	0.002	U		084455-009	SW846-7470
	Nickel	0.00734	0.0005	0.002	NE			084455-009	SW846-6020
	Potassium	4.65	0.400	1.50	NE			084455-009	SW846-6020
	Selenium	ND	0.0025	0.005	0.05	U		084455-009	SW846-6020
	Silver	ND	0.0002	0.001	NE	U		084455-009	SW846-6020
	Sodium	49.8	0.400	1.25	NE			084455-009	SW846-6020
	Thallium	0.000437	0.0004	0.001	0.002	J		084455-009	SW846-6020
	Uranium	0.00651	0.00005	0.0002	0.030			084455-009	SW846-6020
	Uranium-235	0.000047	0.00001	0.00007	NE	J		084455-009	SW846-6020
	Uranium-238	0.00646	0.00005	0.0002	NE			084455-009	SW846-6020
	Vanadium	ND	0.010	0.030	NE	U		084455-009	SW846-6020
	Zinc	0.0118	0.002	0.010	NE			084455-009	SW846-6020

Refer to footnotes at end of table.

Table A-5 (Continued)
Summary of Total Metals Results (Unfiltered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Well ID	Analyte	Result (mg/L)	MDL ^a (mg/L)	PQL ^b (mg/L)	MCL ^c (mg/L)	Laboratory Qualifier ^d	Validation Qualifier ^e	Sample No.	Analytical Method ^f
MWL-MW2 (Duplicate) 06-Apr-07	Aluminum	0.0208	0.005	0.015	NE		B2, J	084456-009	SW846-6020
	Antimony	ND	0.0005	0.002	0.006	B, U		084456-009	SW846-6020
	Arsenic	ND	0.0015	0.005	0.010	B, U		084456-009	SW846-6020
	Barium	0.102	0.0005	0.002	2.00			084456-009	SW846-6020
	Beryllium	ND	0.0001	0.0005	0.004	U		084456-009	SW846-6020
	Cadmium	ND	0.0001	0.001	0.005	U		084456-009	SW846-6020
	Calcium	57.1	0.100	0.500	NE	B		084456-009	SW846-6020
	Chromium	0.0135	0.001	0.003	0.100			084456-009	SW846-6020
	Cobalt	0.000518	0.0001	0.001	NE	J		084456-009	SW846-6020
	Copper	0.00157	0.0002	0.001	NE		B2, J	084456-009	SW846-6020
	Iron	0.330	0.010	0.025	NE	B		084456-009	SW846-6020
	Lead	ND	0.0005	0.002	NE	U		084456-009	SW846-6020
	Magnesium	21.4	0.005	0.015	NE			084456-009	SW846-6020
	Manganese	0.00331	0.001	0.005	NE	J		084456-009	SW846-6020
	Mercury	ND	0.00006	0.0002	0.002	U		084456-009	SW846-7470
	Nickel	0.00706	0.0005	0.002	NE			084456-009	SW846-6020
	Potassium	4.31	0.080	0.300	NE			084456-009	SW846-6020
	Selenium	ND	0.0025	0.005	0.05	U		084456-009	SW846-6020
	Silver	ND	0.0002	0.001	NE	U		084456-009	SW846-6020
	Sodium	49.1	0.400	1.25	NE			084456-009	SW846-6020
	Thallium	ND	0.0004	0.001	0.002	U		084456-009	SW846-6020
	Uranium	0.00639	0.00005	0.0002	0.030			084456-009	SW846-6020
	Uranium-235	0.000043	0.00001	0.00007	NE	J		084456-009	SW846-6020
	Uranium-238	0.00634	0.00005	0.0002	NE			084456-009	SW846-6020
	Vanadium	ND	0.010	0.030	NE	U		084456-009	SW846-6020
	Zinc	0.0126	0.0020	0.010	NE			084456-009	SW846-6020

Refer to footnotes at end of table.

Table A-5 (Continued)
Summary of Total Metals Results (Unfiltered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Well ID	Analyte	Result (mg/L)	MDL ^a (mg/L)	PQL ^b (mg/L)	MCL ^c (mg/L)	Laboratory Qualifier ^d	Validation Qualifier ^e	Sample No.	Analytical Method ^f
MWL-MW3 11-Apr-07	Aluminum	0.0232	0.005	0.015	NE			084458-009	SW846-6020
	Antimony	ND	0.0005	0.002	0.006	U		084458-009	SW846-6020
	Arsenic	0.00152	0.0015	0.005	0.010	J		084458-009	SW846-6020
	Barium	0.0833	0.0005	0.002	2.00			084458-009	SW846-6020
	Beryllium	ND	0.0001	0.0005	0.004	U		084458-009	SW846-6020
	Cadmium	0.000115	0.0001	0.001	0.005	J		084458-009	SW846-6020
	Calcium	41.0	0.020	0.100	NE	B		084458-009	SW846-6020
	Chromium	0.0113	0.001	0.003	0.100			084458-009	SW846-6020
	Cobalt	0.000347	0.0001	0.001	NE	J		084458-009	SW846-6020
	Copper	0.00116	0.0002	0.001	NE			084458-009	SW846-6020
	Iron	0.269	0.010	0.025	NE			084458-009	SW846-6020
	Lead	ND	0.0005	0.002	NE	U		084458-009	SW846-6020
	Magnesium	13.5	0.005	0.015	NE			084458-009	SW846-6020
	Manganese	0.00327	0.001	0.005	NE	J		084458-009	SW846-6020
	Mercury	ND	0.00006	0.0002	0.002	U	B3, UJ	084458-009	SW846-7470
	Nickel	0.0848	0.0005	0.002	NE			084458-009	SW846-6020
	Potassium	3.46	0.080	0.300	NE			084458-009	SW846-6020
	Selenium	ND	0.0025	0.005	0.05	U		084458-009	SW846-6020
	Silver	ND	0.0002	0.001	NE	U		084458-009	SW846-6020
	Sodium	44.2	0.080	0.250	NE			084458-009	SW846-6020
	Thallium	0.00055	0.0004	0.001	0.002	J		084458-009	SW846-6020
	Uranium	0.00493	0.00005	0.0002	0.030			084458-009	SW846-6020
	Uranium-235	0.000034	0.00001	0.00007	NE	J		084458-009	SW846-6020
	Uranium-238	0.00489	0.00005	0.0002	NE			084458-009	SW846-6020
	Vanadium	ND	0.010	0.030	NE	U		084458-009	SW846-6020
	Zinc	0.00649	0.002	0.010	NE	J		084458-009	SW846-6020

Refer to footnotes at end of table.

Table A-5 (Continued)
Summary of Total Metals Results (Unfiltered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Well ID	Analyte	Result (mg/L)	MDL ^a (mg/L)	PQL ^b (mg/L)	MCL ^c (mg/L)	Laboratory Qualifier ^d	Validation Qualifier ^e	Sample No.	Analytical Method ^f
MWL-MW4 05-Jun-07	Aluminum	0.0139	0.005	0.015	NE	J		084460-009	SW846-6020
	Antimony	ND	0.0005	0.002	0.006	B, U		084460-009	SW846-6020
	Arsenic	0.00381	0.0015	0.005	0.010	B, J	B, B3, J	084460-009	SW846-6020
	Barium	0.0965	0.0005	0.002	2.00			084460-009	SW846-6020
	Beryllium	ND	0.0001	0.0005	0.004	U		084460-009	SW846-6020
	Cadmium	ND	0.0001	0.001	0.005	U		084460-009	SW846-6020
	Calcium	63.6	0.100	0.500	NE			084460-009	SW846-6020
	Chromium	0.0013	0.001	0.003	0.100	B, J	B, J, P1	084460-009	SW846-6020
	Cobalt	0.00088	0.0001	0.001	NE	J		084460-009	SW846-6020
	Copper	0.000385	0.0002	0.001	NE	J		084460-009	SW846-6020
	Iron	0.250	0.010	0.025	NE	B		084460-009	SW846-6020
	Lead	0.00051	0.0005	0.002	NE	J		084460-009	SW846-6020
	Magnesium	23.2	0.025	0.075	NE		J	084460-009	SW846-6020
	Manganese	0.0299	0.001	0.005	NE			084460-009	SW846-6020
	Mercury	ND	0.00006	0.0002	0.002	U	B3, UJ	084460-009	SW846-7470
	Nickel	0.00805	0.0005	0.002	NE			084460-009	SW846-6020
	Potassium	4.81	0.080	0.300	NE			084460-009	SW846-6020
	Selenium	ND	0.0025	0.005	0.05	U		084460-009	SW846-6020
	Silver	ND	0.0002	0.001	NE	U		084460-009	SW846-6020
	Sodium	55.0	0.400	1.25	NE			084460-009	SW846-6020
	Thallium	0.000432	0.0004	0.001	0.002	J		084460-009	SW846-6020
	Uranium	0.00571	0.00005	0.0002	0.030			084460-009	SW846-6020
	Uranium-235	0.000038	0.00001	0.00007	NE	J		084460-009	SW846-6020
	Uranium-238	0.00567	0.00005	0.0002	NE			084460-009	SW846-6020
	Vanadium	0.0136	0.010	0.030	NE	J		084460-009	SW846-6020
	Zinc	0.0193	0.0020	0.010	NE			084460-009	SW846-6020

Refer to footnotes at end of table.

Table A-5 (Continued)
Summary of Total Metals Results (Unfiltered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Well ID	Analyte	Result (mg/L)	MDL ^a (mg/L)	PQL ^b (mg/L)	MCL ^c (mg/L)	Laboratory Qualifier ^d	Validation Qualifier ^e	Sample No.	Analytical Method ^f
MWL-MW5 10-Apr-07	Aluminum	0.0114	0.005	0.015	NE	J	B2, J	084462-009	SW846-6020
	Antimony	ND	0.0005	0.002	0.006	B, U		084462-009	SW846-6020
	Arsenic	ND	0.0015	0.005	0.010	U		084462-009	SW846-6020
	Barium	0.128	0.0005	0.002	2.00			084462-009	SW846-6020
	Beryllium	ND	0.0001	0.0005	0.004	U		084462-009	SW846-6020
	Cadmium	ND	0.0001	0.001	0.005	U		084462-009	SW846-6020
	Calcium	88.8	0.100	0.500	NE	B		084462-009	SW846-6020
	Chromium	ND	0.001	0.003	0.100	B, U		084462-009	SW846-6020
	Cobalt	0.000202	0.0001	0.001	NE	B, J	B, J	084462-009	SW846-6020
	Copper	0.000787	0.0002	0.001	NE	B, J	B, J	084462-009	SW846-6020
	Iron	0.346	0.010	0.025	NE	B		084462-009	SW846-6020
	Lead	ND	0.0005	0.002	NE	U		084462-009	SW846-6020
	Magnesium	30.7	0.005	0.015	NE			084462-009	SW846-6020
	Manganese	0.00677	0.001	0.005	NE			084462-009	SW846-6020
	Mercury	ND	0.00006	0.0002	0.002	U		084462-009	SW846-7470
	Nickel	0.00143	0.0005	0.002	NE	B, J	B, B2, J	084462-009	SW846-6020
	Potassium	5.46	0.080	0.300	NE			084462-009	SW846-6020
	Selenium	ND	0.0025	0.005	0.05	U		084462-009	SW846-6020
	Silver	ND	0.0002	0.001	NE	U		084462-009	SW846-6020
	Sodium	68.5	0.400	1.25	NE			084462-009	SW846-6020
	Thallium	ND	0.0004	0.001	0.002	U		084462-009	SW846-6020
	Uranium	0.00961	0.00005	0.0002	0.030	B		084462-009	SW846-6020
	Uranium-235	0.000069	0.00001	0.00007	NE	J		084462-009	SW846-6020
	Uranium-238	0.00954	0.00005	0.0002	NE	B		084462-009	SW846-6020
	Vanadium	ND	0.010	0.030	NE	U		084462-009	SW846-6020
	Zinc	0.00491	0.002	0.010	NE	B, J	B, J	084462-009	SW846-6020

Refer to footnotes at end of table.

Table A-5 (Continued)
Summary of Total Metals Results (Unfiltered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Well ID	Analyte	Result (mg/L)	MDL ^a (mg/L)	PQL ^b (mg/L)	MCL ^c (mg/L)	Laboratory Qualifier ^d	Validation Qualifier ^e	Sample No.	Analytical Method ^f
MWL-MW6 12-Apr-07	Aluminum	0.0094	0.005	0.015	NE	B, J	B, B2, J	084464-009	SW846-6020
	Antimony	ND	0.0005	0.002	0.006	U		084464-009	SW846-6020
	Arsenic	ND	0.0015	0.005	0.010	U		084464-009	SW846-6020
	Barium	0.128	0.0005	0.002	2.00			084464-009	SW846-6020
	Beryllium	ND	0.0001	0.0005	0.004	U		084464-009	SW846-6020
	Cadmium	ND	0.0001	0.001	0.005	U		084464-009	SW846-6020
	Calcium	88.7	0.200	1.00	NE	B		084464-009	SW846-6020
	Chromium	0.00114	0.001	0.003	0.100	J	B2, J	084464-009	SW846-6020
	Cobalt	0.000198	0.0001	0.001	NE	J		084464-009	SW846-6020
	Copper	0.000871	0.0002	0.001	NE	J	B2, J	084464-009	SW846-6020
	Iron	0.344	0.010	0.025	NE			084464-009	SW846-6020
	Lead	ND	0.0005	0.002	NE	U		084464-009	SW846-6020
	Magnesium	26.5	0.005	0.015	NE			084464-009	SW846-6020
	Manganese	ND	0.001	0.005	NE	U		084464-009	SW846-6020
	Mercury	ND	0.00006	0.0002	0.002	U		084464-009	SW846-7470
	Nickel	0.00114	0.0005	0.002	NE	J		084464-009	SW846-6020
	Potassium	5.03	0.08	0.300	NE			084464-009	SW846-6020
	Selenium	ND	0.0025	0.005	0.05	U		084464-009	SW846-6020
	Silver	ND	0.0002	0.001	NE	U		084464-009	SW846-6020
	Sodium	60.2	0.800	2.50	NE			084464-009	SW846-6020
	Thallium	0.000499	0.0004	0.001	0.002	J		084464-009	SW846-6020
	Uranium	0.00942	0.00005	0.0002	0.030			084464-009	SW846-6020
	Uranium-235	0.000068	0.00001	0.00007	NE	J		084464-009	SW846-6020
	Uranium-238	0.00935	0.00005	0.0002	NE			084464-009	SW846-6020
	Vanadium	ND	0.010	0.030	NE	U		084464-009	SW846-6020
	Zinc	0.00477	0.002	0.010	NE	B, J	B, B2, J	084464-009	SW846-6020

Note: Values in bold exceed the established MCL.

^aMDL is the minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.

^bPQL is 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.

^cMCL is established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11[b]), and subsequent amendments or the New Mexico Environmental Improvement Board in Title 20, Chapter 7, Part 1 of the New Mexico Administrative Code (20 NMAC 7.1).

Table A-5 (Concluded)
Summary of Total Metals Results (Unfiltered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

^d Laboratory Qualifiers:	
B	= Analyte is detected in associated laboratory method blank.
J	= Amount detected is below the PQL.
U	= Analyte is absent or below the MDL.
^e Validation Qualifiers (If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.):	
A2	= Laboratory accuracy and/or bias measurements for the matrix spike and/or matrix spike duplicate samples do not meet acceptance criteria.
B	= Method blank contamination at concentration greater than PQL.
B2	= Field/equipment blank contamination at concentration greater than PQL.
B3	= Calibration blank contamination at concentration greater than PQL.
J	= The associated value is an estimated quantity.
P1	= Laboratory precision measurements for the matrix spike and matrix spike duplicate do not meet acceptance criteria.
UU	= The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
^f U.S. Environmental Protection Agency, 1986. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed., Rev. 1, U.S. Environmental Protection Agency, Washington, D.C.	
CFR	= Code of Federal Regulations.
ID	= Identification.
MCL	= Maximum contaminant level.
MDL	= Method detection limit.
mg/L	= Milligram(s) per liter.
MW	= Monitoring well.
MWL	= Mixed Waste Landfill.
ND	= Not detected (at method detection limit).
NE	= Not established.
NMAC	= New Mexico Administrative Code.
PQL	= Practical quantitation limit.

Table A-6
Summary of Total Metals Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Well ID	Analyte	Result (mg/L)	MDL ^a (mg/L)	PQL ^b (mg/L)	MCL ^c (mg/L)	Laboratory Qualifier ^d	Validation Qualifier ^e	Sample No.	Analytical Method ^f
MWL-MW1 05-Apr-07	Aluminum	0.00922	0.005	0.015	NE	J		084453-010	SW846-6020
	Antimony	ND	0.0005	0.002	0.006	U		084453-010	SW846-6020
	Arsenic	ND	0.0015	0.005	0.010	B, U		084453-010	SW846-6020
	Barium	0.0669	0.0005	0.002	2.00			084453-010	SW846-6020
	Beryllium	ND	0.0001	0.0005	0.004	U		084453-010	SW846-6020
	Cadmium	0.000244	0.0001	0.001	0.005	J		084453-010	SW846-6020
	Calcium	49.2	0.100	0.500	NE	B		084453-010	SW846-6020
	Chromium	0.00381	0.001	0.003	0.100	B	B, J	084453-010	SW846-6020
	Cobalt	0.000255	0.0001	0.001	NE	J		084453-010	SW846-6020
	Copper	0.00372	0.0002	0.001	NE			084453-010	SW846-6020
	Iron	0.231	0.010	0.025	NE	B		084453-010	SW846-6020
	Lead	ND	0.0005	0.002	NE	U		084453-010	SW846-6020
	Magnesium	17.8	0.025	0.075	NE			084453-010	SW846-6020
	Manganese	0.00211	0.001	0.005	NE	J		084453-010	SW846-6020
	Mercury	ND	0.00006	0.0002	0.002	U		084453-010	SW846-7470
	Nickel	0.284	0.0005	0.002	NE		J	084453-010	SW846-6020
	Potassium	3.02	0.080	0.300	NE			084453-010	SW846-6020
	Selenium	ND	0.0025	0.005	0.050	U		084453-010	SW846-6020
	Silver	ND	0.0002	0.001	NE	U		084453-010	SW846-6020
	Sodium	47.0	0.400	1.25	NE			084453-010	SW846-6020
	Thallium	ND	0.0004	0.001	0.002	U		084453-010	SW846-6020
	Vanadium	ND	0.010	0.030	NE	U	A2, UJ	084453-010	SW846-6020
	Zinc	0.00668	0.002	0.010	NE	J		084453-010	SW846-6020

Refer to footnotes at end of table.

Table A-6 (Continued)
Summary of Total Metals Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Well ID	Analyte	Result (mg/L)	MDL ^a (mg/L)	PQL ^b (mg/L)	MCL ^c (mg/L)	Laboratory Qualifier ^d	Validation Qualifier ^e	Sample No.	Analytical Method ^f
MWL-MW2 06-Apr-07	Aluminum	0.00702	0.005	0.015	NE	J		084455-010	SW846-6020
	Antimony	ND	0.0005	0.002	0.006	B, U		084455-010	SW846-6020
	Arsenic	ND	0.0015	0.005	0.010	B, U		084455-010	SW846-6020
	Barium	0.102	0.0005	0.002	2.00			084455-010	SW846-6020
	Beryllium	ND	0.0001	0.0005	0.004	U		084455-010	SW846-6020
	Cadmium	ND	0.0001	0.001	0.005	U		084455-010	SW846-6020
	Calcium	58.6	0.100	0.500	NE	B		084455-010	SW846-6020
	Chromium	0.00174	0.001	0.003	0.100	J		084455-010	SW846-6020
	Cobalt	0.000138	0.0001	0.001	NE	J		084455-010	SW846-6020
	Copper	0.000902	0.0002	0.001	NE	J		084455-010	SW846-6020
	Iron	0.217	0.010	0.025	NE	B		084455-010	SW846-6020
	Lead	ND	0.0005	0.002	NE	U		084455-010	SW846-6020
	Magnesium	21.3	0.005	0.015	NE			084455-010	SW846-6020
	Manganese	ND	0.001	0.005	NE	U		084455-010	SW846-6020
	Mercury	ND	0.00006	0.0002	0.002	U		084455-010	SW846-7470
	Nickel	0.00541	0.0005	0.002	NE			084455-010	SW846-6020
	Potassium	4.22	0.080	0.300	NE			084455-010	SW846-6020
	Selenium	ND	0.0025	0.005	0.050	U		084455-010	SW846-6020
	Silver	ND	0.0002	0.001	NE	U		084455-010	SW846-6020
	Sodium	50.3	0.400	1.25	NE			084455-010	SW846-6020
	Thallium	ND	0.0004	0.001	0.002	U		084455-010	SW846-6020
	Vanadium	ND	0.010	0.030	NE	U		084455-010	SW846-6020
	Zinc	0.00729	0.002	0.010	NE	J		084455-010	SW846-6020

Refer to footnotes at end of table.

Table A-6 (Continued)
Summary of Total Metals Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Well ID	Analyte	Result (mg/L)	MDL ^a (mg/L)	PQL ^b (mg/L)	MCL ^c (mg/L)	Laboratory Qualifier ^d	Validation Qualifier ^e	Sample No.	Analytical Method ^f
MWL-MW2 (Duplicate) 06-Apr-07	Aluminum	ND	0.005	0.015	NE	U		084456-010	SW846-6020
	Antimony	ND	0.0005	0.002	0.006	B, U		084456-010	SW846-6020
	Arsenic	ND	0.0015	0.005	0.010	B, U		084456-010	SW846-6020
	Barium	0.108	0.0005	0.002	2.00			084456-010	SW846-6020
	Beryllium	ND	0.0001	0.0005	0.004	U		084456-010	SW846-6020
	Cadmium	ND	0.0001	0.001	0.005	U		084456-010	SW846-6020
	Calcium	56.1	0.100	0.500	NE	B		084456-010	SW846-6020
	Chromium	0.00189	0.001	0.003	0.100	J		084456-010	SW846-6020
	Cobalt	0.000148	0.0001	0.001	NE	J		084456-010	SW846-6020
	Copper	0.000944	0.0002	0.001	NE	J		084456-010	SW846-6020
	Iron	0.239	0.010	0.025	NE	B		084456-010	SW846-6020
	Lead	ND	0.0005	0.002	NE	U		084456-010	SW846-6020
	Magnesium	21.5	0.005	0.015	NE			084456-010	SW846-6020
	Manganese	ND	0.001	0.005	NE	U		084456-010	SW846-6020
	Mercury	ND	0.00006	0.0002	0.002	U		084456-010	SW846-7470
	Nickel	0.00558	0.0005	0.002	NE			084456-010	SW846-6020
	Potassium	4.18	0.080	0.300	NE			084456-010	SW846-6020
	Selenium	ND	0.0025	0.005	0.050	U		084456-010	SW846-6020
	Silver	ND	0.0002	0.001	NE	U		084456-010	SW846-6020
	Sodium	48.5	0.400	1.25	NE			084456-010	SW846-6020
	Thallium	ND	0.0004	0.001	0.002	U		084456-010	SW846-6020
	Vanadium	ND	0.010	0.030	NE	U		084456-010	SW846-6020
	Zinc	0.00734	0.002	0.010	NE	J		084456-010	SW846-6020

Refer to footnotes at end of table.

Table A-6 (Continued)
Summary of Total Metals Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Well ID	Analyte	Result (mg/L)	MDL ^a (mg/L)	PQL ^b (mg/L)	MCL ^c (mg/L)	Laboratory Qualifier ^d	Validation Qualifier ^e	Sample No.	Analytical Method ^f
MWL-MW3 11-Apr-07	Aluminum	0.00588	0.005	0.015	NE	J		084458-010	SW846-6020
	Antimony	ND	0.0005	0.002	0.006	U		084458-010	SW846-6020
	Arsenic	ND	0.0015	0.005	0.010	U		084458-010	SW846-6020
	Barium	0.0802	0.0005	0.002	2.00			084458-010	SW846-6020
	Beryllium	ND	0.0001	0.0005	0.004	U		084458-010	SW846-6020
	Cadmium	ND	0.0001	0.001	0.005	U		084458-010	SW846-6020
	Calcium	41.0	0.020	0.100	NE	B		084458-010	SW846-6020
	Chromium	0.00452	0.001	0.003	0.100			084458-010	SW846-6020
	Cobalt	0.000433	0.0001	0.001	NE	J		084458-010	SW846-6020
	Copper	0.000896	0.0002	0.001	NE	J		084458-010	SW846-6020
	Iron	0.137	0.010	0.025	NE			084458-010	SW846-6020
	Lead	ND	0.0005	0.002	NE	U		084458-010	SW846-6020
	Magnesium	14.1	0.005	0.015	NE			084458-010	SW846-6020
	Manganese	0.00416	0.001	0.005	NE	J		084458-010	SW846-6020
	Mercury	ND	0.00006	0.0002	0.002	U	B3, UJ	084458-010	SW846-7470
	Nickel	0.12	0.0005	0.002	NE			084458-010	SW846-6020
	Potassium	3.74	0.080	0.300	NE			084458-010	SW846-6020
	Selenium	ND	0.0025	0.005	0.050	U		084458-010	SW846-6020
	Silver	ND	0.0002	0.001	NE	U		084458-010	SW846-6020
	Sodium	48.9	0.400	1.25	NE			084458-010	SW846-6020
	Thallium	ND	0.0004	0.001	0.002	U		084458-010	SW846-6020
	Vanadium	ND	0.010	0.030	NE	U		084458-010	SW846-6020
	Zinc	0.0038	0.002	0.010	NE	J		084458-010	SW846-6020

Refer to footnotes at end of table.

Table A-6 (Continued)
Summary of Total Metals Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Well ID	Analyte	Result (mg/L)	MDL ^a (mg/L)	PQL ^b (mg/L)	MCL ^c (mg/L)	Laboratory Qualifier ^d	Validation Qualifier ^e	Sample No.	Analytical Method ^f
MWL-MW4 05-Jun-07	Aluminum	0.00547	0.005	0.015	NE	J		084460-010	SW846-6020
	Antimony	ND	0.0005	0.002	0.006	B, U		084460-010	SW846-6020
	Arsenic	0.00312	0.0015	0.005	0.010	B, J	B, B3, J	084460-010	SW846-6020
	Barium	0.0925	0.0005	0.002	2.00			084460-010	SW846-6020
	Beryllium	ND	0.0001	0.0005	0.004	U		084460-010	SW846-6020
	Cadmium	ND	0.0001	0.001	0.005	U		084460-010	SW846-6020
	Calcium	62.9	0.100	0.500	NE			084460-010	SW846-6020
	Chromium	0.00162	0.001	0.003	0.100	B, J	B, J, P1	084460-010	SW846-6020
	Cobalt	0.000903	0.0001	0.001	NE			084460-010	SW846-6020
	Copper	ND	0.0002	0.001	NE	U		084460-010	SW846-6020
	Iron	0.230	0.010	0.025	NE	B		084460-010	SW846-6020
	Lead	ND	0.0005	0.002	NE	U		084460-010	SW846-6020
	Magnesium	25.7	0.025	0.075	NE		J	084460-010	SW846-6020
	Manganese	0.0302	0.001	0.005	NE			084460-010	SW846-6020
	Nickel	0.00778	0.0005	0.002	0.002			084460-010	SW846-6020
	Potassium	4.59	0.080	0.300	NE			084460-010	SW846-6020
	Selenium	ND	0.0025	0.005	NE	U		084460-010	SW846-6020
	Silver	ND	0.0002	0.001	0.050	U		084460-010	SW846-6020
	Sodium	52.8	0.400	1.25	NE			084460-010	SW846-6020
	Thallium	ND	0.0004	0.001	NE	U		084460-010	SW846-6020
	Vanadium	0.0132	0.010	0.030	0.002	J		084460-010	SW846-6020
	Zinc	0.0181	0.002	0.010	NE			084460-010	SW846-6020

Refer to footnotes at end of table.

Table A-6 (Continued)
Summary of Total Metals Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Well ID	Analyte	Result (mg/L)	MDL ^a (mg/L)	PQL ^b (mg/L)	MCL ^c (mg/L)	Laboratory Qualifier ^d	Validation Qualifier ^e	Sample No.	Analytical Method ^f
MWL-MW5 10-Apr-07	Aluminum	0.0078	0.005	0.015	NE	J		084462-010	SW846-6020
	Antimony	ND	0.0005	0.002	0.006	B, U		084462-010	SW846-6020
	Arsenic	ND	0.0015	0.005	0.010	U		084462-010	SW846-6020
	Barium	0.131	0.0005	0.002	2.00			084462-010	SW846-6020
	Beryllium	ND	0.0001	0.0005	0.004	U		084462-010	SW846-6020
	Cadmium	ND	0.0001	0.001	0.005	U		084462-010	SW846-6020
	Calcium	89.1	0.100	0.500	NE	B		084462-010	SW846-6020
	Chromium	0.00113	0.001	0.003	0.100	B, J	B, J	084462-010	SW846-6020
	Cobalt	0.000194	0.0001	0.001	NE	B, J	B, J	084462-010	SW846-6020
	Copper	0.000807	0.0002	0.001	NE	B, J	B, J	084462-010	SW846-6020
	Iron	0.340	0.010	0.025	NE	B		084462-010	SW846-6020
	Lead	ND	0.0005	0.002	NE	U		084462-010	SW846-6020
	Magnesium	29.3	0.005	0.015	NE			084462-010	SW846-6020
	Manganese	0.00576	0.001	0.005	NE			084462-010	SW846-6020
	Mercury	ND	0.00006	0.0002	0.002	U		084462-010	SW846-7470
	Nickel	0.00164	0.0005	0.002	NE	B, J	B, J	084462-010	SW846-6020
	Potassium	5.42	0.080	0.300	NE			084462-010	SW846-6020
	Selenium	ND	0.0025	0.005	0.050	U		084462-010	SW846-6020
	Silver	ND	0.0002	0.001	NE	U		084462-010	SW846-6020
	Sodium	65.7	0.400	1.25	NE			084462-010	SW846-6020
	Thallium	ND	0.0004	0.001	0.002	U		084462-010	SW846-6020
	Vanadium	ND	0.010	0.030	NE	U		084462-010	SW846-6020
	Zinc	0.00741	0.002	0.010	NE	B, J	B, J	084462-010	SW846-6020

Refer to footnotes at end of table.

Table A-6 (Continued)
Summary of Total Metals Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Well ID	Analyte	Result (mg/L)	MDL ^a (mg/L)	PQL ^b (mg/L)	MCL ^c (mg/L)	Laboratory Qualifier ^d	Validation Qualifier ^e	Sample No.	Analytical Method ^f
MWL-MW6 12-Apr-07	Aluminum	0.00809	0.005	0.015	NE	B, J	B, J	084464-010	SW846-6020
	Antimony	ND	0.0005	0.002	0.006	U		084464-010	SW846-6020
	Arsenic	ND	0.0015	0.005	0.010	U		084464-010	SW846-6020
	Barium	0.120	0.0005	0.002	2.00			084464-010	SW846-6020
	Beryllium	ND	0.0001	0.0005	0.004	U		084464-010	SW846-6020
	Cadmium	ND	0.0001	0.001	0.005	U		084464-010	SW846-6020
	Calcium	86.3	0.200	1.00	NE	B		084464-010	SW846-6020
	Chromium	0.0012	0.001	0.003	0.100	J		084464-010	SW846-6020
	Cobalt	0.000169	0.0001	0.001	NE	J		084464-010	SW846-6020
	Copper	0.000842	0.0002	0.001	NE	J		084464-010	SW846-6020
	Iron	0.341	0.010	0.025	NE			084464-010	SW846-6020
	Lead	ND	0.0005	0.002	NE	U		084464-010	SW846-6020
	Magnesium	28.8	0.005	0.015	NE			084464-010	SW846-6020
	Manganese	ND	0.001	0.005	NE	U		084464-010	SW846-6020
	Mercury	ND	0.00006	0.0002	0.002	U		084464-010	SW846-7470
	Nickel	0.00111	0.0005	0.002	NE	J		084464-010	SW846-6020
	Potassium	4.54	0.080	0.300	NE			084464-010	SW846-6020
	Selenium	ND	0.0025	0.005	0.050	U		084464-010	SW846-6020
	Silver	ND	0.0002	0.001	NE	U		084464-010	SW846-6020
	Sodium	59.0	0.800	2.50	NE			084464-010	SW846-6020
	Thallium	ND	0.0004	0.001	0.002	U		084464-010	SW846-6020
	Vanadium	ND	0.010	0.030	NE	U		084464-010	SW846-6020
	Zinc	0.00462	0.002	0.010	NE	B, J	B, J	084464-010	SW846-6020

^aMDL is the minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.

^bPQL is 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.

^cMCL is established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11(b)), and subsequent amendments or the New Mexico Environmental Improvement Board in Title 20, Chapter 7, Part 1 of the New Mexico Administrative Code (20 NMAC 7.1).

^dLaboratory Qualifiers:

B = Analyte is detected in associated laboratory method blank.

J = Amount detected is below the PQL.

U = Analyte is absent or below the MDL.

Table A-6 (Concluded)
Summary of Total Metals Results (Filtered)
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Validation Qualifiers (If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.):	
A2	= Laboratory accuracy and/or bias measurements for the matrix spike and/or matrix spike duplicate samples do not meet acceptance criteria.
B	= Method blank contamination at concentration greater than PQL.
B3	= Calibration blank contamination at concentration greater than PQL.
J	= The associated value is an estimated quantity.
P1	= Laboratory precision measurements for the matrix spike and matrix spike duplicate do not meet acceptance criteria.
UJ	= The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
U.S. Environmental Protection Agency, 1986. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed., Rev. 1, U.S. Environmental Protection Agency, Washington, D.C.	
CFR	= Code of Federal Regulations.
ID	= Identification.
MCL	= Maximum contaminant level.
MDL	= Method detection limit.
mg/L	= Milligram(s) per liter.
MW	= Monitoring well.
MWL	= Mixed Waste Landfill.
ND	= Not detected (at method detection limit).
NE	= Not established.
NMAC	= New Mexico Administrative Code.
PQL	= Practical quantitation limit.

Table A-7
Summary of Detected Volatile Organic Compounds
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Well ID	Analyte	Result (µg/L)	MDL ^a (µg/L)	PQL ^b (µg/L)	MCL ^c (µg/L)	Laboratory Qualifier ^d	Validation Qualifier ^e	Sample No.	Analytical Method ^f
MWL-MW1 05-Apr-07	Acetone	2.34	1.25	5.00	NE	B, J	U, B	084453-001	SW846-8260
MWL-MW2 06-Apr-07	Acetone	2.06	1.25	5.00	NE	B, J	U, B	084455-001	SW846-8260
MWL-MW2 (Duplicate) 06-Apr-07	Acetone	1.68	1.25	5.00	NE	B, J	U, B	084456-001	SW846-8260
MWL-MW3 11-Apr-07	Acetone	1.68	1.25	5.00	NE	B, J	U, B	084458-001	SW846-8260
MWL-MW4 05-Jun-07	Toluene	0.275	0.250	1.00	1,000	J	U, B	084458-001	SW846-8260
MWL-MW5 10-Apr-07	Acetone	1.48	1.25	5.00	NE	B, J	U, B	084460-001	SW846-8260
MWL-MW6 12-Apr-07	Acetone	0.321	0.250	1.00	1,000	J	U, B	084460-001	SW846-8260
	Acetone	1.90	1.25	5.00	NE	B, J	U, B	084462-001	SW846-8260
	Acetone	2.48	1.25	5.00	NE	B, J	U, B	084464-001	SW846-8260

^aMDL is the minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.

^bPQL is 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.

^cMCL is established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11[b]), and subsequent amendments or the New Mexico Environmental Improvement Board in Title 20, Chapter 7, Part 1 of the New Mexico Administrative Code (20 NMAC 7.1).

^dLaboratory Qualifiers:

B = Analyte is detected in associated laboratory method blank.
J = Amount detected is below the PQL.

^eValidation Qualifiers (If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.):

B = Method blank contamination at concentration greater than PQL.
U = The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
UU = The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

^fU.S. Environmental Protection Agency, 1986. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed., Rev. 1, U.S. Environmental Protection Agency, Washington, D.C.

CFR = Code of Federal Regulations.

ID = Identification.

MCL = Maximum contaminant level.

MDL = Method detection limit.

µg/L = Microgram(s) per liter.

MW = Monitoring well.

MWL = Mixed Waste Landfill.

NE = Not established.

NMAC = New Mexico Administrative Code.

PQL = Practical quantitation limit.

Table A-8
Method Detection Limits for Volatile Organic Compounds
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Analyte	MDL ^a (µg/L)	Analytical Method ^b
Acetone	1.25	SW846-8260
Benzene	0.300	SW846-8260
Bromodichloromethane	0.250	SW846-8260
Bromoform	0.250	SW846-8260
Bromomethane	0.500	SW846-8260
2-Butanone	1.25	SW846-8260
Carbon disulfide	1.25	SW846-8260
Carbon tetrachloride	0.250	SW846-8260
Chlorobenzene	0.250	SW846-8260
Chloroethane	0.500	SW846-8260
Chloroform	0.250	SW846-8260
Chloromethane	0.500	SW846-8260
Dibromochloromethane	0.250	SW846-8260
1,1-Dichloroethane	0.300	SW846-8260
1,2-Dichloroethane	0.250	SW846-8260
1,1-Dichloroethene	0.300	SW846-8260
cis-1,2-Dichloroethene	0.300	SW846-8260
trans-1,2-Dichloroethene	0.300	SW846-8260
1,2-Dichloropropane	0.250	SW846-8260
cis-1,3-Dichloropropene	0.250	SW846-8260
trans-1,3-Dichloropropene	0.250	SW846-8260
Ethyl benzene	0.250	SW846-8260
2-Hexanone	1.25	SW846-8260
Methylene chloride	2.00	SW846-8260
4-Methyl-2-pentanone	1.25	SW846-8260
Styrene	0.250	SW846-8260
1,1,2,2-Tetrachloroethane	0.250	SW846-8260
Tetrachloroethene	0.250	SW846-8260
Toluene	0.250	SW846-8260
1,1,1-Trichloroethane	0.300	SW846-8260
1,1,2-Trichloroethane	0.250	SW846-8260
Trichloroethene	0.250	SW846-8260
Vinyl acetate	1.50	SW846-8260
Vinyl chloride	0.500	SW846-8260
Xylene	0.250	SW846-8260

^aMDL is the minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.

^bU.S. Environmental Protection Agency, 1986. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed., Rev. 1, U.S. Environmental Protection Agency, Washington, D.C.

MDL = Method detection limit.

µg/L = Microgram(s) per liter.

Table A-9
Summary of Tritium, Gross Alpha, and Gross Beta Activity Results
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Well ID	Analyte	Activity ^a (pCi/L)	MDA ^b (pCi/L)	Critical Level ^c (pCi/L)	MCL ^d (pCi/L)	Laboratory Qualifier ^e	Validation Qualifier ^f	Sample No.	Analytical Method ^g
MWL-MW1	Tritium	4.46 ± 114	196	95.4	NE	U		084453-036	EPA 906.0 M
05-Apr-07	Gross Alpha	9.92 ± 2.09	1.64	0.746	15			084453-034	EPA 900.0
	Gross Beta	7.91 ± 1.18	1.49	0.716	4 mrem/yr			084453-034	EPA 900.0
MWL-MW2	Tritium	-33.8 ± 114	198	96.2	NE	U		084455-036	EPA 906.0 M
06-Apr-07	Gross Alpha	9.68 ± 2.00	1.45	0.650	15			084455-034	EPA 900.0
	Gross Beta	8.94 ± 1.21	1.46	0.699	4 mrem/yr			084455-034	EPA 900.0
MWL-MW2 (Duplicate)	Tritium	-29.1 ± 113	197	95.5	NE	U		084456-036	EPA 906.0 M
06-Apr-07	Gross Alpha	9.33 ± 1.89	1.23	0.544	15			084456-034	EPA 900.0
	Gross Beta	4.67 ± 1.14	1.65	0.794	4 mrem/yr			084456-034	EPA 900.0
MWL-MW3	Tritium	126 ± 99.6	159	70.4	NE	U		084458-036	EPA 906.0 M
11-Apr-07	Gross Alpha	5.56 ± 1.36	1.06	0.461	15			084458-034	EPA 900.0
	Gross Beta	5.35 ± 1.18	1.70	0.821	4 mrem/yr			084458-034	EPA 900.0
MWL-MW4	Tritium	-41.8 ± 97.9	173	83.5	NE	U		084460-036	EPA 906.0 M
05-Jun-07	Gross Alpha	7.69 ± 2.81	1.83	0.641	15			084460-034	EPA 900.0
	Gross Beta	6.64 ± 2.12	2.16	0.975	4 mrem/yr			084460-034	EPA 900.0
MWL-MW5	Tritium	42.9 ± 89.9	159	70.7	NE	U		084462-036	EPA 906.0 M
10-Apr-07	Gross Alpha	9.20 ± 1.98	1.49	0.665	15			084462-034	EPA 900.0
	Gross Beta	3.92 ± 1.16	1.75	0.845	4 mrem/yr			084462-034	EPA 900.0
MWL-MW6	Tritium	98.0 ± 96.8	160	70.8	NE	U		084464-036	EPA 906.0 M
12-Apr-07	Gross Alpha	12.0 ± 2.55	2.33	1.08	15			084464-034	EPA 900.0
	Gross Beta	6.19 ± 1.02	1.26	0.599	4 mrem/yr			084464-034	EPA 900.0

^aActivities of zero or less are considered to be not detected.

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

^cCritical level is the minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.

^dMCL is established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11[b]), and subsequent amendments or the New Mexico Environmental Improvement Board in Title 20, Chapter 7, Part 1 of the New Mexico Administrative Code (20 NMAC 7.1). The following are the MCLs for gross alpha particles and beta particles in community water systems: 15 pCi/L = Gross alpha particle activity (including radium-226 but excluding radon and total uranium), 4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (as dose rate).

^eLaboratory Qualifiers:

U = Analyte is absent or below the method detection limit.

^fValidation Qualifiers (If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.)

9U.S. Environmental Protection Agency, 1980. "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.

CFR = Code of Federal Regulations.

EPA = U.S. Environmental Protection Agency.

ID = Identification.

MCL = Maximum contaminant level.

MDA = Minimum detectable activity.

mrem/yr = Millirem per year.

MW = Monitoring well.

MWL = Mixed Waste Landfill.

NE = Not established.

NMAC = New Mexico Administrative Code.

pCi/L = Pico-curie(s) per liter.

Table A-10
Duplicate Sample Analytical Results
Mixed Waste Landfill, Sandia National Laboratories/New Mexico
Annual Groundwater Monitoring, Spring 2007

Sample No. Sample Location	084455 MWL-MW2 (Environmental, unfiltered)	0084456 MWL-MW2 (Duplicate, unfiltered)	RPD ^b
	Result (R ₁)	Result (R ₂)	
Parameter ^a	All results in mg/L, except as noted		
Aluminum	0.0251 J	0.0208 J	NC
Barium	0.105	0.102	3
Bromide	0.418	0.487	15
Calcium	58.3	57.1	2
Chloride	42.9	42.5	1
Chromium	0.013	0.0135	4
Cobalt	0.00051	0.000518	2
Copper	0.00156 J	0.00157 J	NC
Fluoride	0.866	0.878	1
Iron	0.351	0.33	6
Magnesium	21.4	20.9	2
Manganese	0.00342	0.00331	3
Nickel	0.00734	0.00706	4
Nitrate plus Nitrite, as N	3.49	3.16	10
Potassium	4.65	4.31	8
Sodium	49.8	49.1	1
Sulfate	38.0	37.6	1
Uranium, Total	0.00651	0.00639	2
Uranium-235	0.000047	0.000043	9
Uranium-238	0.00646	0.00634	2
Zinc	0.0118	0.0126	7

^aParameters not detected in both samples are not listed.

^bRPD is not calculated for estimated values.

J = Analyte detected below practical quantitation limit or reported as an estimated concentration.

mg/L = Milligram(s) per liter.

MW = Monitoring well.

MWL = Mixed Waste Landfill.

N = Nitrogen.

NC = Not calculated.

RPD = Relative percent difference is calculated with the following equation and rounded to nearest whole number:

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

where:

R₁ = analysis result

R₂ = duplicate analysis result